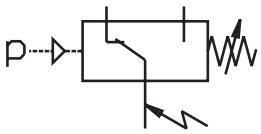
Pressure Switch

p_{max} to 5076 PSI (350 bar)

TS2
MTS2

HU 9201
6/2005

Replaces
HU 9201 1/2005



- **Piston sensing system with soft sealing**
- **Leakage free**
- **Mechanical service life 10 millions of switching operations**
- **Micro switches UL approved**
- **Silver plated contacts in micro switch**
- **Basic model for flange mounting**

Functional Description

Pressure switch consists of an aluminum housing, a piston, a prestressed spring and a microswitch.
When the pressure corresponding with the spring setting is reached, the switch closes or opens the respective electric circuit.

The pressure switch is being supplied with a connector and with two bolts.
When delivered with a sandwich plate, the switch can be turned around its length axes by 90°.
The subplate can be ordered separately or with the switch.

Ordering Code

TS2 - □ - □

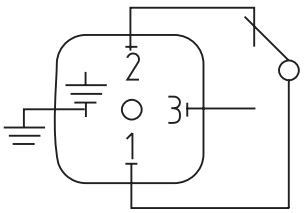
Pressure switch

Type of subplate

0	without subplate
1	subplate type DP3-TS2-1 G1/4
3	subplate type DP3-TS2-3 SAE 6

Pressure range

18	Adjustable pressure 73...2611 PSI (5 ... 180bar)
35	Adjustable pressure 725...5076 PSI (50...350 bar)



Switching function:
One single-pole micro switch (change-over switch)
The pressure increase closes contacts on terminalss 1 - 3 and opens contacts on terminals 1 - 2

Technical Data

Switching pressure ranges	PSI (bar)	73...2611 (5 ... 180)	725...5076 (50...350)
Switching pressure . . . . . at the range beginning difference ca.[1] . . . . . at the range end	PSI (bar)	116 (8) 230 (16)	87 (6) 360 (25)
Limit value [2]	PSI (bar)	3626 (250)	8702 (600)
Adjustable range (Falling pressure)	PSI (bar)	44...2321 (3 ... 160)	580...4351 (40 ... 300)
Adjustable range (Rising pressure)	PSI (bar)	73...2611 (5 ... 180)	725...5076 (50...350)
Max. Hysteresis (At the end of the range)	%	15	
Number of switching max.	1/min	60	
Material of the housing		Aluminium 230	
Materials in the sensing element		Stainless Steel, Turcon and NBR	
Viscosity range	SUS (mm^2/s)	up to 1000	
Repeatability	%	± 1 from range end value [3]	
Electrical connection		plug connector to DIN 43 650	
Switching element		micro switch	
Hydraulic fluid		Petroleum oils (HM, HL, HLP) Phosphate ester fluids (HFD-R)	
Ambient temperature range	F (°C)	-40 ... +176 (-40 ... +80)	
Max. temperature at the switching element	F (°C)	+176 (+80)	
Maximum degree of fluid contamination		Class 21/18/15 to ISO 4406 (1999).	
Max. vibration	Lbs (g)	0,033 (15)	
Mounting position		optional	
Weight	Lbs (kg)	0.772 (0.35)	

1) Operating data at 3.5 million switching operations.
2) Also short pressure peaks during the operation must not exceed this limit value.
Limit value corresponds with the max. testing pressure.
3) Related to pressure control at constant fluid and ambient conditions.

Electric Data of the Microswitch

Enclosure type		IP 65 (Connector DIN 43 650 A, Pg9)
Voltage max.	V	250 AC
Current max.	A	5

Silver plated contacts		
Voltage	Inductive endurance	Resistance endurance
30 V	3,0 A	4,0 A
250 V	0,2 A	0,2 A
250 V~	2,0 A	3,0 A
125 V~	3,0 A	5,0 A

Minimum endurance 160 mA by 5 V DC

Pressure Switch Dimensions

Dimensions in inches (millimetres)

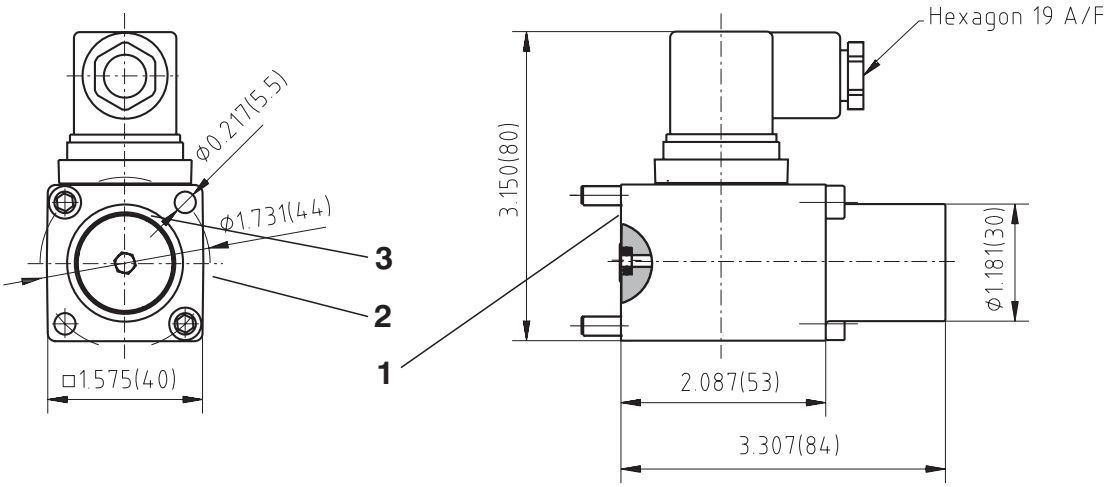
Model TS2 - XX - 0

1a O-ring 8 x 1,5 - for adjustable pressure max 2611 PSI (180 bar) - supplied witch each switch

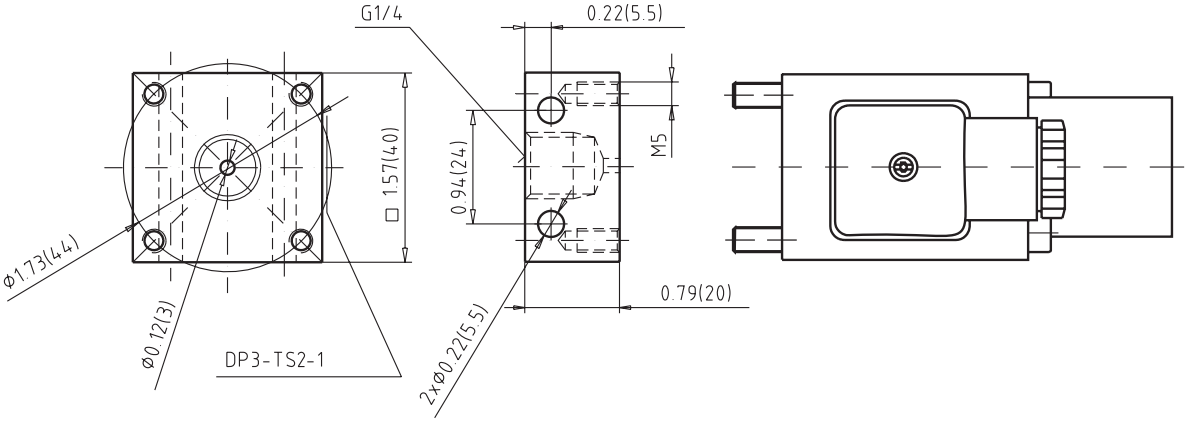
1b O-ring 5 x 1,5 - for adjustable pressure max 5076 PSI (360 bar) - supplied witch each switch

2 2 mounting bolts M5x60 (tightening torque 3.69 lbf.ft (5 Nm) supplied with each switch

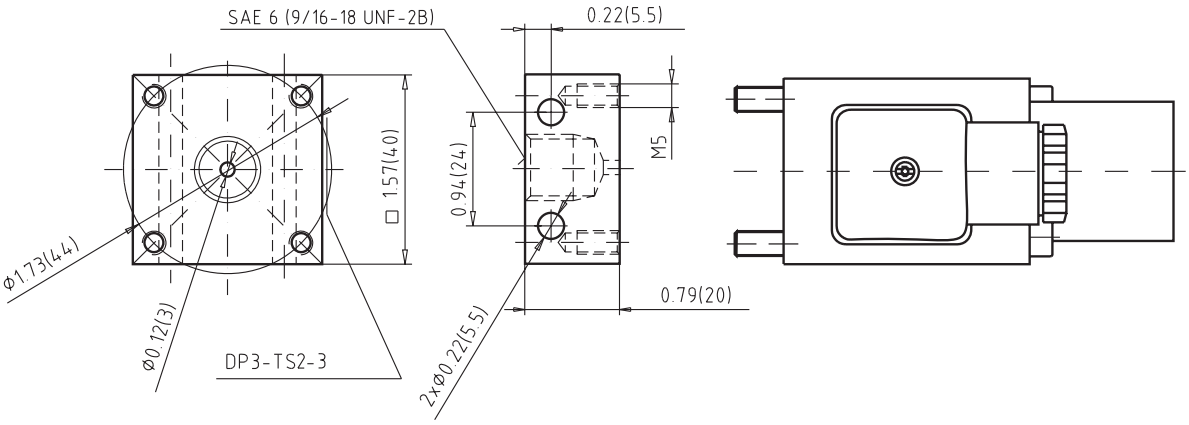
3 Setting of the switch point (inside hexagon 5 mm)



Model TS2 - XX - 1



Model TS2 - XX - 3



Ordering Code of Sandwich Plates

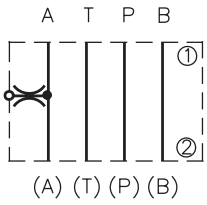
MTS2 - □ / □

Sandwich plate of the pressure switch

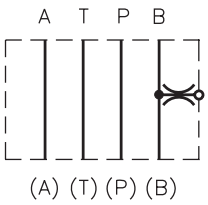
Valve size of the sandwich plate
D 03 (06 mm) **D 03 (06)**
D 05 (10 mm) **D 05 (10)**

Model
A connection in port A
B connection in port B
C connections in ports A and B
P connection in port P

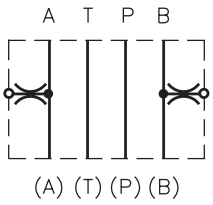
Models of sandwich plates size 06



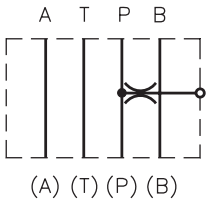
MTS2–06/A



MTS2–06/B

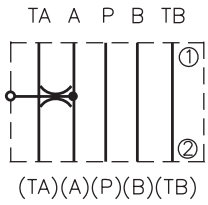


MTS2–06/C

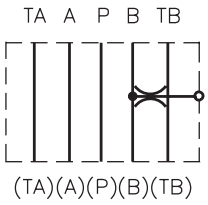


MTS2–06/P

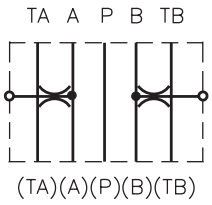
Models of sandwich plates size 10



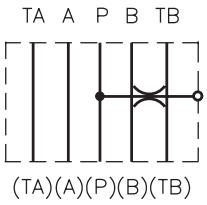
MTS2–10/A



MTS2–10/B



MTS2–10/C



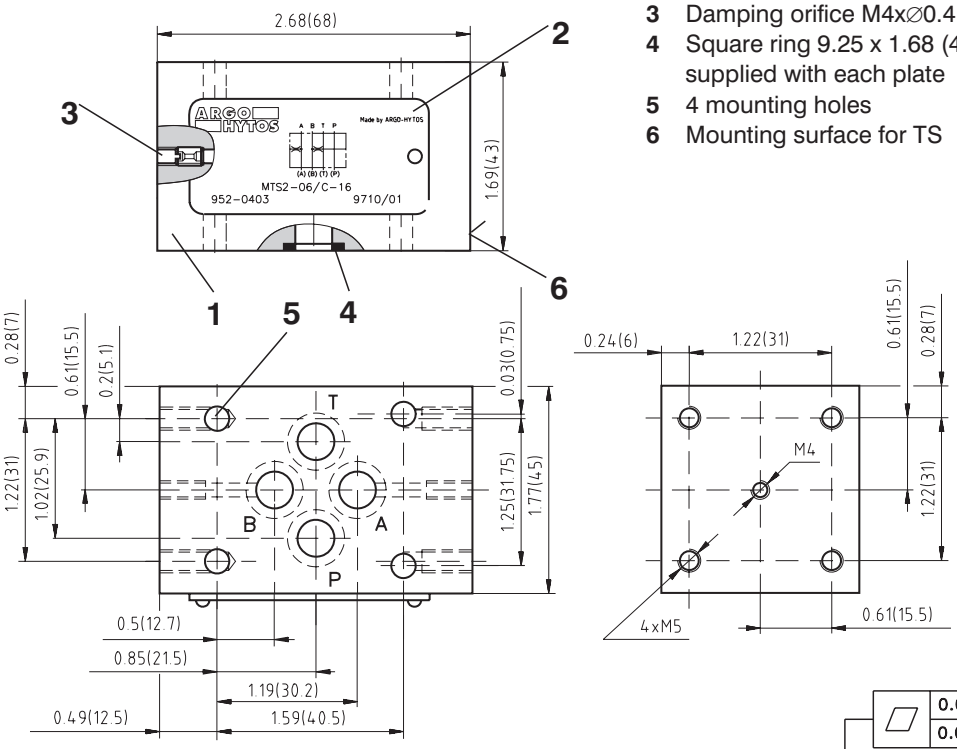
MTS2–10/P

① valve side
② subplate side

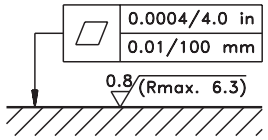
Sandwich Plate Dimensions

Dimensions in inches and (millimetres)

MTS2 - 06/C

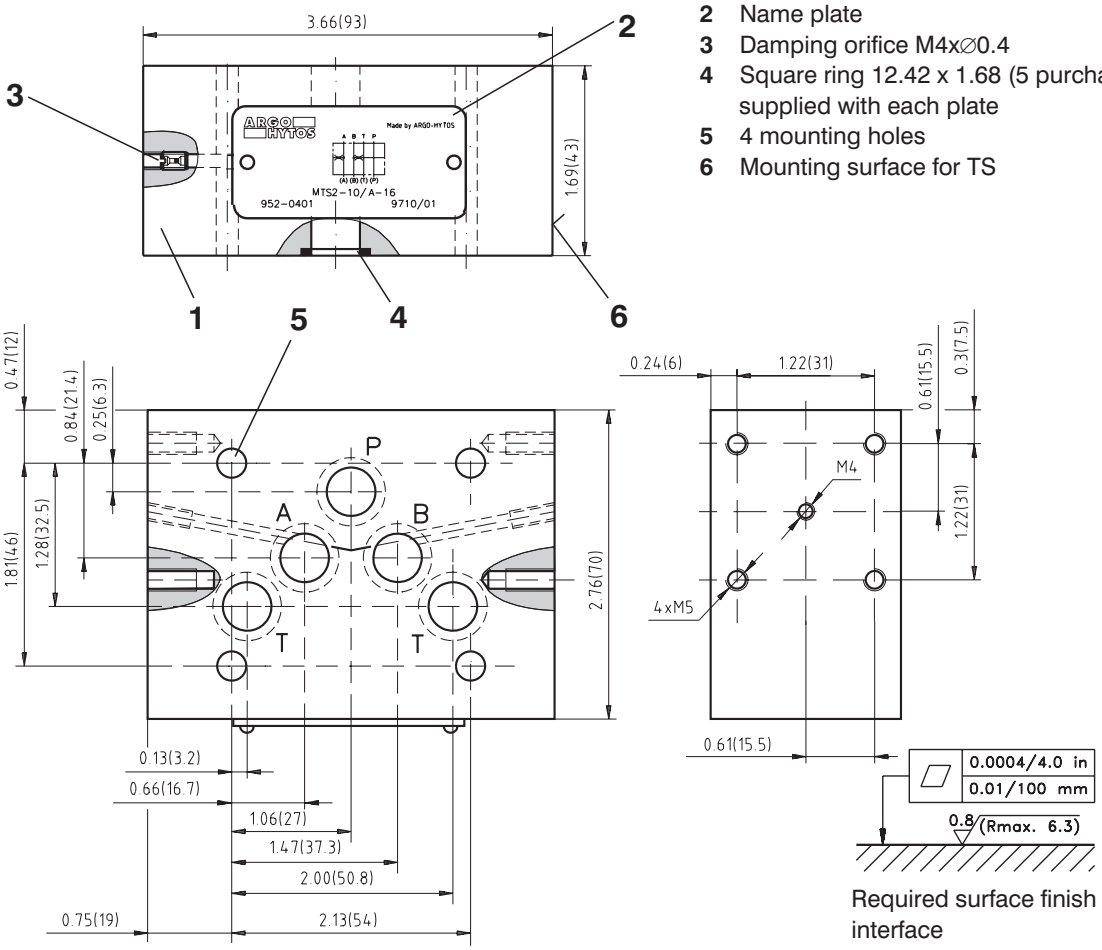


1 Sandwich plate
2 Name plate
3 Damping orifice M4x∅0.4
4 Square ring 9.25 x 1.68 (4 purchase) supplied with each plate
5 4 mounting holes
6 Mounting surface for TS



Required surface finish of interface

MTS2 - 10/C

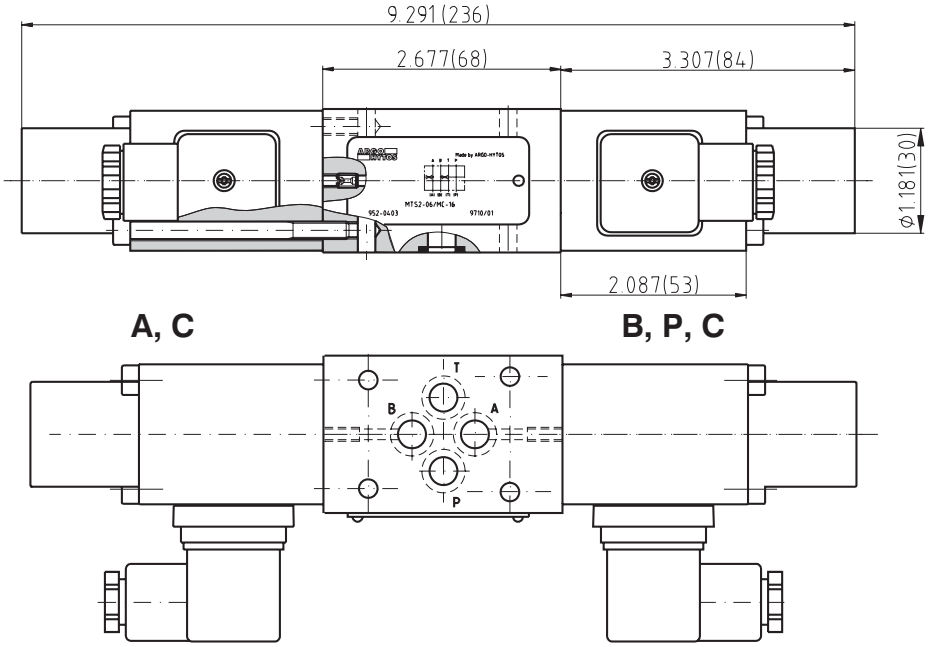


1 Sandwich plate
2 Name plate
3 Damping orifice M4x∅0.4
4 Square ring 12.42 x 1.68 (5 purchase) supplied with each plate
5 4 mounting holes
6 Mounting surface for TS

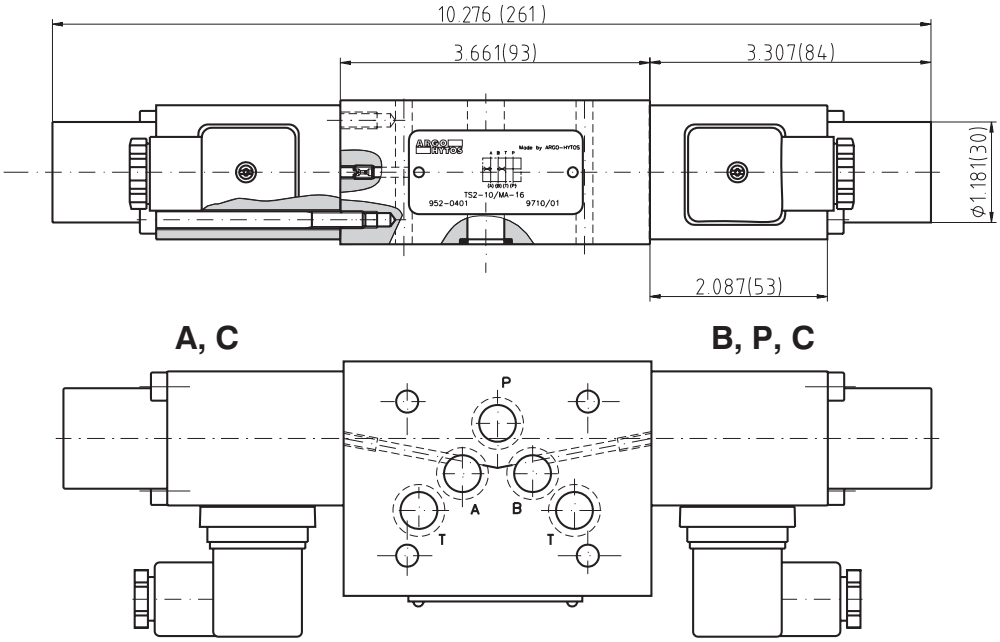
Required surface finish of interface

Mounting Instructions for MTS2

MTS2 - 06



MTS2 - 10



Caution!

- The plastic packaging is recyclable.
- Certified documentation is available per request.

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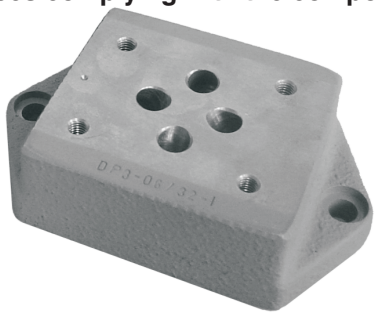
Subplates for valves

Size 04, 06, 10 · p_{max} up to 320 bar

HA 0002
6/2005

Replaces
HA 0002 1/2003

- **Subplates for individual mounting of hydraulic components in hydraulic circuits with connections realized by tubes or hoses**
- **Wide range of connecting threads**
- **Universal subplates for connection of any components with installation dimensions to ISO 4401: 1994, DIN 24 340 and CETOP**
  Installation dimensions of size 04: ISO 4401-02-01-0-94 and CETOP - RP 121H
  Installation dimensions of size 06: ISO 4401-03-02-0-94 and DIN 24 340-A6
  Installation dimensions of size 10: ISO 4401-05-04-0-94 and DIN 24 340-A10
- **Special subplates with specific dimensions of mounting surfaces complying with the components which are intended for - see the Survey of Applications**



Survey of Applications

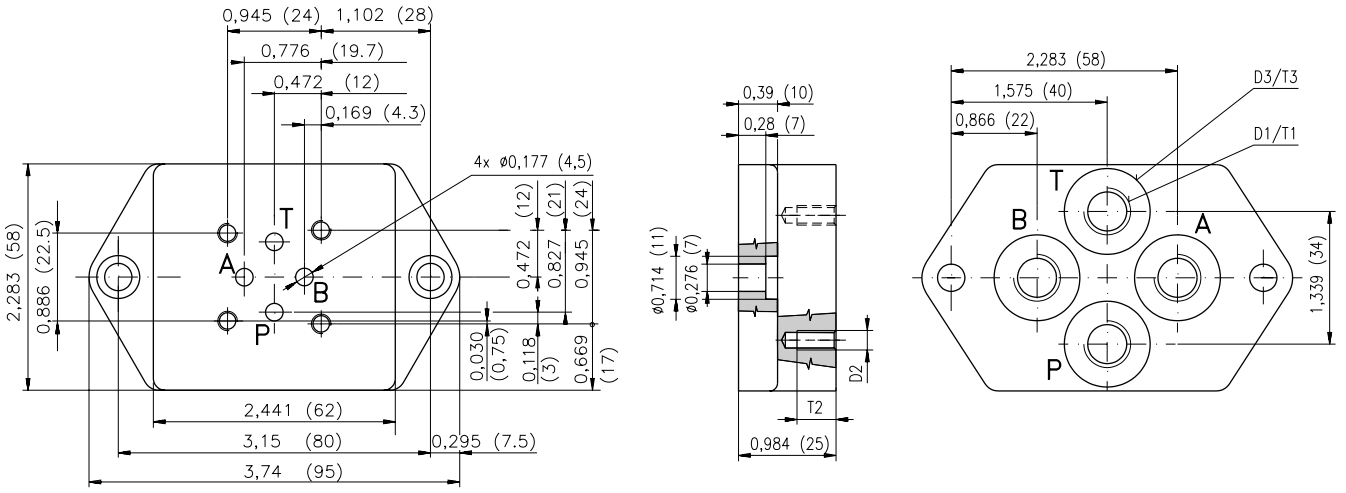
Subplate	For hydraulic valve (catalogue No.)
Size 04	
DP4-04/32-3 DP4-04/32-4 **DP3-04/32-10**	RPE3-04 (HA 4014) VSO1-04/M (HA 5053) VJR1-04/M (HA 5023) VJO1-04/M (HA 5012) VRP2-04 (HA 5142) VPP2-04 (HA 5093)
Size 06	
DP2-06/32-1 DP2-06/32-2 DP3-06/32-1 DP3-06/32-2 DP3-06/32-3 DP3-06/32-4 DP3-06/32-5 DP3-06/32-7 DP3-06/32-8 **DP3-06/32-9** DP3-06/32-11 DP3-06/32-12 DP3-06/32-13 DP3-06/32-15 DP3-06/32-16 DP3-06/32-17	RPR3-06 (HA 4004) RPH2-06 (HA 4005) RPE3-06 (HA 4010) VSS1-206 (HA 5032) VSS1-306 (HA 5033) VSS2-206 (HA 5041) 2VS3-06 (HA 5051) 2RJV1-06 (HA 5021) MVJ2-06 (HA 5013) VPP2-04 (HA 5093)

Subplate	For hydraulic valve (catalogue No.)
Size 10	
DP1-10/32-1 **DP1-10/32-2**	RPE3-10 (HA 4015) VSO2-10/M (HA 5056) VJR2-10/M (HA 5025) MVJ2-10 (HA 5014)
Special subplates	
D-06M/VPP1 D-06G/VPP1 D-08M/VPP1 D-08G/VPP1 D-10M/VPP1 D-10G/VPP1 DP3-TS2-1 DP3-TS2-3	VPP1 (HA 5061) VPP2 (HA 5062) TS2 (HA 9201) TS2 (HA 9201)

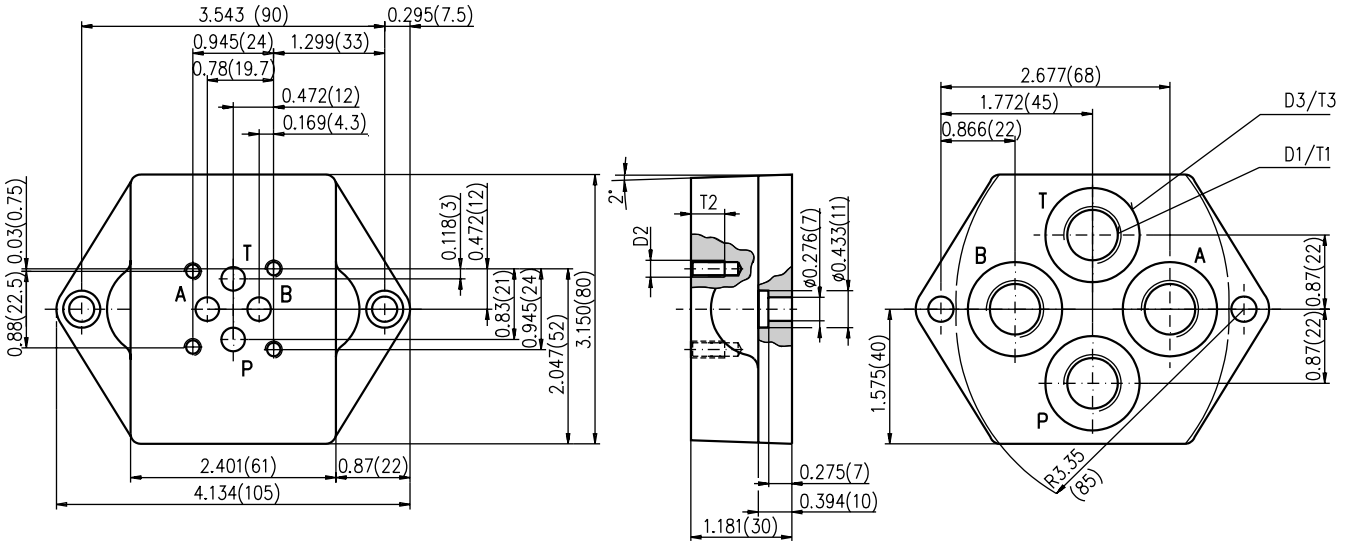
FOR PREFERRED TYPES SEE BOLD TYPING IN SURVEY OF APPLICATIONS

Subplates size 04

Dimensions in inches and millimetres (in brackets)



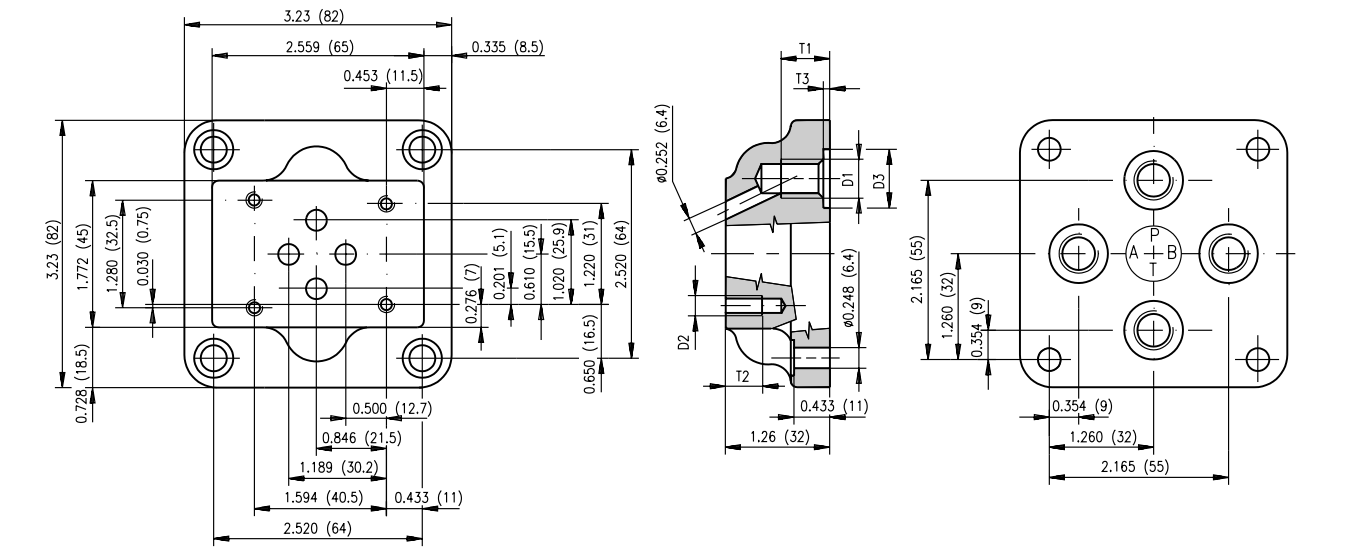
Ordering code	D1	T1	D2	T2	D3	T3	Weigh lbs (kg)
DP4-04/32-3	M12x1.5	0.512 (13)	M5	0.394 (10)	∅0.866 (22)	0.039 (1)	1.32 (0.6)
DP4-04/32-4	BSPP 1/4						



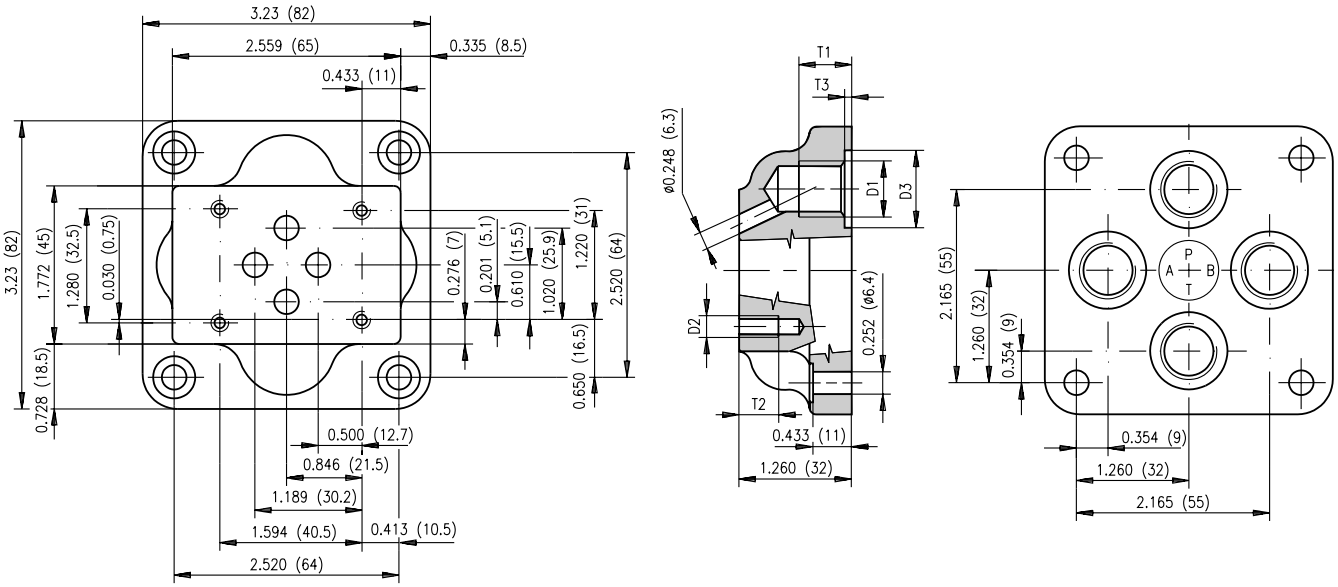
Ordering code	D1	T1	D2	T2	D3	T3	Weigh lbs (kg)
DP3-04/32-10	BSPP 3/8	0.473 (12)	M5	0.394 (10)	∅1.102 (28)	0.039 (1)	1.978 (0.9)

Subplates size 06

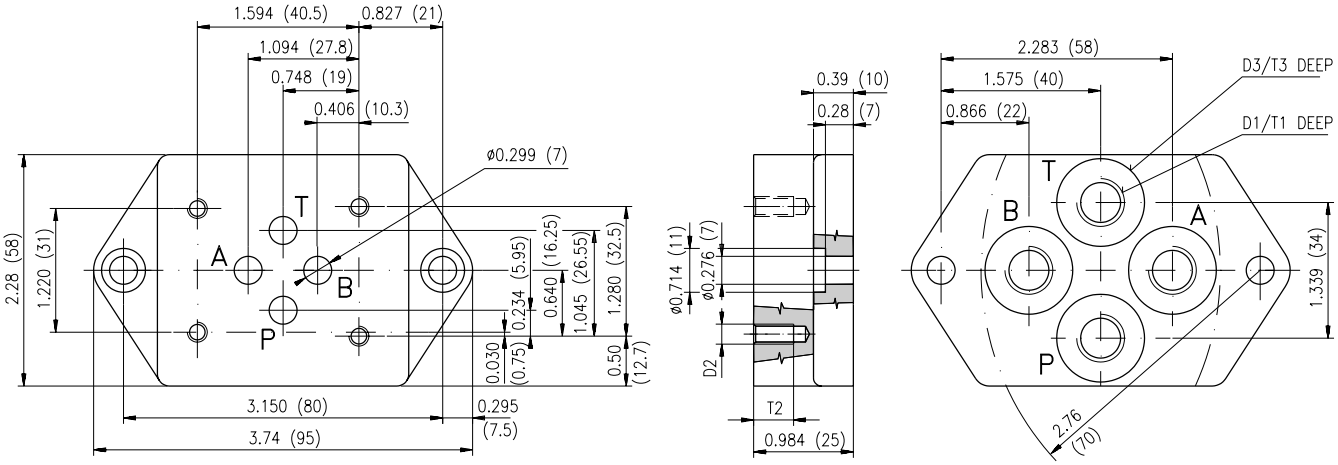
Dimensions in inches and millimetres (in brackets)



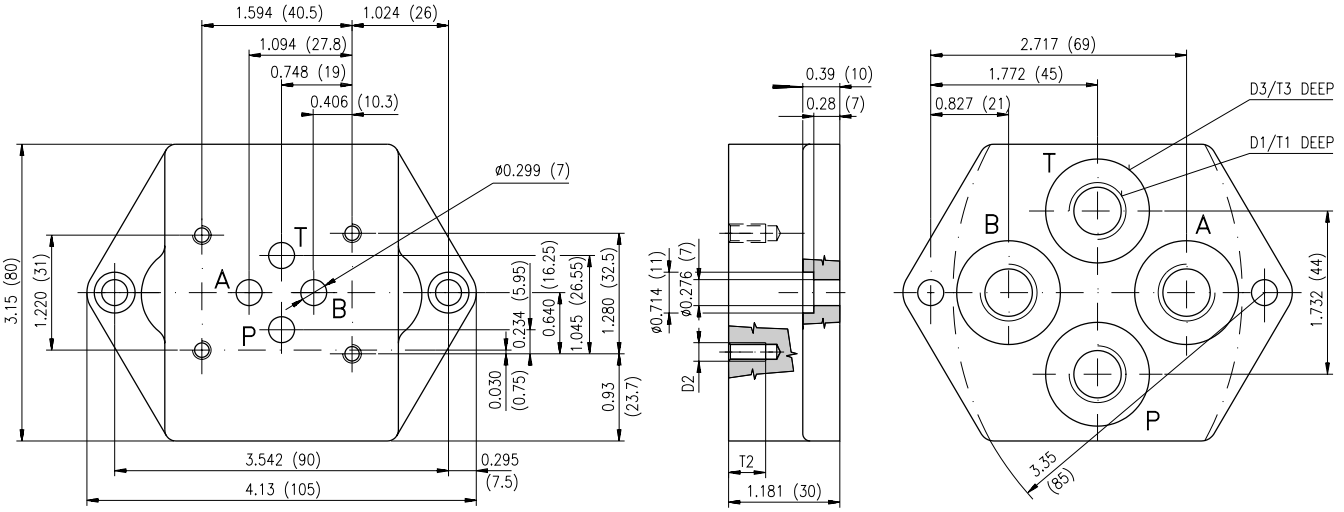
Ordering code	D1	T1	D2	T2	D3	T3	Weigh lbs (kg)
DP2-06/32-1	M12x1.5	0.591 (15)	M5	0.433 (11)	∅0.709 (18)	0.079 (2)	2.09 (0.95)



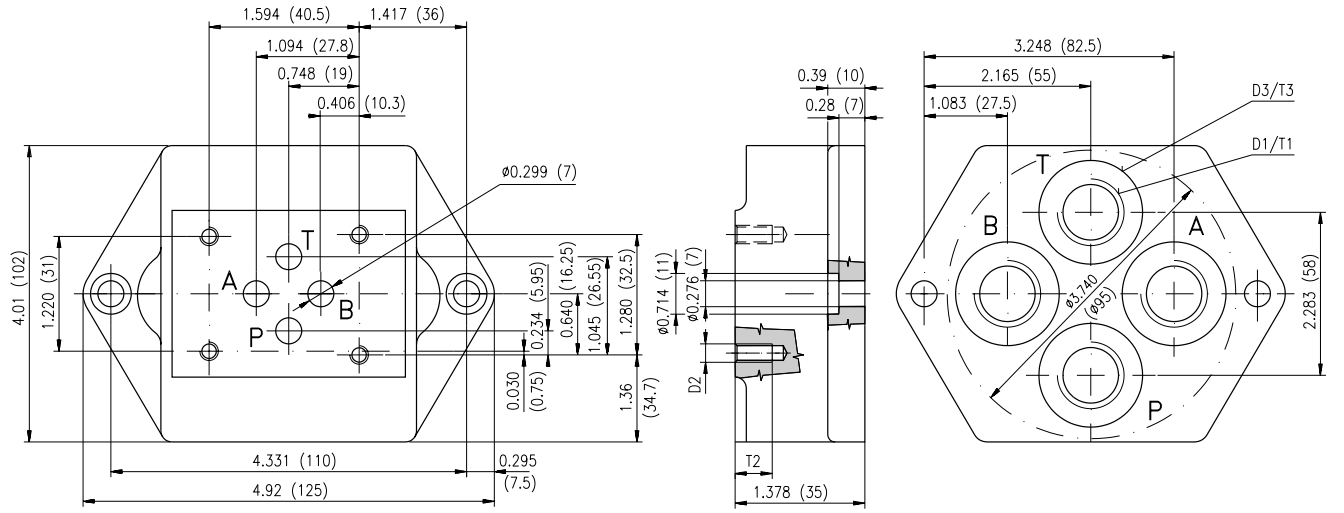
Orderig code	D1	T1	D2	T2	D3	T3	Weigh lbs (kg)
DP2-06/32-2	M16x1.5	0.669 (17)	M5	0.433 (11)	∅0.866 (22)	0.079 (2)	2.9 (0.95)



Ordering code	D1	T1	D2	T2	D3	T3	Weigh lbs (kg)
DP3-06/32-1	M12x1.5	0.512 (13)	M5	0.394 (10)	∅0.866 (22)	0.039 (1)	1.32 (0.6)
DP3-06/32-2	M14x1.5						
DP3-06/32-7	BSPP 1/4						
DP3-06/32-15	NPT 1/4	0.394 (10)	10-24 UNC		–	-	
DP3-06/32-11	SAE-6; 9/16-18	0.512 (13)			∅0.827 (21)	0.032 (0.8)	



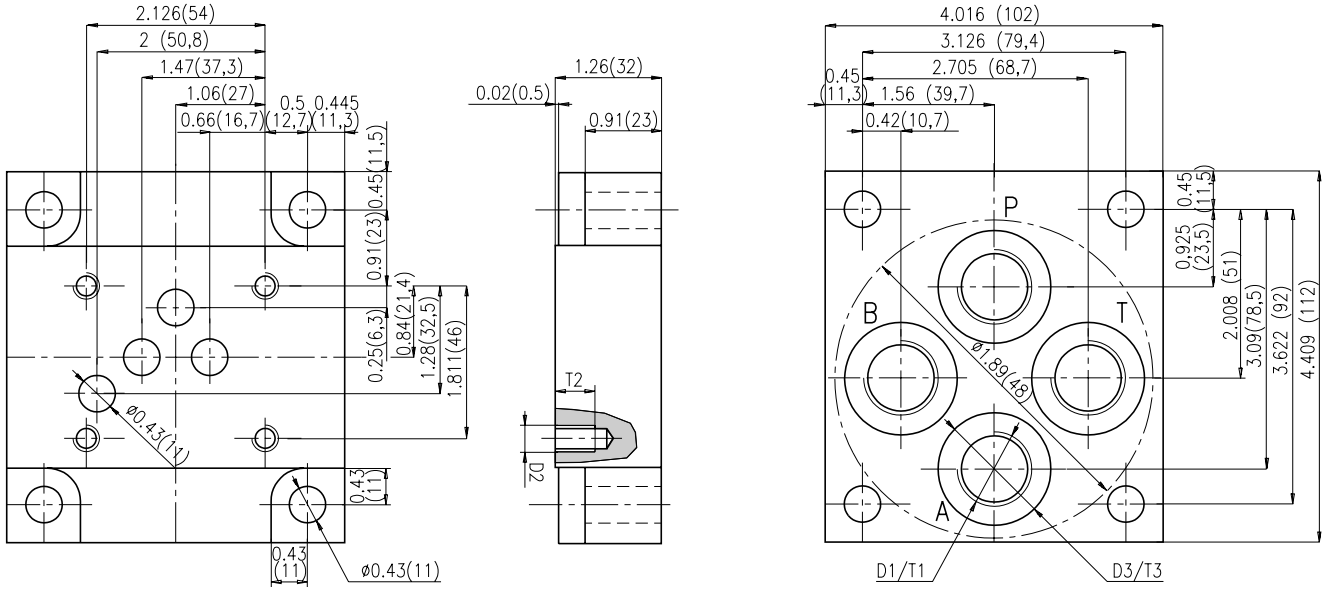
Ordering code	D1	T1	D2	T2	D3	T3	Weigh lbs (kg)
DP3-06/32-3	M16x1.5	0.512 (13)	M5	0.394 (10)	∅1.102 (28)	0.039 (1)	2.42 (1.1)
DP3-06/32-4	M18x1.5						
DP3-06/32-8	BSPP 3/8						
DP3-06/32-16	NPT 3/8	0.406 (10.3)	10-24 UNC		–	-	
DP3-06/32-12	SAE-8; 3/4-16	0.591 (15)			∅0.984 (25)	0.032 (0.8)	



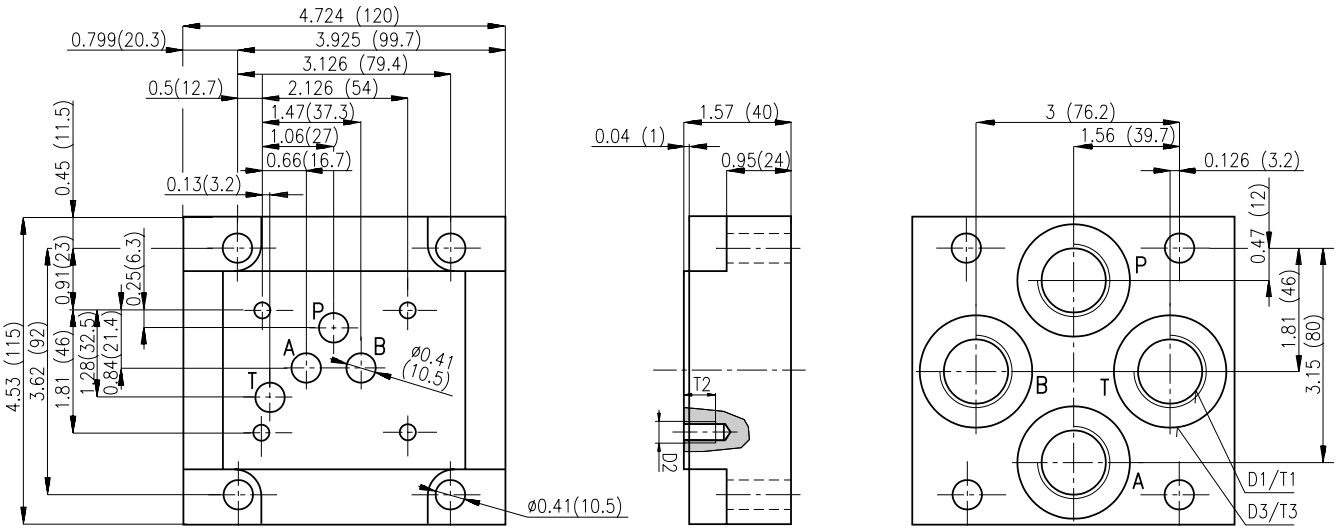
Ordering code	D1	T1	D2	T2	D3	T3	Weigh lbs (kg)
DP3-06/32-5	M22x1.5	0.551 (14)	M5	0.394 (10)	∅1.339 (34)	0.039 (1)	4.18 (1.9)
DP3-06/32-9	BSPP 1/2						
DP3-06/32-17	NPT 1/2		10-24 UNC		-	-	
DP3-06/32-13	SAE-8; 3/4-16	0.591 (15)			∅1.181 (30)	0.032 (0.8)	

Subplates size 10

Dimensions in inches and millimetres (in brackets)



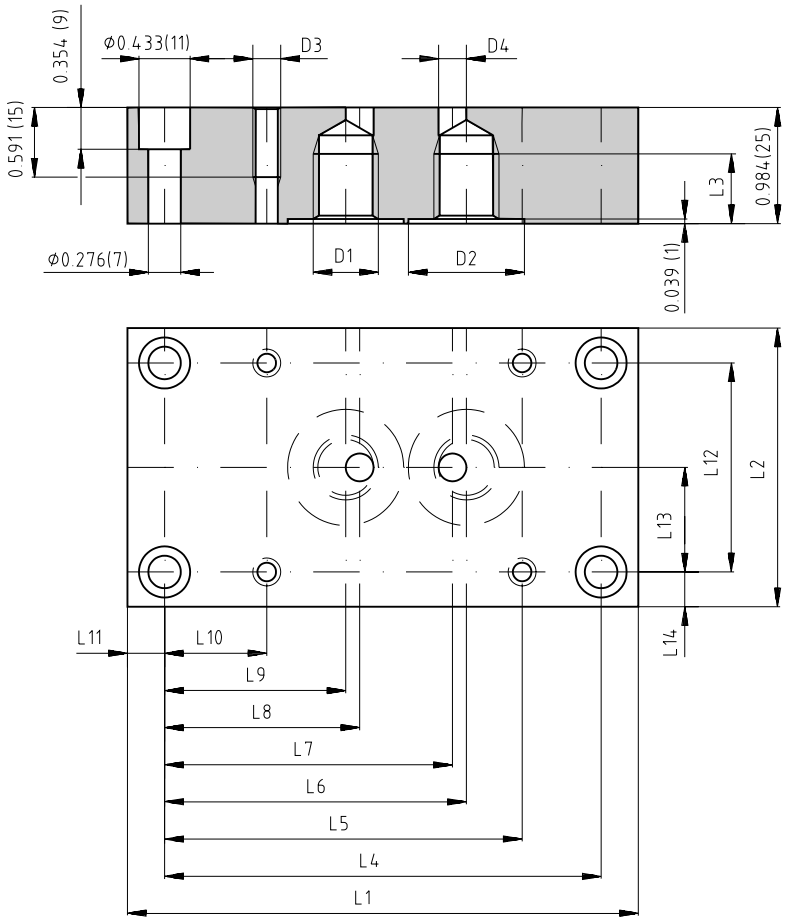
Ordering code	D1	T1	D2	T2	D3	T3	Weight lbs (kg)
DP1-10/32-1	BSPP 1/2	0.551 (14)	M6	0.472 (12)	∅1.339 (34)	0.039 (1)	5.055 (2.3)



Ordering code	D1	T1	D2	T2	D3	T3	Weigh lbs (kg)
DP1-10/32-2	BSPP 3/4	0.630 (16)	M6	0.472 (12)	∅1.654 (42)	0.039 (1)	5.495 (2.5)

Special subplates

Dimensions in inches and millimetres (in brackets)



Ordering code	D1	∅D2	D3	∅D4	L1	L2	L3	L4	L5
D-06M/VPP1	M14x1.5	0.984 (25)	M6	0.236 (6)	4.331 (110)	2.362 (60)	0.591 (15)	3.701 (94)	3.032 (77)
D-06G/VPP1	BSPP 1/4								
D-08M/VPP1	M18x1.5	1.102 (28)	M8	0.394 (10)	5.315 (135)	3.150 (80)	0.630 (16)	4.528 (115)	3.839 (97.5)
D-08G/VPP1	BSPP 3/8								
D-10M/VPP1	M22x1.5	1.339 (34)							
D-10G/VPP1	BSPP 1/2								

Ordering code	L6	L7	L8	L9	L10	L11	L12	L13	L14
D-06M/VPP1	2.560 (65)	2.441 (62)	1.654 (42)	1.535 (39)	0.866 (22)	0.315 (8)	1.772 (45)	0.886 (22.5)	0.295 (7.5)
D-06G/VPP1									
D-08M/VPP1	3.169 (80.5)	2.854 (72.5)	1.909 (48.5)	1.595 (40.5)	1.083 (27.5)	0.394 (10)	2.362 (60)	1.181 (30)	0.394 (10)
D-08G/VPP1									
D-10M/VPP1									
D-10G/VPP1									

Weight of the subplate size 06 is 3.3 lbs (1.5 kg), weight of the subplates size 08 and 10 is 4.4 lbs (2.0 kg).

Caution!

- The packing foil is recyclable.
- The transport plate is to be returned to the supplier.
- Mounting bolts for fixing the subplates are not included.
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law.

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❑ **Blanking plates - used mainly for covering the upper surface of the elements of the sandwich plate design when they are used separately**

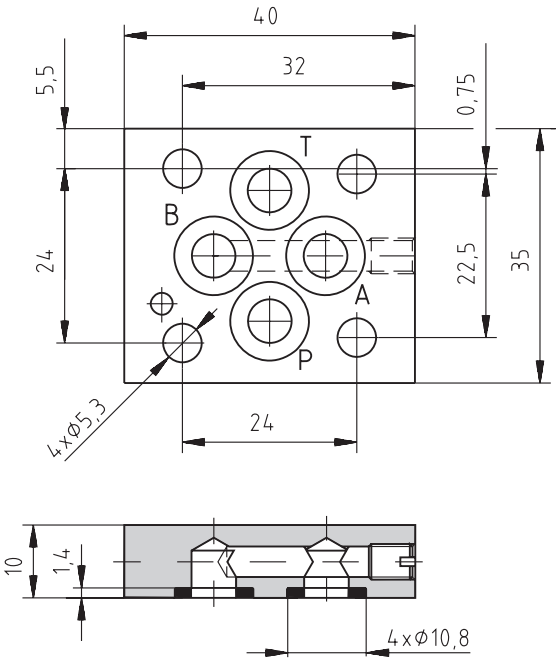
Blanking plate DK1-04/32-1

Dimensions in mm

Used as universal blanking plate size 04.
Connects ports A and B.

Sealing rings	Weight of the plate	Ordering number of the plate
4 pcs. Square rings 7.65 x 1.68	0.10 kg	517-0033

Sealing rings are delivered with each plate (quantity and dimensions see the table above).



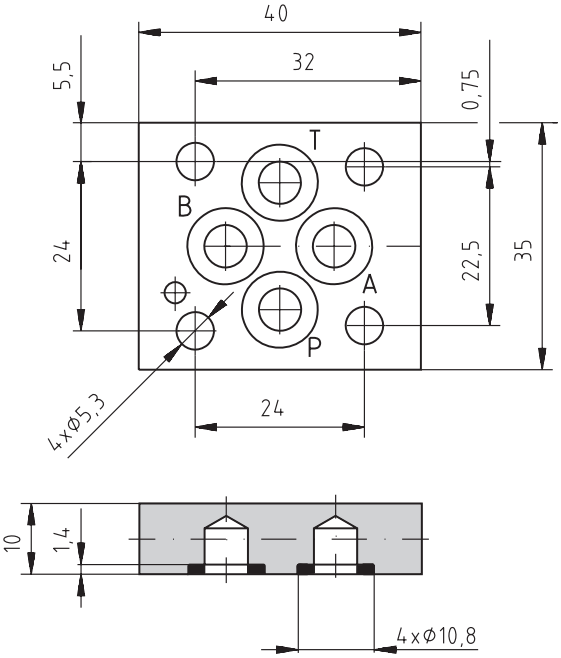
Blanking plate DK1-04/32-2

Dimensions in mm

Used as universal blanking plate size 04.

Sealing rings	Weight of the plate	Ordering number of the plate
4 pcs. Square rings 7.65 x 1.68	0.10 kg	517-0032

Sealing rings are delivered with each plate (quantity and dimensions see the table above).



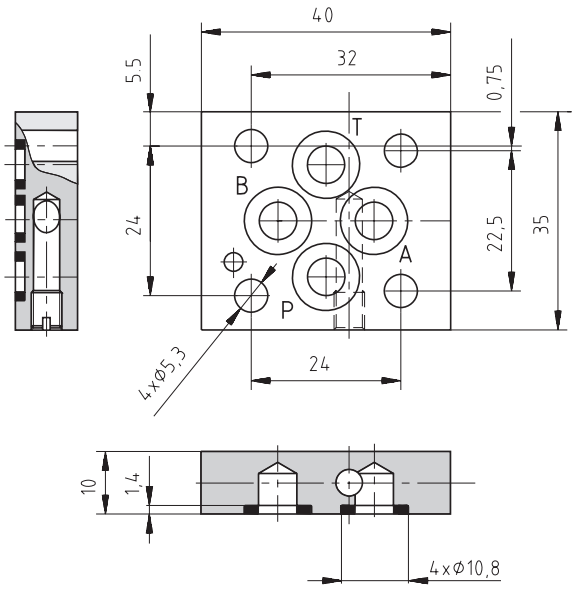
Blanking plate DK1-04/32-3

Dimensions in mm

Used as universal blanking plate size 04.
Connects ports A and P.

Sealing rings	Weight of the plate	Ordering number of the plate
4 pcs. Square rings 7.65 x 1.68	0.10 kg	517-0031

Sealing rings are delivered with each plate (quantity and dimensions see the table above).



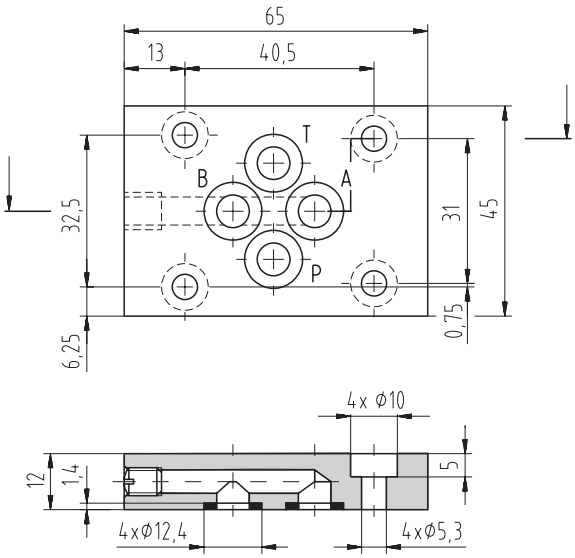
Blanking plate DK1-06/32-1

Dimensions in mm

Used as universal blanking plate size 06.
Connects ports A and B

Sealing rings	Weight of the plate	Ordering number of the plate
4 pcs. Square rings 9.25 x 1.68	0.32 kg	525-0080

Sealing rings are delivered with each plate (quantity and dimensions see the table above).



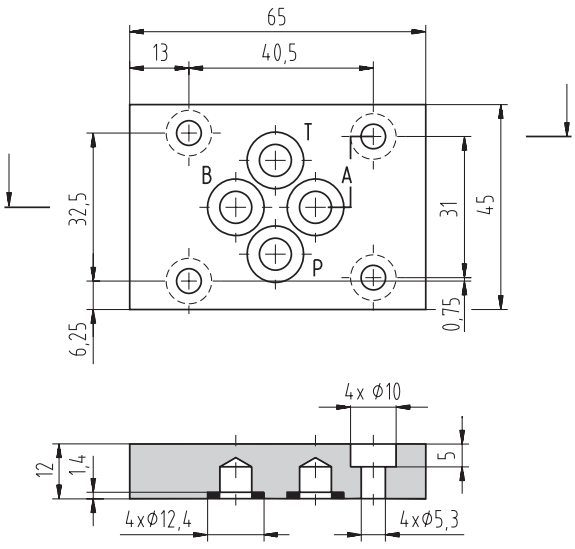
Blanking plate DK1-06/32-2

Dimensions in mm

Used as universal blanking plate size 06.

Sealing rings	Weight of the plate	Ordering number of the plate
4 pcs. Square rings 9.25 x 1.68	0.32 kg	525-0081

Sealing rings are delivered with each plate (quantity and dimensions see the table above).



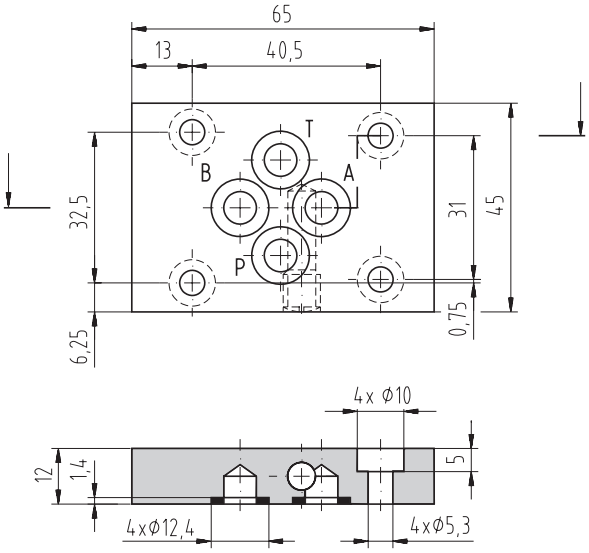
Blanking plate DK1-06/32-3

Dimensions in mm

Used as universal blanking plate size 06.
Connects ports A and P.

Sealing rings	Weight of the plate	Ordering number of the plate
4 pcs. Square rings 9.25 x 1.68	0.32 kg	416-0010

Sealing rings are delivered with each plate
(quantity and dimensions see the table above).



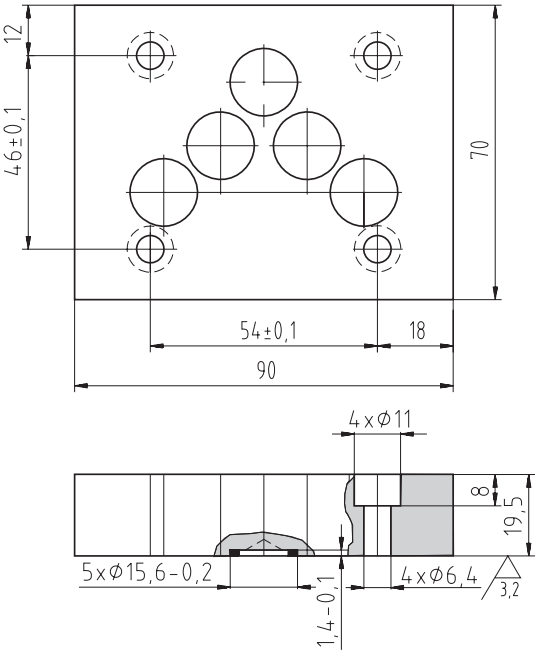
Blanking plate DK1-10/32-2

Dimensions in mm

Used as universal blanking plate size 10.

Sealing rings	Weight of the plate	Ordering number of the plate
5 pcs. Square rings 12.42 x 1.68	1.00 kg	525-0131

Sealing rings are delivered with each plate
(quantity and dimensions see the table above).



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ARGO HYTOS

In-line-manifolds

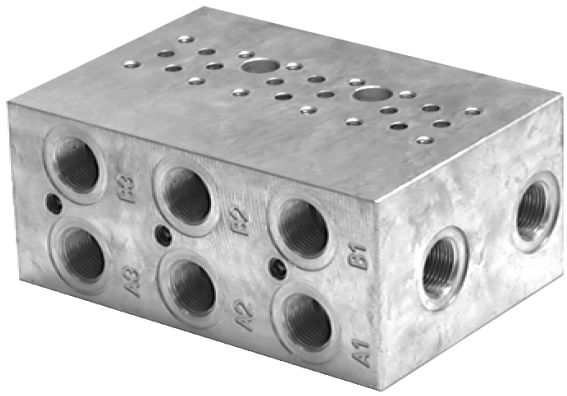
Size 04 • ...3626 PSI (250 bar)

PD04

HA 0005
1/2003

Replaces
HA 0005 4/2000

- ❑ **For in-line mounting of hydraulic valves**
- ❑ **Parallel connection of ports P and T**
- ❑ **1 ... 6 sections possible**
- ❑ **Stud bolts for vertical stacking assemblies - see data sheet HA 0020**
- ❑ **Installation dimensions size 04 to ISO 4401 CETOP - RP 121H**



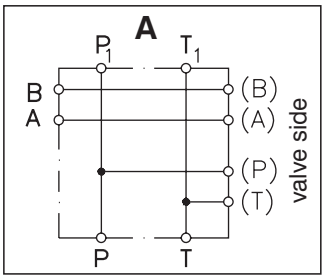
Ordering Code

PD04A ☐ **- AL**

In-line connecting plate

Nominal size

Connection
Functional symbol



Material - aluminium

Number of sections

1	1 section
2	2 sections
3	3 sections
4	4 sections
5	5 sections
6	6 sections

Survey of types

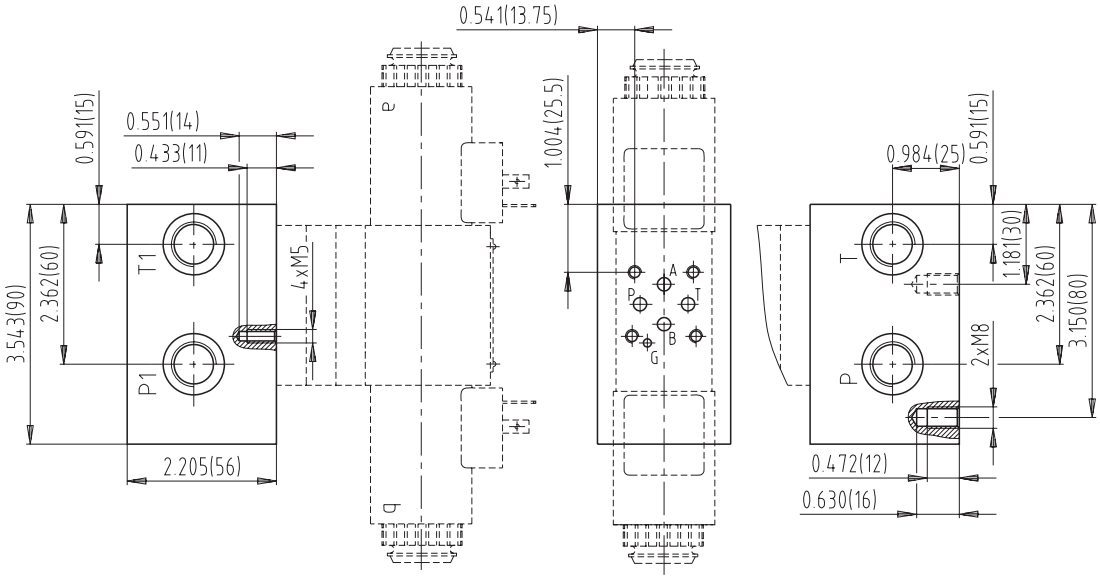
Type	Ordering number	Weight
PD04A1-AL	760-0121	1.319 lbs (0.60 kg)
PD04A2-AL	**760-0122**	2.690 lbs (1.22 kg)
PD04A3-AL	**760-0123**	3.880 lbs (1.76 kg)
PD04A4-AL	760-0124	5.071 lbs (2.30 kg)
PD04A5-AL	760-0125	6.305 lbs (2.86 kg)
PD04A6-AL	760-0126	7.495 lbs (3.40 kg)

FOR PREFERRED TYPES SEE BOLD TYPING IN ORDERING CODE AND TABLE OF SURVEY OF TYPES

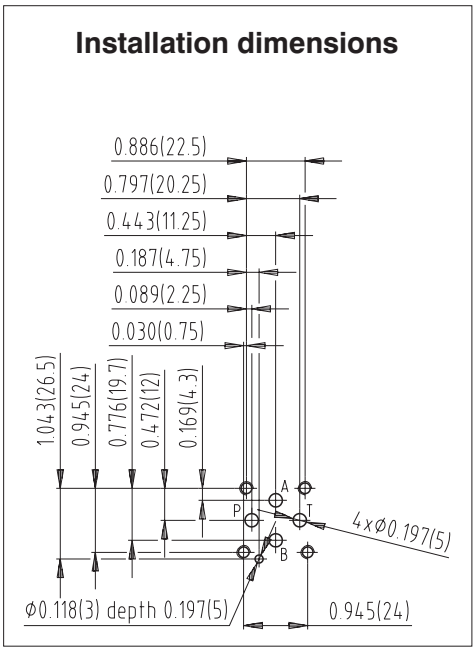
Valve Dimensions

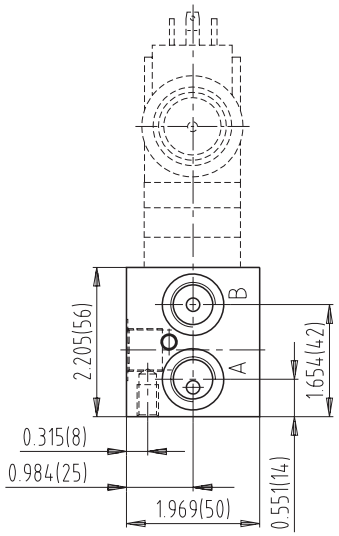
Dimensions in inches and millimeters (in brackets)

Plates with 1 section



Installation dimensions



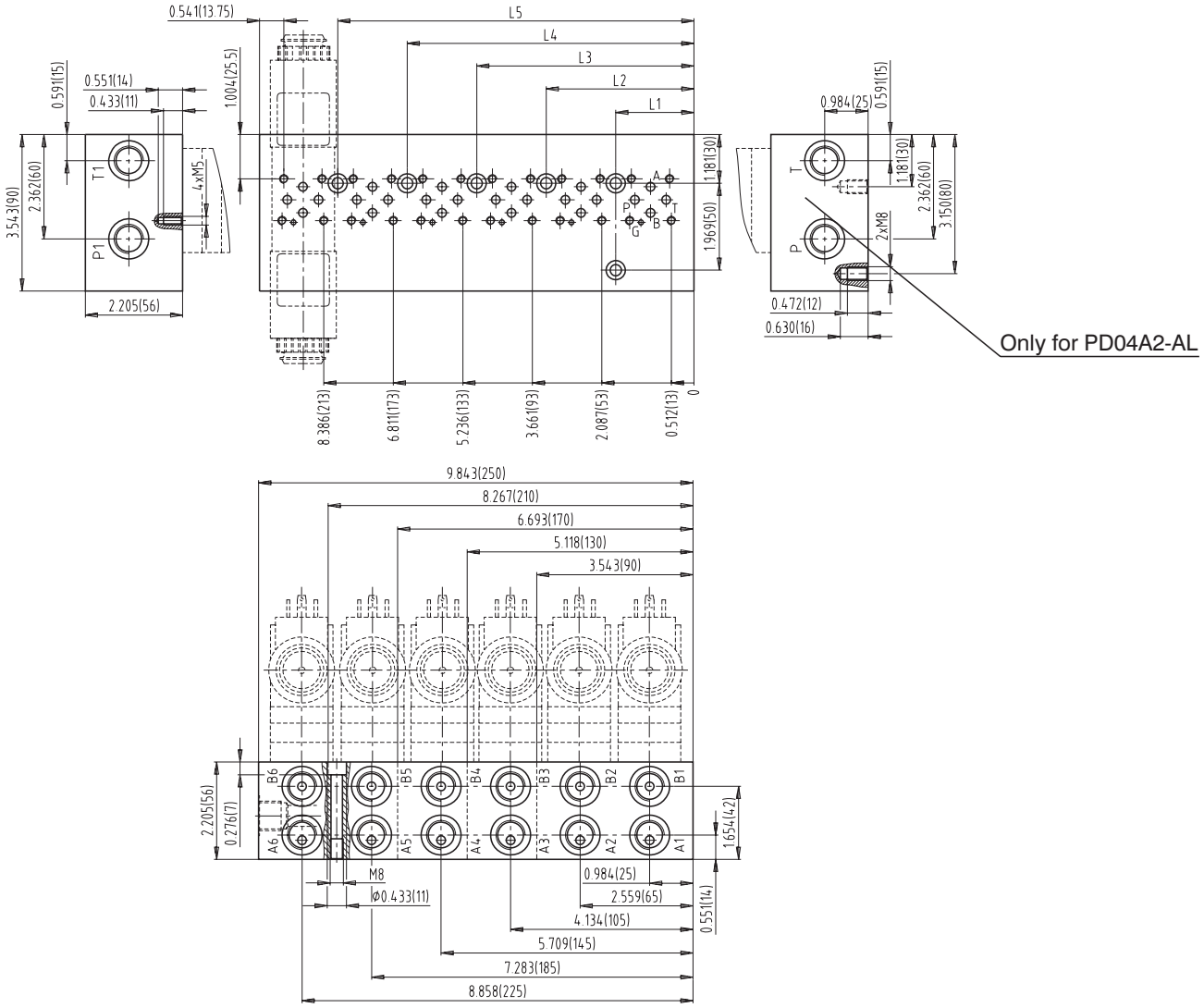


Port	A	B	T	P	T1	P1
Thread	G3/8	G3/8	G3/8	G3/8	G3/8	G3/8
Depth of thread	0.473 (12)	0.473 (12)	0.512 (13)	0.512 (13)	0.512 (13)	0.512 (13)
Counterbore	∅0.945 (24)	∅0.945 (24)	∅0.945 (24)	∅0.945 (24)	∅0.945 (24)	∅0.945 (24)
Depth of counterbore	0.020 (0.5)	0.020 (0.5)	0.020 (0.5)	0.020 (0.5)	0.020 (0.5)	0.020 (0.5)

Valve Dimensions

Dimensions in inches and millimeters (in brackets)

Plates with 2 ... 6 sections



Port	A1 ... A6	B1 ... B6	T	P	T1	P1
Thread	G3/8	G3/8	G3/8	G3/8	G3/8	G3/8
Depth of thread	0.473 (12)	0.473 (12)	0.512 (13)	0.512 (13)	0.512 (13)	0.512 (13)
Counterbore	∅0.945 (24)	∅0.945 (24)	∅0.945 (24)	∅0.945 (24)	∅0.945 (24)	∅0.945 (24)
Depth of counterbore	0.020 (0.5)	0.020 (0.5)	0.020 (0.5)	0.020 (0.5)	0.020 (0.5)	0.020 (0.5)

	L1	L2	L3	L4	L5
PD04A2-AL	1.772 (45)	-	-	-	-
PD04A3-AL	1.772 (45)	3.347 (85)	-	-	-
PD04A4-AL	1.772 (45)	-	4.921 (125)	-	-
PD04A5-AL	1.772 (45)	-	-	6.946 (165)	-
PD04A6-AL	1.772 (45)	-	4.921 (125)	-	8.071 (205)

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ARGO HYTOS

In-line manifolds

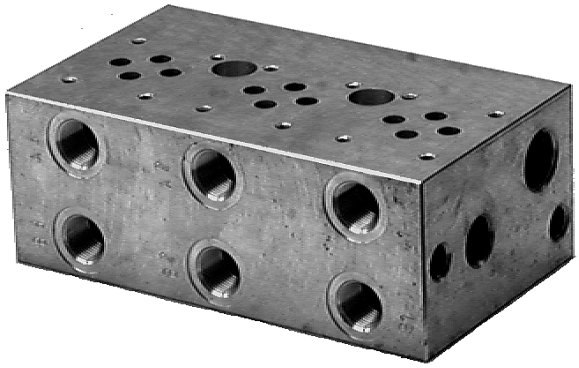
Size 06 • ...3626 PSI (250 bar)

PD06

HA 0006
1/2003

Replaces
HA 0006 2/2000

- ❑ **For in-line mounting of hydraulic valves**
- ❑ **Parallel connection of ports P and T**
- ❑ **1 ... 10 sections possible**
- ❑ **Installation dimensions to ISO 4401-03-02-0-94 and DIN 24 340-A6**
- ❑ **Mounting Accessories**



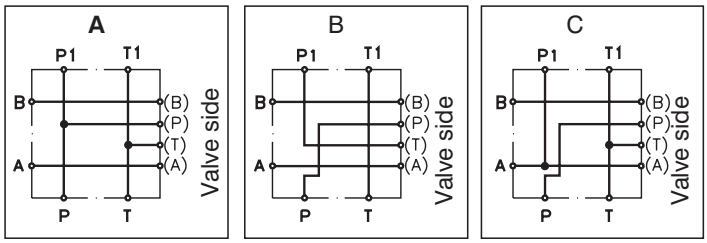
Ordering Code

PD06 ☐ ☐ **-AL**

In-line connecting platte

Nominal size

Connection
Functional symbols



Material - aluminium

Number of section

1	1 section
2	2 sections
3	3 sections
4	4 sections
5	5 sections
6	6 sections

Survey of Types

Type	Ordering number	Weight
PD06A1-AL	760-0031	1.572 lbs (0.713 kg)
PD06B1-AL	760-0037	1.574 lbs (0.714 kg)
PD06C1-AL	760-0038	1.568 lbs (0.711 kg)
PD06A2-AL	**760-0032**	3.109 lbs (1.410 kg)
PD06A3-AL	**760-0033**	4.652 lbs (2.110 kg)
PD06A4-AL	760-0034	6.217 lbs (2.820 kg)
PD06A5-AL	760-0035	7.771 lbs (3.525 kg)
PD06A6-AL	760-0036	9.326 lbs (4.230 kg)

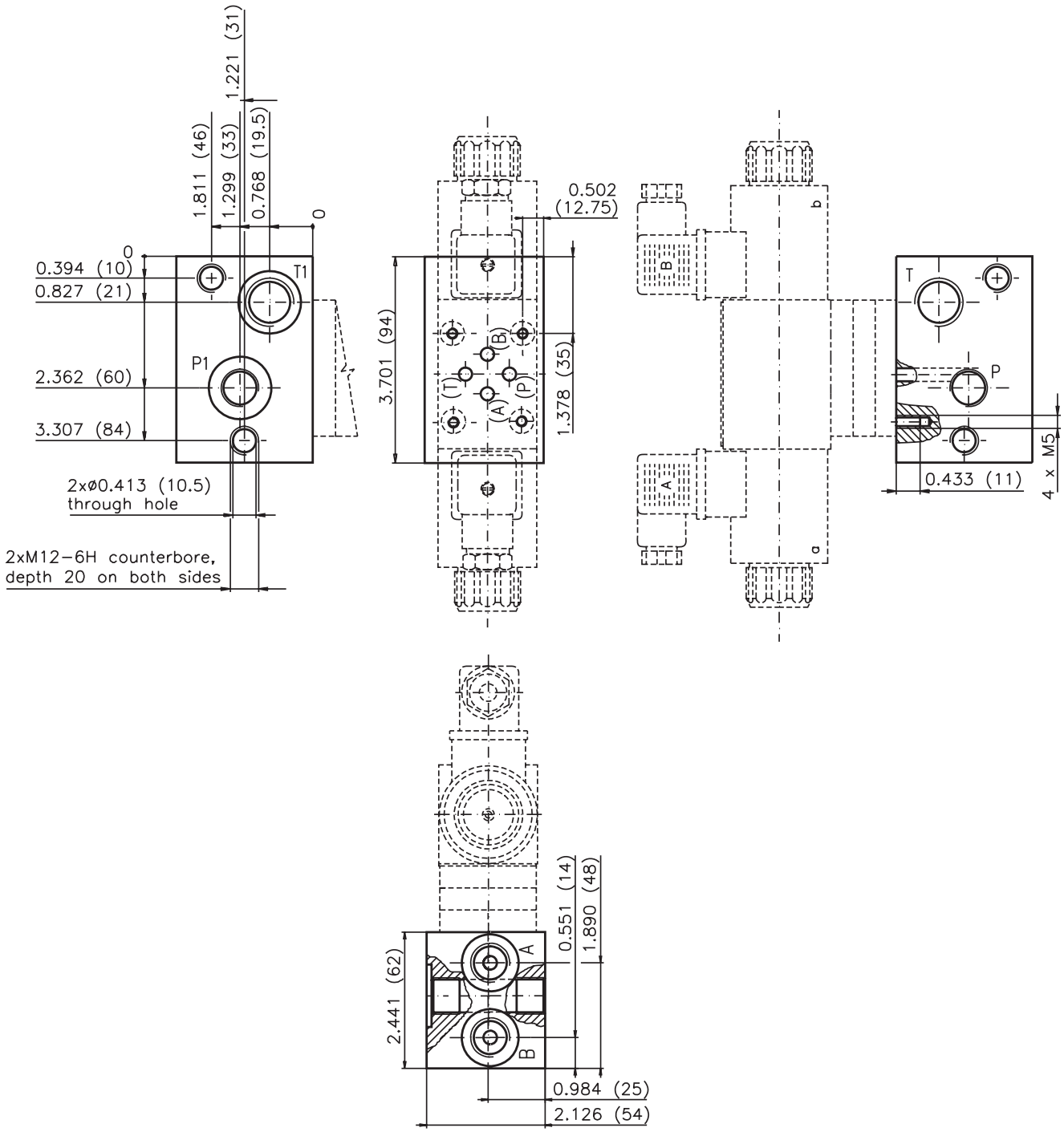
FOR PREFERRED TYPES SEE BOLD TYPING IN ORDERING CODE AND TABLE OF SURVEY OF TYPES

Valve Dimensions

Dimensions in inches and millimeters (in brackets)

Plates with 1 section

Plates with 1, 2, 3 and 4 sections enable combinations up to 10 sections



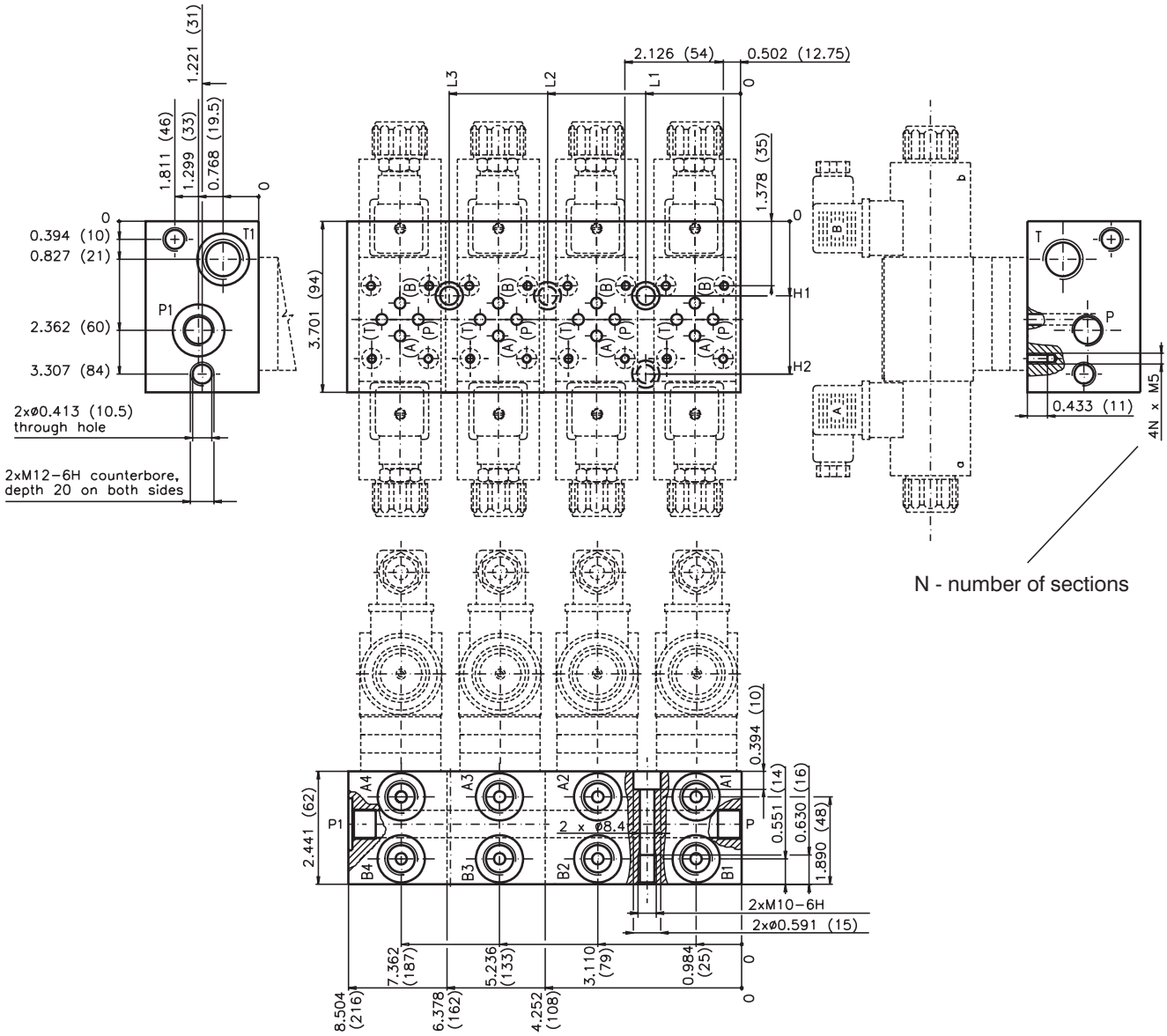
Port	A, B	P	T	P1	T1
Thread	G3/8	G3/8	G1/2	G3/8	G1/2
Depth of thread	0.512 (13)	0.512 (13)	0.670 (17)	0.512 (13)	0.670 (17)
Counterbore	∅0.945 (24)	-	-	∅1.118-0.008 (28.4-0.2)	∅1.118-0.008 (28.4-0.2)
Depth of counterbore	0.020 (0.5)	-	-	0.083-0.004 (2.1-0.1)	0.083-0.004 (2.1-0.1)
O-Ring [mm]	-	-	-	23.4 x 2.62	23.4 x 2.62

Valve Dimensions

Dimensions in inches and millimeters (in brackets)

Plates with 2 ... 4 sections

Plates with 1, 2, 3 and 4 sections enable combinations up to 10 sections



Number of sections	L1	L2	L3	H1	H2
2	2.047 (52)	-	-	1.614 (41)	3.307 (84)
3	2.047 (52)	4.173 (106)	-	1.614 (41)	-
4	2.047 (52)	-	6.300 (160)	1.614 (41)	-

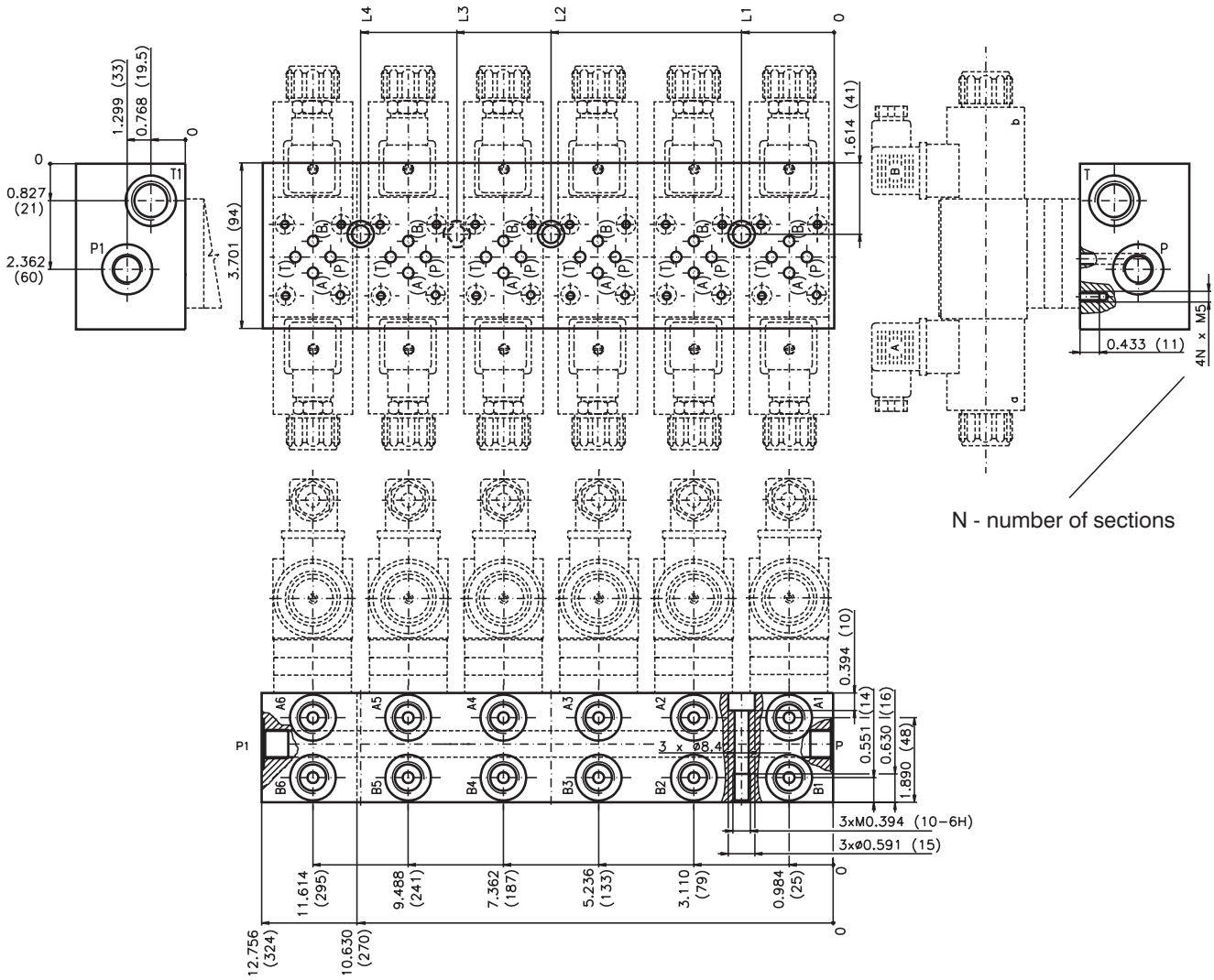
Port	A1...A4, B1...B4	P	P1	T	T1
Thread	G3/8	G3/8	G3/8	G1/2	G1/2
Depth of thread	0.512 (13)	0.512 (13)	0.512 (13)	0.670 (17)	0.670 (17)
Counterbore	⌀0.945 (24)	-	⌀1.118-0.008 (28.4-0.2)	-	⌀1.118-0.008 (28.4-0.2)
Depth of counterbore	0.020 (0.5)	-	0.083-0.004 (2.1-0.1)	-	0.083-0.004 (2.1-0.1)
O-Ring [mm]	-	-	23.4 x 2.62	-	23.4 x 2.62

Valve Dimensions

Dimensions in inches and millimeters (in brackets)

Plates with 5 ... 6 sections

Plates with 5 and 6 do not enable any other combinations



Number of sections	L1	L2	L3	L4
5	2.047 (52)	6.300 (160)	8.425 (214)	-
6	2.047 (52)	6.300 (160)	-	10.551 (268)

Port	A1...A6, B1...B6	P, P1	T, T1
Thread	G3/8	G3/8	G1/2
Depth of thread	0.512 (13)	0.512 (13)	0.670 (17)
Counterbore	∅0.945 (24)	∅1.108 (28)	∅1.108 (28)
Depth of counterbore	0.020 (0.5)	0.020 (0.5)	0.020 (0.5)

Mounting Accessories

Set of stud bolts, nuts and washers for connection of PD06 plates

Ordering Code

MP □ □ - □

Mounting accesories		
1 ... 10		**Number of section**
Model		
- for connection of PD plates with ZB06 block (catalogue HA 0010)	**B**	
- for separate connection of PD06 plates	**S**	
M10		**Thread**

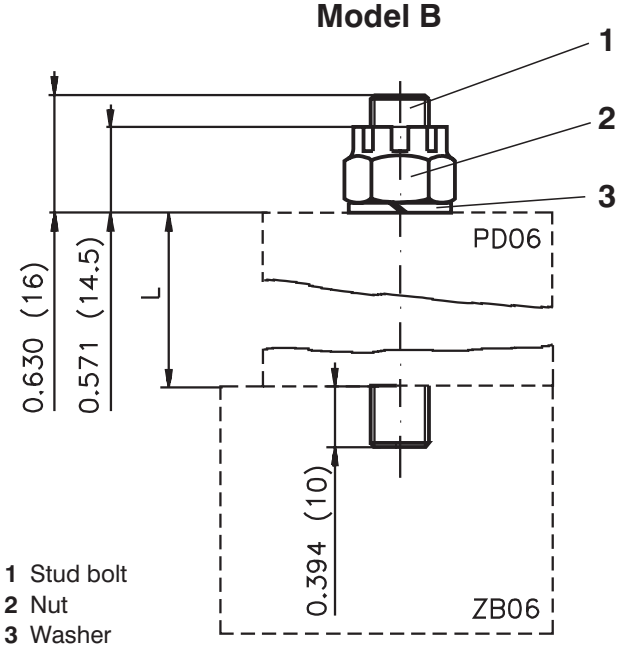
Survey of Types

		Model B		Model S	
Number of sektions	**Total block length - L** [mm]	**Type**	**Ordering number**	**Type**	**Ordering number**
1	2.126 (54)	MPB10-1	760-0050	-	-
2	4.252 (108)	MPB10-2	760-0051	MPS10-2	760-0060
3	6.378 (162)	MPB10-3	760-0052	MPS10-3	760-0061
4	8.504 (216)	MPB10-4	760-0053	MPS10-4	760-0062
5	10.630 (270)	MPB10-5	760-0054	MPS10-5	760-0063
6	12.760 (324)	MPB10-6	760-0055	MPS10-6	760-0064
7	14.882 (378)	MPB10-7	760-0056	MPS10-7	760-0065
8	17.010 (432)	MPB10-8	760-0057	MPS10-8	760-0066
9	19.134 (486)	-	-	MPS10-9	760-0067
10	21.260 (540)	-	-	MPS10-10	760-0068

Dimensions

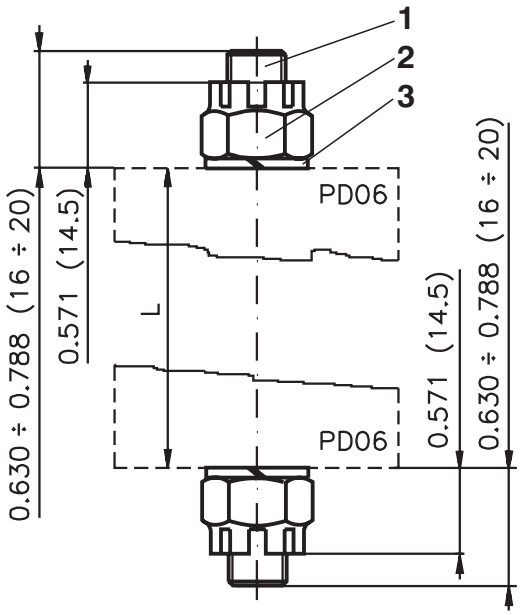
Dimensions in inches and millimeters (in brackets)

Model B



1 Stud bolt
2 Nut
3 Washer

Model S



Caution

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- O-Ring supplied with delivery.
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ARGO HYTOS

In-line manifolds

Size 10 • ...3626 PSI (250 bar)

PD10

HA 0008 1/2003

Replaces HA 0008 1/2000

- ❑ **For in-line mounting of hydraulic valves**
- ❑ **Parallel connection of ports P and T**
- ❑ **1 ... 6 sections possible**
- ❑ **Installation dimensions size 10 to ISO 4401 and DIN 24 340-A10**

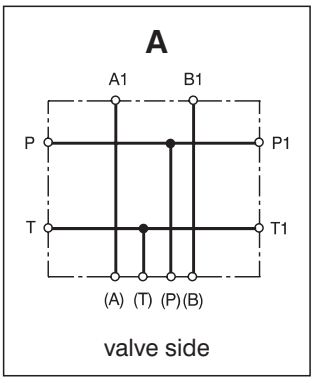
Ordering Code

PD10 ☐ ☐ - AL

In-line connecting plate

Nominal size

Connection
see functional symbol



Material - aluminium

Number of sections

1	1 section
2	2 sections
3	3 sections
4	4 sections
5	5 sections
6	6 sections

Survey of types

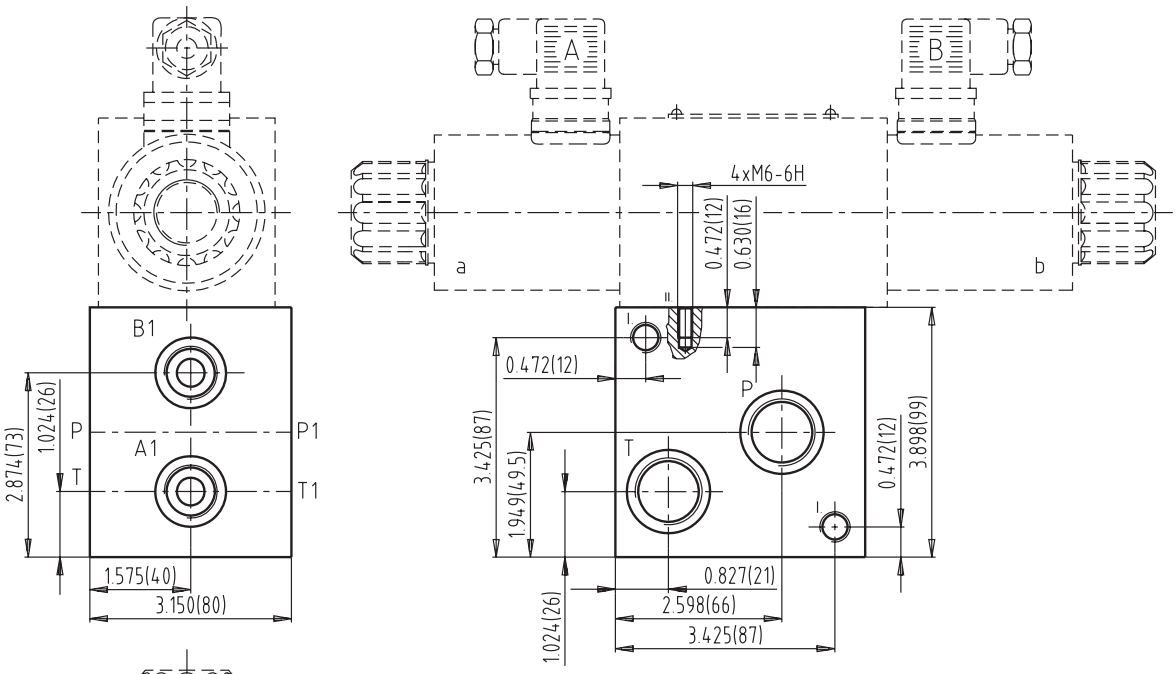
Type	Ordering number	Weight lbs (kg)
PD10A1-AL	760-0151	5.10 (2.32)
PD10A2-AL	**760-0152**	9.85 (4.48)
PD10A3-AL	**760-0153**	14.55 (6.62)
PD10A4-AL	760-0154	19.45 (8.85)
PD10A5-AL	760-0155	24.24 (11.03)
PD10A6-AL	760-0156	29.03 (13.21)

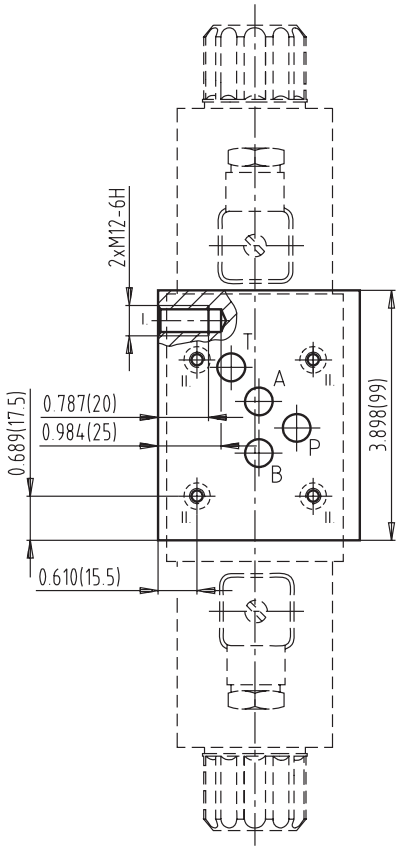
FOR PREFERRED TYPES SEE BOLD TYPING IN ORDERING CODE AND TABLE OF SURVEY OF TYPES

Plate Dimensions

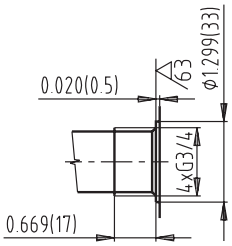
Dimensions in inches and millimetres (in brackets)

Plates with 1 section

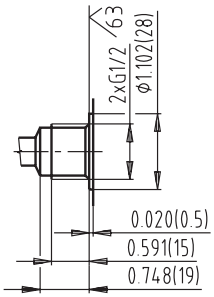




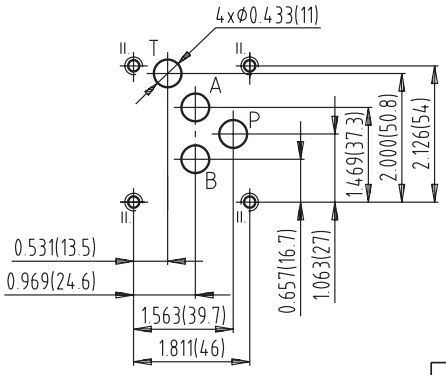
P, T, P1, T1

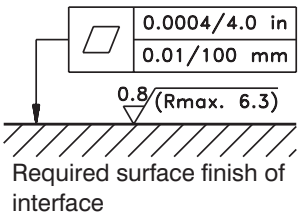


A, B



Installation dimensions





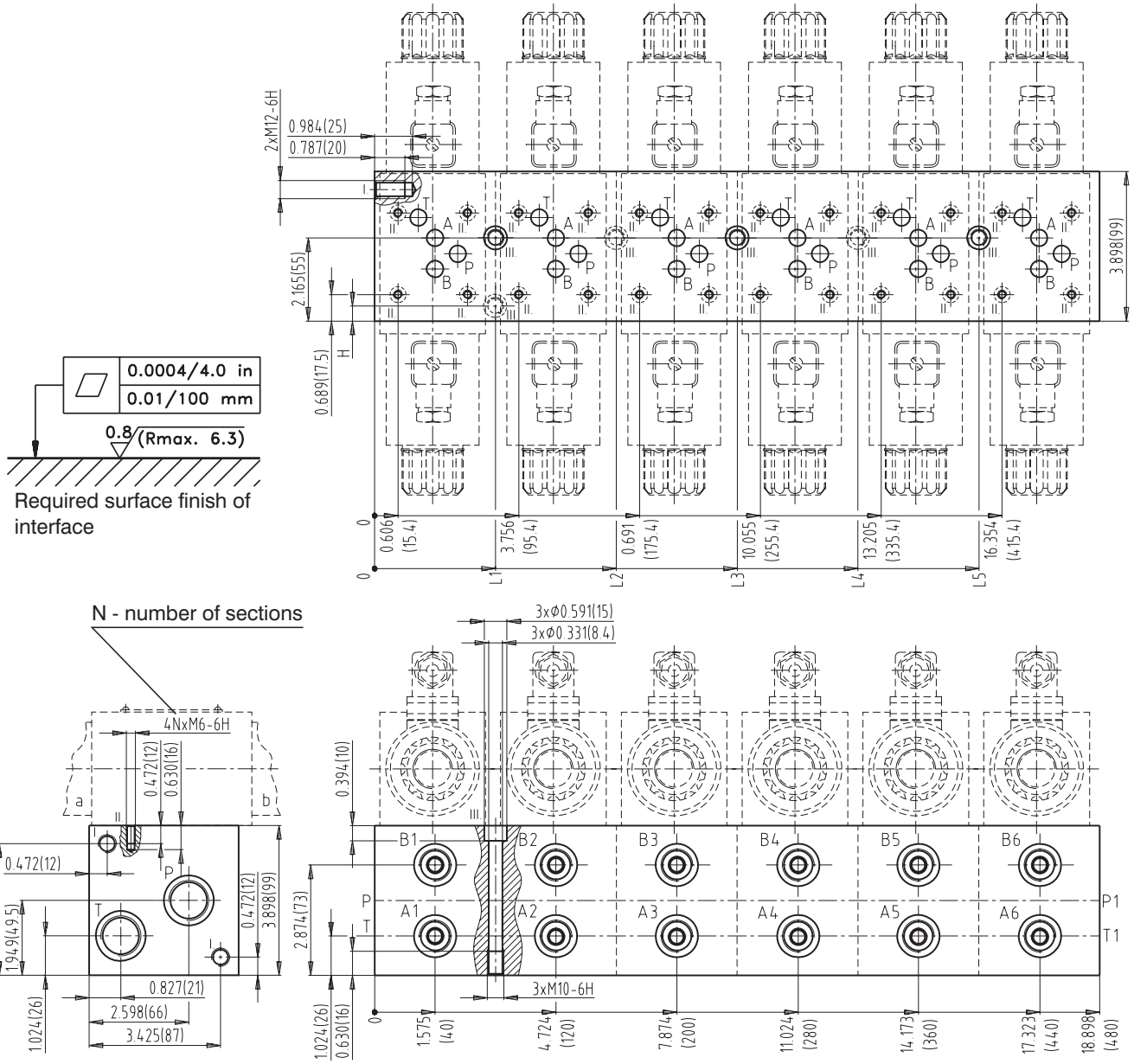
Required surface finish of interface

Port	A, B	P, T, P1, T1
Thread	G1/2	G3/4
Depth of thread	0.591 (15)	0.669 (17)
Counterbore	∅1.102 (28)	∅1.299 (33)
Depth of counterbore	0.020 (0.5)	0.020 (0.5)

Plate Dimensions

Dimensions in inches and millimetres (in brackets)

Plates with 2 ... 6 sections



Number of sections	L1	L2	L3	L4	L5	H
2	3.150 (80)	-	-	-	-	0.394 (10)
3	3.150 (80)	6.299 (160)	-	-	-	-
4	3.150 (80)	-	9.449 (240)	-	-	-
5	3.150 (80)	-	9.449 (240)	12.598 (320)	-	-
6	3.150 (80)	-	9.449 (240)	-	15.748 (400)	-

Port	A1...A6, B1...B6	P, T, P1, T1
Thread	G1/2	G3/4
Depth of thread	0.591 (15)	0.669 (17)
Counterbore	∅1.102 (28)	∅1.299 (33)
Depth of counterbore	0.020 (0.5)	0.020 (0.5)

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ARGO HYTOS

Basic block

Size 06 • p_{max} up to 320 bar

ZB06

HA 0010
2/2002

Replaces
HA 0010 11/98

- **Block for mounting on the tank covers of the power packs**
- **8 models**
- **Enable connection of PD connecting plates – see catalogue HA 0006**
- **Mounting cavity for pressure relief valve VPP1 or VPP2 – see catalogue HA 5061 and HA 5062**
- **Installation dimensions to DIN 24 340-A6 and ISO 4401-AB-03-4-A**

Ordering Code

ZB06 □ - □ □

Basic block

Nominal size

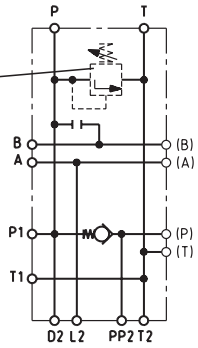
Model
with check valve — **A**
without check valve — **B**

Connection
1 without connection of P - B
2 with connection of P - B

Model
1 without drain valve
2 with drain valve

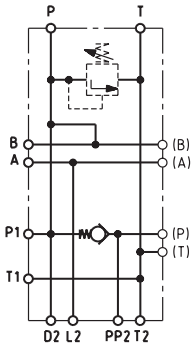
Functional symbols

ZB06A-11

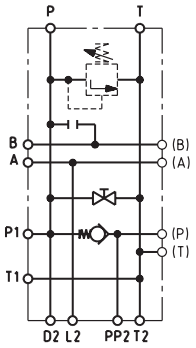


Pressure relief valve *

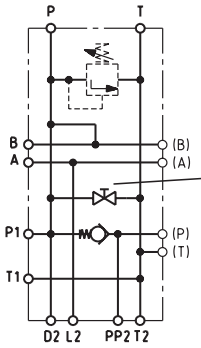
ZB06A-12



ZB06A-21

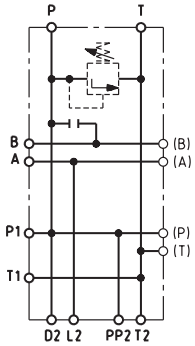


ZB06A-22

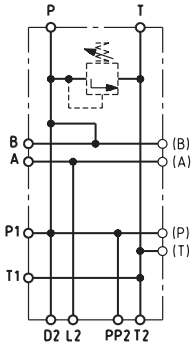


Drain valve

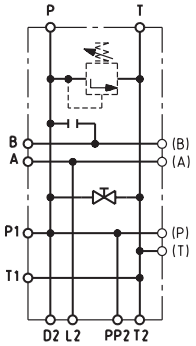
ZB06B-11



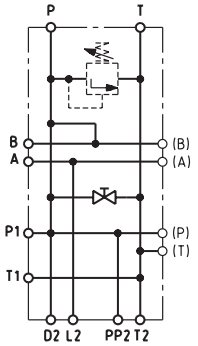
ZB06B-12



ZB06B-21



ZB06B-22



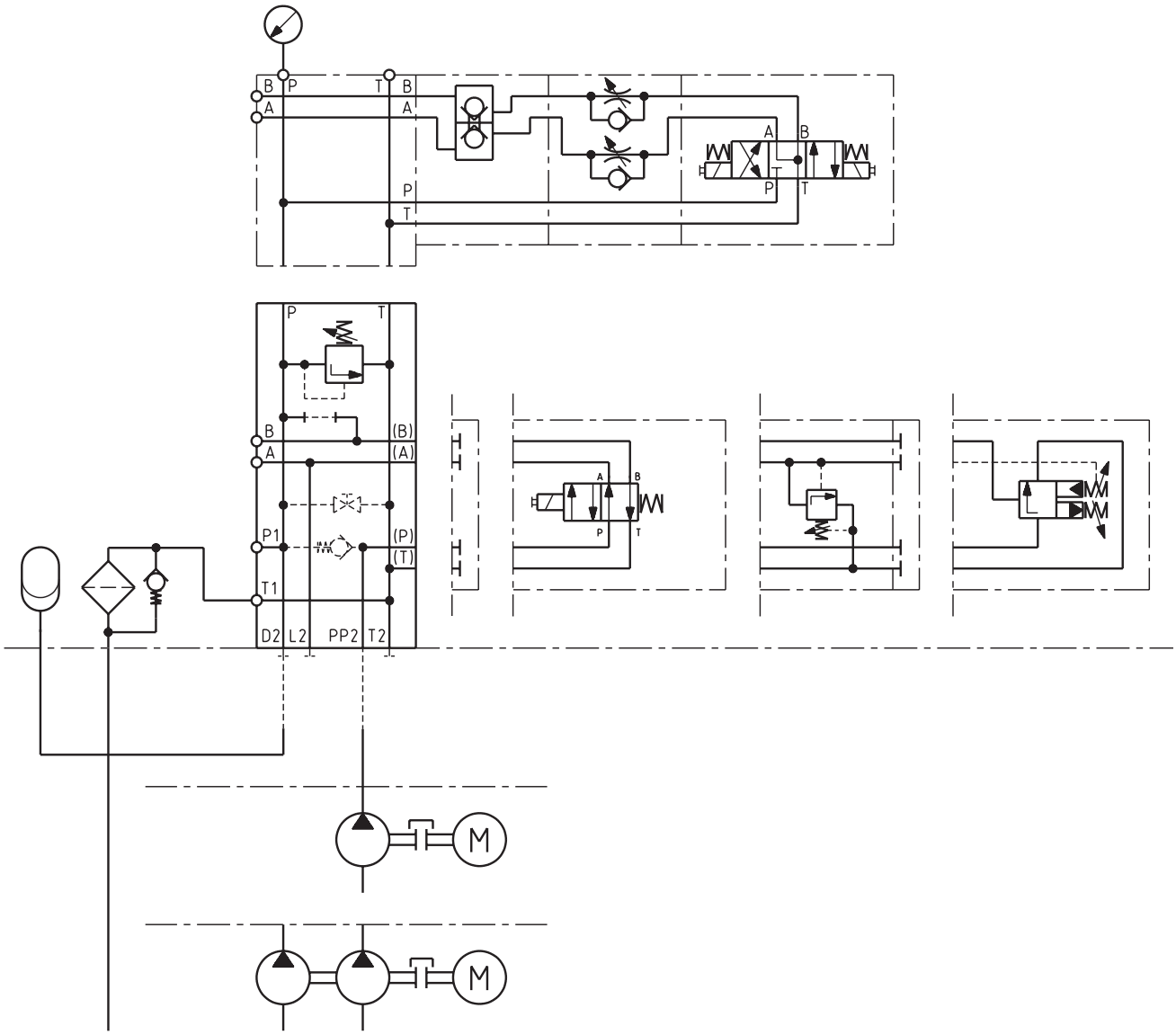
* Pressure relief valve does not belong to delivery.

Type Survey

Type	Ordering number	Pressure [bar]	Weight [kg]
ZB06A-11	760-0002	320	4.7
ZB06A-12	760-0004	320	4.7
ZB06A-21	760-0003	320	4.7
ZB06A-22	760-0005	320	4.7
ZB06B-11	760-0012	320	4.7
ZB06B-12	760-0014	320	4.7
ZB06B-21	760-0013	320	4.7
ZB06B-22	760-0015	320	4.7

Hydraulic Circuit

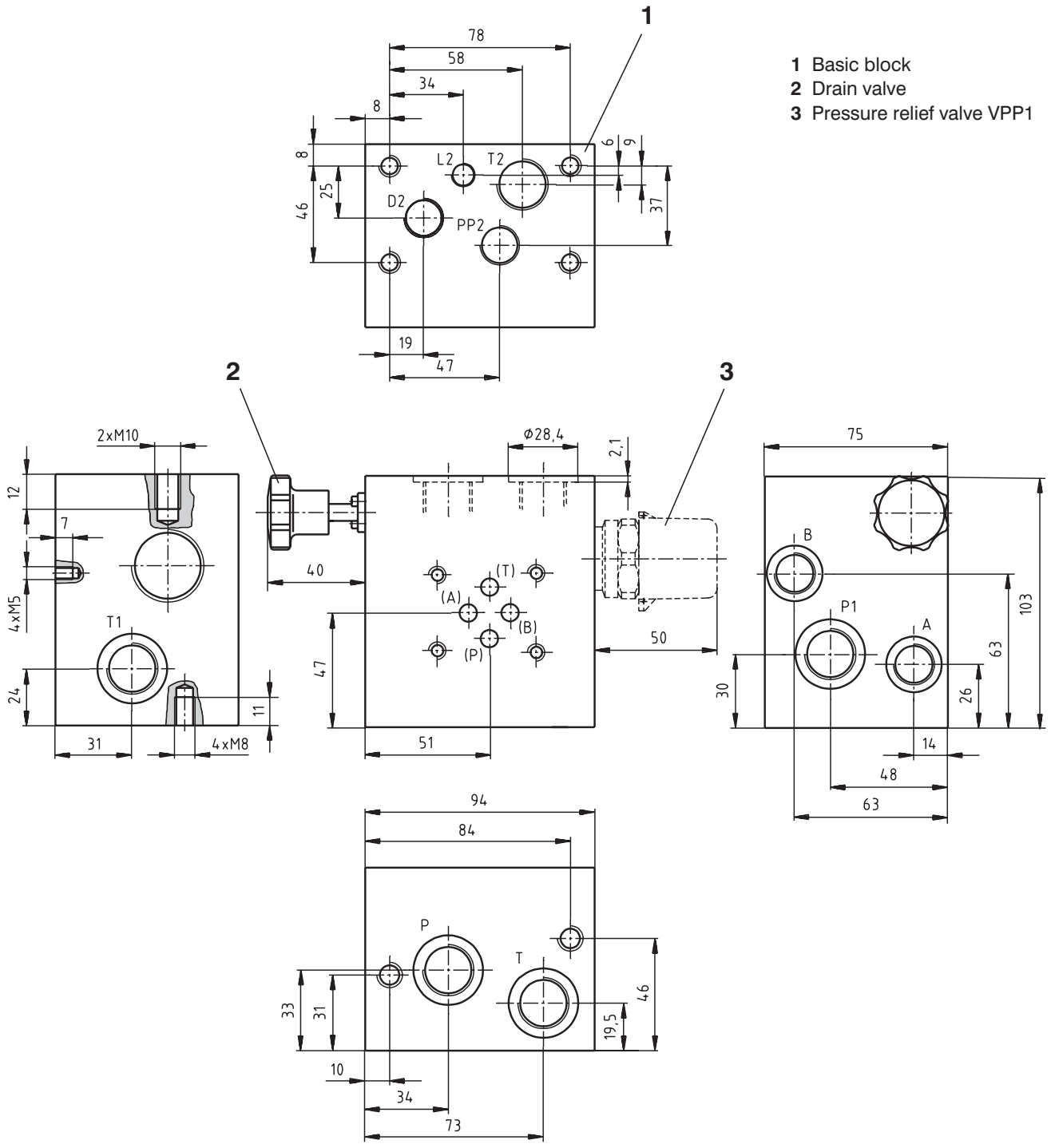
Typical circuit



This block enables a great number of circuit arrangements. The above shown example represents only one of many possible variants.

Valve Dimensions

Dimensions in millimeters



1 Basic block
2 Drain valve
3 Pressure relief valve VPP1

Port	P	T	P1	T1	T2	A	B	PP2	D2	L2
Thread	G1/2	G1/2	G1/2	G1/2	G1/2	G3/8	G3/8	G3/8	G3/8	G1/8
O-Ring	23.4x2.62	23.4x2.62	-	-	-	-	-	-	-	-

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Basic manifold with pressure relieve valve

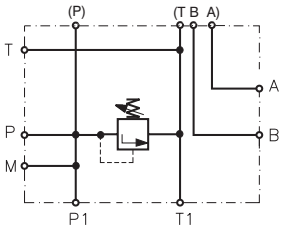
DP6

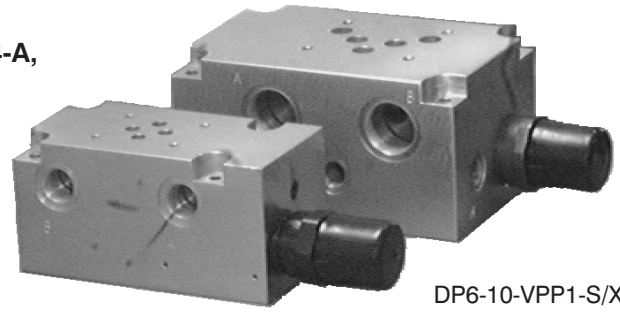
Size 06, 10 • ...4600 PSI (320 bar) • ...13.2 US GPM (50 L/min) ...31.7 US GPM (120 L/min)

HA 0012
2/2000

Replaces
HA 0012 12/98

- ❑ **Basic manifold for hydraulic systems**
- ❑ **6 pressure ranges**
- ❑ **Installation dimensions to ISO 4401-AB-03-4-A, ISO 4401-AC-05-4-A, DIN 24 340-A6 and DIN 24 340-A10**





DP6-10-VPP1-S/XX

DP6-06-VPP1-S/XX

Functional Description

Basic manifolds DP6 are used for hydraulic systems which require only one directional valve assembly. With regard to its versatile connection possibilities, it is suitable either for horizontal mounting of the pump drive unit on the tank cover, or for vertical arrangement with the pump situated in the tank under the oil level.

The steel manifold can be supplied in two sizes. A direct operated pressure relief valve is available in six pressure ranges.
The basic surface treatment of the block is zinc coating.

Ordering Code

DP6 - ☐ - ☐ - ☐ / ☐

Basic block

Nominal size

06 mm	**06**
10 mm	**10**

Pressure relief valve

VPP1 - 06, 10	**VPP1**
VPP2 - 06	**VPP2**

Druckstufe

2.5	up to 360 PSI (25 bar)
6.3	up to 914 PSI (63 bar)
10	up to 1450 PSI (100 bar)
16	up to 2300 PSI (160 bar)
25	up to 3600 PSI (250 bar)
32	up to 4600 PSI (320 bar)

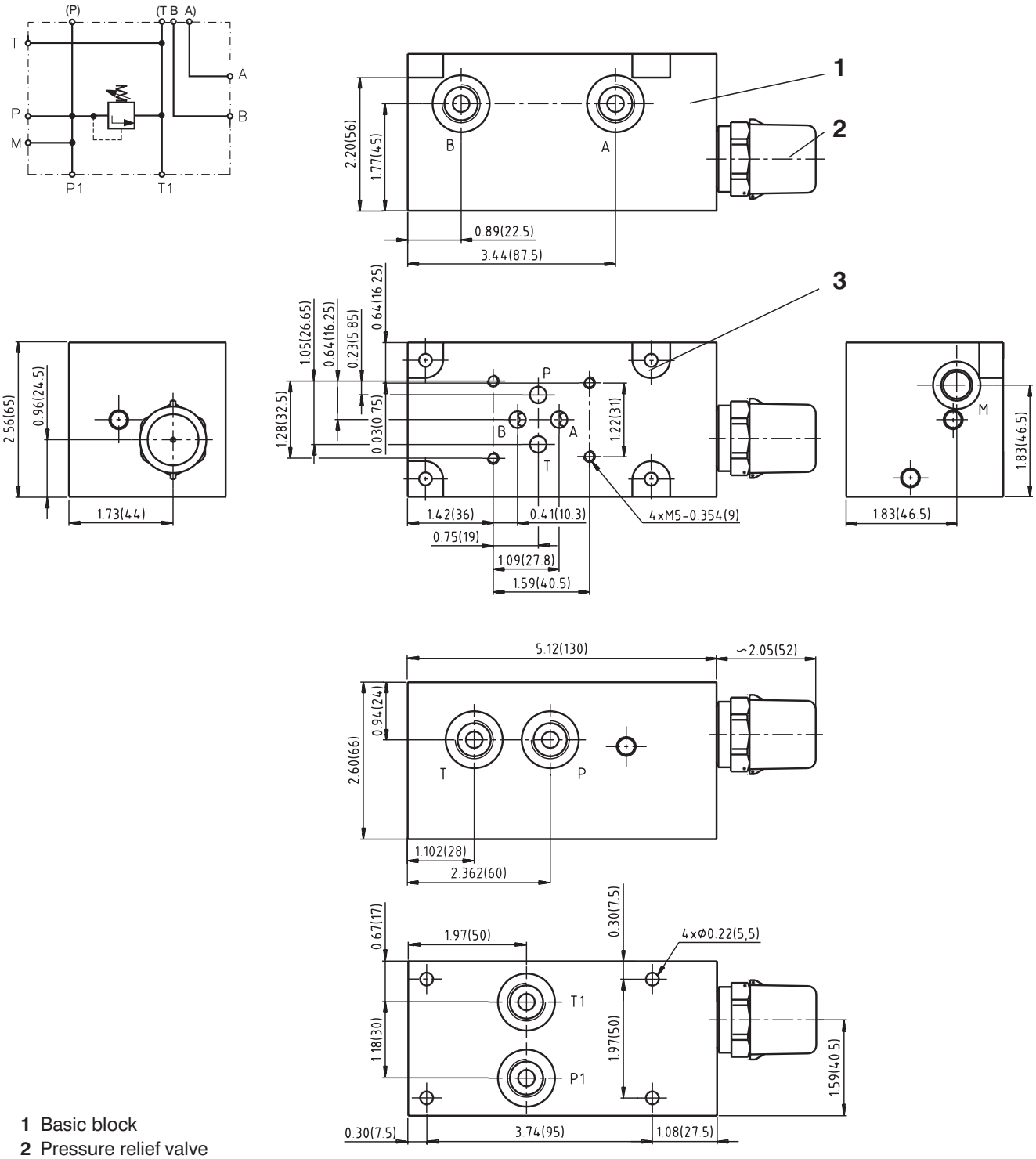
Adjustment element

S	Screw with inside hexagon 0.197 (5 mm)
R	Hand knob

Valve Dimensions

Dimensions in inches and millimeters (in brackets)

DP6-06-VPP1-S/XX



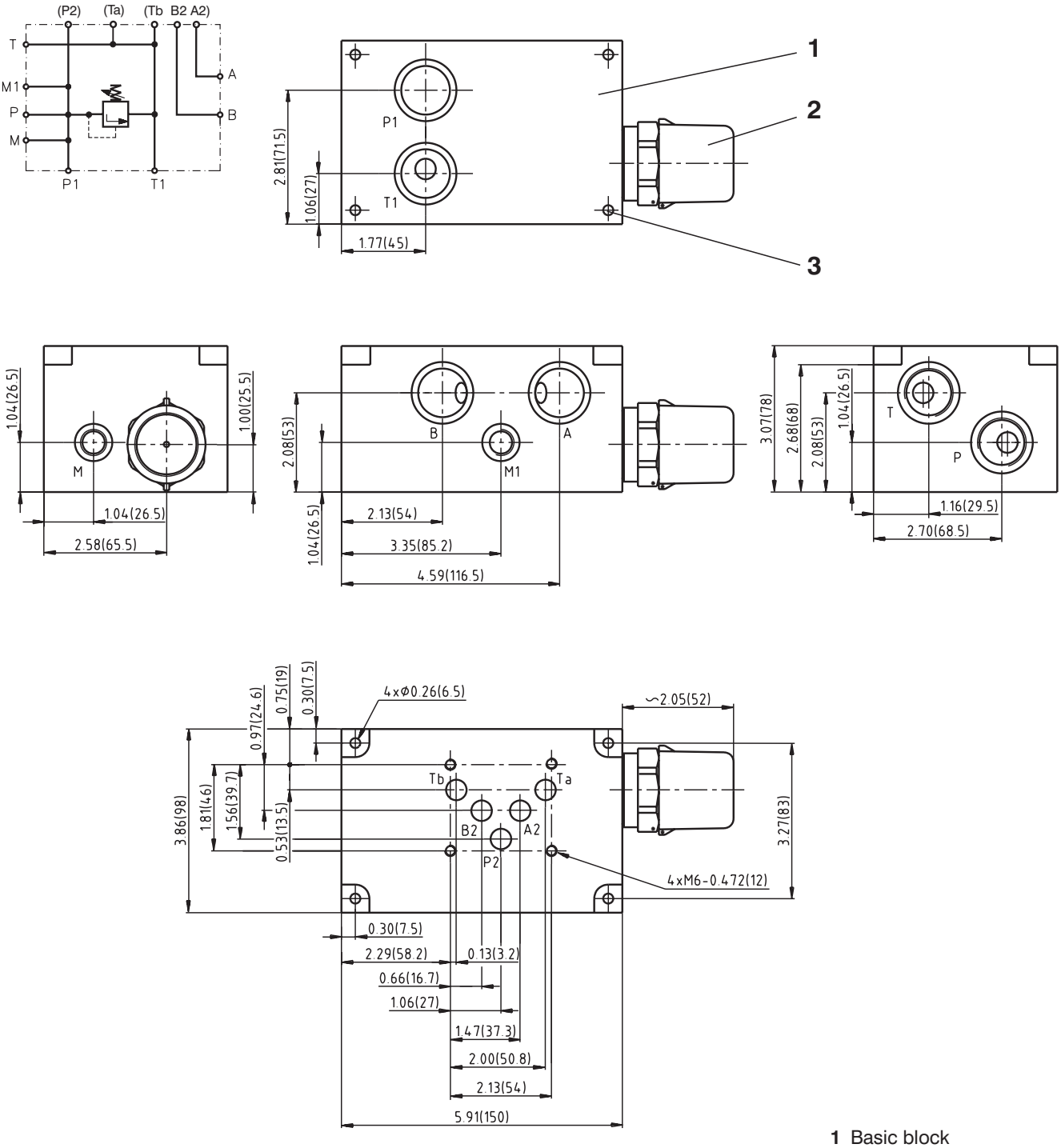
1 Basic block
2 Pressure relief valve
3 4 mounting holes

Port	A	B	P	T	P1	T1	M
Thread	G3/8	G3/8	G3/8	G3/8	G3/8	G3/8	G1/4
Counterbore	∅0.945 (24)	∅0.945 (24)	∅0.945 (24)	∅0.945 (24)	∅1.102 (28)	∅1.102 (28)	∅0.787 (20)
Depth of counterbore	0.039 (1)	0.039 (1)	0.039 (1)	0.039 (1)	0.217 (5.5)	0.217 (5.5)	0.039 (1)

Valve Dimensions

Dimensions in inches and millimeters (in brackets)

DP6-10-VPP1-S/XX



1 Basic block
2 Pressure relief valve
3 4 mounting holes

Port	A	B	P	T	P1	T1	M	M1
Thread	G3/4	G3/4	G3/4	G3/4	G3/4	G3/4	G1/4	G1/4
Counterbore	∅1.299 (33)	∅1.299 (33)	∅1.299 (33)	∅1.299 (33)	∅1.496 (38)	∅1.496 (38)	∅0.787 (20)	∅0.787 (20)
Depth of counterbore	0.039 (1)	0.039 (1)	0.039 (1)	0.039 (1)	0.217 (5.5)	0.217 (5.5)	0.039 (1)	0.039 (1)

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ARGO HYTOS

In-line-manifolds

Size 06 • p_{max} up to 320 bar

DR1- 06

HA 0016
6/2004

- ❑ **For in-line mounting of hydraulic valves**
- ❑ **Parallel connection of ports P and T**
- ❑ **1 ...8 sections possible**
- ❑ **Installation dimensions size 06 to ISO 4401 CETOP - RP 121H**

Ordering Code

DR1-06 / ☐ ☐

In-line connecting plate

Nominal size

0	without cavities*
1	with one cavity for pressure valve
2	with two cavities for pressure and relief valve

*Version DR1-06/0 only for 2-8 sections

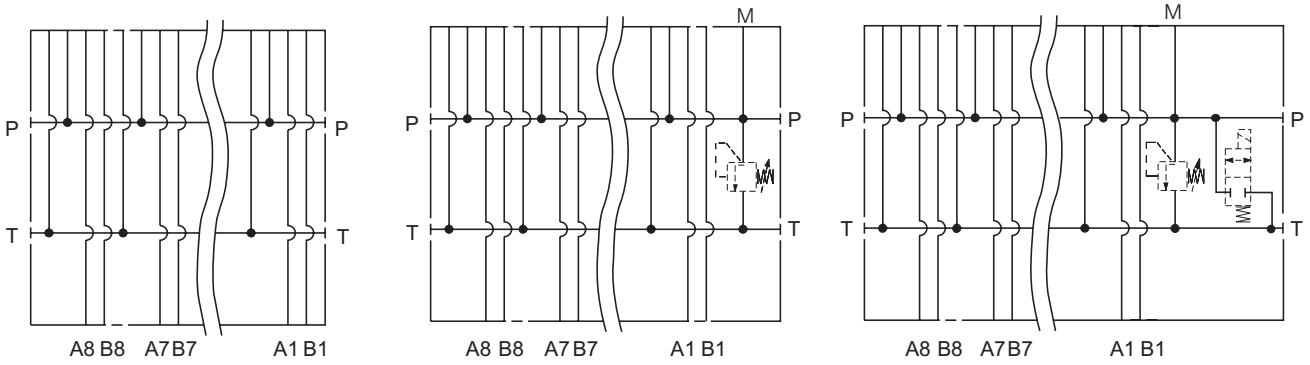
	Number of sections
1	1 section
2	2 sections
3	3 sections
4	4 sections
5	5 sections
6	6 sections
7	7 sections
8	8 sections

Connection

DR1 06/ ☐ 0
P, T.....G1/2
A, B.....G3/8

DR1 06/ ☐ 1
P, T.....G1/2
A, B.....G3/8
M.....G1/4
valve cavity 3/4-16-UNF
(description 08-01-0-0)

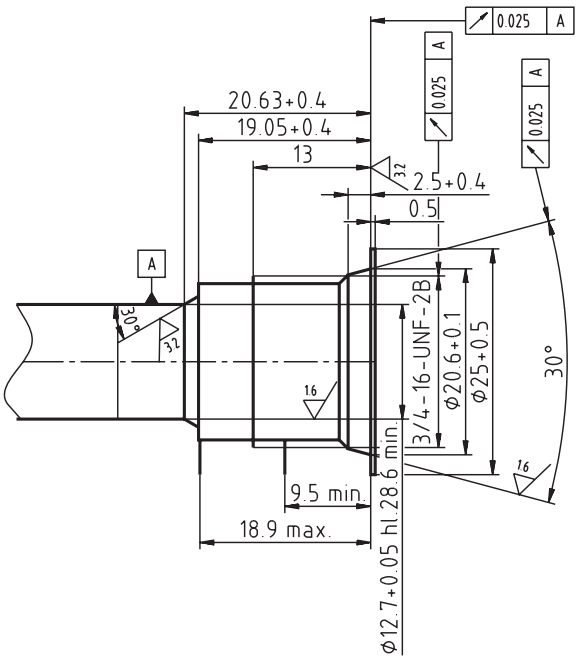
DR1 06/ ☐ 2
P, T.....G1/2
A, B.....G3/8
M.....G1/4
valve cavity 3/4-16-UNF
(description 08-01-0-0)



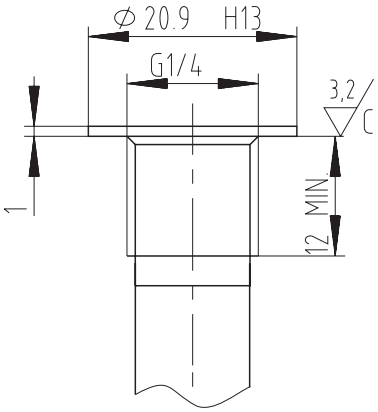
Cavities

Dimensions in millimeters

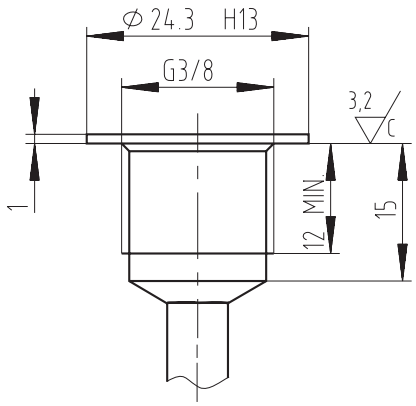
Cavity for valves 3/4-16- UNF, cavity A2



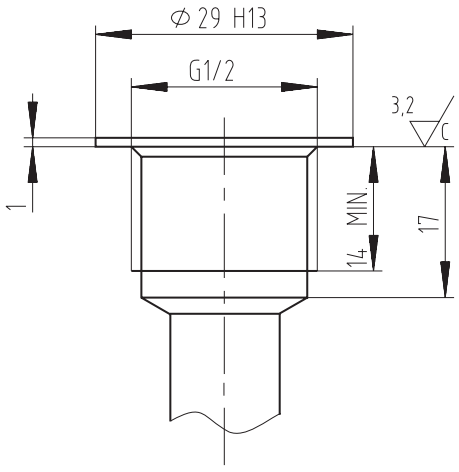
Port cavity G1/4...M



Port cavity G3/8... A, B



Port cavity G1/2...P, T

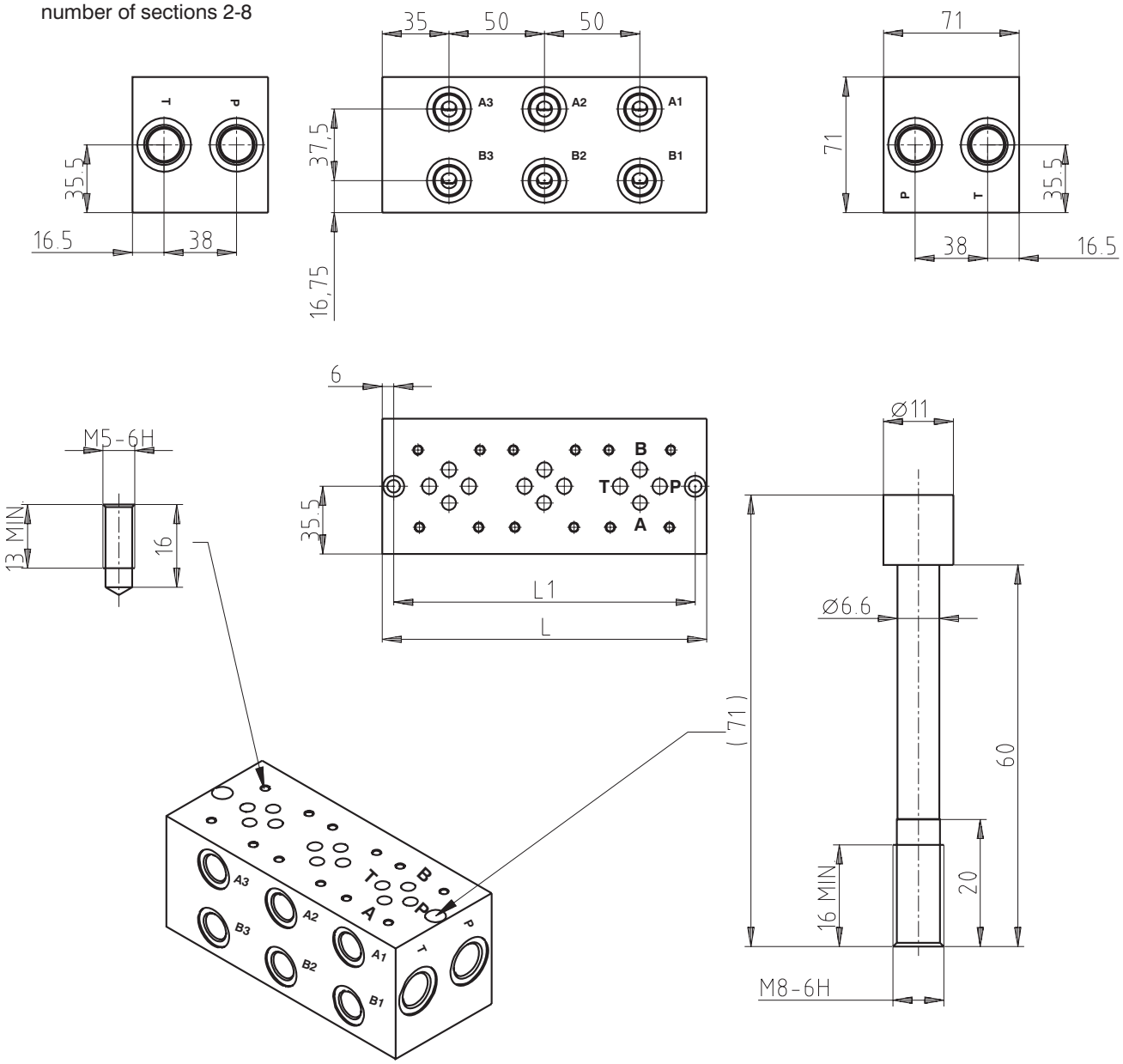


Valve Dimensions

Dimensions in millimeters

DR1 06 / □ 0

number of sections 2-8



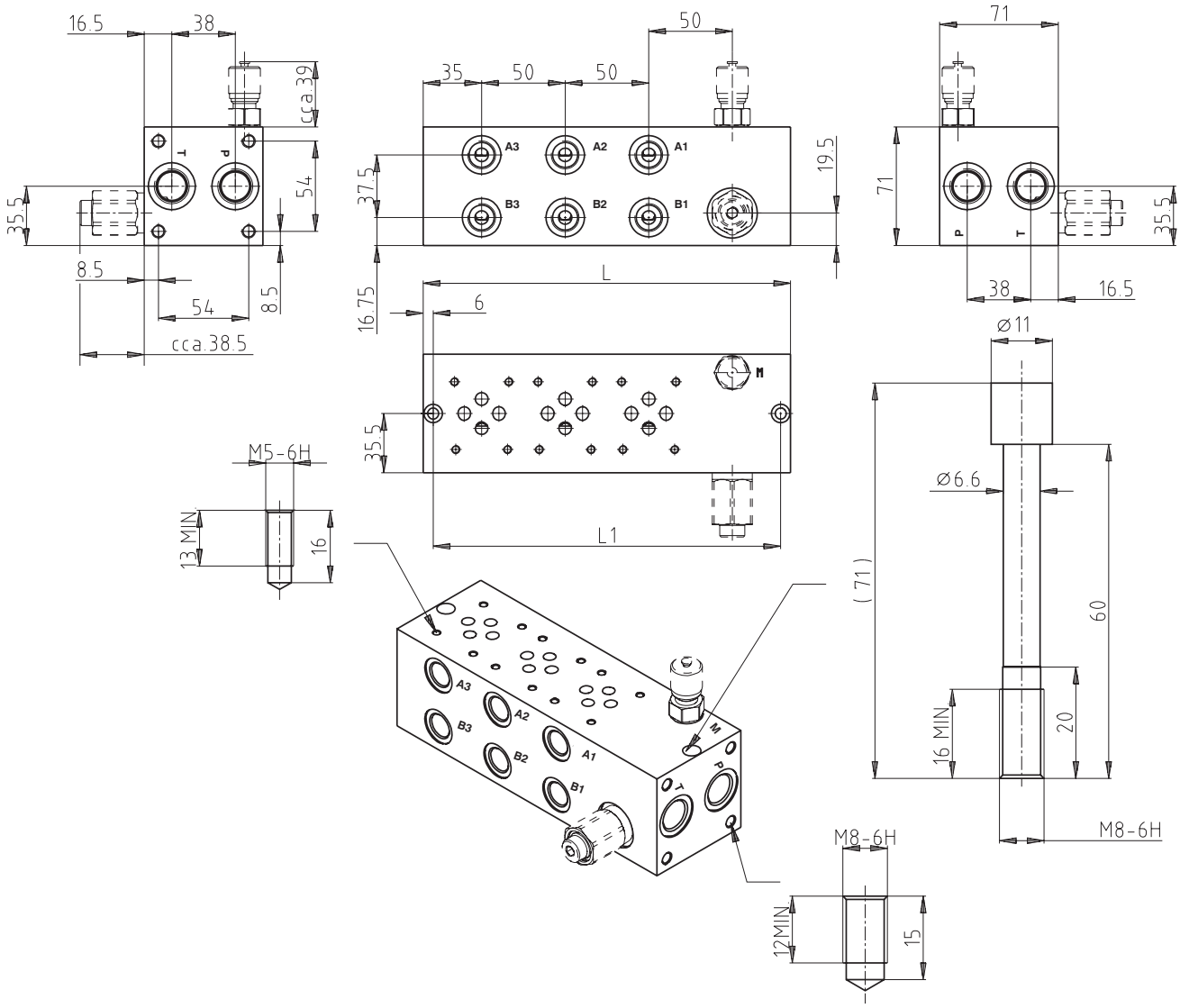
Number of sections	L (mm)	L1 (mm)	Ordering number
2	120	108	760-0330
3	170	158	760-0331
4	220	208	760-0332
5	270	258	760-0333
6	320	308	760-0334
7	370	358	760-0335
8	420	408	760-0336

Valve Dimensions

Dimensions in millimeters

DR1 06 / □ 1

number of sections 1-8



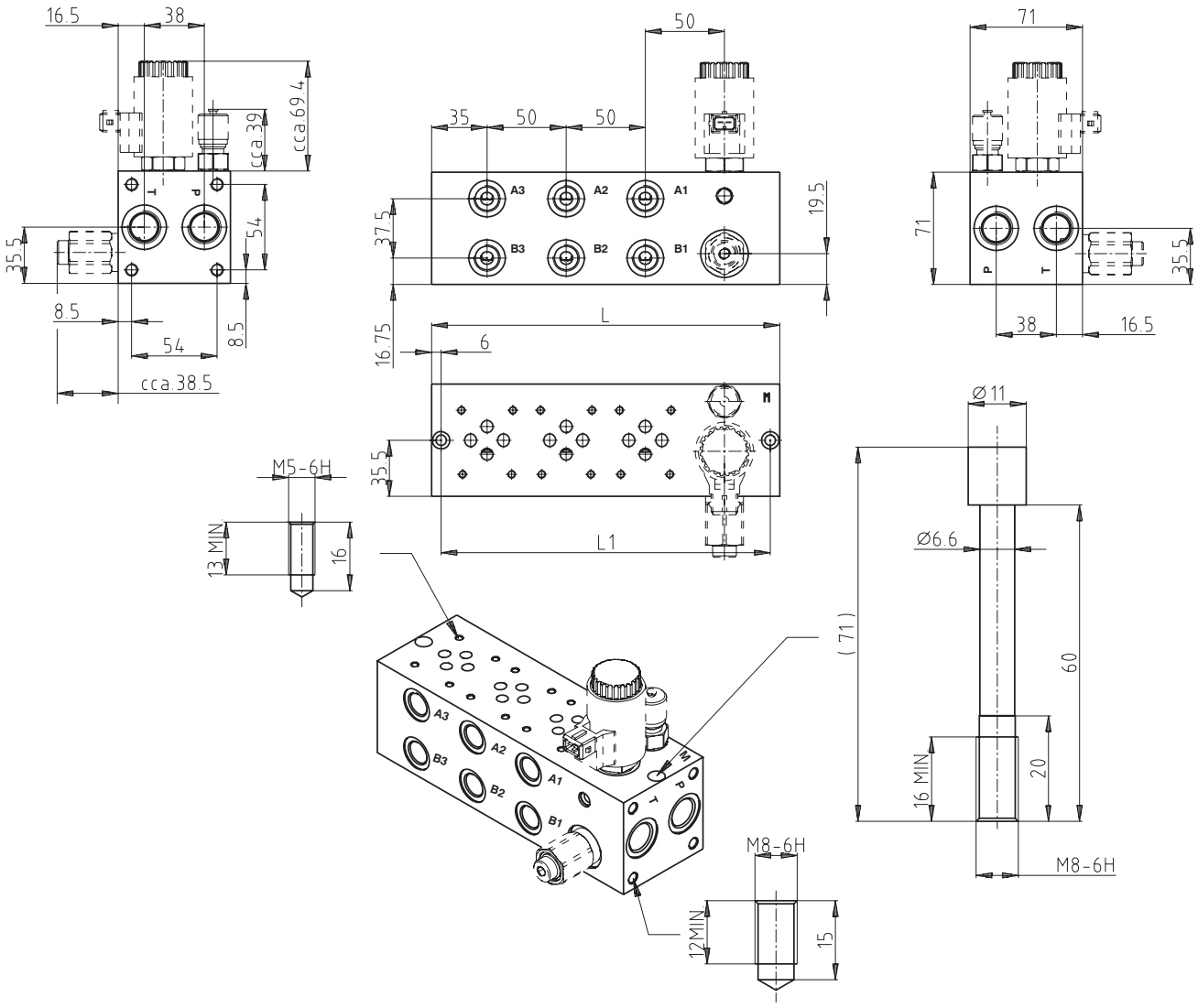
Number of sections	L (mm)	L1 (mm)	Ordering number
1	120	108	760-0337
2	170	158	760-0338
3	220	208	760-0339
4	270	258	760-0340
5	320	308	760-0341
6	370	358	760-0342
7	420	408	760-0343
8	470	458	760-0344

Valve Dimensions

Dimensions in millimeters

DR1 06 / □ 2

number of sections 1-8



Number of sections	L (mm)	L1 (mm)	Ordering number
1	120	108	760-0345
2	170	158	760-0346
3	220	208	760-0347
4	270	258	760-0348
5	320	308	760-0349
6	370	358	760-0350
7	420	408	760-0351
8	470	458	760-0352

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ARGO HYTOS

In-line-manifolds

Size 04 • p_{max} up to 320 bar

DR1- 04

HA 0017
6/2004

- ❑ **For in-line mounting of hydraulic valves**
- ❑ **Parallel connection of ports P and T**
- ❑ **1 ...8 sections possible**
- ❑ **Installation dimensions size 04 to ISO 4401 CETOP - RP 121H**

Ordering Code

DR1-04 / ☐ ☐

In-line connecting plate

Nominal size

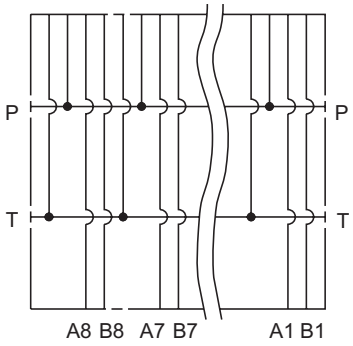
0	without cavities*
1	with one cavity for pressure valve
2	with two cavities for pressure and relief valve

*Version DR1-04/0 only for 2-8 sections

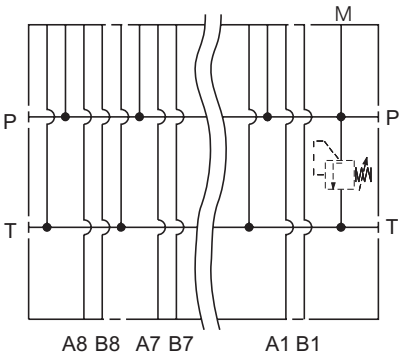
	Number of sections
1	1 section
2	2 sections
3	3 sections
4	4 sections
5	5 sections
6	6 sections
7	7 sections
8	8 sections

Connection

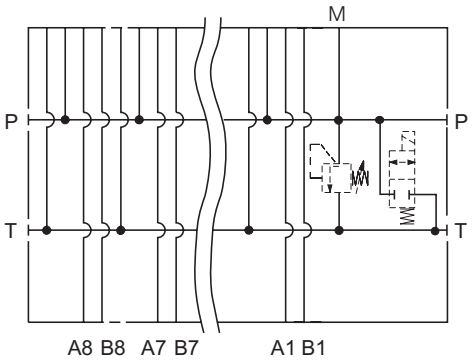
DR1 04/ □ 0
P, T.....G3/8
A, B.....G1/4



DR1 04/ □ 1
P, T.....G3/8
A, B.....G1/4
M.....G1/4
valve cavity 3/4-16-UNF
(description 08-01-0-0)



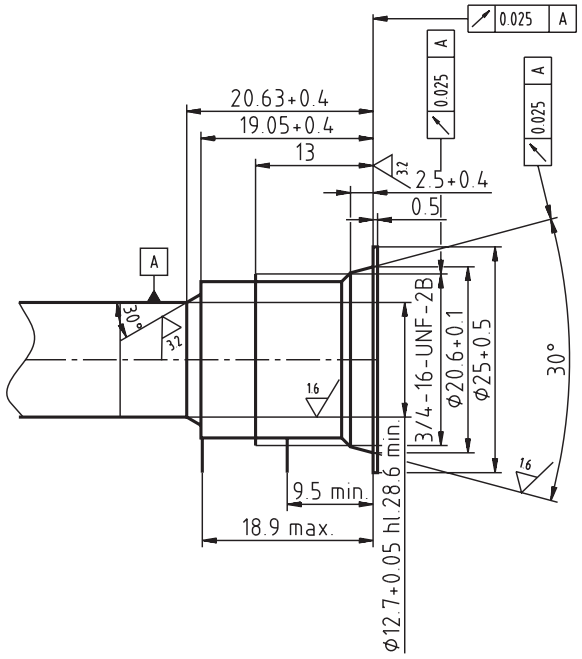
DR1 04/ □ 2
P, T.....G3/8
A, B.....G1/4
M.....G1/4
valve cavity 3/4-16-UNF
(description 08-01-0-0)



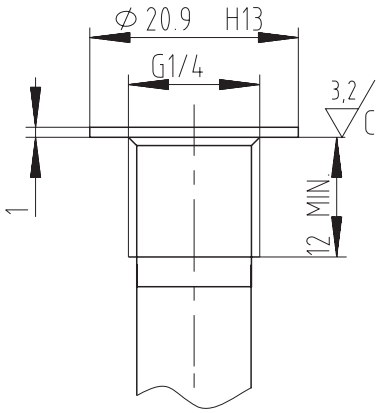
Cavities

Dimensions in millimeters

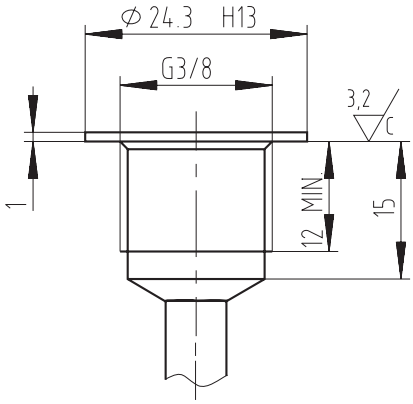
Cavity for valves 3/4-16- UNF, cavity A2



Port cavity G1/4...A, B, M



Port cavity G3/8... P, T

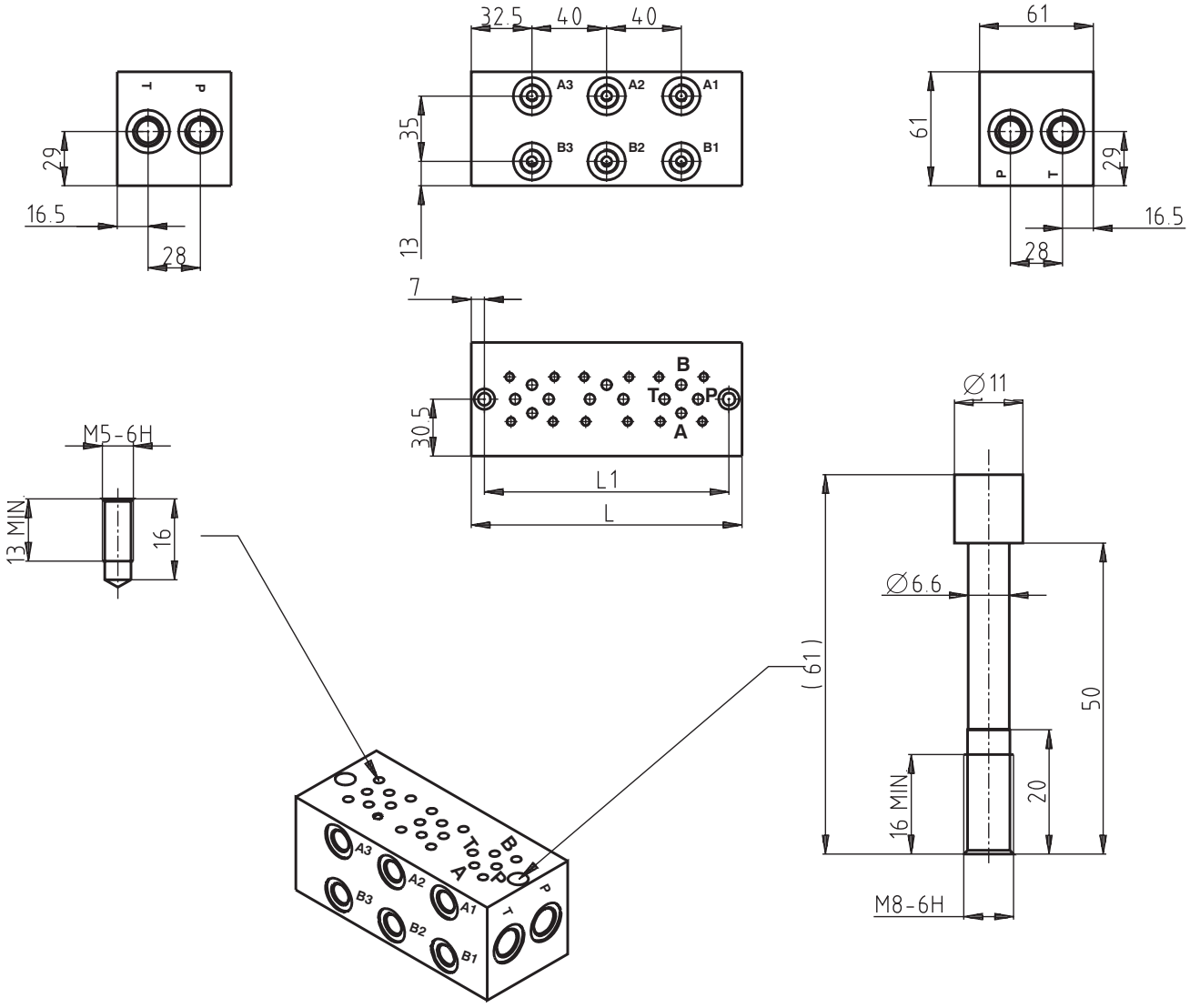


Valve Dimensions

Dimensions in millimeters

DR1 04 / □ 0

number of sections 2-8



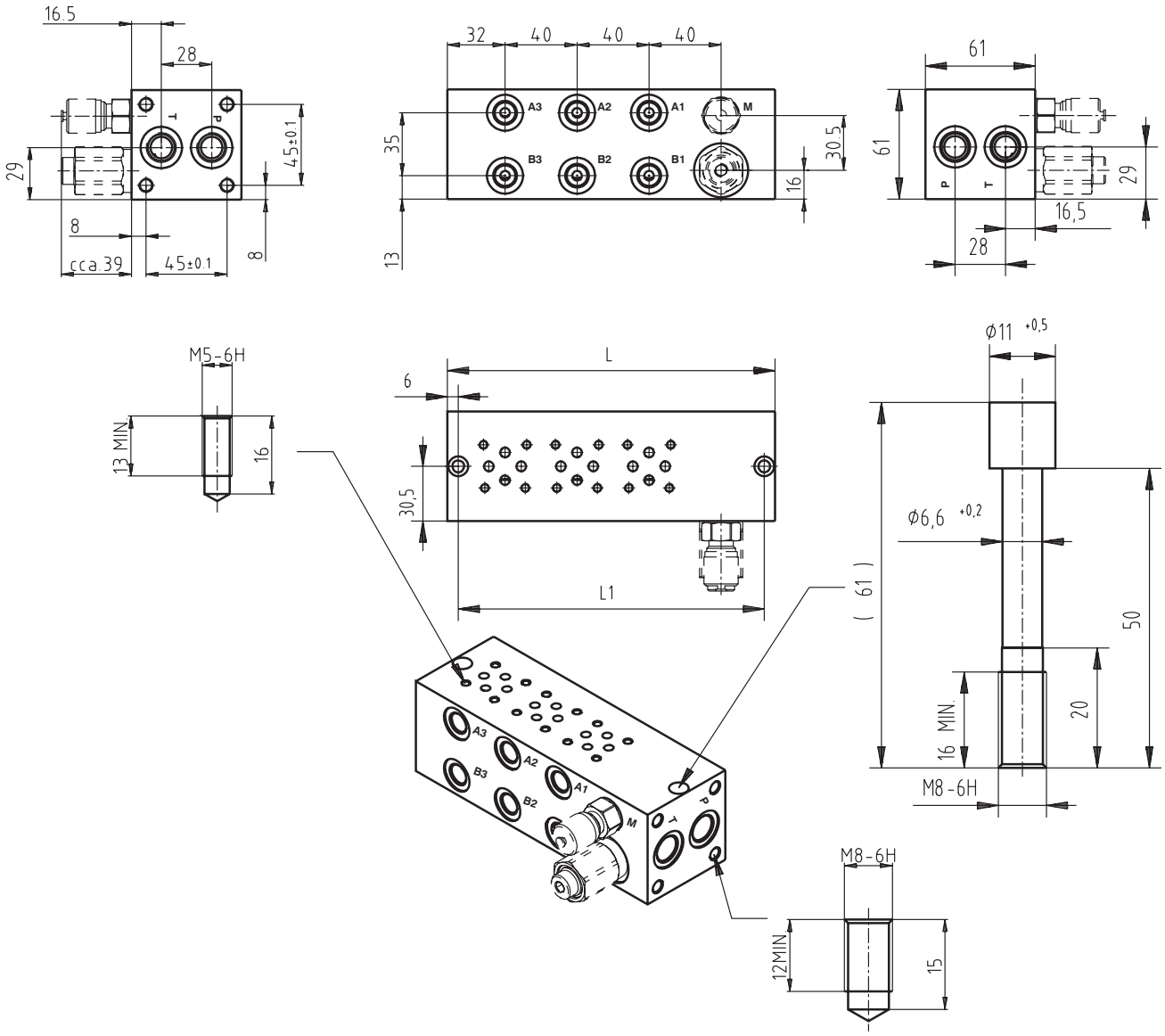
Section number	L (mm)	L1 (mm)	Ordering number
2	105	91	760-0300
3	145	131	760-0301
4	185	171	760-0302
5	225	211	760-0303
6	265	251	760-0304
7	305	291	760-0305
8	345	331	760-0306

Valve Dimensions

Dimensions in millimeters

DR1 04 / ☐ 1

number of sections 1-8



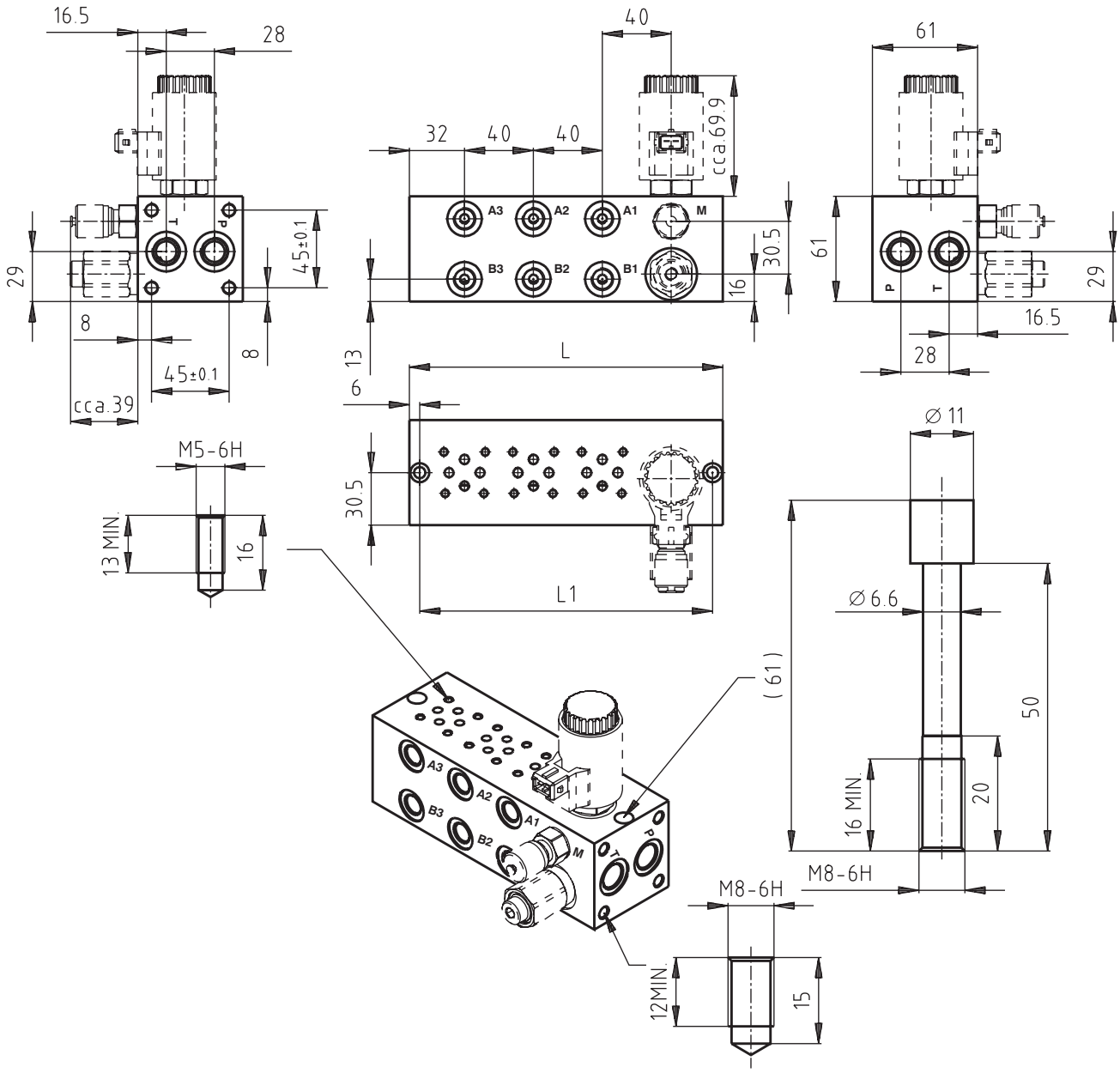
Section number	L (mm)	L1 (mm)	Ordering number
1	102	90	760-0307
2	142	130	760-0308
3	182	170	760-0309
4	222	210	760-0310
5	262	250	760-0311
6	302	290	760-0312
7	342	330	760-0313
8	382	370	760-0314

Valve Dimensions

Dimensions in millimeters

DR1 04 / □ 2

number of sections 1-8



Section number	L (mm)	L1 (mm)	Ordering number
1	102	90	760-0315
2	142	130	760-0316
3	182	170	760-0317
4	222	210	760-0318
5	262	250	760-0319
6	302	290	760-0320
7	342	330	760-0321
8	382	370	760-0322

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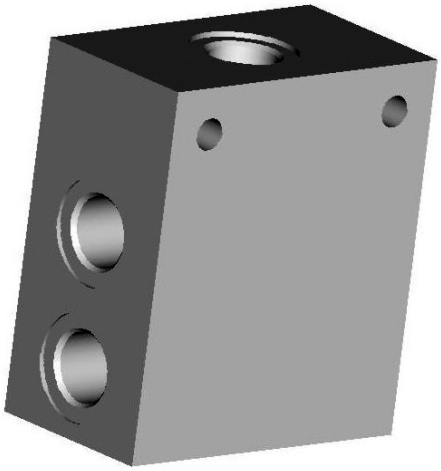
www.argo-hytos.com

- Pipeline housing for cartridge valves
- Installation dimensions to ISO 4401 and SAE JS14
- Materials available are aluminum and steel



Ordering Code

SB- □ □ - □ □ □

Screw in cartridge, Body

Form boring:
3/4 - 16 UNF - 2B **A**

Number of ways
2
3
4

Body configuration **01**

Body material
Aluminium **AL**
Steel, Surface treatment Zn **ST**

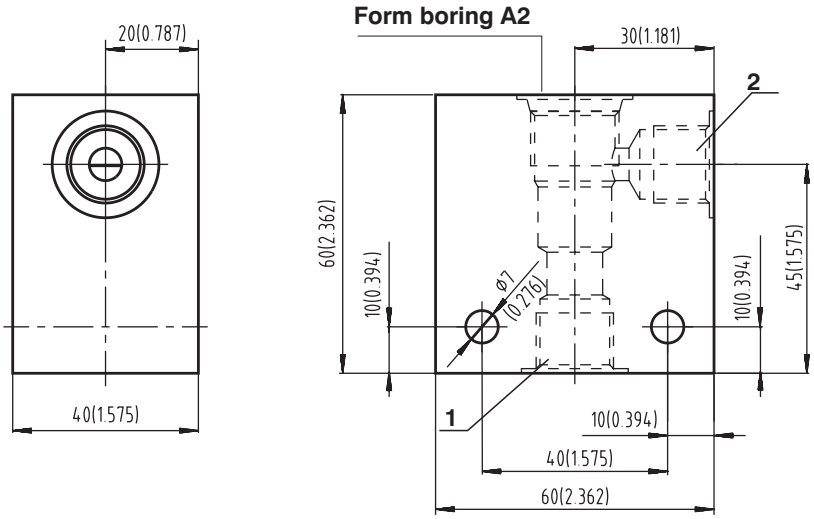
Connecting size
G3/8 **03**
SAE 6 **02**

Body for 2-Way SIC Valve

Dimensions millimeters (inches)

Body material	Pressure	Weight
Aluminium	up to 250 bar (3626 PSI)	0.35 kg (0,77 lbs)
Steel	up to 420 bar (6091 PSI)	0.98 kg (2,16 lbs)

Body configuration 01



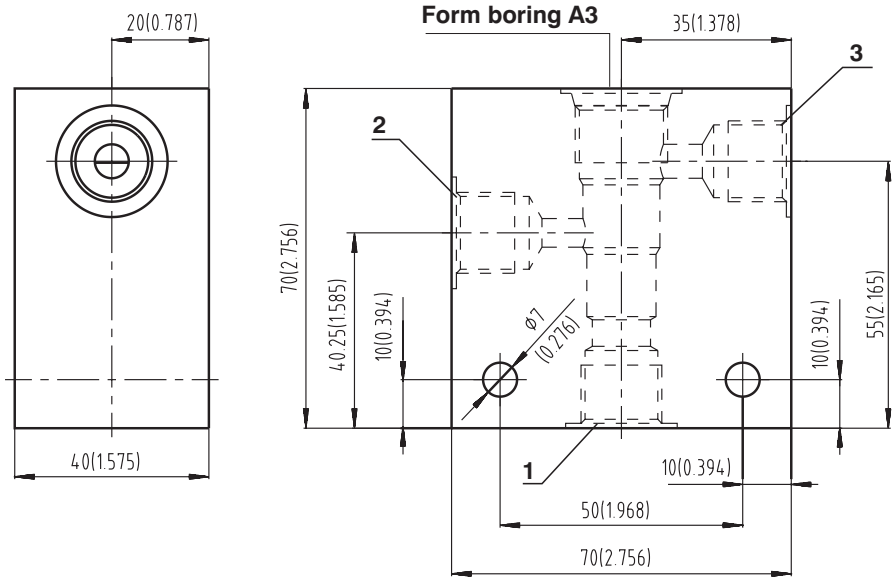
Connections	
1	2
G3/8	
SAE 6	

Body for 3-Way SIC Valve

Dimensions millimeters (inches)

Body material	Pressure	Weight
Aluminium	up to 250 bar (3626 PSI)	0,48kg (1,05 lbs)
Steel	up to 420 bar (6091 PSI)	0,45kg (0,99 lbs)

Body configuration 01



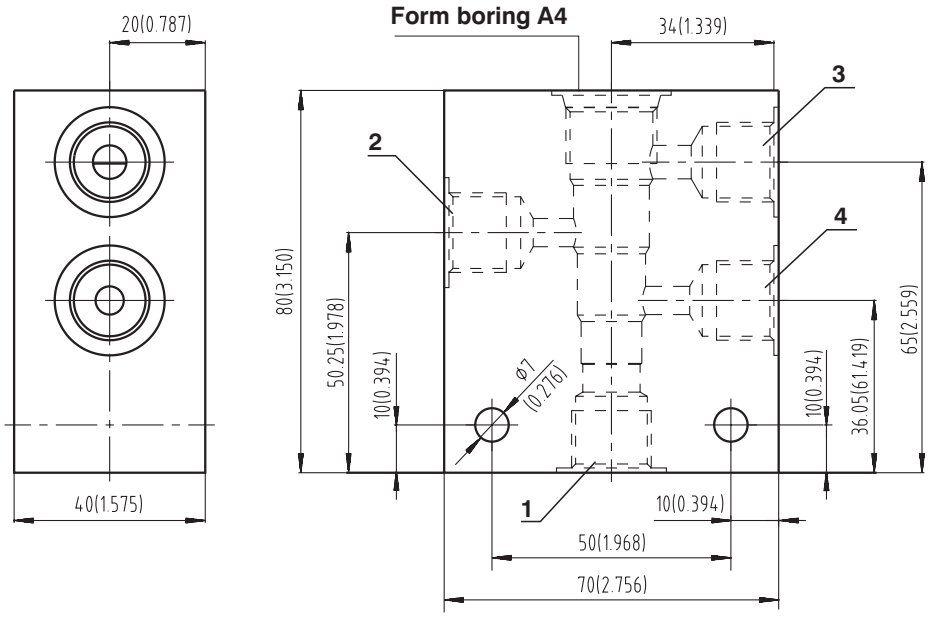
Connections		
1	2	3
G3/8		
SAE 6		

Body for 4-Way SIC Valve

Dimensions millimeters (inches)

Body material	Pressure	Weight
Aluminium	up to 250 bar (3626 PSI)	0,54 kg (1,19 lbs)
Steel	up to 420 bar (6091 PSI)	0,53 kg (1,17 lbs)

Body configuration 01



Connections			
1	2	3	4
G3/8			
SAE 6			

Caution!

- Recommended fixing bolts M6 x 55 DIN 912-10.9, bolt tightening torque 14^{+2} Nm
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- ❑ **Tools for form borings**
- ❑ **Tool material HSS-E**
- ❑ **Clamping: cylindrical shaft with Weldon-clamping flat**

Ordering code

S MT - □ □ - □

Cartridge valves

Form tooling

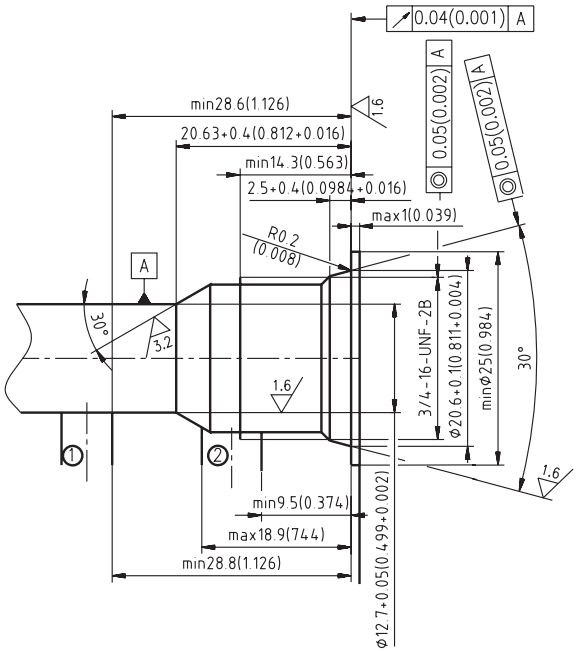
Form boring:
3/4 - 16 UNF - 2B — **A**

Kind of tool
Form drill — **D**
Form reamer — **R**
Plug tap — **T**

Number of ways
2-Way — **2**
3-Way — **3**
4-Way — **4**

2- Way Form Boring 3/4 - 16 UNF- 2B

Dimensions in mm (inches)

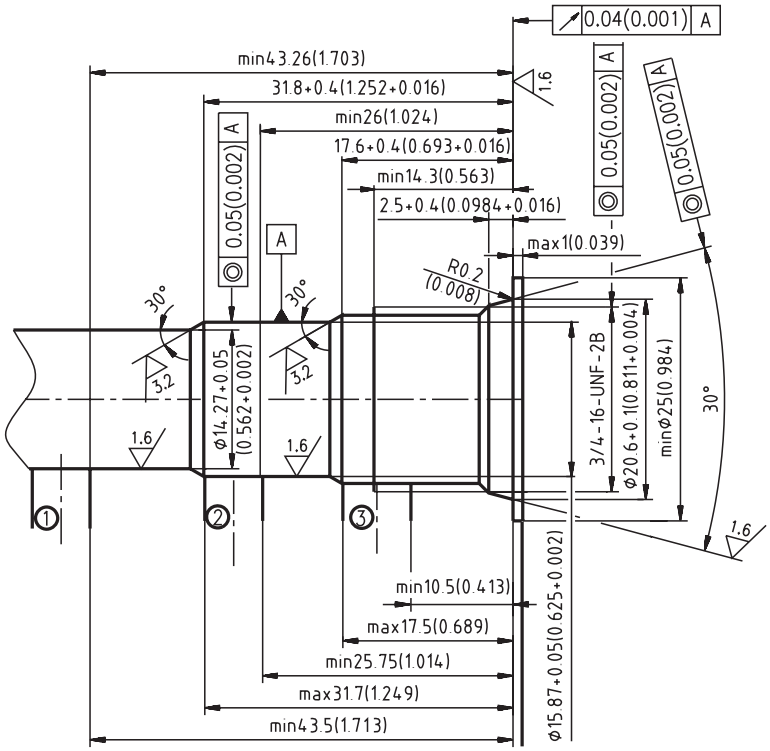


Cutting Conditions for HSSE Tools

Form boring: 3/4 - 16 – UNF – 2B with 2 ways		Form drill	Form reamer	Plug tap
Revolutions in 1/min	Aluminium	500	300	150
	Steel	200	150	80
Feeding in mm	Aluminium	120	100	-
	Steel	50	50	-
Type code		SMT-A2-D	SMT-A2-R	SMT-A2-T

3-Way Form Boring 3/4 - 16 UNF – 2B

Dimensions in mm (inches)

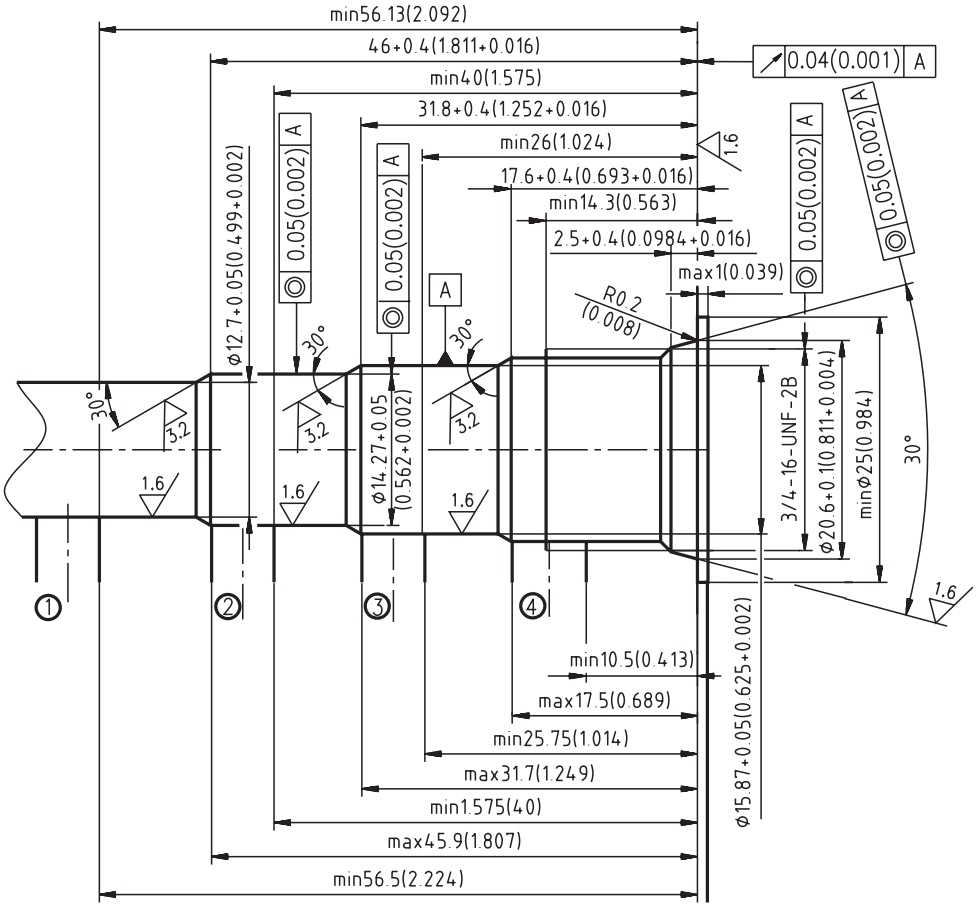


Cutting Conditions for HSSE Tools

Form boring: 3/4 - 16 – UNF – 2B with 3 ways		Form drill	Form reamer	Plug tap
Revolutions in 1/min	Aluminium	480	300	150
	Steel	200	170	80
Feeding in mm	Aluminium	110	100	-
	Steel	50	50	-
Type code		SMT-A3-D	SMT-A3-R	SMT-A3-T

4-Way Form Boring 3/4 - 16 UNF – 2B

Dimensions in mm (inches)



Cutting Conditions for HSSE Tools

Form boring: 3/4 - 16 – UNF – 2B with 4 ways		Form drill	Form reamer	Plug tap
Revolutions in 1/min	Aluminium	480	300	150
	Steel	200	170	80
Feeding in mm	Aluminium	110	100	-
	Steel	50	50	-
Type code		SMT-A4-D	SMT-A4-R	SMT-A4-T

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Studs and Nuts for Vertical Stacking Assemblies

Size 04

HA 0020
2/2006

Replaces
HA 0020 1/2000

Table of stud kits for vertical stacking assemblies in combination with directional control valve RPE3-04

Pressure switch Height 35 mm	Pressure reducing valve Height 30 mm	Pressure relief valve Height 35 mm	Pilot operated check valve Height 30 mm	Check valve Height 30 mm	Throttle valve Height 30 mm	Studs with rolled threads M_u = 5 Nm	Maximum working pressure p_{max} bar	Ordering number*
M-TR						M5 x 82	320	760-0070
	VRP2-04					M5 x 77	320	760-0089
		VPP2-04				M5 x 82	320	760-0070
			VJR1-04			M5 x 77	320	760-0089
				VJO1-04/M		M5 x 77	320	760-0089
					VSO1-04/M	M5 x 77	320	760-0089
M-TR	VRP2-04					M5 x 110	320	760-0074
M-TR		VPP2-04				M5 x 115	320	760-0146
M-TR			VJR1-04			M5 x 110	320	760-0074
M-TR				VJO1-04/M		M5 x 110	320	760-0074
M-TR					VSO1-04/M	M5 x 110	320	760-0074
	VRP2-04	VPP2-04				M5 x 110	320	760-0074
	VRP2-04		VJR1-04			M5 x 110	320	760-0074
	VRP2-04			VJO1-04/M		M5 x 110	320	760-0074
	VRP2-04				VSO1-04/M	M5 x 110	320	760-0074
		VPP2-04	VJR1-04			M5 x 110	320	760-0074
		VPP2-04		VJO1-04/M		M5 x 110	320	760-0074
		VPP2-04			VSO1-04/M	M5 x 110	320	760-0074
			VJR1-04	VJO1-04/M		M5 x 110	320	760-0074
			VJR1-04		VSO1-04/M	M5 x 110	320	760-0074
				VJO1-04/M	VSO1-04/M	M5 x 110	320	760-0074
M-TR	VRP2-04	VPP2-04				M5 x 144	320	760-0078
M-TR	VRP2-04		VJR1-04			M5 x 144	320	760-0078
M-TR	VRP2-04			VJO1-04/M		M5 x 144	320	760-0078
M-TR	VRP2-04				VSO1-04/M	M5 x 144	320	760-0078
M-TR		VPP2-04	VJR1-04			M5 x 144	320	760-0078
M-TR		VPP2-04		VJO1-04/M		M5 x 144	320	760-0078
M-TR		VPP2-04			VSO1-04/M	M5 x 144	320	760-0078
M-TR			VJR1-04	VJO1-04/M		M5 x 144	320	760-0078
M-TR			VJR1-04		VSO1-04/M	M5 x 144	320	760-0078
M-TR				VJO1-04/M	VSO1-04/M	M5 x 144	320	760-0078
	VRP2-04	VPP2-04	VJR1-04			M5 x 144	320	760-0078
	VRP2-04	VPP2-04		VJO1-04/M		M5 x 144	320	760-0078
	VRP2-04	VPP2-04			VSO1-04/M	M5 x 144	320	760-0078
	VRP2-04		VJR1-04	VJO1-04/M		M5 x 136	320	760-0077
	VRP2-04		VJR1-04		VSO1-04/M	M5 x 136	320	760-0077
	VRP2-04			VJO1-04/M	VSO1-04/M	M5 x 136	320	760-0077

Table of stud kits for vertical stacking assemblies in combination with directional control valve RPE3-04

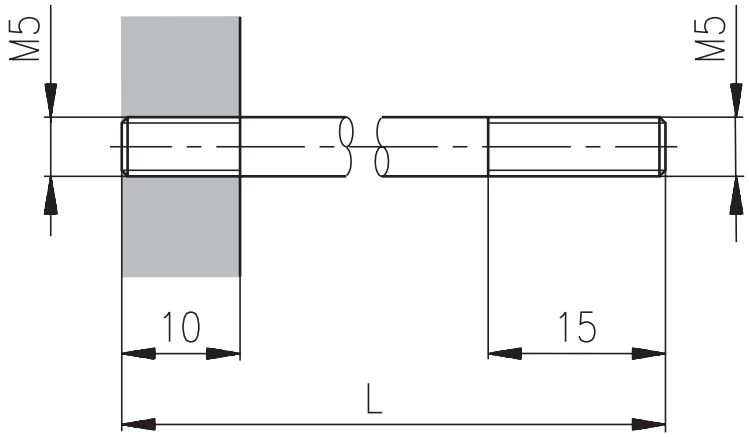
Pressure switch Height 35 mm	Pressure reducing valve Height 30 mm	Pressure relief valve Height 35 mm	Pilot operated check valve Height 30 mm	Check valve Height 30 mm	Throttle valve Height 30 mm	Studs with rolled threads M_u= 5 Nm	Maximum working pressure p_{max} bar	Ordering number*
		VPP2-04	VJR1-04	VJO1-04/M		M5 x 144	320	760-0078
		VPP2-04	VJR1-04		VSO1-04/M	M5 x 144	320	760-0078
		VPP2-04		VJO1-04/M	VSO1-04/M	M5 x 144	320	760-0078
			VJR1-04	VJO1-04/M	VSO1-04/M	M5 x 136	320	760-0077
M-TR	VRP2-04	VPP2-04	VJR1-04			M5 x 177	320	760-0147
M-TR	VRP2-04	VPP2-04		VJO1-04/M		M5 x 177	320	760-0147
M-TR	VRP2-04	VPP2-04			VSO1-04/M	M5 x 177	320	760-0147
M-TR	VRP2-04		VJR1-04	VJO1-04/M		M5 x 170	320	760-0080
M-TR	VRP2-04		VJR1-04		VSO1-04/M	M5 x 170	320	760-0080
M-TR	VRP2-04			VJO1-04/M	VSO1-04/M	M5 x 170	320	760-0080
M-TR		VPP2-04	VJR1-04	VJO1-04/M		M5 x 177	320	760-0147
M-TR		VPP2-04	VJR1-04		VSO1-04/M	M5 x 177	320	760-0147
M-TR		VPP2-04		VJO1-04/M	VSO1-04/M	M5 x 177	320	760-0147
M-TR			VJR1-04	VJO1-04/M	VSO1-04/M	M5 x 170	320	760-0080
	VRP2-04	VPP2-04	VJR1-04	VJO1-04/M		M5 x 170	320	760-0080
	VRP2-04	VPP2-04	VJR1-04		VSO1-04/M	M5 x 170	320	760-0080
	VRP2-04	VPP2-04		VJO1-04/M	VSO1-04/M	M5 x 170	320	760-0080
	VRP2-04		VJR1-04	VJO1-04/M	VSO1-04/M	M5 x 170	320	760-0080
		VPP2-04	VJR1-04	VJO1-04/M	VSO1-04/M	M5 x 170	320	760-0080
M-TR	VRP2-04	VPP2-04	VJR1-04	VJO1-04/M		M5 x 210	250	760-0085
M-TR	VRP2-04	VPP2-04	VJR1-04		VSO1-04/M	M5 x 210	250	760-0085
M-TR	VRP2-04	VPP2-04		VJO1-04/M	VSO1-04/M	M5 x 210	250	760-0085
M-TR	VRP2-04		VJR1-04	VJO1-04/M	VSO1-04/M	M5 x 202	250	760-0095
M-TR		VPP2-04	VJR1-04	VJO1-04/M	VSO1-04/M	M5 x 210	250	760-0085
	VRP2-04	VPP2-04	VJR1-04	VJO1-04/M	VSO1-04/M	M5 x 202	250	760-0095

* The order number contains a set of 4 studs and 4 nuts.

Valve Dimensions

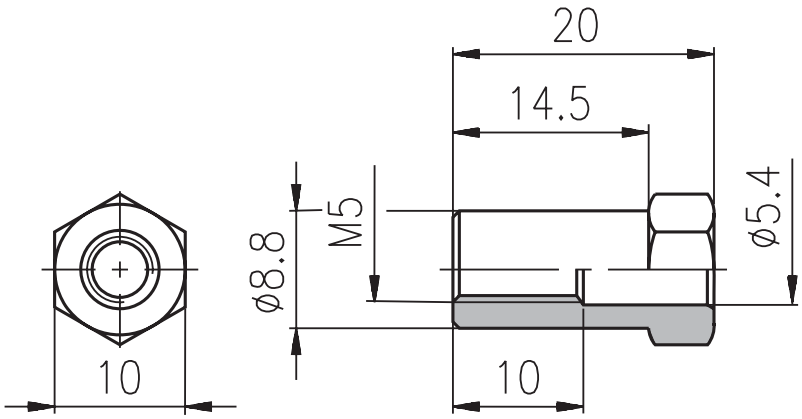
Dimensions in millimeters

Stud Bolt



Stud bolt M5 x L (length L see the table), class of strength 10.9.

Stud Nut



Order numbers of Individual Stud Bolts and Stud Nuts

Name	Dimension	Weight/100 pcs (kg)	Ordering number
Stud Bolt	M5 x 77	1.08	309001005077
Stud Bolt	M5 x 82	1.15	309001005082
Stud Bolt	M5 x 110	1.55	309001005110
Stud Bolt	M5 x 115	1.62	309001005115
Stud Bolt	M5 x 136	1.92	309001005136
Stud Bolt	M5 x 144	2.03	309001005144
Stud Bolt	M5 x 170	2.39	309001005170
Stud Bolt	M5 x 177	2.49	309001005177
Stud Bolt	M5 x 202	2.84	309001005202
Stud Bolt	M5 x 210	2.96	309001005210
Stud Nut	M5	0.71	336 677 721 990

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Studs and Nuts for Vertical Stacking Assemblies

Size 06

HA 0030 2/2006

Replaces HA 0030 7/2001

Table of stud kits for vertical stacking assemblies in combination with directional control valve RPE3-06

Pressure switch Height 43 mm	Pressure reducing valve Height 45 mm	Pressure relief valve Height 40 mm	Pilot operated check valve Height 40 mm	Check valve Height 31.4 mm	Throttle valve Height 40 mm	Studs with rolled threads M_u = 8.9 Nm	Maximum working pressure p_{max} bar	Ordering number*
MTS1-06						M5 x 98	320	760-0072
	VRN2-06					M5 x 102	320	760-0073
		VPN1-06				M5 x 98	320	760-0072
			2RJV1-06			M5 x 98	320	760-0072
				MVJ2-06		M5 x 88	320	760-0094
					2VS3-06	M5 x 98	320	760-0072
MTS1-06	VRN2-06					M5 x 144	320	760-0078
MTS1-06		VPN1-06				M5 x 136	320	760-0077
MTS1-06			2RJV1-06			M5 x 136	320	760-0077
MTS1-06				MVJ2-06		M5 x 130	320	760-0076
MTS1-06					2VS3-06	M5 x 136	320	760-0077
	VRN2-06	VPN1-06				M5 x 144	320	760-0078
	VRN2-06		2RJV1-06			M5 x 144	320	760-0078
	VRN2-06			MVJ2-06		M5 x 136	320	760-0077
	VRN2-06				2VS3-06	M5 x 144	320	760-0078
		VPN1-06	2RJV1-06			M5 x 136	320	760-0077
		VPN1-06		MVJ2-06		M5 x 130	320	760-0076
		VPN1-06			2VS3-06	M5 x 136	320	760-0077
			2RJV1-06	MVJ2-06		M5 x 130	320	760-0076
			2RJV1-06		2VS3-06	M5 x 136	320	760-0077
				MVJ2-06	2VS3-06	M5 x 130	320	760-0076
MTS1-06	VRN2-06	VPN1-06				M5 x 185	320	760-0083
MTS1-06	VRN2-06		2RJV1-06			M5 x 185	320	760-0083
MTS1-06	VRN2-06			MVJ2-06		M5 x 175	320	760-0081
MTS1-06	VRN2-06				2VS3-06	M5 x 180	320	760-0082
MTS1-06		VPN1-06	2RJV1-06			M5 x 180	320	760-0082
MTS1-06		VPN1-06		MVJ2-06		M5 x 170	320	760-0080
MTS1-06		VPN1-06			2VS3-06	M5 x 180	320	760-0082
MTS1-06			2RJV1-06	MVJ2-06		M5 x 170	320	760-0080
MTS1-06			2RJV1-06		2VS3-06	M5 x 180	320	760-0082
MTS1-06				MVJ2-06	2VS3-06	M5 x 170	320	760-0080
	VRN2-06	VPN1-06	2RJV1-06			M5 x 185	320	760-0083
	VRN2-06	VPN1-06		MVJ2-06		M5 x 175	320	760-0081
	VRN2-06	VPN1-06			2VS3-06	M5 x 180	320	760-0082
	VRN2-06		2RJV1-06	MVJ2-06		M5 x 175	320	760-0081
	VRN2-06		2RJV1-06		2VS3-06	M5 x 180	320	760-0082
	VRN2-06			MVJ2-06	2VS3-06	M5 x 175	320	760-0081

Table of stud kits for vertical stacking assemblies in combination with directional control valve RPE3-06

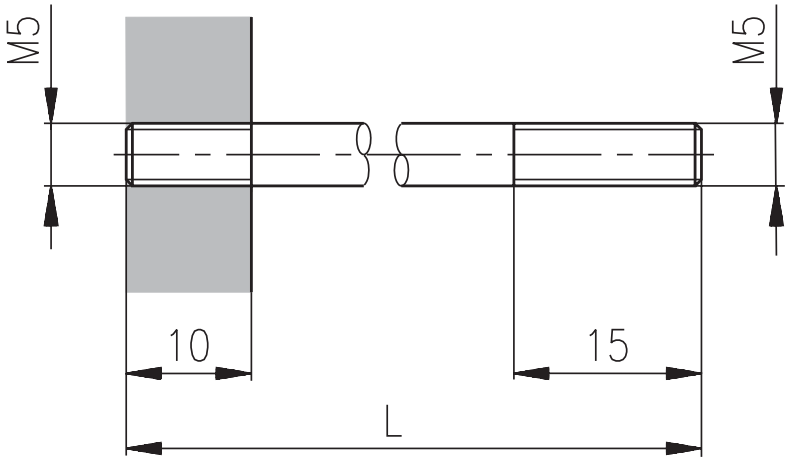
Pressure switch Height 43 mm	Pressure reducing valve Height 45 mm	Pressure relief valve Height 40 mm	Pilot operated check valve Height 40 mm	Check valve Height 31.4 mm	Throttle valve Height 40 mm	Studs with rolled threads M_u = 8.9 Nm	Maximum working pressure p_{max} bar	Ordering number*
		VPN1-06	2RJV1-06	MVJ2-06		M5 x 170	320	760-0080
		VPN1-06	2RJV1-06		2VS3-06	M5 x 175	320	760-0081
		VPN1-06		MVJ2-06	2VS3-06	M5 x 170	320	760-0080
			2RJV1-06	MVJ2-06	2VS3-06	M5 x 170	320	760-0080
MTS1-06	VRN2-06	VPN1-06	2RJV1-06			M5 x 222	250	760-0087
MTS1-06	VRN2-06	VPN1-06		MVJ2-06		M5 x 215	250	760-0086
MTS1-06	VRN2-06	VPN1-06			2VS3-06	M5 x 222	250	760-0087
MTS1-06	VRN2-06		2RJV1-06	MVJ2-06		M5 x 215	250	760-0086
MTS1-06	VRN2-06		2RJV1-06		2VS3-06	M5 x 222	250	760-0087
MTS1-06	VRN2-06			MVJ2-06	2VS3-06	M5 x 215	250	760-0086
MTS1-06		VPN1-06	2RJV1-06	MVJ2-06		M5 x 210	250	760-0085
MTS1-06		VPN1-06	2RJV1-06		2VS3-06	M5 x 215	250	760-0086
MTS1-06		VPN1-06		MVJ2-06	2VS3-06	M5 x 210	250	760-0085
MTS1-06			2RJV1-06	MVJ2-06	2VS3-06	M5 x 210	250	760-0085
	VRN2-06	VPN1-06	2RJV1-06	MVJ2-06		M5 x 215	250	760-0086
	VRN2-06	VPN1-06	2RJV1-06		2VS3-06	M5 x 222	250	760-0087
	VRN2-06	VPN1-06		MVJ2-06	2VS3-06	M5 x 215	250	760-0086
	VRN2-06		2RJV1-06	MVJ2-06	2VS3-06	M5 x 215	250	760-0086
		VPN1-06	2RJV1-06	MVJ2-06	2VS3-06	M5 x 210	250	760-0085
MTS1-06	VRN2-06	VPN1-06	2RJV1-06	MVJ2-06		M5 x 255	200	760-0088
MTS1-06	VRN2-06	VPN1-06	2RJV1-06		2VS3-06	M5 x 262	200	760-0096
MTS1-06	VRN2-06	VPN1-06		MVJ2-06	2VS3-06	M5 x 255	200	760-0088
MTS1-06	VRN2-06		2RJV1-06	MVJ2-06	2VS3-06	M5 x 255	200	760-0088
MTS1-06		VPN1-06	2RJV1-06	MVJ2-06	2VS3-06	M5 x 250	200	760-0097
	VRN2-06	VPN1-06	2RJV1-06	MVJ2-06	2VS3-06	M5 x 255	200	760-0088

* The ordering number contains a set of 4 studs and 4 nuts.

Valve Dimensions

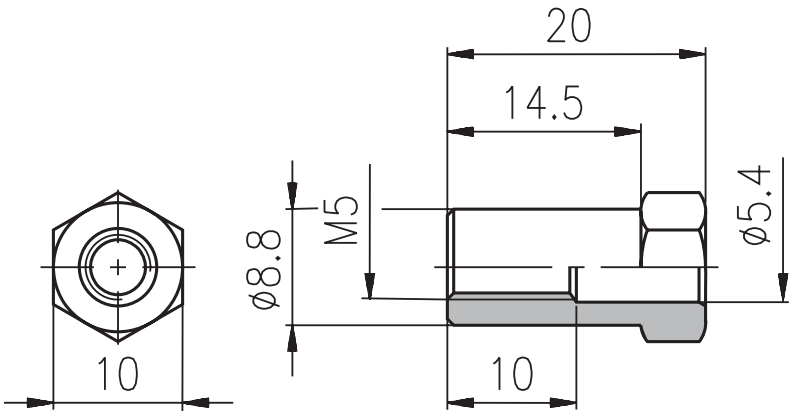
Dimensions in millimeters

Stud Bolt



Stud bolt M5 x L (length L see the table), class of strength 10.9.

Stud Nut



Order numbers of Individual Stud Bolts and Stud Nuts

Name	Dimension	Weight/100 pcs (kg)	Ordering number
Stud Bolt	M5 x 88	1.24	309001005088
Stud Bolt	M5 x 98	1.38	309001005098
Stud Bolt	M5 x 102	1.44	309001005102
Stud Bolt	M5 x 130	1.83	309001005130
Stud Bolt	M5 x 136	1.92	309001005136
Stud Bolt	M5 x 144	2.03	309001005144
Stud Bolt	M5 x 170	2.39	309001005170
Stud Bolt	M5 x 175	2.46	309001005175
Stud Bolt	M5 x 180	2.53	309001005180
Stud Bolt	M5 x 185	2.61	309001005185
Stud Bolt	M5 x 210	2.96	309001005210
Stud Bolt	M5 x 215	3.03	309001005215
Stud Bolt	M5 x 222	3.13	309001005222
Stud Bolt	M5 x 250	3.52	309001005250
Stud Bolt	M5 x 255	3.59	309001005255
Stud Bolt	M5 x 262	3.69	309001005262
Stud Nut	M5	0.71	336 677 721 990

Caution!

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ARGO HYTOS

Studs and Nuts for Vertical Stacking Assemblies

Size 10

HA 0040 6/2006

Replaces HA 0040 3/2002

Table of stud kits for vertical stacking assemblies in combination with directional control valve RPE4-10

Pressure switch Height 43 mm	Pressure reducing valve Height 50 mm	Pressure relief valve Height 50 mm	Pilot operated check valve Height 50 mm	Check valve Height 40 mm	Throttle valve Height 50 mm	Studs with rolled threads M_u = 14 Nm	Maximum working pressure p_{max} bar	Ordering number*
MTS1-10						M6 x 92	320	760-0131
	VRN1-10					M6 x 103	320	760-0130
		VPN2-10				M6 x 103	320	760-0130
			VJR2-10			M6 x 103	320	760-0130
				MVJ2-10		M6 x 92	320	760-0131
					VSO2-10	M6 x 103	320	760-0130
MTS1-10	VRN1-10					M6 x 147	320	760-0144
MTS1-10		VPN2-10				M6 x 147	320	760-0144
MTS1-10			VJR2-10			M6 x 147	320	760-0144
MTS1-10				MVJ2-10		M6 x 136	320	760-0143
MTS1-10					VSO2-10	M6 x 147	320	760-0144
	VRN1-10	VPN2-10				M6 x 152	320	760-0133
	VRN1-10		VJR2-10			M6 x 152	320	760-0133
	VRN1-10			MVJ2-10		M6 x 143	320	760-0132
	VRN1-10				VSO2-10	M6 x 152	320	760-0133
		VPN2-10	VJR2-10			M6 x 152	320	760-0133
		VPN2-10		MVJ2-10		M6 x 143	320	760-0132
		VPN2-10			VSO2-10	M6 x 152	320	760-0133
			VJR2-10	MVJ2-10		M6 x 143	320	760-0132
			VJR2-10		VSO2-10	M6 x 152	320	760-0133
				MVJ2-10	VSO2-10	M6 x 143	320	760-0132
MTS1-10	VRN1-10	VPN2-10				M6 x 199	320	760-0145
MTS1-10	VRN1-10		VJR2-10			M6 x 199	320	760-0145
MTS1-10	VRN1-10			MVJ2-10		M6 x 187	320	760-0134
MTS1-10	VRN1-10				VSO2-10	M6 x 199	320	760-0145
MTS1-10		VPN2-10	VJR2-10			M6 x 199	320	760-0145
MTS1-10		VPN2-10		MVJ2-10		M6 x 187	320	760-0134
MTS1-10		VPN2-10			VSO2-10	M6 x 199	320	760-0145
MTS1-10			VJR2-10	MVJ2-10		M6 x 187	320	760-0134
MTS1-10			VJR2-10		VSO2-10	M6 x 199	320	760-0145
MTS1-10				MVJ2-10	VSO2-10	M6 x 187	320	760-0134
	VRN1-10	VPN2-10	VJR2-10			M6 x 203	320	760-0136
	VRN1-10	VPN2-10		MVJ2-10		M6 x 194	320	760-0135
	VRN1-10	VPN2-10			VSO2-10	M6 x 203	320	760-0136
	VRN1-10		VJR2-10	MVJ2-10		M6 x 194	320	760-0135
	VRN1-10		VJR2-10		VSO2-10	M6 x 203	320	760-0136
	VRN1-10			MVJ2-10	VSO2-10	M6 x 194	320	760-0135

Table of stud kits for vertical stacking assemblies in combination with directional control valve RPE4-10

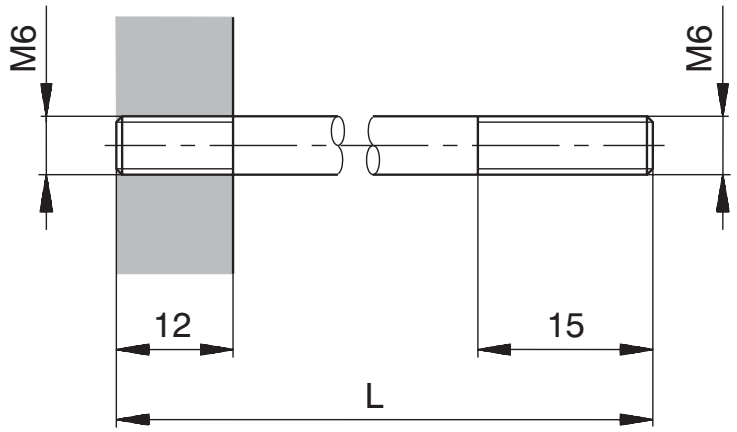
Pressure switch Height 43 mm	**Pressure reducing valve** Height 50 mm	**Pressure relief valve** Height 50 mm	**Pilot operated check valve** Height 50 mm	**Check valve** Height 40 mm	**Throttle valve** Height 50 mm	**Studs with rolled threads** M_u = 14 Nm	**Maximum working pressure** p_{max} bar	**Ordering number***
		VPN2-10	VJR2-10	MVJ2-10		M6 x 194	320	760-0135
		VPN2-10	VJR2-10		VSO2-10	M6 x 203	320	760-0136
		VPN2-10		MVJ2-10	VSO2-10	M6 x 194	320	760-0135
			VJR2-10	MVJ2-10	VSO2-10	M6 x 194	320	760-0135
MTS1-10	VRN1-10	VPN2-10	VJR2-10			M6 x 245	250	760-0138
MTS1-10	VRN1-10	VPN2-10		MVJ2-10		M6 x 236	250	760-0137
MTS1-10	VRN1-10	VPN2-10			VSO2-10	M6 x 245	250	760-0138
MTS1-10	VRN1-10		VJR2-10	MVJ2-10		M6 x 236	250	760-0137
MTS1-10	VRN1-10		VJR2-10		VSO2-10	M6 x 245	250	760-0138
MTS1-10	VRN1-10			MVJ2-10	VSO2-10	M6 x 236	250	760-0137
MTS1-10		VPN2-10	VJR2-10	MVJ2-10		M6 x 236	250	760-0137
MTS1-10		VPN2-10	VJR2-10		VSO2-10	M6 x 245	250	760-0138
MTS1-10		VPN2-10		MVJ2-10	VSO2-10	M6 x 236	250	760-0137
MTS1-10			VJR2-10	MVJ2-10	VSO2-10	M6 x 236	250	760-0137
	VRN1-10	VPN2-10	VJR2-10	MVJ2-10		M6 x 245	250	760-0138
	VRN1-10	VPN2-10	VJR2-10		VSO2-10	M6 x 253	250	760-0142
	VRN1-10	VPN2-10		MVJ2-10	VSO2-10	M6 x 245	250	760-0138
	VRN1-10		VJR2-10	MVJ2-10	VSO2-10	M6 x 245	250	760-0138
		VPN2-10	VJR2-10	MVJ2-10	VSO2-10	M6 x 245	250	760-0138
MTS1-10	VRN1-10	VPN2-10	VJR2-10	MVJ2-10		M6 x 287	200	760-0139
MTS1-10	VRN1-10	VPN2-10	VJR2-10		VSO2-10	M6 x 295	200	760-0140
MTS1-10	VRN1-10	VPN2-10		MVJ2-10	VSO2-10	M6 x 287	200	760-0139
MTS1-10	VRN1-10		VJR2-10	MVJ2-10	VSO2-10	M6 x 287	200	760-0139
MTS1-10		VPN2-10	VJR2-10	MVJ2-10	VSO2-10	M6 x 287	200	760-0139
	VRN1-10	VPN2-10	VJR2-10	MVJ2-10	VSO2-10	M6 x 295	200	760-0140

* The ordering number contains a set of 4 studs and 4 nuts.

Valve Dimensions

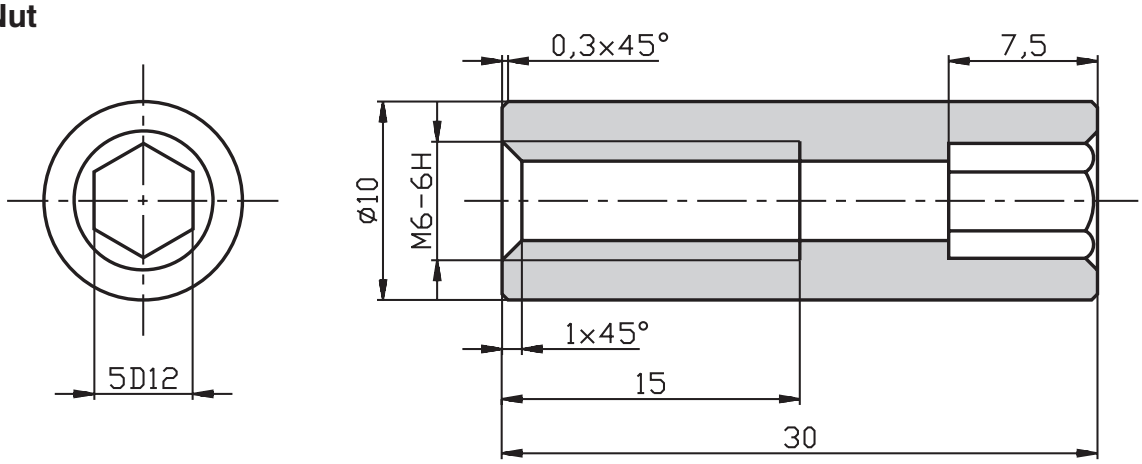
Dimensions in millimeters

Stud Bolt



Stud bolt M6 x L (length L see the table), classs of strength 10.9.

Stud Nut



Ordering numbers of individual stud bolts and stud nuts

Name	Dimension	Weight/100 pcs (kg)	Ordering number
Stud Bolt	M6 x 92	1.9	309001006092
Stud Bolt	M6 x 103	2.1	309001006103
Stud Bolt	M6 x 136	2.8	309001006136
Stud Bolt	M6 x 143	3.0	309001006143
Stud Bolt	M6 x 147	3.1	309001006147
Stud Bolt	M6 x 152	3.2	309001006152
Stud Bolt	M6 x 187	4.0	309001006187
Stud Bolt	M6 x 194	4.1	309001006194
Stud Bolt	M6 x 199	4.2	309001006199
Stud Bolt	M6 x 203	4.3	309001006203
Stud Bolt	M6 x 236	5.0	309001006236
Stud Bolt	M6 x 245	5.2	309001006245
Stud Bolt	M6 x 253	5.5	309001006253
Stud Bolt	M6 x 287	6.1	309001006287
Stud Bolt	M6 x 295	6.4	309001006295
Stud Nut	M6	1.31	760/4220

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Hand-operated directional control valves

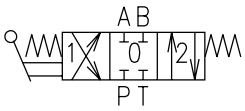
RPR3-06

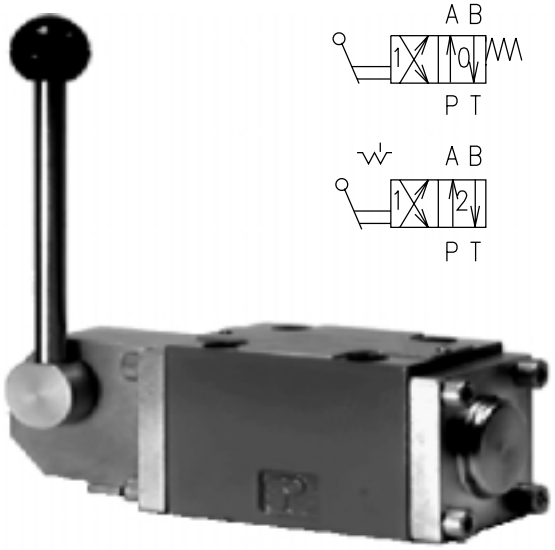
Size 06 • p_{max} up to 320 bar • Q_{max} up to 80 L/min

HA 4004
3/2002

Replaces
HA 4004 3/2001

- **4/3 and 4/2 - way spool type directional control valves**
- **Hand-lever operated**
- **Actuating section can be rotated in four positions 90° apart**
- **Four-land spool - reduced functional dependence on fluid viscosity**
- **16 standard spool configurations**
- **Installation dimensions to ISO 4401-03-02-0-94 and DIN 24 340-A6**

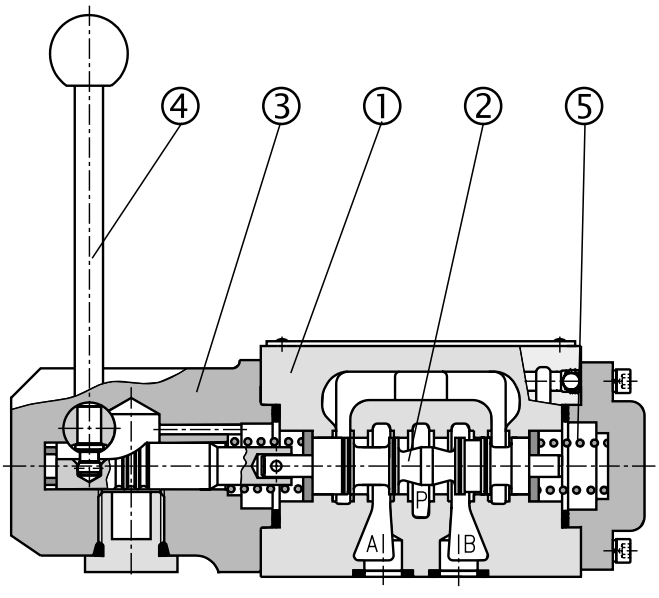




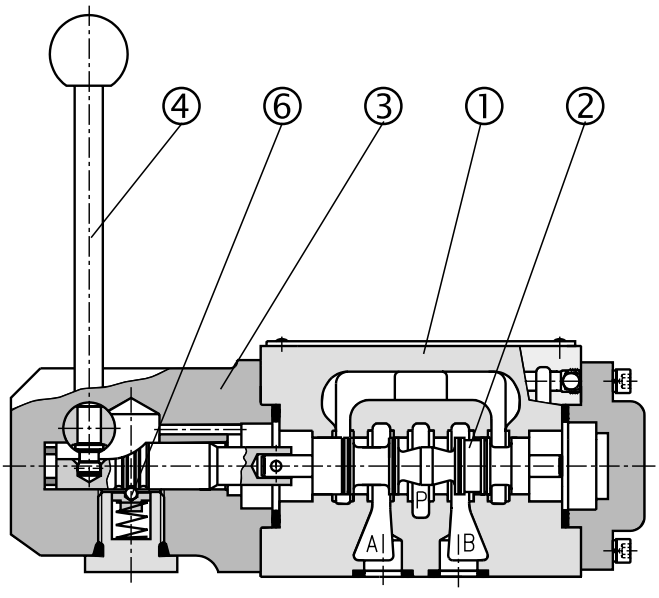
Functional Description

The hand operated directional control valves are used mainly to control start, stop and direction of fluid.
The valves consist of housing (1) with control spool (2) and the actuating section (3). The actuating section consists either of the hand lever (4) and of one or two return springs (5), or of the hand lever (4) and the detent assembly (6). The detent assembly holds the spool in its last shifted position.

The directional control valves are being manufactured as two-position and three-position valves (see table with functional symbols).
The valve housing (1) is phosphate coated, the components of the actuating section (3) are zinc coated.



Type with return springs



Type with detent assembly

Ordering Code

RPR3-06 □ □ - □

Hand operated directional control valves

Valve size

Number of valve positions
two positions **2**
three positions **3**

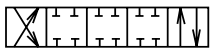
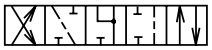
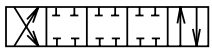
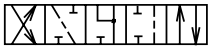
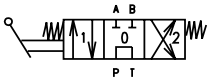
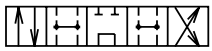
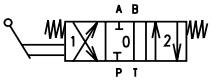
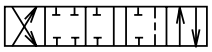
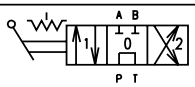
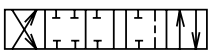
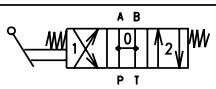
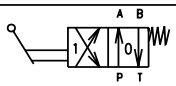
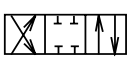
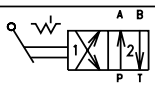
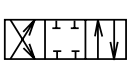
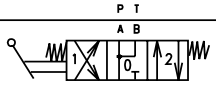
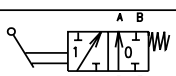
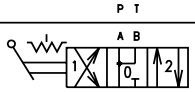
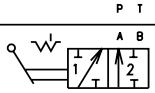
Spool symbols
see the table Spool symbols

Seals
without designation NBR
V FPM (Viton)

Technical Data

Valve size	mm	06
Maximum flow	L/min	80
Maximum operating pressure at ports P, A, B	bar	320
Maximum operating pressure at port T	bar	100
Pressure drop	bar	see Δp -Q characteristics
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP RP 91H in viscosity classes ISO VG 32,46 and 68
Fluid temperature range - NBR	°C	-30 ... +80
Fluid temperature range - Viton	°C	-20 ... +80
Viscosity range	mm^2/s	20 ... 400
Maximum degree of fluid contamination		Class 21/18/15 to ISO 4406 (1999).
Operating force on lever	N	< 50
Weight	kg	1.6
Mounting position		optional

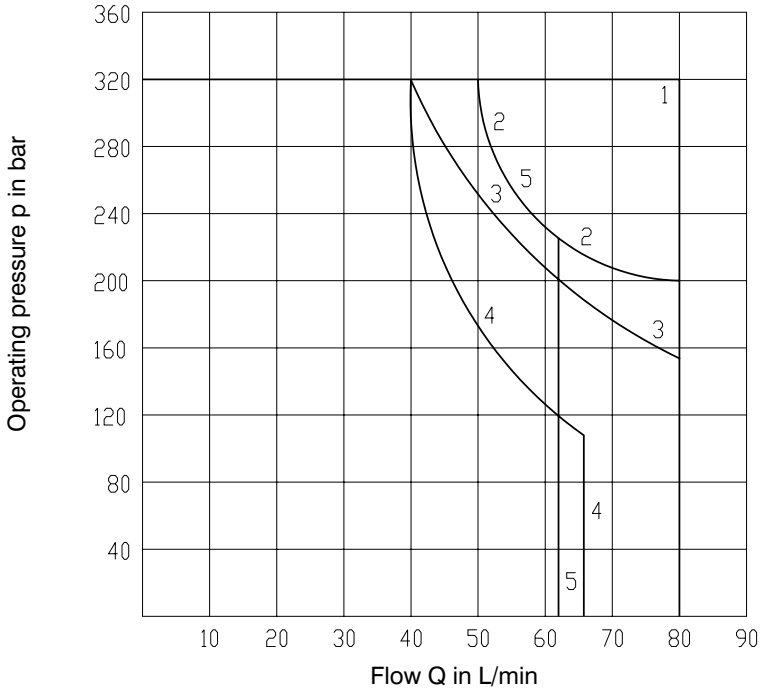
Spool Symbols

Type	Symbol	Crossover	Type	Symbol	Crossover
Z11			Y11		
Z15			Y15		
C11			B11		
C15			B15		
H11			R11		
H15			J15		
P11			A51		
P15			J75		

p-Q Characteristics

Measured at ν = 32 mm^2/s and t = 40 °C

Operating limits for maximum hydraulic power tfansferred by the directional valve.

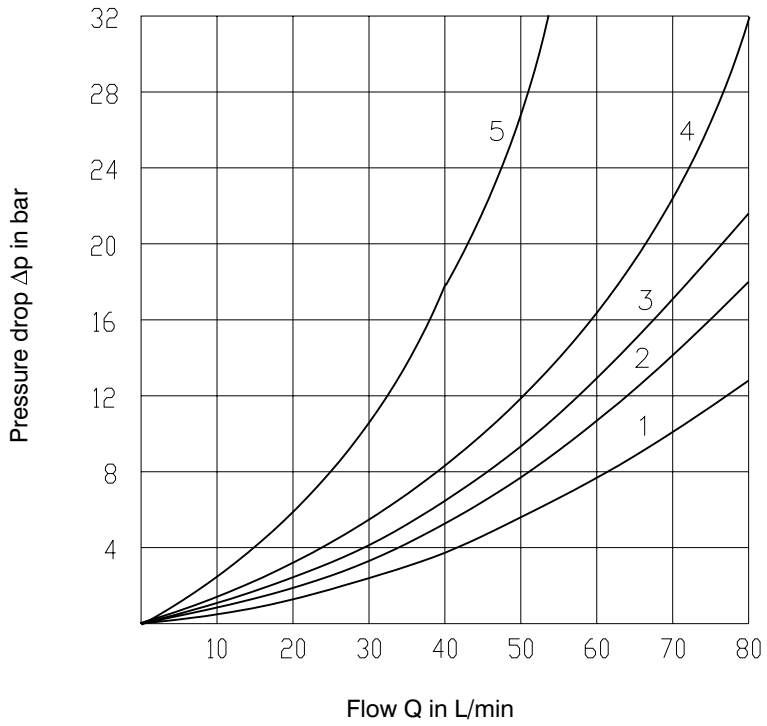


Z11	1	Z15	1
C11	4	C15	1
H11	3	H15	1
P11	1	P15	1
Y11	2	Y15	1
B11	5	B15	1
R11	1	J15	1
A51	3	J75	1

Δp-Q Characteristics

Measured at ν = 32 mm^2/s and t = 40 °C

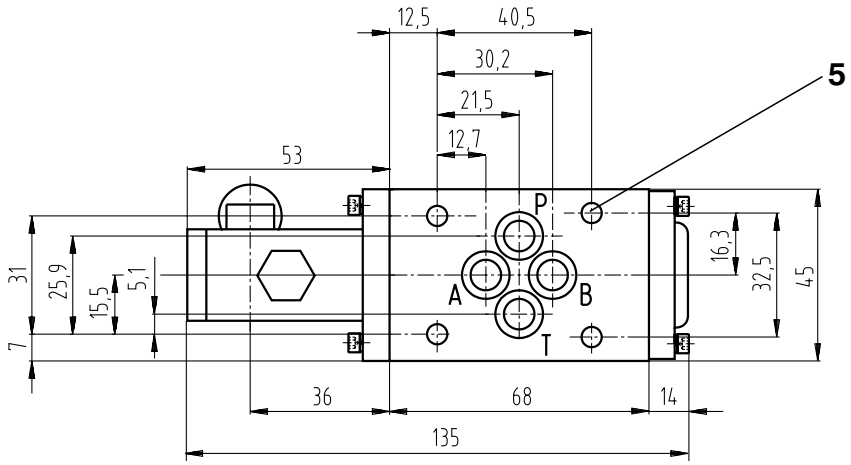
Pressure drop Δp related to flow rate.

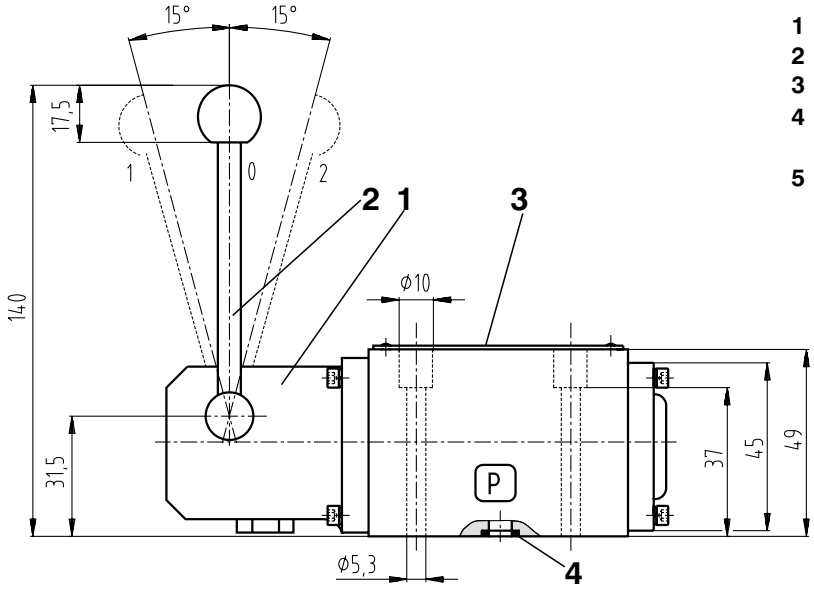


	P-A	P-B	A-T	B-T	P-T
Z11, Z15	2	2	3	3	
C11, C15	3	3	4	3	5
H11, H15	2	2	2	2	3
P11, P15	1	1	3	3	
Y11, Y15	2	2	2	2	
B11, B15	2	2	3	3	
R11, J15	2	2	3	3	
A51, J75	2	2			

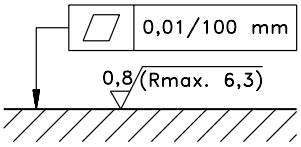
Valve Dimensions

Dimensions in millimeters





1 Actuating section
2 Hand lever
3 Name plate
4 Square ring (4 pcs.) 9.25 x 1.68 (ore compatible) supplied with valve
5 4 mounting holes



Required surface finish of interface

Spare Parts

Seal kit

Type	Dimensions, quantity	Ordering number
O-ring - NBR90	22 x 2 (2 pcs.)	483-9000
Square ring - NBR70	9.25 x 1.68 (4 pcs.)	
O-ring - NBR70	11 x 1.5 (2 pcs.)	
O-ring - NBR70	11.3 x 2.4 (1 pc.)	

Bolt kit (for Studs see HA 0030)

Dimensions, quantity	Bolt torque	Ordering number
M5 x 45 DIN 912-10.9 (4 pcs.)	8.9 Nm	484-9958

Caution!

- With functional symbols A51 and J75 for pressures exceeding 100 bar, the T-port should be connected directly to the tank.
- Directional valves with other functional symbols as those shown in the table above can be delivered on request.
- The packing foil is recyclable.
- The protective plate can be returned to manufacturer.
- Mounting bolts M5x45 DIN 912-10.9 or studs must be ordered separately. Tightening torgue is 8.9 Nm.
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law.

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ARGO HYTOS

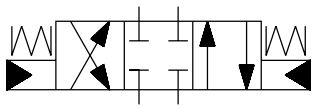
Hydraulic operated directional control valves

RPH2-06

Size 06 • p_{max} up to 320 bar • Q_{max} up to 80 L/min

HA 4005
3/2002

Replaces
HA 4005 2/2000

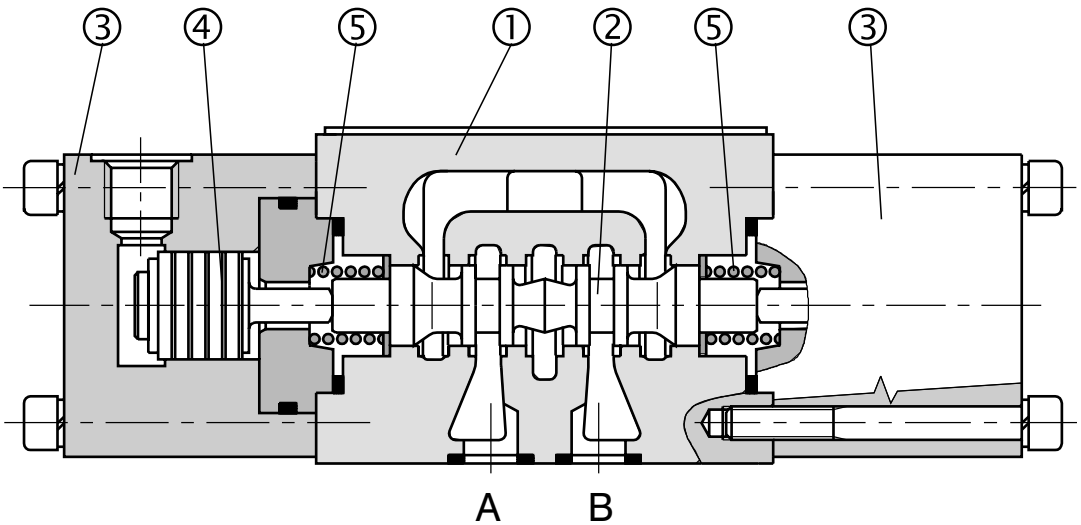


- **4/3-, 4/2- and 3/2- way spool type directional valves hydraulic operated**
- **Installation dimensions to ISO 4401-03-02-0-94 and DIN 24 340-A6**

Functional Description

The directional control valves are of modular design and comprise a housing (1) with a cylidrical spool (2) and one or two operating elements (3) consisting of hydraulic pistons (4) and return springs (5).

Three-position directional valves are fitted with two hydraulic operating elements and two centering springs. Two-position directional valves have only one hydraulic operating element and one springs.



Ordering Code

RPH2-06 □ □ / □ **-1** □

Hydraulic pilot operated directional valves

Nominal size

Number of operating positions
two positions **2**
three positions **3**

Functional symbols
see the table functional symbols

Seals
omit NBR
V FPM (Viton)

Model

Connecting threads
1 M10x1
2 G1/8

Technical Data

Valve size	mm	06
Maximum flow (according to pressure and functional symbols)	L/min	see p-Q characteristics
Maximum operating pressure at ports P, A, B	bar	320
Maximum operating pressure at port T	bar	120
Minimum pilot pressure	bar	30 + pressure at port T
Maximum pilot pressure	bar	160
Pilot volume	cm^3	0.5
Pressure drop	bar	see Δp-Q characteristics
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP RP 91H in viscosity classes ISO VG 32, 46 and 68
Fluid temperature range for standard sealing (NBR)	°C	-30 ... +80
Fluid temperature range for Viton seals (FPM)	°C	-20 ... +80
Viscosity range	mm^2/s	20 ... 400
Maximum degree of fluid contamination		Class 21/18/15 to ISO 4406 (1999).
Service life	cycles	10^7
Weight valve with 1 actuatop valve with 2 actuators	kg	1.8 2.5
Mounting position		optional

Spare Parts

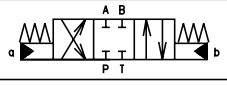
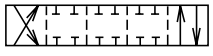
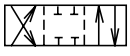
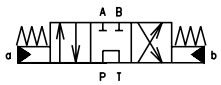
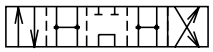
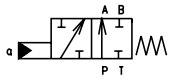
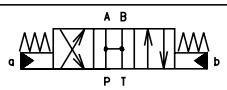
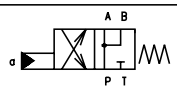
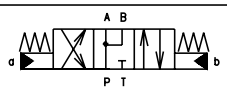
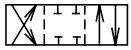
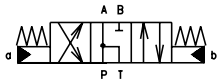
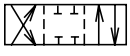
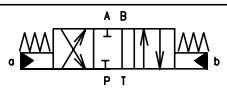
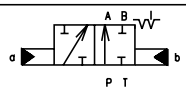
Bolt kit

Dimensions,number	Tightening torque	Ordering number
M5 x 45 DIN 912-10.9	8.9 Nm	484-9958

Seal kit

Type	Dimensions, number		Ordering number
	O-ring	Square ring	
Standard NBR	22 x 2 NBR90 (2 pcs.)	9.25 x 1.68 NBR70 (4 pcs.)	482-9000
	28 x 2 (2 pcs.)	-	
Viton	22 x 2 (2 pcs.)	9.25 x 1.78 (4 pcs.)	482-9001
	28 x 2 (2 pcs.)	-	

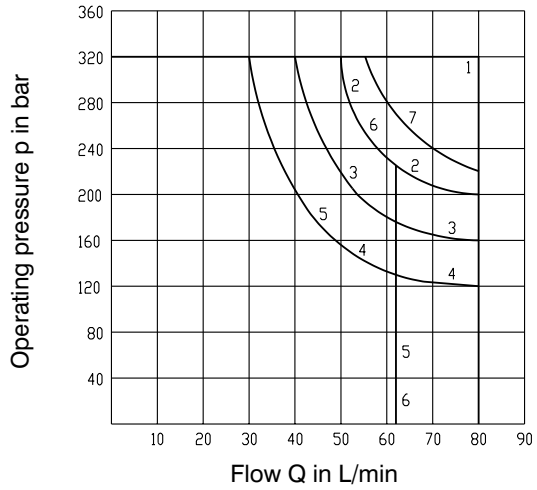
Functional Symbols

Three position directional valves RPH2-063			Two position directional valves RPH2-062		
Type	Symbol	Crossover	Type	Symbol	Crossover
Z11			R11		
C11			A51		
H11			P51		
P11			Y51		
Y11			X11		
L21			J15		
B11			J75		

p-Q Characteristics

Measured at $\nu = 32\ mm^2/s$ and $t = 40\ °C$

Operating limits for maximum hydraulic power tfansferred by the directional valve. For respective spool type - see Functional Symbols.

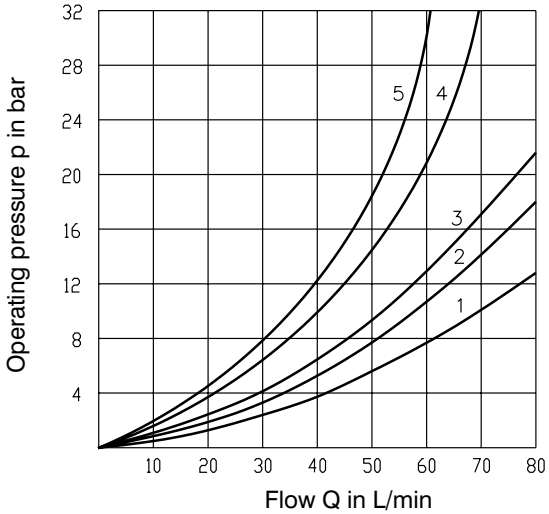


Z11	1
C11	5
H11	3
P11	1
Y11	2
L21	4
B11	6
R11	3
A51	4
P51	1
Y51	2
X11	3
J15	1
J75	7

Δp-Q Characteristics

Measured at $\nu = 32\ mm^2/s$ and $t = 40\ °C$

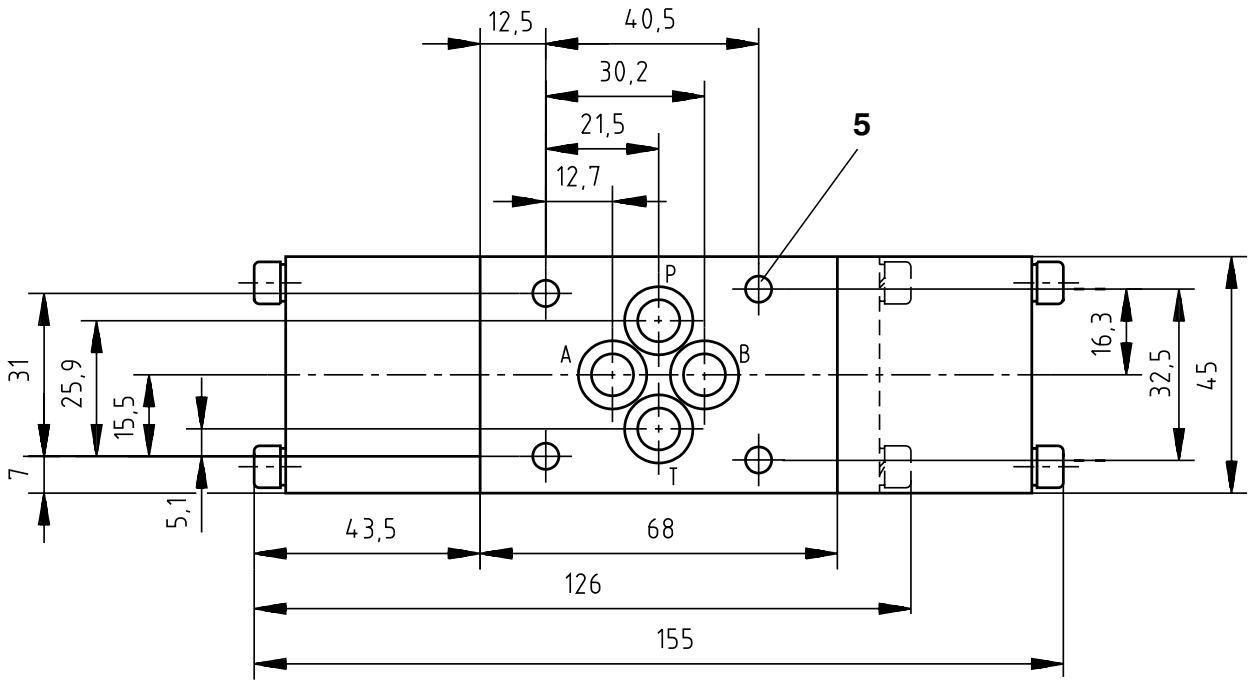
Pressure drop Δp related to flow rate.

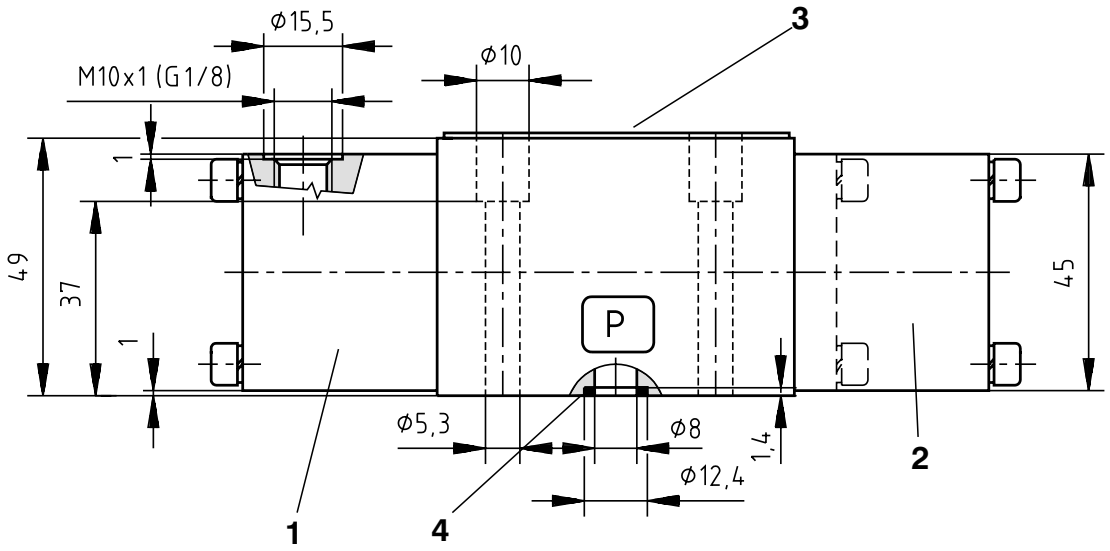


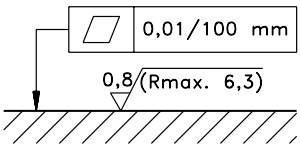
	P-A	P-B	A-T	B-T	P-T
Z11	2	2	3	3	
C11	4	4	4	5	3
H11	2	2	2	2	3
P11	1	1	3	3	
Y11	2	2	2	2	
L21	2	2	3	3	
B11	2	2	3	3	
R11	2	2	3	3	
A51	2	2			
P51		1	3		
Y51		2	2		
X11	2	2	3	3	
J15	2	2	3	3	
J75	2	2			

Valve Dimensions

Dimensions in millimetres







Required surface finish of interface

1 Operating element 1
2 Operating element 2
3 Name plate
4 Square ring 9.25 x 1.68 (4 pcs.) supplied with each valve
5 4 mounting holes

Caution!

- With functional symbol A51 for pressures exceeding 100 bar, the T-port should be connected directly to the tank. Other functional symbols on request.
- The packing foil is recyclable.
- The transport plate is to be returned to the supplier.
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law.

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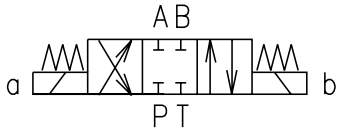
Solenoid - operated directional control valves

RPE3-06

Size 06 • p_{max} up to 320 bar • Q_{max} up to 80 L/min

HA 4010
2/2005

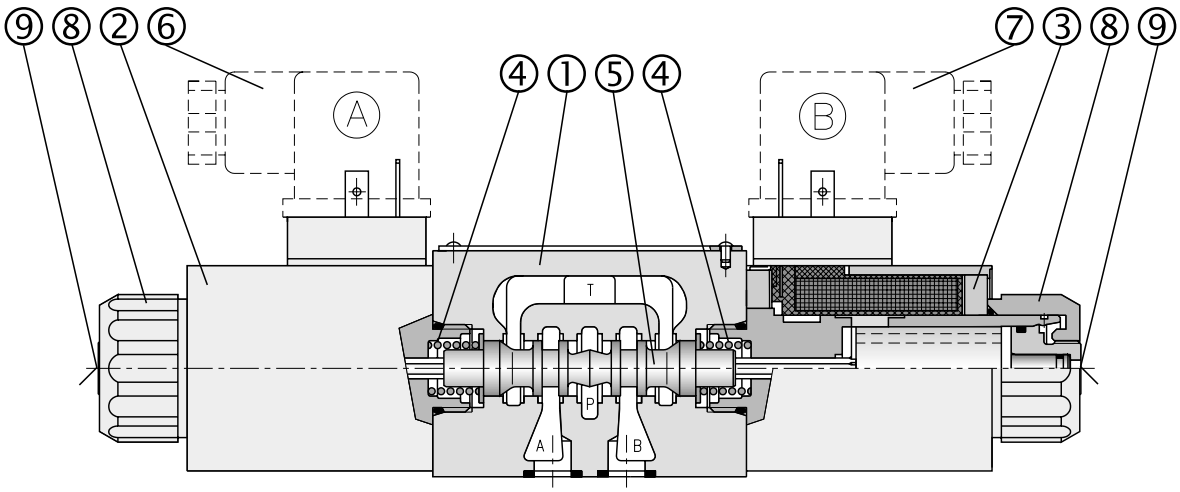
Replaces
HA 4010 3/2002



- **4/3-, 4/2- and 3/2- way directional control valves**
- **Cylindrical AC or DC, solenoids with removable coils - Elektrical connector can be rotated in either direction by 90°**
- **Four-land spool - reduced functional dependence on fluid viscosity**
- **Wet pin core tubes**
- **Push button manual override**
- **Installation dimensions to ISO 4401-03-02-0-94, DIN 24 340-A6**
- **Subplates see data sheet HA 0002**
- **CSA Upon request**

Functional Description

The RPE3 directional control valves consist of housing (1), a control spool (5) with two centering springs (4) and cylindrical operating solenoids (2, 3).
The three-position directional control valves are fitted with two solenoids and two springs. Two-position directional control valves have either one solenoid and one return spring or two solenoids and a detent assembly.
The operating solenoids are DC solenoids. For AC supply the solenoids are provided with a rectifier, which is integrated directly into the connectors A, B (6, 7) or inside the coil. The connectors (6, 7) can be turned by 90°. By loosening the nut (8), the solenoids can be turned or replaced without interfering with any seals of the valve.
In the case of solenoid malfunction or power failure, the spool of the valve can be shifted by manual override (9), provided the pressure in T-port does not exceed 25 bar.
The basic surface treatment of the valve housing (1) is phosphate coated and the solenoids (2, 3) are zinc coated.



Ordering Code

RPE3-06 □□/□□□□□□□□□□

Solenoid operated directional control valves

Nominal size

Number of operating positions
two positions **2**
three positions **3**

Functional symbols
see the table Functional symbols

Rated supply voltage of solenoids
(at the coil terminals)

12 V DC / 2.72 A	**01200**
14 V DC / 1.93 A	01400
21 V DC / 1.54 A	02100
24 V DC / 1.29 A	**02400**
42 V DC / 0.80 A	04200
48 V DC / 0.61 A	04800
60 V DC / 0.49 A	06000
102 V DC / 0.30 A	10200
205 V DC / 0.15 A	20500
24 V AC / 1.54 A / 50 (60) Hz	02450
115 V AC / 0.35 A / 50 (60) Hz	11550
230 V AC / 0.17 A / 50 (60) Hz	**23050**

The AC coils correspond with E5 type.

CSA Upon request

Type of solenoid coil

with DIN connector	**E1**
with DIN connector and quenching diode	E2
with AMP connector	E3
with AMP connector and quenching diode	E4
with integrated rectifier and DIN connector	**E5**
with Kostal connector	E6
with Kostal connector and quenching diode	E7

Sensing of the end position
no designation without sensing
S1 sensing of the end position

Seals
no designation NBR
V FPM (Viton)

Orifice in P port
no designation without orifice
D1 ∅1.0 mm
D2 ∅1.5 mm
D3 ∅2.0 mm
D4 ∅2.2 mm
D5 ∅2.5 mm

Spool speed control orifice
no designation without damping
T1 orifice ∅0.7 mm in solenoid

Manual overide
no designation standard
N1 covered with retaining nut
N2 covered with rubber boot
N3 with detent assembly

***Electrical connector, DIN 43 650**
no designation without connector
K1 connector without rectifier
K2 connector without rectifier with LED and quenching diode
K3 connector with rectifier
K4 connector with rectifier with LED and quenching diode
K5 connector without rectifier

*other information on pages 6 and 9

Note: Connector of the position sensor is not supplied (see ordering number on page 9)

FOR PREFERRED TYPES SEE BOLD TYPING IN ORDERING CODE, FUNCTIONAL SYMBOLS AND TABLE OF PREFERRED TYPES ON PAGE 11

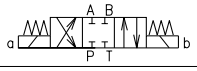
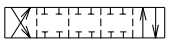
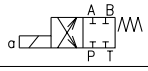
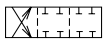
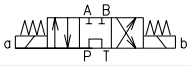
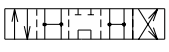
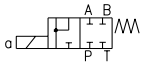
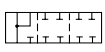
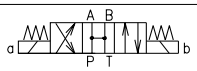
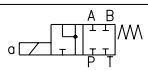
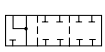
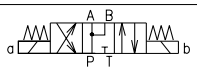
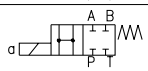
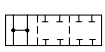
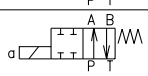
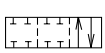
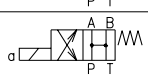
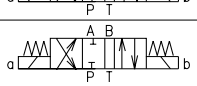
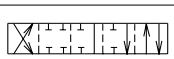
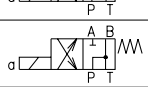
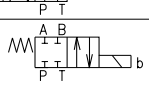
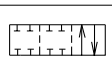
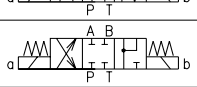
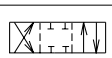
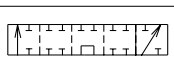
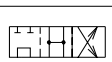
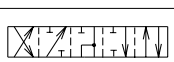
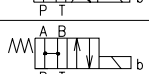
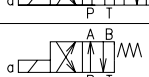
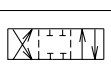
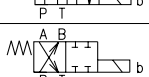
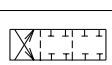
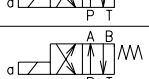
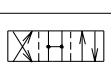
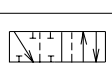
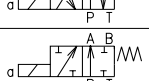
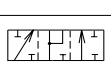
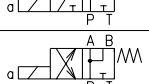
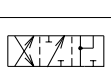
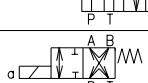
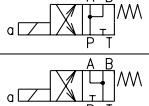
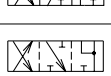
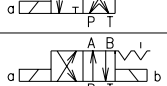
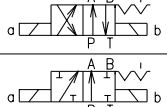
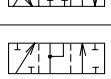
Recommended solenoid coils used with elektrical connector with rectifiers - type designation K3, K4

Rated supply source voltage (permissible rated voltage variation ±10 %)	Type designation of the solenoid voltage
24 V AC / 1.54 A / 50 (60) Hz	02100
115 V AC / 0.35 A / 50 (60) Hz	10200
230 V AC / 0.17 A / 50 (60) Hz	20500

Technical Data

Nominal size	mm	06	
Maximum flow	L/min	see p-Q characteristics	
Max. operating pressure at porte P, A, B	bar	320	
Max. operating pressure at port T	bar	210	
Pressure drop	bar	see Δp-Q characteristics	
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP-RP 91H in viscosity classes ISO VG 32, 46 and 68.	
Fluid temperature range for NBR seals	°C	-30 ... +80	
Fluid temperature range for FPM seals	°C	-20 ... +80	
Ambient temperature, max.	°C	up to +50	
Viscosity range	mm^2/s	20 ... 400	
Maximum degree of fluid contamination		Class 21/18/15 to ISO 4406 (1999)	
Max. allowable voltage variation	%	DC: ±10	AC: ±10
Max. switching frequency	1/h	15 000	
Switching time, on: at ν=32 mm^2/s	ms	DC: 30 ... 50	AC: 30 ... 40
Switching time, off: at ν=32 mm^2/s	ms	DC: 10 ... 50	AC: 30 ... 70
Duty cycle	%	100	
Service life	cycles	10^7	
Enclosure type to DIN 40 050		IP 65	
Weigt - valve with 1 solenoid - valve with 2 solenoids	kg	1.6 2.2	
Mounting position		optional	

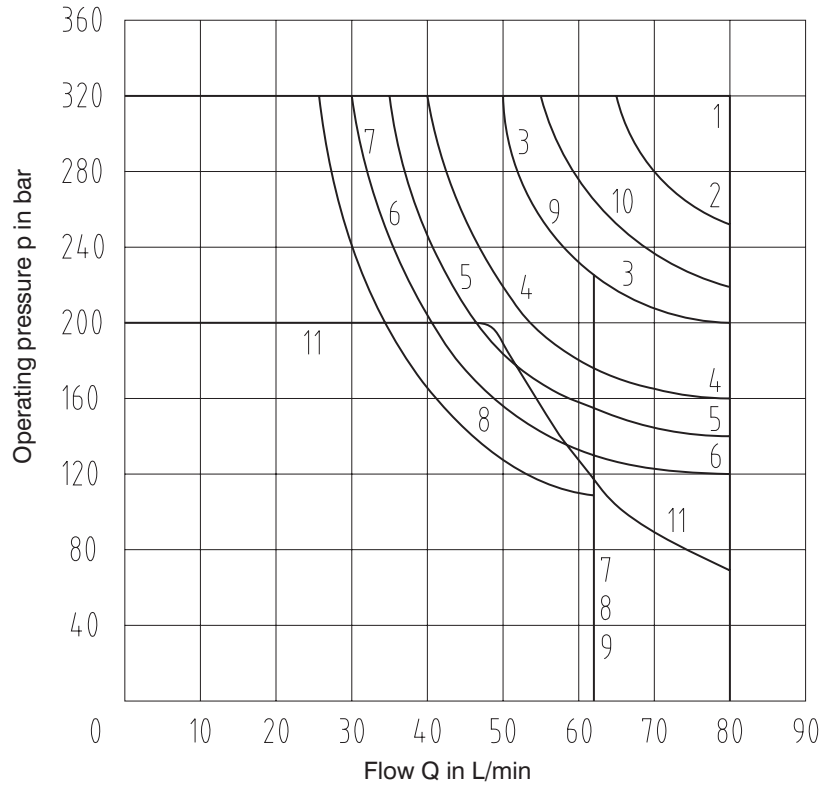
Functional Symbols

Designation	Symbol	Interposition	Designation	Symbol	Interposition
Z11			**Z51**		
C11			Z71		
H11			Z81		
P11			Z91		
Y11			R31		
L21			H51		
B11			F51		
Y41			**Z11**		
Z21			X11		
C41			C11		
F11			H11		
R11			K11		
R21			N11		
A51			F11		
P51			X25		
Y51			**J15**		
C51			J75		

p-Q Characteristics

Measured at $\nu = 32\ mm^2/s$ and $t = 40\ °C$

Operating limits for maximum hydraulic power transferred by the directional valve.
For respective spool type - see functional symbols.

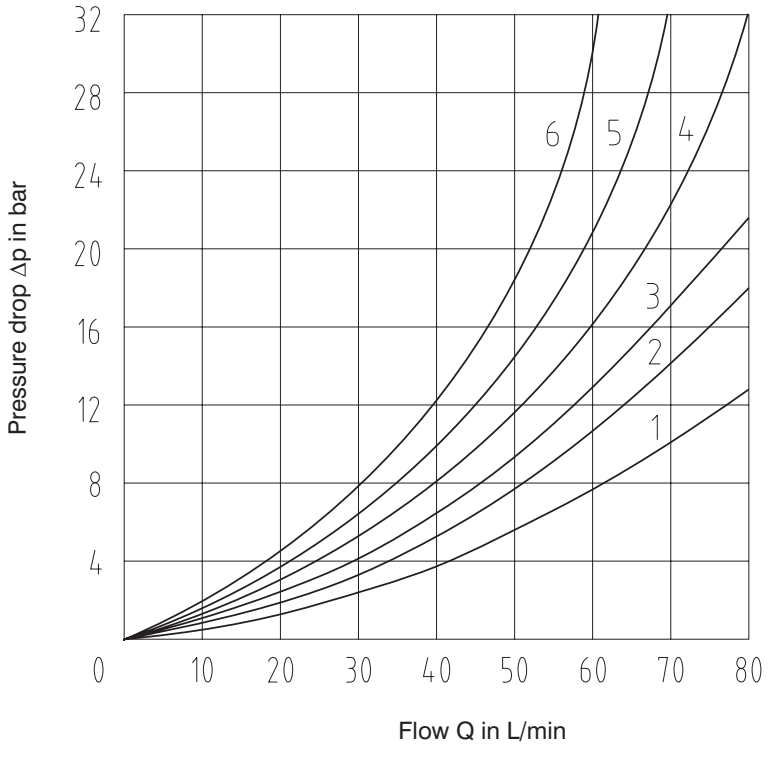


Z11	1
C11	7
H11	4
P11	1
Y11	3
L21	6
B11	9
Y41	7
Z21	1
C41	6
F11	6
R11	4
R21	5
A51	6
P51	1
Y51	3
C51	7
Z51	1
Z71	8
Z81	8
Z91	8
R31	6
H51	8
F51	8
X11	4
K11	8
N11	8
X25	11
J15	1
J75	10

Δp-Q Characteristics

Measured at $\nu = 32\ mm^2/s$ and $t = 40\ °C$

Pressure drop Δp related to flow rate.

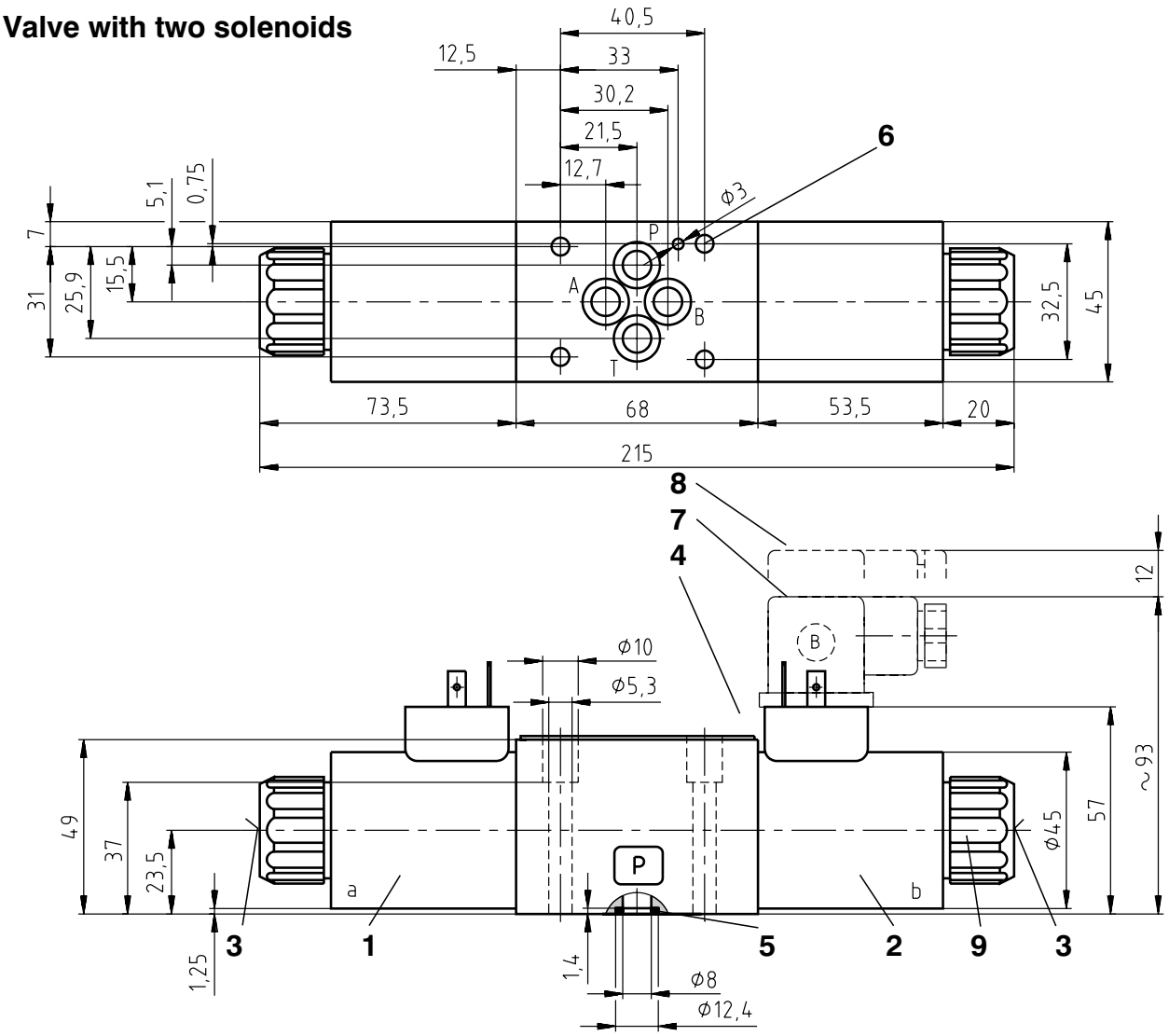


	P-A	P-B	A-T	B-T	P-T
Z11	2	2	3	3	
C11	5	5	5	6	3
H11	2	2	2	3	3
P11	1	1	3	3	
Y11	2	2	2	2	
L21	2	2	3	3	
B11	2	2	3	3	
Y41	3	3	3	3	
Z21		2	3		
C41	4	4			5
F11	1	2		3	3
R11	2	2	3	3	
R21	2	2	3	3	
A51	2	2			
P51		1	3		
Y51		2	2		
C51	2			3	4
Z51		2	3		
Z71	3	3			
Z81			3	3	
Z91	3			3	3
R31	2			3	
H51		2	3		
F51		2	3		
X11	2	2	3	3	
K11		2	3		
N11	2	2	3	3	
X25	3	3	3		
J15	2	2	3	3	
J75	2	2			

Valve Dimensions

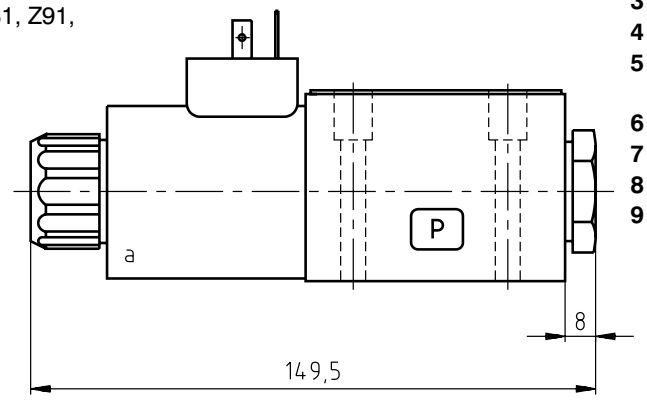
Dimensions in millimetres

Valve with two solenoids

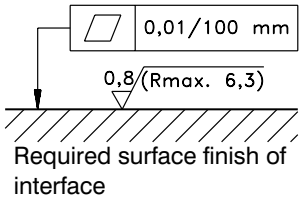


Valve with one solenoid a

Spool symbols R11, R21, A51, P51, Y51, Z51, C51, Z71, Z81, Z91, R31, H51, F51, X25



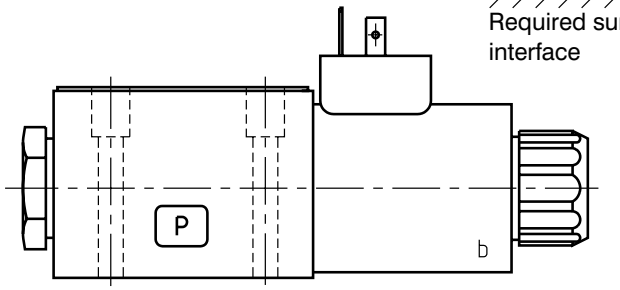
1 Solenoid a
2 Solenoid b
3 Manual override
4 Name plate
5 Square ring (4 pcs.)
9.25 x 1.68 supplied with valve
6 4 mounting holes
7 Electrical connector, DIN 43 650
8 Space required to remove connector
9 Retaining nut of the solenoid



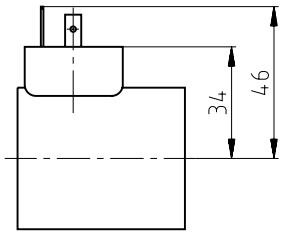
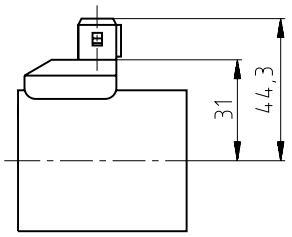
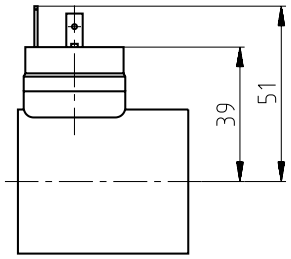
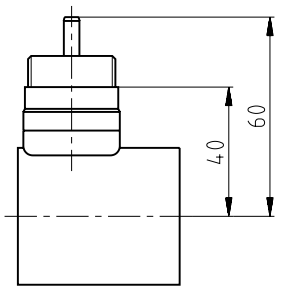
Required surface finish of interface

Valve with one solenoid b

Spool symbols X11, Z11, C11, H11, K11, N11, F11

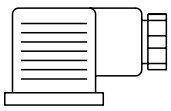


Type of the Solenoid Coil

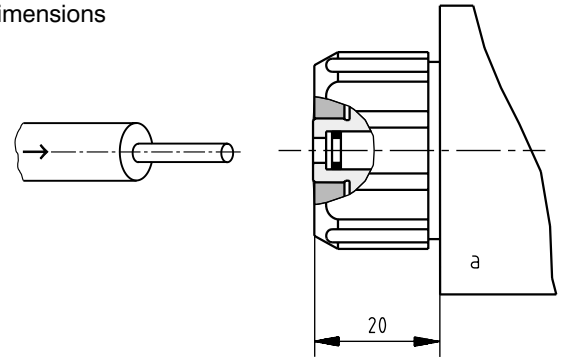
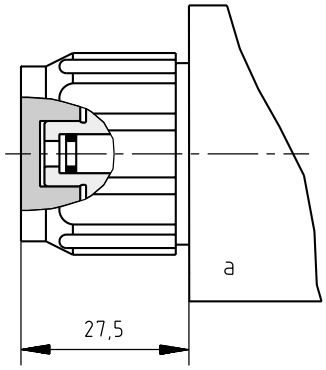
Designation	Dimensional sketch	Description
E1		Solenoid coil with terminal for the electrical connector, DIN 43 650.
E2		Solenoid coil with integrated quenching diode (bipolar transil diode) and terminal for the electrical connector, DIN 43 650.
E3		Solenoid coil with terminal for AMP electrical connector.
E4		Solenoid coil with integrated quenching diode (bipolar transil diode) and terminal for AMP electrical connector.
E5		Solenoid coil with integrated rectifier and terminal for the electrical connector, DIN 43 650.
E6		Solenoid coil with terminal for Kostal electrical connector.
E7		Solenoid coil with terminal for Kostal electrical connector and integrated quenching diode (bipolar transil diode).

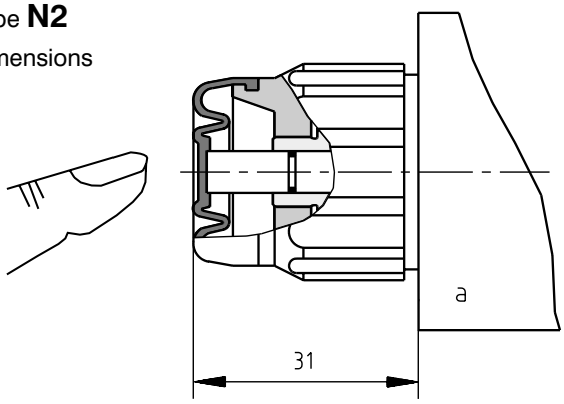
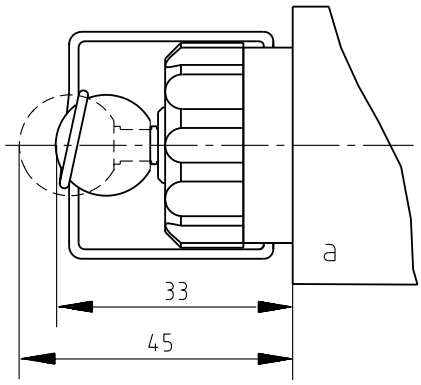
Electrical Connector, DIN 43 650

Designation	Type	Model	Max. input voltage	
K1	Connector B (black)	without rectifier - M16x1.5 (bushing bore ∅ 6-8 mm)	230 V DC	
	Connector A (grey)		230 V AC	
K5	Connector B (black)	without rectifier - M16x1.5 (bushing bore ∅ 4-6 mm)	230 V DC	
	Connector A (grey)		230 V AC	
K2	Connector B (black)	without rectifier with LED and quenching diode - M16x1.5 (bushing bore ∅ 6-8)	12...24 V DC	
	Connector A (grey)		12...24 V DC	
K3	Connector B (black)	with rectifier - M16x1.5 (bushing bore ∅ 6-8 mm)	230 V AC	
	Connector A (grey)		230 V AC	
K4	Connector B (black)	with rectifier with LED and quenching diode - M16x1.5 (bushing bore ∅ 6-8 mm)	230 V AC	
	Connector A (grey)		230 V AC	

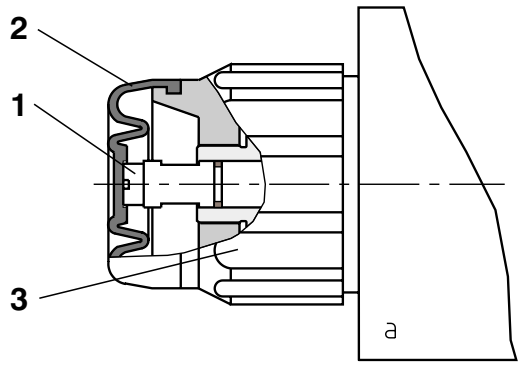


Manual Override

STANDARD	CLOSED NUT
Dimensions  Standard model of the manual override. Standard retaining nut of the solenoid.	Type **N1** Dimensions  Manual override with retaining nut. Can be used after removing nut.

RUBBER BOOT	DETENT ASSEMBLY
Type **N2** Dimensions  Manual override protected by rubber boot.	Type **N3** Dimensions  Manual override holds the spool in the shiftet position.

Spool Speed Control Orifice

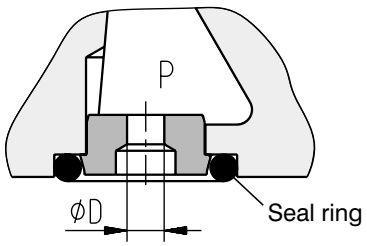
Type	Dimension	Description
T1		This direstional valve provides control spool soft shifting by means of orifice situated in the solenoid armature.To ensure the proper function of the valve, perfect air bleeding of the solenoid is required (byus of bleeding plug (1)). The plugs are accessible after removing the rubber boot (2) from the solenoid retaining nut (3).

Switching times

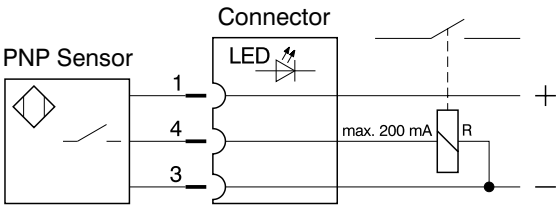
Total switching time, on	ms	300 ... 500
Total switching time, off	ms	400 ... 800
Time of the pressure change, switching on	ms	80 ... 200
Time of the pressure change, switching off	ms	80 ... 400

The switching times shown are valid for viscosity ν = 32 mm^2/s, valve temperature t = 40 °C and nominal voltage. They are dependent upon working pressure and flow rate of the directional control valve.

Orifice in P-Port

Type	∅D (mm)	Dimensions	Description
D1	1.0		P-Port orifices limit the flow into the directional control valve.
D2	1.5		
D3	2.0		
D4	2.2		
D5	2.5		

Sensing of the Spool End Position

Type	Circuit diagram of the sensor	Description
S1		The proximity sensor transforms the spool position into an electrical step signal. Can be used with directional control valves with one or two solenoids.

Technical Data of the Sensor

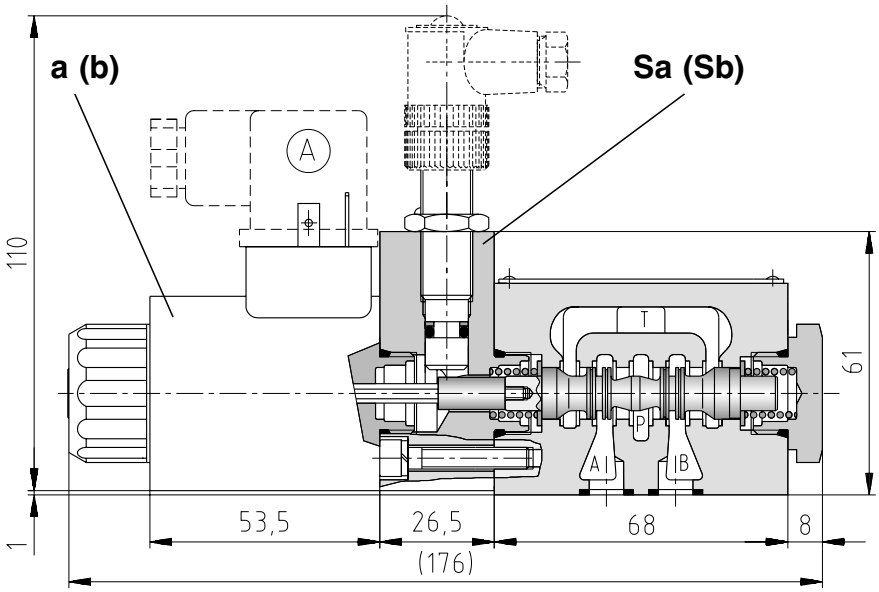
Rared voltage	V	24 DC
Power supply voltage range	V	10 ... 30 DC
Rated current	mA	200
Max. operating pressure	bar	up to 50
Switching frequency	Hz	1000
Ambient temperature range	°C	-25 ... +80

Technical Data of the Connector

Power supply voltage range	V	10 ... 30 DC
Ambient temperature range	°C	-25 ... +80
Indication		yellow LED

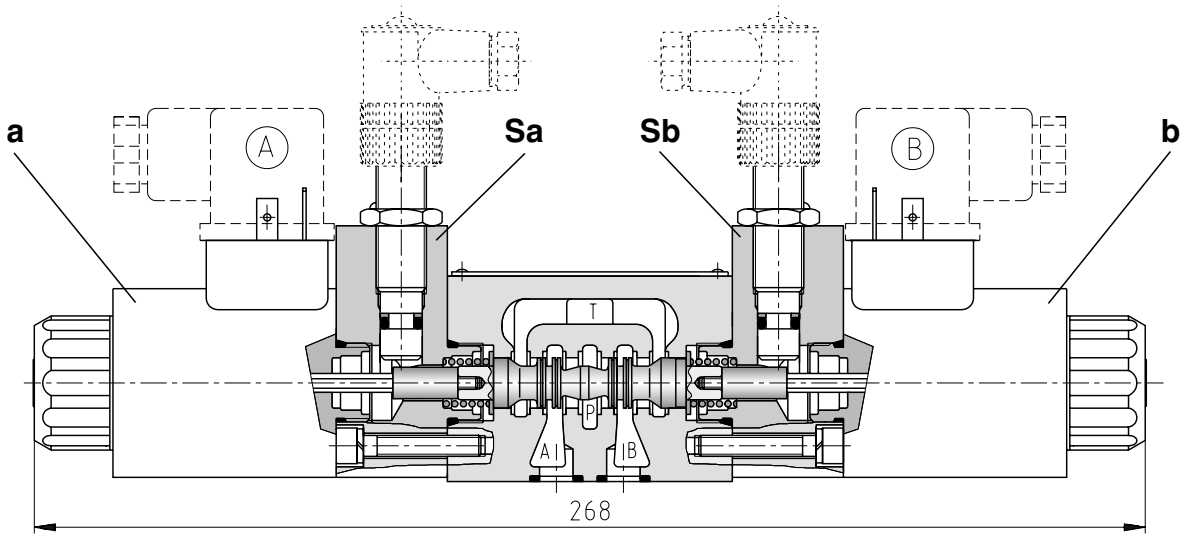
Two Positions Directional Control Valve

Signal of solenoid a (b)	Signal of sensor Sa (Sb)	LED
0	1	ON
1	0	OFF



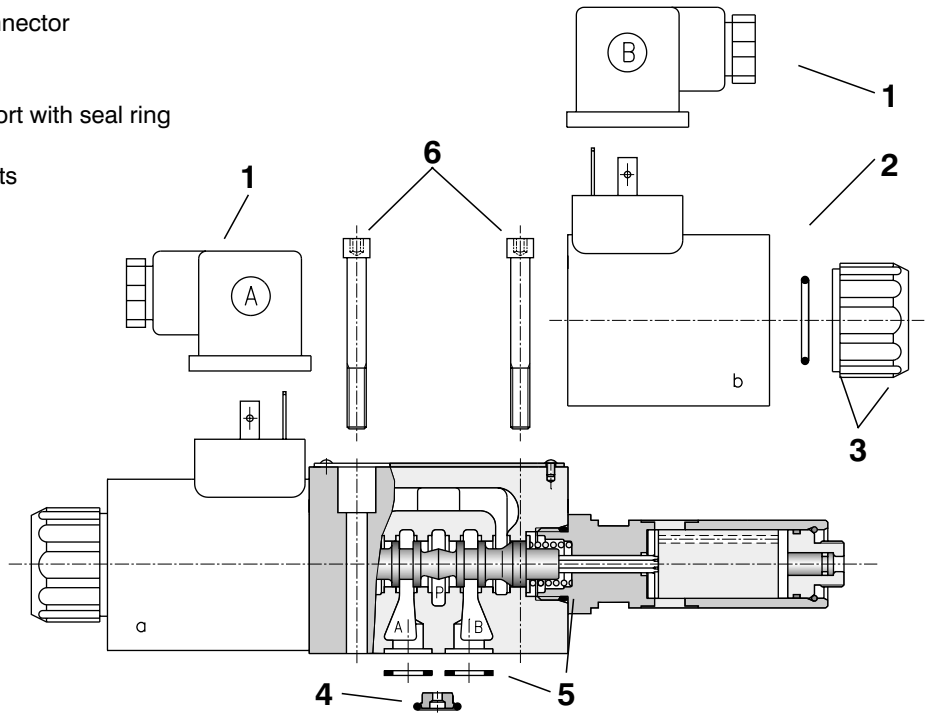
Three Positions Directional Control Valve

Signal of solenoids		Signal of sensors		LED	
a	b	Sa	Sb	Sa - LED	Sb - LED
0	0	1	1	ON	ON
0	1	1	0	ON	OFF
1	0	0	1	OFF	ON



Spare Parts

1 Electrical connector
2 Solenoid coil
3 Nut with seal
4 Orifice in P port with seal ring
5 Seal kit
6 Mounting bolts



Electrical connector, DIN 43 650

Type designation	Connector A grey	Connector B black
	Ordering number	
K1	936-9902	936-9901
K5	936-9906	936-9905
K2	936-9908	936-9907
K3	936-9904	936-9903
K4	936-9910	936-9909

Connector of position sensor

Type designation	Model	Max. input voltage	Ordering number
K02	connector of position sensor with LED	10...30 V DC	936-9940

Solenoid coil

Solenoid type	Coil type						
	E1	E2	E3	E4	E5	E6	E7
	Ordering number						
01200	936-0062	936-6200	936-4306	936-4305		936-4901	936-4902
*01200	944-0001	-	-	-		-	-
01400	936-0063	936-6201	-	-		-	-
02100	-	-	-	-		-	-
02400	936-0066	936-6204	936-4327	936-4325		936-4903	936-4900
*02400	944-0002	-	-	-		-	-
04200	-	-	-	-		-	-
04800	936-0071	936-6208	-	-		-	-
06000	936-0073	-	-	-		-	-
10200	936-0076	-	-	-		-	-
20500	936-0078	-	-	-		-	-
02450					936-2325		
11550					936-2375		
*11550					944-0003		
23050					936-2385		
*23050					944-0004		

Solenoid retaining nut with seal

Type of the nut	Seal ring	Ordering number
Standard nut	22 x 2	484-9951
Closed nut		484-9952
Nut with rubber boot		484-9953
Nut with detent assembly		484-9954

Orifice in P port

Type	∅D (mm)	Seal ring	Ordering number
D1	1.0	9.25 x 1.75	484-9973
D2	1.5		484-9974
D3	2.0		484-9975
D4	2.2		484-9977
D5	2.5		484-9976

Seal kit

Type	Dimensions, number		Ordering number
Standard - NBR70	9.25 x 1.68 (4 pcs.)	17 x 1.8 (2 pcs.)	484-9961
Viton	9.25 x 1.78 (4 pcs.)	17.17 x 1.78 (2 pcs.)	484-9971

Mounting bolts

Dimensions, number	Tightening torque	Ordering number
M5 x 45 DIN 912-10.9 (4 pcs.)	8.9 Nm	484-9958

* CSA Upon request

Preferred Types of Valves

Type	Ordering Number	Type	Ordering Number
RPE3-062Z11/01200E1	484-0703	RPE3-063Y11/02400E1	484-0785
RPE3-063Z11/01200E1	484-0677	RPE3-062R11/02400E1	484-0788
RPE3-062Z51/01200E1	484-0699	RPE3-062R21/02400E1	484-0793
RPE3-063C11/01200E1	484-0678	RPE3-062A51/02400E1	484-0789
RPE3-062C51/01200E1	484-0700	RPE3-062Y51/02400E1	484-0801
RPE3-063H11/01200E1	484-0679	RPE3-062J15/02400E1	484-0790
RPE3-063Y11/01200E1	484-0681	RPE3-062Z11/23050E5	484-1107
RPE3-062R11/01200E1	484-0684	RPE3-063Z11/23050E5	484-1034
RPE3-062R21/01200E1	484-0689	RPE3-062Z51/23050E5	484-1115
RPE3-062A51/01200E1	484-0685	RPE3-063C11/23050E5	484-1042
RPE3-062Y51/01200E1	484-0697	RPE3-062C51/23050E5	484-1066
RPE3-062J15/01200E1	484-0686	RPE3-063H11/23050E5	484-1043
RPE3-062Z11/02400E1	484-0807	RPE3-063Y11/23050E5	484-1044
RPE3-063Z11/02400E1	484-0781	RPE3-062R11/23050E5	484-1047
RPE3-062Z51/02400E1	484-0803	RPE3-062R21/23050E5	484-1113
RPE3-063C11/02400E1	484-0782	RPE3-062A51/23050E5	484-1048
RPE3-062C51/02400E1	484-0804	RPE3-062Y51/23050E5	484-1249
RPE3-063H11/02400E1	484-0783	RPE3-062J15/23050E5	484-1035

Caution!

- For applications outside the given parameters, please consult us.
- With spool symbols A51 and J75 for pressures exceeding 210 bar, the T-port should be connected directly to the tank.
- For directional control valves with two solenoids, one solenoids must be without power before the other solenoid can be powered charged. Switching time for directional valves with detent assembly (impulse control) should not be shorter than 60 ms. With directional valves with cushioned spool shifting, the switching time must correspond with the shifting time.
- Other for spool symbols on request.
- The packing foil is recyclable.
- Mounting bolts or studs must be ordered separately.
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law.

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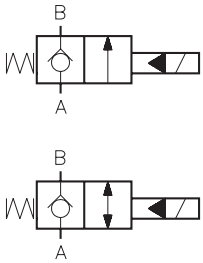
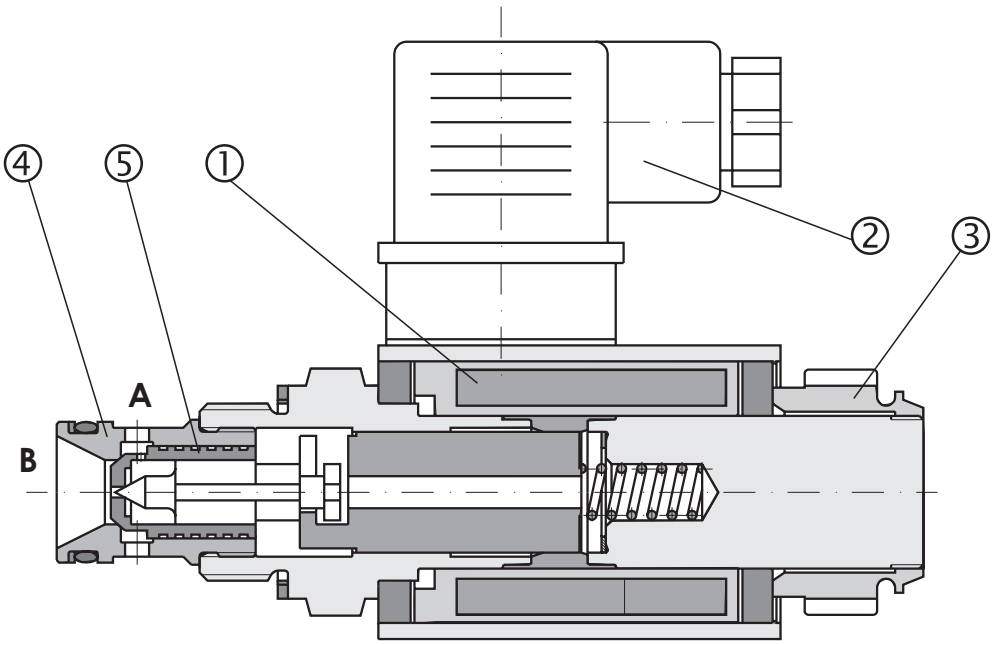
HYTOS	*SOLENOID - OPERATED POPPET-TYPE DIRECTIONAL VALVES* **ROE2-06**		**HA 4011 2/99**
	Size 06	...3626 psi (250 bar)	..16.64 US gpm (63 l/min)	Replaces HA 4011 1/96



- ❑ **Poppet valve - leak-free closing**
- ❑ **High switching reliability after long idling time**
- ❑ **Short switching times**

Functional Description

Solenoid-operated poppet-type directional valves are designed to check and open the flow of the hydraulic fluid. The opening and closing of the valve is ensured by an electro - hydraulically controlled poppet (5) which sits on the seat (4) and guarantees in its closed position practically leak-free sealing.
The operating solenoid (1) is a DC solenoid. for AC supply, the solenoid is provided with a rectifier, which is integrated directly into the connector (2). The plug connector can be turned by 90°. By loosening the fixing nut (3), the solenoid (1) can be turned arbitrarily in the range of 360°, or replaced.
The valves are delivered with basic surface treatment. The basic surface treatment of both the valve body and the solenoid is zinc coating.



Ordering Code

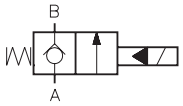
ROE2-062 □ / □ □ □

Solenoid - operated poppet-type directional valve

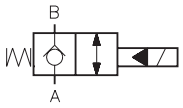
Nominal size

Number of operating positions

Functional symbols



S1



S2

Connector plug to DIN 43 650

no designation	without connector plug
K1	connector plug without rectifier
K2	connector plug without rectifier and with LED
K3	connector plug without rectifier
K4	connector plug with rectifier and LED

Type of the solenoid coil

E1	with DIN connector
E2	with DIN connector and quenching diode
E3	with AMP connector
E4	with AMP connector and quenching diode
E5	with integrated rectifier and DIN connector

Rated supply voltage at plug connector input

01200	12V DC / 2.41A
01400	14V DC / 1.66A
02100	21V DC / 1.14A
02400	24V DC / 1.16A
04200	42V DC / 0.59A
04800	48V DC / 0.56A
06000	60V DC / 0.41A
10200	102V DC / 0.24A
20500	205V DC / 0.12A
02450	24V AC / 1.44A / 50 (60)Hz
11550	115V AC / 0.26A / 50 (60)Hz
23050	230V AC / 0.14A / 50 (60)Hz

The AC coils correspond with E5 type.

Recommended solenoid coils used with connector plugs with rectifiers - type designation K3, K4

Rated supply source voltage (permissible rated voltage variation ± 10%)	Type designation of the solenoid voltage
24V AC / 1,44A / 50 (60)Hz	02100
115V AC / 0,26A / 50 (60)Hz	10200
230V AC /0,14A / 50 (60)Hz	20500

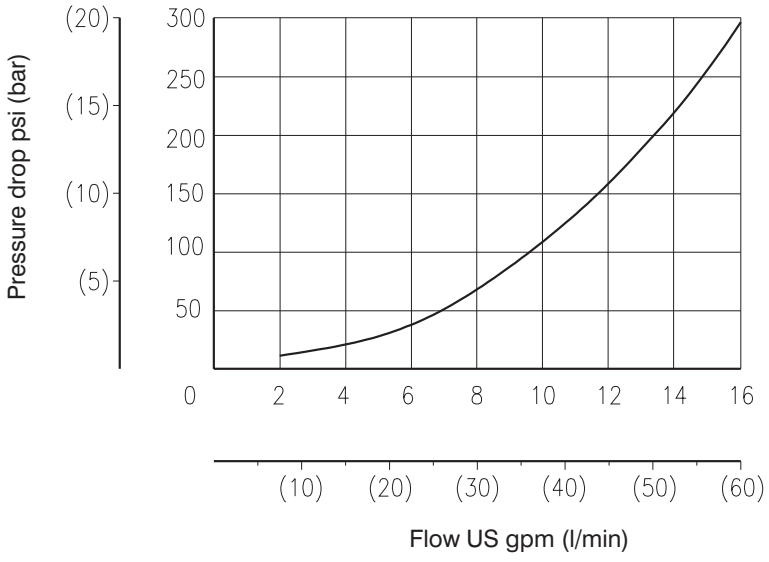
Technical Data

Nominal size	mm	06	
Maximal flow	US gpm (l/min)	16.64 (63)	
Max. operating pressure	psi (bar)	3626 (320)	
Pressure drop	psi (bar)	see z Δp-Q performance curve	
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP RP 91H in viscosity classes ISO VG 32, 46 and 68	
Fluid temperature range	°F (°C)	-22 ... +176 (-30 ... +80)	
Ambient temperature max.	°F (°C)	+122 (+50)	
Viscosity range	SUS (mm^2/s)	98 ... 1840 (20 ... 400)	
Maximum degree of fluid contamination		Class 18/15 according to ISO 4406. Therefore we recommend a filter with a retention rate $\beta_{10} \geq 75$.	
Permissible rated voltage variation	%	± 10	+ 5 - 15
Max. switching frequency	1/h	15 000	
Switching time, on; at rated voltage and ν = 98 SUS (20 mm^2/s)	ms	30 ... 110	30 ... 110
Switching time, off; at ν = 98 SUS (20 mm^2/s)	ms	10 ... 130	30 ... 150
Duty cycle	%	100	
Service life		10^7	
Enclosure type to DIN 40 050		IP 65	
Weight - valve with 1 solenoid valve with 2 solenoids	lb(kg)	1.1 (0.5)	
Mounting position		optional	

Δp-Q Charakteristics

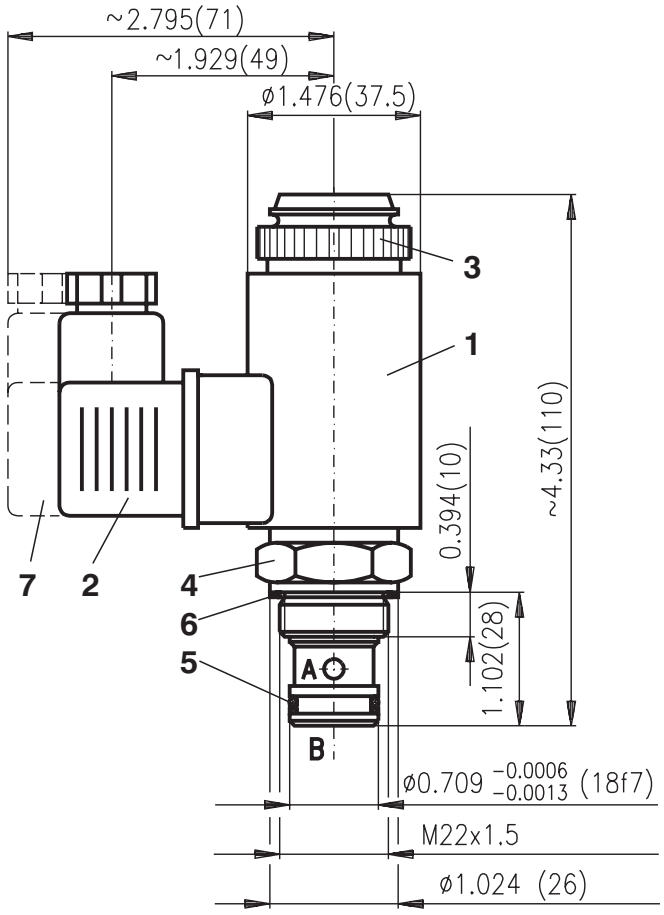
Measured at ν = 166 SUS (35 mm^2/s) and t = 104°F (40°C)

A → B; B→ A

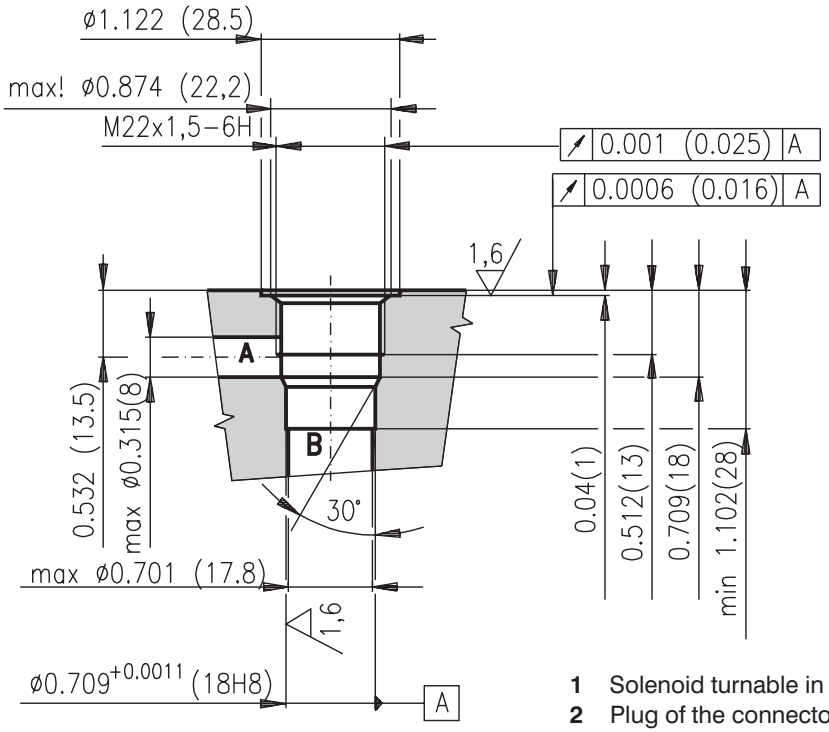


Valve Dimensions

Dimensions in inches and millimetres (in brackets)

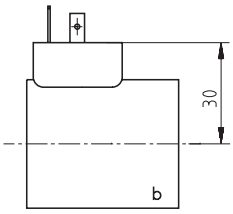
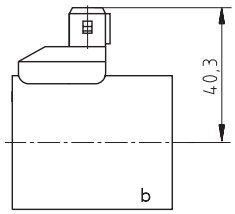
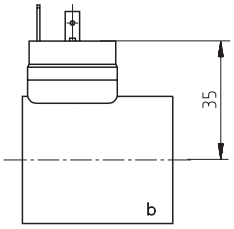


Installation Cavity

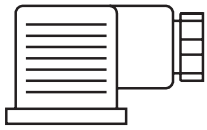


1 Solenoid turnable in the range of 360°
2 Plug of the connector
3 Fixing nut of the solenoid
4 Outside hexagon s=27mm
Tightening torque 18.5 lb-ft (25 Nm)
5 Sealing: O-RING 14x1.78
Back-up ring 14.73 x 17.43 x 1.14
6 U-SEAL 22.5x28x1.5
7 Distance required to remove plug

Type of the solenoid coil

Designation	Dimensional sketch	Description
E1		Solenoid coil with terminal for the connector plug to DIN 43 650.
E2		Solenoid coil with integrated quenching diode and terminal for the connector plug to DIN 43 650.
E3		Solenoid coil with terminal for AMP connector plug.
E4		Solenoid coil with integrated quenching diode and terminal for AMP connector plug.
E5		Solenoid coil with integrated rectifier and terminal for the connector plug to DIN 43 650.

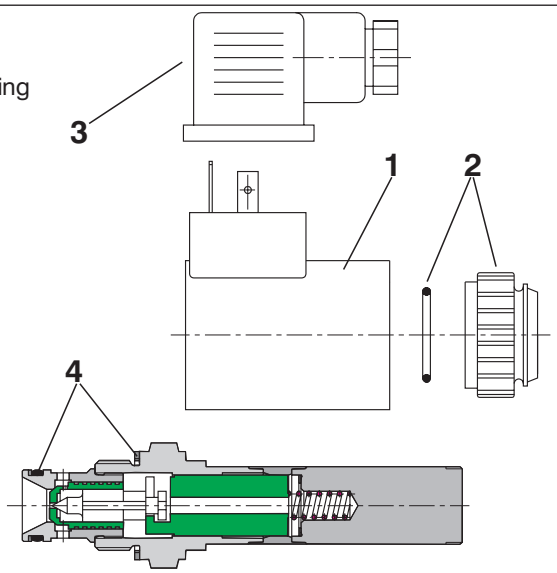
Connector plug to DIN 43 650



Designation	Typ	Model	Max input voltage
K1	Plug B (black)	without rectifier	250V DC
			230V AC
	Plug A (grey)	without rectifier	250V DC
			230V AC
K2	Plug B (black)	without rectifier and with LED	12...30V DC
			230V AC
	Plug A (grey)	without rectifier and with LED	12...30V DC
			230V AC
K3	Plug B (black)	with rectifier	250V AC
	Plug A (grey)	with rectifier	250V AC
K4	Plug B (black)	with rectifier and with LED	250V AC
	Plug A (grey)	with rectifier and with LED	250V AC

Spare parts

1 Solenoid coil
2 Solenoid fixing nut + sealing ring
3 Connector plug
4 Set of sealing



Solenoid coil

Type designation of the coil voltage	Type of the coil				
	E1	E2	E3	E4	E5
	Ordering number				
01200	936-0022	936-0690	936-0670	936-0680	
01400	936-0650	936-0691	936-0673	936-0681	
02100	936-0651	936-0692	936-0674	936-0682	
02400	936-0026	936-0693	936-0672	936-0683	
04200	936-0653	936-0695	936-0676	936-0685	
04800	936-0031	936-0696	936-0677	936-0686	
06000	936-0654				
10200	936-0655				
20500	936-0036				
02450					936-2125
11550					936-2175
23050					936-2185

Solenoid fixing nut + sealing ring

Type of the nut	Sealing ring	Ordering number
Standard nut	18x1.5	486-9010

Connector plug to DIN 43 650

Type designation	Model	Max. input voltage	Connector plug A grey	Connector B black
			Ordering number	
K1	without rectifier	0...250V DC	936-9902	936-9901
		0...230V AC		
K2	without rectifier and with LED	12...30V DC	936-9908	936-9907
		0...230V AC	936-9906	936-9905
K3	without rectifier	0...250V AC	936-9904	936-9903
K4	without rectifier and LED	250V AC	936-9910	936-9909

Set of the seal

Type	Standard - NBR70	Dimensions, number	Ordering number
ROE2-06	U-SEAL	22.5x28x1.5	404-9000
	O-RING	14x1.78	
	Back-up ring	14.73x17.43x1.14	

Caution!

- The packing foil is recyclable.
- The sealing rings pos. 5 and 6 are supplied with each valve.
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law.

HYTOS a.s., CZ - 543 15 Vrchlabí, Czech Republic

Tel.: +420-438-403111, Fax: +420-438-403421, e-mail: sales@hytos.cz

Solenoid operated directional valves

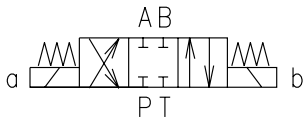
RPE2-04

Size 04 • p_{max} up to 320 bar • Q_{max} up to 30 L/min

HA 4012
3/2002

Replaces
HA 4012 6/2000

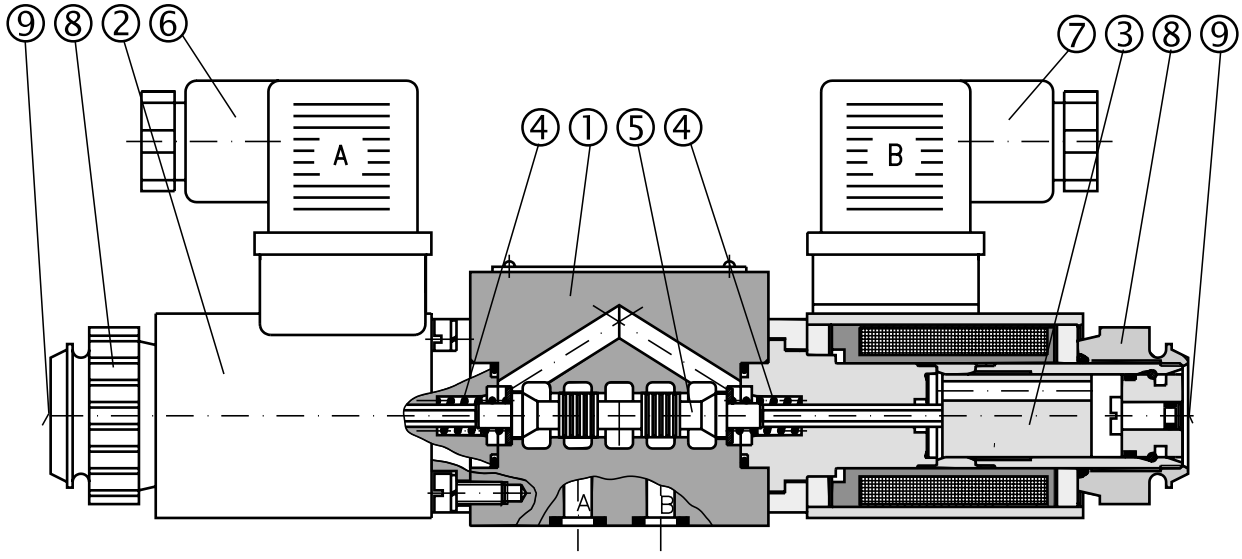
Special model - special installation dimensions



- **4/3-, 4/2- and 3/2-way directional valves with solenoid control**
- **Solenoids can be turned arbitrarily around their axis**
- **Push button manual override**

Functional Description

The directional control valves RPE2-04 consist of cast iron housing (1), control spool (5), centering springs (4) and operating solenoids (2, 3).
The three-position directional valves are fitted with two solenoids and two springs. The two-position directional valves have either one solenoid and one return spring or two solenoids and the detent assembly.
The operating solenoids are D.C. solenoids and are supplied through connectors A, B (6, 7). For A.C. supply the solenoids are provided with rectifiers, which are integrated directly into the connectors A, B (6, 7). The plug connectors can be turned by 90°. By loosening the fixing nut (8), the solenoids (2, 3) can be turned on their axis in the range of 360°.
Provided that the pressure in T-port does not exceed 363.6 psi (25 bar), the spool of the valve can be repositioned by manual override (9).
The surface of the valve housing is phosphate coated and the operating solenoids are zinc coated.



Ordering Code

RPE2-04 ☐ ☐ / ☐ - ☐

Solenoid operated directional valves

Nominal size

Number of operating positions
two positions **2**
three positions **3**

Functional Symbols
see the table functional symbols

Installation Dimensions
2 see valve dimensions on pg. 4
3 to DIN 24 340-A-4

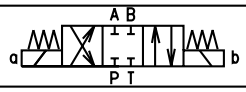
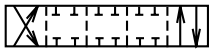
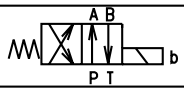
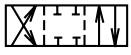
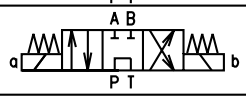
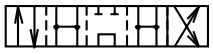
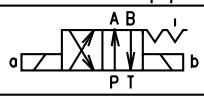
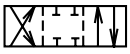
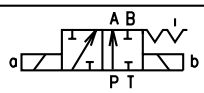
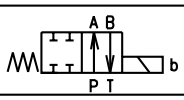
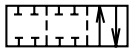
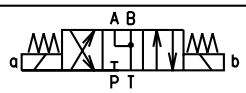
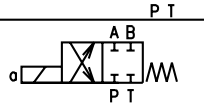
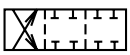
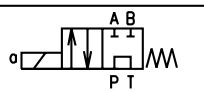
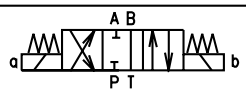
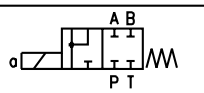
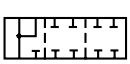
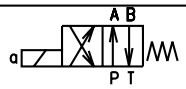
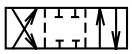
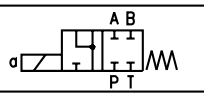
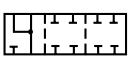
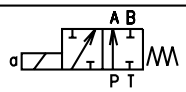
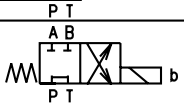
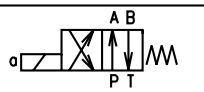
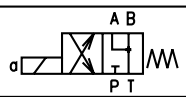
Rated supply voltage at the connector input

01200	D.C. 12V		
01400	D.C. 14V		
02100	D.C. 21V	**02450**	A.C. 24V (50Hz)
02400	D.C. 24V		
04200	D.C. 42V		
04800	D.C. 48V		
06000	D.C. 60V		
10200	D.C. 102V	**11550**	A.C. 115V (50Hz)
20500	D.C. 205V	**23050**	A.C. 230V (50Hz)

Technical Data

Nominal size	mm	04
Maximum flow	L/min	see p-Q characteristics
Max. operating pressure at ports P, A, B	bar	320
Max. operating pressure at port T	bar	100
Pressure drop	bar	see Δp-Q characteristics
Hydraulic fluid		Hydraulics oils of power classes HM, HV to CETOP RP 91 H in viscosity classes ISO VG 32, 46 and 68
Fluid temperature range	°C	-30 ... +80
Ambient temperature, max.	°C	up to +50
Viscosity range	mm^2/s	20 ... 400
Maximum degree of fluid contamination		Class 21/18/15 to ISO 4406 (1999).
Rated voltage and current at connector input without rectifier	V/A D.C.	12/2.4 14/2.0 21/1.33 24/1.16 42/0.66 48/0.56 60/0.46 102/0.29 205/0.15´´
Rated voltage and current at connector input with rectifier	V/A A.C.	24/1.52 115/0.33 230/0.17
Permissible rated voltage variation	%	A.C. ±10 D.C. ±10
Max. switching frequency	1/h	15 000
Switching time, ON; at $\nu = 32\ mm^2/s$	ms	30 ... 50
Switching time, OFF; at $\nu = 32\ mm^2/s$	ms	A.C. 70 ... 100 D.C. 30 ... 50
Duty cycle	%	100
Service life	cycles	10^7
Enclosure type to DIN 40 050		IP 65
Weight - valve with 1 solenoid valve with 2 solenoids	kg	1.10 1.50
Mounting position		optional

Functional Symbols

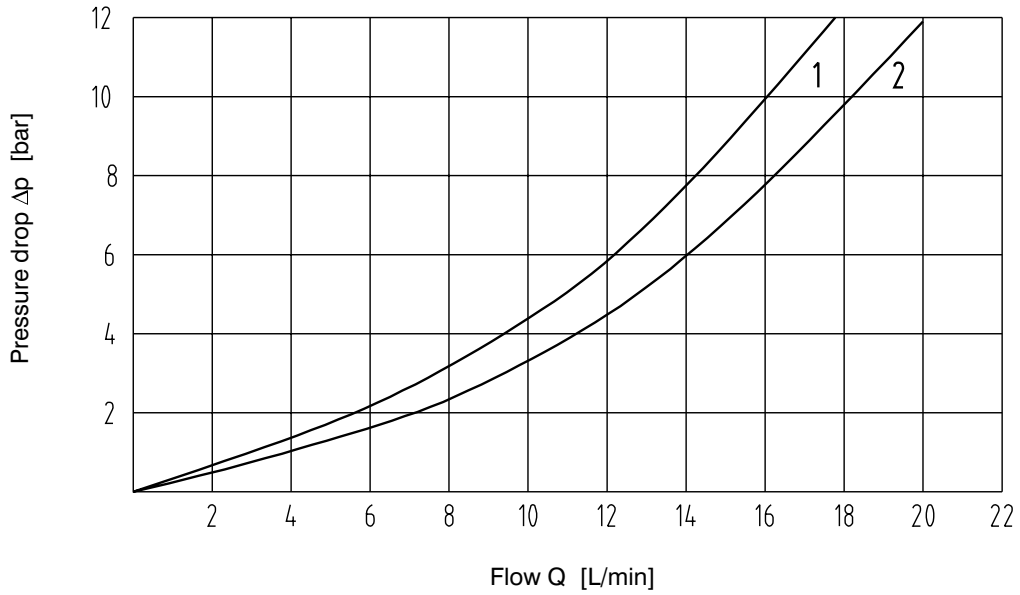
Designation	Symbol	Interposition	Designation	Symbol	Interposition
Z11			X11		
C11			J15		
H11			J75		
P11			Z11		
Y11			Z51		
L21			C51		
B11			Z71		
R11			Z81		
A51			C11		
P51			R21		
Y51					

Caution!

- For applications outside these parameters, please consult the manufacturer.
- With functional symbols A51 and J75 for pressures exceeding 100 bar, the T-port should be connected directly to the tank.
- For directional valves with two solenoids, one solenoid must be without charge before the other solenoid can be charged. Switching time for directional valves with detent assembly should not be shorter than 60 ms.
- Directional valves with other functional symbols as those shown in the table above can be delivered on request.
- The packing foil is recyclable.
- The protective plate can be returned to manufacturer.
- Mounting bolts M5 x 50 DIN 912-10.9 or studs must be orderer separately.
  Tightening torque is 5 Nm.
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law.

Δp-Q Characteristics

Measured at $\nu = 32\ mm^2/s$ and $t = 40\ °C$



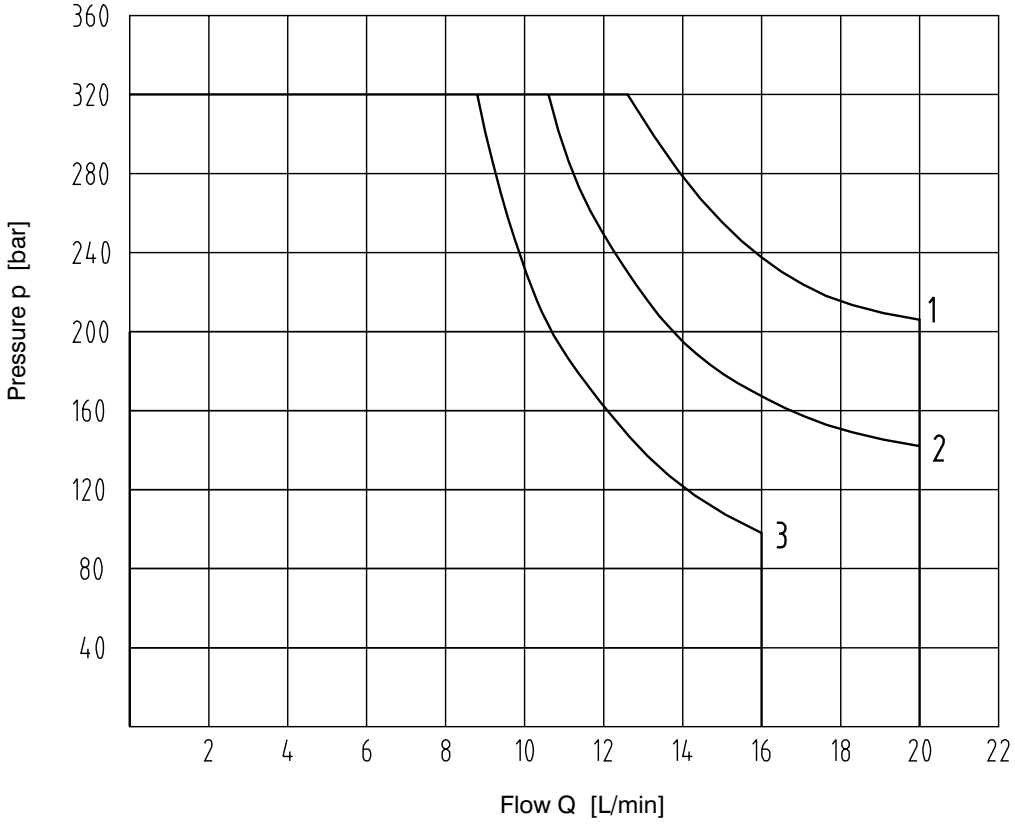
For all Functional Symbols

P→T	P→A	P → B	A→T	B→T
1	2	2	2	2

p-Q Characteristics

Measured at $\nu = 32\ mm^2/s$ and $t = 40\ °C$

Operating limits for maximum hydraulic power tfansferred by the directional valve. For respective spool type - see functional symbols.



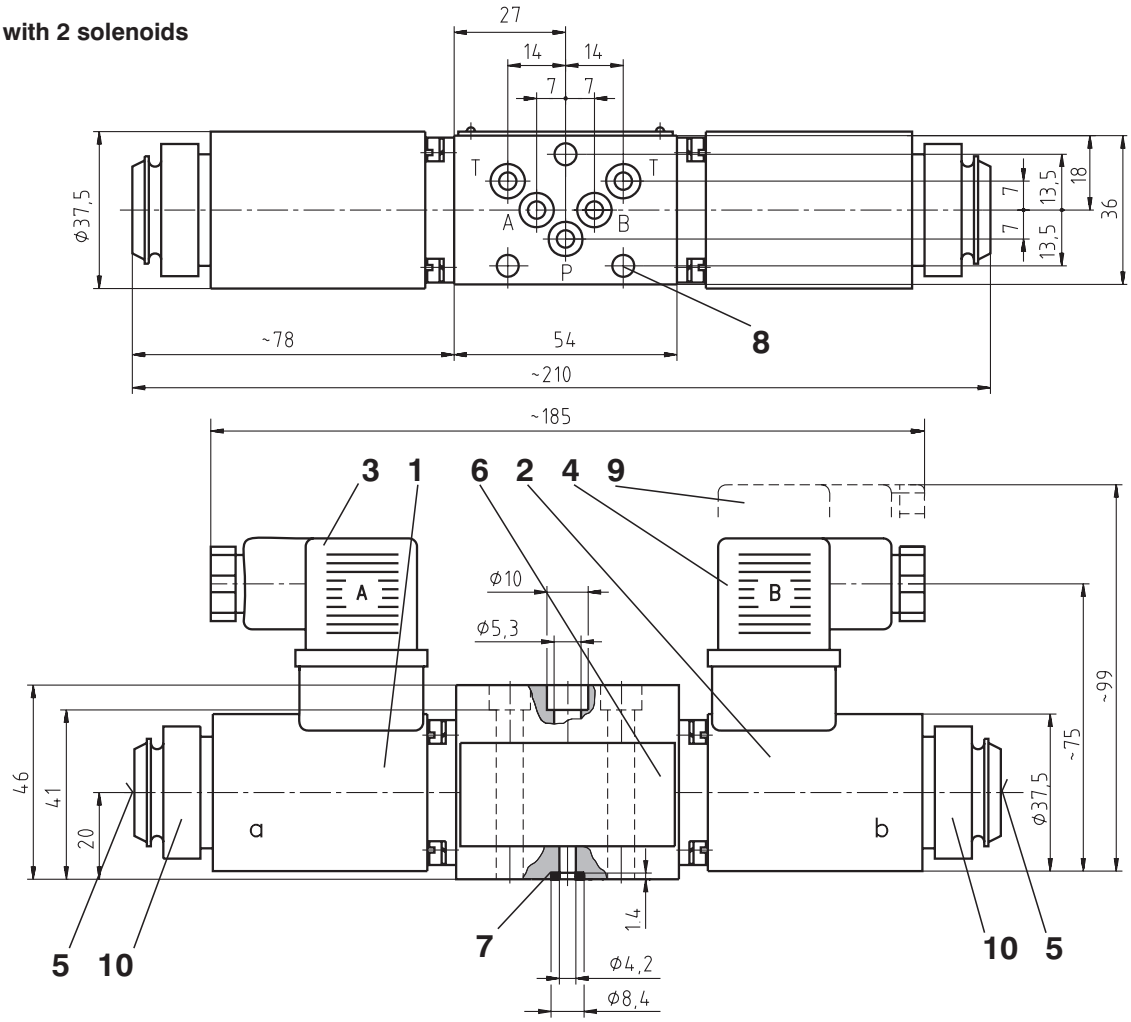
Z11	Z51	H11	P11	P51	Y11	Y51	C11	C51	B11	L21	R11	R21	X11	A51	Z71	Z81	J15	J75
2	2	2	2	2	2	2	3	3	2	3	1	1	1	3	3	3	3	1

Valve Dimensions

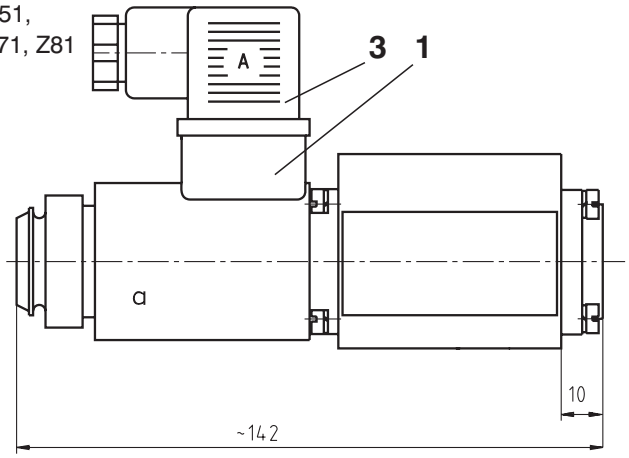
Dimensions in millimeters

Installation dimensions 2

Valve with 2 solenoids

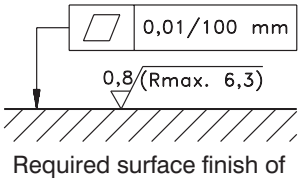


Valve with 1 solenoid
Functional symbols
R11, R21, A51, P51,
Y51, Z51, C51, Z71, Z81

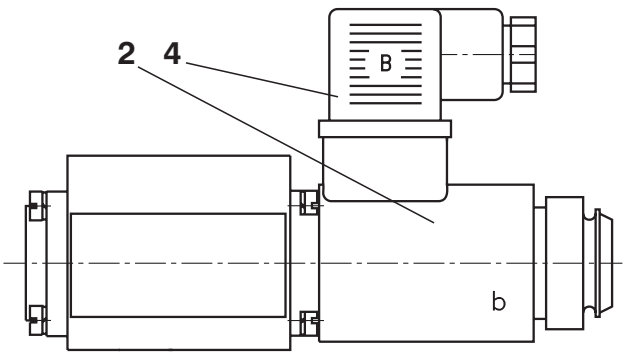


1 Solenoid a
2 Solenoid b
3 Connector plug A, grey color, to DIN 43 650
4 Connector plug B, black color, to DIN 43 650
5 Manual override
6 Name plate
7 Square ring 009 5.28 x 1.68 (5 pcs.) supplied with valve
8 3 mounting holes
9 Distance required to remove plug
10 Fixing nut

Valve with 1 solenoid
Functional symbols X11, Z11, C11



Required surface finish of interface

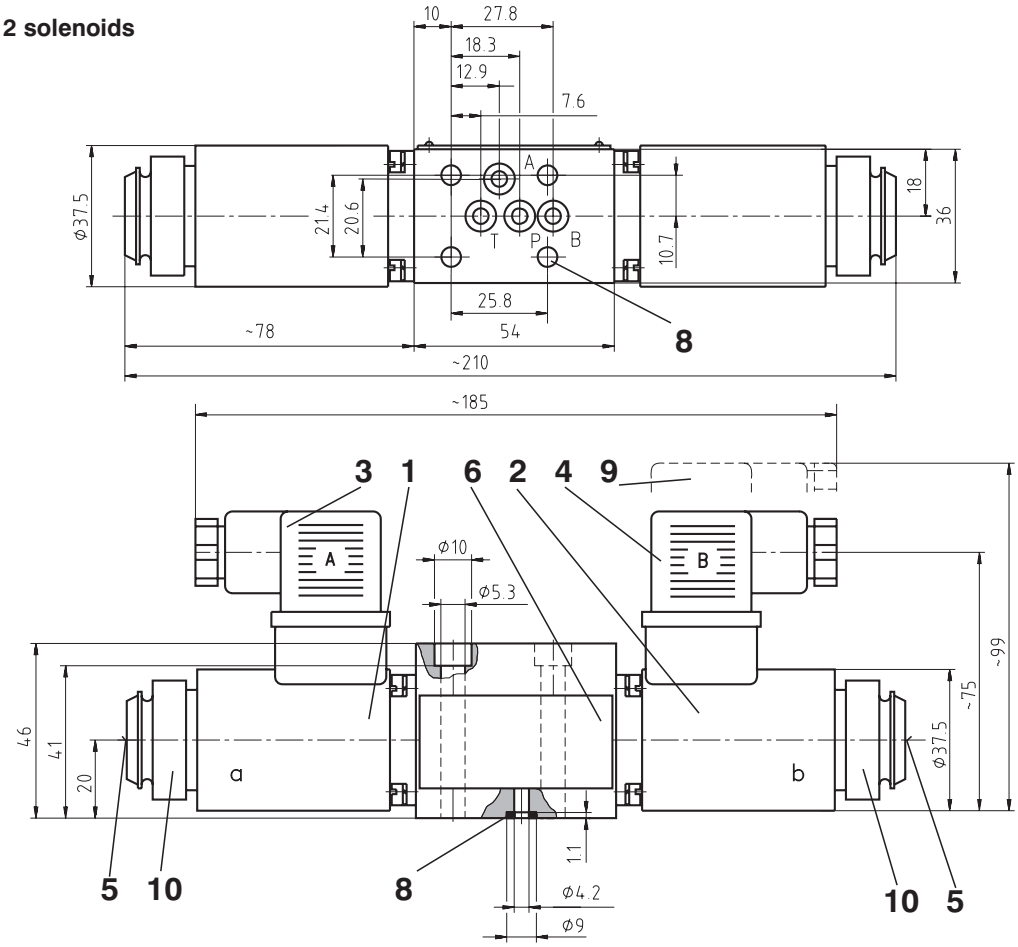


Valve Dimensions

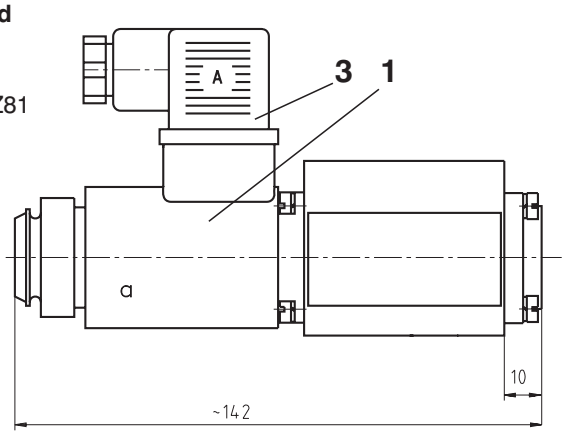
Dimensions in millimeters

Installation dimensions 3 (to DIN 24 340-A4)

Valve with 2 solenoids

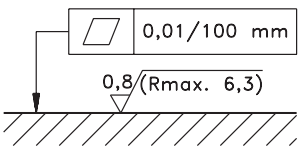


Valve with 1 solenoid
Functional symbols
R11, R21, A51, P51,
Y51, Z51, C51, Z71, Z81

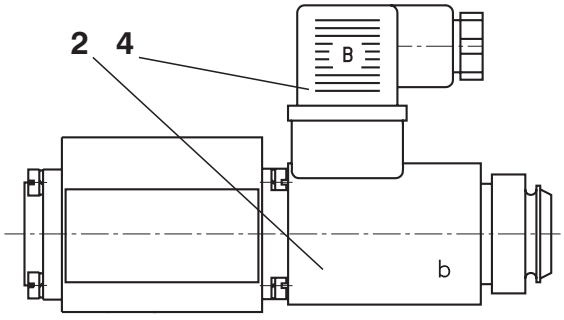


1 Solenoid a
2 Solenoid b
3 Connector plug A, grey color, to DIN 43 650
4 Connector plug B, black color, to DIN 43 650
5 Manual override
6 Name plate
7 Square ring 6 x 1.5 (4 pcs.) supplied with valve
8 4 mounting holes
9 Distance required to remove plug
10 Fixing nut

Valve with 1 solenoid
Functional symbols X11, Z11, C11



Required surface finish of interface



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E-mail: sales.cz@argo-hytos.com
www.argo-hytos.com

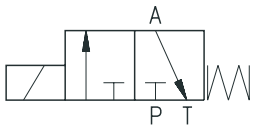
3/2-way cartridge directional valves solenoid operated

ROX1-04

Size 04 • p_{max} up to 210 bar • Q_{max} up to 40 L/min

HA 4013
1/2003

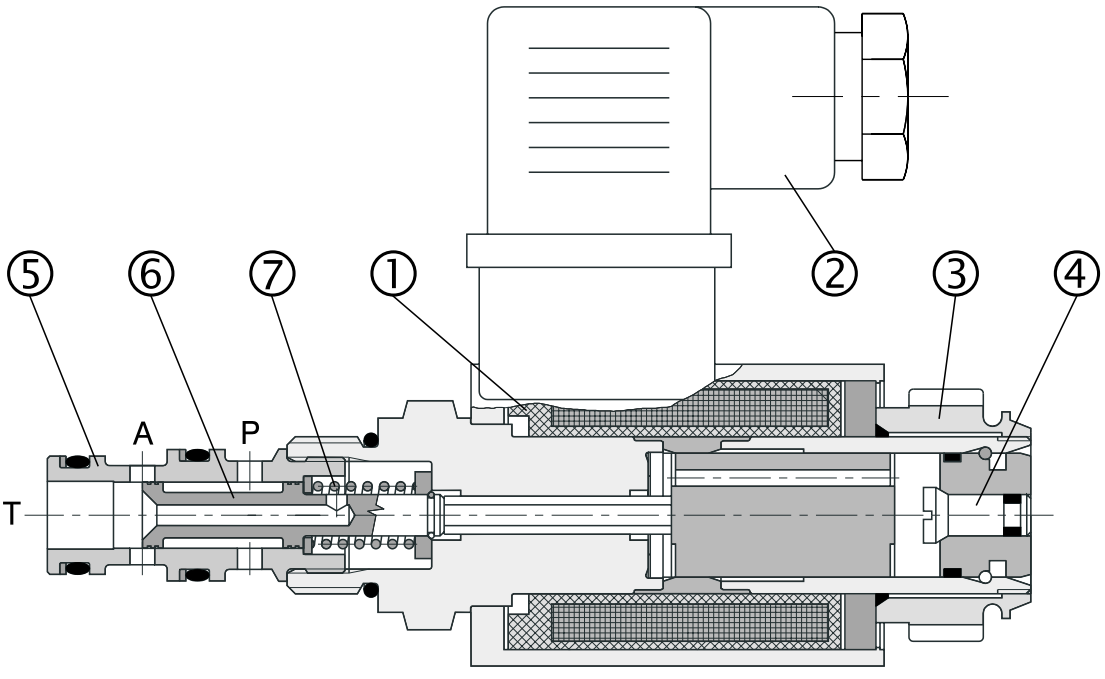
Replaces
HA 4013 3/2002



- ❑ **3/2-way directional cartridge control valve**
- ❑ **High switching reliability after long idling time**
- ❑ **Short switching times**
- ❑ **Push button manual override**
- ❑ **Single electrical connection**
- ❑ **High transmitted power**

Functional Description

3/2-way directional cartridge valves with solenoid operation are designed to check and control the direction of the hydraulic fluid. The valve consists of housing (5), cylindrical spool (6), return spring (7) and operating solenoid (1). The operating solenoid is a DC solenoid. For AC supply, the solenoid is provided with a rectifier which is integrated directly into the connector (2). With model E5, the rectifier is integrated directly into the solenoid coil. The electrical connector can be turned by 90°. By loosening the retaining nut (3), the solenoid (1) can be turned arbitrarily in the range of 360°, or replaced. In the case of solenoid or power malfunction, the spool of the valve can be repositioned by manual overide (4), provided the pressure in the T-port does not exceed 25 bar.
The valve body and the solenoid are zinc coated.



Ordering Code

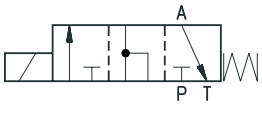
ROX1-042 ☐ / ☐ ☐ ☐ ☐ ☐ ☐

3/2-way directional spool control valve

Nominal size

Number of operating positions

Functional symbol



D21

Rated supply voltage of solenoids

12 V DC / 2.41 A	**01200**
14 V DC / 1.66 A	01400
21 V DC / 1.14 A	02100
24 V DC / 1.16 A	**02400**
42 V DC / 0.59 A	04200
48 V DC / 0.56 A	04800
60 V DC / 0.41 A	06000
102 V DC / 0.24 A	10200
205 V DC / 0.12 A	20500
24 V AC / 1.44 A / 50 (60) Hz	02450
115 V AC / 0.26 A / 50 (60) Hz	11550
230 V AC / 0.14 A / 50 (60) Hz	**23050**

The AC coils correspond with E5 type.

Seals

no designation	NBR
V	FPM (Viton)

Manual override

no designation	standard

***Electrical connector, DIN 43 650**

no designation	without connector
K1	connector without rectifier
K2	connector without rectifier with LED and quenching diode
K3	connector with rectifier
K4	connector with rectifier with LED and quenching diode
K5	connector without rectifier

Type of the solenoid coil

E1	with DIN connector
E2	with DIN connector and quenching diode
E3	with AMP connector
E4	with AMP connector and quenching diode
E5	with integrated rectifier and DIN connector
E6	with Kostal connector
E7	with Kostal connector and quenching diode

*other information on pages 4 and 6

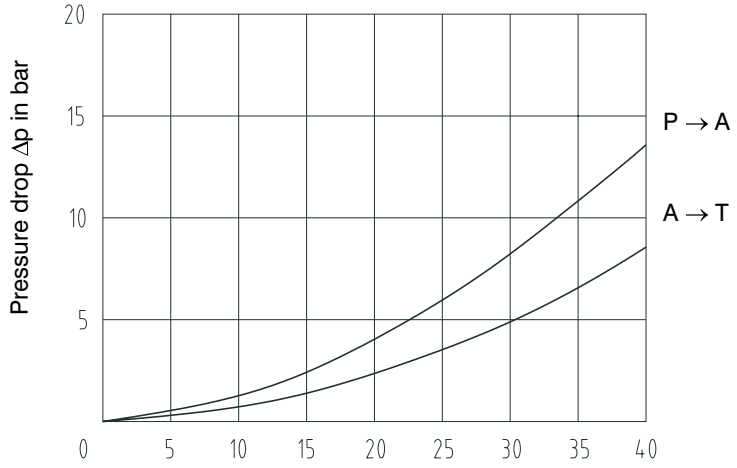
FOR PREFERRED TYPES SEE BOLD TYPING IN ORDERING CODE AND TABLE OF PREFERRED TYPES ON PAGE 6

Recommended solenoid coils used with electrical connector with rectifiers - type designation K3, K4

Rated supply source voltage (permissible rated voltage variation ± 10 %)	Type designation of the solenoid voltage
24 V AC / 1.44 A / 50 (60) Hz	02100
115 V AC / 0.26 A / 50 (60) Hz	10200
230 V AC / 0.14 A / 50 (60) Hz	20500

Δp-Q Characteristic

Measured at $\nu = 32\ mm^2/s$ and $t = 40\ °C$



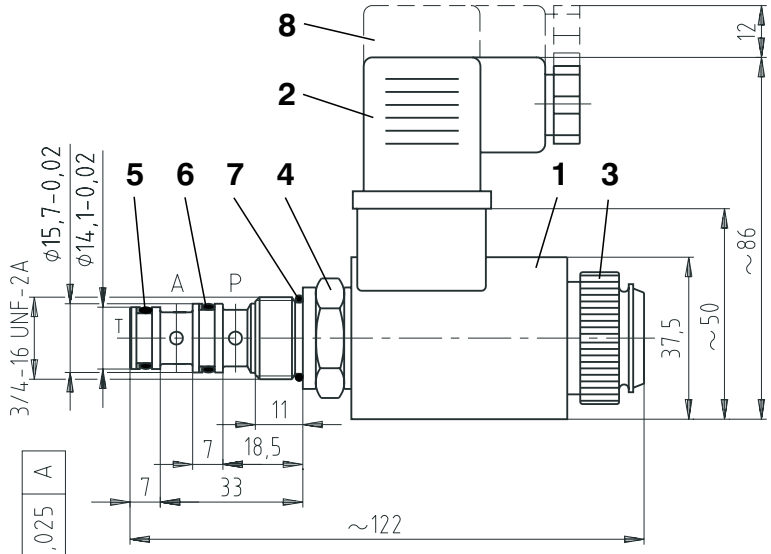
Tecnical Data

Nominal size	mm	04			
Maximum flow	L/min	40			
Max. operating pressure	bar	210			
Pressure drop	bar	see Δp-Q characteristics			
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP - RP 91H in viscosity classes ISO VG 32, 46 and 68			
Fluid temperature range	°C	-30 ... +80 for NBR seals -20 ... +80 for FPM seals			
Ambient temperature, max.	°C	up to +50			
Viscosity range	mm^2/s	20 ... 400			
Maximum degree of fluid contamination		Class 21/18/15 according to ISO 4406 (1999).			
Permissible rated voltage variation	%	DC	±10	AC	±10
Max. switching frequency	1/h	15 000			
Switching time, ON; at rated voltage and ν=32 mm^2/s	ms	DC	30 ... 50	AC	30 ... 50
Switching time, OFF; at ν=32 mm^2/s	ms		20 ... 40		70 ... 100
Duty cycle	%	100			
Service life		10^7			
Enclosure type to DIN 40 050		IP 65			
Weight	kg	0.6			
Mounting position		optional			

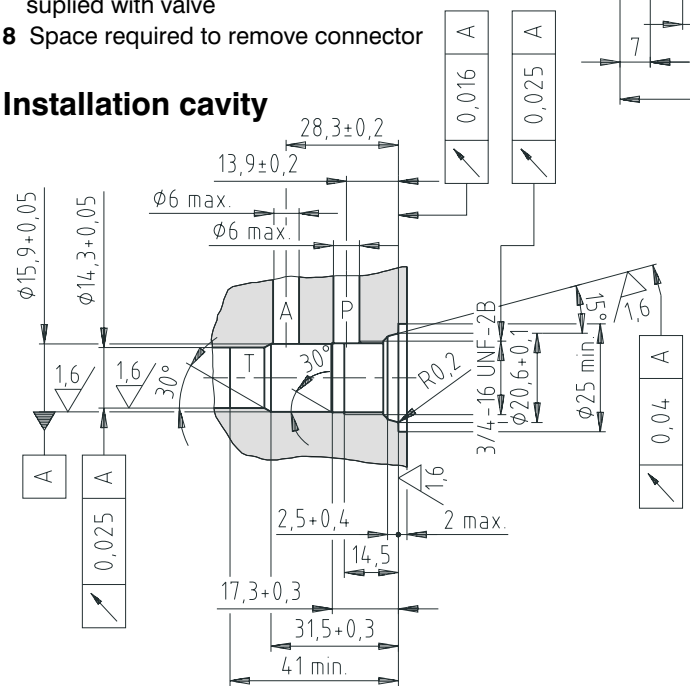
Valve Dimensions

Dimensions in millimetres

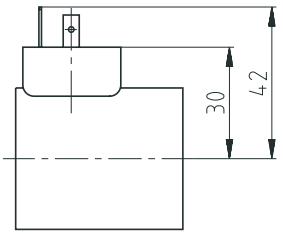
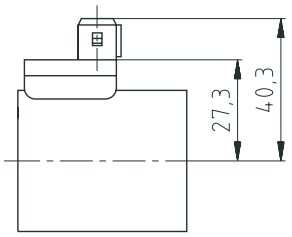
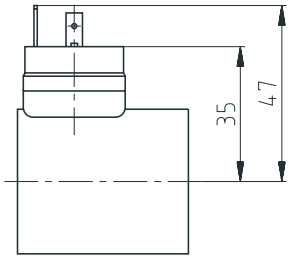
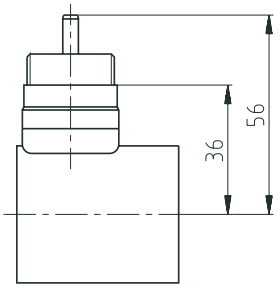
1 Solenoid turnable in the range of 360°
2 Electrical connector, DIN 43 650
3 Retaining nut of the solenoid
4 Outside hexagon s = 24 mm
Tightening torque 20 Nm
5 Combined sealing:
O-ring 11.2 x 1.8 (1 pc.)
Back-up ring 11.5 x 14.3 x 1.4 (1 pc.)
suplied with valve
6 Combined sealing:
O-ring 12.42 x 1.78 (1 pc.)
Back-up ring 13.1 x 15.9 x 1.4 (1 pc.)
suplied with valve
7 O-ring 17 x 1.8 (1 pc.)
suplied with valve
8 Space required to remove connector



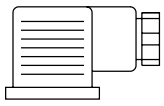
Installation cavity



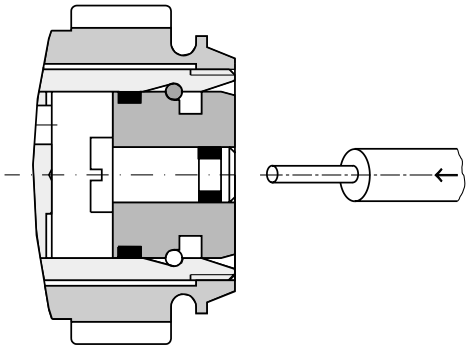
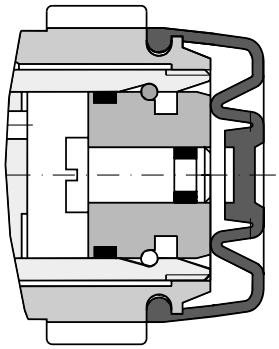
Type of the Solenoid Coil

Designation	Dimensional sketch	Description
E1		Solenoid coil with terminal for the electrical connector, DIN 43 650.
E2		Solenoid coil with integrated quenching diode (bipolar transil diode) and terminal for the electrical connector, DIN 43 650.
E3		Solenoid coil with terminal for AMP electrical connector.
E4		Solenoid coil with integrated quenching diode (bipolar transil diode) and terminal for AMP electrical connector.
E5		Solenoid coil with integrated rectifier and terminal for the electrical connector, DIN 43 650.
E6		Solenoid coil with terminal for Kostal electrical connector.
E7		Solenoid coil with integrated quenching diode (bipolar transil diode) and terminal for Kostal electrical connector.

Electrical Connector, DIN 43 650

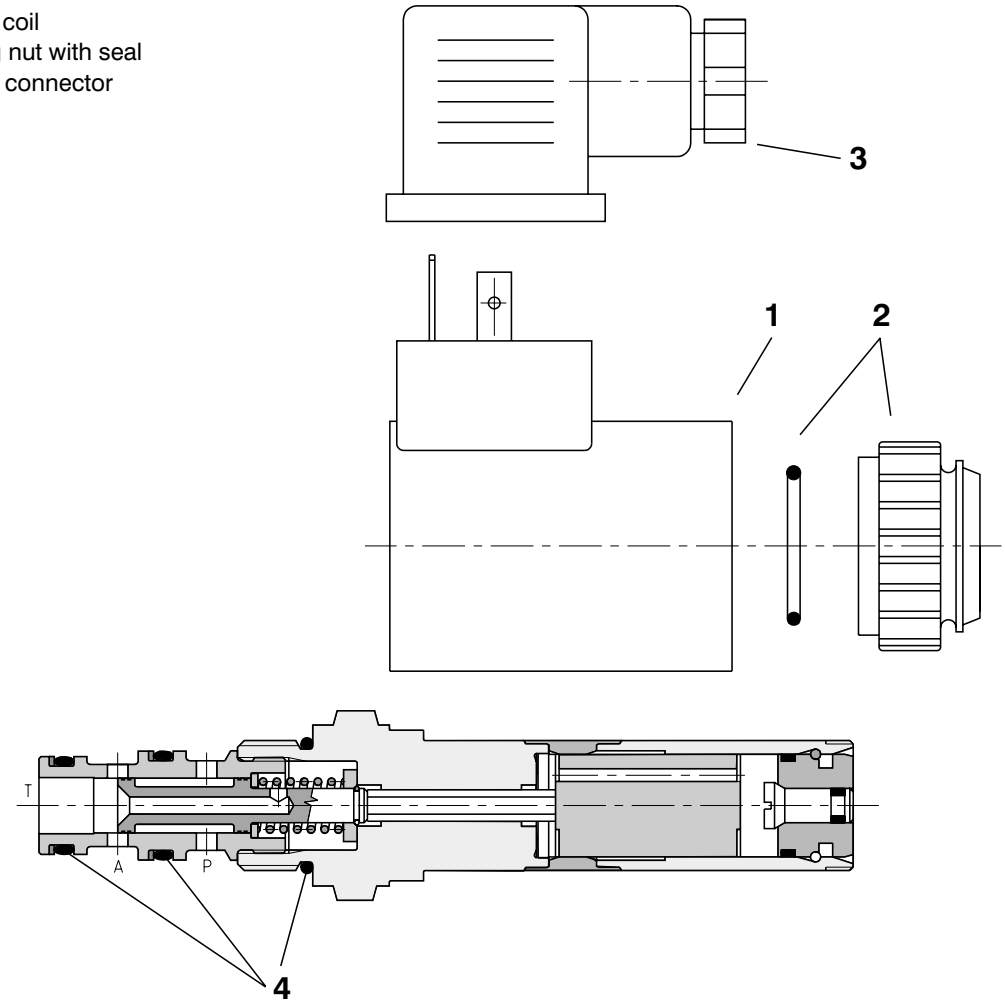
Designation	Type	Model	Max. input voltage	
K1	Connector B (black)	without rectifier - M16x1.5 (bushing bore ∅ 6-8 mm)	230 V DC	
	Connector A (grey)		230 V AC	
K5	Connector B (black)	without rectifier - M16x1.5 (bushing bore ∅ 4-6 mm)	230 V DC	
	Connector A (grey)		230 V AC	
K2	Connector B (black)	without rectifier and with LED and quenching diode - M16x1.5 (bushing bore ∅ 6-8 mm)	12...24 V DC	
	Connector A (grey)			
K3	Connector B (black)	with rectifier - M16x1.5 (bushing bore ∅ 6-8 mm)	230 V AC	
	Connector A (grey)			
K4	Connector B (black)	with rectifier with LED and quenching diode - M16x1.5 (bushing bore ∅ 6-8 mm)	230 V AC	
	Connector A (grey)			

Manual Override

STANDARD	RUBBER BOOT
Without designation Dimensional sketch	Designation **N1** Dimensional sketch
	
Description Standard model of the manual override. Standard retaining nut of the solenoid.	Description Manual override protected by rubber boot. The valve can be hand operated after removing the rubber boot.

Spare Parts

1 Solenoid coil
2 Retaining nut with seal
3 Electrical connector
4 Seal kit



Caution!

- The packing foil is recyclable.
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law.

Solenoid coil

Type designation of the coil voltage	Type of the coil						
	E1	E2	E3	E4	E5	E6	E7
	Ordering number						
01200	936-0022	936-0690	936-0670	936-0680		936-4880	936-4882
01400	936-0650	936-0691	936-0673	936-0681		-	-
02100	936-0651	936-0692	936-0674	936-0682		-	-
02400	936-0026	936-0693	936-0672	936-0683		936-4881	936-4883
04200	936-0653	936-0695	936-0676	936-0685		-	-
04800	936-0031	936-0696	936-0677	936-0686		-	-
06000	936-0654	-	-	-		-	-
10200	936-0655	-	-	-		-	-
20500	936-0036	-	-	-		-	-
02450					936-2125		
11550					936-2175		
23050					936-2185		

Solenoid retaining nut with seal

Type of nut	Seal ring	Order number
Standard nut	18 x 1.5	403-1001
Nut with rubber boot		486-9001

Electrical connector, DIN 43 650

Type designation	Connector A grey	Connector B black
	Ordering number	
K1	936-9902	936-9901
K5	936-9906	936-9905
K2	936-9908	936-9907
K3	936-9904	936-9903
K4	936-9910	936-9909

Seal kit

Type	Dimensions, quantity		Order number
	Back-up ring	O-ring	
Standard - NBR70	13.1 x 15.9 x 1.4 (1 pc.)	12.42 x 1.78 (1 pc.)	403-1000
	11.5 x 14.3 x 1.4 (1 pc.)	11.2 x 1.8 (1 pc.)	
	-	17 x 1.8 (1 pc.)	
	-	18 x 1.5 (1 pc.)	
Viton - FPM	13.1 x 15.9 x 1.4 (1 pc.)	12.42 x 1.78 (1 pc.)	403-1004
	11.5 x 14.3 x 1.4 (1 pc.)	10.82 x 1.78 (1 pc.)	
	-	17.17 x 1.78 (1 pc.)	
	-	18 x 1.5 (1 pc.)	

Preferred Types of Valves

Type	Ordering number
ROX-042D21/01200E1	403-0308
ROX-042D21/02400E1	403-0306
ROX-042D21/23050E5	403-0337

ARGO-HYTOS a. s. CZ - 543 15 Vrchlabí
Tel.: +420-499-403111, Fax: +420-499-403421
E-mail: sales.cz@argo-hytos.com
www.argo-hytos.com

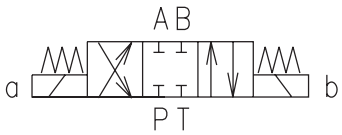
Solenoid - Operated Directional Control Valves

RPE3-04

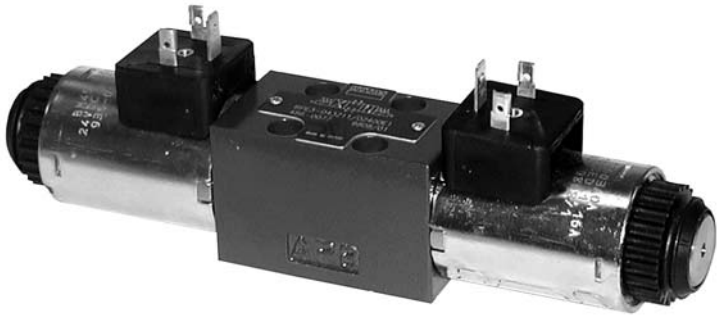
Size 04 • p_{max} up to 320 bar • Q_{max} up to 30 L/min

HA 4014
09/2006

Replaces
HA 4014 02/2006

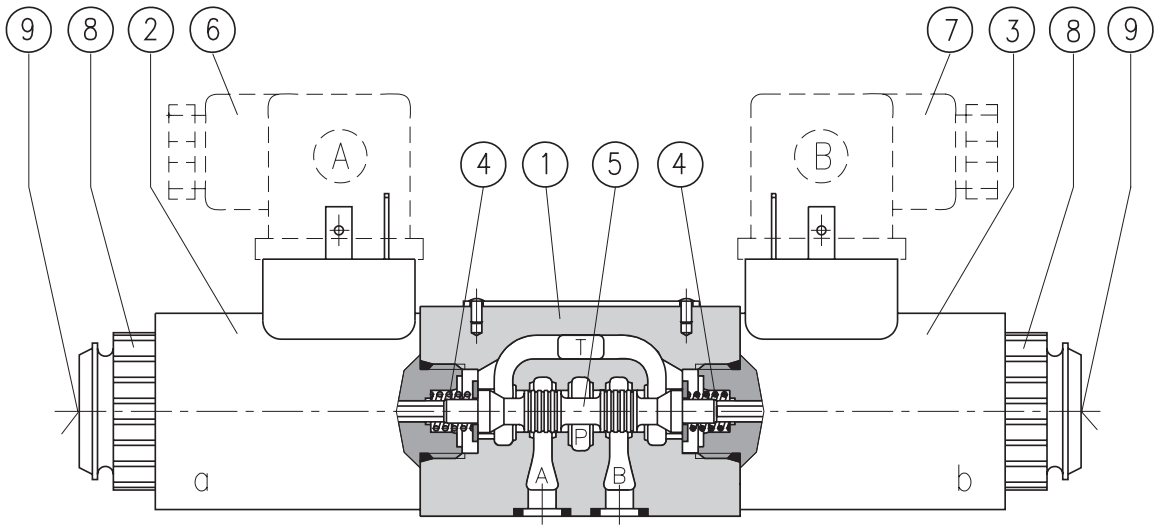


- **4/3-, 4/2- and 3/2-way directional control valves with solenoid control**
- **Solenoids can be turned around their axis to any position**
- **Push button manual override**
- **Installation dimensions acording to ISO 4401 CETOP - RP 121H**
- **Subplates see data sheet HA 0002**
- **CSA Upon request**



Functional Description

The RPE3-04 directional control valves consist of cast iron housing (1), control spool (5) with two centering springs (4) and operating solenoids (2, 3).
The three-position directional valves are fitted with two solenoids and two springs. Two-position directional valves have either one solenoid and one return spring or two solenoids and a detent assembly.
The operating solenoids are DC solenoids supplied through connectors A, B (6, 7). For AC supply the solenoids are provided with rectifiers, which are integrated directly into the connectors A, B (6, 7) or inside the coil. By loosening the nut (8), the solenoid can be turned around its axis up to 360°.
In the case of solenoid malfunction or power failure, the spool of the valve can be repositioned by manual override (9), provided the pressure in the T-port does not exceed 363 PSI (25 bar).
The basic surface treatment of the valve housing (1) is phosphate coated and the solenoids (2, 3) are zinc coated.



Ordering Code

RPE3-04 ☐☐/☐☐☐☐☐☐☐

Solenoid operated directional control valve

Nominal size

Number of valve positions

two positions	**2**
three positions	**3**

Functional symbols
see the table functional symbols

Rated supply voltage of solenoids
(at the coil terminals)

12 V DC / 2.41 A	**01200**
14 V DC / 1.66 A	01400
21 V DC / 1.14 A	02100
24 V DC / 1.16 A	**02400**
42 V DC / 0.59 A	04200
48 V DC / 0.56 A	04800
60 V DC / 0.41 A	06000
102 V DC / 0.24 A	10200
205 V DC / 0.12 A	20500
24 V AC / 1.44 A / 50 (60) Hz	02450
115V AC / 0.26 A / 50 (60) Hz	11550
230 V AC / 0.14 A / 50 (60) Hz	**23050**

The AC coils correspond with E5 type.
CSA Upon request

***Electrical connector, DIN 43 650**

no designation	without connector
K1	connector without rectifier
K2	connector without rectifier with LED and quenching diode
K3	connector with rectifier
K4	connector with rectifier with LED and quenching diode
K5	connector without rectifier

*other information on pages 6 and 8

Type of solenoid coil

E1	with DIN connector
E2	with DIN connector and quenching diode
E3	with AMP connector
E4	with AMP connector and quenching diode
E5	with integrated rectifier and DIN connector

Note: For other solenoid coil consult factory

Manual override

no designation	standard
N2	covered with rubber protective boot

Orifice in P-Port

no designation	without orifice
D1	∅0.8 mm
D2	∅1.0 mm
D3	∅1.2 mm
D4	∅1.5 mm
D5	∅0.7 mm

Seals

no designation	NBR
V	FPM (Viton)

FOR PREFERRED TYPES SEE BOLD TYPING IN ORDERING CODE, FUNCTIONAL SYMBOLS AND TABLE OF PREFERRED TYPES ON PAGE 9

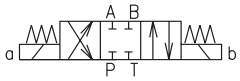
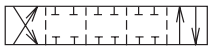
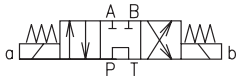
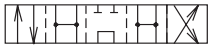
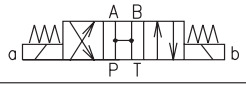
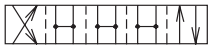
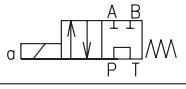
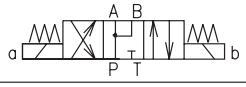
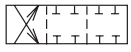
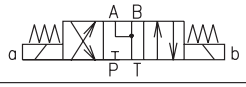
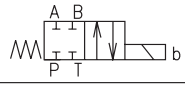
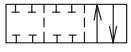
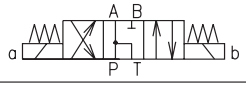
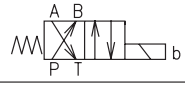
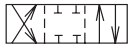
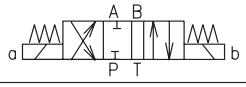
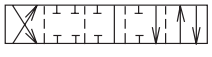
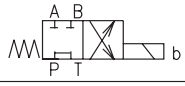
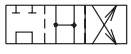
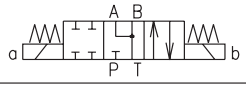
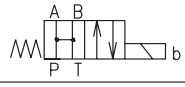
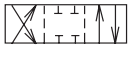
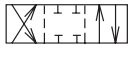
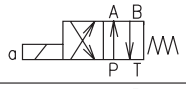
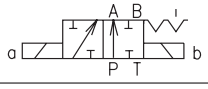
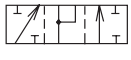
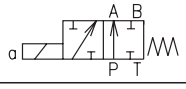
Recommended solenoid coils used with elektrical connector with rectifiers - type designation K3, K4

Rated supply source voltage (permissible rated voltage variation ±10 %)	Type designation of the solenoid voltage
24 V AC / 1.44 A / 50 (60) Hz	02100
115 V AC / 0.26 A / 50 (60) Hz	10200
230 V AC / 0.14 A / 50 (60) Hz	20500

Technical Data

Nominal size	mm	04	
Maximum flow	L/min	see p-Q characteristics	
Maximum operating pressure at ports P, A, B	bar	320	
Maximum operating pressure at port T	bar	210	
Pressure drop	bar	see Δp-Q characteristics	
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP - RP 91H in viscosity classes ISO VG 32, 46 and 68.	
Fluid temperature range (NBR / Viton)	°C	-30 ... +80	-20 ... +80
Ambient temperature, max.	°C	up to +50	
Viscosity range	mm^2/s	20 ... 400	
Maximum degree of fluid contamination		Class 21/18/15 to ISO 4406 (1999).	
Maximum allowable voltage variation	%	AC: ±10	DC: ±10
Maximum switching frequency	1/h	15 000	
Switching time, ON; at $\nu = 32\ mm^2/s$	ms	30 ... 50	
Switching time, OFF; at $\nu = 32\ mm^2/s$	ms	AC: 70 ... 100	DC: 30 ... 50
Duty cycle	%	100	
Service life	cycles	10^7	
Enclosure type to DIN 40 050		IP 65	
Weight - valve with 1 solenoid - valve with 2 solenoid	kg	0.9 1.25	
Mounting position		optional	

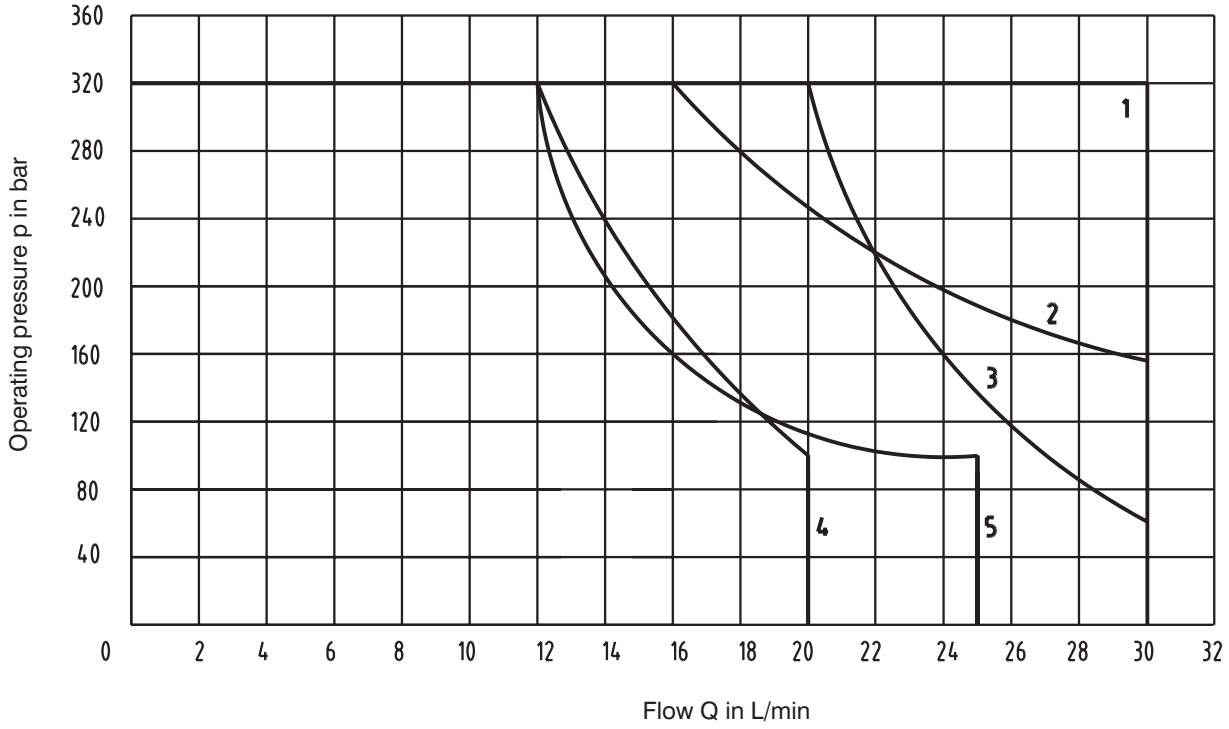
Functional Symbols

Designation	Symbol	Interposition	Designation	Symbol	Interposition
Z11			P51		
C11			**Y51**		
H11			C51		
P11			Z51		
Y11			**Z11**		
L21			X11		
B11			C11		
Y71			H11		
R11			**J15**		
R21			J75		
A51					

p-Q Characteristic

Measured at $\nu = 32\ mm^2/s$ and $t = 40\ °C$

Operating limits for maximum hydraulic power transferred by the directional valve. For respective spool type - see functional symbols.

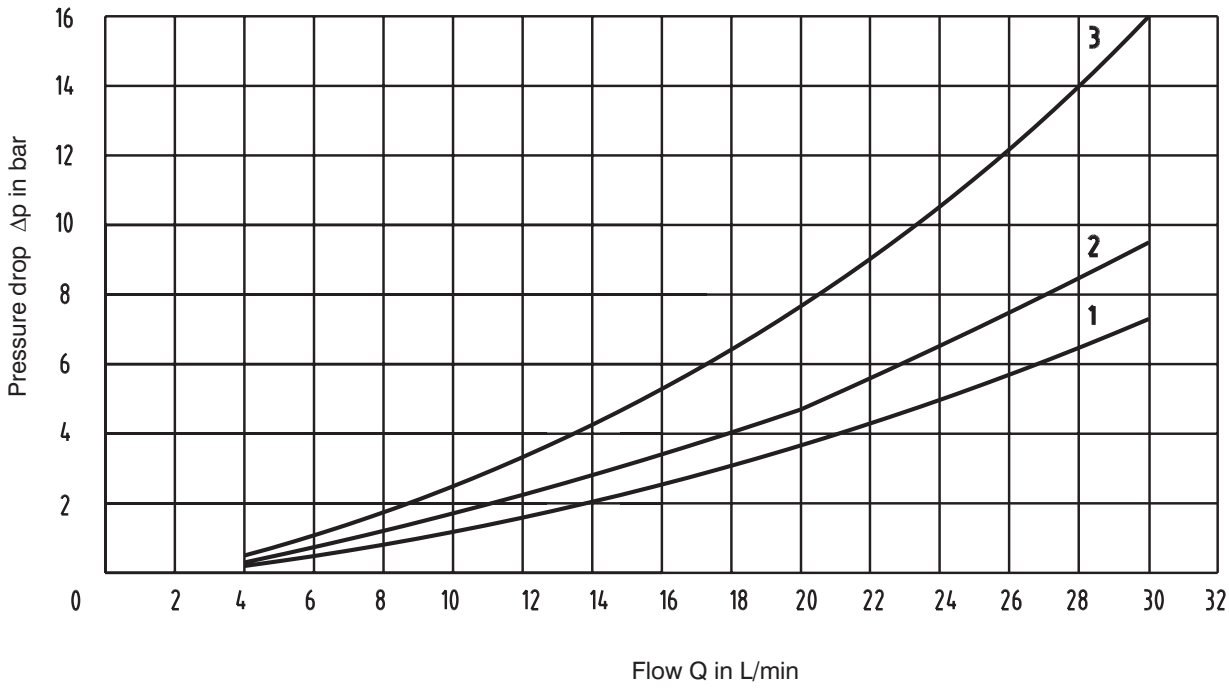


Z11	C11	H11	P11	Y11	L21	B11	Y71	R11	R21	A51	P51	Y51	C51	Z51	X11	J15	J75
1	2	1	1	1	4	1	5	1	3	4	1	1	2	1	1	1	4

Δp-Q Characteristic

Measured at $\nu = 32\ mm^2/s$ and $t = 40\ °C$

Pressure drop Δp ralated to flow rate.

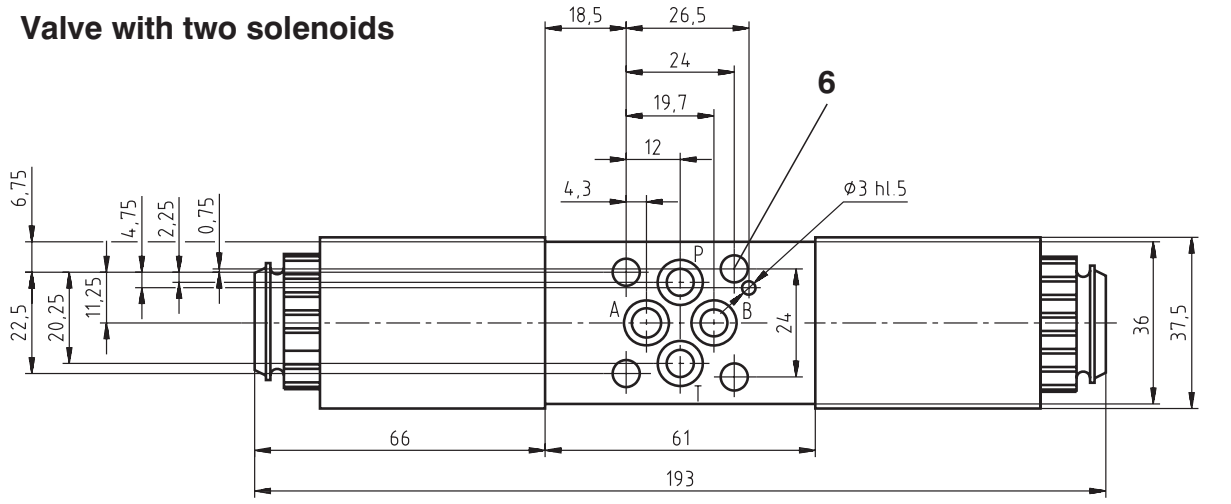


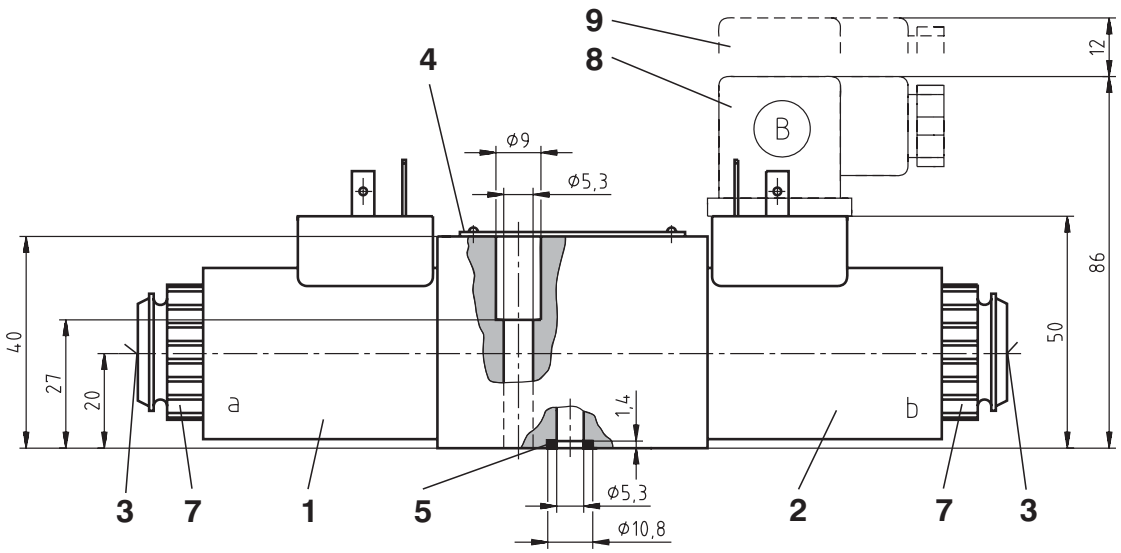
	Z11	C11	H11	P11	Y11	L21	B11	Y71	R11	R21	A51	P51	Y51	C51	Z51	X11	J15	J75
P-A	1	3	1	1	1	1	1	2	2	2	1			3		2	2	1
P-B	1	3	1	1	1	1	1		2	2	1	1	1		1	2	2	1
A-T	1	3	1	1	1	1	1	2	2	2		1	1		1	2	2	
B-T	1	3	1	1	1	1	1	1	2	2				3		2	2	
P-T		2	2											2				

Valve Dimensions

Dimensions in millimeters

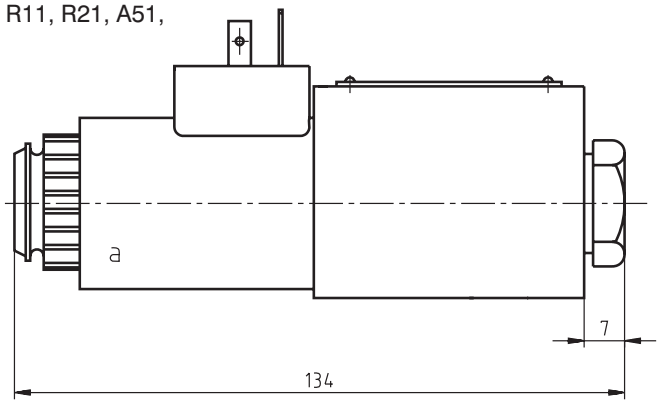
Valve with two solenoids



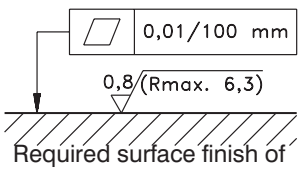


Valve with one solenoid a

Functional symbols R11, R21, A51, P51, Y51, C51, Z51



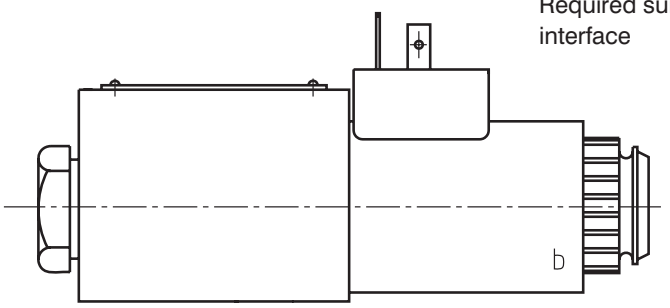
1 Solenoid a
2 Solenoid b
3 Manual override
4 Name plate
5 Square ring 7.65 x 1.68 (4 pcs.) supplied with valve
6 4 mounting holes
7 Retaining nut of the solenoid
8 Electrical connector, DIN 43 650
9 Space required to remove connector



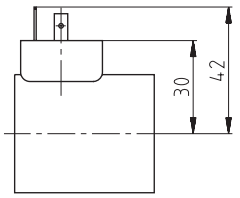
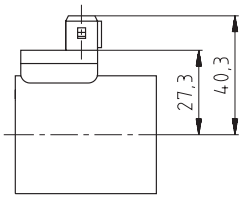
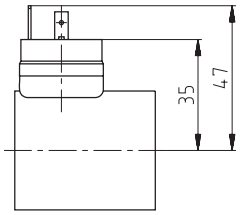
Required surface finish of interface

Valve with one solenoid b

Functional symbols Z11, X11, C11, H11

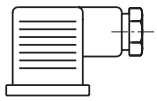


Type of the Solenoid Coil

Designation	Dimensional sketch	Description
E1		Solenoid coil with terminal for the electrical connector, DIN 43 650.
E2		Solenoid coil with integrated quenching diode (bipolar transil diode) and terminal for the electrical connector, DIN 43 650.
E3		Solenoid coil with terminal for AMP electrical connector.
E4		Solenoid coil with integrated quenching diode (bipolar transil diode) and terminal for AMP electrical connector.
E5		Solenoid coil with integrated rectifier and terminal for the electrical connector, DIN 43 650.

Electrical Connector, DIN 43 650

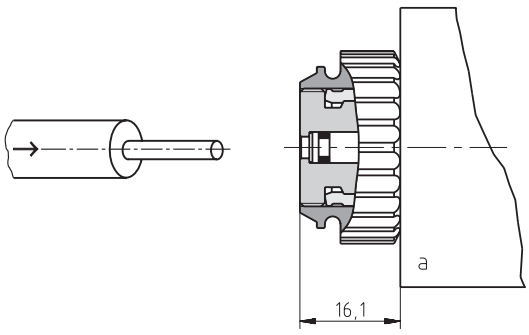
Designation	Type	Model	Max. input voltage
K1	Connector B (black) Connector A (grey)	without rectifier - M16x1.5 (bushing bore ∅ 6-8 mm)	230 V AC/DC
K5	Connector B (black) Connector A (grey)	without rectifier - M16x1.5 (bushing bore ∅ 4-6 mm)	230 V AC/DC
K2	Connector B (black) Connector A (grey)	without rectifier with LED and quenching diode - M16x1.5 (bushing bore ∅ 6-8 mm)	12...24 V DC
K3	Connector B (black) Connector A (grey)	with rectifier - M16x1.5 (bushing bore ∅ 6-8 mm)	230 V AC
K4	Connector B (black) Connector A (grey)	with rectifier with LED and quenching diode - M16x1.5 (bushing bore ∅ 6-8 mm)	230 V AC



Manual Override

STANDARD

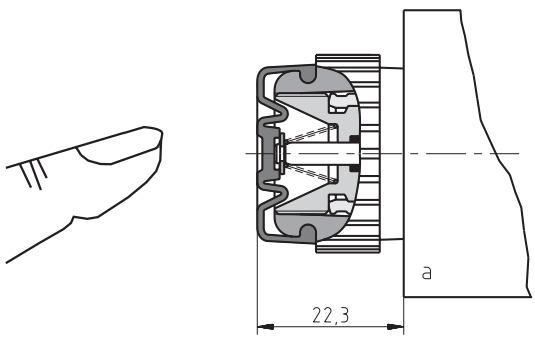
Without designation
Dimensional sketch



Description
Standard model of the manual override.
Standard retaining nut of the solenoid.

RUBBER BOOT

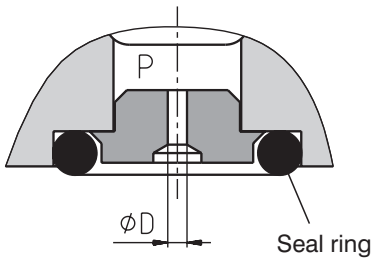
Designation **N2**
Dimensional sketch



Description
Manual override protected by rubber boot.

Orifice in P-Port

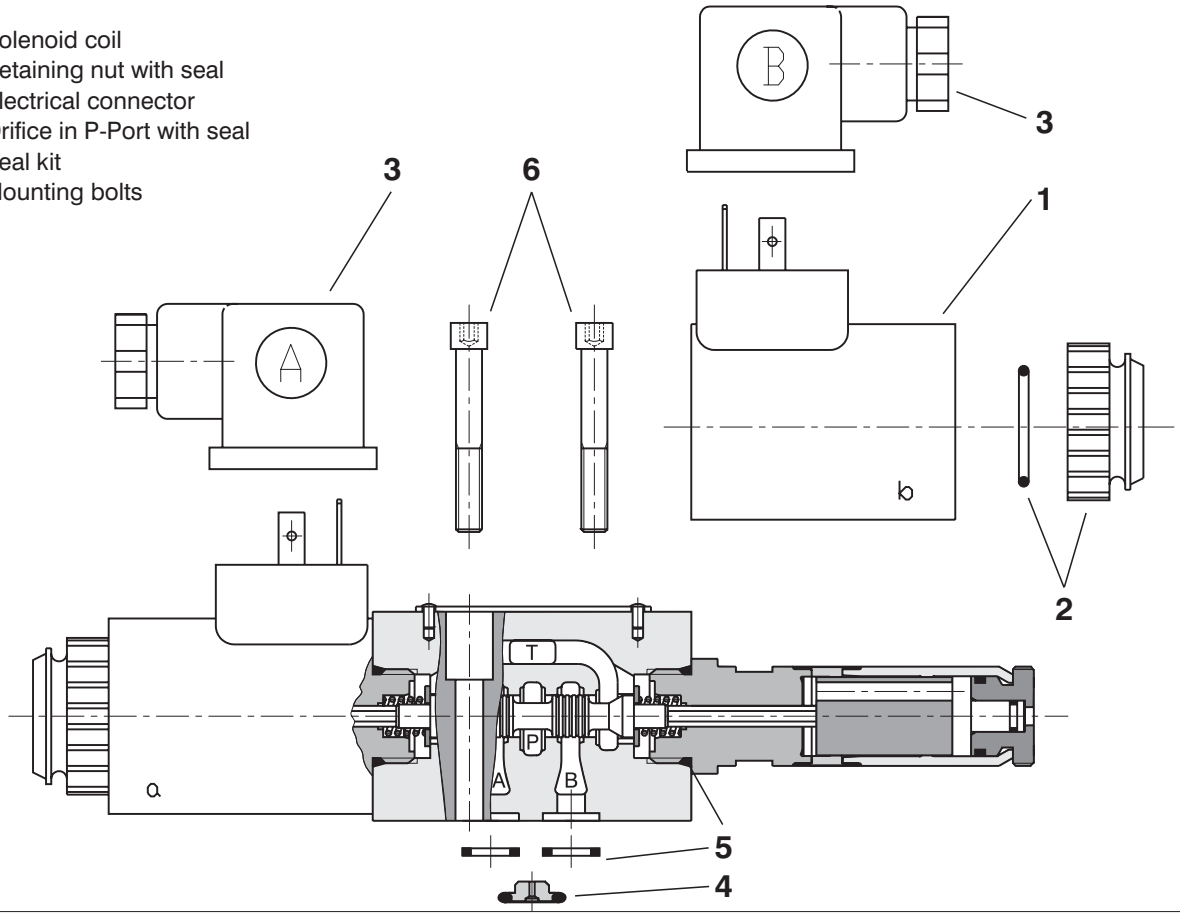
Type	∅D (mm)
D1	0.8
D2	1.0
D3	1.2
D4	1.5
D5	0.7



P-Port orifices limits the flow into the directional control valve.

Spare Parts

1 Solenoid coil
2 Retaining nut with seal
3 Electrical connector
4 Orifice in P-Port with seal
5 Seal kit
6 Mounting bolts



Solenoid coil

Type designation of the coil voltage	Type of the coil				
	E1	E2	E3	E4	E5
	Ordering number				
01200	936-0022	936-0690	936-0670	936-0680	
*01200	493-0001				
01400	936-0650	936-0691	936-0673	936-0681	
02100	936-0651	936-0692	936-0674	936-0682	
02400	936-0026	936-0693	936-0672	936-0683	
*02400	493-0002				
04200	936-0653	936-0695	936-0676	936-0685	
04800	936-0031	936-0696	936-0677	936-0686	
06000	936-0654	-	-	-	
10200	936-0655	-	-	-	
20500	936-0036	-	-	-	
02450					936-2125
11550					936-2175
*11550					493-0003
23050					936-2185
*23050					493-0004

* CSA Upon request

Solenoid retaining nut with seal

Type of the nut	Seal ring	Ordering number
Standard nut	18 x 1.5	486-9010
Nut with rubber boot		486-9013

Electrical connector, DIN 43 650

Type designation	Connector A grey	Connector B black
	Ordering number	
K1	936-9902	936-9901
K5	936-9906	936-9905
K2	936-9908	936-9907
K3	936-9904	936-9903
K4	936-9910	936-9909

Orifice in P-Port

Type designation	∅D (mm)	Seal ring	Ordering number
D1	0.8	7.65 x 1.78	486-9005
D2	1.0		486-9006
D3	1.2		486-9007
D4	1.5		486-9008
D5	0.7		486-9014

Seal kit

Type	Dimensions, number		Ordering number
	Square ring	O-ring	
Standard NBR70	7.65 x 1.68 (4 pcs.)	16 x 2 (2 pcs.)	486-9002
Viton	7.65 x 1.78 (4 pcs.)	16 x 2 (2 pcs.)	486-9009

Mounting bolts

Dimensions, number	Tightening torque	Ordering number
M5 x 35 DIN 912-10.9 (4 pcs.)	5 Nm	486-9011

Preferred Types of Valves

Type	Ordering Number	Type	Ordering Number
RPE3-042Z11/01200E1	486-0017	RPE3-042R11/02400E1	486-0091
RPE3-043Z11/01200E1	486-0001	RPE3-042R21/02400E1	486-0092
RPE3-043C11/01200E1	486-0002	RPE3-042A51/02400E1	486-0090
RPE3-043H11/01200E1	486-0003	RPE3-042Y51/02400E1	486-0088
RPE3-043Y11/01200E1	486-0005	RPE3-042J15/02400E1	486-0100
RPE3-042R11/01200E1	486-0015	RPE3-042Z11/23050E5	486-0230
RPE3-042R21/01200E1	486-0016	RPE3-043Z11/23050E5	486-0258
RPE3-042A51/01200E1	486-0014	RPE3-043C11/23050E5	486-0262
RPE3-042Y51/01200E1	486-0012	RPE3-043H11/23050E5	486-0257
RPE3-042J15/01200E1	486-0024	RPE3-043Y11/23050E5	486-0260
RPE3-042Z11/02400E1	486-0093	RPE3-042R11/23050E5	486-0259
RPE3-043Z11/02400E1	486-0077	RPE3-042R21/23050E5	486-0622
RPE3-043C11/02400E1	486-0078	RPE3-042A51/23050E5	486-0261
RPE3-043H11/02400E1	486-0079	RPE3-042Y51/23050E5	486-0781
RPE3-043Y11/02400E1	486-0081	RPE3-042J15/23050E5	486-0782

Caution!

- With functional symbols A51 and J75 for pressures exceeding 100 bar, the T-port should de connected directly to the tank.
- For directional valves with two solenoids, one solenoid must be without power before the other solenoid can be powered. Switching time for directional valves with detent assembly (impulse control) should not be shorter than 60 ms.
- Other functional symbols on request.
- The packing foil is recyclable.
- The protecting plate can be returned to the manufacturer.
- Mounting bolts M5 x 35 DIN 912-10.9 or studs must be ordered separately.
- Tightening torque of the bolts is 5 Nm.
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law.

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www.argo-hytos.com

Solenoid - operated directional control valves

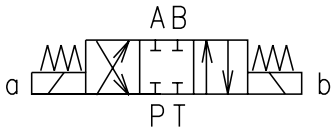
RPE3-10

Size 10 • p_{max} up to 320 bar • Q_{max} up to 120 L/min

HA 4015
2/2005

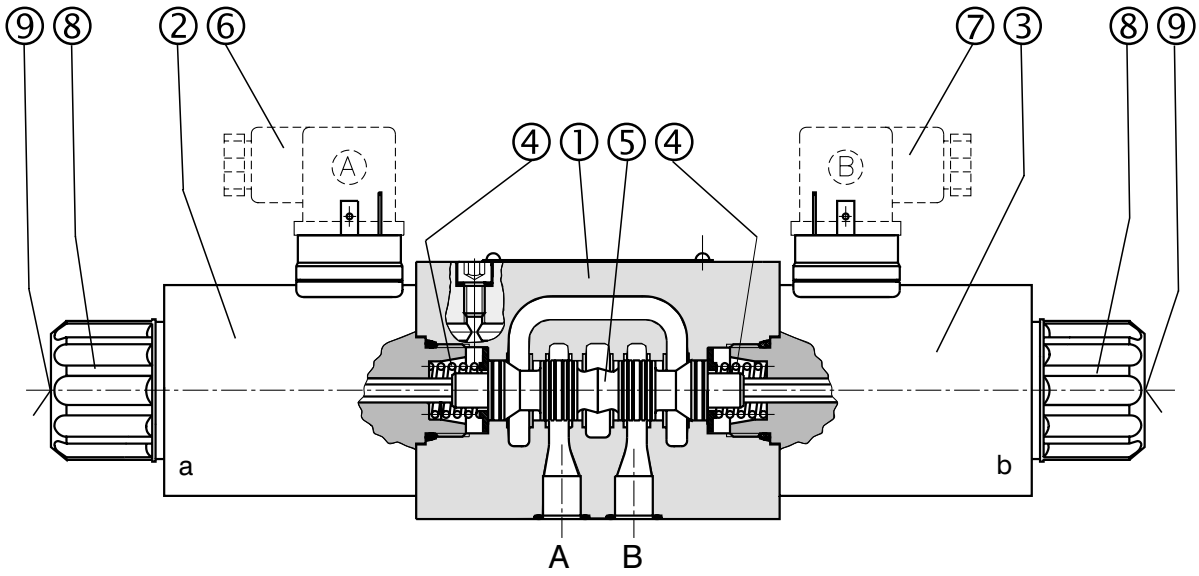
Replaces
HA 4015 1/2003

- ❑ **4/3-, 4/2- and 3/2-way directional control valves**
- ❑ **Cylindrical DC solenoids with removable coils. Electrical connectors can be rotated in three positions 90° apart**
- ❑ **Dual frequency solenoids, AC voltage 50/60 Hz**
- ❑ **Wet pin core tubes**
- ❑ **Push button manual override**
- ❑ **With soft shifting option**
- ❑ **Installation dimensions to DIN 24 340, ISO 4401**
- ❑ **Subplates see data sheet HA 0002**
- ❑ **CSA Upon request**



Functional Description

The RPE3-10 directional control valves consist of housing (1), control spool (5), centering springs (4) and operating solenoids (2, 3).
The three-position directional control valves are fitted with two solenoids and two springs. The two position directional control valves have one solenoid and one return spring.
The operating solenoids are DC solenoids and are supplied through connectors A, B (6, 7) without rectifiers. For AC supply the solenoids are provided with rectifiers, which are integrated directly into the connectors A, B (6, 7) or inside the coil.
By loosening the retaining nut (8), the solenoid can be turned on its axis and locked in three positions 90° apart.
Provided that the pressure in T-port does not exceed 363 PSI (25 bar), the spool of the valve can be shifted by manual override (9).
The basic surface treatment of the valve housing (1) is phosphate coated, the operating solenoids (2, 3) are zinc coated.



Ordering Code

RPE3-10 □ □ / □ □ □ □ □ □

Solenoid operated directional control valves

Nominal size 10

Number of operating positions
two positions **2**
three positions **3**

Functional symbols
see the table functional symbols

Rated supply voltage of solenoids
(at the coil terminals)

12 V DC / 3.17 A	**01200**
24 V DC / 1.73 A	**02400**
102 V DC / 0.41 A	10200
205 V DC / 0.20 A	20500
48 V AC / 0.97 A / 50 (60) Hz	04850
115 V AC / 0.41 A / 50 (60) Hz	11550
230 V AC / 0.20 A / 50 (60) Hz	**23050**

The AC coils correspond with E5 type.
CSA Upon request

Type of the solenoid coil

with DIN connector	**E1**
with integrated rectifier and DIN connector	**E5**
with fast switching off	E51

Seals

no designation	NBR
V	FPM (Viton)

Damping

no designation	without damping
T2	nozzle ∅0.6 mm
T3	throttle screw

Manual override

no designation	standard
N2	covered with rubber boot

Electrical connector, DIN 43 650

no designation	without connector
K1	connector without rectifier
K2	connector without rectifier with LED and quenching diode
K3	connector with rectifier
K4	connector with rectifier with LED and quenching diode
K5	connector without rectifier

*other information on pages 6 and 8

FOR PREFERRED TYPES SEE BOLD TYPING IN ORDERING CODE, FUNCTIONAL SYMBOLS AND TABLE OF PREFERRED TYPES ON PAGE 9

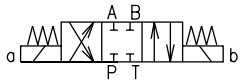
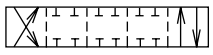
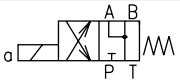
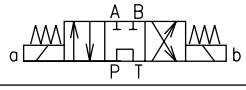
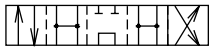
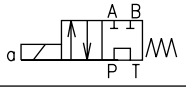
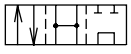
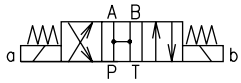
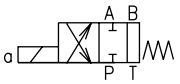
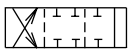
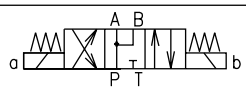
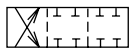
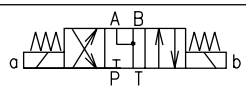
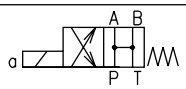
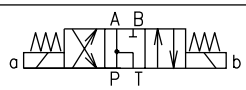
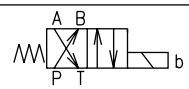
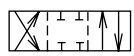
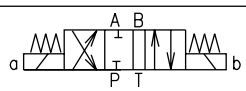
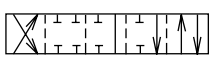
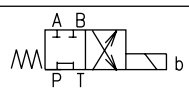
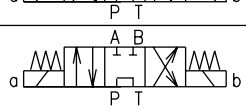
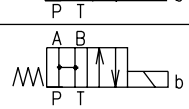
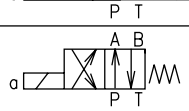
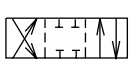
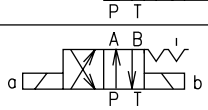
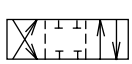
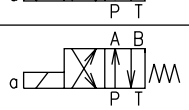
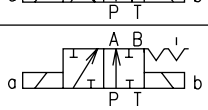
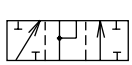
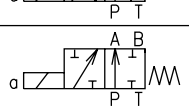
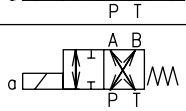
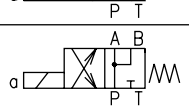
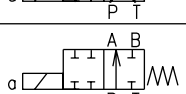
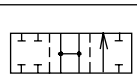
Recommended solenoid coils used with electrical connector with rectifiers - type designation K3, K4

Rated supply source voltage (permissible rated voltage variation ±10 %)	Type designation of the solenoid voltage
48 V AC / 0.97 A / 50 (60) Hz	04300
115 V AC / 0.41 A / 50 (60) Hz	10200
230 V AC / 0.20 A / 50 (60) Hz	20500

Kenngrößen

Nenngröße	mm	10	
Max. Volumenstrom	l/min	siehe p-Q Kennlinien	
Max. Betriebsdruck in den Anschlüssen P, A, B	bar	320	
Max. Betriebsdruck im Anschluß T	bar	210	
Druckverluste	bar	siehe Δp-Q Kennlinien	
Druckflüssigkeit		Mineralöl (HM, HV) nach DIN 51 254	
Flüssigkeitstemperaturbereich (NBR/ Viton)	°C	-30 ... +80	-20... +80
Umgebungstemperatur max.	°C	bis +50	
Viskositätsbereich	mm^2/s	20 ... 400	
Verschmutzungsgrad		Max. zulässiger Verschmutzungsgrad der Flüssigkeit nach ISO 4406 (1999), Klasse 21/18/15.	
Zulässige Toleranz der Nennspannung	%	AC: ±10	DC: ±10
Max. Schalthäufigkeit	Schalt./h	15 000	
Einschaltzeit bei U_n und Viskosität 32 mm^2/s	ms	AC: 80 ... 330	DC: 50 ... 120
Ausschaltzeit bei Viskosität 32 mm^2/s	ms	AC: 100 ... 280	DC: 30 ... 90
Schnellabschaltzeit		AC: 30 ... 130	
Max. zulässiger Belastungsfaktor	%	100	
Lebensdauer der Wegenventile - Anzahl der Schaltzyklen		10^7	
Schutzart gemäß DIN 40 050		IP 65	
Wegenventilmasse - mit 1 Magnet - mit 2 Magneten	kg	5,1 6,6	
Einbaulage		beliebig	

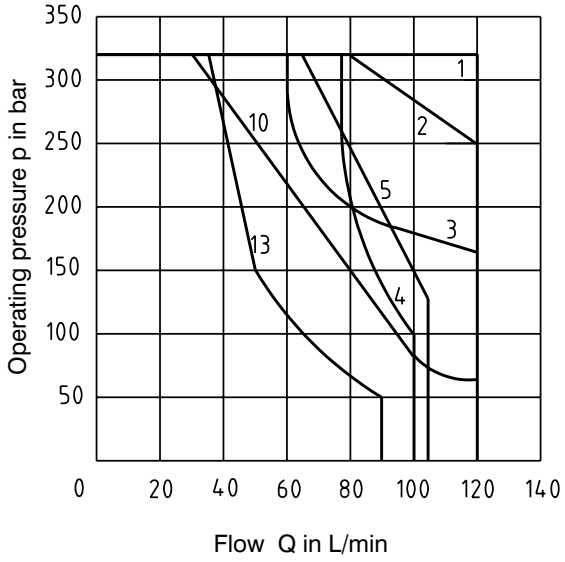
Tabelle der Schaltzeichen

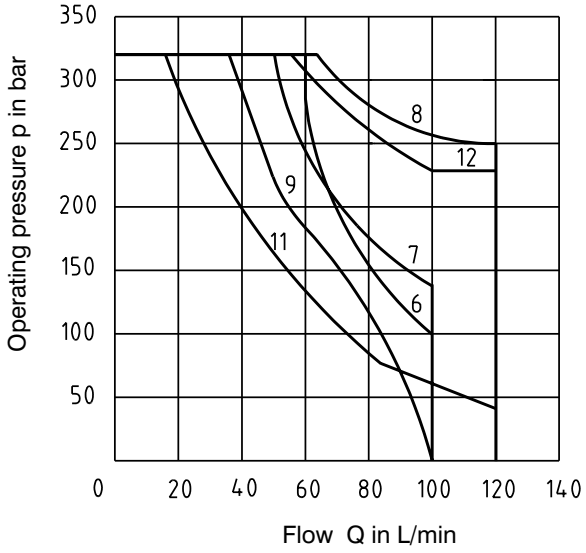
Bezeichnung	Symbol	Übergangsstellung	Bezeichnung	Symbol	Übergangsstellung
Z11			**Y51**		
C11			**C51**		
H11			B51		
P11			**Z51**		
Y11			H51		
L21			X11		
B11			C11		
C21			H11		
R11			**J15**		
R21			J75		
A51			X25		
P51			M21		

p-Q Characteristics

Measured at $\nu = 32\ mm^2/s$ and $t = 40\ °C$

Operating limits for maximum hydraulic power transferred by the directional valve. For respective spool type - see functional symbols.



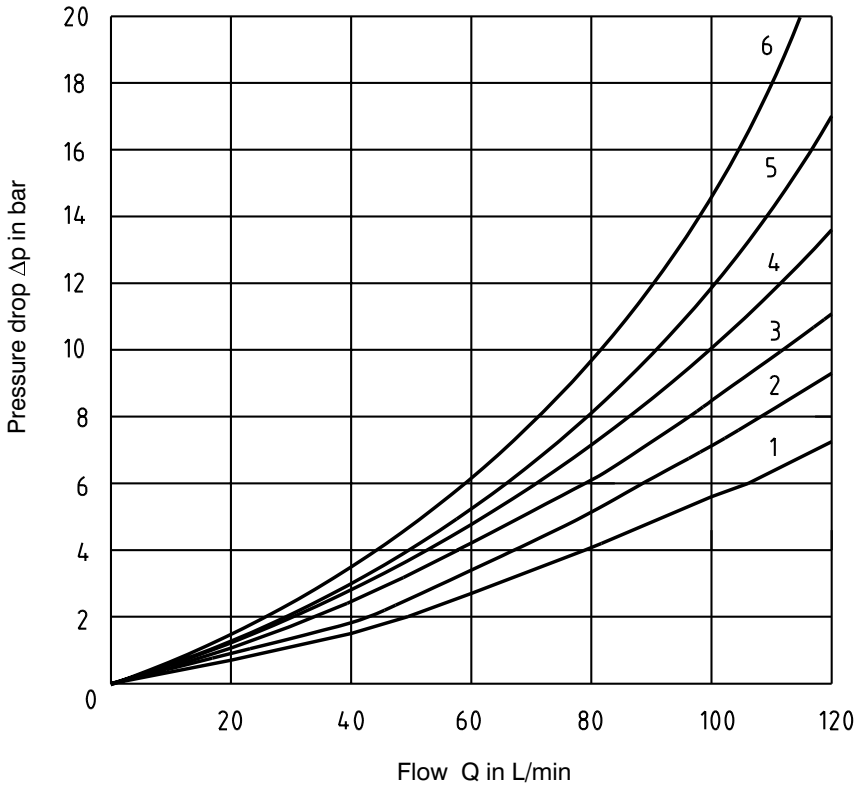


Z11	Z51	H11	H51	P11	P51	Y11	Y51	C11	C51	R11	X11	B11	B51	L21	R21	J15	J75	A51	M21	X25	C21
3	3	2	2	1	1	7	7	4	4	6	6	5	5	9	8	1	10	11	12	1	13

p-Q Characteristics

Measured at $\nu = 32\ mm^2/s$ and $t = 40\ °C$

Pressure drop Δp related to flow rate.

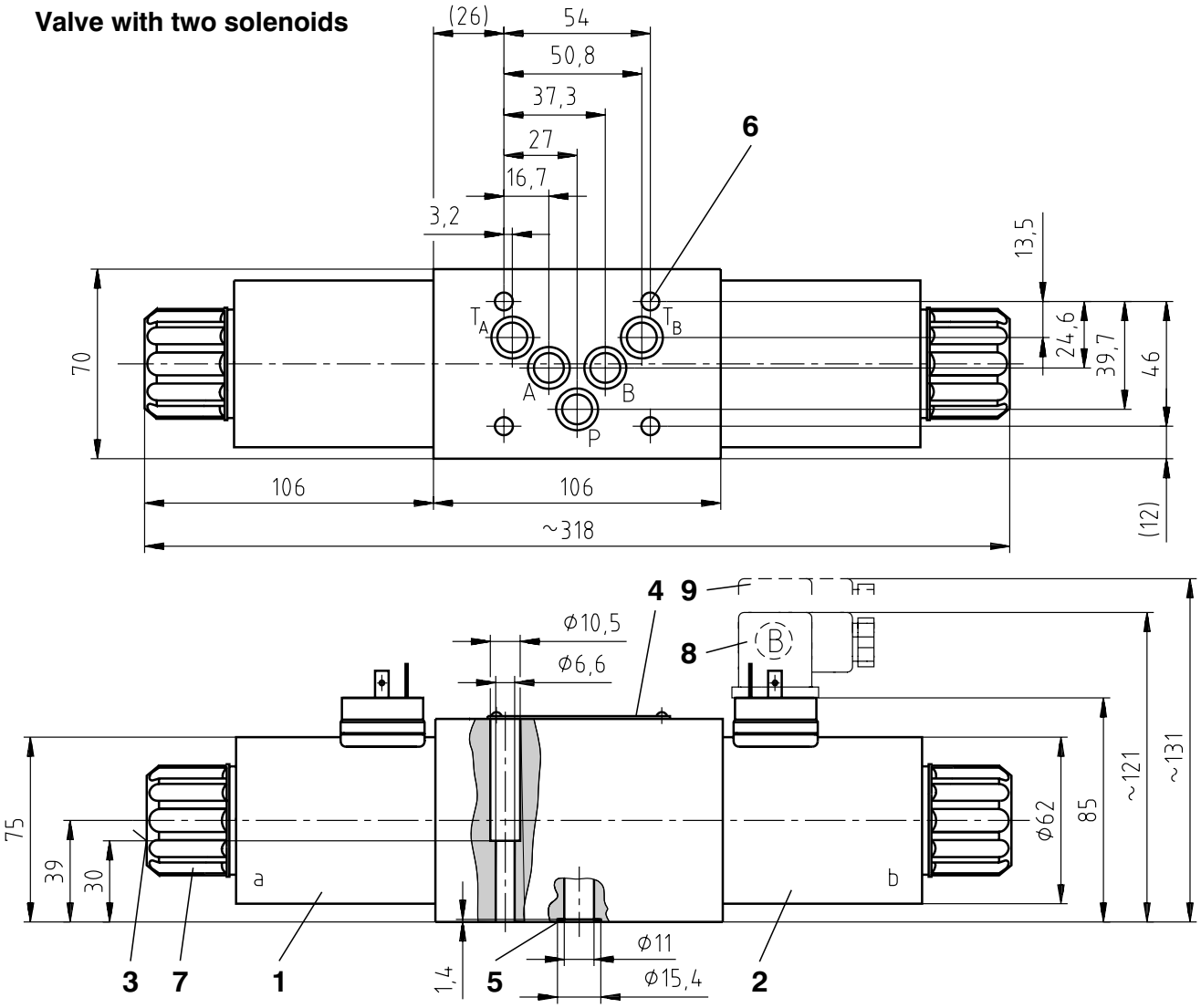


	P-A	P-B	A-T	B-T	P-T
Z11	1	1	2	2	
Z51		1	2		
H11	1	1	2	2	1
H51		1	2		1
P11	1	1	2	2	
P51		1	2		
Y11	1	1	1	1	
Y51		1	1		
C11	4	3	4	5	1
C51	4			5	1
R11	2	1	2	3	
X11	2	1	2	3	
B11	1	1	2	2	
B51		1	2		
L21	1	1	1	2	2
R21	1	1	2	3	
J15	1	4	2	3	
J75	1	1			
A51	1	1			
M21	1				
X25	1	2	1		
C21	6	6	6	6	4

Valve Dimensions

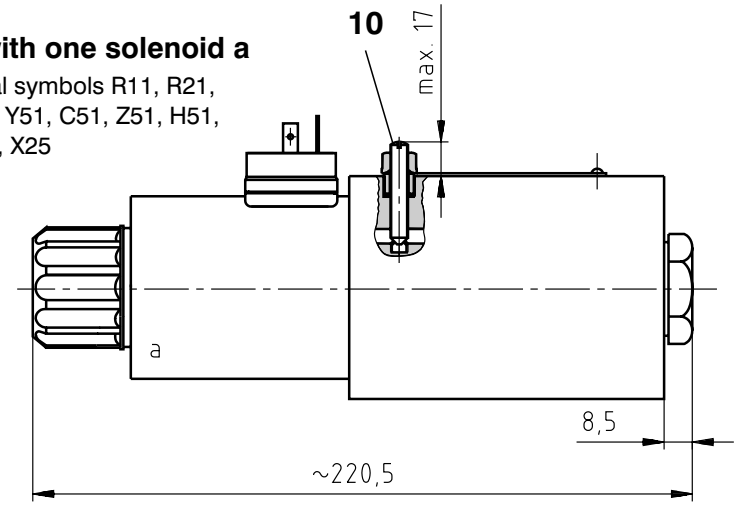
Dimensions in millimetres

Valve with two solenoids

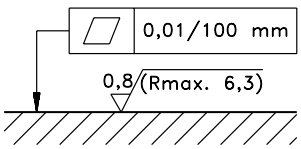


Valve with one solenoid a

Functional symbols R11, R21, A51, P51, Y51, C51, Z51, H51, B51, M21, X25



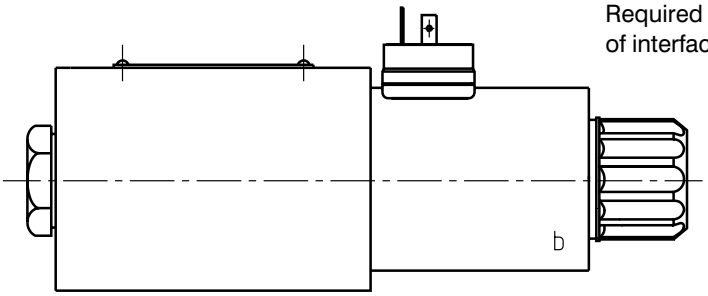
1 Solenoid a
2 Solenoid b
3 Manual override
4 Name plate
5 Square ring 12.42 x 1.68 (5 pcs.) supplied with valve
6 4 mounting holes
7 Retaining nut of the solenoid
8 Electrical connector, DIN 43 650
9 Space reguired to remove connector
10 Throttle screw



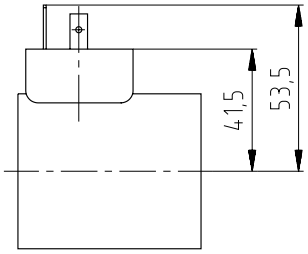
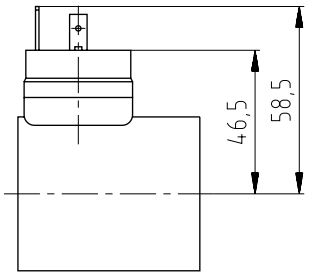
Required surface finish of interface.

Valve with one solenoid b

Functional symbols X11, C11, H11

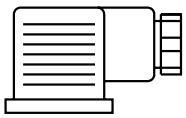


Type of the Solenoid Coil

Designation	Dimensional sketch	Description
E1		Solenoid coil with terminal for the electrical connector, DIN 43 650.
E5		Solenoid coil with integrated rectifier and terminal for electrical connector, DIN 43 650.

Electrical Connector, DIN 43 650

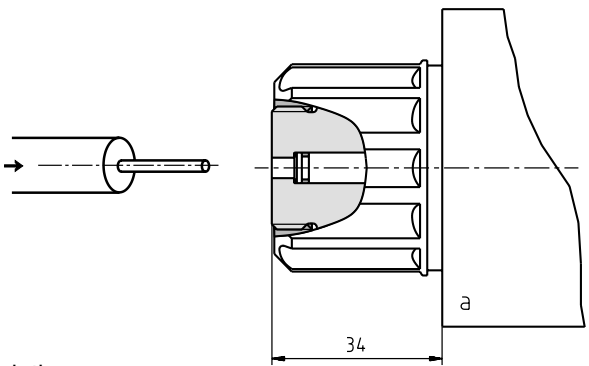
Designation	Type	Model	Max input voltage
K1	Connector B (black)	without rectifier - M16x1.5 (bushing bore ∅ 6-8 mm)	230 V DC
	Connector A (grey)		230 V AC
K5	Connector B (black)	without rectifier - M16x1.5 (bushing bore ∅ 4-6 mm)	230 V DC
	Connector A (grey)		230 V AC
K2	Connector B (black)	without rectifier with LED and quenching diode - M16x1.5 (bushing bore ∅ 6-8 mm)	12 ... 24 V DC
	Connector A (grey)		
K3	Connector B (black)	with rectifier - M16x1.5 (bushing bore ∅ 6-8 mm)	230 V AC
	Connector A (grey)		
K4	Connector B (black)	with rectifier with LED and quenching diode - M16x1.5 (bushing bore ∅ 6-8 mm)	230 V AC
	Connector A (grey)		



Manual Override

STANDARD

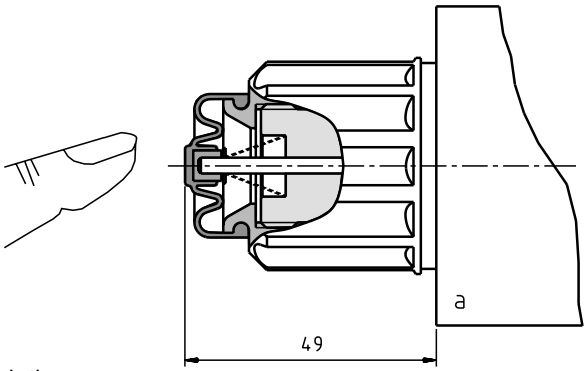
Without designation
Dimensional sketch



Description
Standard model of the manual override.
Standard retaining nut of the solenoid.

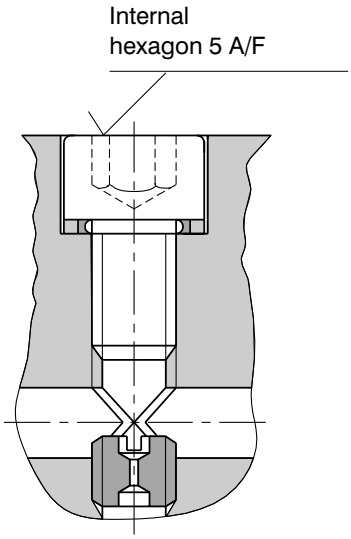
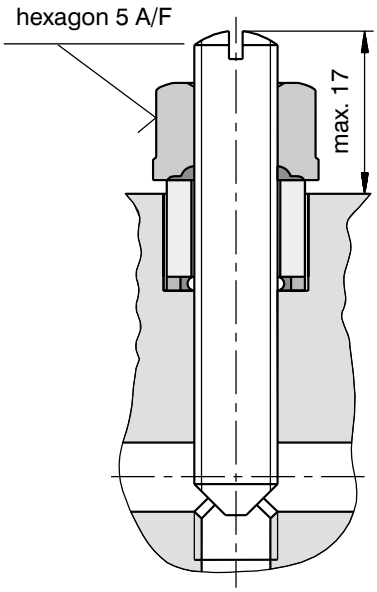
RUBBER BOOT

Designation **N2**
Dimensional sketch



Description
Manual override protected by rubber boot.

Soft Shifting Spool Options

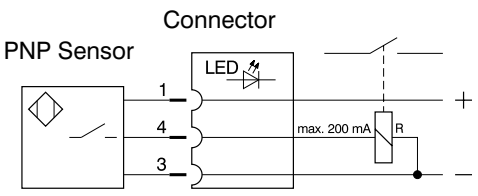
NOZZLE ∅0.6 mm	THROTTLE SCREW
Designation **T2** Dimensional sketch  Description The orifice extends the valve shifting time.	Designation **T3** Dimensional sketch  Description The control orifice allows for stepless adjustment of the valve shifting time.

Delay Time

T2	Total switching time, ON Total switching time, OFF	ms	170 ... 200
T3	Total switching time, ON Total switching time, OFF	ms	90 ... 2000

The switching times shown are valid for viscosity $\nu = 32\ mm^2/s$, valve temperature t = 40 °C and nominal voltage. They are dependent upon working pressure and flow rate of the directional valve.

Sensing of the Spool End Position

Type	Circuit diagram of the sensor	Description
S1	 	The proximity sensor transforms the spool position into an electrical step signal. Can be used with directional control valves with one or two solenoids.

Technical Data of the Sensor

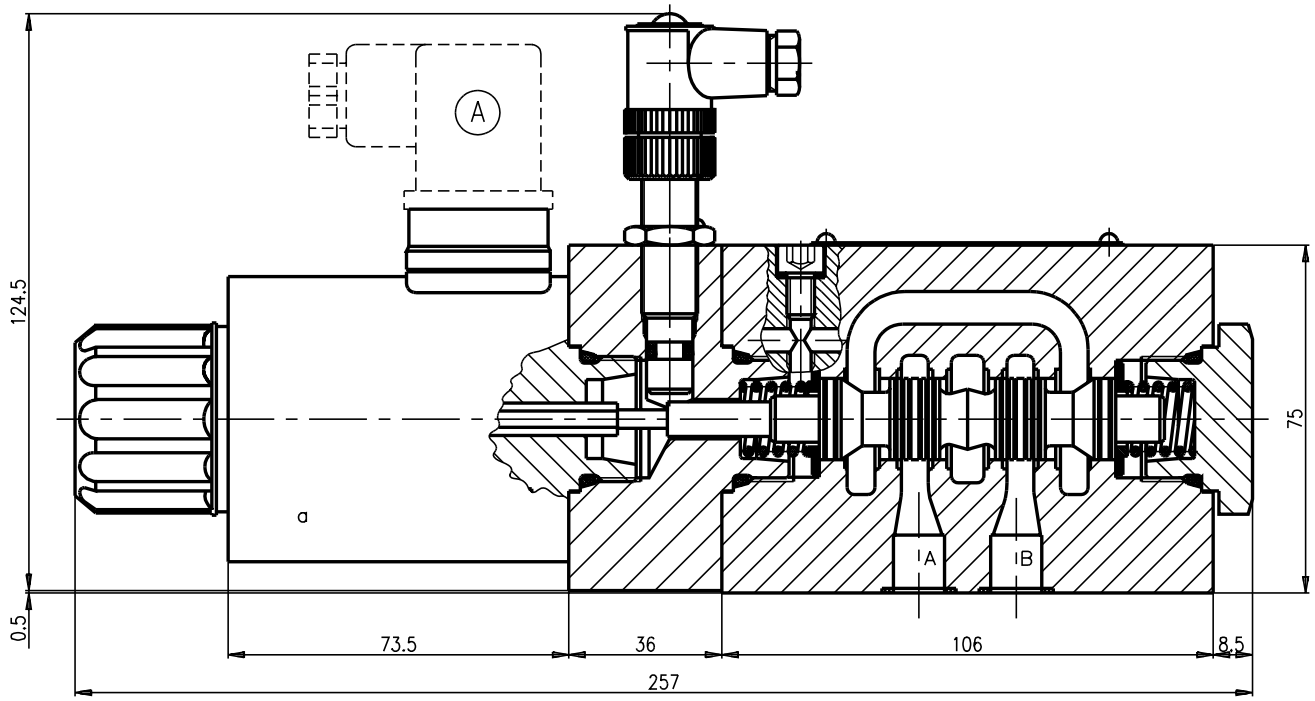
Rared voltage	V	24 DC
Power supply voltage range	V	10 ... 30 DC
Rated current	mA	200
Max. operating pressure	bar	up to 50
Switching frequency	Hz	1000
Ambient temperature range	°C	-25 ... +80

Technical Data of the Connector

Power supply voltage range	V	10 ... 30 DC
Ambient temperature range	°C	-25 ... +80
Indication		yellow LED

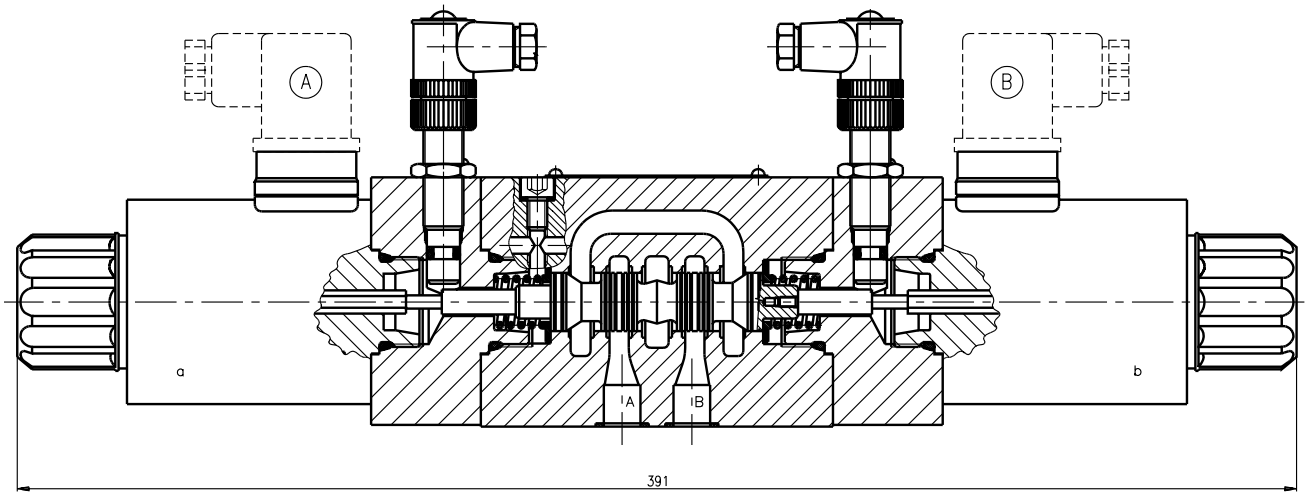
To Positions Directional Control Valve

Signal of solenoid a (b)	Signal of sensor Sa (Sb)	LED
0	1	ON
1	0	OFF



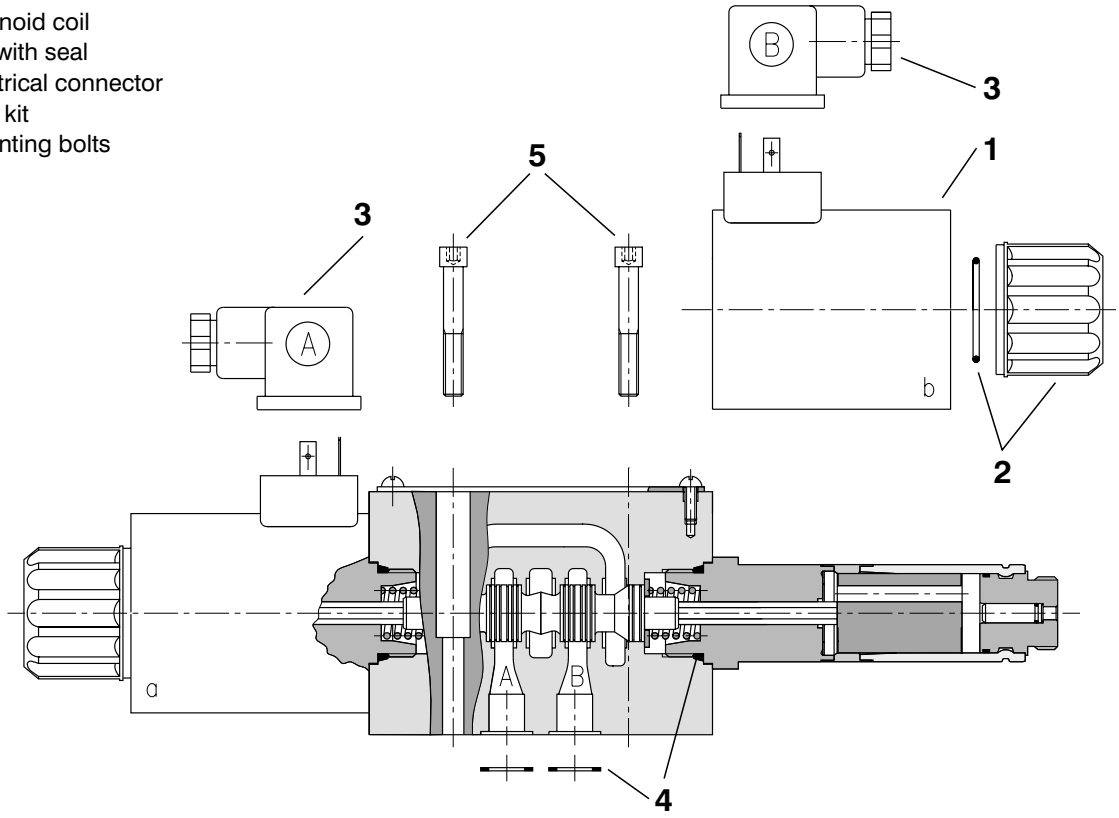
Three Positions Directional Control Valve

Signal of solenoids		Signal of sensors		LED	
a	b	Sa	Sb	Sa - LED	Sb - LED
0	0	1	1	ON	ON
0	1	1	0	ON	OFF
1	0	0	1	OFF	ON



Spare Parts

1 Solenoid coil
2 Nut with seal
3 Electrical connector
4 Seal kit
5 Mounting bolts



Solenoid coil

Type designation of the coil voltage	Type of the coil	
	E1	E5
	Ordering number	
01200	936-4610	
*01200	945-0001	
02400	936-4627	
*02400	945-0002	
10200	936-4677	
20500	936-4685	
04850		936-2440
11550		936-2475
*11550		945-0003
23050		936-2485
*23050		945-0004

Solenoid retaining nut with seal

Type of the nut	Seal ring	Ordering number
Standard nut	30 x 2	485-9963
Nut with rubber boot		485-9966

Mounting bolts

Dimensions, number	Tightening torque	Ordering number
M6 x 40 DIN 912-10.9 (4 pcs.)	14+2 Nm	485-9964

* CSA Upon request

Electrical connector, DIN 43 650

Type designation	Connector A grey	Connector B black
	Ordering number	
K1	936-9902	936-9901
K5	936-9906	936-9905
K2	936-9908	936-9907
K3	936-9904	936-9903
K4	936-9910	936-9909

Seal kit

Type	Dimensions, number			Ordering number
	Square ring	O-ring	U-seal	
Standard NBR70	12.42 x 1.68 (5 pcs.)	23.81 x 2.62 (2 pcs.)	6.7 x 10 x 1 (1 pcs.)	485-9960
Viton	12.42 x 1.68 (5 pcs.)	23.47 x 2.62 (2 pcs.)	6.7 x 10 x 1 (1 pcs.)	485-9965

Preferred Types of Valves

Type	Ordering Number	Type	Ordering Number
RPE3-103Z11/01200E1	485-0001	RPE3-102R11/02400E1	485-0023
RPE3-102Z51/01200E1	485-0220	RPE3-102R21/02400E1	485-0027
RPE3-103C11/01200E1	485-0002	RPE3-102A51/02400E1	485-0024
RPE3-102C51/01200E1	485-0151	RPE3-102Y51/02400E1	485-0382
RPE3-103H11/01200E1	485-0003	RPE3-102J15/02400E1	485-0025
RPE3-103Y11/01200E1	485-0005	RPE3-103Z11/23050E5	485-0075
RPE3-102R11/01200E1	485-0007	RPE3-102Z51/23050E5	485-0088
RPE3-102R21/01200E1	485-0011	RPE3-103C11/23050E5	485-0076
RPE3-102A51/01200E1	485-0008	RPE3-102C51/23050E5	485-0089
RPE3-102Y51/01200E1	485-0381	RPE3-103H11/23050E5	485-0077
RPE3-102J15/01200E1	485-0009	RPE3-103Y11/23050E5	485-0079
RPE3-103Z11/02400E1	485-0016	RPE3-102R11/23050E5	485-0085
RPE3-102Z51/02400E1	485-0029	RPE3-102R21/23050E5	485-0086
RPE3-103C11/02400E1	485-0017	RPE3-102A51/23050E5	485-0082
RPE3-102C51/02400E1	485-0030	RPE3-102Y51/23050E5	485-0383
RPE3-103H11/02400E1	485-0018	RPE3-102J15/23050E5	485-0083
RPE3-103Y11/02400E1	485-0020	-	-

Caution!

- In the case of directional valves with two solenoids, any of the solenoids may be energized, but only after switching off the other.
- Directional valves with other functional symbols as those shown in the table, please consult with the manufacturer.
- The packing foil is recyclable.
- The protective plate can be returned to manufacturer.
- Mounting bolts M6 x 40 DIN 912-10.9 or studs must be ordered separately.
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law.

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www.argo-hytos.com

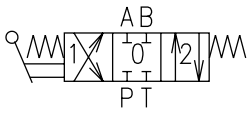
Hand-operated directional control valves

RPR3-04

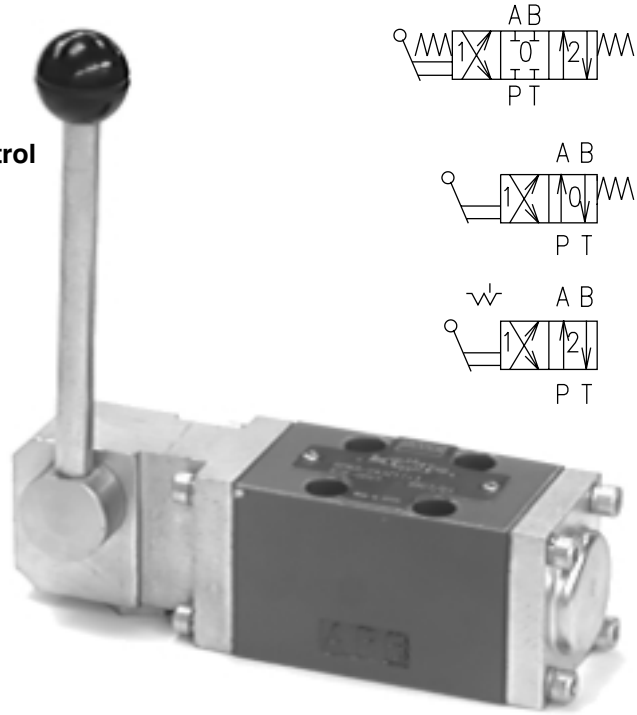
Size 04 • p_{max} up to 320 bar • Q_{max} up to 30 L/min

HA 4018
3/2002

Replaces
HA 4018 6/2001



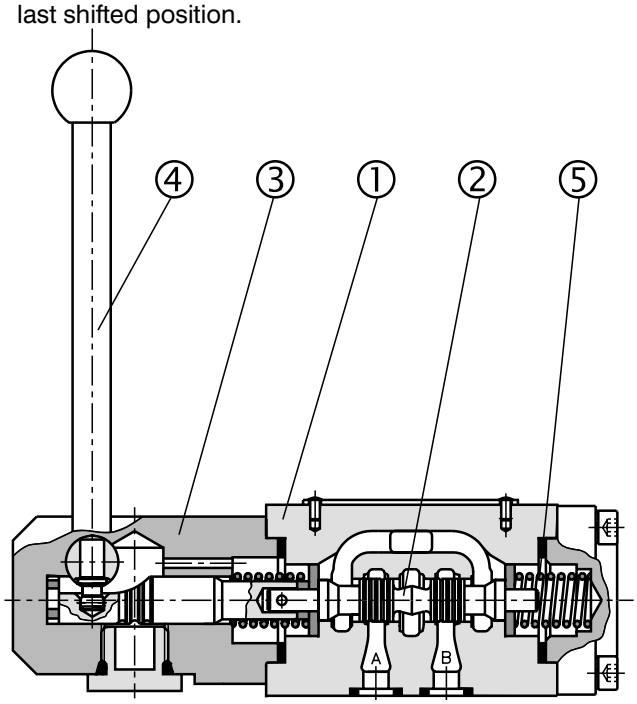
- **4/3 and 4/2 - way spool type directional control valves**
- **Hand-lever operated**
- **Actuating section can be rotated in four positions 90° apart**
- **Installation dimensions acording to ISO 4401 CETOP - RP 121H**



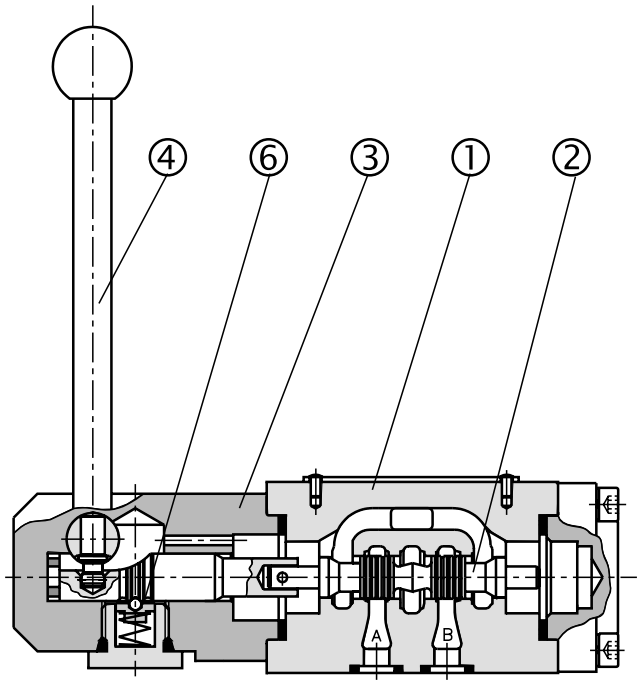
Functional Description

The hand operated directional control valves are used mainly to control start, stop and direction of fluid.
The valves consist of housing (1) with control spool (2) and the actuating section (3). The actuating section consists either of the hand lever (4) and of one or two return springs (5), or of the hand lever (4) and the detent assembly (6). The detent assembly holds the spool in its last shifted position.

The directional control valves are being manufactured as two-position and three-position valves (see table with functional symbols).
The valve housing (1) is phosphate coated, the components of the actuating section (3) are zinc coated.



Type with return springs



Type with detent assembly

Ordering Code

RPR3-04 □ □ - □

Hand operated directional control valves

Nominal size

Number of operating positions
two positions **2**
three positions **3**

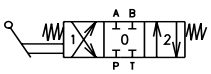
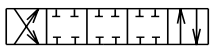
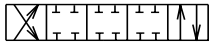
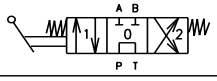
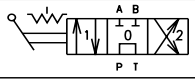
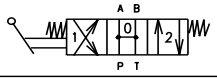
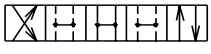
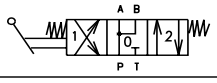
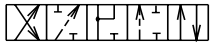
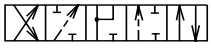
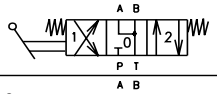
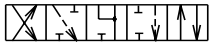
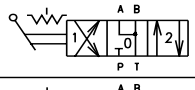
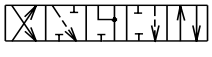
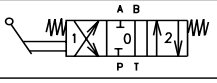
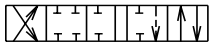
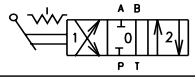
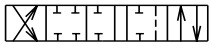
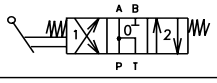
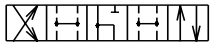
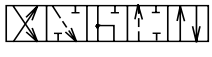
Seals
without designation NBR
V FPM (Viton)

Spool symbols
see table spool symbols

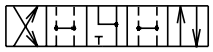
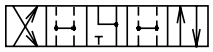
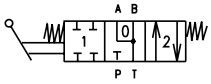
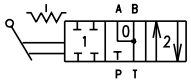
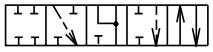
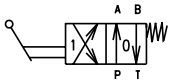
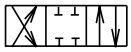
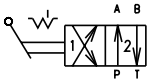
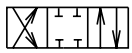
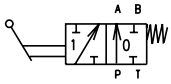
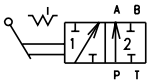
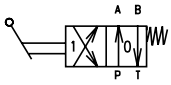
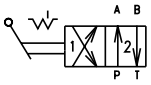
Technical Data

Valve size	mm	04
Maximum flow	L/min	30
Maximum operating pressure at ports P, A, B	bar	320
Maximum operating pressure at port T	bar	100
Pressure losses	bar	see p-Q characteristics
Hydraulic fluid		Hydraulic fluids of power clsses HM, HV to CETOP RP 91 H in viscosity classes ISO VG 32, 46 and 68
Fluid temperature range for standard seal (NBR)	°C	-30 ... +80
Fluid temperature range for Viton sealing (FPM)	°C	-20 ... +80
Viscosity range	mm^2/s	20 ... 400
Maximum degree of fluid contamination		Class 21/18/15 to ISO 4406 (1999).
Operating force on lever	N	< 40
Weight	kg	1.0
Mounting position		optional

Spool Symbols

Type	Symbol	Crossover	Type	Symbol	Crossover
Z11			Z15		
C11			C15		
H11			H15		
P11			P15		
Y11			Y15		
B11			B15		
L11			L15		
L21			L25		

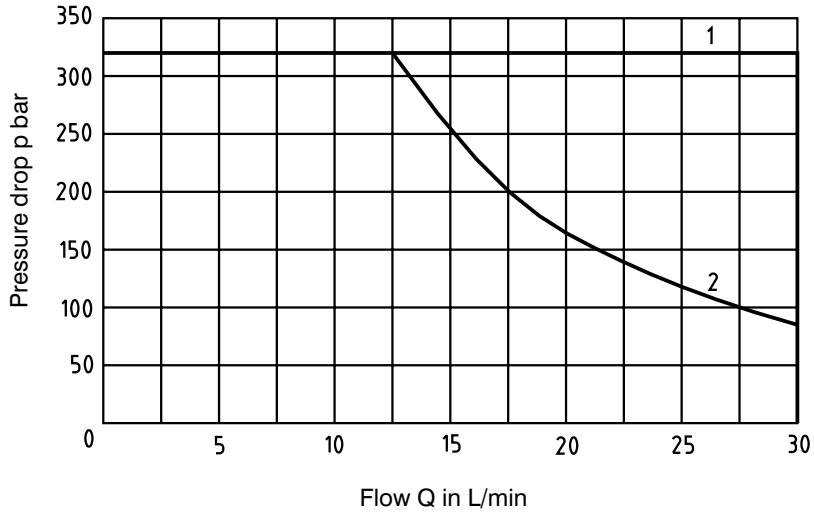
Spool Symbols

Type	Symbol	Crossover	Type	Symbol	Crossover
Y31			Y35		
Y71			Y75		
R11			J15		
A51			J75		
R21			R25		

p-Q Characteristics

Measured at $\nu = 32\ mm^2/s$ and $t = 40\ °C$

Operating limits for maximum hydraulic power transferred by the directional valve.

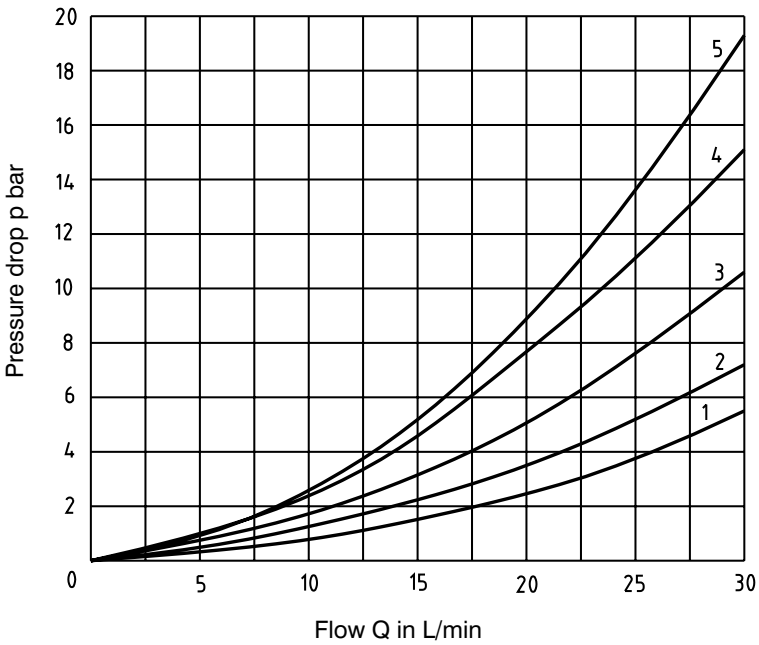


Z11	1	Z15	1
C11	1	C15	1
H11	1	H15	1
P11	1	P15	1
Y11	1	Y15	1
B11	1	B15	1
L11	2	L15	1
L21	2	L25	1
Y31	1	Y35	1
Y71	1	Y75	1
R11	1	J15	1
A51	1	J75	1
R21	1	R25	1

Δp-Q Characteristics

Measured at $\nu = 32\ mm^2/s$ and $t = 40\ °C$

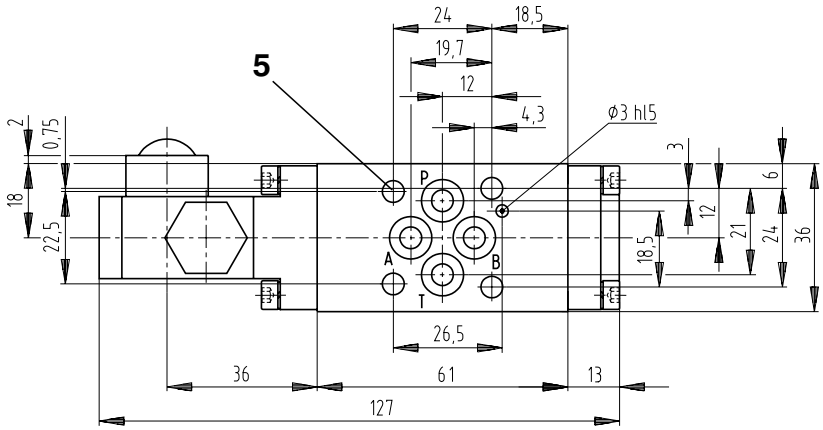
Pressure drop Δp related to flow rate.

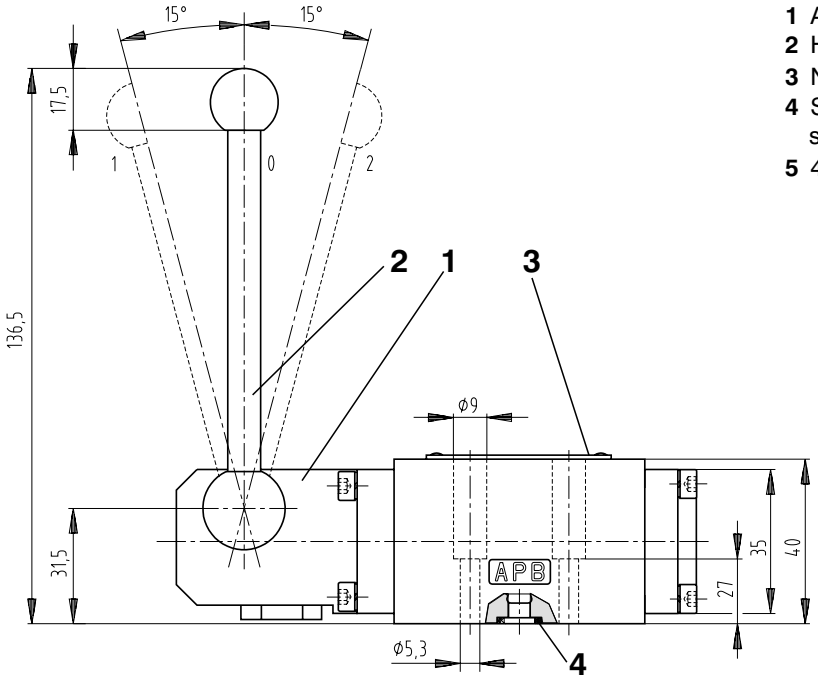


	P-A	P-B	A-T	B-T	P-T
Z11, Z15	3	2	2	2	
C11, C15	5	5	4	4	3
H11, H15	3	3	2	2	3
P11, P15	1	1	1	3	
Y11, Y15	3	3	1	1	
B11, B15	3	3	2	1	
L11, L15	3	2	1	2	4
L21, L25	2	2	3	3	4
Y31, Y35	3	3	2	2	
Y71, Y75	3	1			
R11, J15	3	3	2	2	
A51, J75	2	2			
R21, R25	3	3	2	2	

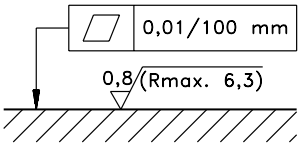
Valve Dimensions

Dimensions in millimeters





1 Actuating section
2 Hand lever
3 Name plate
4 Square ring 7.65 x 1.68 (4 pcs.) supplied with valve
5 4 mounting holes



Required surface finish of interface

Spare Parts

Seal kit

Type	Dimensions, quantity				Ordering number
	O-ring	Square ring	O-ring	O-ring	
Standard NBR70	22 x 2 (2 pcs.)	7.65 x 1.68 (4 pcs.)	11 x 1.5 (2 pcs.)	11.3 x 2.4 (1 pc.)	475-9000
Viton	22 x 2 (2 pcs.)	7.65 x 1.68 (4 pcs.)	11 x 1.5 (2 pcs.)	11.3 x 2.4 (1 pc.)	475-9001

Bolt kit (for studs see HA 0020)

Dimensions, quantity	Bolt torque	Ordering number
M5x35 DIN 912-10.9 (4 pcs.)	3.7 ft-lbs (5 Nm)	486-9011

Caution!

- With functional symbols A51 and J75 for pressures exceeding 100 bar, the T-port or must be connected directly to the tank.
- Directional valves with other functional symbols as those shown in the table above can be delivered on request.
- The packing foil is recyclable.
- Mounting bolts or studs must be ordered separately.
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law.

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E-mail: sales.cz@argo-hytos.com
www.argo-hytos.com

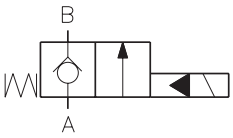
2-way directional poppet valves, solenoid operated

ROE3

Size 04, 06 • p_{max} up to 250 bar • Q_{max} up to 25 L/min / 63 L/min

HA 4022
1/2003

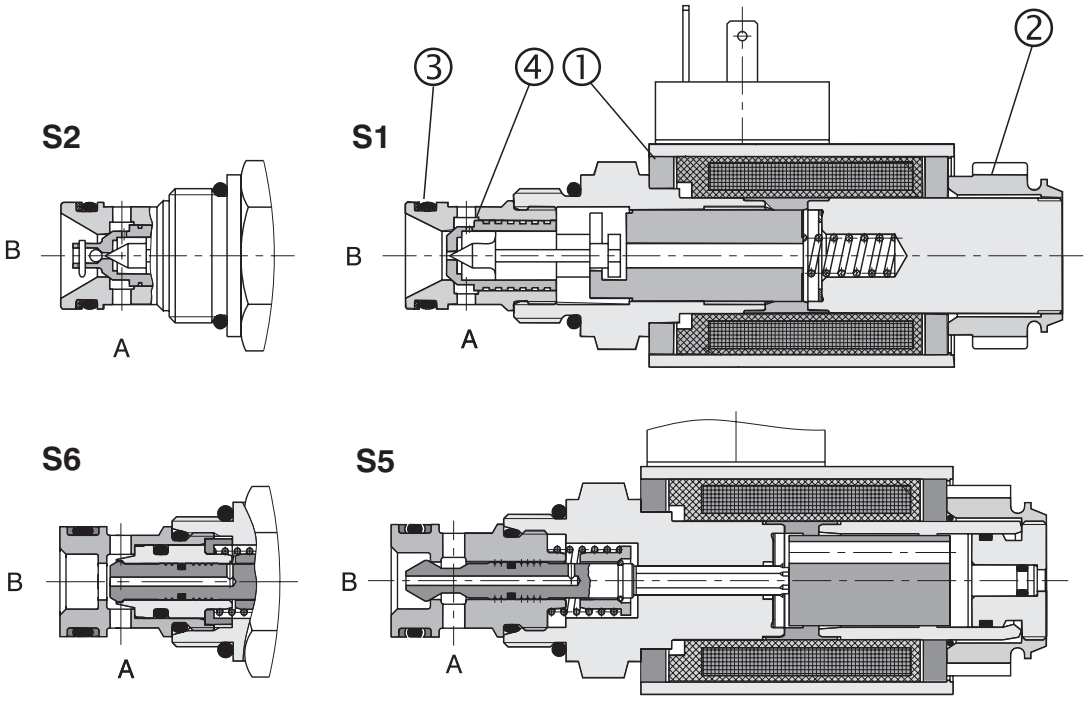
Replaces
HA 4022 3/2002



- **Screw-in cartridge, modular and in-line des**
- **ign**
- **Poppet valve - leak-free closing**
- **High switching reliability after long idling time**
- **Short switching times**
- **Installation dimensions size 04 to ISO 4401, CETOP - RP 121H**
- **Installation dimensions size 06 to ISO 4401, DIN 24 340-A6**

Functional Description

2-way directional poppet valves with solenoid operation are designed to check and open the flow of the hydraulic fluid. The opening and closing of the valve is ensured by an electro-hydraulically controlled poppet (4) which sits on the seat (3) and guarantees in its closed position practically leak-free sealing.
The operating solenoid (1) is a DC solenoid. For AC supply the solenoid is provided with a rectifier which is integrated in the DIN connector socket as part of the solenoid. The electrical connector can be turned by 90°. By loosening the retaining nut (2), the solenoid (1) can be turned arbitrarily in the range of 360°, or replaced.
The valve body is zinc coated, blocks M and R are phosphate coated.



Ordering Code

ROE3 - ☐ 2 ☐ ☐ / ☐ ☐ ☐ ☐

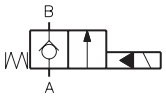
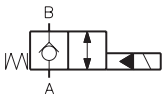
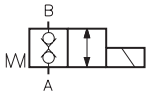
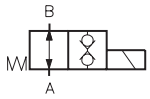
2-way directional poppnet valves with solenoid operation

Nominal size

04	**04**
06	**06**

Number of operating positions

Model and functional symbols

screw-in cartridge		S1
screw-in cartridge		**S2**
screw-in cartridge		**S5***
screw-in cartridge		**S6***

* only for nominal size 04

Model

screw-in cartridge	**no designation**
modular valve, connection of A2 - A1	MA04
modular valve, connection of B2 - B1	MB04
modular valve, connection of A - B	MX04
modular valve, connection of A - T	MD04
modular valve, connection of B - T	ME04
modular valve, connection of B2 - B1, A2 - A1	MC04
modular valve, connection of B - T, A - T	MF04
modular valve, connection of P - T	MG04
modular valve, connection of A2 - A1	MA06
modular valve, connection of B2 - B1	MB06
modular valve, connection of A - B	MX06
modular valve, connection of A - T	MD06
modular valve, connection of B - T	ME06
modular valve, connection of B2 - B1, A2 - A1	MC06
modular valve, connection of B - T, A - T	MF06
modular valve, connection of P - T	MG06
modular valve, connection of P1 -P2	MP06
tube-mounting valve, thread G3/8	R1
tube-mounting valve, thread G1/2	R2

Seals

no designation	NBR
V	FPM (Viton)

****Electrical connector, DIN 43 650**

no designation	without connector
K1	connector without rectifier
K2	connector without rectifier with LED and quenching diode
K3	connector with rectifier
K4	connector with rectifier with LED and quenching diode
K5	connector without rectifier

Type of the solenoid coil

E1	with DIN connector
E2	with DIN connector and quenching diode
E3	with AMP connector
E4	with AMP connector and quenching diode
E5	with integrated rectifier and DIN connector

Rated supply voltage of solenoids

01200	12 V DC / 2.41 A
01400	14 V DC / 1.66 A
02100	21 V DC / 1.14 A
02400	24 V DC / 1.16 A
04200	42 V DC / 0.59 A
04800	48 V DC / 0.56 A
06000	60 V DC / 0.41 A
10200	102 V DC / 0.24 A
20500	205 V DC / 0.12 A
02450	24 V AC / 1.44 A / 50 (60) Hz
11550	115 V AC / 0.26 A / 50 (60) Hz
23050	230 V AC / 0.14 A / 50 (60) Hz

The AC coils correspond with E5 type.

****other information on pages 12 and 14**

FOR PREFERRED TYPES SEE BOLD TYPING IN ORDERING CODE, AND TABLE OF PREFERRED TYPES ON PAGE 14

Recommended solenoid coils used with electrical connector with rectifiers - type designation K3, K4

Rated supply source voltage (permissible rated voltage variation ±10 %)	Type designation of the solenoid voltage
24 V AC / 1.44 A / 50 (60) Hz	02100
115 V AC / 0.26 A / 50 (60) Hz	10200
230 V AC / 0.14 A / 50 (60) Hz	20500

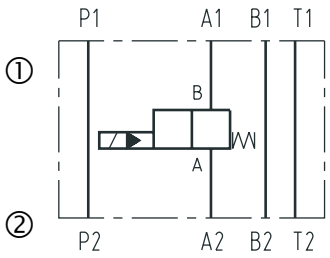
Ordering Numbers of Sandwich / Valve Bodies (without screw-in cartridge)

Modular valve - sealing NBR	Ordering number	Modular valve - sealing Viton	Ordering number
MA04-ROE3	405-6000	MA04-ROE3/V	405-6007
MB04-ROE3	405-6001	MB04-ROE3/V	405-6008
MX04-ROE3	405-6002	MX04-ROE3/V	405-6009
MD04-ROE3	405-6003	MD04-ROE3/V	405-6010
ME04-ROE3	405-6004	ME04-ROE3/V	405-6011
MC04-ROE3	405-6005	MC04-ROE3/V	405-6012
MF04-ROE3	405-6006	MF04-ROE3/V	405-6013
MG04-ROE3	405-6018	MG04-ROE3/V	405-6019
MA06-ROE3	404-6000	MA06-ROE3/V	404-6007
MB06-ROE3	404-6001	MB06-ROE3/V	404-6008
MX06-ROE3	404-6002	MX06-ROE3/V	404-6009
MD06-ROE3	404-6003	MD06-ROE3/V	404-6010
ME06-ROE3	404-6004	ME06-ROE3/V	404-6011
MC06-ROE3	404-6005	MC06-ROE3/V	404-6012
MF06-ROE3	404-6006	MF06-ROE3/V	404-6013
MG06-ROE3	404-6015	MG06-ROE3/V	404-6016
MP06-ROE3	404-6017	MP06-ROE3/V	404-6018

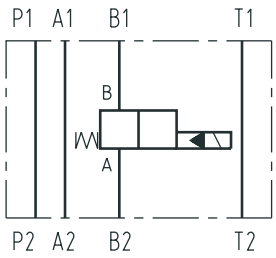
Tube-mounting valve	Ordering number
R1-ROE3	405-6014
R2-ROE3	405-6015

Functional Symbols

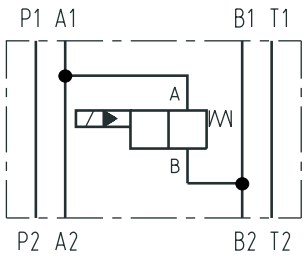
Model MA



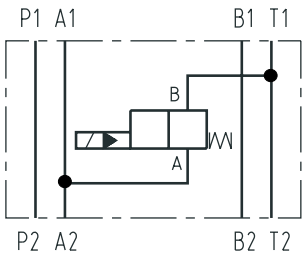
Model MB



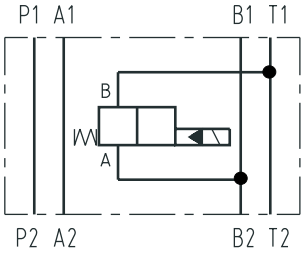
Model MX



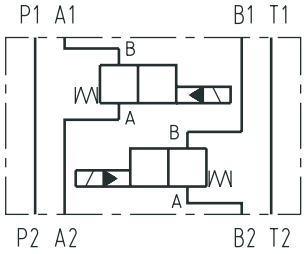
Model MD



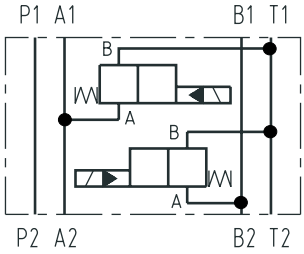
Model ME



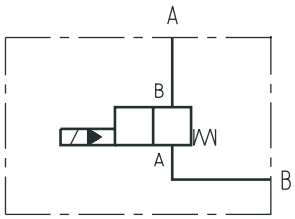
Model MC



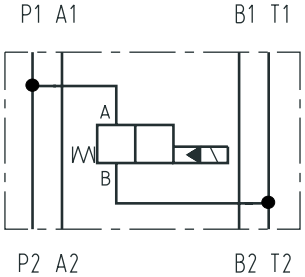
Model MF



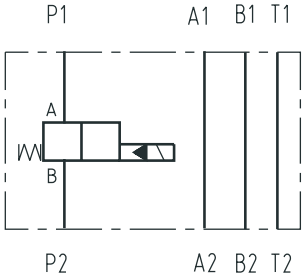
Model R1, R2



Model MG



Model MP



① Valve side
② Subplate side

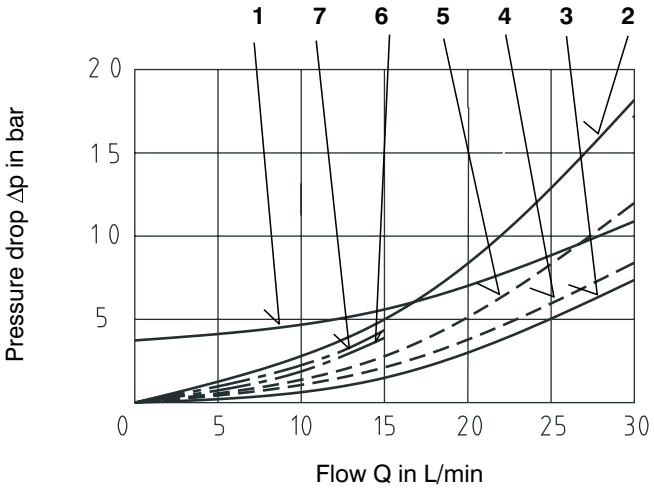
Technical Data

Nominal size	mm	04	06
Maximal flow	L/min	25	63
Maximal operating pressure	bar	250	250
Pressure drop	bar	see Δp-Q characteristics	
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP - RP 91H in viscosity classes ISO VG 32, 46 and 68.	
Fluid temperature range	°C	-30 ... +80 for NBR seals -20 ... +80 for FPM seals	
Ambient temperature, max.	°C	50	
Viscosity range	mm^2/s	20 ... 400	
Maximum degree of fluid contamination		Class 21/18/15 according to ISO 4406 (1999).	
Permissible rated voltage variation	%	DC ±10 AC ±10	DC ±10 AC ±10
Maximal switching frequency	1/h	15 000	10 000
Switching time, ON; at rated voltage and $\nu = 32\ mm^2/s$	ms	DC 25 ... 35 AC 25 ... 35	DC 30 ... 50 AC 30 ... 110
Switching time, OFF; at $\nu = 32\ mm^2/s$	ms	DC 15 ... 25 AC 50 ... 100	DC 80 ... 130 AC 100 ... 150
Duty cycle	%	100	
Service life		10^7	
Enclosure type to DIN 40 050		IP 65	
Weight - screw-in cartridge - model MA, MB, MX, MD, ME, MG, MP - model MC, MF - model R1, R2	kg	0.5 1.15 1.65 1.6	0.5 1.45 1.95 1.6
Mounting position		optional	

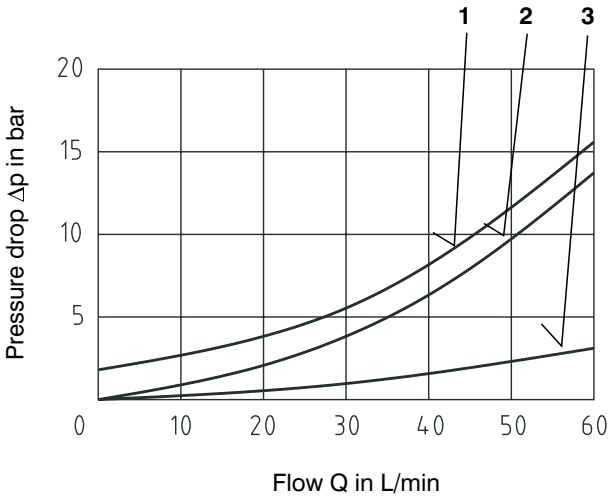
p-Q Characteristics

Measured at $\nu = 32\ mm^2/s$ and $t = 40\ °C$

For the screw-in cartridge without valve body



1 - S1, S2 (B - A) Solenoid OFF
2 - S1, S2 (A - B) Solenoid ON
3 - S2 (B - A) Solenoid ON
4 - S5 (A - B)
5 - S5 (B - A)
6 - S6 (A - B)
7 - S6 (B - A)
flow up to15 L/min



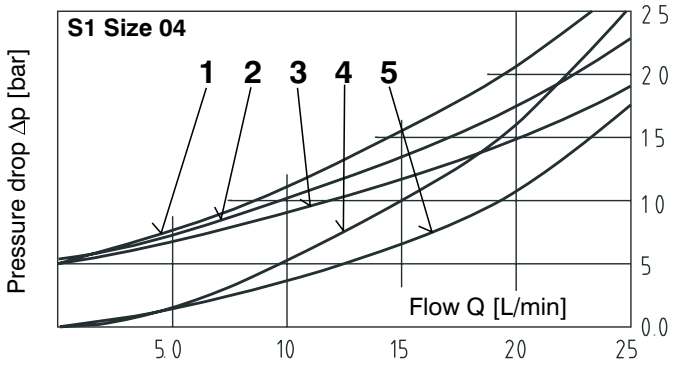
1 - S1, S2 (B - A) Solenoid OFF
2 - S1, S2 (A - B) Solenoid ON
3 - S2 (B - A) Solenoid ON

In connection with a valve body, the additional pressure loss of the valve body is to be considered.

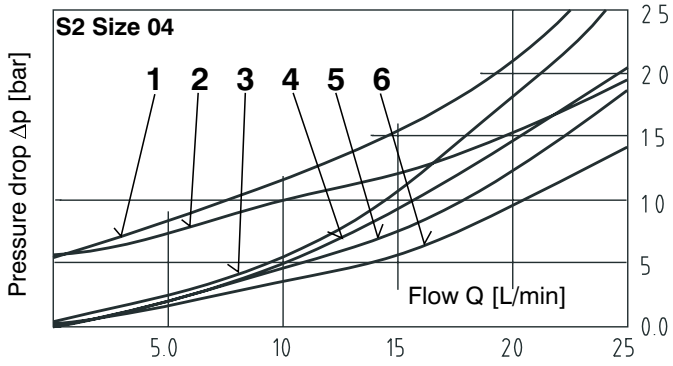
p-Q Characteristics

Measured at ν = 32 mm^2/s and t = 40 °C

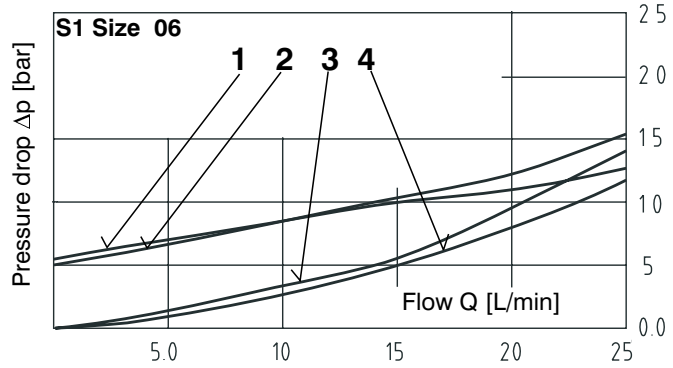
Pressure drops of valves S1, S2 in sandwich blocks
Blocks R1, R2 for thread connection



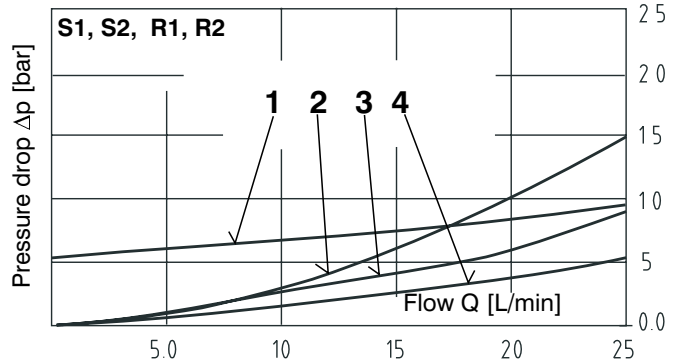
1 -MD 04 (T-A)
2 -MX 04 (B-A)
3 -MA 04 (A1-A2)
4 -MX 04 (A-B), MD 04 (A-T), MG 04 (P-T)
5 -MA 04 (A2-A1)



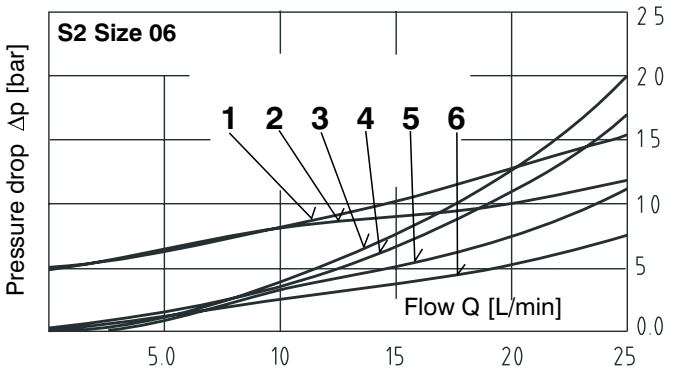
1 -MD 04 (T-A) Magnet OFF
MX 04 (B-A) Magnet OFF
2 -MA 04 (A1-A2) Magnet OFF
3 -MD 04 (A-T)
4 -MA 04 (A2-A1)
MD 04 (T-A) Magnet ON
5 -MX 04 (B-A) Magnet ON
6 -MA 04 (A1-A2) Magnet ON



1 -MA 06 (A1-A2), MX 06 (B-A)
2 -MD 06 (T-A)
3 -MD 06 (A-T), MG 06 (P-T)
4 -MA 06 (A2-A1), MX 06 (A-B)



1 -S2 R1 (A-B) Magnet OFF
S2 R2 (A-B)Magnet OFF
S1 R1 (A-B),S1 R2 (A-B)
2 -S2 R1 (B-A), S2 R2(B-A)
3 -S1 R1 (B-A), S1 R2(B-A)
4 -S2 R1 (A-B) Magnet ON
S2 R2 (A-B) Magnet ON

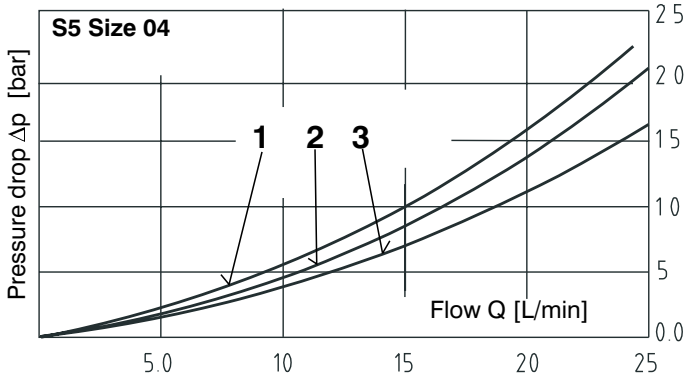


1 -MD 06 (T-A) Magnet OFF
2 -MX 06 (B-A) Magnet OFF
MA 06 (A1-A2) Magnet OFF
3 -MD 06 (A-T)
4 -MA 06 (A2-A1), MX 06 (A-B)
5 -MD 06 (A-T)
6 -MA 06 (A1-A2) Magnet ON
MX 06 (B-A) Magnet ON

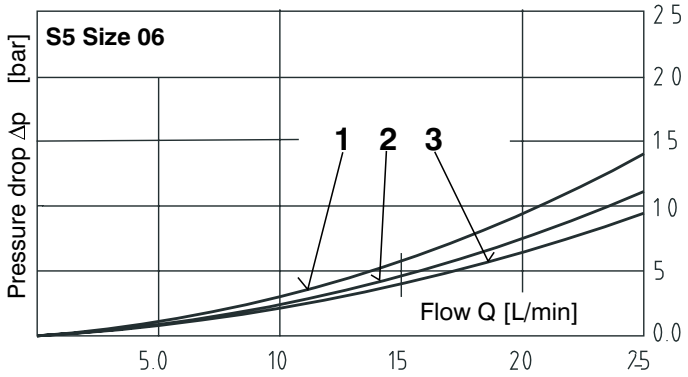
p-Q Characteristics

Measured at ν = 32 mm^2/s and t = 40 °C

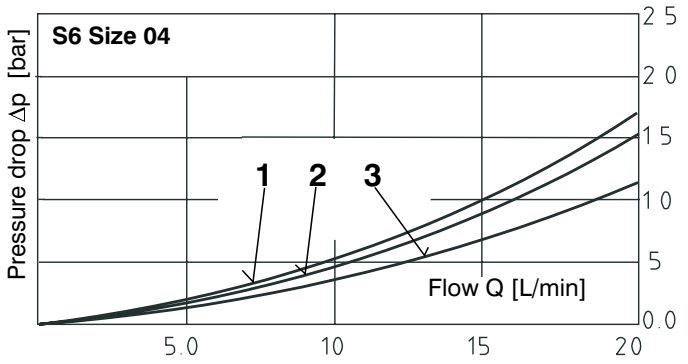
Pressure drops for valves S5, S6 in modular blocks
Blocks R1, R2 for thread connection



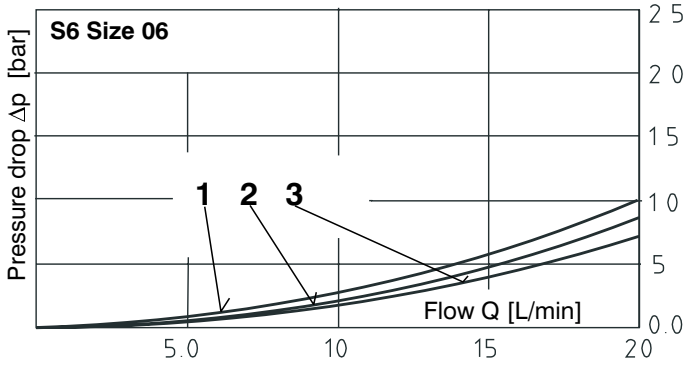
1 - MD 04 (A-T, T-A), ME 04 (B-T, T-B)
MF 04 (A-T, T-A)
2 - MX 04 (A-B, B-A)
3 - MA 04 (A1-A2, A2-A1), MB 04 (B1-B2, B2-B1)



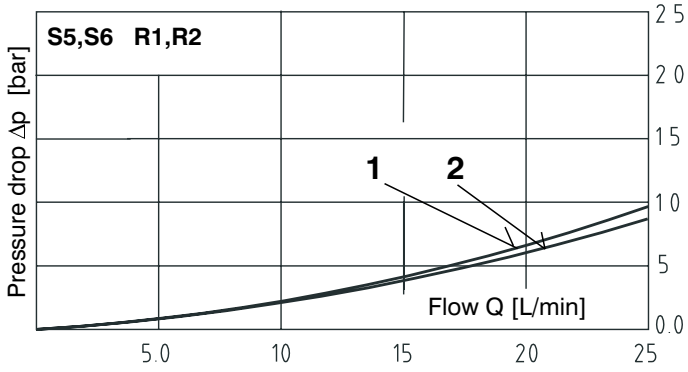
1 - MD 06 (A-T, T-A), ME 06 (B-T, T-B)
MF 06 v(A-T, B-T / T-A, T-B)
2 - MA 06 (A1-A2), MB 06 v(B1-B2),
MC 06 (A1-A2 / B1-B2), MX (B-A)
3 - MA 06 (A2-A1), MB 06 (B1-B2)
MC 06 (A2-A1/B2-B1), MX 06 (A-B)



1 - MD 04 (A-T, T-A), ME 04 (T-B, B-T)
MF 04 (A-T, B-T / T-A, T-B)
2 - MX 04 (A-B, B-A)
3 - MA 04 (A1-A2, A2-A1),MB (B1-B2, B2-B1)
MC 04 (A1-A2, A2-A1 / B1-B2, B2-B1)



1- MD (T-A), ME (T-B), MF (T-A, T-B)
2 - MD (A-T), ME (B-T), MF (A-T, B-T)
3 - MA (A1-A2, A2-A1), MB (B1 -B2, B2-B1)
MC (A1-A2, A2-A1/ B1 -B2, B2-B1)



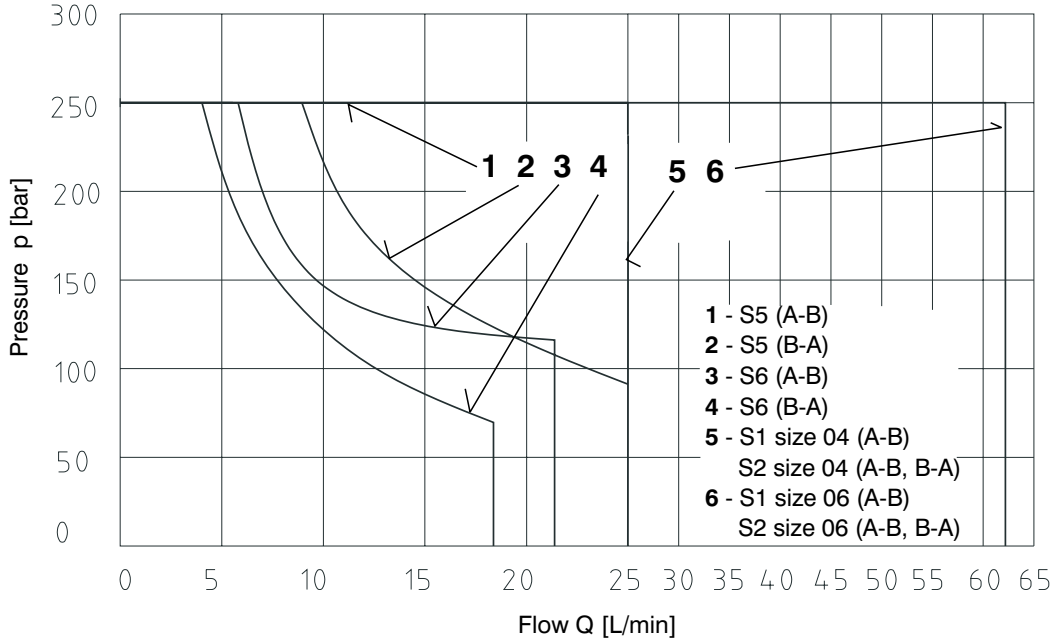
S5 **1** - R1 (A-B, B-A)
2 - R2 (A-B, B-A)

S6 **1**- R1 (A-B, B-A)
2 - R2 (A-B, B-A)

p-Q Characteristics

Measured at ν = 32 mm^2/s and t = 40 °C

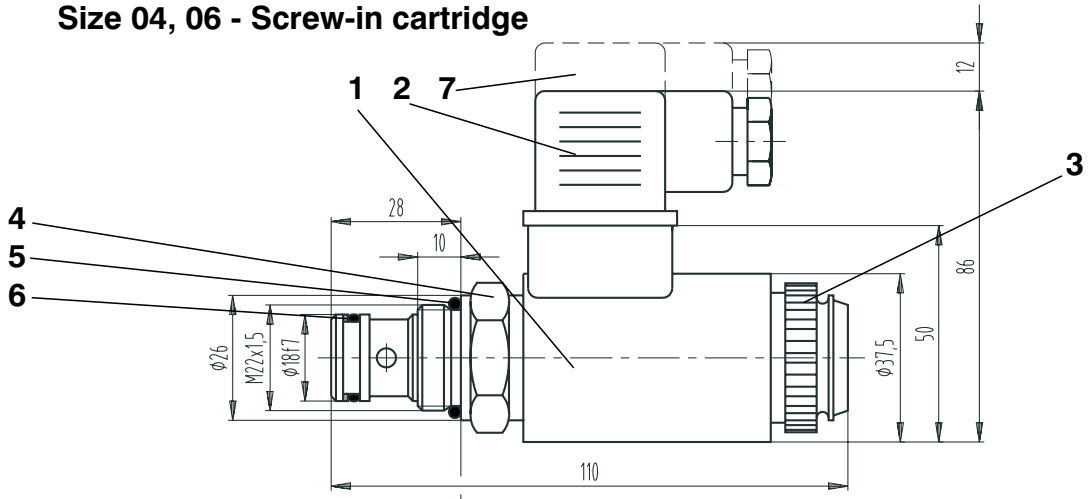
Operating limits for maximum hydraulic power for valves S1, S2, S5, S6



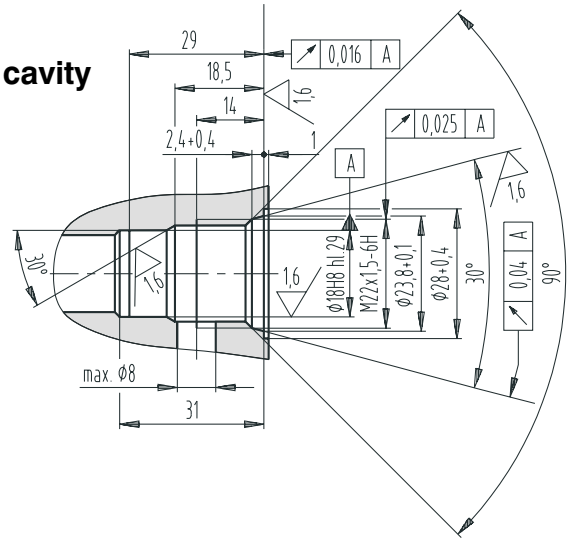
Valve Dimensions

Dimensions in millimetres

Size 04, 06 - Screw-in cartridge



Mounting cavity



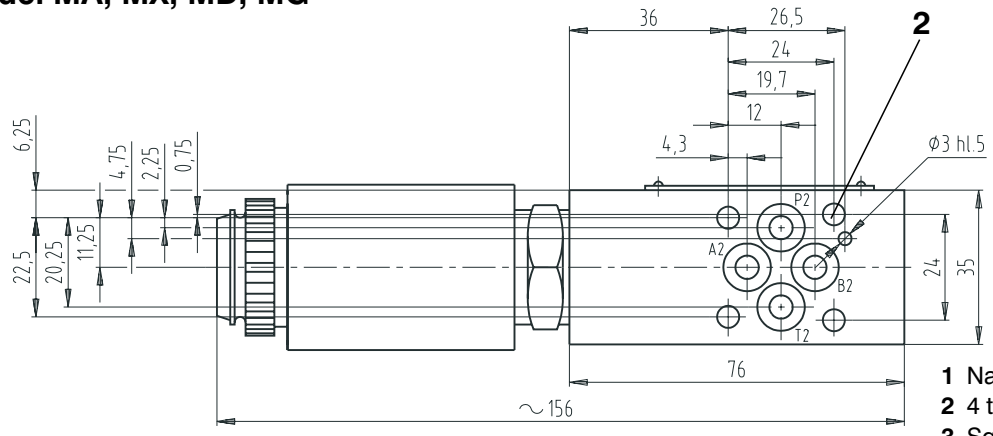
1 Solenoid turnable in the range of 360°
2 Electrical connector, DIN 43 650
3 Retaining nut of the solenoid
4 Outside hexagon s = 27 mm
Tightening torque 25 Nm
5 O-ring 19.4 x 2.1 NBR 80 (1 pc.)
supplied with valve
6 Combined sealing:
O-ring 14 x 1.78 (1 pc.)
Back-up ring 14.73 x 17.43 x 1.14 (1 pc.)
supplied with valve
7 Space required to remove connector

Valve Dimensions

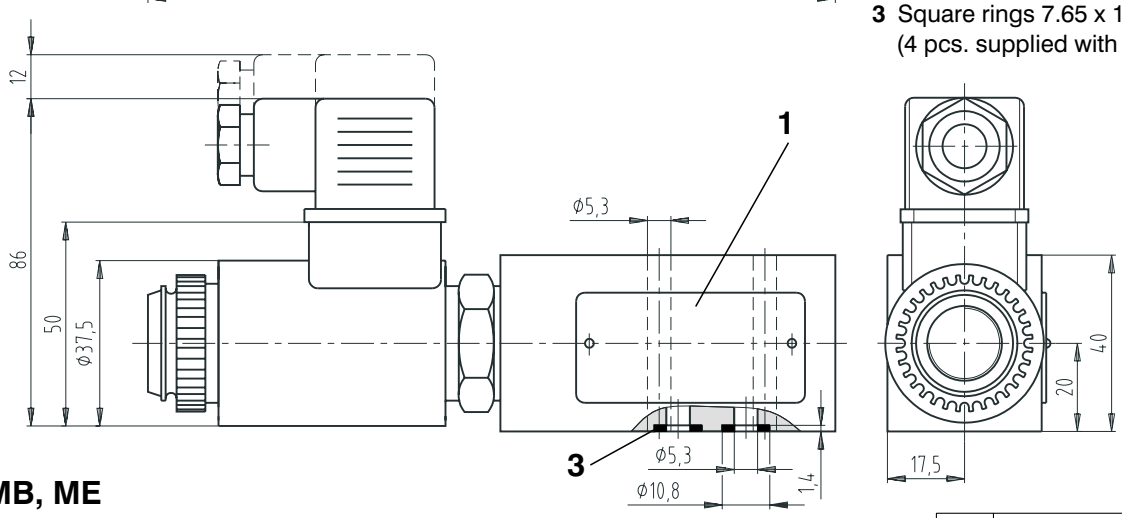
Dimensions in millimetres

Size 04 (Installation dimensions to ISO 4401, CETOP - RP 121H)

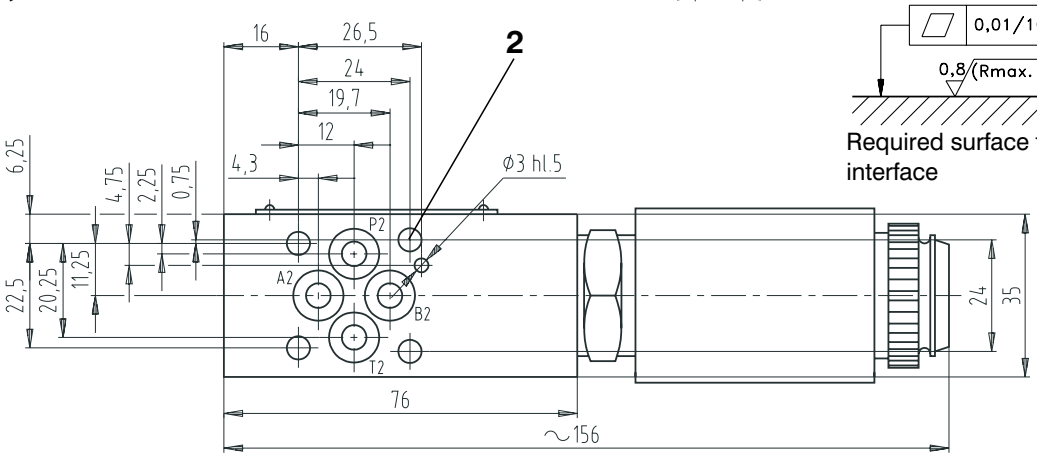
Model MA, MX, MD, MG

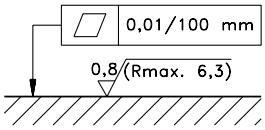


1 Name plate
2 4 through mounting holes
3 Square rings 7.65 x 1.68
(4 pcs. supplied with valve)

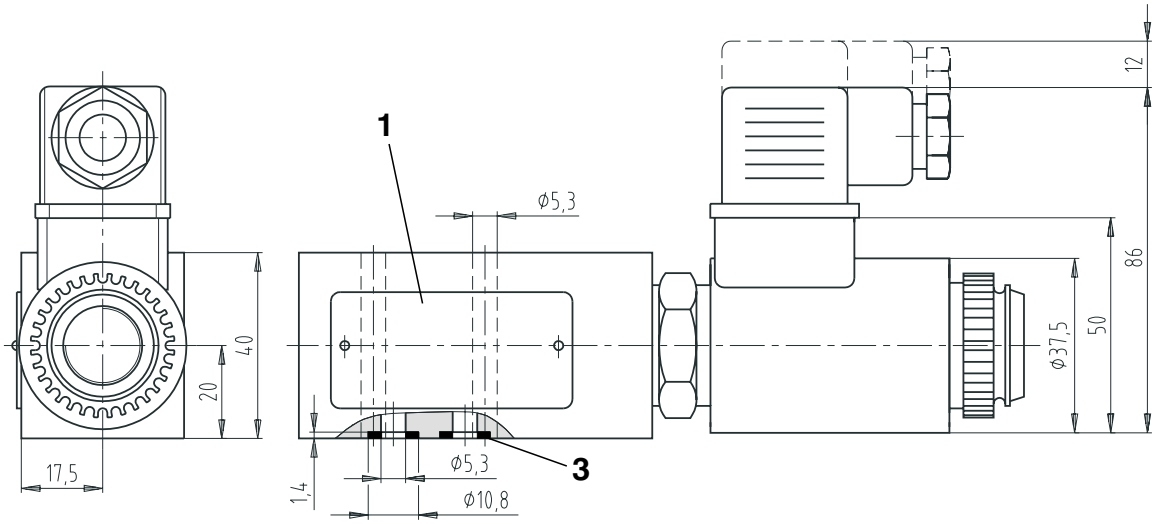


Model MB, ME





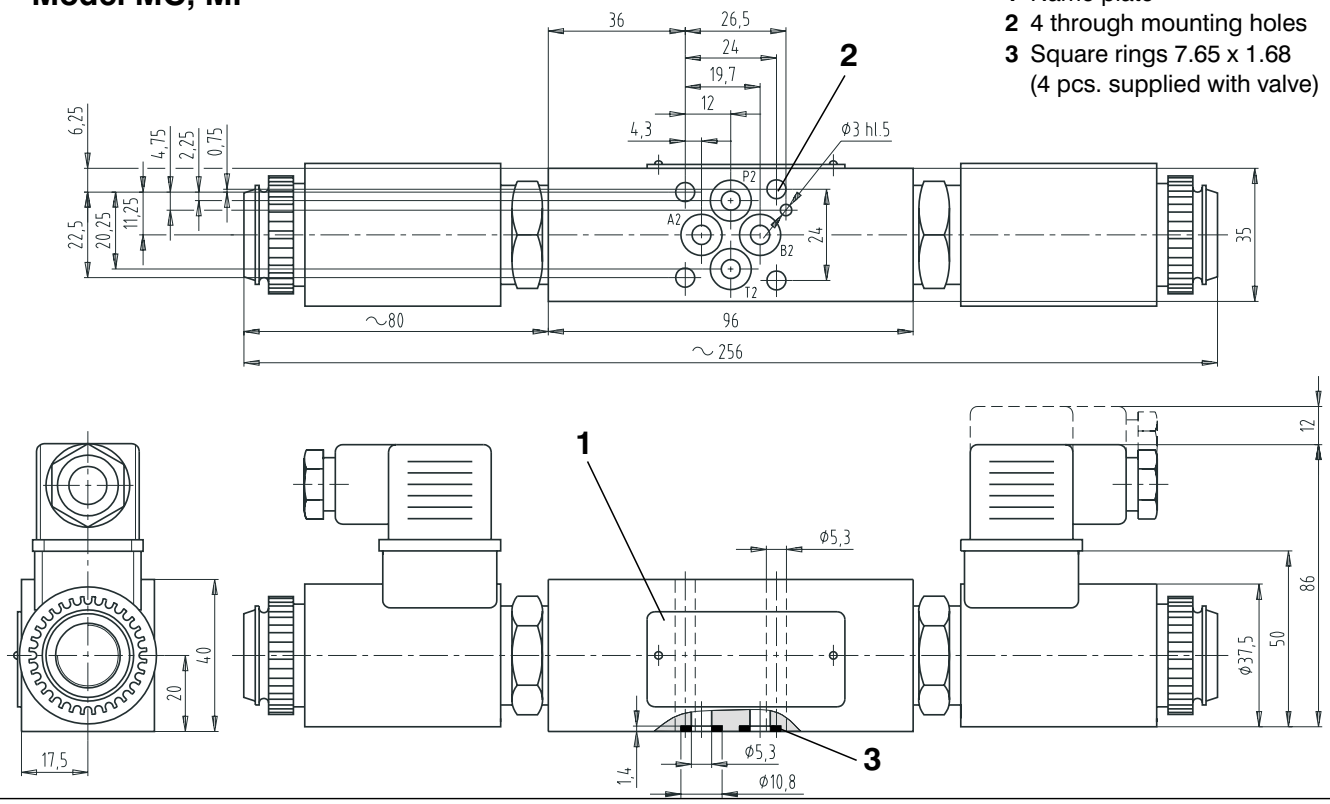
Required surface finish of interface



Valve Dimensions

Dimensions in millimetres

Model MC, MF



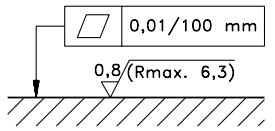
1 Name plate
2 4 through mounting holes
3 Square rings 7.65 x 1.68
(4 pcs. supplied with valve)

Valve Dimensions

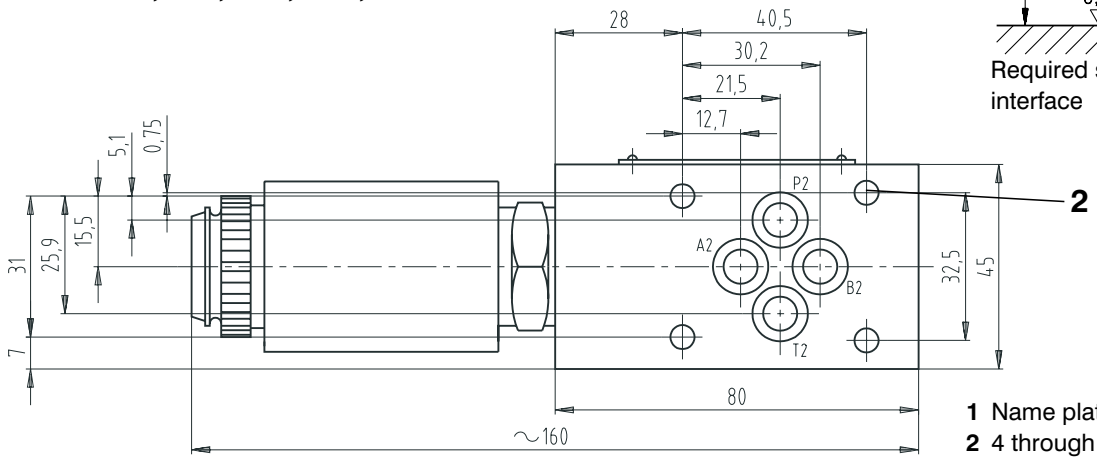
Dimensions in millimetres

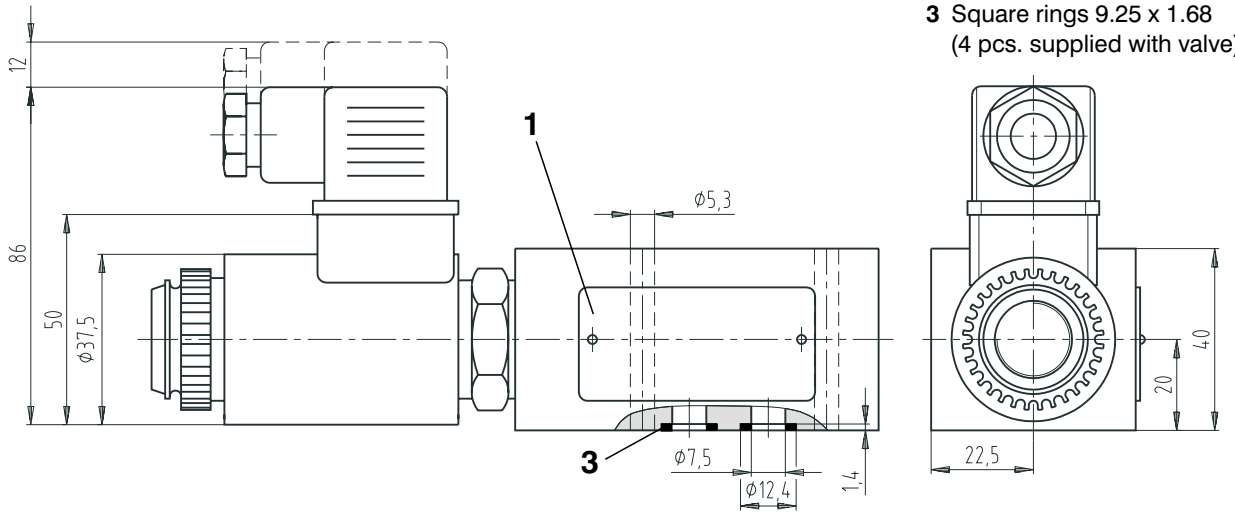
Size 06 (Installation dimensions to ISO 4401, DIN 24 340)

Model MA, MX, MD, MG, MP



Required surface finish of interface





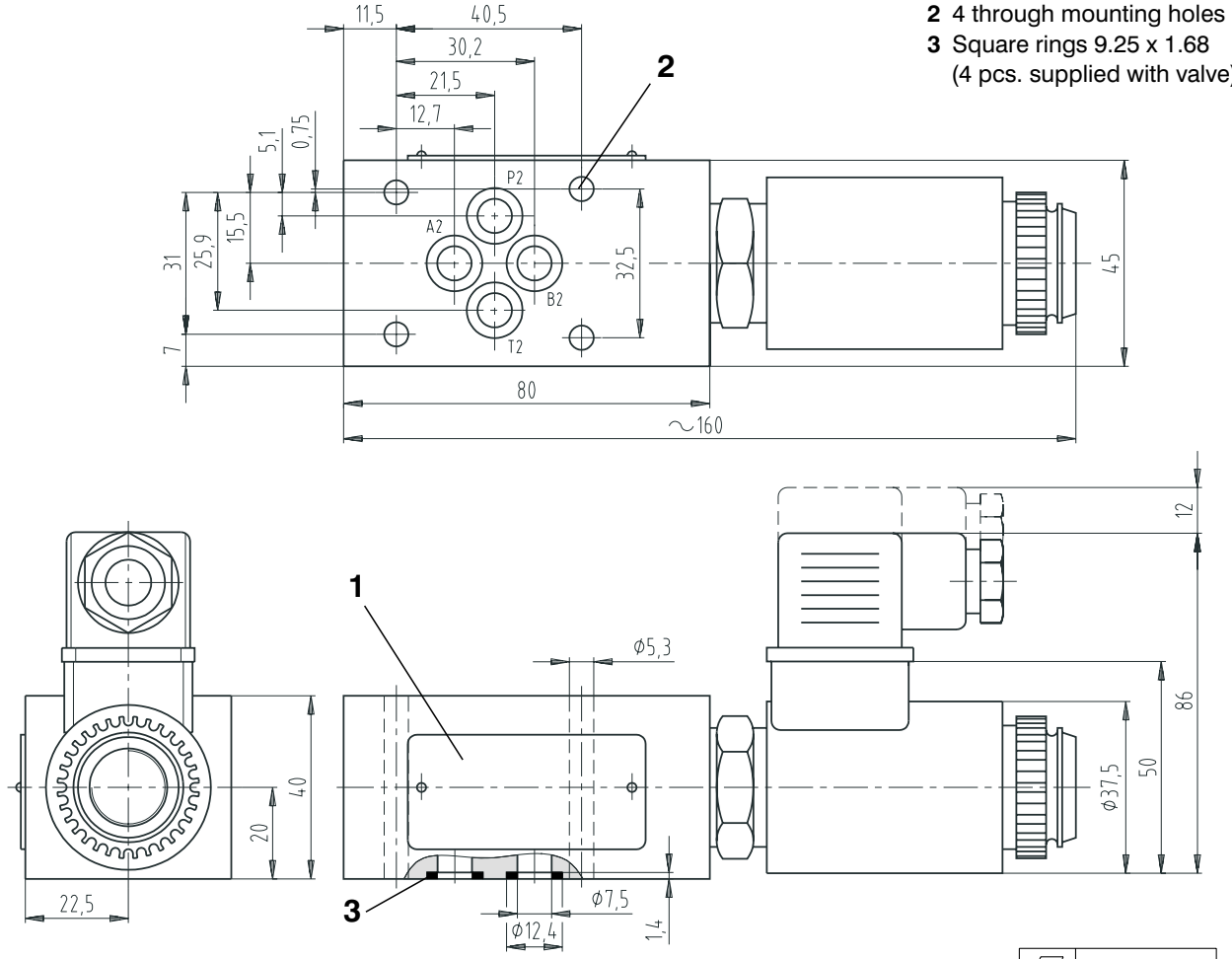
1 Name plate
2 4 through mounting holes
3 Square rings 9.25 x 1.68
(4 pcs. supplied with valve)

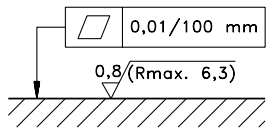
Valve Dimensions

Dimensions in millimetres

Model MB, ME

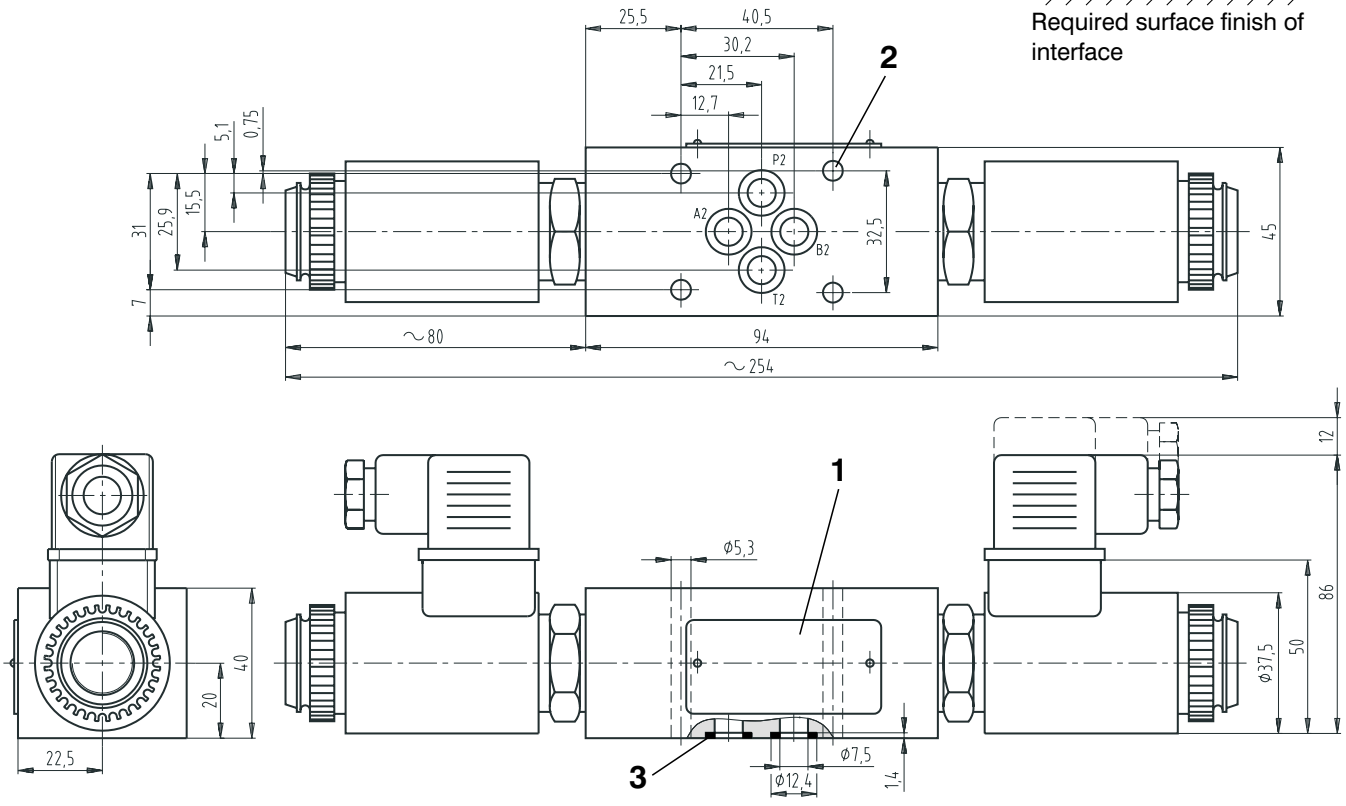
1 Name plate
2 4 through mounting holes
3 Square rings 9.25 x 1.68
(4 pcs. supplied with valve)





Required surface finish of interface

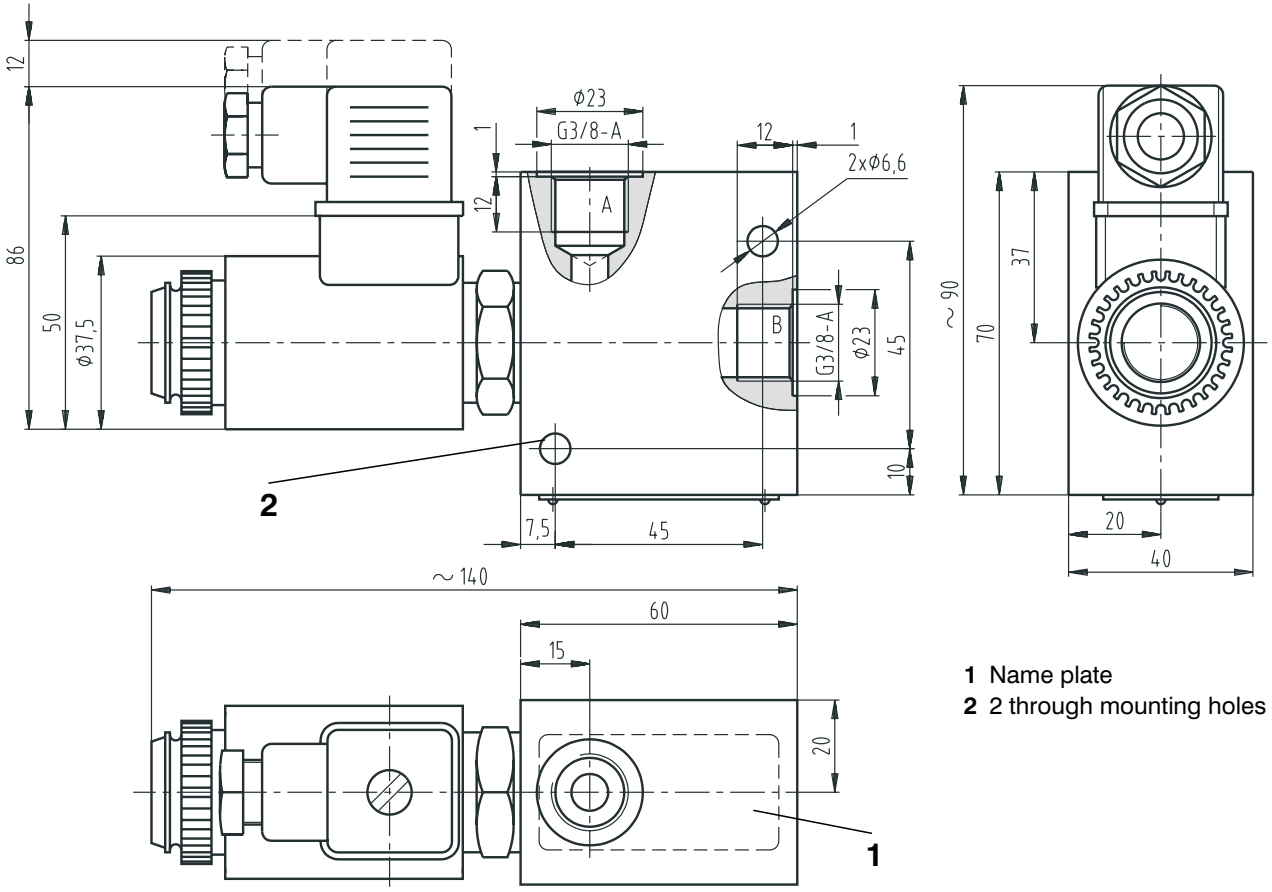
Model MC, MF



Valve Dimensions

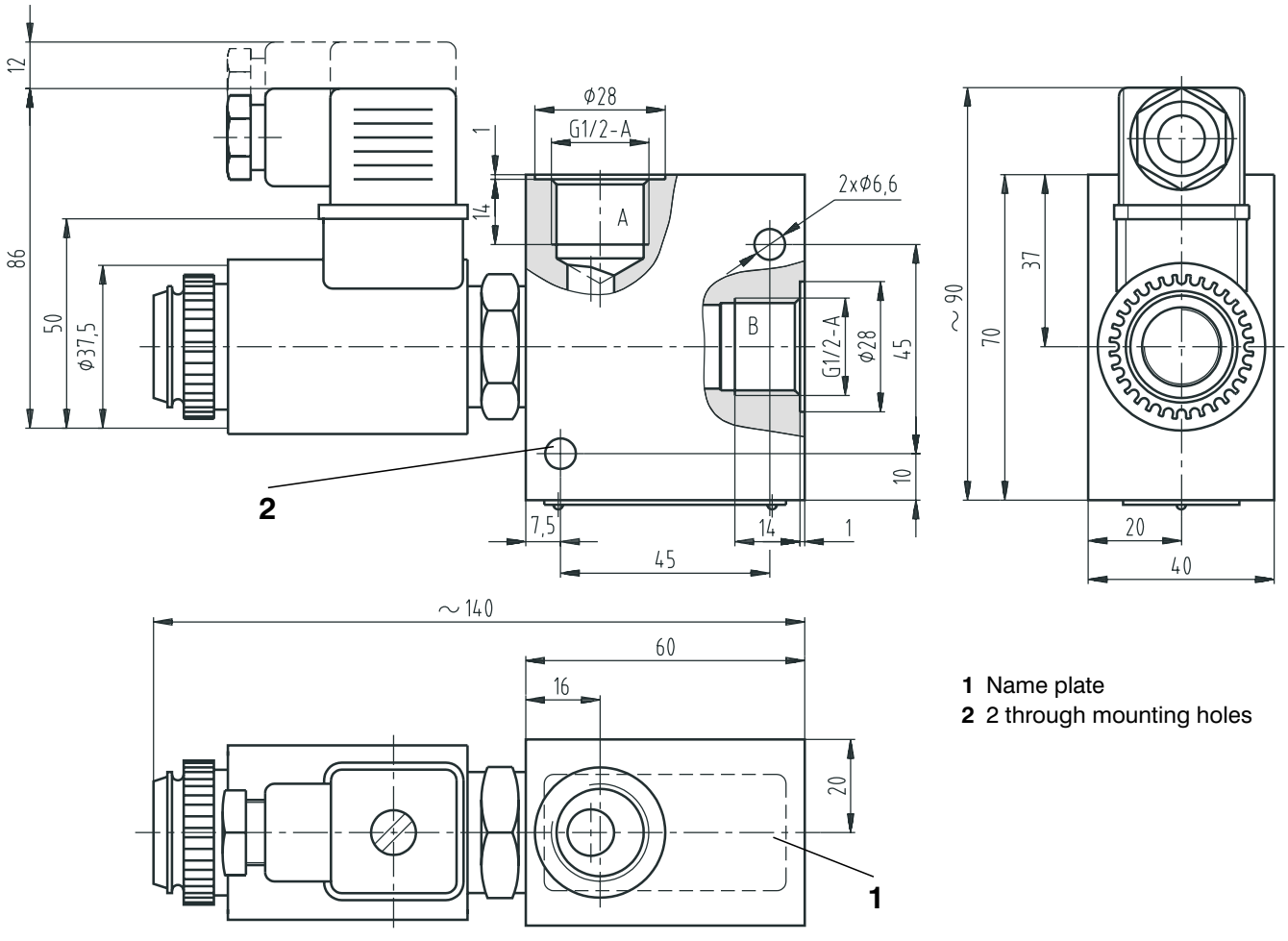
Dimensions in millimetres

Model R1



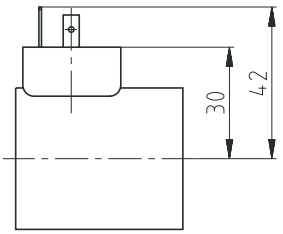
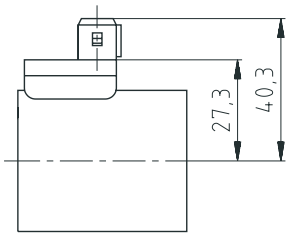
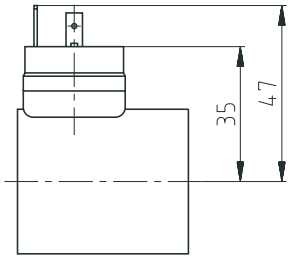
1 Name plate
2 2 through mounting holes

Model R2

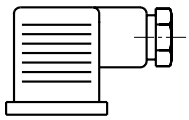


1 Name plate
2 2 through mounting holes

Type of the Solenoid Coil

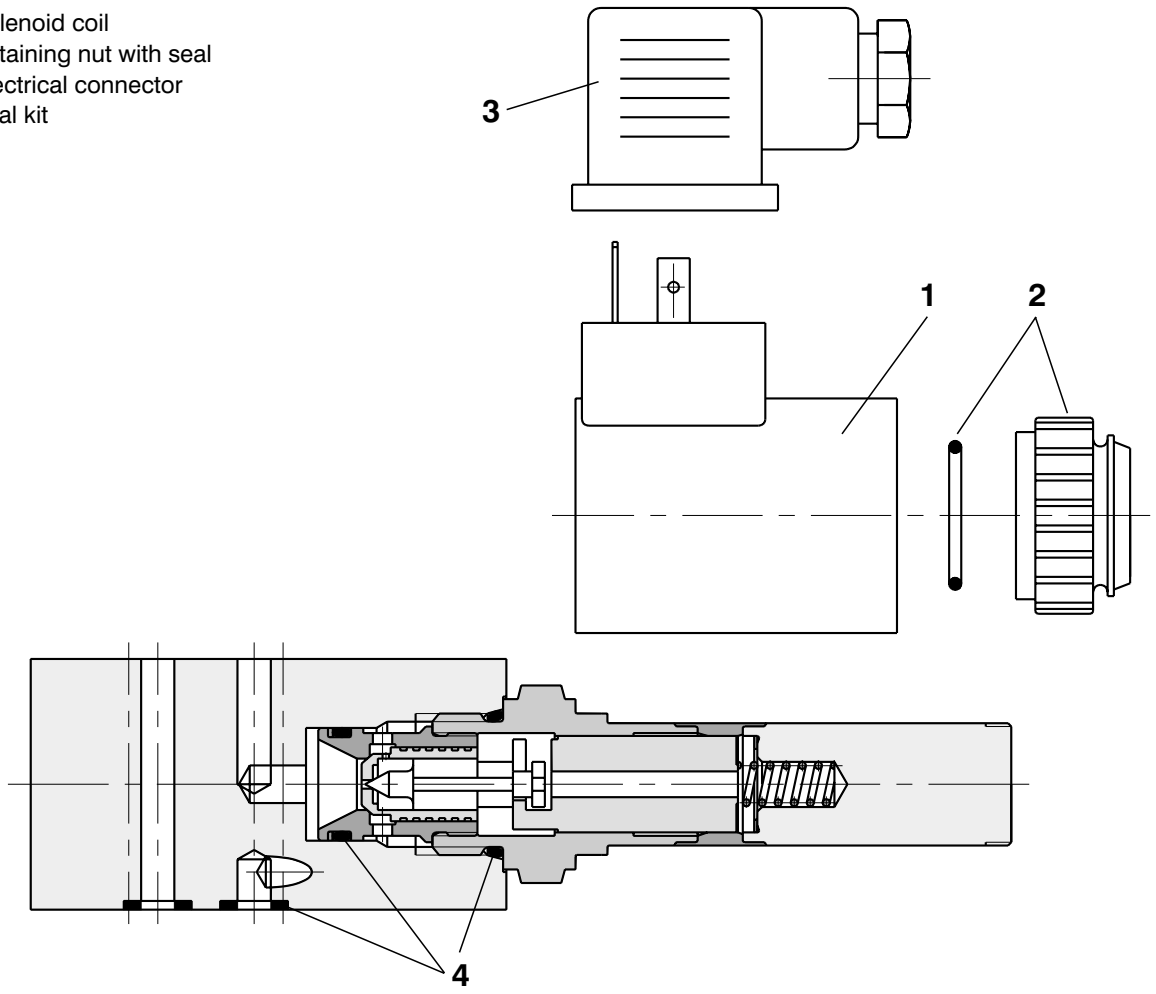
Designation	Dimensional sketch	Description
E1		Solenoid coil with terminal for the electrical connector, DIN 43 650.
E2		Solenoid coil with integrated quenching diode (bipolar transil diode) and terminal for the electrical connector, DIN 43 650.
E3		Solenoid coil with terminal for AMP electrical connector.
E4		Solenoid coil with integrated quenching diode (bipolar transil diode) and terminal for AMP electrical connector.
E5		Solenoid coil with integrated rectifier and terminal for the electrical connector, DIN 43 650.

Electrical Connector, DIN 43 650

Designation	Type	Model	Max. input voltage	
K1	Connector B (black)	without rectifier - M16x1.5 (bushing bore ∅ 6-8 mm)	230 V DC	
	Connector A (grey)		230 V AC	
K5	Connector B (black)	without rectifier - M16x1.5 (bushing bore ∅ 4-6 mm)	230 V DC	
	Connector A (grey)		230 V AC	
K2	Connector B (black)	without rectifier with LED and quenching diode - M16x1.5 (bushing bore ∅ 6-8 mm)	12...24 V DC	
	Connector A (grey)			
K3	Connector B (black)	with rectifier - M16x1.5 (bushing bore ∅ 6-8 mm)r	230 V AC	
	Connector A (grey)			
K4	Connector B (black)	with rectifier with LED and quenching diode - M16x1.5 (bushing bore ∅ 6-8 mm)	230 V AC	
	Connector A (grey)			

Spare Parts

1 Solenoid coil
2 Retaining nut with seal
3 Electrical connector
4 Seal kit



Solenoid coil

Type designation of the coil voltage	Type of the coil				
	E1	E2	E3	E4	E5
	Ordering number				
01200	936-0022	936-0690	936-0670	936-0680	
01400	936-0650	936-0691	936-0673	936-0681	
02100	936-0651	936-0692	936-0674	936-0682	
02400	936-0026	936-0693	936-0672	936-0683	
04200	936-0653	936-0695	936-0676	936-0685	
04800	936-0031	936-0696	936-0677	936-0686	
06000	936-0654	-	-	-	
10200	936-0655	-	-	-	
20500	936-0036	-	-	-	
02450					936-2125
11550					936-2175
23050					936-2185

Solenoid retaining nut with seal

Type of the nut	Seal ring	Ordering number
Standart nut for S1, S2	18 x 1,5	403-1001
Standard nut for S5, S6	18 x 1.5	486-9010

Electrical connector, DIN 43 650

Type designation	Connector A grey	Connector B black
	Ordering number	
K1	936-9902	936-9901
K5	936-9906	936-9905
K2	936-9908	936-9907
K3	936-9904	936-9903
K4	936-9910	936-9909

Seal kit

Type	Model	Dimensions, number	Ordering number
Screw-in cartridge ROE3	O-ring - NBR 80	19.4 x 2.1 (1 pc.)	405-9001
	O-ring - NBR 80	14 x 1.78 (1 pc.)	
	Back-up ring	14.73 x 17.43 x 1.14 (1 pc.)	
Screw-in cartridge ROE3	O-ring - Viton	19.4 x 2.1 (1 pc.)	404-9002
	O-ring - Viton	14 x 1.78 (1 pc.)	
	Back-up ring	14.73 x 17.43 x 1.14 (1 pc.)	
Subplate size 04	Square ring - NBR 70	7.65 x 1.68 (4 pcs.)	405-9004
Subplate size 06	Square ring - NBR 70	9.25 x 1.68 (4 pcs.)	404-9003
Subplate size 04	O-ring - Viton	7.65 x 1.68 (4 pcs.)	405-9005

Preferred Types of Valves

Type	Ordering Number	Type	Ordering Number
ROE3-042S2/01200E1	405-0526	ROE3-042S5/01200E1	406-0020
ROE3-042S2/02400E1	405-0506	ROE3-042S5/02400E1	406-0021
ROE3-042S2/23050E5	405-0544	ROE-042S5/23050E5	406-0012
ROE3-062S2/01200E1	404-1042	ROE3-042S6/01200E1	406-0040
ROE3-062S2/02400E1	404-1043	ROE3-042S6/02400E1	406-0041
ROE3-062S2/23050E5	404-1118	ROE3-042S6/23050E5	406-0121
R2-ROE3	405-6015		

Caution!

- The packing foil is recyclable.
- The protecting plate can be returned to the manufacturer.
- Mounting studs must be ordered separately. Tightening torques are 5 Nm (size 04) and 8.9 Nm (size 06).
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law.

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www.argo-hytos.com

4/2- and 4/3- way directional control valves pilot operated

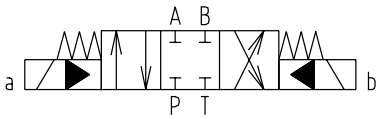
RPEH4-16

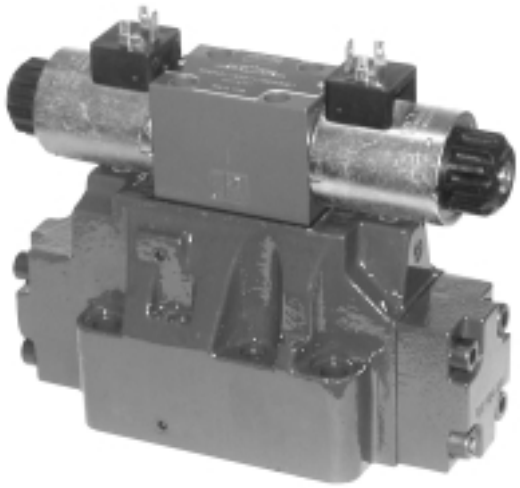
Size 16 • p_{max} up to 320 bar • Q_{max} up to 300 L/min

HA 4023
2/2003

Replaces
HA 4023 2/2002

- ❑ **Solenoid pilot operated directional valves (RPEH)**
- ❑ **Hydraulic pilot operated directional valves (RPH)**
- ❑ **Small energy input**
- ❑ **Wet pin core tubes**
- ❑ **Manual overrides optional (only for RPEH)**
- ❑ **Installation dimensions to DIN 24 340, ISO 4401 and CETOP - RP 121H**

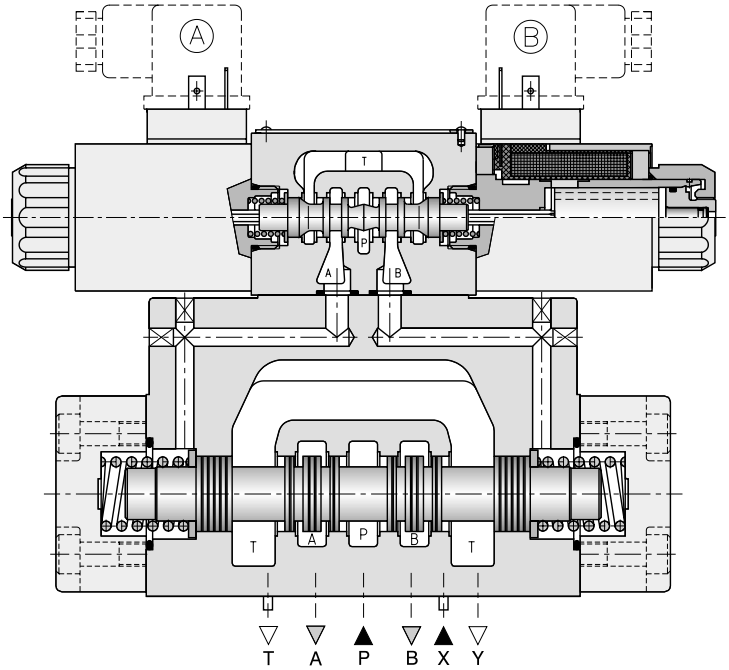




Functional Description

The RPEH solenoid operated - hydropiloted valves are consisting of an RPE3-06 type solenoid operated directional control valve (see data sheet HA 4010) that operates a 4-way hydropiloted control valve with a connection surface in accordance with the CETOP standards. They are available in various configurations and spool types.
The pilot and the drain connections can be made internal or external by inserting or removing the accordant threaded plugs located in the main directional control valve.

A wide range of configurations and different solenoid operated - hydropiloted directional control valve spool positions are available:
– 4-way, 3-position directional control valve, with two solenoids; positioning of the spool in center position is obtained with centering springs.
– 4-way, 2-position directional valve, with one solenoid and one return spring or two solenoids and detent of the spool position.
The basic surface treatment of the valve housing is phosphate coated and the solenoids are zinc coated.



Ordering Code

RP ☐ **4-16** ☐ ☐ / ☐ ☐ ☐ / ☐ /**13-** ☐ ☐ ☐ / ☐

Directional control valve, pilot operated

Type of control
electrohydraulically operated **EH**
hydraulically operated **H**

Design series

Valve size

Number of operating positions
two positions **2**
three positions **3**

Functional symbols
see the table functional symbols

Controls
if not required omit
main spool shifting speed control **D**
shifting speed control, with orifice (0.8 mm) in port P of solenoid pilot valve **PF**

Piloting
if not required omit
external piloting (see note herebelow) **E**

Seals
omit NBR
V FPM (Viton)

Manual overide
omit standard
N1 covered with retaining nut
N2 covered with rubber boot

Type of solenoid coil
E1 with DIN connector socket
E2 with DIN connector socket and quenching diode
E5 with integrated rectifier and DIN connector socket

Rated supply voltage of solenoids *
(at the coil terminals)

01200	12 V DC / 2.72 A
02400	24 V DC / 1.29 A
12060	120 V AC / 0.35 A / 50 (60) Hz
23050	230 V AC / 0.17 A / 50 (60) Hz

The AC coils correspond with E5 type.
* Other voltages per request.

Series number

Check valve incorporated in P-line
omit if not required
C3 with check valve (see page 7)

Drain
omit external drain which is recommended when the valve is used with back pressure on the outlet
I internal drain

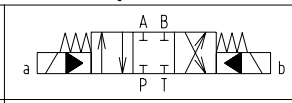
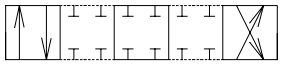
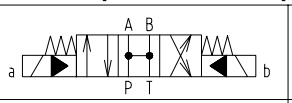
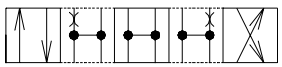
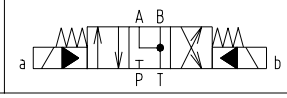
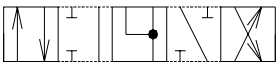
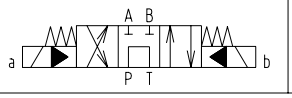
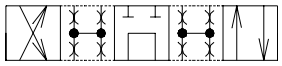
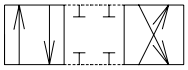
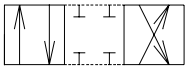
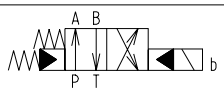
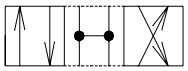
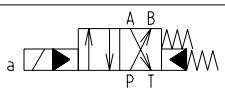
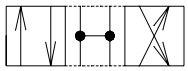
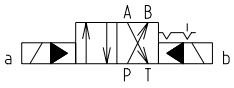
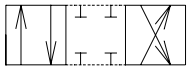
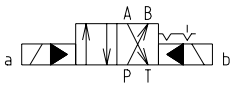
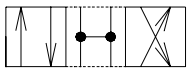
Note:
Piloting must always be external for valves with the H11 type pilot valve (available on request). Also valve must have external piloting for spools with P and T connected in the center position. Internal piloting is possible only with a C3 version valve (see page 7), or by installing a check valve with a setting of min. 5 bar on the outlet line. In this case the valve must have external drainage.
Piloting must always be external for valves with the **RPH** type hydraulic control valve (available on request).

Technical Data

Valve size	mm	16
Maximum flow rate from port P to A, B, T	L/min	300
Max. operating pressure ports P, A, B port T port T (external drain version)	bar	 320 210 250
Pressure drop	bar	see Pressure Drop Δp-Q
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP-RP 91H in viscosity classes ISO VG 32, 46 and 68.
Fluid temperature range for NBR seals	°C	-30 ... +80
Fluid temperature range for FPM seals	°C	-20 ... +80
Ambient temperature max.	°C	up to +50
Viscosity range	mm^2/s	20 ... 400
Maximum degree of fluid contamination		Class 21/18/15 to ISO 4406 (1999).
Weigt - RPEH4-162 - RPEH4-163	kg	8.5 9.1

Functional Symbols

Symbols are referred to the solenoid valve RPEH. For the hydraulic control version RPH please verify the connection scheme (see page 7).

Three positions with spring centering			**Three positions with spring centering**		
Z11			**H11**		
Y11			**C11**		
Two positions with return spring			**Two positions with return spring**		
R51			**X51**		
R52			**X52**		
Two positions with mechanical detent on pilot valve					
J17					
J27					

Besides the diagrams shown, which are the most frequently used, other special versions are available: consult our technical department for their identification, feasibility and operating limits.

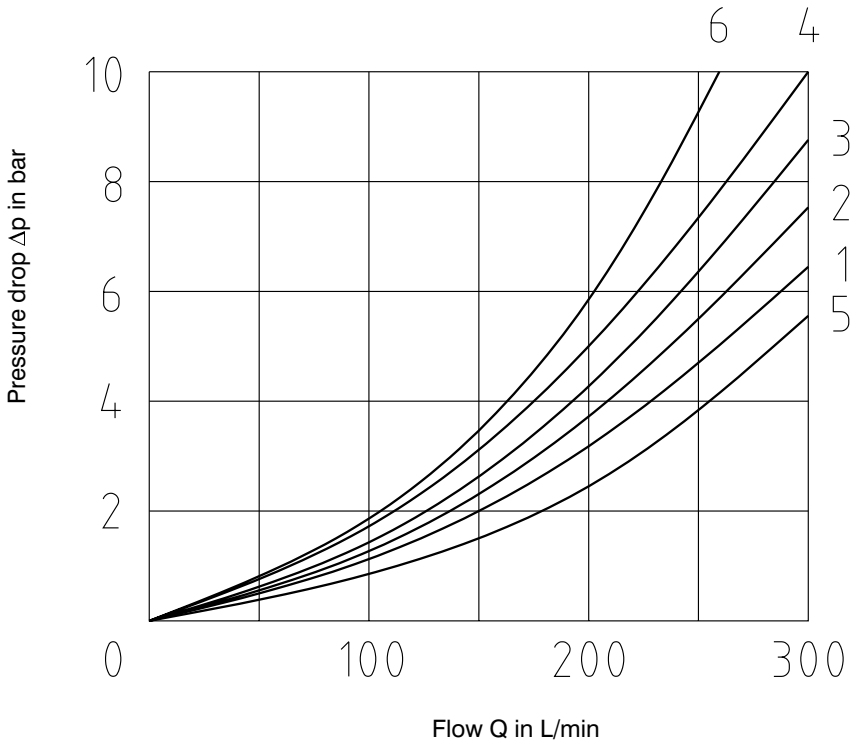
Performance Characteristic

Pressures in bar)	MIN.	MAX.
Pilot pressure	5	210
Pressure on line T with internal drainage	-	140
Pressure on line T with external drainage	-	250

Maximum flow rates in L/min	PRESSURES	
	210 bar	320 bar
Spool type C11	250	200
All other spools	300	250

Pressure Drop Δp-Q

Measured at $\nu = 35\ mm^2/s$ and $t = 50\ °C$



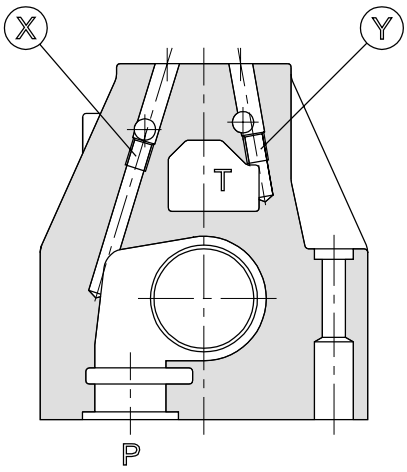
Spool type	Spool position	Connections				
		P - A	P - B	A - T	B - T	P - T
		Curves on graph				
Z11	Energized	1	1	2	3	
H11	De-energized Energized	5	5	1	2	6*
Y11	De-energized Energized	1	1	4• 1	4° 2	
C11	De-energized Energized	6	6	3	4	6
R51, R52, X51, X52	De-energized Energized	1	1	2	3	
J17, J27	Energized	1	1	2	3	

* A-B blocked • B blocked ° A blocked

Pilot and Drain

The RPEH valves are available with pilot and drain, both internal and external. The version with external drain allows for a higher back pressure on the outlet.

Type of valve		Plug assembly	
		X	Y
RPEH4-16/***	Internal pilot and external drain	NO	YES
RPEH4-16/*I**	Internal pilot and internal drain	NO	NO
RPEH4-16/*E**	External pilot and external drain	YES	YES
RPEH4-16/*EI**	External pilot and internal drain	YES	NO



X: plug M6 x 8 for external pilot
Y: plug M6 x 8 for external drain

Electrical Features

Solenoids
The operating solenoids are DC solenoids. For AC supply the solenoids are provided with rectifier which are integrated in the DIN connector socket as part of the solenoid. The connectors can be turned by 90°. By loosening the nut, the solenoids can be turned or replaced without interfering with any seals of the valve.In the case of solenoid malfunction or power failure, the spool of the valve can be shifted by manual override, provided the pressure in T-port does not exceed 25 bar.

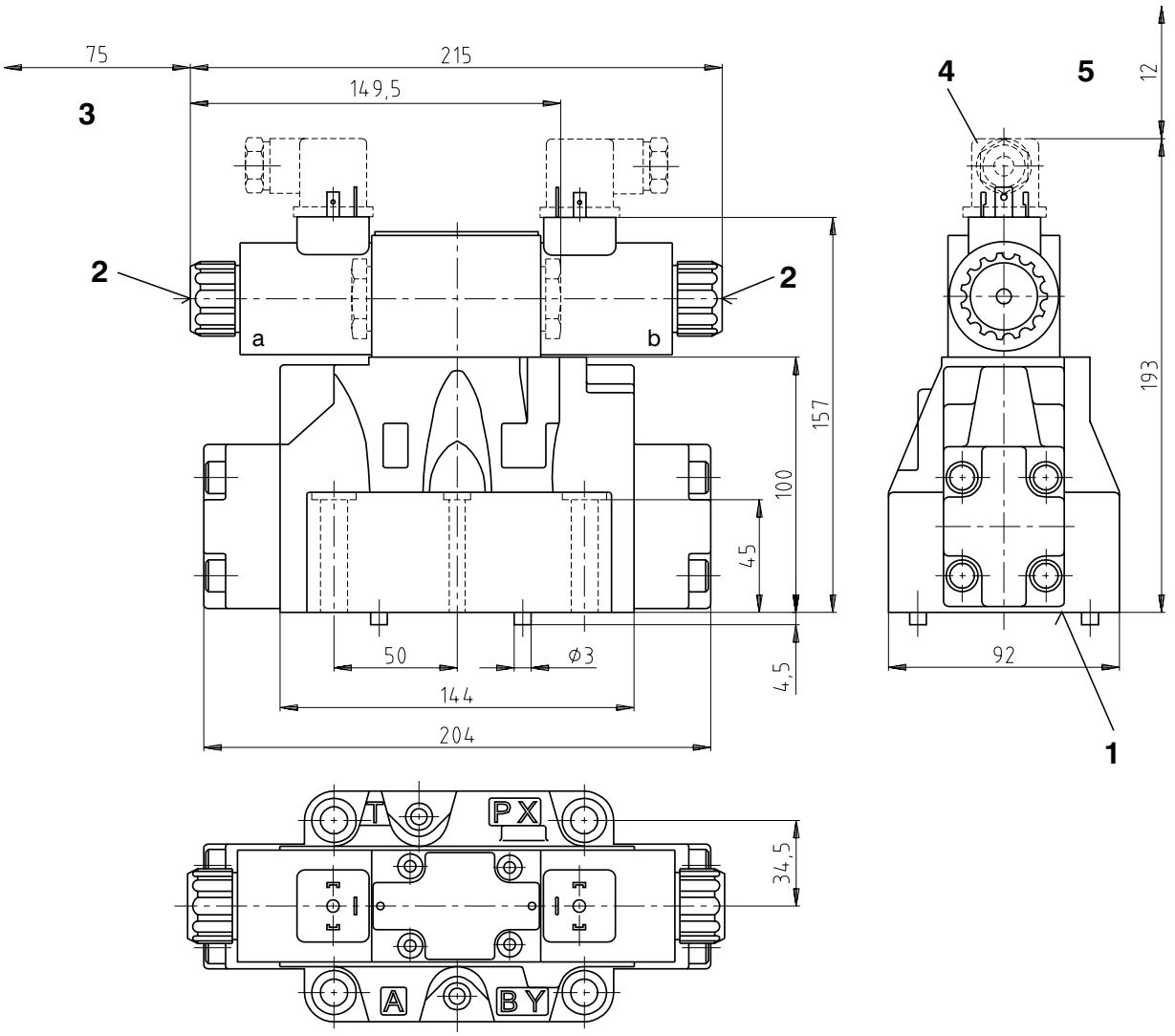
		DC solenoid	AC solenoid
Max. allowable voltage variation	%	-10 ... +6	±10
Max. switching frequency	1/h	10 000	
Switching times ±10 %, energizing (two position)	ms	70	60
Switching times ±10 %, de-energizing (two position)	ms	80	80
Switching times ±10 %, energizing (three position)	ms	50	80
Switching times ±10 %, de-energizing (three position)	ms	60	60
Duty cycle	%	100	
Service life	cycles	10^7	
Enclosure type to DIN 40 050		IP 65	

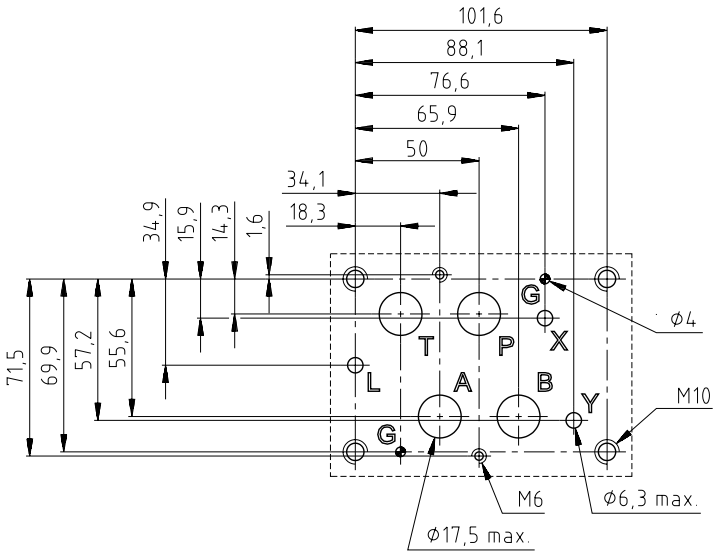
The values indicated refer to a solenoid valve operating with piloting pressure 100 bar, with mineral oil at a temperature of 50 °C, a viscosity of 35 mm^2/s and with PA and BT connections. The switch on times are obtained from the time the spool switches over. The switch off times are measured at the time pressure variation occurs in the line.

Valve Dimensions

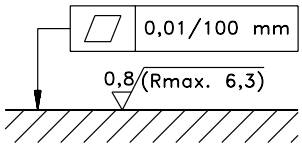
Dimensions in millimetres

RPEH4-162, RPEH4-163





1 Mounting surface with seal rings
2 Manual override
3 Space required to remove coil
4 Electrical connector
(must be ordered separately)
5 Space required to remove connector



Required surface finish of interface

Single valve fastening: 4 bolts M10 x 60
2 bolts M6 x 60

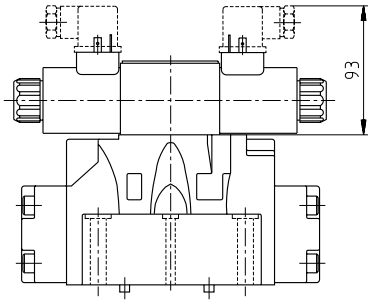
Bolt torque: M10 x 60: 40 Nm - bolts A 8.8
M6 x 60: 8 Nm - bolts A 8.8

Threads of mounting holes: M6 x 18; M10 x 18

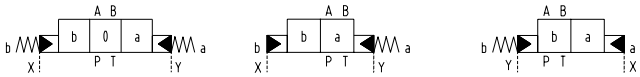
Seal rings: 4 O-rings type 22.22 x 2.62
2 O-rings type 10.82 x 1.78

Type of Command

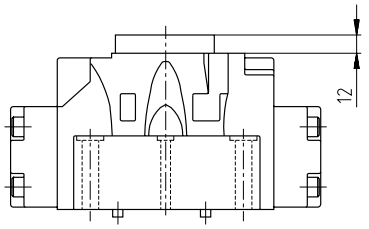
Solenoid control: RPEH
The valve is supplied with a pilot solenoid valve type RPE3-06.



Hydraulic control: RPH
The valve is supplied with a cross-connection cover-plate.
X and Y connections are used for the hydraulic control of the valve.

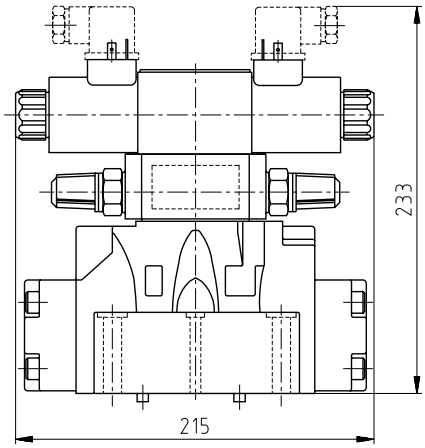


RPH4-163 RPH4-162 RPH4-162



Controls

Control of the main spool shifting speed: D
By placing a 2VS3-06 type double flow control valve between the pilot solenoid valve and the hydropiloted valve, the piloted flow rate can be controlled and therefore the shifting speed can be varied. Add the letter **D** to the identification code to request this device.



Manual Override

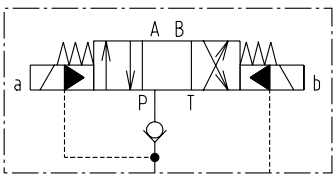
Whenever the solenoid valve installation may involve exposure to atmospheric agents or be used in tropical climates, the manual override, boot protection is recommended. Add the suffix **N1** or **N2** to request this device.

Electrical Connector

The solenoid valves are never supplied with connector. Connectors must be ordered separately.

Special Configurations C3

Check valve incorporated on line P: C3
Valve RPEH is available upon request with check valve incorporated on line P. This is particularly useful to obtain the necessary piloting pressure when the main control valve, in the rest position, has line P connected to the T outlet. The cracking pressure is 5 bar. Add **C3** to the identification code for this request.



Installation

Configurations with centering and recall springs can be mounted in any position; type J17, J27 valves - without springs and with mechanical retention must be mounted with the longitudinal axis horizontal. Valve fastening takes place by means of screws or tie rods, placing the valve on a flat surface, with values of planarity and smoothness that are equal to or better than those indicated in the drawing. If the minimum values of planarity or smoothness are not met, fluid leakages between valve and mounting surface can easily occur.

Spare parts

Seal kit

Design		Dimensions, number			Ordering number
		O-ring	Square ring	Back-up ring	
Head valve size 16	Standard - NBR	22.22 x 2.62 (4 pcs.)	-	-	487-9901
		10.82 x 1.78 (2 pcs.)			
		31.42 x 2.62 (2 pcs.)			
	Viton	22.22 x 2.62 (4 pcs.)			487-9902
		10.82 x 1.78 (2 pcs.)			
		31.42 x 2.62 (2 pcs.)			
Throttle valve 2VS3-06-CS type number 525-0023	Standard - NBR	18 x 2.65 (2 pcs.)	9.25 x 1.68 (4 pcs.)	6.73 x 9.43 x 1.14 (2 pcs.)	525-9900
		6.9 x 1.8 (2 pcs.)	-	17.83 x 22.19 x 1.14 (2 pcs.)	
	Viton	17.12 x 2.62 (2 pcs.)		9.43 x 6.73 x 1.14 (2 pcs.)	525-9940
		9.25 x 1.78 (4 pcs.)		17.83 x 22.19 x 1.14 (2 pcs.)	
		6.75 x 1.78 (2 pcs.)		-	
Control valve	see data sheet ARGO-HYTOS - RPE3-06				

Mounting bolt

	Dimensions, number		Tightening torque	Ordering number
Fixation of extension of valve	Bolt M5 x 45	DIN 912-10.9 (4pcs.)	8.9 Nm	484-9958
	Bolt M5 x 98 - 8G	(4 pcs.)		760-0072
	Nut M5			

Other

	Design	
Cover plate	PA, BT	525-0084
	PB, TA	525-0079

Caution!

- Service valve without range stated parameter consultation with manufacturer.
- Detaile information at control vavle - see data sheet RPE3-06, HA 4010
- The packing foil is recyclable.
- The technical information regarding the product presented in this data sheet is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law.

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www.argo-hytos.com

4/2- and 4/3- way directional control valves pilot operated

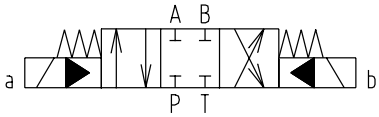
RPEH4-25

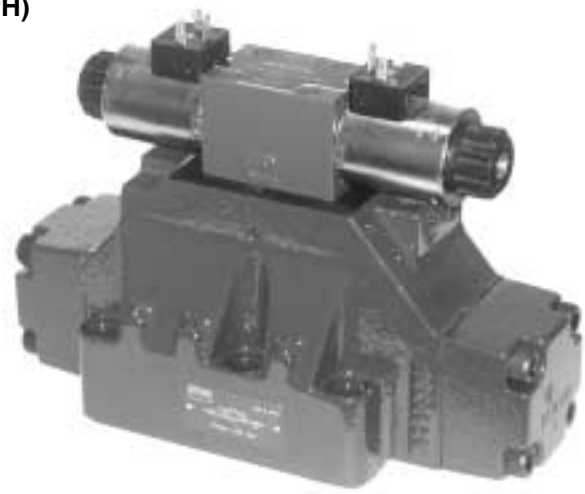
Size 25 • p_{max} up to 320 bar • Q_{max} up to 600 L/min

HA 4024
2/2003

Replaces
HA 4024 2/2002

- ❑ **Solenoid pilot operated directional valves (RPEH)**
- ❑ **Hydraulic pilot operated directional valves (RPH)**
- ❑ **Small energy input**
- ❑ **Wet pin core tubes**
- ❑ **Manual overrides optional (only for RPEH)**
- ❑ **Installation dimensions to DIN 24 340, ISO 4401 and CETOP - RP 121H**

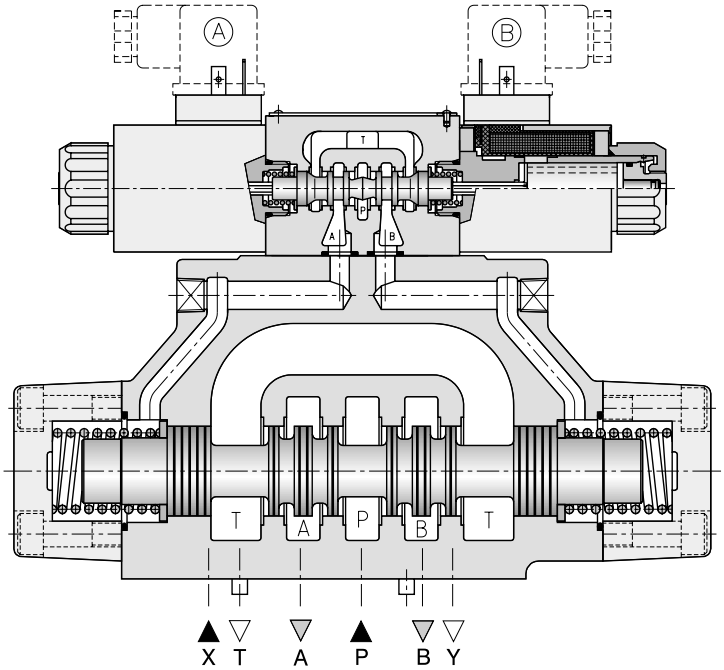




Functional Description

The RPEH solenoid operated - hydropiloted valves are consisting of an RPE3-06 type solenoid operated directional control valve (see data sheet HA 4010) that operates a 4-way hydropiloted control valve with a connection surface in accordance with the CETOP standards. They are available in various configurations and spool types.
The pilot and the drain connections can be made internal or external by inserting or removing the accordant threaded plugs located in the main directional control valve.

A wide range of configurations and different solenoid operated - hydropiloted directional control valve spool positions are available:
– 4-way, 3-position directional control valve, with two solenoids; positioning of the spool in center position is obtained with centering springs.
– 4-way, 2-position directional valve, with one solenoid and one return spring or two solenoids and detent of the spool position.
The basic surface treatment of the valve housing is phosphate coated and the solenoids are zinc coated.



Ordering Code

RP ☐ **4-25** ☐ ☐ / ☐ ☐ ☐ / ☐ **/33-** ☐ ☐ ☐ / ☐

Directional control valve, pilot operated

Type of control
electrohydraulically operated **EH**
hydraulically operated **H**

Design series

Valve size

Number of operating positions
two positions **2**
three positions **3**

Functional symbols
see the table Functional Symbols

Controls
if not required omit
main spool shifting speed control **D**
shifting speed control, with orifice (0.8 mm) in port P of solenoid pilot valve **PF**

Piloting
if not required omit
external piloting (see note herebelow) **E**

Seals
omit NBR
V FPM (Viton)

Manual overide
omit standard
N1 covered with retaining nut
N2 covered with rubber boot

Type of solenoid coil
E1 with DIN connector socket
E2 with DIN connector socket and quenching diode
E5 with integrated rectifier and DIN connector socket

Rated supply voltage of solenoids *
(at the coil terminals)

01200	12 V DC / 2.72 A
02400	24 V DC / 1.29 A
12060	120 V AC / 0.35 A / 50 (60) Hz
23050	230 V AC / 0.17 A / 50 (60) Hz

The AC coils correspond with E5 type.
* Other voltages per request.

Series number

Check valve incorporated on P-line
omit if not required
C3 with check valve (see page 7)

Drain
omit external drain which is recommended when the valve is used with back pressure on the outlet
I internal drain

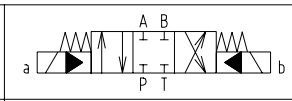
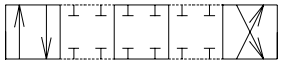
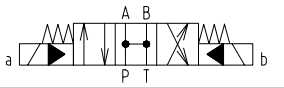
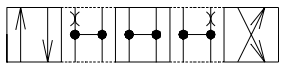
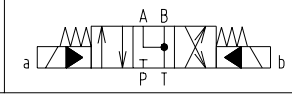
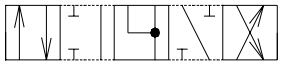
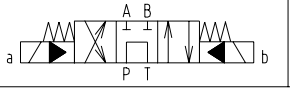
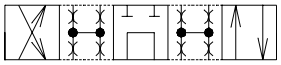
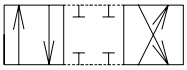
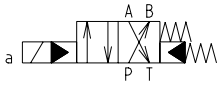
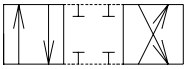
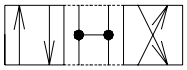
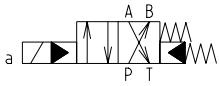
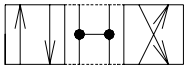
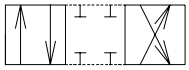
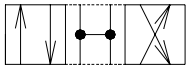
Note:
Piloting must always be external for valves with the H11 type pilot valve (available on request). Also valve must have external piloting for spools with P and T connected in the center position. Internal piloting is possible only with a C3 version valve (see page 7), or by installing a check valve with a setting of min. 5 bar on the outlet line. In this case the valve must have external drainage.
Piloting must always be external for valves with the **RPH** type hydraulic control valve (available on request).

Technical Data

Valve size	mm	25
Maximum flow rate from port P to A, B, T	L/min	600
Max. operating pressure ports P, A, B port T port T (external drain version)	bar	 320 210 250
Pressure drop	bar	see Pressure Drop Δp-Q
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP-RP 91H in viscosity classes ISO VG 32, 46 and 68.
Fluid temperature range for NBR seals	°C	-30 ... +80
Fluid temperature range for FPM seals	°C	-20 ... +80
Ambient temperature max.	°C	up to +50
Viscosity range	mm^2/s	20 ... 400
Maximum degree of fluid contamination		Class 21/18/15 to ISO 4406 (1999).
Weigt - RPEH4-252 - RPEH4-253	kg	15 15.6

Functional Symbols

Symbols are referred to the solenoid valve RPEH. For the hydraulic control version RPH please verify the connection scheme (see page 7).

Three positions with spring centering			**Three positions with spring centering**		
Z11			**H11**		
Y11			**C11**		
Two positions with return spring			**Two positions with return spring**		
R51			**X51**		
R52			**X52**		
Two positions with mechanical detent on pilot valve					
J17					
J27					

Besides the diagrams shown, which are the most frequently used, other special versions are available: consult our technical department for their identification, feasibility and operating limits.

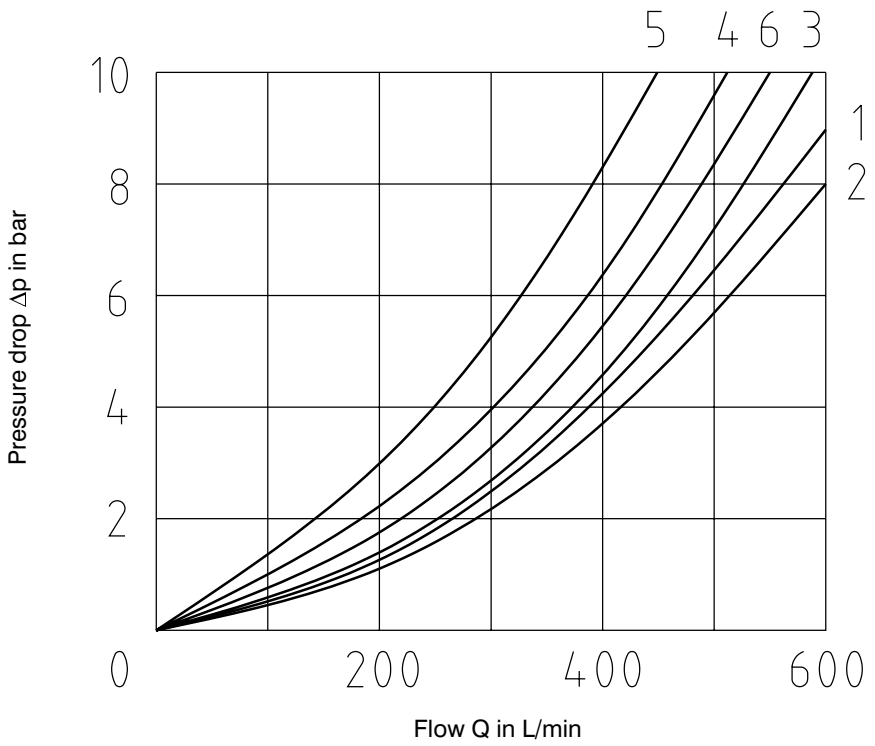
Performance Characteristic

Pressures in bar	MIN.	MAX.
Pilot pressure	5	210
Pressure on line T with internal drain	-	140
Pressure on line T with external drain	-	250

Maximum flow rates in L/min	PRESSURES	
	210 bar	320 bar
Spool type C11	500	450
All other spools	600	500

Pressure Drop Δp-Q

Measured at $\nu = 35\ mm^2/s$ and $t = 50\ °C$



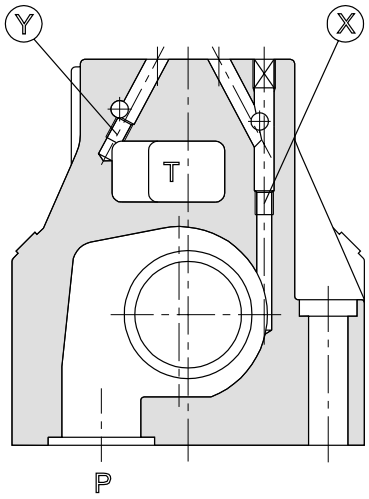
Spool type	Spool position	Connections				
		P - A	P - B	A - T	B - T	P - T
		Curves on graph				
Z11	Energized	1	1	2	3	
H11	De-energized Energized	2	2	1	2	6*
Y11	De-energized Energized	1	1	4• 1	4° 2	
C11	De-energized Energized	6	6	3	4	5
R51, R52, X51, X52,	De-energized Energized	1	1	2	3	
J17, J27	Energized	1	1	2	3	

* A-B blocked • B blocked ° A blocked

Pilot and Drain

The RPEH valves are available with pilot and drain, both internal and external. The version with external drain allows for a higher back pressure on the outlet.

Type of valve		Plug assembly	
		X	Y
RPEH4-25/***	Internal pilot and external drain	NO*	YES
RPEH4-25/*I**	Internal pilot and internal drain	NO*	NO
RPEH4-25/*E**	External pilot and external drain	YES	YES
RPEH4-25/*EI**	External pilot and internal drain	YES	NO



* Plug **Y** must always be present, version C3.

X: plug M6 x 8 for external pilot
Y: plug M6 x 8 for external drain

Electrical Features

Solenoids
The operating solenoids are DC solenoids. For AC supply the solenoids are provided with rectifier which are integrated in the DIN connector socket as part of the solenoid. The connectors can be turned by 90°. By loosening the nut, the solenoids can be turned or replaced without interfering with any seals of the valve.
In the case of solenoid malfunction or power failure, the spool of the valve can be shifted by manual override, provided the pressure in T-port does not exceed 25 bar.

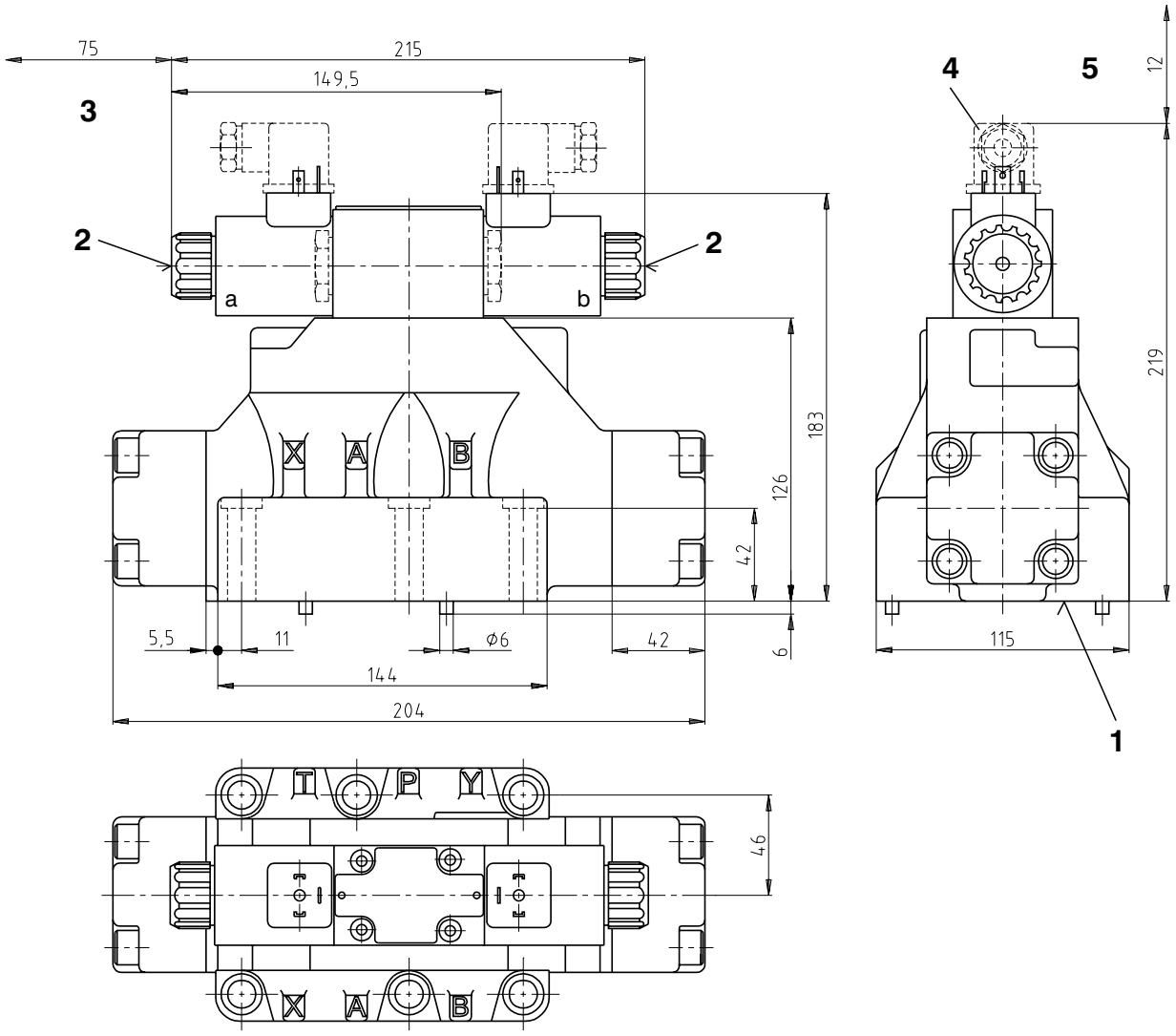
		DC solenoid	AC solenoid
Max. allowable voltage variation	%	-10 ... +6	±10
Max. switching frequency	1/h	8 000	
Switching times ±10 %, energizing (two position)	ms	75	60
Switching times ±10 %, de-energizing (two position)	ms	90	90
Switching times ±10 %, energizing (three position)	ms	55	45
Switching times ±10 %, de-energizing (three position)	ms	60	60
Duty cycle	%	100	
Service life	cycles	10^7	
Enclosure type to DIN 40 050		IP 65	

The values indicated refer to a solenoid valve operating with piloting pressure 100 bar, with mineral oil at a temperature of 50 °C, a viscosity of 35 mm^2/s and with PA and BT connections. The switch on times are obtained from the time the spool switches over. The switch off times are measured at the time pressure variation occurs in the line.

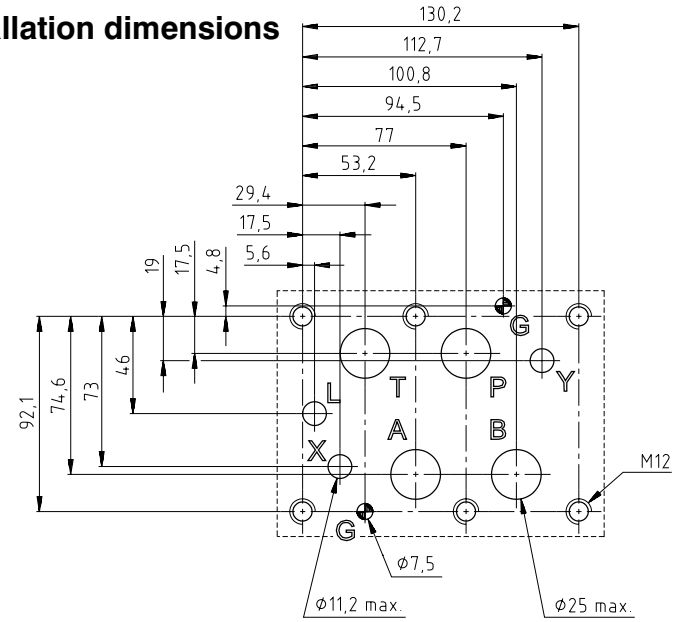
Valve Dimensions

Dimensions in millimetres

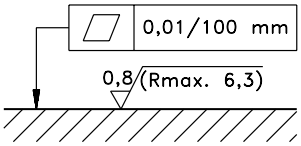
RPEH4-252, RPEH4-253



Installation dimensions



1 Mounting surface with seal rings
2 Manual override
3 Space required to remove coil
4 Electrical connector
(must be ordered separately)
5 Space required to remove connector

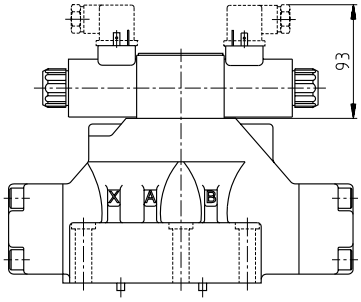


Required surface finish of interface

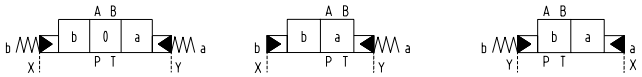
Single valve fastening: 6 bolts M12 x 60
Bolt torque: 69 Nm - bolts A 8.8
Threads of mounting holes: M12 x 20
Seal rings: 4 O-rings 29.82 x 2.62 2 O-rings 20.29 x 2.62

Type of Command

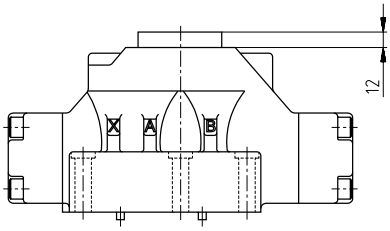
Solenoid control: RPEH
The valve is supplied with a pilot solenoid valve type RPE3-06.



Hydraulic control: RPH
The valve is supplied with a cross-connection cover-plate.
X and Y connections are used for the hydraulic control of the valve.

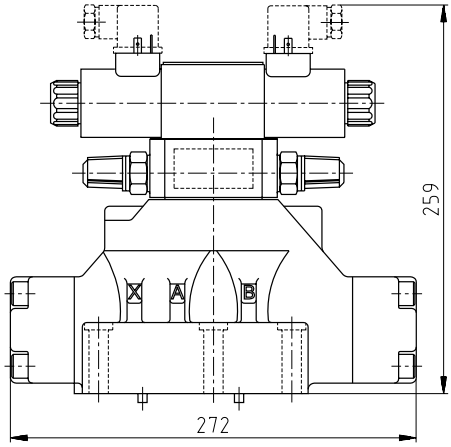


RPH4-253 RPH4-252 RPH4-252



Controls

Control of the main spool shifting speed: D
By placing a 2VS3-06 type double flow control valve between the pilot solenoid valve and the hydropiloted valve, the piloted flow rate can be controlled and therefore the shifting speed can be varied. Add the letter **D** to the identification code to request this device.



Manual Override

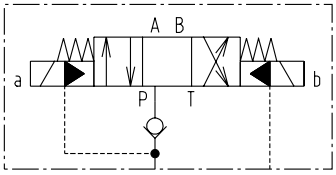
Whenever the solenoid valve installation may involve exposure to atmospheric agents or be used in tropical climates, the manual override, boot protection is recommended. Add the suffix **N1**or **N2** to request this device.

Electrical Connector

The solenoid valves are never supplied with connector. Connectors must be ordered separately.

Special Configurations C3

Check valve incorporated on line P: C3
Valve RPEH is available upon request with check valve incorporated on line P. This is particularly useful to obtain the necessary piloting pressure when the main control valve, in the rest position, has line P connected to the T outlet. The cracking pressure is 5 bar. Add **C3** to the identification code for this request.
C3 version is available only with internal pilot.



Installation

Configurations with centering and recall springs can be mounted in any position; type J17, J27 valves - without springs and with mechanical retention must be mounted with the longitudinal axis horizontal. Valve fastening takes place by means of screws or tie rods, placing the valve on a flat surface, with values of planarity and smoothness that are equal to or better than those indicated in the drawing. If the minimum values of planarity or smoothness are not met, fluid leakages between valve and mounting surface can easily occur.

Spare parts

Seal kit

Design		Dimensions, number			Ordering number
		O-ring	Square ring	Back-up ring	
Head vavle size 25	Standard - NBR	29.82 x 2.62 (4 pcs.)	-	-	488-9901
		20.29 x 2.62 (2 pcs.)			
		40.94 x 2.62 (2 pcs.)			
		34.59 x 2.62* (1 pc.)			
	Viton	29.82 x 2.62 (4 pcs.)			488-9902
		20.29 x 2.62 (2 pcs.)			
		40.94 x 2.62 (2 pcs.)			
		34.59 x 2.62* (1 pc.)			
Throttle valve 2VS3-06-CS type number 525-0023	Standard - NBR	18 x 2.65 (2 pcs.)	9.25 x 1.68 (4 pcs.)	6.73 x 9.43 x 1.14 (2 pcs.)	525-9900
		6.9 x 1.8 (2 pcs.)	-	17.83 x 22.19 x 1.14 (2 pcs.)	
	Viton	17.12 x 2.62 (2 pcs.)		9.43 x 6.73 x 1.14 (2 pcs.)	525-9940
		9.25 x 1.78 (4 pcs.)		17.83 x 22.19 x 1.14 (2 pcs.)	
		6.75 x 1.78 (2 pcs.)		-	
Control valve	see data sheet ARGO-HYTOS - RPE3-06				

Mounting bolt

	Dimensions, number		Tightening torque	Ordering number
Fixation of extension of valve	Bolt M5 x 45	DIN 912-10.9 (4 pcs.)	8.9 Nm	484-9958
	Bolt M5 x 98 - 8G	(4 pcs.)		760-0072
	Nut M5			

Other

	Design	
Cover plate	PA, BT	525-0084
	PB, TA	525-0079

Caution!

- Service valve without range stated parameter consultation with manufacturer.
- Detaile information at control vavle - see data sheet RPE3-06, HA 4010
- The packing foil is recyclable.
- The technical information regarding the product presented in this data sheet is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law.

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www.argo-hytos.com

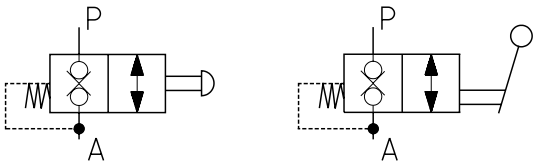
2-way poppet type valves manually operated

ROR3-062

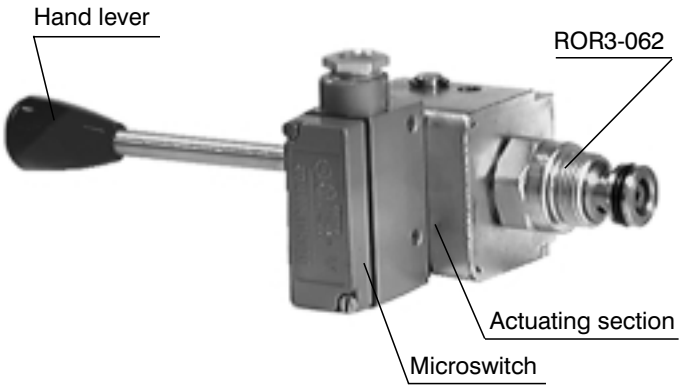
Size 06 • p_{max} up to 320 bar • Q_{max} up to 35 L/min

HA 4025
3/2001

Replaces
HA 4025 6/2000

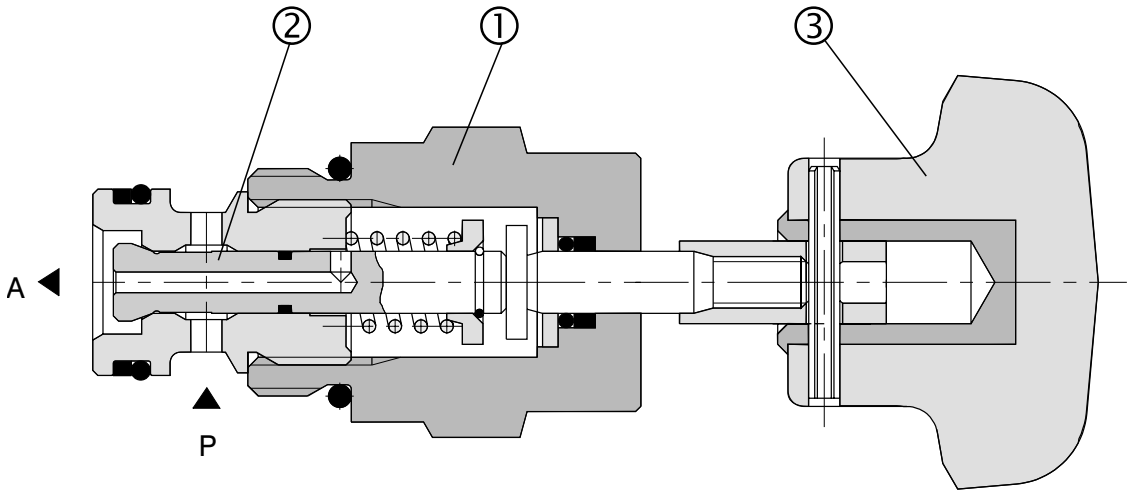


- **Poppet design - leakfree closure**
- **Simple design**
- **4 models**



Functional Description

2-way poppet type valves manually operated are designed to check and open the flow of the hydraulic fluid. Additionally, they can also provide flow throttling.
The valve consists of the housing (1), the poppet (2) and the actuating section (3).
Opening and closing of the valve is handled by a poppet. The poppet is pushed onto the seat by a spring, thus providing leakfree closure of the valve. The poppet can be operated by a mechanical stop device, a push hand knob or a hand lever. The model with the hand knob (3) has 2 operating positions. After releasing the hand knob, the spring returns the valve into its closed position. The model with a hand lever in fact also has only two operating positions, but the hand lever can be set to 3 positions. These are as follows:
Position **0** , middle hand lever position - the valve is closed by means of the return spring.
Position **I.** opens the valve against the return spring.
Position **II.** actuates a contact (with the model with micro switch), e.g. in order to turn on the pump motor by means of a switching relay. With the model without microswitch, this position also exists, but it does not have any function.
Caution! The advantageous flow direction is P → A because of smaller operating forces.
The basic surface treatment of the valve is zinc coating.



Ordering Code

ROR3-062- ☐ - ☐ ☐

2-way poppet type valves manually operated

Design

Nominal size

Number of operating positions

Seals
without designation Standard (NBR)
V Viton (FPM)

Model
1 with mechanical stop device
2 with hand knob
3 with hand lever without microswitch
4 with hand lever with microswitch

Mode of throttling
00 without throttling

Technical Data

Nominal size	mm	06
Maximum flow	L/min	35
Max. operating pressure	bar	320
Pressure drop	bar	see Δp characteristics
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP RP 91 H in viscosity classes ISO VG 32, 46 and 68
Fluid temperature range for standard sealing (NBR)	°C	-30 ... +80
Fluid temperature range for Viton sealing (FPM)	°C	-20 ... +80
Ambient temperature max.	°C	up to +50
Viscosity range	mm^2/s	20 ... 400
Maximum degree of fluid contamination		Class 21/18/15 according to ISO 4406 (1999).
Operating force on handle knob at flow direction (P → A)	N	150
Weight - model 1 model 2 model 3 model 4	kg	0.149 0.250 0.660 0.766
Mounting position		optional
Microswitch		B612 - 2 TH33
Microswitch data		2A - 250 V A.C. 0.1A - 250 V D.C.

Δp-Q Characteristics

Measured at $\nu = 35\ mm^2/s$ and $t = 40\ °C$

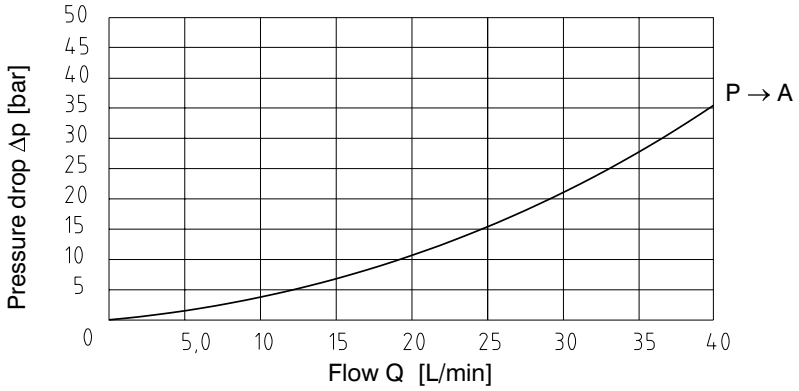
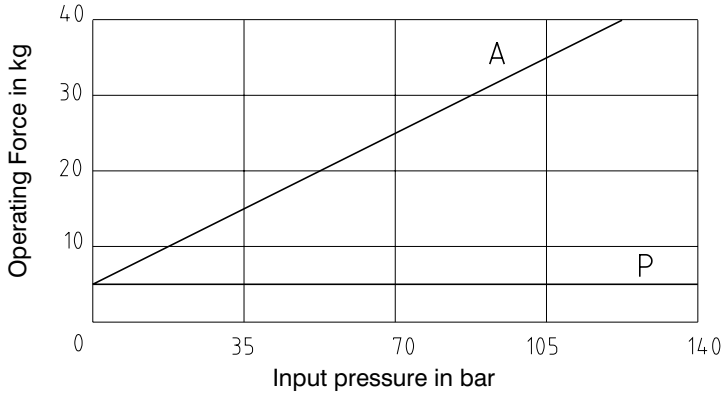


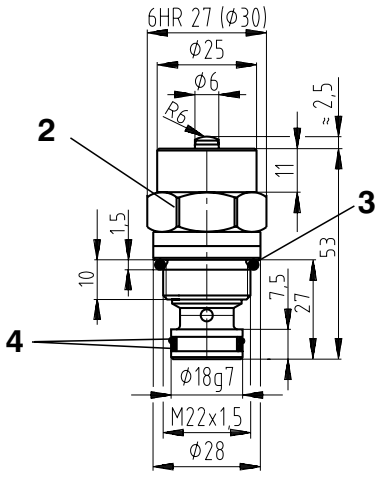
Diagram of Operating Force



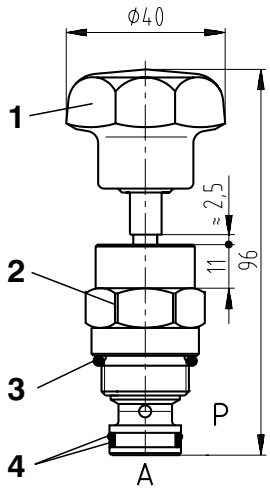
Valve Dimensions

Dimensions in millimeters

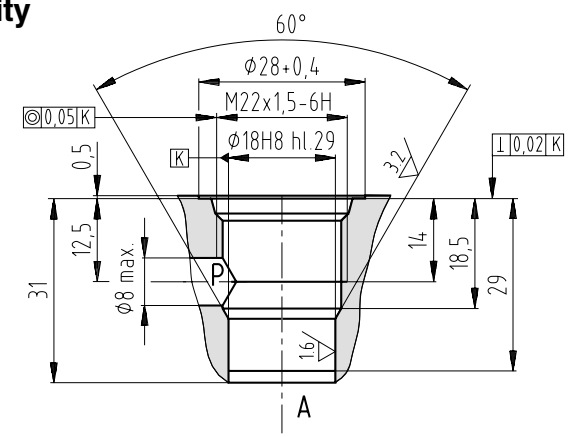
Type: ROR3-062-xx-1x



Type: ROR3-062-xx-2x



Installation Cavity



1 Push hand knob
2 Outside hexagon s=27 mm
Tightening torque 25 Nm
3 Seal: O-ring 19.4 x 2.1
(supplied with valve)
4 Seal:
O-ring 14 x 1.78
Back-up ring 14.73 x 17.43 x 1.14
(supplied with valve)

Spare Parts

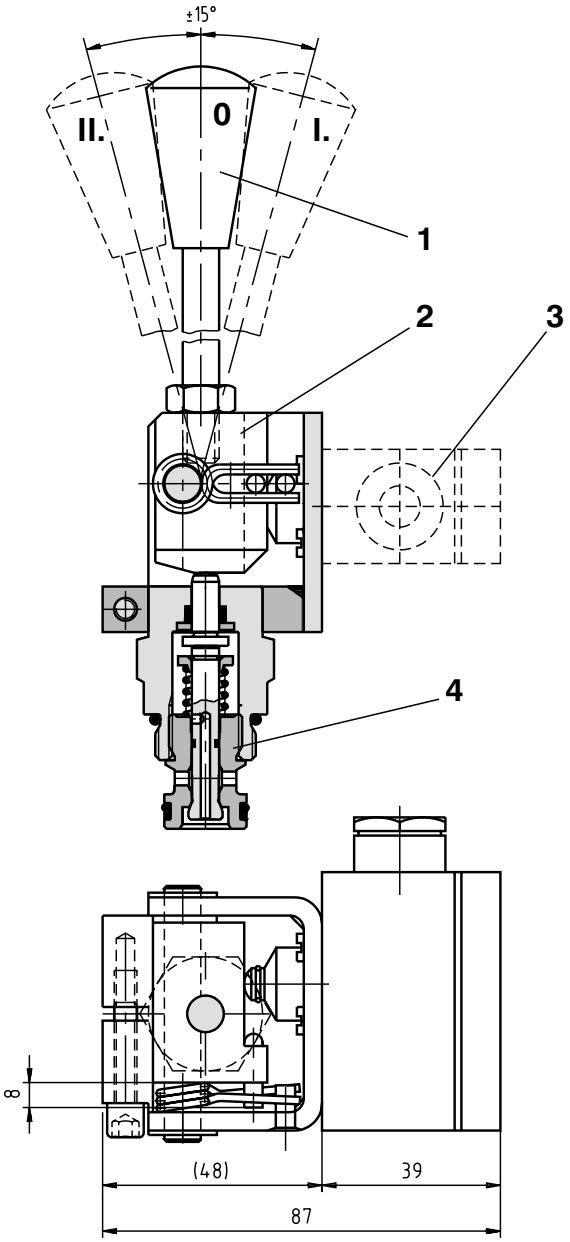
Seal kit

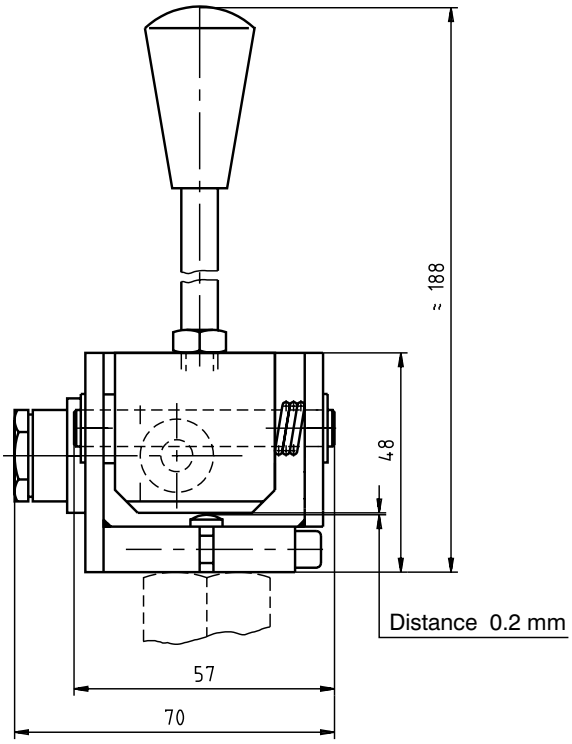
Type	Dimensions, quantity		Ordering number
	O-ring	Back-up ring	
Standard - NBR	14 x 1.78 NBR 90 (1 pc.)	BBP80B015-N9 14.73 x 17.43 x 1.14 (1 pc.)	531-0098
	5.6 x 1.8 NBR 70 (1 pc.)	BBP80B009-N9 5.94 x 8.64 x 1.14 (1 pc.)	
	19.4 x 2.1 NBR 80 (1 pc.)	-	
	4 x 1 NBR 70 (1 pc.)	-	
Viton	14 x 1.78 (1 pc.)	14.73 x 17.43 x 1.14 (1 pc.)	531-0099
	6.07 x 1.78 (1 pc.)	5.95 x 8.64 x 1.1 (1 pc.)	
	19.4 x 2.1 (1 pc.)	-	
	4 x 1 (1 pc.)	-	

Valve Dimensions

Dimensions in millimeters

Type: ROR3-062-xx-3x and ROR3-062-xx-4x





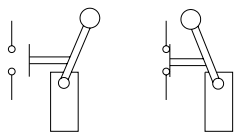
1 Hand lever
- **0** middle arrested position
- **I.** first position - opens the valve
- **II.** second position - closes the contact of the microswitch

2 Segment of the hand lever

3 Microswitch -only with ROR3-062-xx-4x

4 ROR3-062

Electric circuit



Position 0, I. Position II.

Caution!

- The packing foil is recyclable.
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law.

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ARGO HYTOS

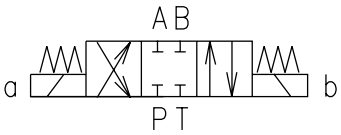
Directional control valves solenoid operated

RPEK1-03

Size 03 • p_{max} up to 250 bar • Q_{max} up to 20 L/min

HA 4027
2/2003

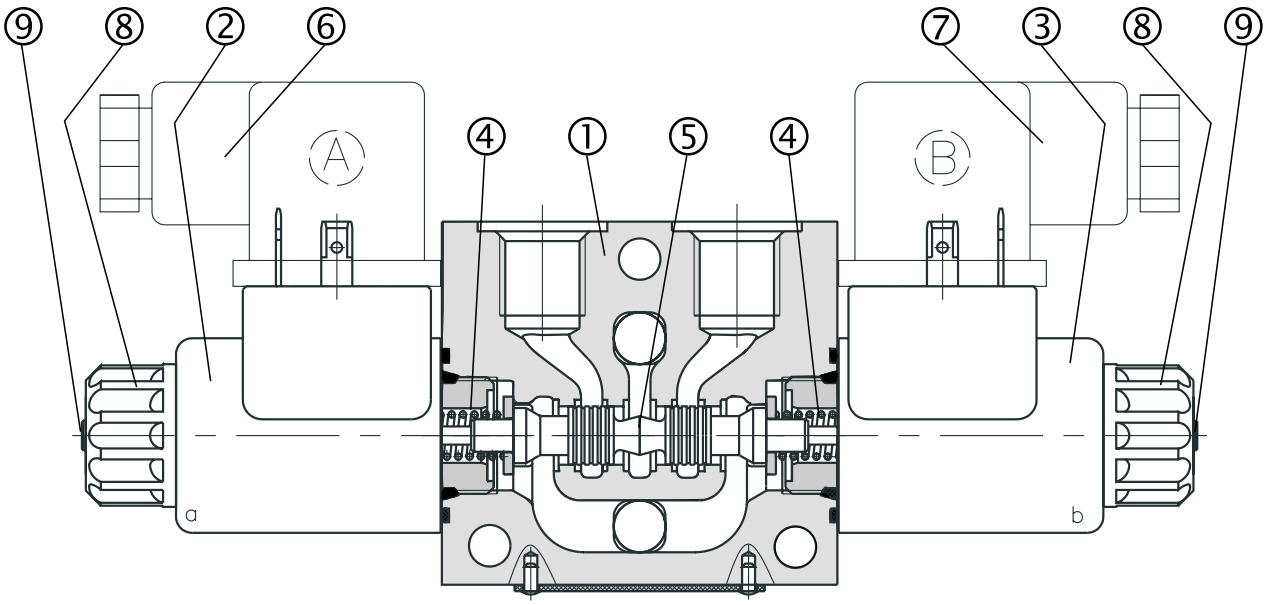
Replaces
HA 4027 10/2002



- **4/3-, 4/2 way directional control valves with solenoid control**
- **Solenoids can be turned around their axis to any position**
- **Push button manual override**

Functional Description

The RPEK1-03 directional control valves consist of cast iron housing (1), control spool (5) with two centering springs (4) and operating solenoids (2, 3).
The three-position directional valves are fitted with two solenoids and two springs. Two-position directional valves have either one solenoid and one return spring or two solenoids and a detent assembly.
The operating solenoids are DC solenoids supplied through connectors A, B (6, 7). For AC supply the solenoids are provided with rectifiers, which are integrated directly into the connectors A, B (6, 7) or inside the coil. By loosening the nut (8), the solenoid can be turned around its axis up to 360°.
In the case of solenoid malfunction or power failure, the spool of the valve can be repositioned by manual override (9), provided the pressure in the T-port does not exceed 363 PSI (25 bar).
The basic surface treatment of the valve housing (1) is phosphate coated and the solenoids (2, 3) are zinc coated.



Ordering Code

RPEK1-03 □ □ □ / □ □ □ □

Solenoid operated directional control valve

Nominal size

Type of connection
G1/4 **G**

Number of valve positions
two positions **2**
three positions **3**

Functional symbols
see the table functional symbols

Rated supply voltage of solenoids
(at the coil terminals)

12 V DC / 1,83 A	**01200**
24 V DC / 0,92 A	**02400**
*205 V DC / 0,08 A	**20500**

Other voltages per request

Seals
no designation NBR
V FPM (Viton)

Manual override
no designation standard

Type of solenoid coil
E1 with DIN connector

Note: Electrical connectors in DIN 43 650 have to be ordered separately. See page 10.

FOR PREFERRED TYPES SEE BOLD TYPING IN ORDERING CODE, FUNCTIONAL SYMBOLS AND TABLE OF PREFERRED TYPES ON PAGE 10

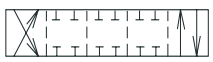
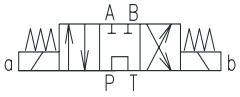
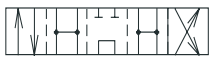
*Recommended solenoid coils used with elektrical connector with rectifiers - type designation K3, K4, see page 6.

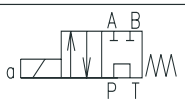
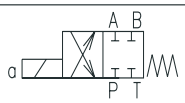
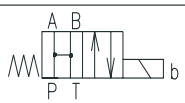
Rated supply source voltage (permissible rated voltage variation ± 10 %)	Type designation of the solenoid voltage
230 V AC / 0,08 A / 50 (60) Hz	20500

Technical Data

Nominal size	mm	03
Maximum flow	L/min	see p-Q characteristics
Maximum operating pressure at ports P, A, B	bar	250
Maximum operating pressure at port T	bar	210
Pressure drop	bar	see Δp-Q characteristics
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP - RP 91H in viscosity classes ISO VG 32, 46 and 68.
Fluid temperature range (NBR / FMP (Viton)	°C	-30 ... +80 / -20 ... +80
Ambient temperature, max.	°C	up to +50
Viscosity range	mm^2/s	20 ... 400
Maximum degree of fluid contamination		Class 21/18/15 to ISO 4406 (1999).
Maximum allowable voltage variation	%	AC: ± 10 DC: ± 10
Maximum switching frequency	1/h	15 000
Switching time, ON; at ν = 32 mm^2/s	ms	30 ... 50
Switching time, OFF; at ν = 32 mm^2/s	ms	AC: 70 ... 100 DC: 30 ... 50
Duty cycle	%	100
Service life	cycles	10^7
Enclosure type to DIN 40 050		IP 65
Weight - valve with 1 solenoid - valve with 2 solenoid	kg	0.90 1,05
Mounting position		optional

Functional Symbols

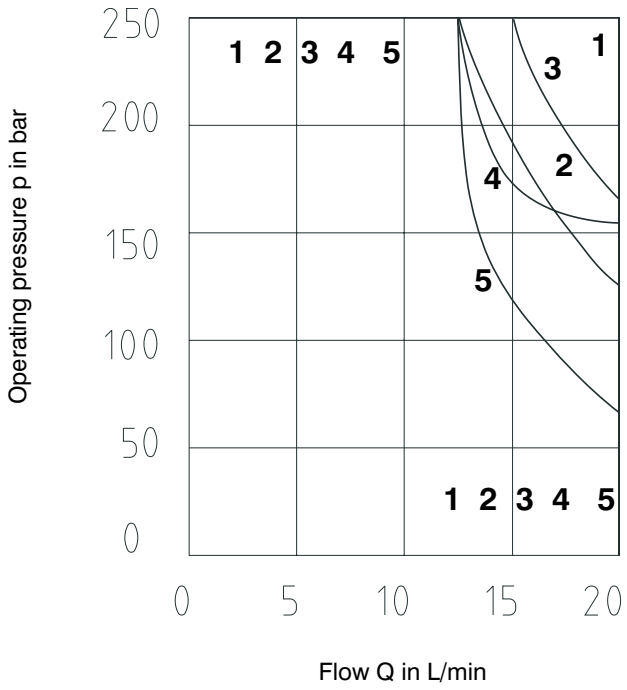
Designation	Symbol	Interposition
Z11		
C11		
H11		
Y11		
R11		

Designation	Symbol	Interposition
R21		
Y51		
C51		
Z51		
H11		

p-Q Characteristic

Measured at $\nu = 32\ mm^2/s$ and $t = 40\ °C$

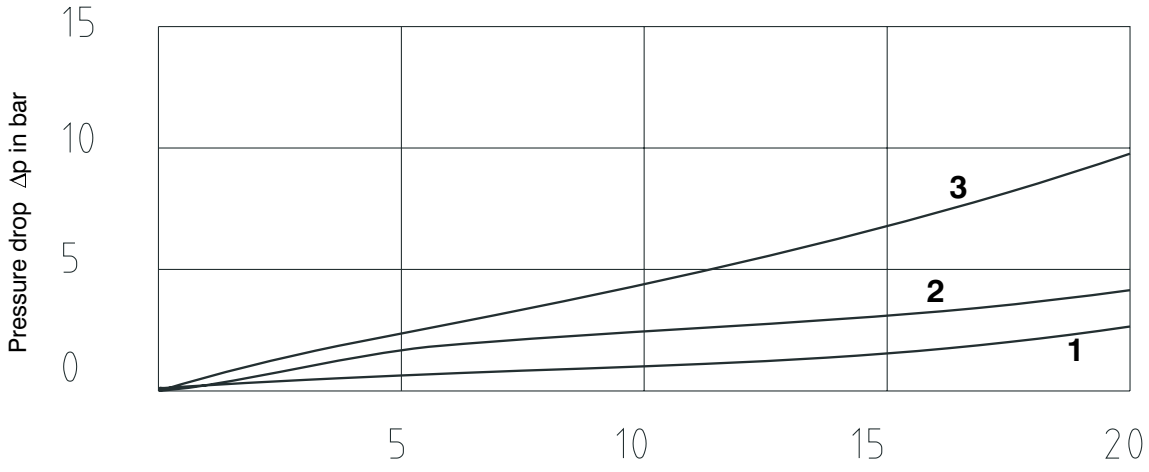
Operating limits for maximum hydraulic power transferred by the directional valve.



Z11	Z51	R11	R21	C11	C51	H11	Y11	Y51
1	1	1	5	2	2	3	4	4

Δp-Q Characteristic

Measured at $\nu = 32\ mm^2/s$ and $t = 40\ °C$

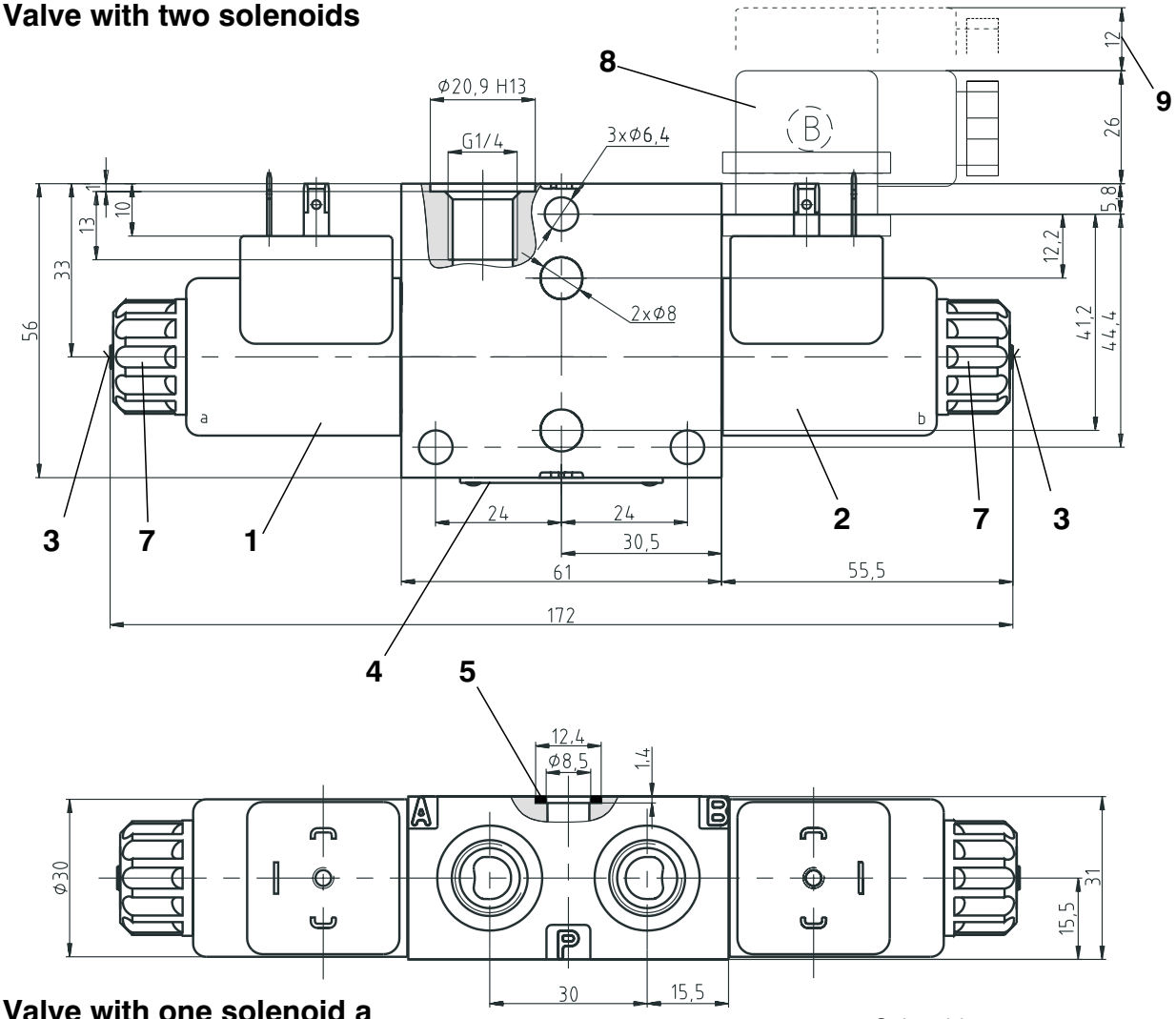


	Z11	C11	H11	Y11	R11	R21	Y51	C51	Z51
P-A	1	3	1	1	2	2		3	
P-B	1	3	1	1	2	2	1		1
A-T	1	3	1	1	2	2	1		1
B-T	1	3	1	1	2	2		3	
P-T		2	2					2	

Valve Dimensions

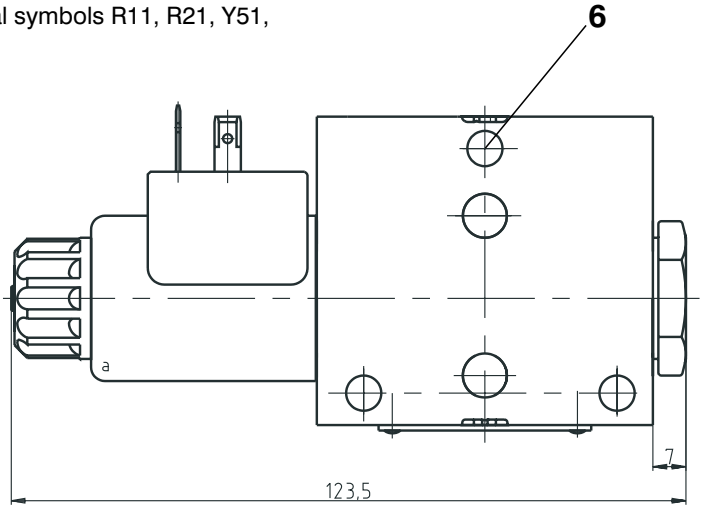
Dimensions in millimeters

Valve with two solenoids

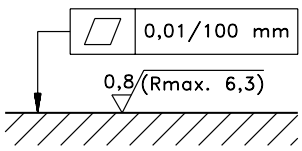


Valve with one solenoid a

Functional symbols R11, R21, Y51, C51, Z51



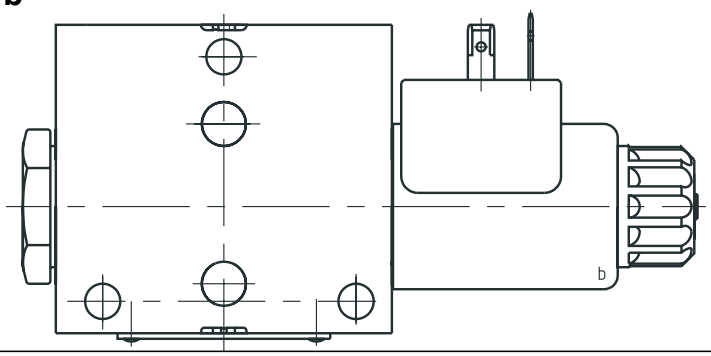
1 Solenoid a
2 Solenoid b
3 Manual override
4 Name plate
5 Square ring 9,25 x 1,68 (2 pcs.) supplied with valve
6 3 mounting holes
7 Retaining nut of the solenoid
8 Electrical connector, DIN 43 650
9 Space required to remove connector



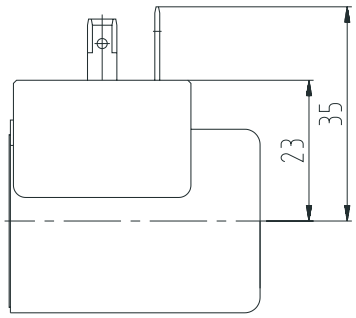
Required surface finish of interface

Valve with one solenoid b

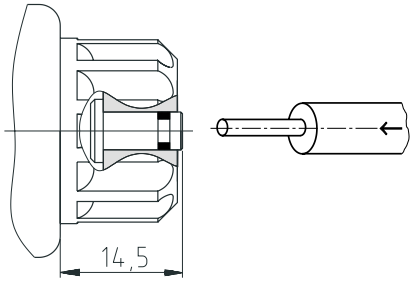
Functional symbols H11



Type of the Solenoid Coil

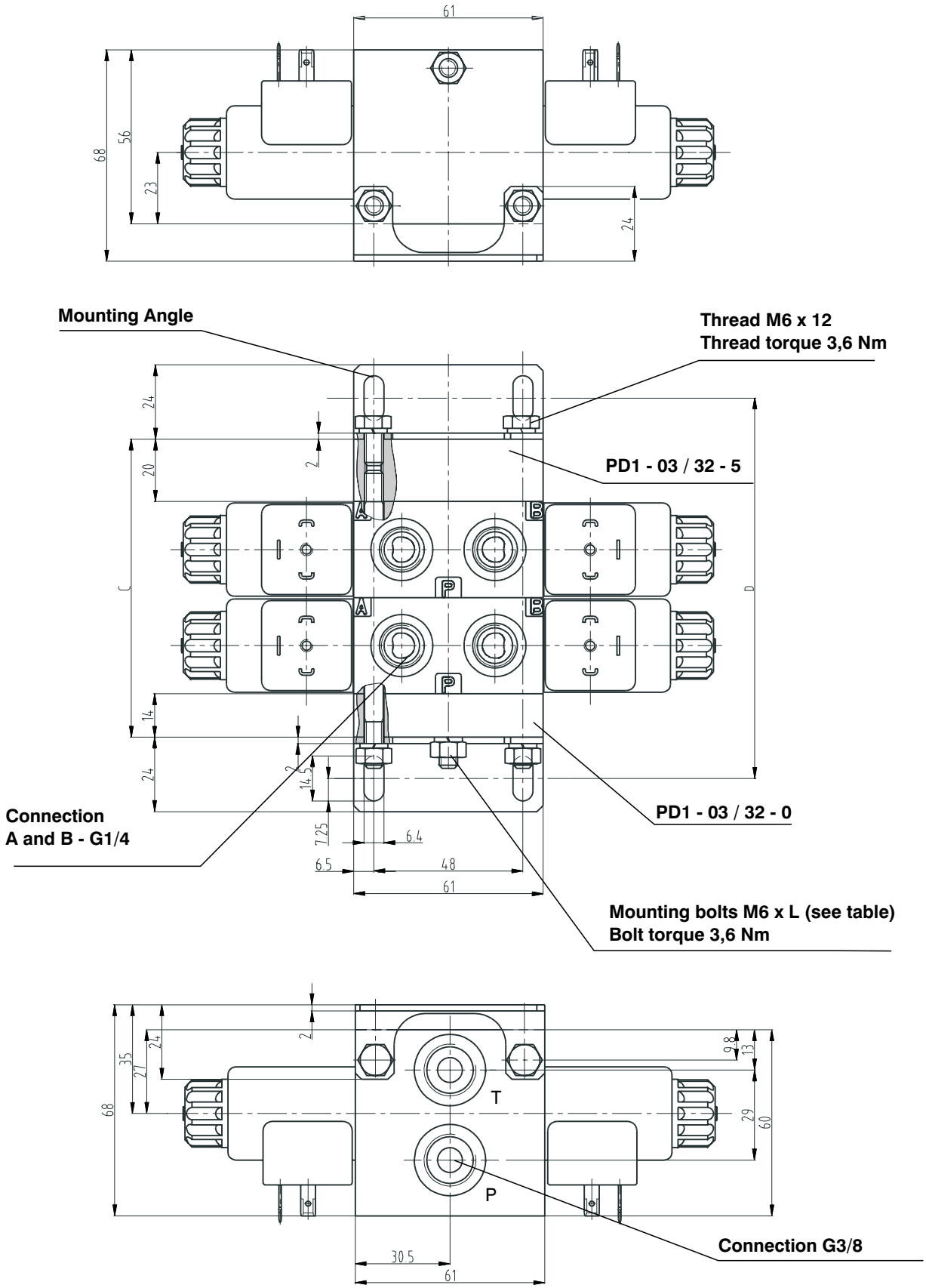
Designation	Dimensional sketch	Description
E1		Solenoid coil with terminal for the electrical connector, DIN 43 650.

Manual Override

STANDARD	
Without designation Dimensional sketch  Description Standard model of the manual override. Standard retaining nut of the solenoid.	

Block Assembly

Dimensions in millimeters

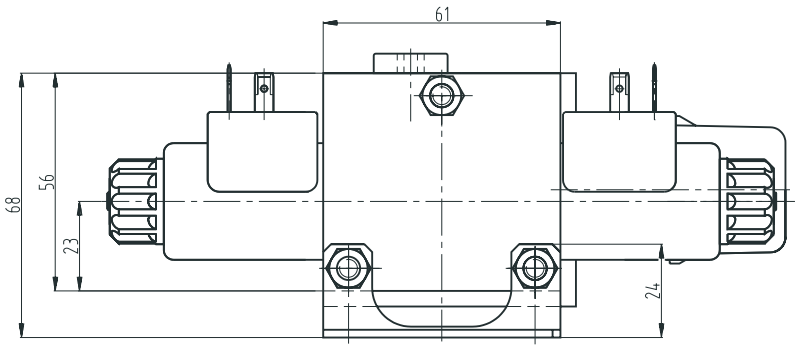


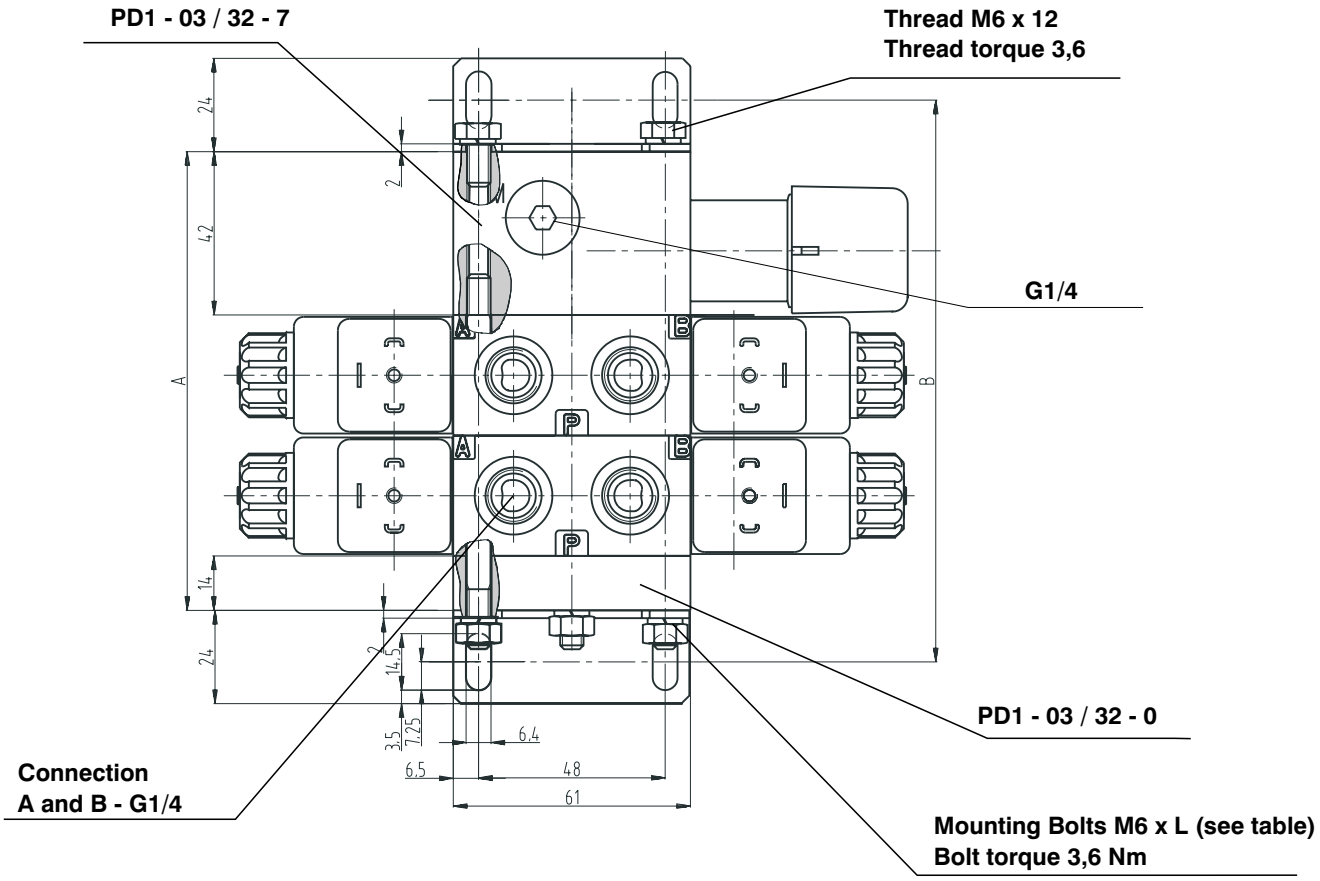
Dimensions

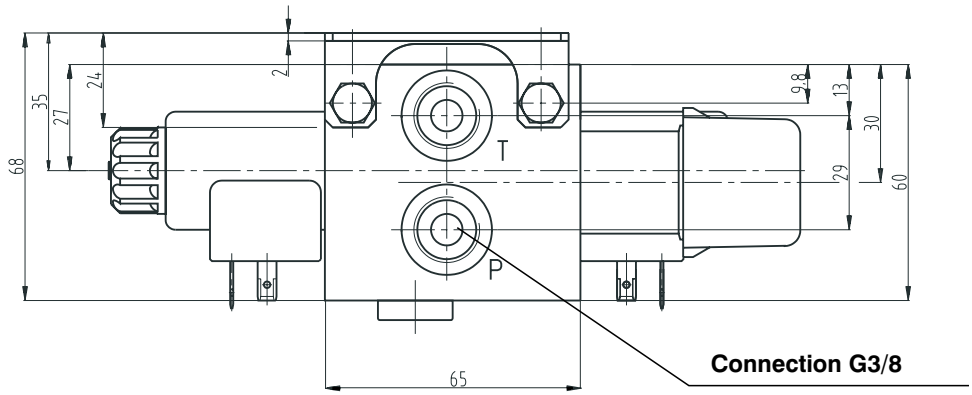
Number of section	1	2	3	4	5	6	7	8
Dimension C [mm]	65	96	127	158	189	220	251	282
Dimension D [mm]	91,5	122,5	153,5	184,5	215,5	264,5	277,5	308,5
Dimension L [mm]	55	100	133	163	194	224	256	287

Block Assembly

Dimensions in millimeters





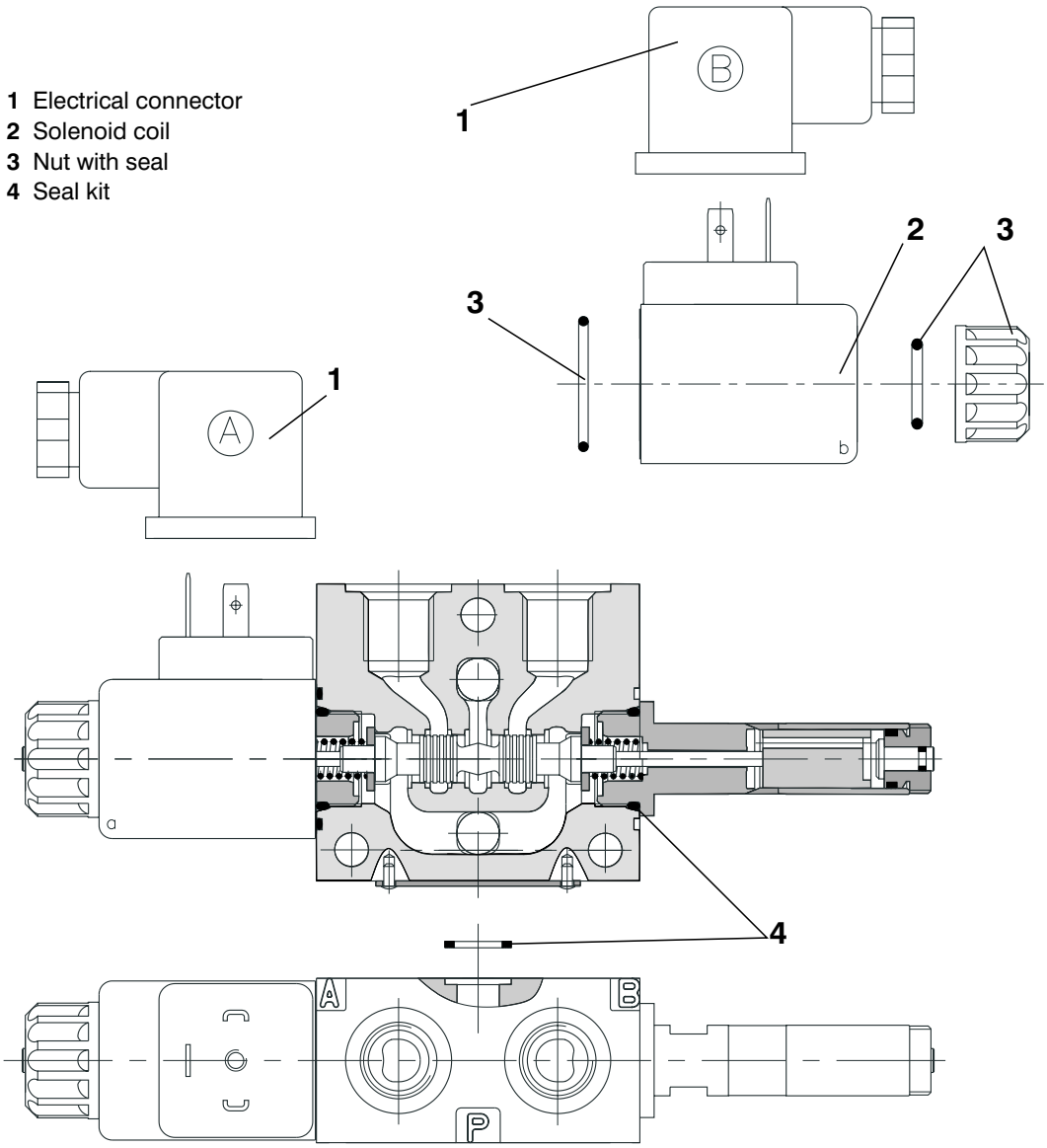


Dimensions

Number of section	1	2	3	4	5	6	7	8
Dimension A [mm]	87	118	149	180	211	242	273	304
Dimension B [mm]	113,5	144,5	175,5	206,5	237,5	268,5	299,5	330,5
Dimension L [mm]	55	100	133	163	194	224	256	287

Spare Parts

1 Electrical connector
2 Solenoid coil
3 Nut with seal
4 Seal kit



Subplates and connecting material

Subplates

Number	Type	Ordering number
Subplate No 5	PD1- 03 / 32 - 5 (G3/8)	479-9105
Subplate No 7	PD1 - 03 / 32 - 7 (G3/8 VPP2-04/S-32S)*	479-9107
Endplate No 0	PD1 - 03 / 32 - 0	479-9102

Connecting material + Mounting Angle

Number of section	3 pcs. Bolt + 3 pcs. Nut + 3 pcs. Washer (thread torque 3,6 Nm)	Ordering number
1	M6 x 55	479-9001
2	M6 x 100	479-9002
3	M6 x 133	479-9003
4	M6 x 163	479-9004
5	M6 x 194	479-9005
6	M6 x 224	479-9006
7	M6 x 256	479-9007
8	M6 x 287	479-9008
	2 pcs. Mounting angle + 2 pcs. Thread (M6 x 12) + 2 pcs. Washer (thread torque 3,6 Nm)	479-9900

Spare parts

Solenoid retaining nut with seal

Type of the nut	Seal ring		Ordering number
Standard nut	13 x 2	21,95 x 1,78	479-9502

Electrical connector, DIN 43 650

Type designation	Model	Max. input voltage	Connector A grey	Connector B black
			Ordering number	
K1	without rectifier - M16x1,5 (bushing bore ∅ 6-8 mm)	230 V AC/DC	936-9902	936-9901
K2	without rectifier with LED and quenching diode -M16x1,5 (bushing bore ∅ 6-8 mm)	12...24 V DC	936-9908	936-9907
K3	with rectifier-M16x1,5 (bushing bore ∅ 6-8 mm)	230 V AC	936-9904	936-9903
K4	with rectifier with LED and quenching diode -M16x1,5 (bushing bore ∅ 6-8 mm)	230 V AC	936-9910	936-9909
K5	without rectifier - M16x1,5 (bushing bore ∅ 4-6 mm)	230 V AC/DC	936-9906	936-9905

Seal kit

Type	Dimensions, number		Ordering number
	Square ring	O-ring	
Standard NBR70	9,25 x 1,68 (2 pcs.)	16 x 1,8 (2 pcs.)	479-9500
Viton	9,25 x 1,78 (2 pcs.)	16 x 2 (2 pcs.)	479-9501

Solenoids

Type	E1	E1	E1
Voltage	01200	02400	20500
Ordering number	941-1005	941-1007	941-1009

* For other pressure steps see ARGO-HYTOS data sheet HA 5093.

Preferred Types of Valves

Type	Ordering number	Type	Ordering number
RPEK1-03G2Z11/01200E1	479-0007	RPEK1-03G3Y11/02400E1	479-0016
RPEK1-03G2R11/01200E1	479-0005	PD1-03/32-5(G3/8)	479-9105
RPEK1-03G3Y11/01200E1	479-0048	PD1-03/32-7(G3/8VPP2-04/S-32S)	479-9107
RPEK1-03G2Z11/20500E1	479-0080	PD1-03/32-0	479-9102
RPEK1-03G2R11/20500E1	479-0081	M6 x 133	479-9003
RPEK1-03G3Y11/20500E1	479-0082	M6 x 194	479-9005
RPEK1-03G2Z11/02400E1	479-0052	M6 x 256	479-9007
RPEK1-03G2R11/02400E1	479-0045	2 pcs. Mounting angle + 2 pcs. Thread (M6 x 12) + 2 pcs. Washer (thread torque 3,6 Nm)	479-9900

Caution!

- For directional valves with two solenoids, one solenoid must be without power before the other solenoid can be powered.
- Other functional symbols on request.
- The packing foil is recyclable.
- The protecting plate can be returned to the manufacturer.
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law.

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www.argo-hytos.com

Solenoid - operated directional control valves with wirebox

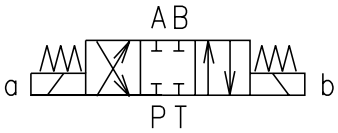
RPEW3-06

Size 06 p_{max} up to 320 bar Q_{max} up to 80 L/min

HA 4028
2/2005

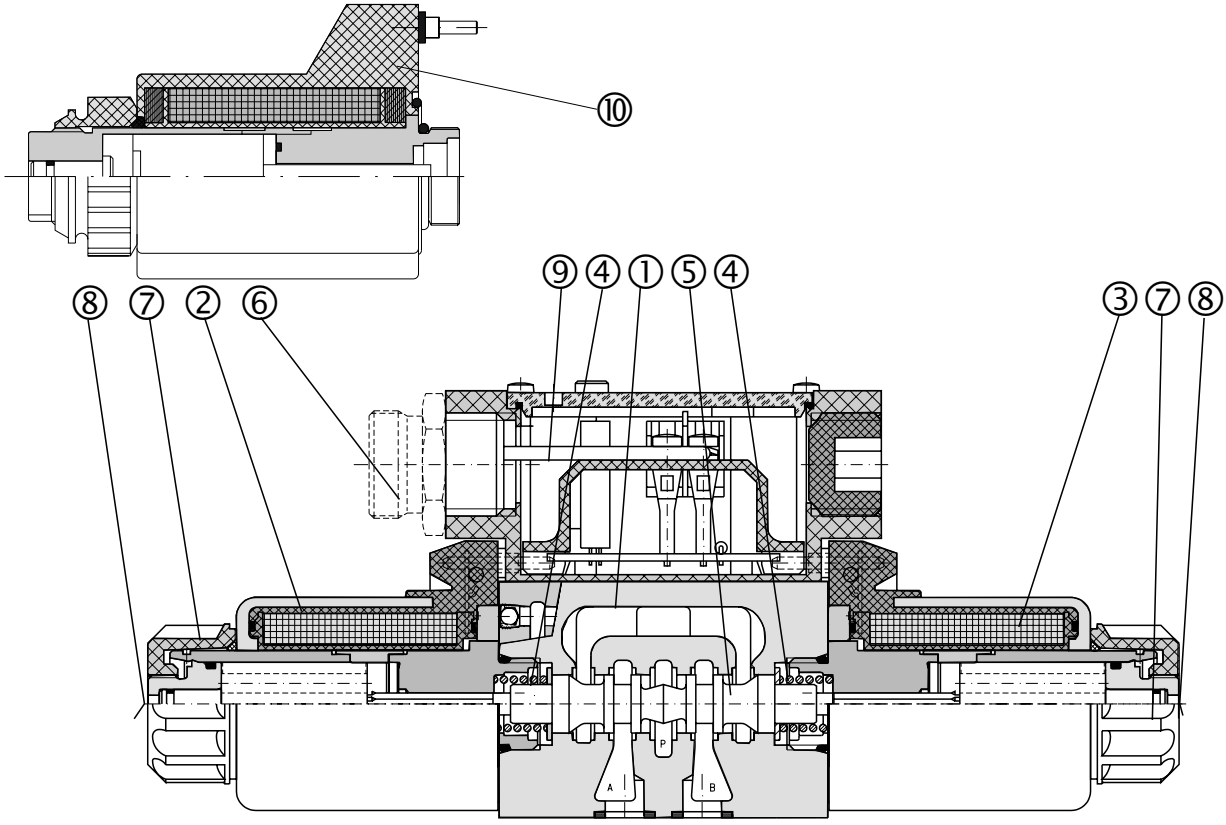
Replaces
HA 4028 3/2002

- **4/3-, 4/2- and 3/2- way directional control valves**
- **Cylindrical AC or DC, solenoids with removable coils - Elektrical connector can be rotated in either direction by 90°**
- **Four-land spool - reduced functional dependence on fluid viscosity**
- **Wet pin core tubes**
- **Push button manual override**
- **Installation dimensions to ISO 4401-03-02-0-94, DIN 24 340-A6**
- **Subplates see Data Sheet HA 0002**
- **CSA Upon request**



Functional Description

The RPEW3 directional control valves consist of housing (1), a control spool (5) with two centering springs (4) and cylindrical operating solenoids (2, 3), electric wirebox (9) and connector (6).
The three-position directional control valves are fitted with two solenoids and two springs. Two-position directional control valves have either one solenoid and one return spring or two solenoids and a detent assembly.
The solenoids are supplied with DC and AC (10) - voltage through the 1/2 NPT Ports on the wirebox (optional on both sides) or through Connector Item (3 - Pin single solenoid, 5 - Pin - double solenoid) see wiring diagram (page 7). The wires are connected to a terminal plate inside the wirebox. Optional lights are installed on this terminal plate for shift indication. The lights are visible as raised arrows on the valve label. The solenoids are retained by the Nut (7) and plug-in to the wirebox. Plug -in design allows easy removal without wire change.
In the case of solenoid malfunction or power failure, the spool of the valve can be shifted by manual override (8), provided the pressure in T- port does not exceed 25 bar.
The valve housing (1) is phosphate coated and the solenoids (2, 3) are zinc coated.



Ordering Code

RPEW3-06 ☐☐ / ☐☐☐☐☐☐☐☐☐

Solenoid Operated Directional Control Valves with Wirebox

Nominal Size

Number of Valve Positions

two positions	**2**
three positions	**3**

Spool Symbols
see the table spool symbols

Rated Supply Voltage of Solenoids
(at the wirebox terminals)

12 V DC / 2.64 A	**01200**
24 V DC / 1.32 A	**02400**
120V AC/60Hz*	**12060**

*The direct AC coils
or
DC coils with rectifier in wirebox

CSA Upon request

Note: For other voltages consult factory

Type of Solenoid Coil for Wiring Box (Plug-In-Coil)

DC solenoid	**EW1**
DC solenoid with quenching diode	**EW2**
AC solenoid (direct)	**EW5**

Type of Wirebox

Wirebox for DC and direct AC	**K**
Wirebox AC rectified (rectifier in wirebox)	**R**

Seals

omit	NBR
V	FPM (Viton)

Orifice in P Port

omit	without orifice
D1	∅1.0 mm
D2	∅1.5 mm
D3	∅2.0 mm
D4	∅2.2 mm
D5	∅2.5 mm

Spool Speed Control Orifice

omit	without damping
T1	orifice ∅0.7 mm in solenoid*

* Only with coils type EW1 or EW2

Manual Override

omit	standard
N1	covered with retaining nut*
N2	covered with rubber boot*

* for DC voltage only

Wirebox Configurations:

50 Standard wiring box with 1/2 NPT both ends (Either side can be used for wiring, Remove cover -plug accordingly)

51 Standard wiring box with 1/2 NPT both ends and lights (B- side pluged, A - side covert for shipping)

---

52 Wiring box with 3 PIN connector ANSI/B93.55M mounted on A-side (B-side pluged, only for single solenoid valves)

53 Wiring box with 3 PIN connector ANSI/B93.55M mounted on B-side (A-side pluged, only for single solenoid valves)

---

54 Wiring box with 3 PIN connector ANSI/B93.55M mounted on A-side with light (B-side pluged, only for single solenoid valves)

55 Wiring box with 3 PIN connector ANSI/B93.55M mounted on B-side with light (A-side pluged, only for single solenoid valves)

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56 Wiring box with 5 PIN connector ANSI/B93.55M mounted on A-side (B-side pluged, only for double solenoid valves)

57 Wiring box with 5 PIN connector ANSI/B93.55M mounted on B-side (A-side pluged, only for double solenoid valves)

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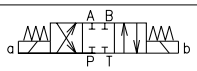
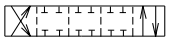
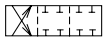
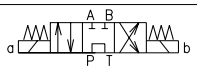
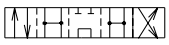
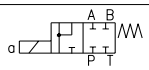
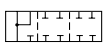
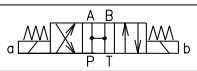
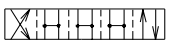
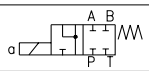
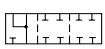
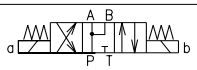
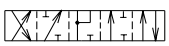
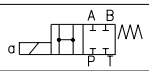
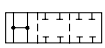
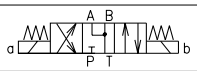
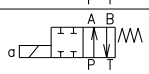
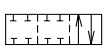
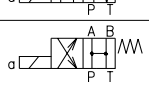
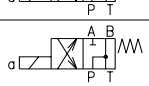
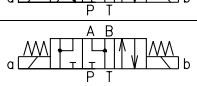
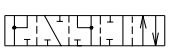
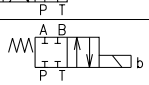
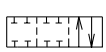
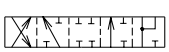
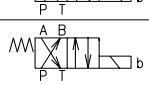
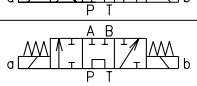
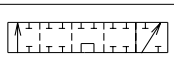
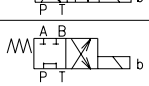
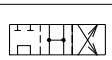
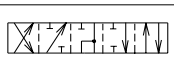
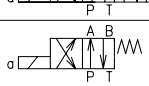
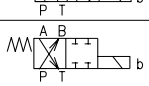
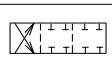
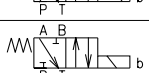
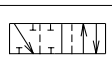
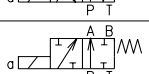
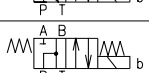
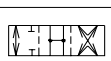
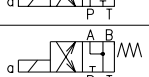
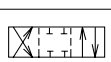
58 Wiring box with 5 PIN connector ANSI/B93.55M mounted on A-side with light (B-side pluged, only for double solenoid valves)

59 Wiring box with 5 PIN connector ANSI/B93.55M mounted on B-side with light (A-side pluged, only for double solenoid valves)

Technical Data

Nominal size	mm	06		
Maximum flow	L/min	see p-Q characteristics		
Max. operating pressure at porte P, A, B	bar	320		
Max. operating pressure at port T	bar	210		
Pressure drop	bar	see Δp-Q characteristics		
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP-RP 91H in viscosity classes ISO VG 32, 46 and 68.		
Fluid temperature range for NBR seals	°C	-30 ... +80		
Fluid temperature range for FPM seals	°C	-20 ... +80		
Ambient temperature, max.	°C	up to +50		
Viscosity range	mm^2/s	20 ... 400		
Maximum degree of fluid contamination		Class 21/18/15 to ISO 4406 (1999).		
Max. allowable voltage variation	%	DC: ± 10%	AC: ±10%	
Max. switching frequency	1/h	15 000		
Switching time, on: at ν=32 mm^2/s	ms	DC: 30 ... 50	AC direct: CF	AC rec.: 30 ... 40
Switching time, off: at ν=32 mm^2/s	ms	DC: 10 ... 50	AC direct: CF	AC rec.: 30 ... 70
Duty cycle	%	100		
Service life	cycles	10^7		
Enclosure type to DIN 40 050		IP 65		
Weigt - valve with 1 solenoid - valve with 2 solenoids	kg	1.3 1.9		
Mounting position		optional		

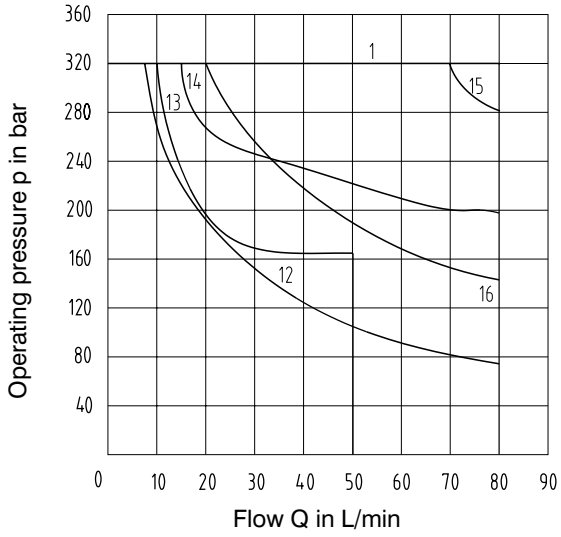
Functional Symbols

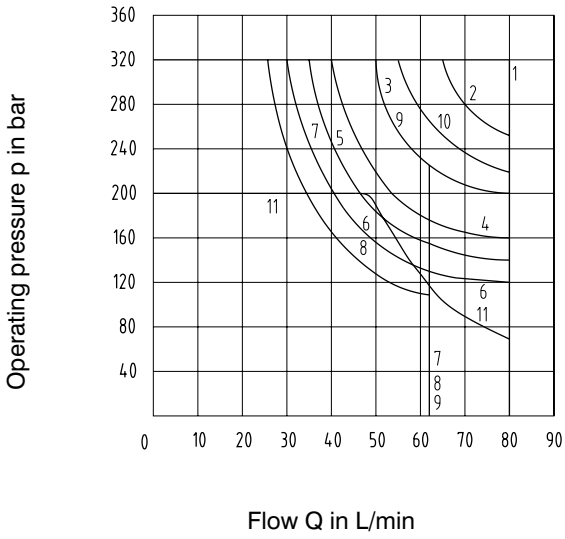
Designation	Symbol	Interposition	Designation	Symbol	Interposition
Z11			Z51		
C11			Z71		
H11			Z81		
P11			Z91		
Y11			R31		
L21			H51		
B11			F51		
Y41			Z11		
Z21			X11		
C41			C11		
F11			H11		
R11			K11		
R21			N11		
A51			F11		
P51			X25		
Y51			J15		
C51			J75		

p-Q Characteristics

Measured at $\nu = 32\ mm^2/s$ and $t = 40\ °C$

Operating limits for maximum hydraulic power transferred by the directional valve.
For respective spool type - see Functional Symbols.





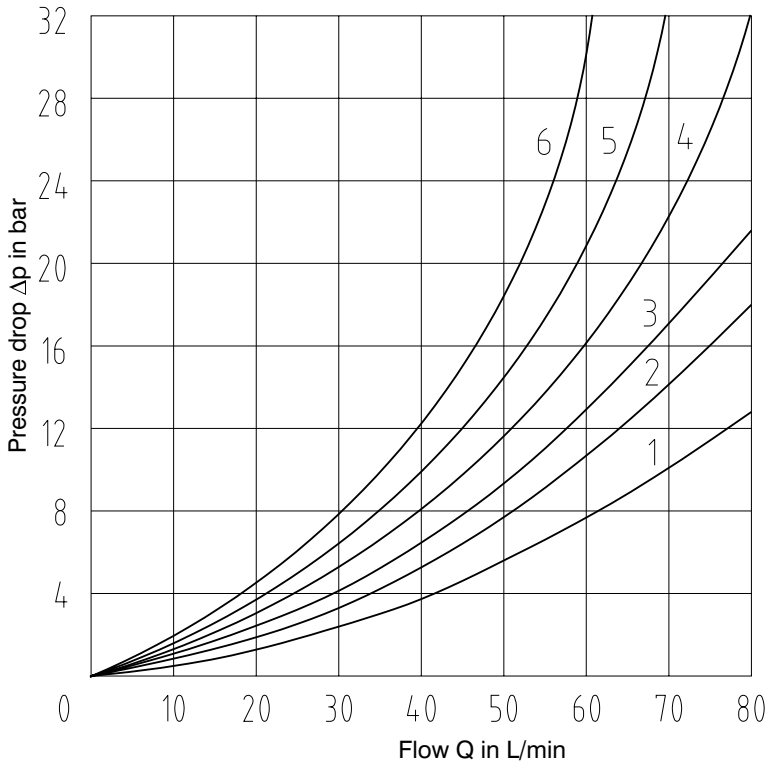
AC	
Z11	1
C11	13
H11	14
P11	1
Y11	16
B11	15
R11	14
A51	12
J15	1

DC		DC		DC		DC	
Z11	1	C41	6	Z71	8	X25	11
C11	7	F11	6	Z81	8	J15	1
H11	4	R11	4	Z91	8	J75	10
P11	1	R21	5	R31	6		
Y11	3	A51	6	H51	8		
L21	6	P51	1	F51	8		
B11	9	Y51	3	X11	4		
Y41	7	C51	7	K11	8		
Z21	1	Z51	1	N11	8		

Δp-Q Characteristics

Measured at $\nu = 32\ mm^2/s$ and $t = 40\ °C$

Pressure drop Δp related to flow rate.

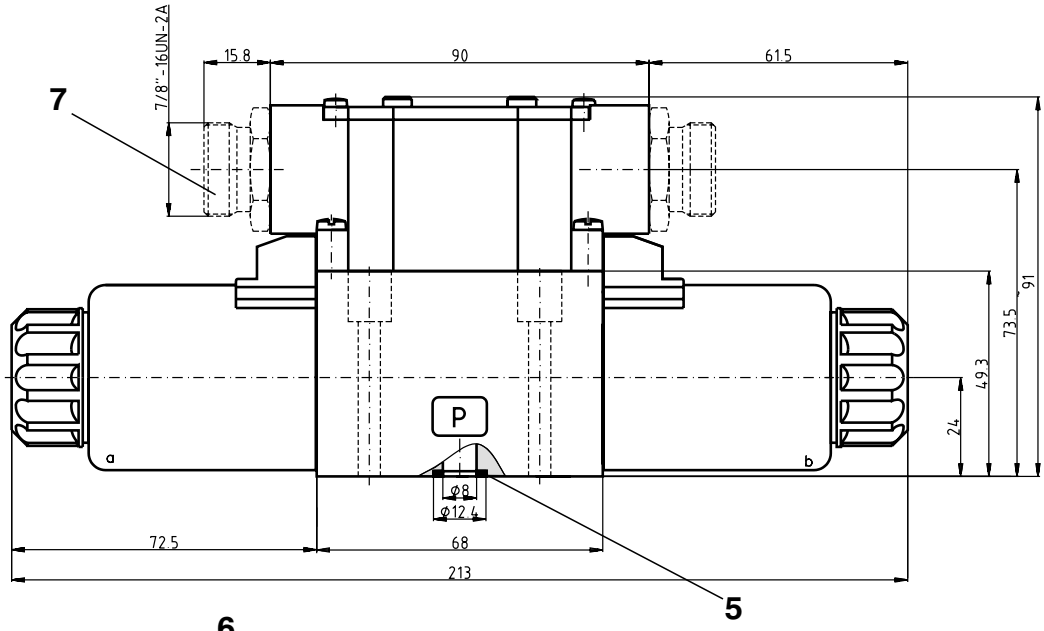


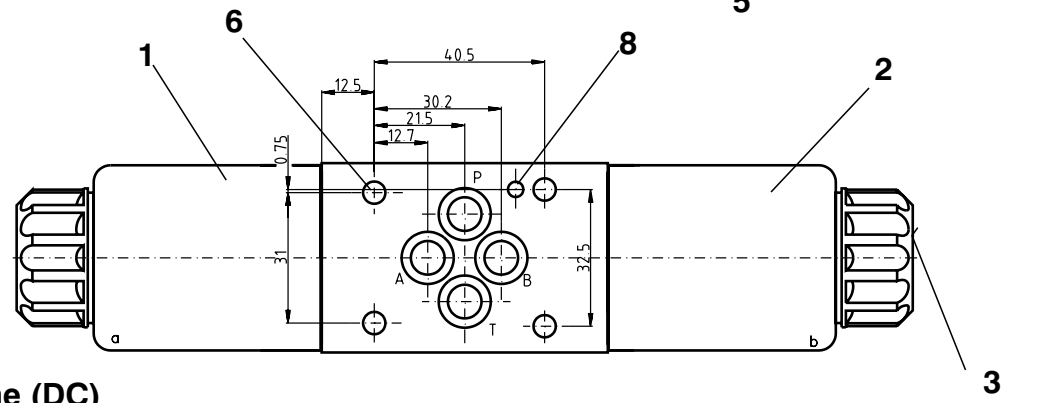
	P-A	P-B	A-T	B-T	P-T
Z11	2	2	3	3	
C11	5	5	5	6	3
H11	2	2	2	3	3
P11	1	1	3	3	
Y11	2	2	2	2	
L21	2	2	3	3	
B11	2	2	3	3	
Y41	3	3	3	3	
Z21		2	3		
C41	4	4			5
F11	1	2		3	3
R11	2	2	3	3	
R21	2	2	3	3	
A51	2	2			
P51		1	3		
Y51		2	2		
C51	2			3	4
Z51		2	3		
Z71	3	3			
Z81			3	3	
Z91	3			3	3
R31	2			3	
H51		2	3		
F51		2	3		
X11	2	2	3	3	
K11		2	3		
N11	2	2	3	3	
X25	3	3	3		
J15	2	2	3	3	
J75	2	2			

Valve Dimensions

Dimensions in millimetres

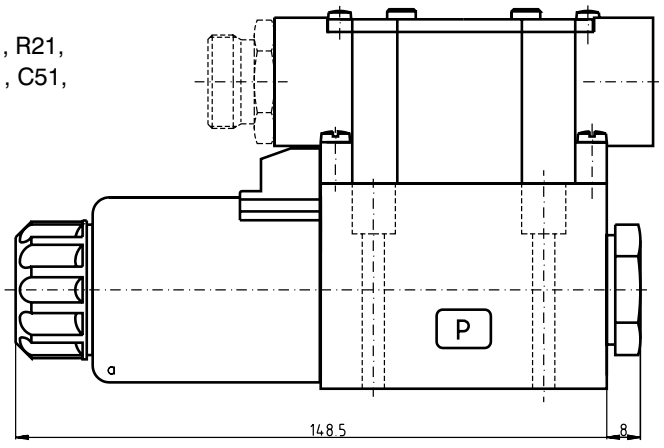
Valve with two DC voltage supplied solenoids and AC rectified (Code R)





Valve with one (DC) solenoid a

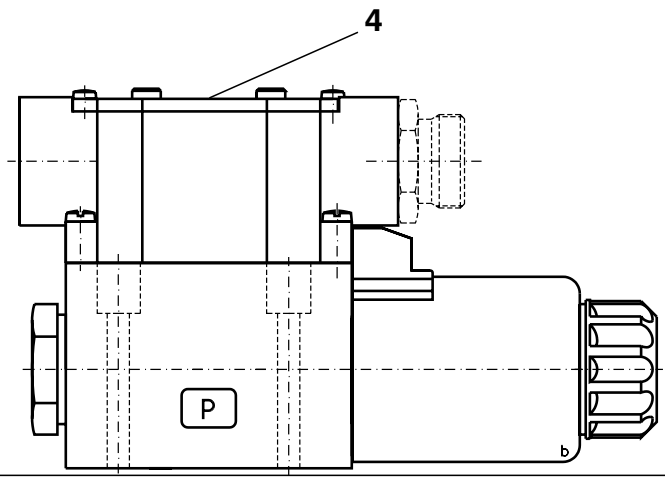
Spool symbols R11, R21, A51, P51, Y51, Z51, C51, Z71, Z81, Z91, R31, H51, F51, X25

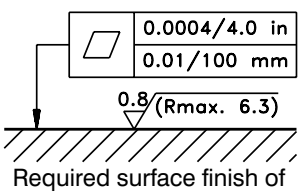


1 Solenoid a (Nut torque 3Nm)
2 Solenoid b (Nut torque 3Nm)
3 Manual override
4 Name plate
5 Square ring (4 pcs.) 0,36 x 0,66 supplied with valve
6 4 mounting holes
7 Electrical connector
8 Pin hole

Valve with one (DC) solenoid b

Spool symbols X11, Z11, C11, H11, K11, N11, F11



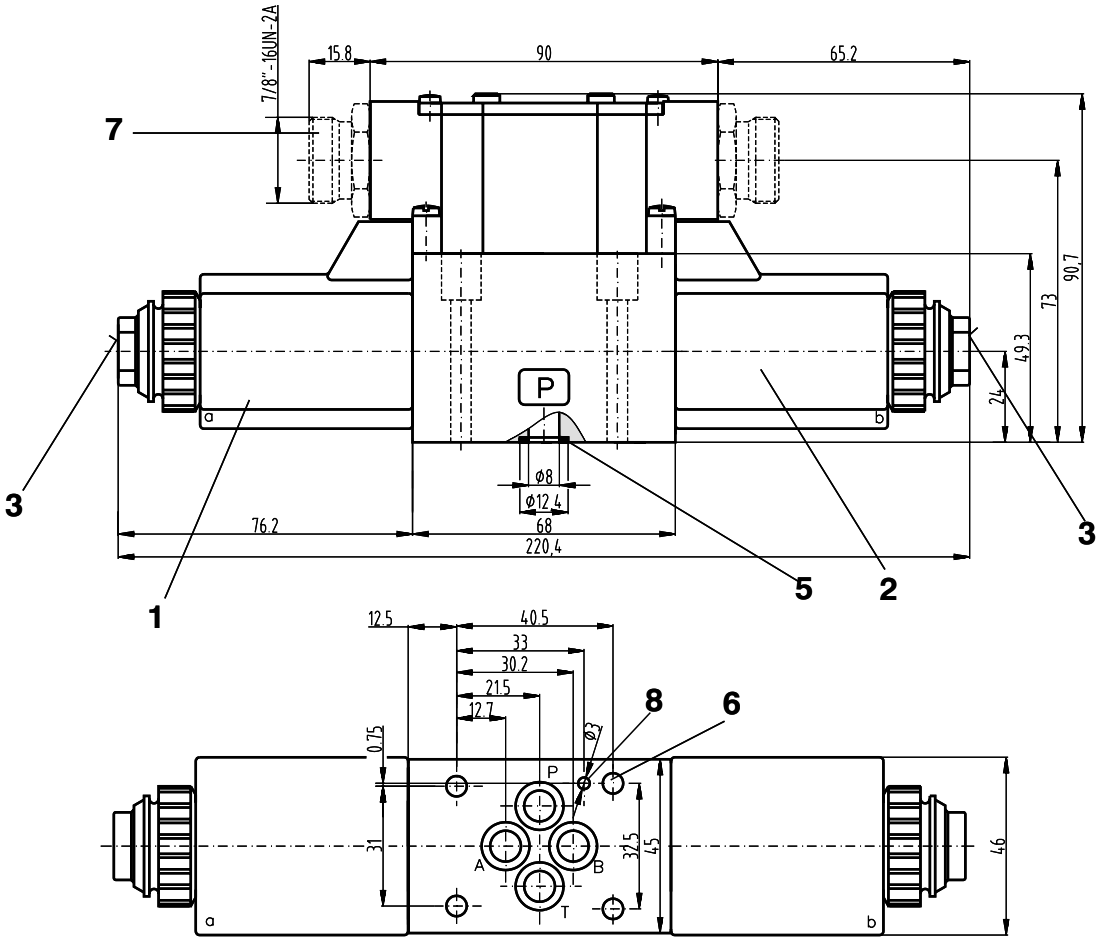


Required surface finish of interface

Valve Dimensions

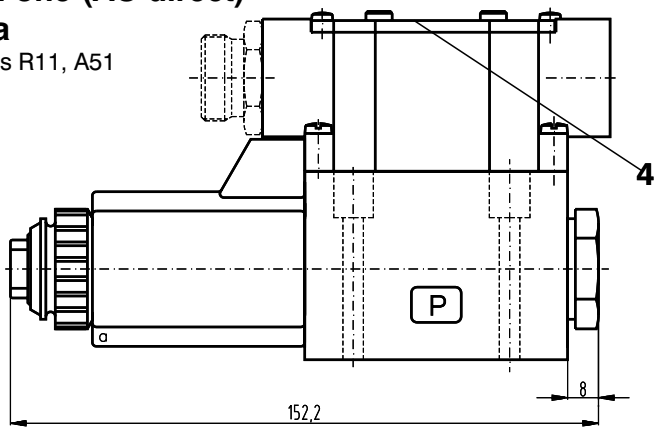
Dimensions in millimetres

Valve with two AC direct voltage supplied solenoids



Valve with one (AC direct) solenoid a

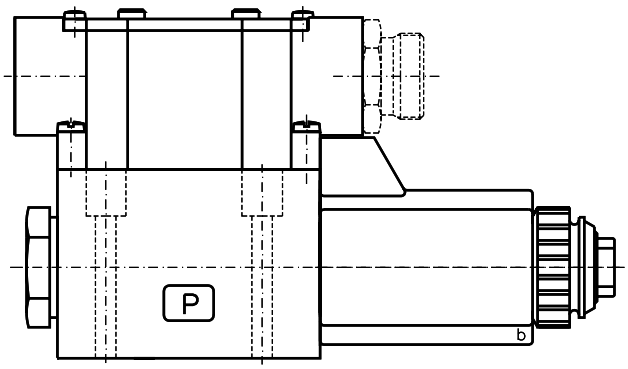
Spool symbols R11, A51

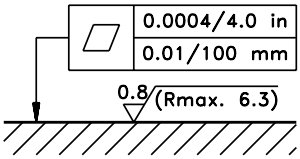


1 Solenoid a (Nut torque 3Nm)
2 Solenoid b (Nut torque 3Nm)
3 Manual override
4 Name plate
5 Square ring (4 pcs.)
0.36 x 0.66 supplied with valve
6 4 mounting holes
7 Electrical connector
8 Pin hole

Valve with one (AC) solenoid b

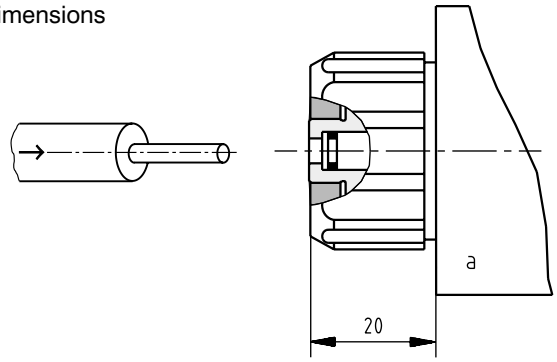
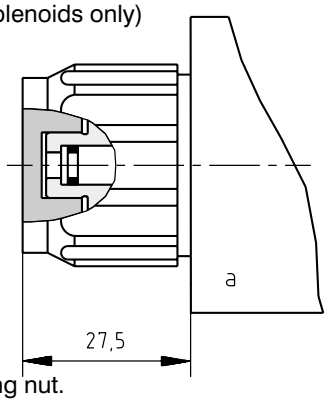
Spool symbols Z11, C11, H11

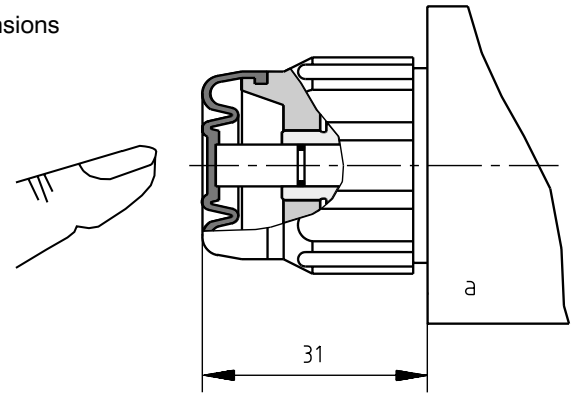




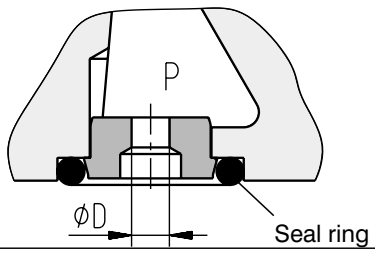
Required surface finish of interface

Manual Override

STANDARD	CLOSED NUT
Dimensions  Standard model of the manual override. Standard retaining nut of the solenoid.	Type **N1** (For DC voltage solenoids only) Dimensions  Manual override with retaining nut. Can be used after removing nut.

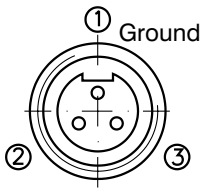
RUBBER BOOT	
Type **N2** (For DC voltage solenoids only) Dimensions  Manual override protected by rubber boot.	

Orifice in P-Port

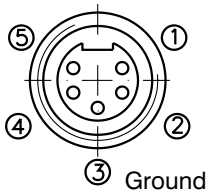
Type	∅D mm	Dimensions	Description
D1	1.0		P-Port orifices limit the flow into the directional control valve.
D2	1.5		
D3	2.0		
D4	2.2		
D5	2.5		

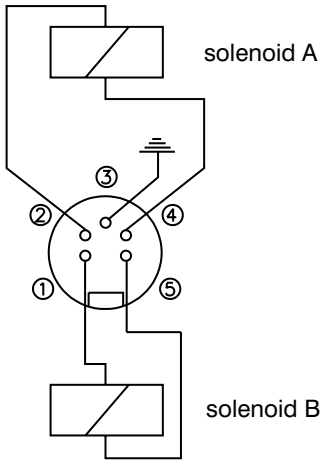
Connector - US - Standard - ANSI/B93.55M

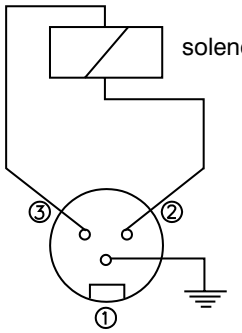
1 - green
2 - black
3 - white



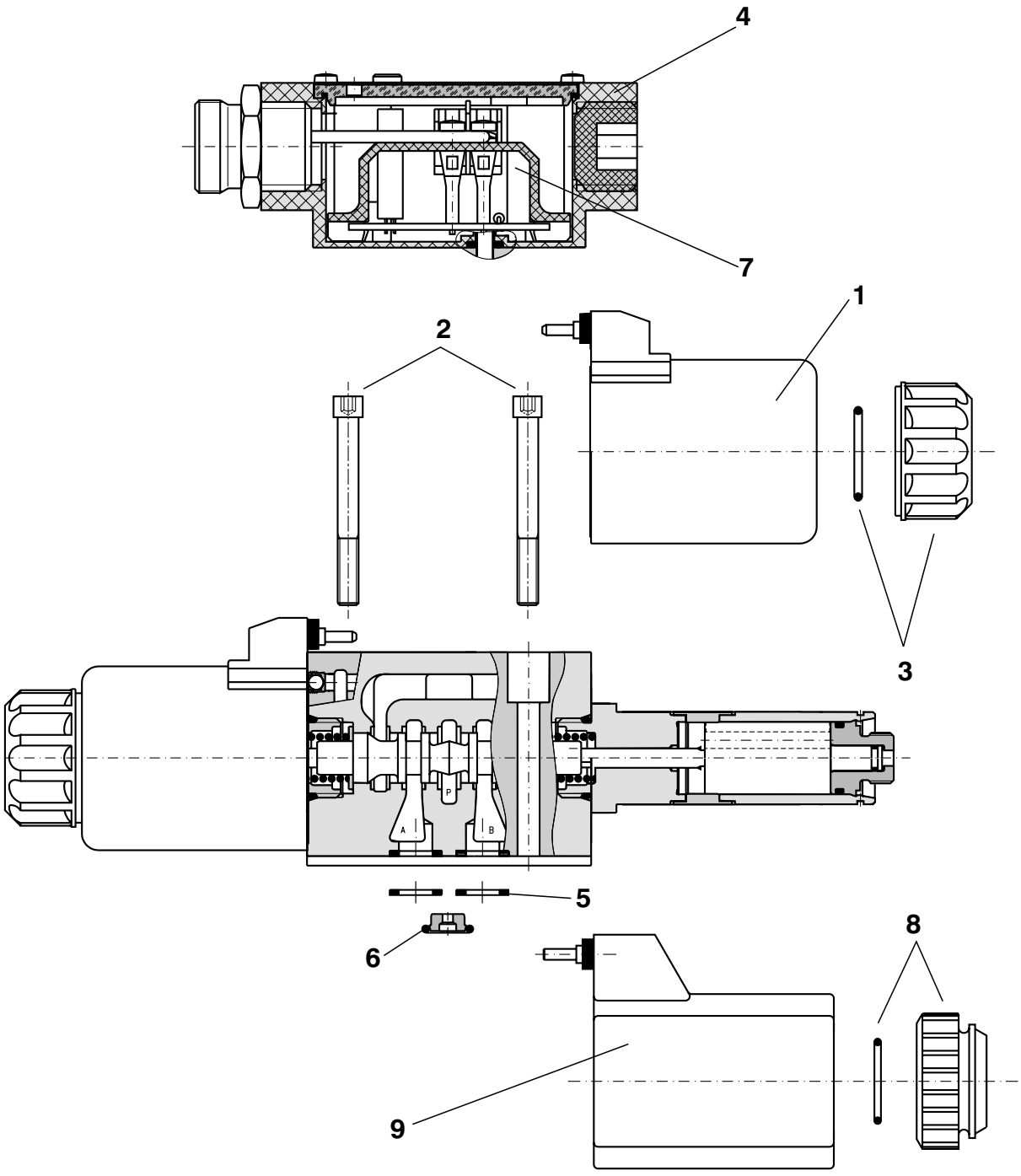
1 - white
2 - red
3 - green
4 - orange
5 - black







Spare Parts



1 Solenoid coil (DC solenoid)
2 Mounting bolts
3 Nut with seal (Nut torque 3Nm)
4 Wiring box + connector
5 Seal kit
6 Orifice in P port with seal ring
7 Terminal plate
8 Nut with seal (AC solenoid)
9 AC voltage supplied solenoid

Spare Parts

Wiringbox

Type	Ordering number
Wiring box without terminal plate	937-0668

Terminal Plates

Type	Ordering number
Terminal plate - basic design A+B	937-0669
Terminal plate A - basic design A	937-0670
Terminal plate B - basic design B	937-0671
Terminal plate 12V DC - lights A+B	937-0672
Terminal plate 24V DC - lights A+B	937-0675
Terminal plate 12V DC - light A	937-0673
Terminal plate 12V DC - light B	937-0674
Terminal plate 24V DC - light A	937-0676
Terminal plate 24V DC - light B	937-0677
Terminal plate 120V AC - lights A+B	937-0678
Terminal plate 120V AC - light A	937-0679
Terminal plate 120V AC - light B	937-0680
Terminal plate 120V AC - rectifier A+B	937-0684
Terminal plate 120V AC - rectifier A	937-0685
Terminal plate 120V AC - rectifier B	937-0686
Terminal plate 120V AC - rectifier A+B and lights A+B	937-0687
Terminal plate 120V AC - rectifier and light A	937-0688
Terminal plate 120V AC - rectifier and light B	937-0689

Solenoid Coil

Voltage rating	Type	Ordering number
01200 DC	EW1	937-0701
*01200 DC	EW1	944-0005
02400 DC	EW1	937-0700
*02400 DC	EW1	944-0006
10600 DC (120V/60Hz rectifier)	EW1	937-0702
12060 AC	EW5	937-0703
01200 DC	EW2	937-0710
02400 DC	EW2	937-0711

Solenoid Retaining Nut with Seal

Type of the nut	Seal ring	Ordering number
Standard nut	22 x 2	484-9951
Nut with detent assembly (DC only)		484-9954
Closed nut (DC only)		484-9952
Nut with rubber boot (DC only)		484-9953
Standard nut for AC voltage supplied solenoid	18 x 1,5	486-9010

Electrical Connector, ANSI/B93.55M

Type	Ordering number
3 PIN	937-0616
5 PIN	937-0617

* CSA Upon request

Orifice in P-Port

Type	∅D mm	Seal ring	Ordering number
D1	1.0	9.25 x 1.75	484-9973
D2	1.5		484-9974
D3	2.0		484-9975
D4	2.2		484-9977
D5	2.5		484-9976

Seal Kit

Type	Dimensions, quantity			Ordering number
Standard - NBR70	9.25 x 1.68 (4 pcs.)	17 x 1.8 (2 pcs.)	9.25 x 1.75 (1 pc)	484-9965
Viton	9.25 x 1.78 (4 pcs.)	17.17 x 1.78 (2 pcs.)		484-9971

Bolt Kit (for studs see HA 0030)

Dimensions, quantity	Bolt torque	Ordering number
M5 x 45 DIN 912-10.9 (4 pcs.)	8.9 Nm	484-9958

Caution!

- For applications outside the given parameters, please consult us.
- With spool symbols A51 and J75 for pressures exceeding 160 bar, the T-port should be connected directly to the tank.
- For directional control valves with two solenoids, one solenoids must be without power before the other solenoid can be powered charged. Switching time for directional valves with detent assembly (impulse control) should not be shorter than 60 ms. With directional valves with cushioned spool shifting, the switching time must correspond with the shifting time.
- Other for spool symbols on request.
- The packing foil is recyclable.
- Mounting bolts or studs must be ordered separately.
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law.

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E-mail: sales.cz@argo-hytos.com
www.argo-hytos.com

ARGO HYTOS

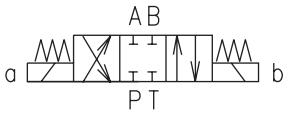
Solenoid - operated directional control valves with 8W coil

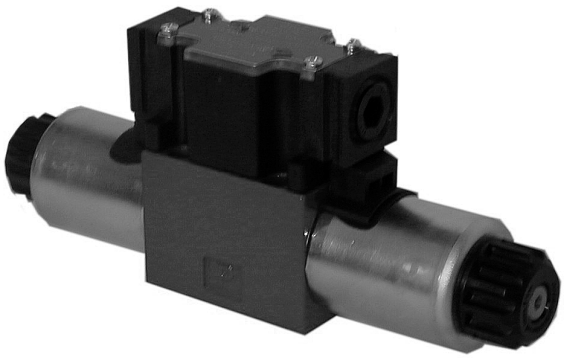
RPEA3-06

HA 4029
3/2003

Size 06 • p_{max} up to 320 bar • Q_{max} up to 80 L/min

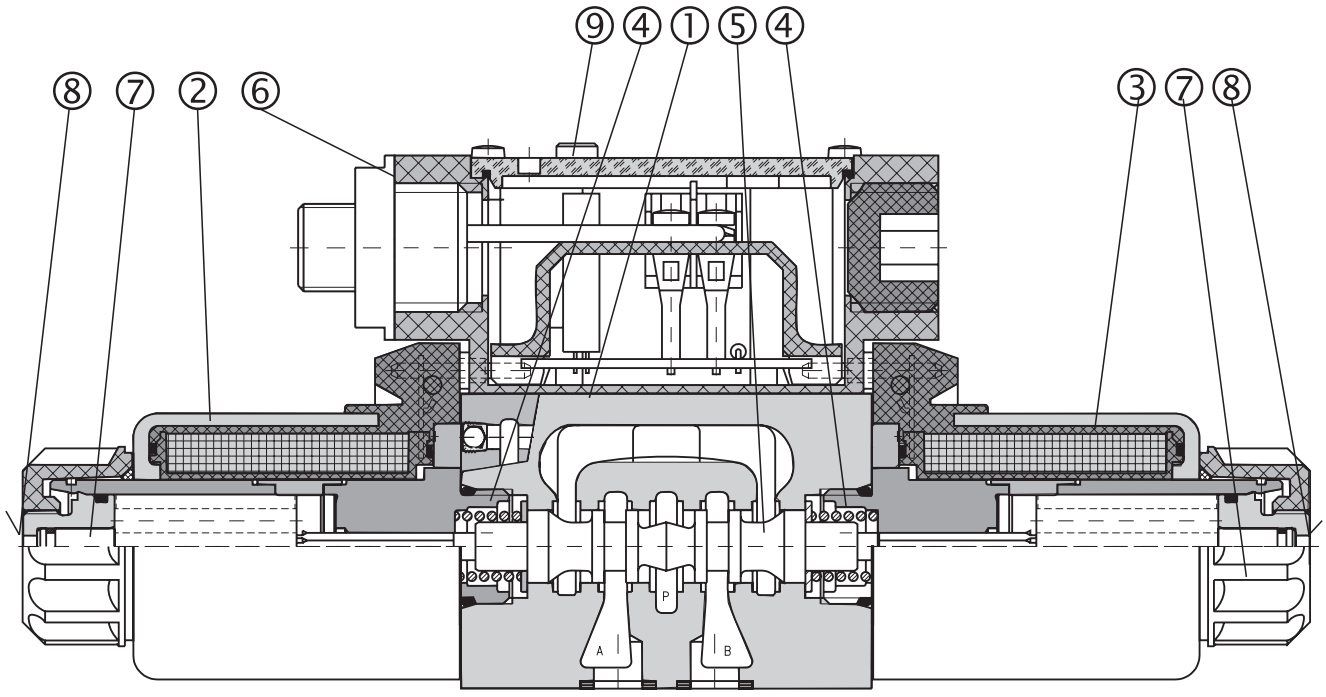
- 4/3-, 4/2- and 3/2- way directional control valves
- Enclosure type to IP65
- Four-land spool - reduced functional dependence on fluid viscosity
- Wet pin core tubes
- DC solenoids with removable coils
- Push button manual override
- Installation dimensions to ISO 4401-03-02-0-94, DIN 24 340-A6
- Subplates see data sheet HA 0002





Functional Description

The RPEA3 directional control valves consist of housing (1), a control spool (5) with two centering springs (4), cylindrical operating solenoids (2, 3), electric wirebox (9) and connector (6).
The three-position directional control valves are fitted with two solenoids and two springs. Two-position directional control valves have either one solenoid and one return spring or two solenoids and a detent assembly.
The solenoids are supplied with DC voltage through the Ports on the wirebox optional on both sides or through Connector Item (5 - Pin) M12, see wiring diagram (page 6). The wires are connected to a terminal plate inside the wirebox. Optional lights are installed on this terminal plate for shift indication. The lights are visible as raised arrows on the valve label. The solenoids are retained by the Nut (7) and plug-in to the wirebox. Plug -in design allows easy removal without wire change.
In the case of solenoid malfunction or power failure, the spool of the valve can be shifted by manual override (8), provided the pressure in T- port does not exceed 25 bar.
The valve housing (1) is phosphate coated and the solenoids (2, 3) are zinc coated.



Ordering Code

RPEA3-06 ☐ ☐ / ☐ ☐ ☐ ☐ ☐ ☐ ☐

Solenoid Operated Directional Control Valves with 8W Spool

Nominal Size

Number of Valve Positions

two positions	**2**
three positions	**3**

Spool Symbols
see the table spool symbols

Rated Supply Voltage of Solenoids

24 V DC / 0.33 A	**02400**

Note: Valve with DIN plug on request.

Type of Solenoid Coil

EW1	DC solenoid 8W

Type of Wirebox

omit	standard
R	With LED diode

Manual Override

omit	standard
N1	covered with retaining nut
N2	covered with rubber boot

Orifice in P Port

omit	without orifice
D1	∅1.0 mm
D2	∅1.5 mm
D3	∅2.0 mm
D4	∅2.2 mm
D5	∅2.5 mm

Seals

omit	NBR
V	FPM (Viton)

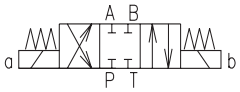
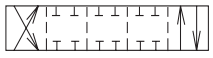
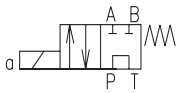
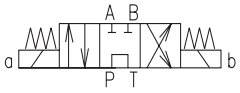
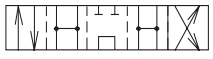
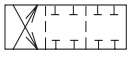
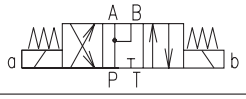
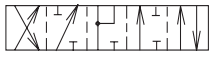
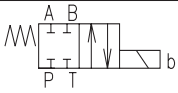
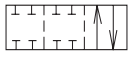
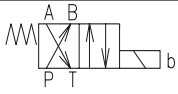
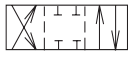
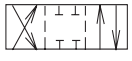
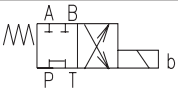
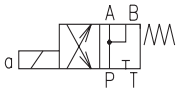
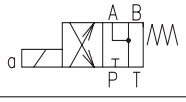
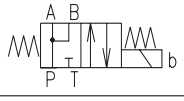
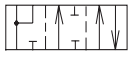
Solenoid identification

Omit	standard ISO
A	US Standard ANSI-B93.9

Technical Data

Nominal size	mm	06
Maximum flow	L/min	see p-Q characteristics
Max. operating pressure at porte P, A, B	bar	320
Max. operating pressure at port T	bar	210
Pressure drop	bar	see Δp-Q characteristics
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP-RP 91H in viscosity classes ISO VG 32, 46 and 68.
Fluid temperature range for NBR seals	°C	-30 ... +80
Fluid temperature range for FPM seals	°C	-20 ... +80
Ambient temperature, max.	°C	up to +50
Viscosity range	mm^2/s	20 ... 400
Maximum degree of fluid contamination		Class 21/18/15 to ISO 4406 (1999).
Max. allowable voltage variation	%	DC: ± 10%
Max. switching frequency	1/h	15 000
Switching time, on: at ν=32 mm^2/s	ms	DC: 30 ... 50
Switching time, off: at ν=32 mm^2/s	ms	DC: 10 ... 50
Duty cycle	%	100
Service life	cycles	10^7
Enclosure type to DIN 40 050		IP 65
Weigt - valve with 1 solenoid - valve with 2 solenoids	kg	1.3 1.9
Mounting position		optional

Functional Symbols

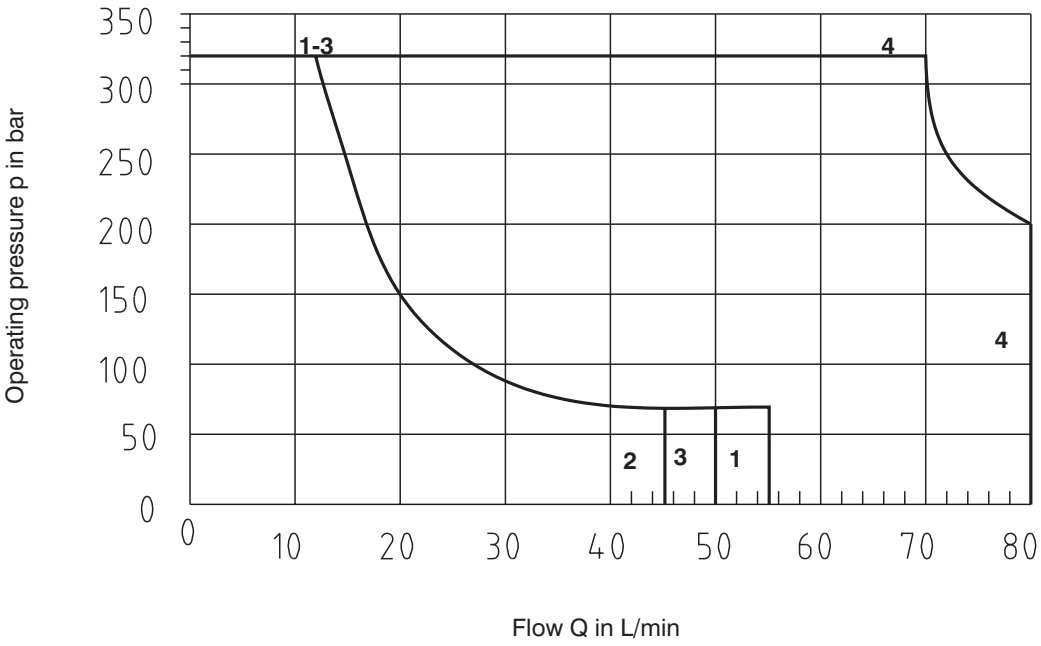
Designation	Symbol	Interposition	Designation	Symbol	Interposition
Z11			C51		
C11			Z51		
P11			Z11		
Y11			X11		
R11			C11		
P51			Y11		
Y51			P11		

Note: Contrary to the European Norm, the US Standard ANSI-B93.9 states that the solenoid routing on energizing the oil flow to port A be marked with a, and the solenoid routing on energizing the oil flow to port B be marked with b. This rule is valid independently from the solenoid lay-out.

p-Q Characteristics

Measured at $\nu = 32\ mm^2/s$ and $t = 40\ °C$

Operating limits for maximum hydraulic power transferred by the directional valve.

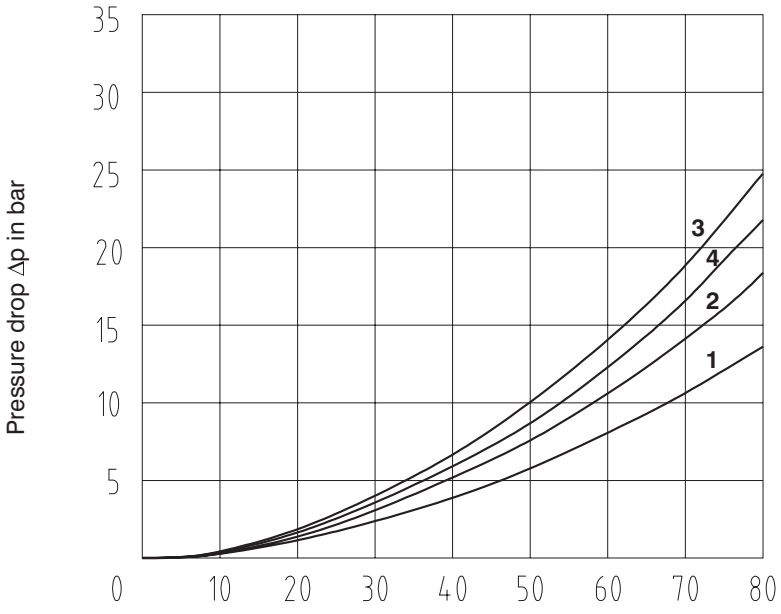


Z11	C11	P11	Y11	R11	P51	Z51	C51	X11	Y51
1	3	4	1	2	4	1	3	2	1

Δp-Q Characteristics

Measured at $\nu = 32\ mm^2/s$ and $t = 40\ °C$

Pressure drop Δp related to flow rate.

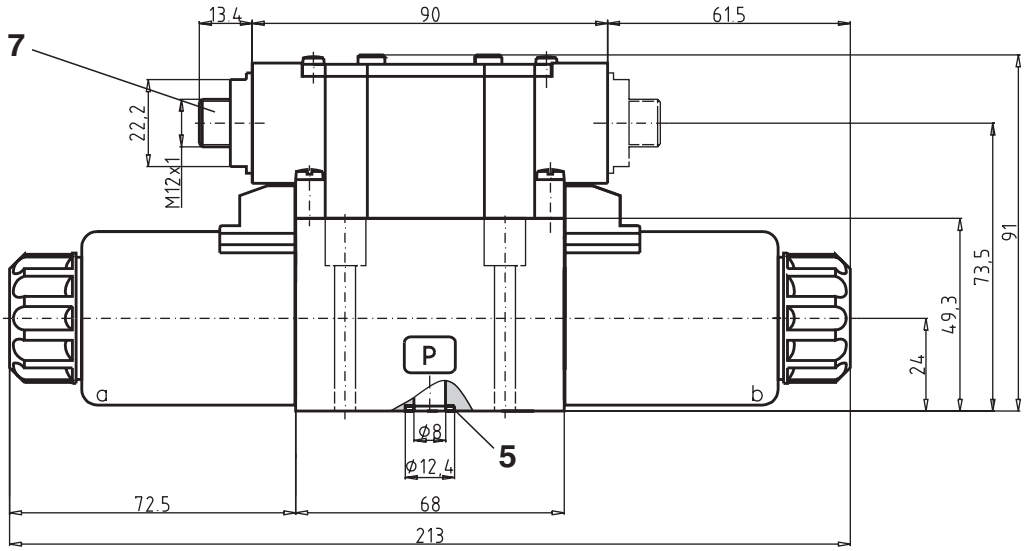


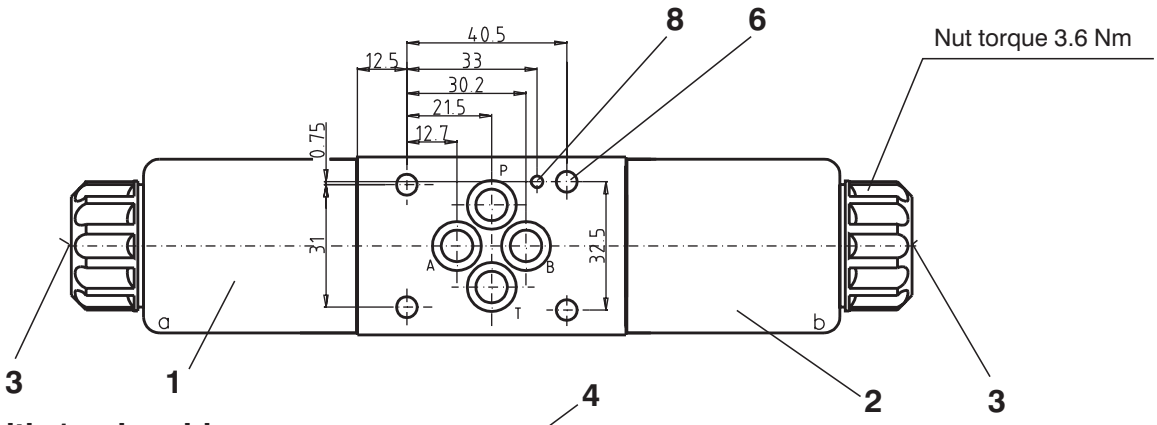
	P-A	P-B	A-T	B-T	P-T
Z11	2	2	2	2	
C11	2	2	2	2	3
P11	2	2	4	4	
Y11	2	2	1		
R11	2	2	4	2	
X11	2	2	4	2	
Z51		2	2		
C51	2			2	3
P51		1	1		
Y51		2	4		

Valve Dimensions

Dimensions in millimetres

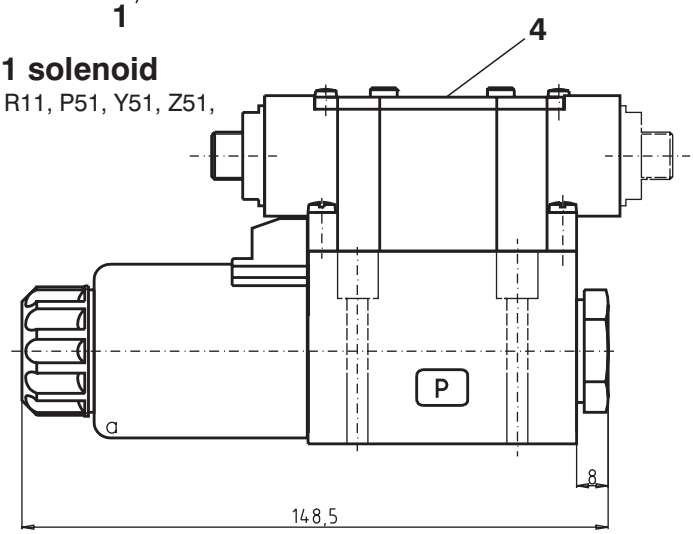
Valve with 2 solenoids





Valve with 1 solenoid

Spool symbols R11, P51, Y51, Z51, C51

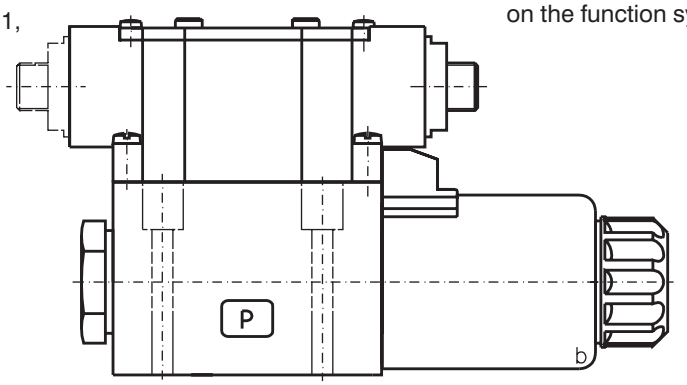


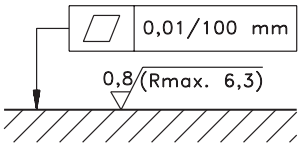
1 Solenoid a*
2 Solenoid b*
3 Manual override
4 Name plate
5 Square ring 9.25 x 1.68 (4 pcs.) supplied with valve
6 4 mounting holes
7 Electrical connector
8 Pin hole

***Note:** On valves with solenoid identification according to US Standard ANSI-B93.9 can the solenoid designation vary from this arangement, this is based on the function symbol.

Valve with 1 solenoid

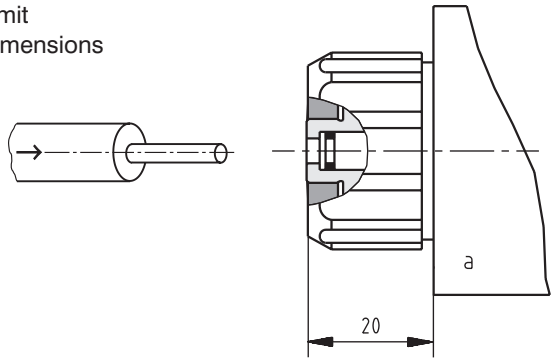
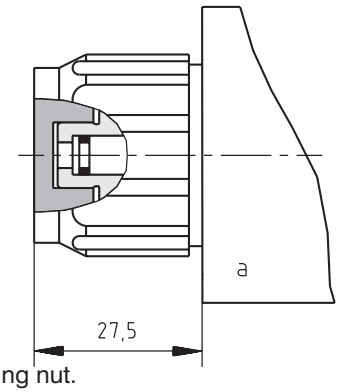
Spool symbols X11, Z11, C11, Y11, P11

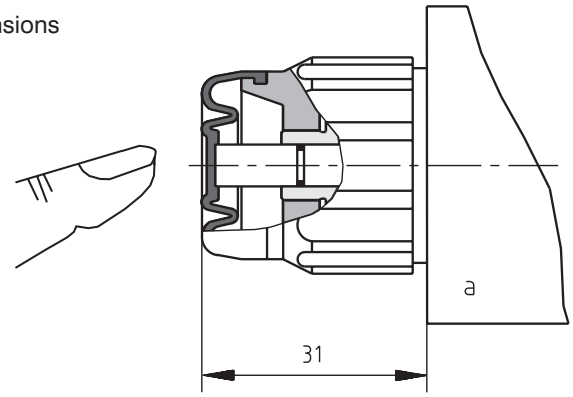




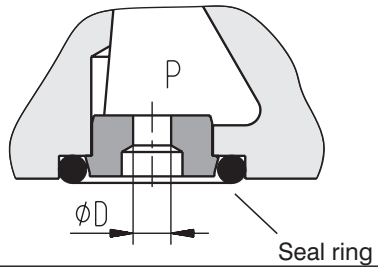
Required surface finish of interface

Manual Override

STANDARD	CLOSED NUT
Omit Dimensions  Standard model of the manual override. Standard retaining nut of the solenoid.	Type **N1** Dimensions  Manual override with retaining nut. Can be used after removing nut.

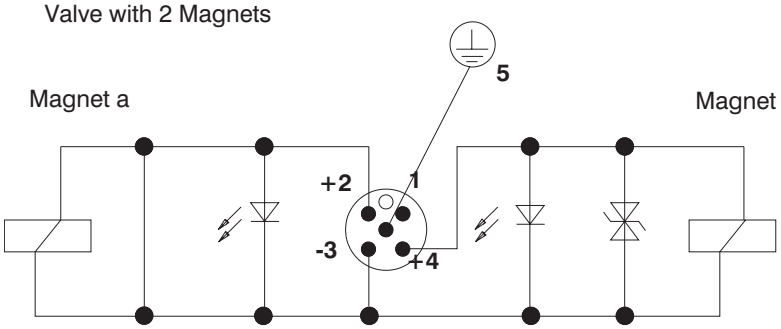
RUBBER BOOT	
Type **N2** Dimensions  Manual override protected by rubber boot.	

Orifice in P-Port

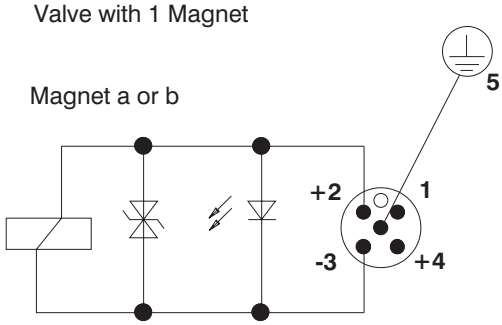
Type	∅D mm	Dimensions	Description
D1	1.0		P-Port orifices limit the flow into the directional control valve.
D2	1.5		
D3	2.0		
D4	2.2		
D5	2.5		

Connector - M12

Pin - location
Valve with 2 Magnets



Pin - location
Valve with 1 Magnet



Note: On valves with solenoid identification according to US Standard ANSI-B93.9 wiring will be different from above: on valves with one (1) solenoid always Pin 2 for the a-Solenoid and Pin 4 for the b-Solenoid. This is independent from the actual physical location of the solenoid.

Spare Parts

Wiringbox

Type	Ordering number
Wiring box without terminal plate	937-0608

Terminal Plates

Type	Ordering number
Terminal plate 24V - preventive A+B	937-0642
Terminal plate 24V - preventive A	937-0643
Terminal plate 24V - preventive B	937-0644
Terminal plate 24V - rectifier and preventive A+B	937-0645
Terminal plate 24V - rectifier and preventive A	937-0646
Terminal plate 24V - rectifier and preventive B	937-0647

Solenoid Coil

Voltage rating	Type	Ordering number
02400	EW1	937-0728

Solenoid Retaining Nut with Seal

Type of the nut	Seal ring	Ordering number
Standard nut	22 x 2	484-9951
Closed nut		484-9952
Nut with rubber boot		484-9953

Connector M12

Type	Ordering number
5 PIN	937-0648

Orifice in P-Port

Type	∅D mm	Seal ring	Ordering number
D1	1.0	9.25 x 1.75	484-9973
D2	1.5		484-9974
D3	2.0		484-9975
D4	2.2		484-9977
D5	2.5		484-9976

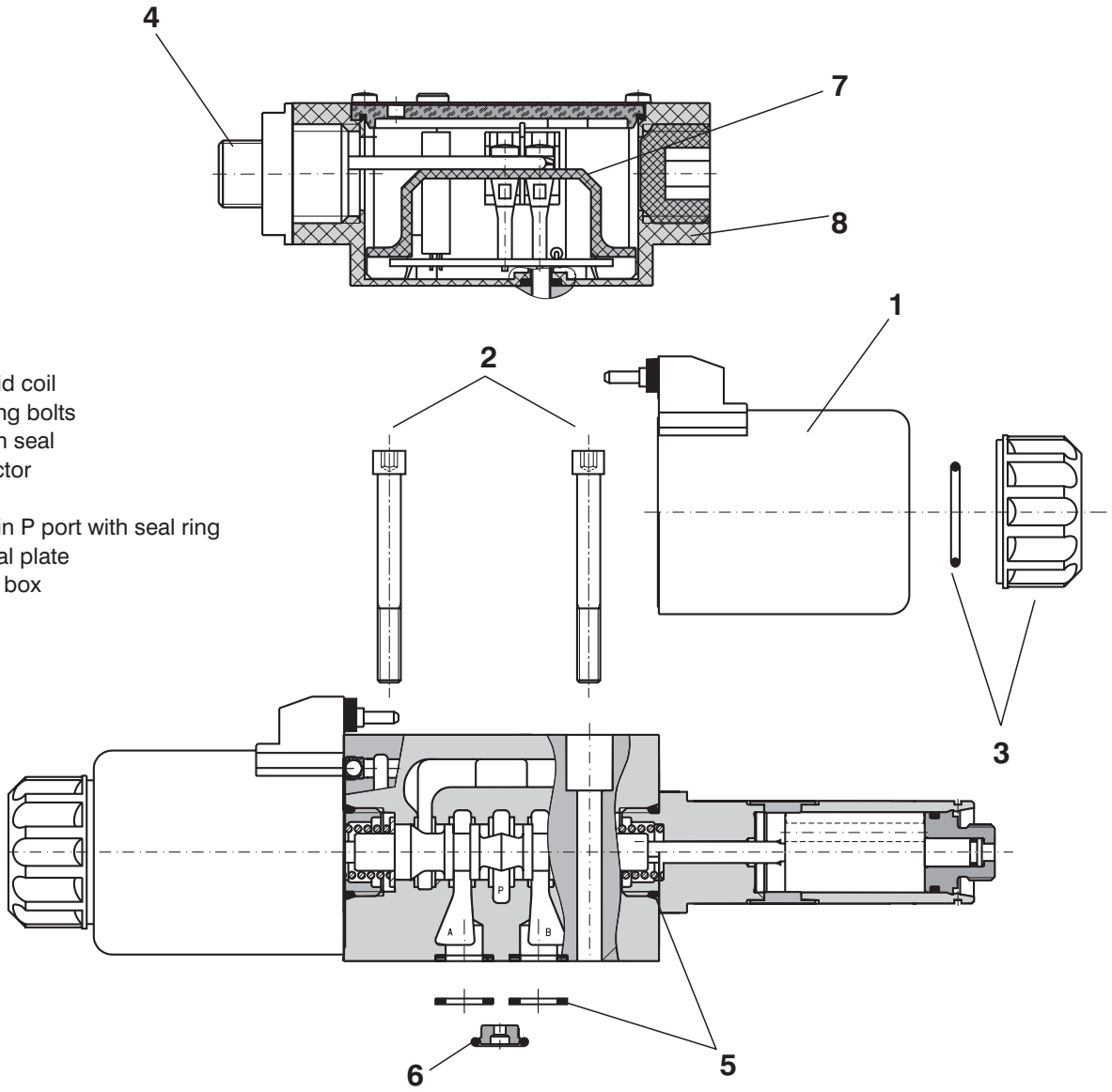
Seal Kit

Type	Dimensions, quantity			Ordering number
Standard - NBR70	9.25 x 1.68 (4 pcs.)	17 x 1.8 (2 pcs.)	9.25 x 1.75 (1 pc)	484-9965
Viton	9.25 x 1.78 (4 pcs.)	17.17 x 1.78 (2 pcs.)		484-9971

Bolt Kit

Dimensions, quantity	Bolt torque	Ordering number
M5 x 45 DIN 912-10.9 (4 pcs.)	8.9 Nm	484-9958

Spare Parts



1 Solenoid coil
2 Mounting bolts
3 Nut with seal
4 Connector
5 Seal kit
6 Orifice in P port with seal ring
7 Terminal plate
8 - Wiring box

Caution!

- For applications outside the given parameters, please consult us.
- For directional control valves with two solenoids, one solenoids must be without power before the other solenoid can be powered charged.
- The packing foil is recyclable.
- Mounting bolts or studs must be ordered separately.
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law.

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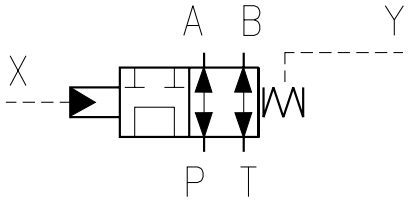
www.argo-hytos.com

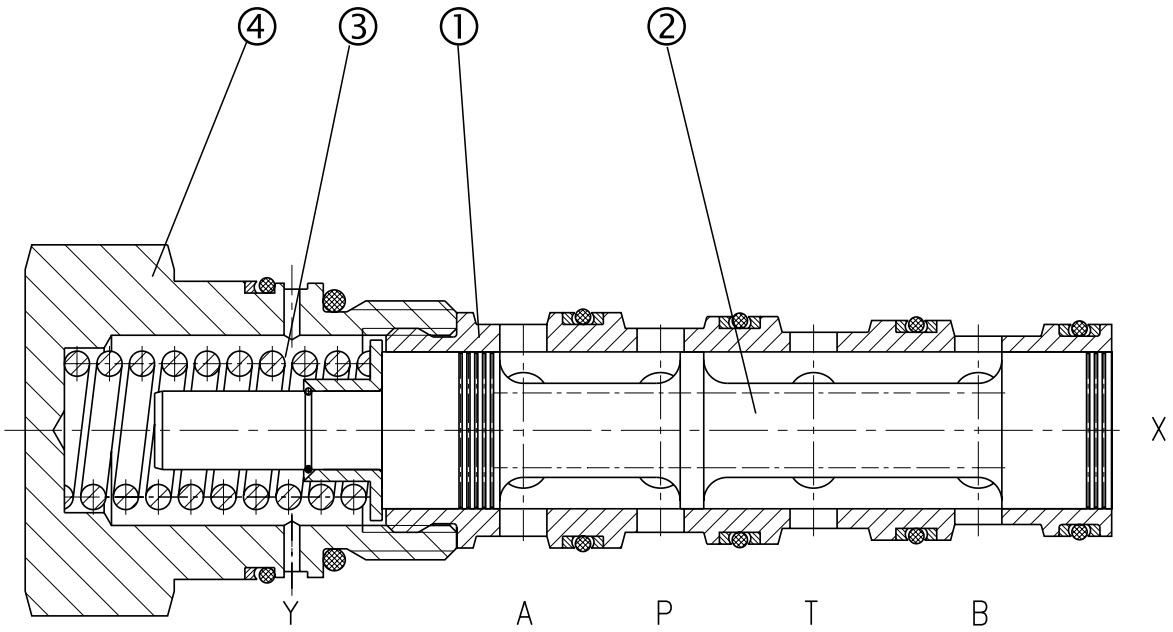
HYTOS	*HYDRAULIC OPERATED DIRECTIONAL CONTROL VALVES*	***RPH1-10***	**HA 4031 11/2001**
	Size 10	...4641 PSI (320 bar)	...21 US GPM (80 L/min)
	Preliminary technical information		



- **Spool type directional valves hydraulic operated**
- **Cartrige design**

Functional Description

The directional control valves are of cartridge design and comprise a housing (1) with a cylidrical spool (2), return springs (3)and the plug (4).



Ordering Code

RPH1-10 ☐ / **-1** ☐

Hydraulic pilot operated directional valves

Nominal size

Number of operating positions
two positions **2**

Seals
omit NBR
V FPM (Viton)

Model

Technical Data

Valve size	mm	10
Maximum flow (according to pressure and functional symbols)	L/min	see p-Q characteristics
Maximum operating pressure at ports P, A, B, T, X, Y	bar	320
Maximum operating pressure at port T	bar	320
Minimum pilot pressure	bar	15 + pressure at port T
Maximum pilot pressure	bar	320
Pilot volume	cm^3	2
Pressure drop	bar	see Δp-Q characteristics
Hydraulic fluid		Hydraulic oils
Fluid temperature range for standard sealing (NBR)	°C	-30 ... +80
Viscosity range	mm^2/s	20 ... 400
Maximum degree of fluid contamination		Class 18/15 to ISO 4406. Therefore, we recommend a filter with a retention rate $\beta_{10} \geq 75$
Service life	cycles	10^7
Weight valve with 1 actuator	kg	0,65
Mounting position		optional

Spare Parts

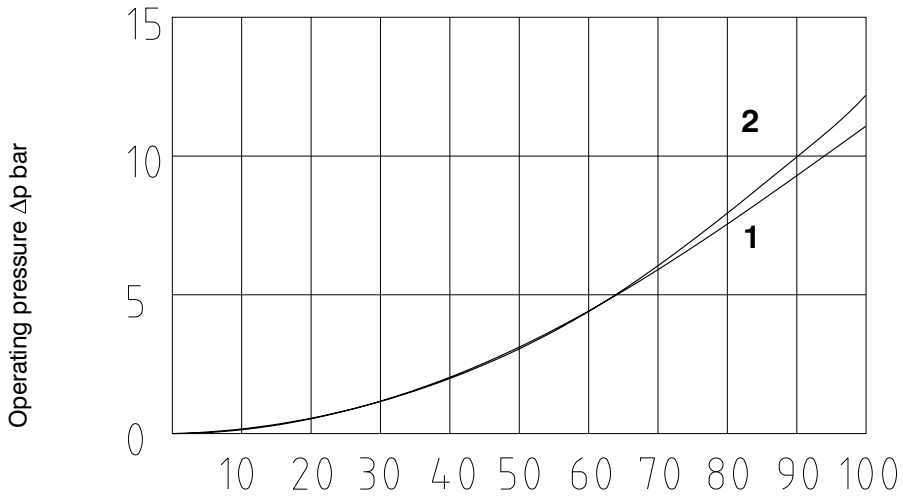
Seal kit

Type	Dimensions, number O-ring	Dimensions, number Back-up ring	Ordering number
Standard NBR	29,7x2,8 (1 pcs.)	35,38 x 38,08 x 1,14 (1 pcs.)	482-1001
	34,65 x 1,78 NBR 70 (1 pcs.)	27,43 x 30,13 x 1,14 (2 pcs.)	
	25,12 x 1,78 NBR 70 (1 pcs.)	25,86 x 28,56 x 1,14 (2 pcs.)	
	23,52 x 1,78 NBR 90 (2 pcs.)	24,26 x 26,96 x 1,4 (4 pcs.)	
Viton	26,7 x 1,78 V 70 (1 pcs.)	-	

Δp-Q Characteristics

Measured at ν = 166 SUS (35 mm²/s) and t = 104 °F (40 °C)

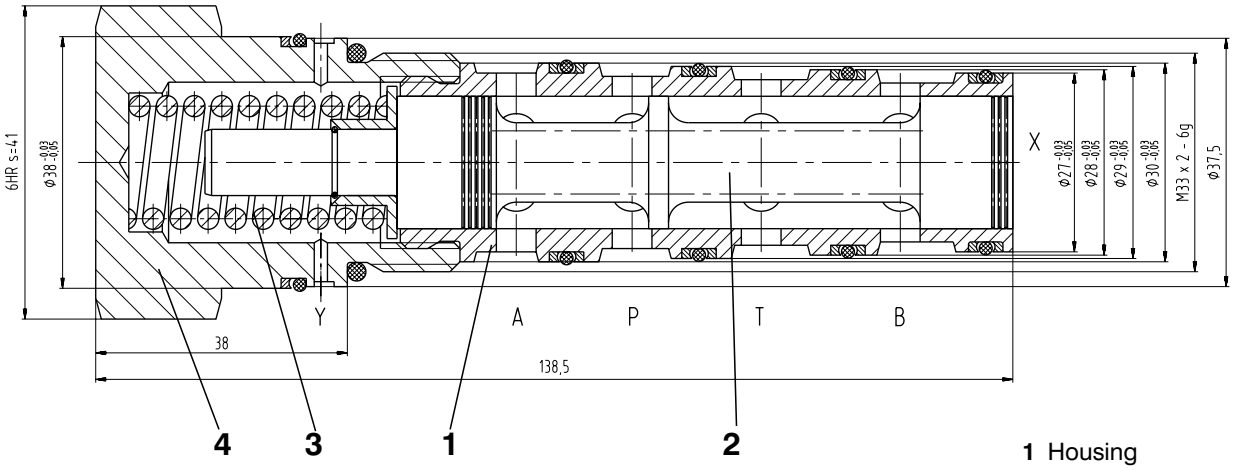
Pressure drop Δp related to flow rate.



1	2
B - T	P - T
P - A	

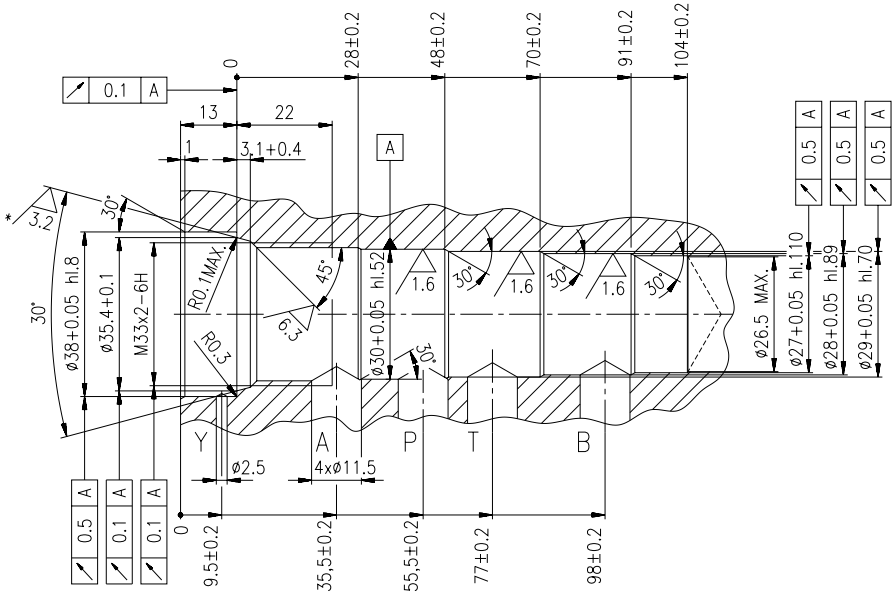
Valve Dimensions

Dimensions in millimetres



1 Housing
2 Cylindrical spool
3 Return springs
4 Plug

M1:1



Caution!

- With functional symbol A51 for pressures exceeding 1450 PSI (100 bar), the T-port should be connected directly to the tank. Other functional symbols on request.
- The packing foil is recyclable.
- The transport plate is to be returned to the supplier.
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law.

HYTOS a.s., CZ- 543 15 Vrchlabí, Czech Republic

Tel.: +420-438-403111, Fax: +420-438-403421, e-mail: sales@hytos.cz

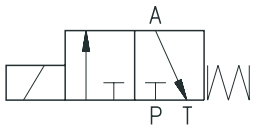
3/2-way cartridge directional valve solenoid operated

ROV1-04

HA 4032
11/2001

Size 04 ...3046 PSI (320 bar) 15,85... US GPM (60 L/min)

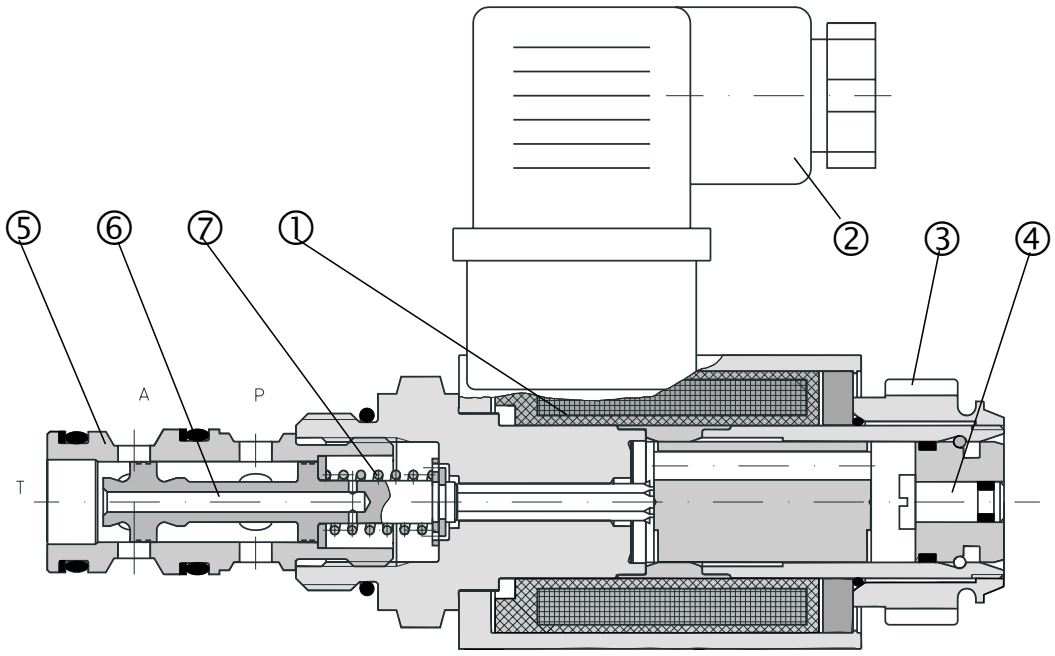
Preliminary technical information



- ❑ **3/2-way directional cartridge control valve**
- ❑ **High switching reliability after long idling time**
- ❑ **Short switching times**
- ❑ **Push button manual override**
- ❑ **Single electrical connection**
- ❑ **High transmitted power**

Functional Description

3/2-way directional cartridge valves with solenoid operation are designed to check and control the direction of the hydraulic fluid. The valve consists of housing (5), cylindrical spool (6), return spring (7) and operating solenoid (1). The operating solenoid is a DC solenoid. For AC supply, the solenoid is provided with a rectifier which is integrated directly into the connector (2). With model E5, the rectifier is integrated directly into the solenoid coil. The electrical connector can be turned by 90°. By loosening the retaining nut (3), the solenoid (1) can be turned arbitrarily in the range of 360°, or replaced. In the case of solenoid or power malfunction, the spool of the valve can be repositioned by manual overide (4), provided the pressure in the T-port does not exceed 363 PSI (25 bar).
The valve body and the solenoid are zinc coated.



Ordering Code

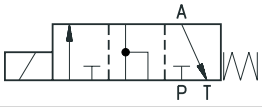
ROV1-042 ☐ / ☐ ☐ ☐ ☐

3/2-way directional spool control valve

Nominal size

Number of operating positions

Functional symbol



D21

Rated supply voltage of solenoids

12 V DC / 2.41 A	**01200**
14 V DC / 1.66 A	**01400**
21 V DC / 1.14 A	**02100**
24 V DC / 1.16 A	**02400**
42 V DC / 0.59 A	**04200**
48 V DC / 0.56 A	**04800**
60 V DC / 0.41 A	**06000**
102 V DC / 0.24 A	**10200**
205 V DC / 0.12 A	**20500**
24 V AC / 1.44 A / 50 (60) Hz	**02450**
115 V AC / 0.26 A / 50 (60) Hz	**11550**
230 V AC / 0.14 A / 50 (60) Hz	**23050**

The AC coils correspond with E5 type.

Manual override

no designation	standard
N1	covered with rubber protective

Electrical connector, DIN 43 650

no designation	without connector
K1	connector without rectifier - Pg11
K2	connector without rectifier and with LED
K3	connector with rectifier
K4	connector with rectifier and LED
K5	connector without rectifier - Pg9

Type of the solenoid coil

E1	with DIN connector
E2	with DIN connector and quenching diode
E3	with AMP connector
E4	with AMP connector and quenching diode
E5	with integrated rectifier and DIN connector
E6	with Kostal connector
E7	with Kostal connector and quenching diode

Recommended solenoid coils used with electrical connector with rectifiers - type designation K3, K4

Rated supply source voltage (permissible rated voltage variation ± 10 %)	Type designation of the solenoid voltage
24 V AC / 1.44 A / 50 (60) Hz	02100
115 V AC / 0.26 A / 50 (60) Hz	10200
230 V AC / 0.14 A / 50 (60) Hz	20500

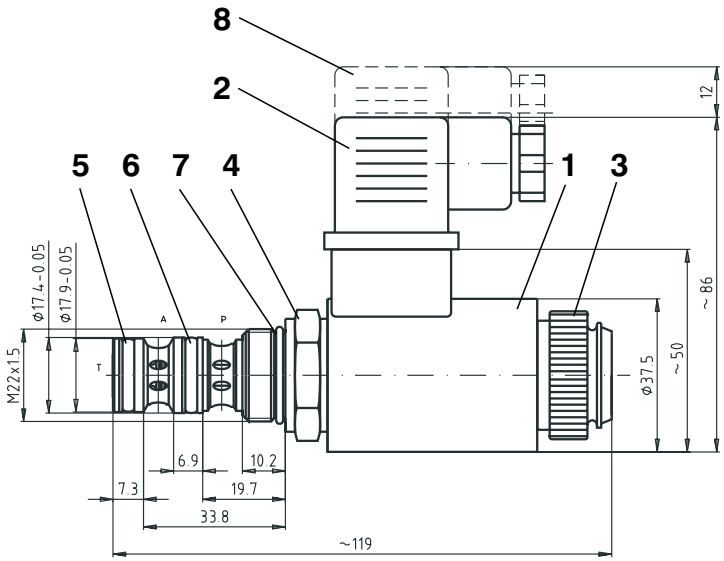
Tecnical Data

Nominal size	mm	04			
Maximum flow	L/min	60			
Max. operating pressure	bar	210			
Pressure drop	bar	see Δp-Q characteristics			
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP - RP 91H in viscosity classes ISO VG 32, 46 and 68			
Fluid temperature range	°C	-30 ... +80 for NBR seals -20 ... +80 for FPM seals			
Ambient temperature, max.	°C	+50			
Viscosity range	mm^2/s	20 ... 400			
Maximum degree of fluid contamination		Class 21/18/15 according to ISO 4406 (1999).			
Permissible rated voltage variation	%	DC	-10 +6	AC	+5 -15
Max. switching frequency	1/h	15 000			
Switching time, ON; at rated voltage and 20 mm^2/s	ms	DC		AC	
Switching time, OFF; at 20 mm^2/s	ms				
Duty cycle	%	100			
Service life		10^7			
Enclosure type to DIN 40 050		IP 65			
Weight	kg	0,65			
Mounting position		optional			

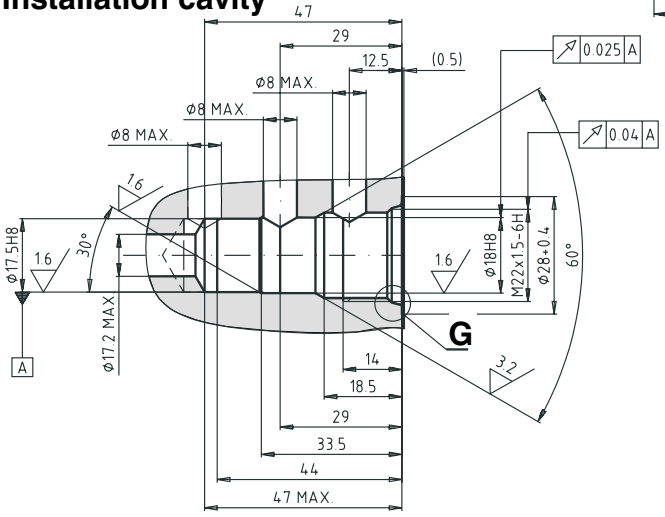
Valve Dimensions

Dimensions in millimetres

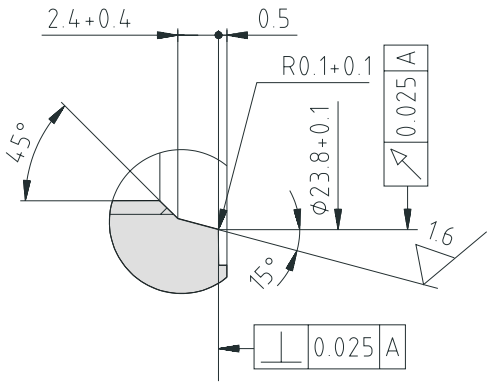
1 Solenoid turnable in the range of 360°
2 Electrical connector, DIN 43 650
3 Retaining nut of the solenoid
4 Outside hexagon s = 27 mm
Tightening torque 30 Nm
5 Combined sealing:
O-ring 14 x 1.78 (1 pc.)
Back-up ring 14.73 x 17.43 x 1.1 (1 pc.)
suplied with valve
6 Combined sealing:
O-ring 14 x 1.78 (1 pc.)
Back-up ring 14.73 x 17.43 x 1.1 (1 pc.)
suplied with valve
7 O-ring 19.4 x 2.1 (1 pc.)
suplied with valve
8 Space required to remove connector



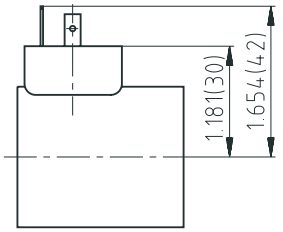
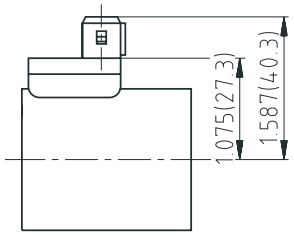
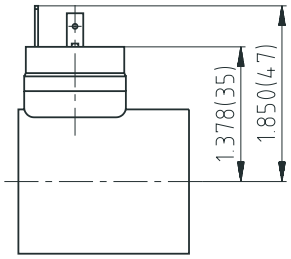
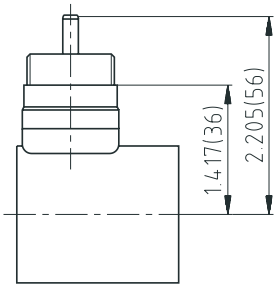
Installation cavity



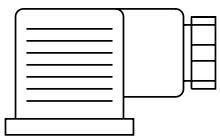
Detail G



Type of the Solenoid Coil

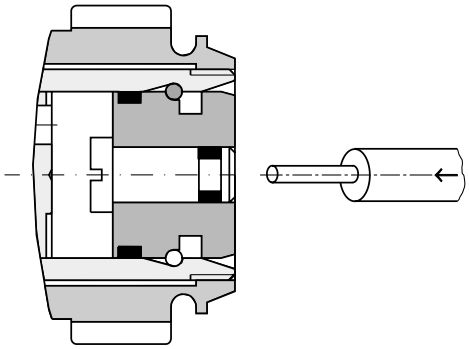
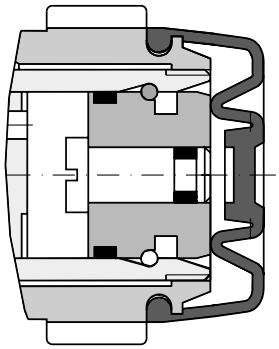
Designation	Dimensional sketch	Description
E1		Solenoid coil with terminal for the electrical connector, DIN 43 650.
E2		Solenoid coil with integrated quenching diode (bipolar transil diode) and terminal for the electrical connector, DIN 43 650.
E3		Solenoid coil with terminal for AMP electrical connector.
E4		Solenoid coil with integrated quenching diode (bipolar transil diode) and terminal for AMP electrical connector.
E5		Solenoid coil with integrated rectifier and terminal for the electrical connector, DIN 43 650.
E6		Solenoid coil with terminal for Kostal electrical connector.
E7		Solenoid coil with integrated quenching diode (bipolar transil diode) and terminal for Kostal electrical connector.

Electrical Connector, DIN 43 650



Designation	Type	Model	Max. input voltage
K1	Connector B (black)	without rectifier - Pg11	250 V DC
	Connector A (grey)		250 V AC
K5	Connector B (black)	without rectifier - Pg9	250 V DC
	Connector A (grey)		250 V AC
K2	Connector B (black)	without rectifier and with LED	12...30 V DC
	Connector A (grey)	without rectifier and with LED	12...30 V DC
K3	Connector B (black)	with rectifier	250 V AC
	Connector A (grey)	with rectifier	250 V AC
K4	Connector B (black)	with rectifier and with LED	250 V AC
	Connector A (grey)	with rectifier and with LED	250 V AC

Manual Override

STANDARD	RUBBER BOOT
Without designation Dimensional sketch  Description Standard model of the manual override. Standard retaining nut of the solenoid.	Designation **N1** Dimensional sketch  Description Manual override protected by rubber boot. The valve can be hand operated after removing the rubber boot.

Solenoid coil

Type designation of the coil voltage	Type of the coil						
	E1	E2	E3	E4	E5	E6	E7
	Ordering number						
01200	936-0022	936-0690	936-0670	936-0680		936-4880	936-4882
01400	936-0650	936-0691	936-0673	936-0681		-	-
02100	936-0651	936-0692	936-0674	936-0682		-	-
02400	936-0026	936-0693	936-0672	936-0683		936-4881	936-4883
04200	936-0653	936-0695	936-0676	936-0685		-	-
04800	936-0031	936-0696	936-0677	936-0686		-	-
06000	936-0654	-	-	-		-	-
10200	936-0655	-	-	-		-	-
20500	936-0036	-	-	-		-	-
02450					936-2125		
11550					936-2175		
23050					936-2185		

Solenoid retaining nut with seal

Type of nut	Seal ring	Order number
Standard nut	18 x 1.5	403-1009
Nut with rubber boot		486-9001

Electrical connector, DIN 43 650

Type designation	Model	Max. input voltage	Connector A grey	Connector B black
			Ordering number	
K1	without rectifier - Pg11	0...250 V AC/DC	936-9902	936-9901
K5	without rectifier - Pg9	0...250 V AC/DC	936-9906	936-9905
K2	without rectifier and with LED	12...30 V DC	936-9908	936-9907
K3	with rectifier	0...250 V AC	936-9904	936-9903
K4	with rectifier and with LED	0...250 V AC	936-9910	936-9909

Seal kit

Type	Dimensions, quantity		Ordering number
	Back-up ring	O-ring	
Standard - NBR90	14,73 x 17,43 x 1,14 (2 pcs.)	14 x 1,78 (2 pcs.)	403-1005
Standard - NBR80	-	19,4 x 2,1 (1 pc.)	

Caution!

- The packing foil is recyclable.
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law.

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Solenoid - Operated Directional Control Valves with Wirebox

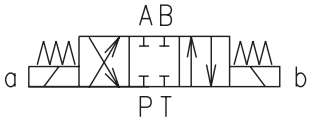
RPEW4-06

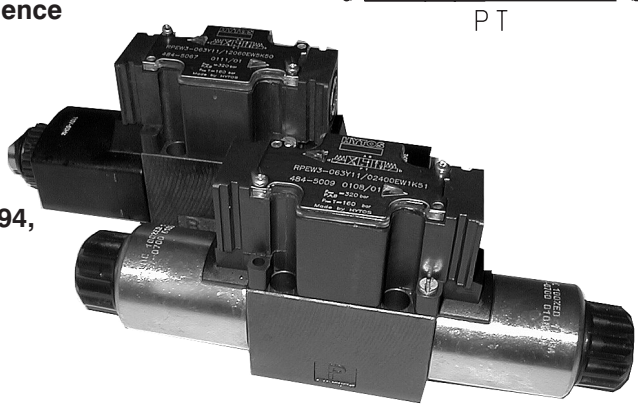
Size 06 • p_{max} up to 320 bar • Q_{max} up to 80 L/min

HA 4035
2/2005

Replaces
HA 4035 2/2004

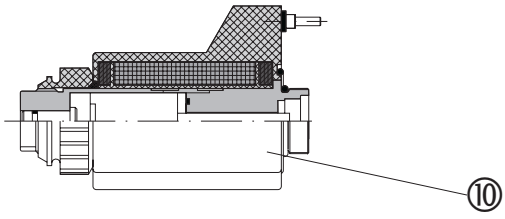
- ❑ **4/3-, 4/2- and 3/2- way directional control valves**
- ❑ **Four-land spool - reduced functional dependence on fluid viscosity**
- ❑ **Wet pin core tubes**
- ❑ **Push button manual override**
- ❑ **Installation dimensions to ISO 4401-03-02-0-94, DIN 24 340-A6**
- ❑ **Subplates see Data Sheet HA 0002**
- ❑ **CSA Upon request**

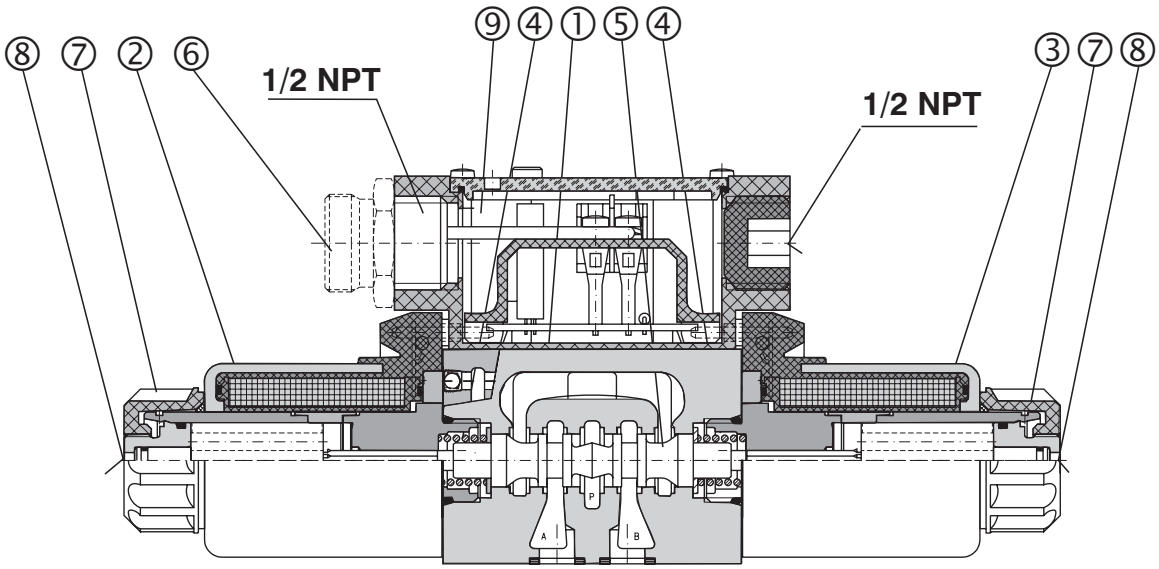




Functional Description

The RPEW4 directional control valves consist of housing (1), a control spool (5) with two centering springs (4) and cylindrical operating solenoids (2, 3), electric wirebox (9) and connector (6).
The three-position directional control valves are fitted with two solenoids and two springs. Two-position directional control valves have either one solenoid and one return spring or two solenoids and a detent assembly.
The solenoids are supplied with DC and AC (10) - voltage through the 1/2 NPT Ports on the wirebox (optional on both sides) or through Connector Item (3 - Pin single solenoid, 5 - Pin - double solenoid) see wiring diagram (page 7). The wires are connected to a terminal plate inside the wirebox. Optional lights are installed on this terminal plate for shift indication. The lights are visible as raised arrows on the valve label. The solenoids are retained by the Nut (7) and plug-in to the wirebox. Plug -in design allows easy removal without wire change.
In the case of solenoid malfunction or power failure, the spool of the valve can be shifted by manual override (8), provided the pressure in T- port does not exceed 25 bar.
The valve housing (1) is phosphate coated and the solenoids (2, 3) are zinc coated.





Ordering Code

RPEW4-06 ☐ ☐ / ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐

Solenoid Operated Directional Control Valves with Wirebox

Nominal Size

Number of Valve Positions

two positions	**2**
three positions	**3**

Spool Symbols
see the table spool symbols

Rated Supply Voltage of Solenoids
(at the wirebox terminals)

12 V DC / 2.64 A	**01200**
24 V DC / 1.32 A	**02400**
120V AC/60Hz*	**12060**

*AC coils
or
DC coils with rectifier in wirebox

CSA Upon request

Note: For other voltages consult factory

Type of Solenoid Coil for Wiring Box (Plug-In-Coil)

DC solenoid	**EW1**
DC solenoid with quenching diode	**EW2**
AC solenoid	**EW5**

Type of Wirebox

Wirebox for DC and AC	**K**
Wirebox AC rectified (rectifier in wirebox)	**R**

Seals

omit	NBR
V	FPM (Viton)

Orifice in P Port

omit	without orifice
D1	∅1.0 mm
D2	∅1.5 mm
D3	∅2.0 mm
D4	∅2.2 mm
D5	∅2.5 mm

Spool Speed Control Orifice

omit	without damping
T1	orifice ∅0.7 mm in solenoid*

* for DC voltage only

Manual Override

omit	standard
N1	covered with retaining nut*
N2	covered with rubber boot*

* for DC voltage only

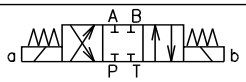
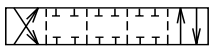
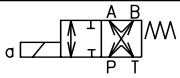
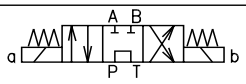
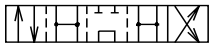
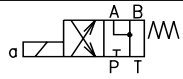
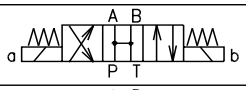
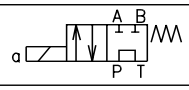
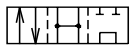
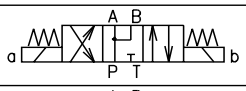
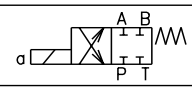
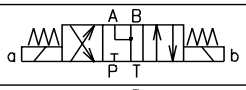
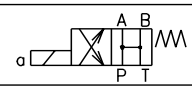
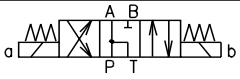
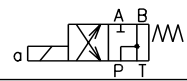
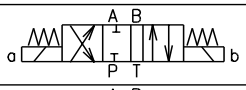
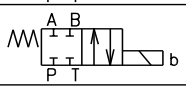
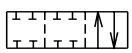
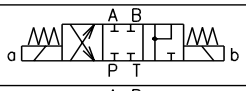
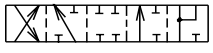
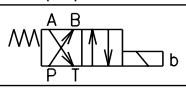
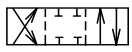
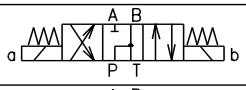
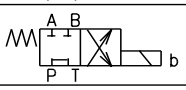
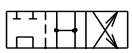
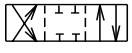
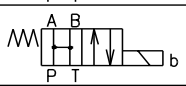
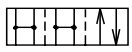
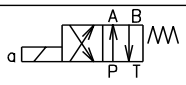
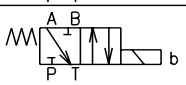
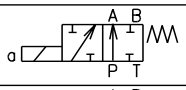
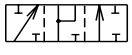
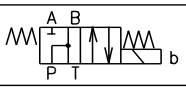
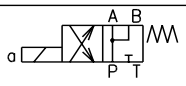
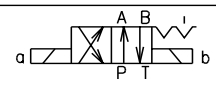
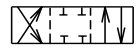
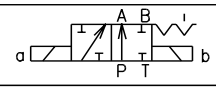
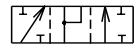
Wirebox Configurations:

50	Standard wiring box with 1/2 NPT both ends (Either side can be used for wiring, Remove cover -plug accordingly)
51	Standard wiring box with 1/2 NPT both ends and lights (B- side pluged, A - side covert for shipping)
52	Wiring box with 3 PIN connector ANSI/B93.55M mounted on A-side (B-side pluged, only for single solenoid valves)
53	Wiring box with 3 PIN connector ANSI/B93.55M mounted on B-side (A-side pluged, only for single solenoid valves)
54	Wiring box with 3 PIN connector ANSI/B93.55M mounted on A-side with light (B-side pluged, only for single solenoid valves)
55	Wiring box with 3 PIN connector ANSI/B93.55M mounted on B-side with light (A-side pluged, only for single solenoid valves)
56	Wiring box with 5 PIN connector ANSI/B93.55M mounted on A-side (B-side pluged, only for double solenoid valves)
57	Wiring box with 5 PIN connector ANSI/B93.55M mounted on B-side (A-side pluged, only for double solenoid valves)
58	Wiring box with 5 PIN connector ANSI/B93.55M mounted on A-side with light (B-side pluged, only for double solenoid valves)
59	Wiring box with 5 PIN connector ANSI/B93.55M mounted on B-side with light (A-side pluged, only for double solenoid valves)

Technical Data

Nominal size	mm	06		
Maximum flow	L/min	see p-Q characteristics		
Max. operating pressure at porte P, A, B	bar	320		
Max. operating pressure at port T	bar	210		
Pressure drop	bar	see Δp-Q characteristics		
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP-RP 91H in viscosity classes ISO VG 32, 46 and 68.		
Fluid temperature range for NBR seals	°C	-30 ... +80		
Fluid temperature range for FPM seals	°C	-20 ... +80		
Ambient temperature, max.	°C	up to +50		
Viscosity range	mm^2/s	20 ... 400		
Maximum degree of fluid contamination		Class 21/18/15 to ISO 4406 (1999).		
Max. allowable voltage variation	%	DC: ± 10%	AC: ±10%	
Max. switching frequency	1/h	15 000		
Switching time, on: at ν=32 mm^2/s	ms	DC: 30 ... 50	AC direct: CF	AC rec.: 30 ... 40
Switching time, off: at ν=32 mm^2/s	ms	DC: 10 ... 50	AC direct: CF	AC rec.: 30 ... 70
Duty cycle	%	100		
Service life	cycles	10^7		
Enclosure type to DIN 40 050		IP 65		
Weigt - valve with 1 solenoid - valve with 2 solenoids	kg	1.3 1.9		
Mounting position		optional		

Functional Symbols

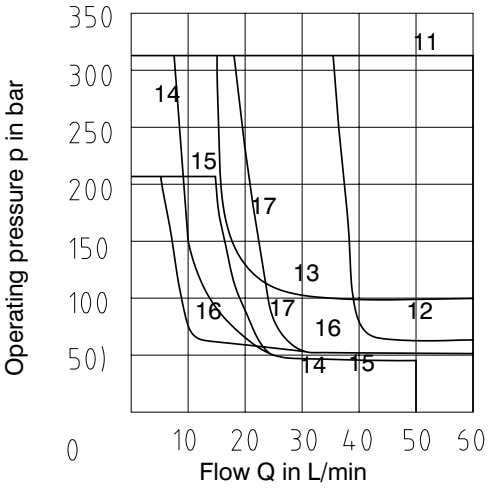
Designation	Symbol	Interposition	Designation	Symbol	Interposition
Z11			X25		
C11			Y51		
H11			C51		
P11			Z51		
Y11			H51		
L21			F51		
B11			Z11		
Z21			X11		
F11			C11		
R11			H11		
R21			N11		
A51			F11		
P51			J15		
			J75		

p-Q Characteristics

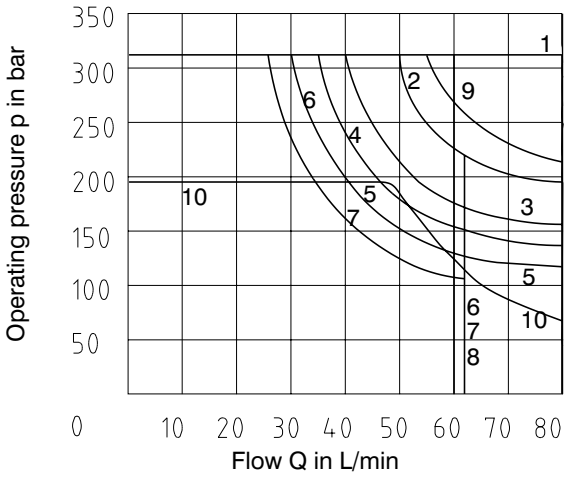
Measured at ν = 32 mm^2/s and t = 40 °C

Operating limits for maximum hydraulic power transferred by the directional valve. For respective spool type - see Functional Symbols.

AC characteristics



DC characteristics



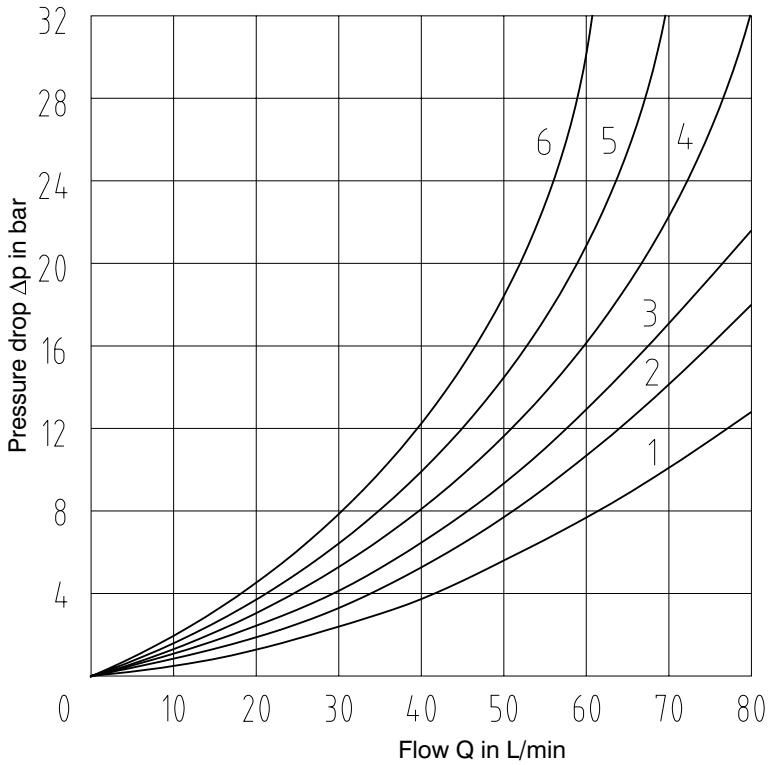
AC		AC		AC	
Z51	12	Z11	12	J15	11
Y11	12	C11	13	R21	15
Y51	12	X11	17	R11	17
C51	13	P11	11		
H11	14	L21	14		
H51	14	F11	14		
B11	12	F51	14		
N11	12	A51	16		
P51	11	J75	16		

DC		DC		DC	
Z11	1	J75	9	H51	7
C11	6	F11	5	F51	7
H11	3	R11	3	X11	3
P11	1	R21	4	N11	7
Y11	2	A51	5	X25	10
L21	5	P51	1		
B11	8	Y51	2		
J15	1	C51	6		
Z21	1	Z51	1		

Δp-Q Characteristics

Measured at ν = 32 mm^2/s and t = 40 °C

Pressure drop Δp related to flow rate.

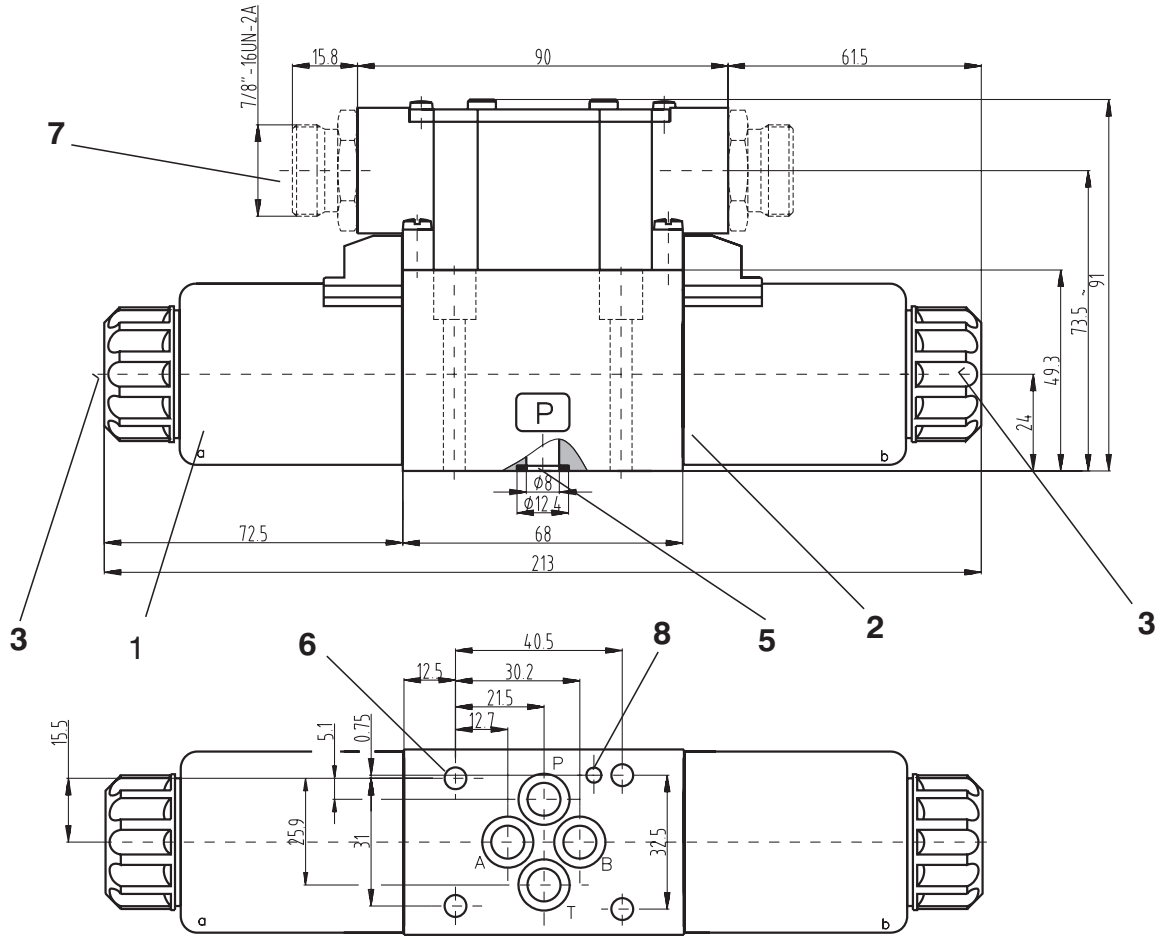


	P-A	P-B	A-T	B-T	P-T
Z11	2	2	3	3	
C11	5	5	5	6	3
H11	2	2	2	3	3
P11	1	1	3	3	
Y11	2	2	2	2	
L21	2	2	3	3	
B11	2	2	3	3	
Z21		2	3		
F11	1	2		3	3
R11	2	2	3	3	
R21	2	2	3	3	
A51	2	2			
P51		1	3		
Y51		2	2		
C51	2			3	4
Z51		2	3		
H51		2	3		
F51		2	3		
X11	2	2	3	3	
N11	2	2	3	3	
J15	2	2	3	3	
J75	2	2			

Valve Dimensions

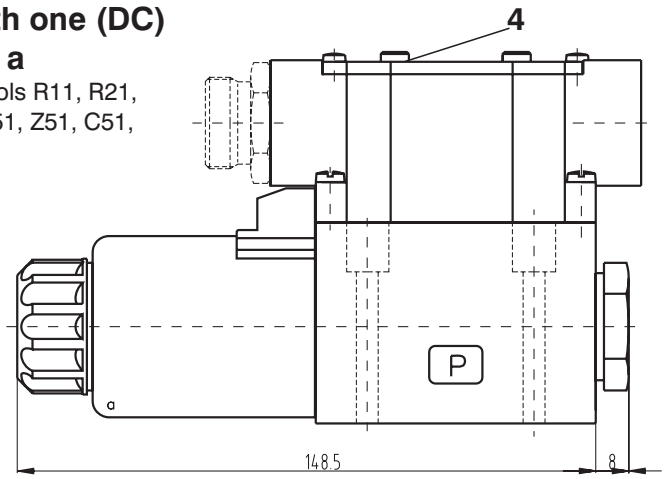
Dimensions in millimetres

Valve with two DC voltage supplied solenoids and AC rectified (Code R)



Valve with one (DC) solenoid a

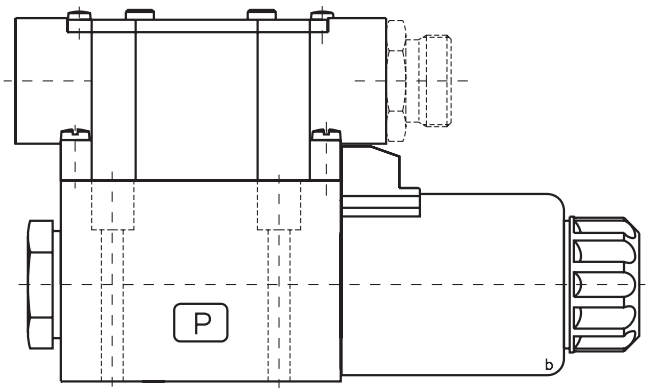
Spool symbols R11, R21, A51,P51, Y51, Z51, C51, H51, F51

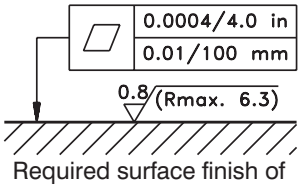


1 Solenoid a (Nut torque 3Nm)
2 Solenoid b (Nut torque 3Nm)
3 Manual override
4 Name plate
5 Square ring (4 pcs.)
0,36 x 0,66 supplied with valve
6 4 mounting holes
7 Electrical connector
8 Pin hole

Valve with one (DC) solenoid b

Spool symbols X11, Z11, C11, H11, N11, F11



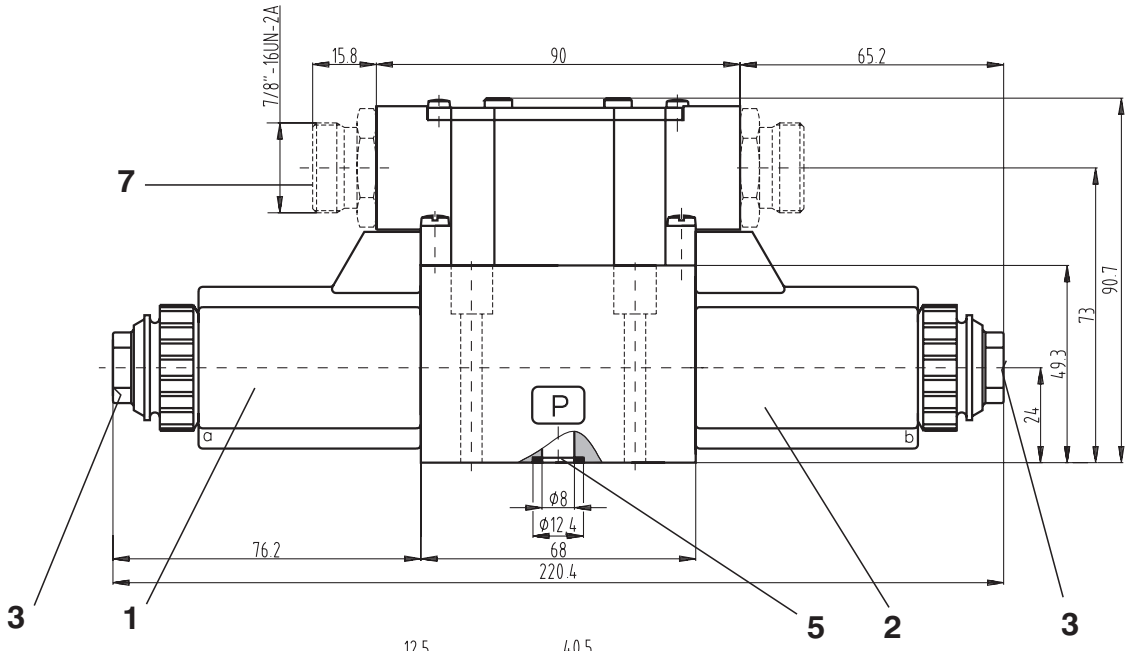


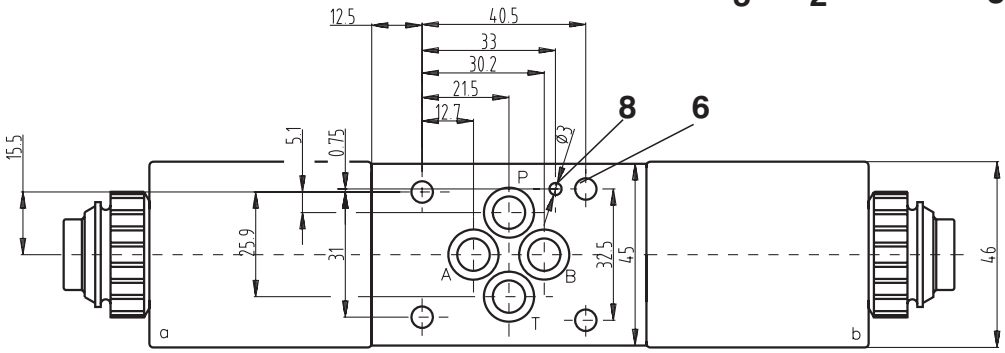
Required surface finish of interface

Valve Dimensions

Dimensions in millimetres

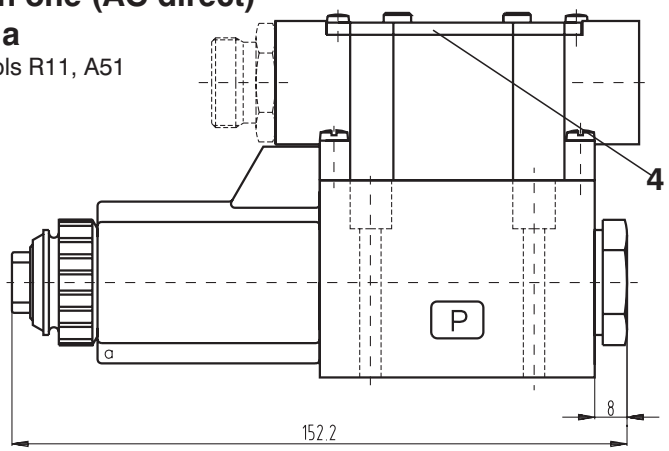
Valve with two AC direct voltage supplied solenoids





Valve with one (AC direct) solenoid a

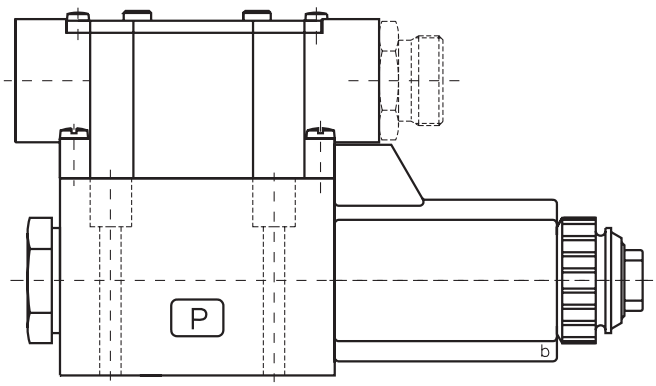
Spool symbols R11, A51

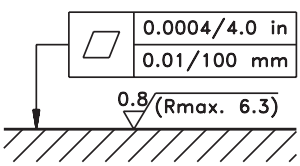


1 Solenoid a (Nut torque 3Nm)
2 Solenoid b (Nut torque 3Nm)
3 Manual override
4 Name plate
5 Square ring (4 pcs.)
0.36 x 0.66 supplied with valve
6 4 mounting holes
7 Electrical connector
8 Pin hole

Valve with one (AC) solenoid b

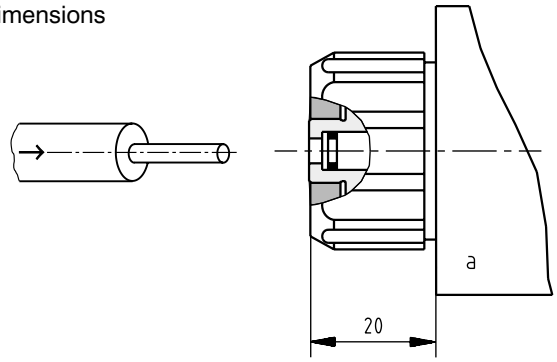
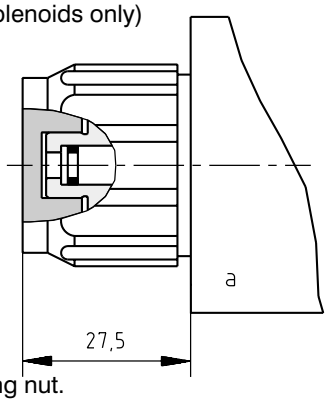
Spool symbols Z11, C11, H11

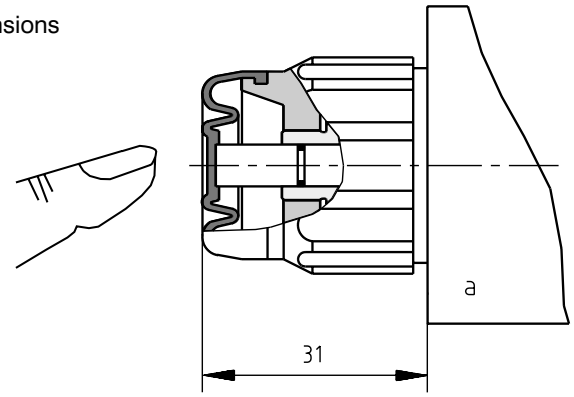




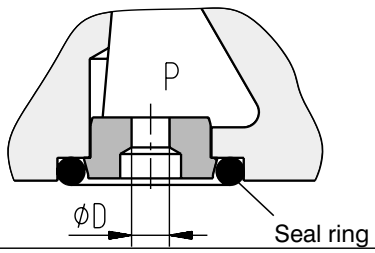
Required surface finish of interface

Manual Override

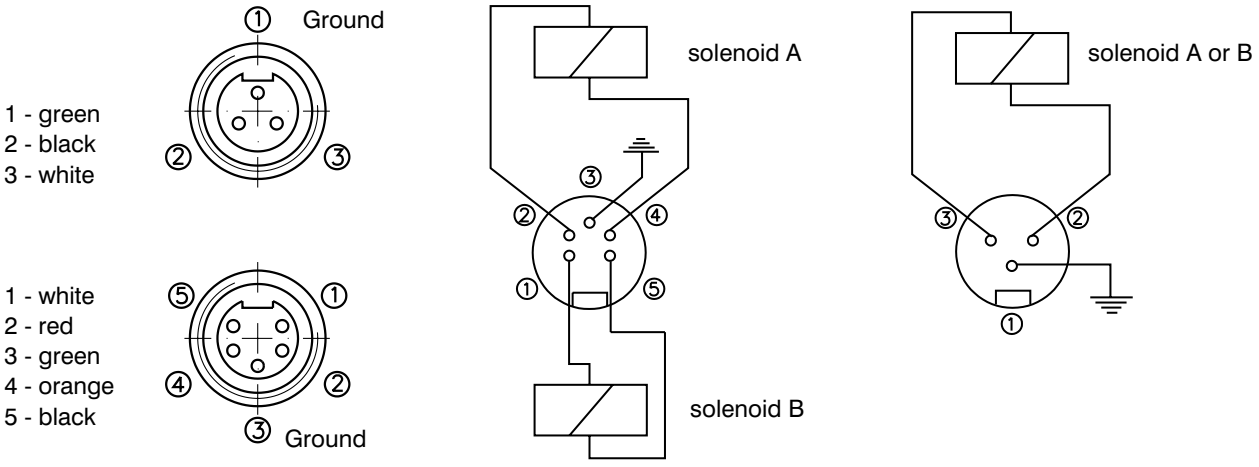
STANDARD	CLOSED NUT
Dimensions  Standard model of the manual override. Standard retaining nut of the solenoid.	Type **N1** (For DC voltage solenoids only) Dimensions  Manual override with retaining nut. Can be used after removing nut.

RUBBER BOOT	
Type **N2** (For DC voltage solenoids only) Dimensions  Manual override protected by rubber boot.	

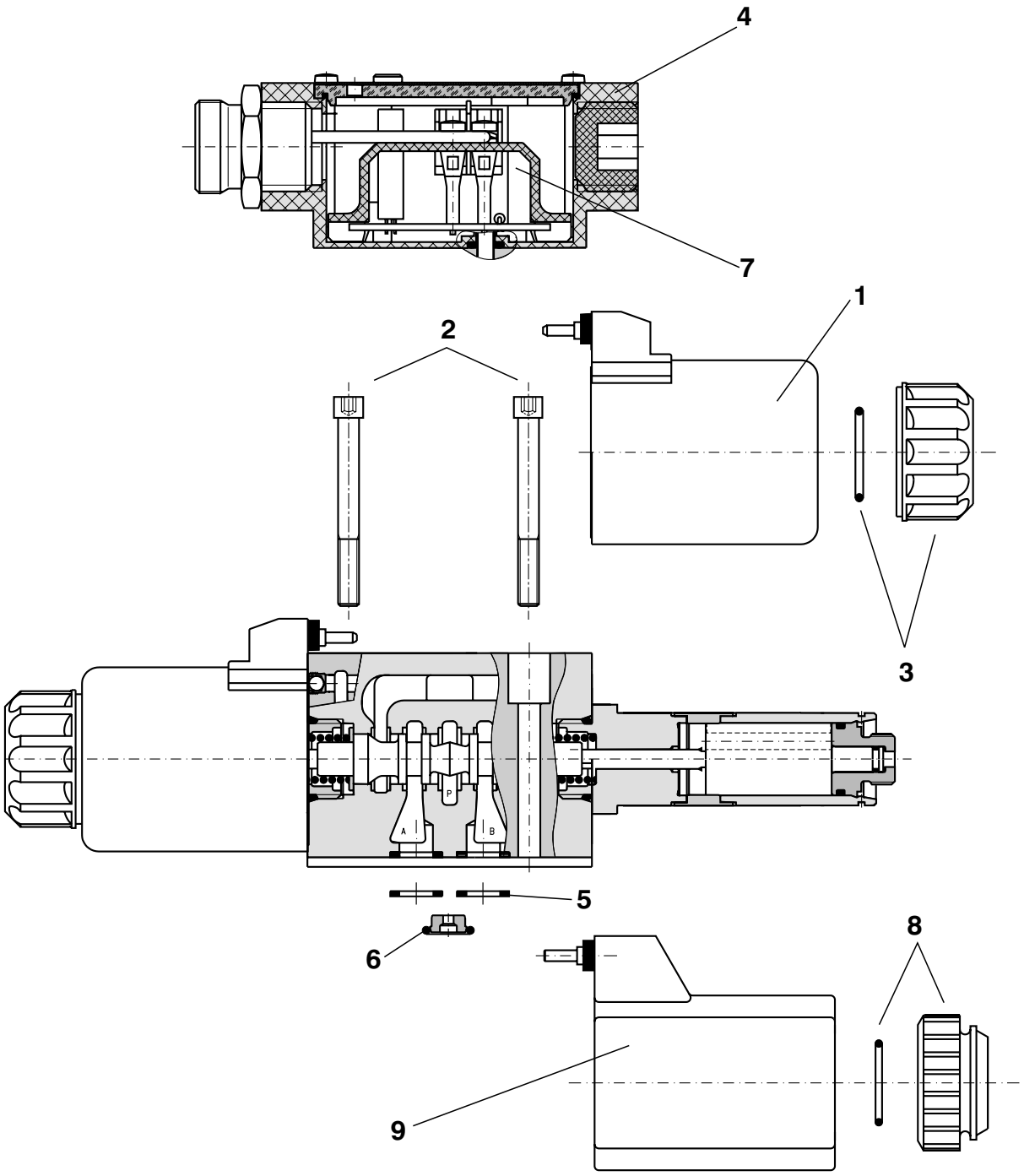
Orifice in P-Port

Type	∅D mm	Dimensions	Description
D1	1.0		P-Port orifices limit the flow into the directional control valve.
D2	1.5		
D3	2.0		
D4	2.2		
D5	2.5		

Connector - US - Standard - ANSI/B93.55M



Spare Parts



1 Solenoid coil (DC solenoid)
2 Mounting bolts
3 Nut with seal (Nut torque 3Nm)
4 Wiring box + connector
5 Seal kit
6 Orifice in P port with seal ring
7 Terminal plate
8 Nut with seal (AC solenoid)
9 AC voltage supplied solenoid

Spare Parts

Wiringbox	
Type	Ordering number
Wiring box without terminal plate	937-0668
Terminal Plates	
Type	Ordering number
Terminal plate - basic design A+B	937-0669
Terminal plate A - basic design	937-0696
Terminal plate B - basic design	937-0671
Terminal plate 12V DC - lights A+B	937-0672
Terminal plate 24V DC - lights A+B	937-0675
Terminal plate 12V DC - light A	937-0673
Terminal plate 12V DC - light B	937-0674
Terminal plate 24V DC - light A	937-0676
Terminal plate 24V DC - light B	937-0677
Terminal plate 120V AC - lights A+B	937-0678
Terminal plate 120V AC - light A	937-0679
Terminal plate 120V AC - light B	937-0680
Terminal plate 120V AC - rectifier A+B	937-0684
Terminal plate 120V AC - rectifier A	937-0685
Terminal plate 120V AC - rectifier B	937-0686
Terminal plate 120V AC - rectifier A+B and lights A+B	937-0687
Terminal plate 120V AC - rectifier and light A	937-0688
Terminal plate 120V AC - rectifier and light B	937-0689

Solenoid Coil		
Voltage rating	Type	Ordering number
01200 DC	EW1	937-0701
*01200 DC	EW1	944-0005
02400 DC	EW1	937-0700
*02400 DC	EW1	944-0006
10600 DC (120V/60Hz rectifier)	EW1	937-0702
12060 AC	EW5	937-0703
01200 DC	EW2	937-0710
02400 DC	EW2	937-0711

Solenoid Retaining Nut with Seal		
Type of the nut	Seal ring	Ordering number
Standard nut	22 x 2	484-9951
Nut with detent assembly (DC only)		484-9954
Closed nut (DC only)		484-9952
Nut with rubber boot (DC only)		484-9953
Standard nut for AC voltage supplied solenoid	18 x 1,5	486-9010

Electrical Connector, ANSI/B93.55M	
Type	Ordering number
3 PIN	937-0616
5 PIN	937-0617

* CSA Upon request

Orifice in P-Port

Type	∅D mm	Seal ring	Ordering number
D1	1.0	9.25 x 1.75	484-9973
D2	1.5		484-9974
D3	2.0		484-9975
D4	2.2		484-9977
D5	2.5		484-9976

Seal Kit

Type	Dimensions, quantity			Ordering number
Standard - NBR70	9.25 x 1.68 (4 pcs.)	17 x 1.8 (2 pcs.)	9.25 x 1.75 (1 pc)	484-9965
Viton	9.25 x 1.78 (4 pcs.)	17.17 x 1.78 (2 pcs.)		484-9971

Bolt Kit (for studs see HA 0030)

Dimensions, quantity	Bolt torque	Ordering number
M5 x 45 DIN 912-10.9 (4 pcs.)	8.9 Nm	484-9958

Caution!

- For applications outside the given parameters, please consult us.
- With spool symbols A51 and J75 for pressures exceeding 160 bar, the T-port should be connected directly to the tank.
- For directional control valves with two solenoids, one solenoids must be without power before the other solenoid can be powered charged. Switching time for directional valves with detent assembly (impulse control) should not be shorter than 60 ms. With directional valves with cushioned spool shifting, the switching time must correspond with the shifting time.
- Other for spool symbols on request.
- The packing foil is recyclable.
- Mounting bolts or studs must be ordered separately.
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law.

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www.argo-hytos.com

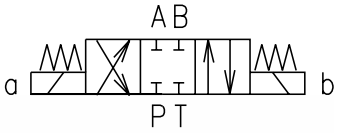
Solenoid - operated directional control valves

RPES3-06

HA 4036
2/2003

Size 06 p_{max} up to 320 bar Q_{max} up to 80 L/min

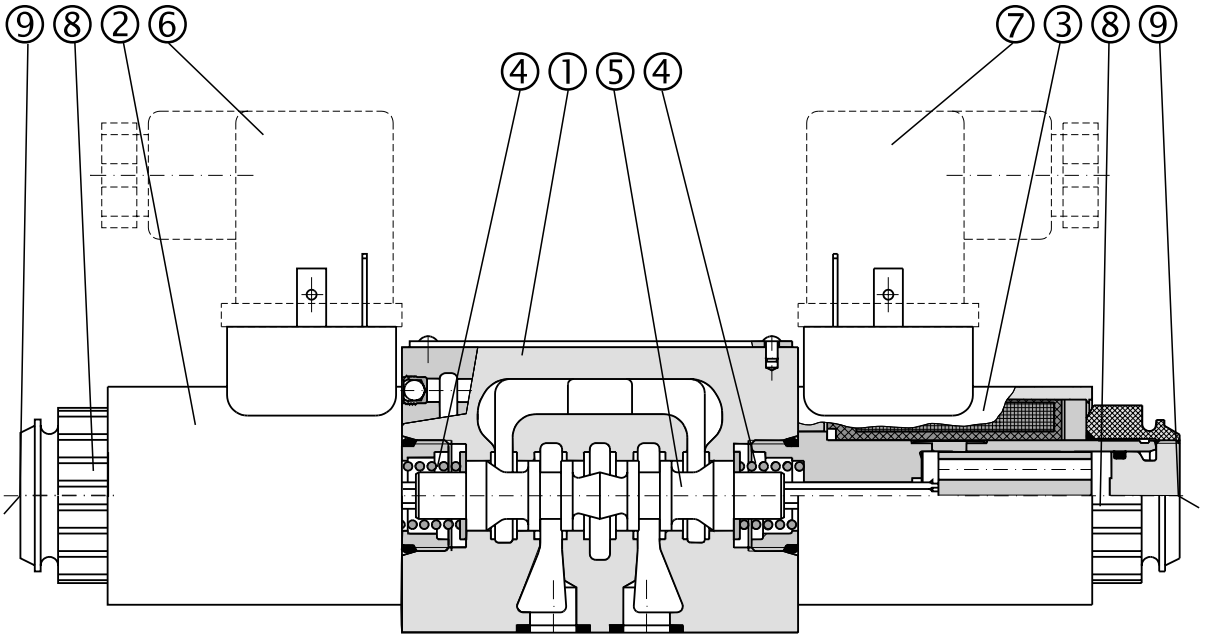
Preliminary technical information



- **4/3-, 4/2- and 3/2- way directional control valves**
- **Cylindrical AC or DC, solenoids with removable coils - Elektrical connector can be rotated in either direction by 90°**
- **Wet pin core tubes**
- **Push button manual override**
- **Installation dimensions to ISO 4401-03-02-0-94, DIN 24 340-A6**
- **Subplates see data sheet HA 0002**

Functional Description

The RPES3 directional control valves consist of housing (1), a control spool (5) with two centering springs (4) and cylindrical operating solenoids (2, 3).
The three-position directional control valves are fitted with two solenoids and two springs. Two-position directional control valves have either one solenoid and one return spring or two solenoids and a detent assembly.
The operating solenoids are DC solenoids. For AC supply the solenoids are provided with a rectifier, which is integrated directly into the connectors A, B (6, 7) or inside the coil. The connectors (6, 7) can be turned by 90°. By loosening the nut (8), the solenoids can be turned or replaced without interfering with any seals of the valve.
In the case of solenoid malfunction or power failure, the spool of the valve can be shifted by manual override (9), provided the pressure in T-port does not exceed 25 bar.
The basic surface treatment of the valve housing (1) is phosphate coated and the solenoids (2, 3) are zinc coated.



Ordering Code

RPES3-06 □ □ / □ □ □ □ □ □ □

Solenoid operated directional control valves

Nominal size

Number of operating positions
two positions **2**
three positions **3**

Functional symbols
see the table Functional symbols

Rated supply voltage of solenoids
(at the coil terminals)

12 V DC / 2,41 A	**01200**
14 V DC / 1,66 A	**01400**
21 V DC / 1,14 A	**02100**
24 V DC / 1,16 A	**02400**
42 V DC / 0,59 A	**04200**
48 V DC / 0,56 A	**04800**
60 V DC / 0,41 A	**06000**
102 V DC / 0,24 A	**10200**
205 V DC / 0,12 A	**20500**
24 V AC / 1,44 A / 50 (60) Hz	**02450**
115V AC / 0,26 A / 50 (60) Hz	**11550**
230 V AC / 0,14 A / 50 (60) Hz	**23050**

The AC coils correspond with E5 type.

Type of solenoid coil

with DIN connector	**E1**
with DIN connector and quenching diode	**E2**
with AMP connector	**E3**
with AMP connector and quenching diode	**E4**
with integrated rectifier and DIN connector	**E5**
with Kostal connector	**E6**
with Kostal connector and quenching diode	**E7**

***Electrical connector, DIN 43 650**

no designation	without connector
K1	connector without rectifier
K2	connector without rectifier with LED and quenching diode
K3	connector with rectifier
K4	connector with rectifier with LED and quenching diode
K5	connector without rectifier

Manual overide

no designation	standard
N2	covered with rubber boot

Orifice in P port

no designation	without orifice
D1	∅1.0 mm
D2	∅1.5 mm
D3	∅2.0 mm
D4	∅2.2 mm
D5	∅2.5 mm

Seals

no designation	NBR
V	FPM (Viton)

Sensing of the end position

no designation	without sensing
S1	sensing of the end position

*other information on pages 6 and 9

Note: Connector of the position sensor is not supplied (see ordering number on page 9)

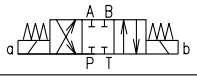
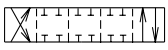
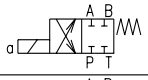
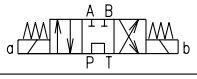
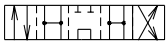
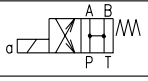
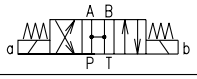
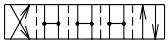
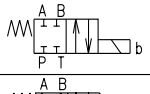
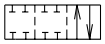
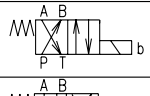
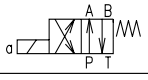
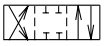
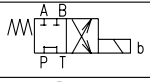
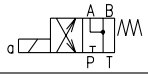
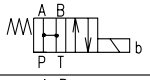
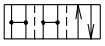
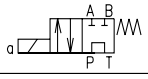
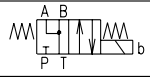
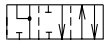
Recommended solenoid coils used with elektrical connector with rectifiers - type designation K3, K4

Rated supply source voltage (permissible rated voltage variation ±10 %)	Type designation of the solenoid voltage
24 V AC / 1,44 A / 50 (60) Hz	02100
115 V AC / 0,26 A / 50 (60) Hz	10200
230 V AC / 0,14 A / 50 (60) Hz	20500

Technical Data

Nominal size	mm	06	
Maximum flow	L/min	see p-Q characteristics	
Max. operating pressure at porte P, A, B	bar	320	
Max. operating pressure at port T	bar	100	
Pressure drop	bar	see Δp-Q characteristics	
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP-RP 91H in viscosity classes ISO VG 32, 46 and 68.	
Fluid temperature range for NBR seals	°C	-30 ... +80	
Fluid temperature range for FPM seals	°C	-20 ... +80	
Ambient temperature, max.	°C	up to +50	
Viscosity range	mm^2/s	20 ... 400	
Maximum degree of fluid contamination		Class 21/18/15 to ISO 4406 (1999).	
Max. allowable voltage variation	%	DC: ±10	AC: ±10
Max. switching frequency	1/h	15 000	
Switching time, on: at ν=32 mm^2/s	ms	DC: 30 ... 50	AC: 30 ... 40
Switching time, off: at ν=32 mm^2/s	ms	DC: 10 ... 50	AC: 30 ... 70
Duty cycle	%	100	
Service life	cycles	10^7	
Enclosure type to DIN 40 050		IP 65	
Weigt - valve with 1 solenoid - valve with 2 solenoids	kg	1,4 1,6	
Mounting position		optional	

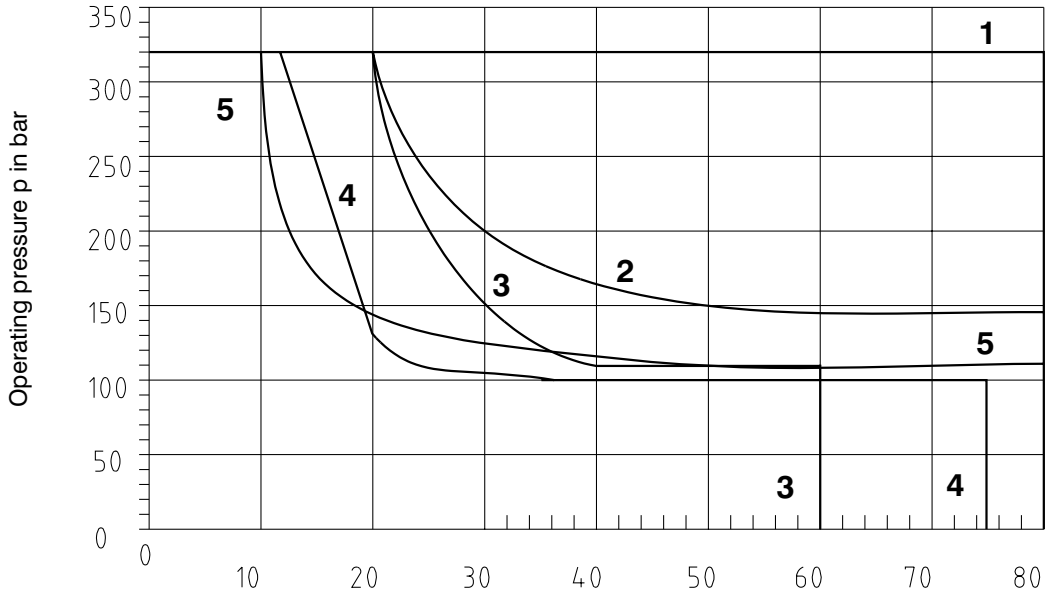
Functional Symbols

Designation	Symbol	Interposition	Designation	Symbol	Interposition
Z11			Z51		
C11			H51		
H11			Z11		
Y11			X11		
R11			C11		
Y51			H11		
C51			Y11		

p-Q Characteristics

Measured at $\nu = 32\ mm^2/s$ and $t = 40\ °C$

Operating limits for maximum hydraulic power transferred by the directional valve.
For respective spool type - see functional symbols.

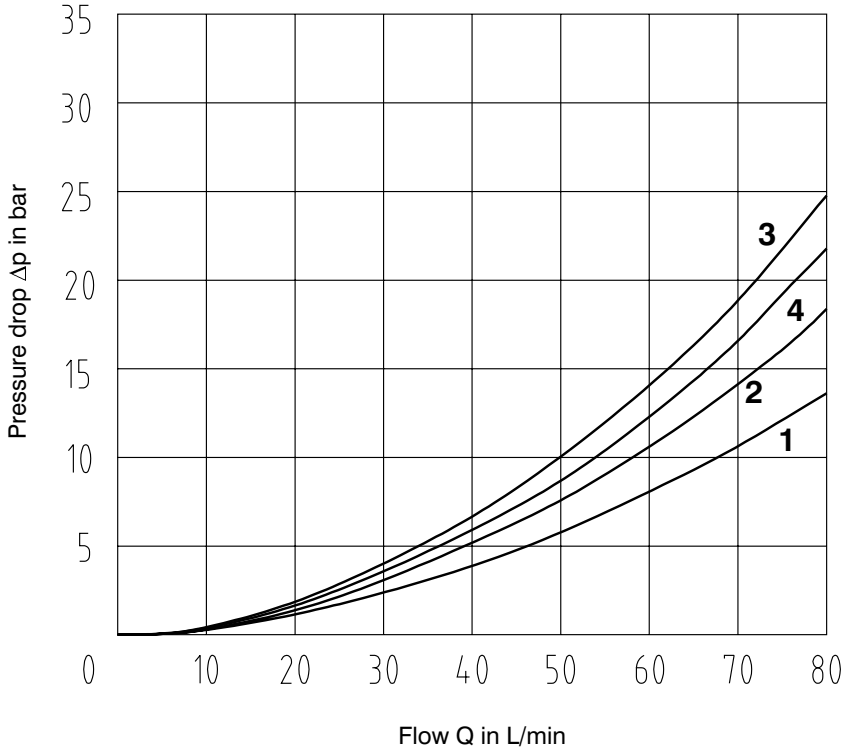


Z11	2	X11	4
C11	5	Z51	2
H11	1	C51	5
R11	4	H51	1
Y11	3	Y51	3

Δp-Q Characteristics

Measured at $\nu = 32\ mm^2/s$ and $t = 40\ °C$

Pressure drop Δp related to flow rate.

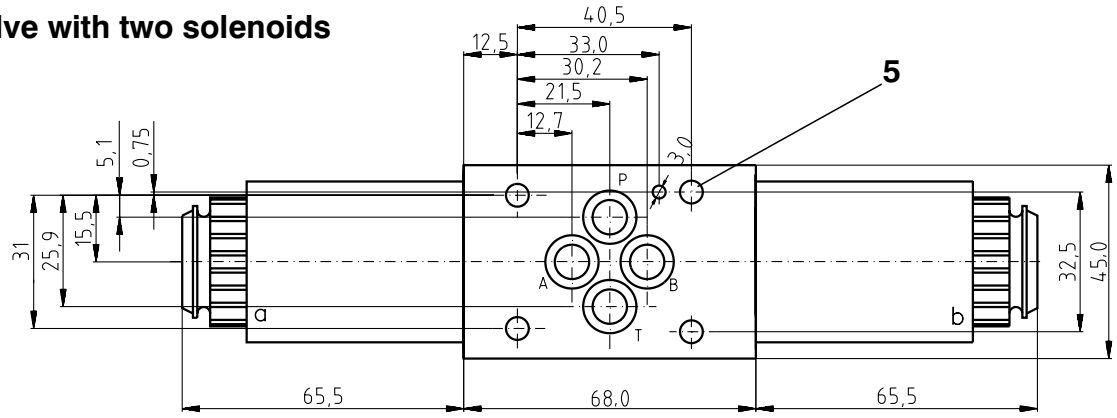


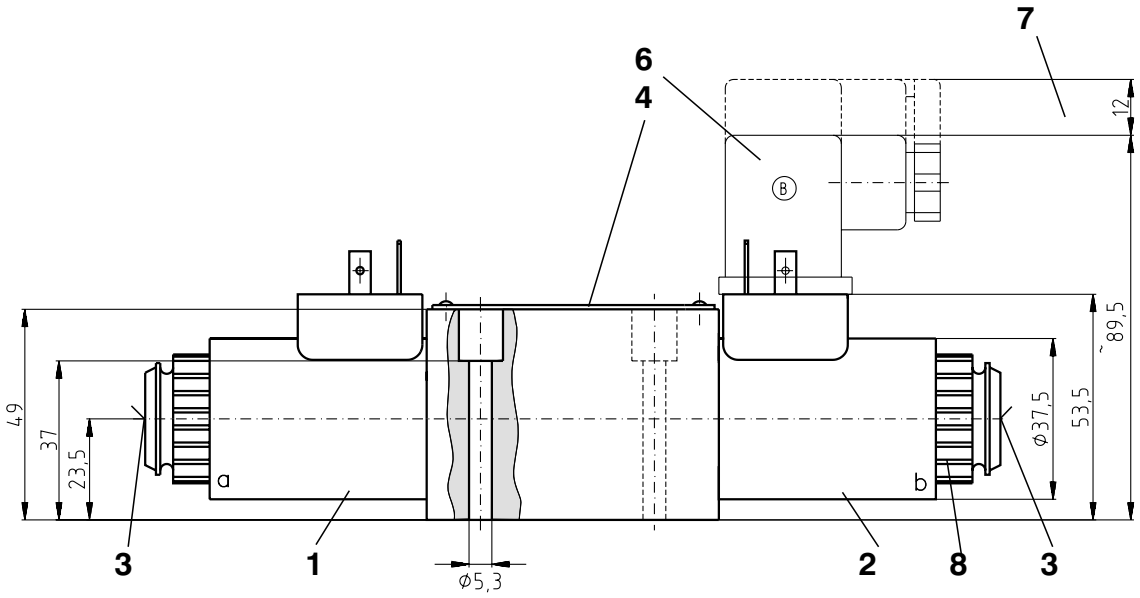
	P-A	P-B	A-T	B-T	P-T
Z11	2	2	2	2	
C11	2	2	2	2	3
H11	1	1	1	1	2
Y11	2	2	1		
R11	2	2	4	2	
X11	2	2	4	2	
Z51		2	2		
C51	2			2	3
H51		1	1		
Y51		2	2		

Valve Dimensions

Dimensions in millimetres

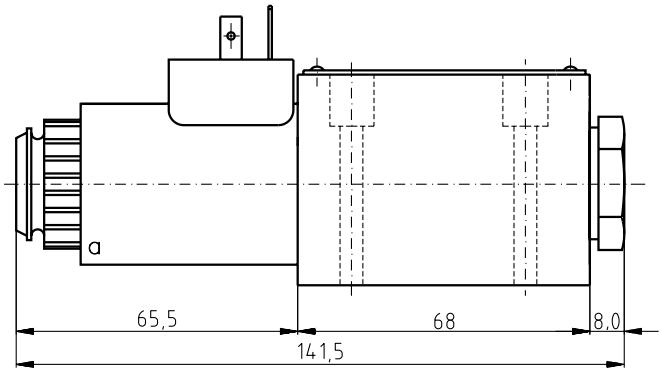
Valve with two solenoids



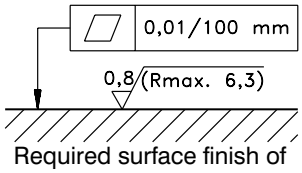


Valve with one solenoid a

Spool symbols R11, Z51, C51, H51, Y51



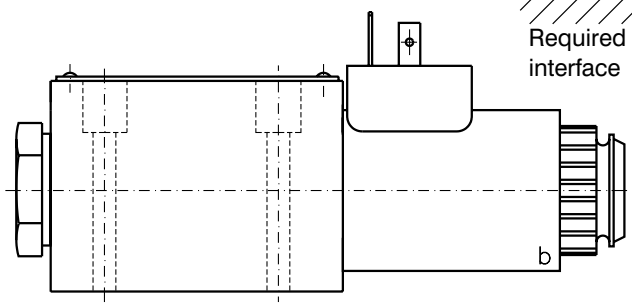
1 Solenoid a
2 Solenoid b
3 Manual override
4 Name plate
5 4 mounting holes
6 Electrical connector, DIN 43 650
7 Space required to remove connector
8 Retaining nut of the solenoid



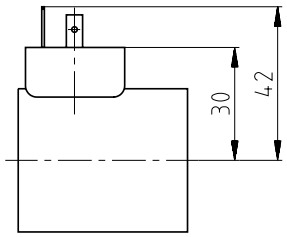
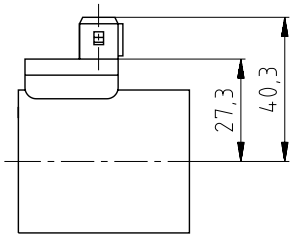
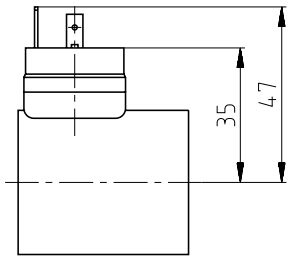
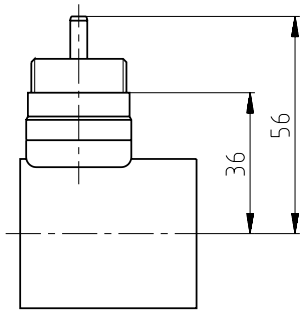
Required surface finish of interface

Valve with one solenoid b

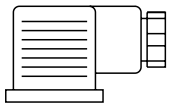
Spool symbols Z11, X11, C11, H11, Y11



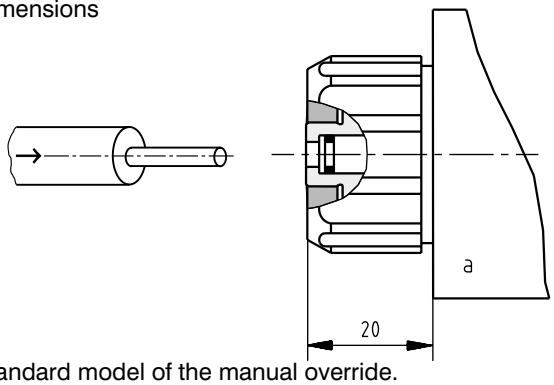
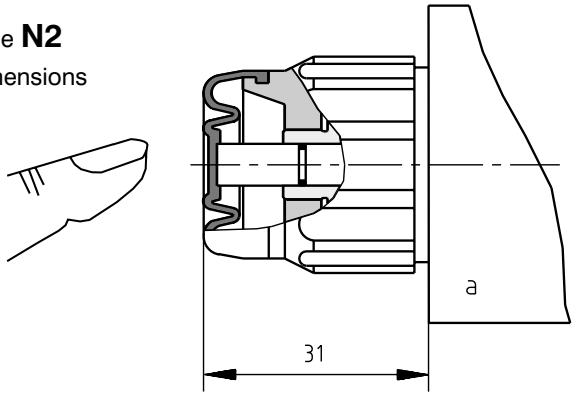
Type of the Solenoid Coil

Designation	Dimensional sketch	Description
E1		Solenoid coil with terminal for the electrical connector, DIN 43 650.
E2		Solenoid coil with integrated quenching diode (bipolar transil diode) and terminal for the electrical connector, DIN 43 650.
E3		Solenoid coil with terminal for AMP electrical connector.
E4		Solenoid coil with integrated quenching diode (bipolar transil diode) and terminal for AMP electrical connector.
E5		Solenoid coil with integrated rectifier and terminal for the electrical connector, DIN 43 650.
E6		Solenoid coil with terminal for Kostal electrical connector.
E7		Solenoid coil with terminal for Kostal electrical connector and integrated quenching diode (bipolar transil diode).

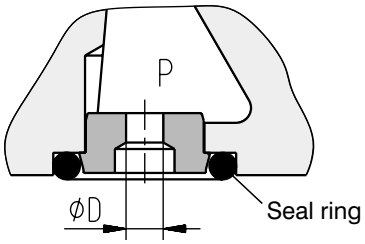
Electrical Connector, DIN 43 650

Designation	Type	Model	Max. input voltage	
K1	Connector B (black)	without rectifier - M16x1,5 (bushing bore ∅ 6-8 mm)	230 V DC	
	Connector A (grey)		230 V AC	
K5	Connector B (black)	without rectifier - M16x1,5 (bushing bore ∅ 4-6 mm)	230 V DC	
	Connector A (grey)		230 V AC	
K2	Connector B (black)	without rectifier and with LED - M16x1,5 (bushing bore ∅ 6-8 mm)	12...24 V DC	
	Connector A (grey)		12...24 V DC	
K3	Connector B (black)	with rectifier - M16x1,5 (bushing bore ∅ 6-8 mm)	230 V AC	
	Connector A (grey)		230 V AC	
K4	Connector B (black)	with rectifier and with LED - M16x1,5 (bushing bore ∅ 6-8 mm)	230 V AC	
	Connector A (grey)		230 V AC	

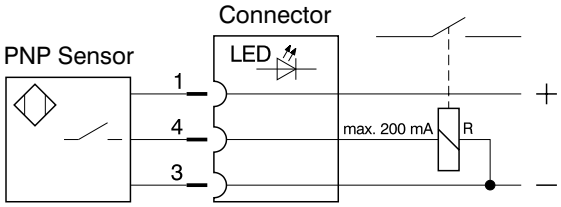
Manual Override

STANDARD	RUBBER BOOT
Dimensions  Standard model of the manual override. Standard retaining nut of the solenoid.	Type **N2** Dimensions  Manual override protected by rubber boot.

Orifice in P-Port

Type	∅D (mm)	Dimensions	Description
D1	1.0		P-Port orifices limit the flow into the directional control valve.
D2	1.5		
D3	2.0		
D4	2.2		
D5	2.5		

Sensing of the Spool End Position

Type	Circuit diagram of the sensor	Description
S1		The proximity sensor transforms the spool position into an electrical step signal. Can be used with directional control valves with one or two solenoids.

Technical Data of the Sensor

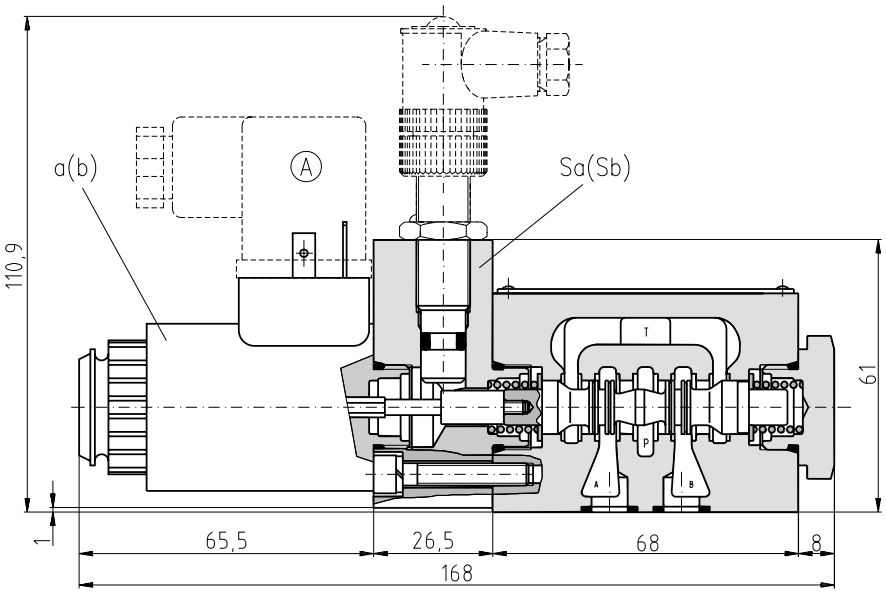
Rared voltage	V	24 DC
Power supply voltage range	V	10 ... 30 DC
Rated current	mA	200
Max. operating pressure	bar	up to 50
Switching frequency	Hz	1000
Ambient temperature range	°C	-25 ... +80

Technical Data of the Connector

Power supply voltage range	V	10 ... 30 DC
Ambient temperature range	°C	-40 ... +85
Indication		yellow LED

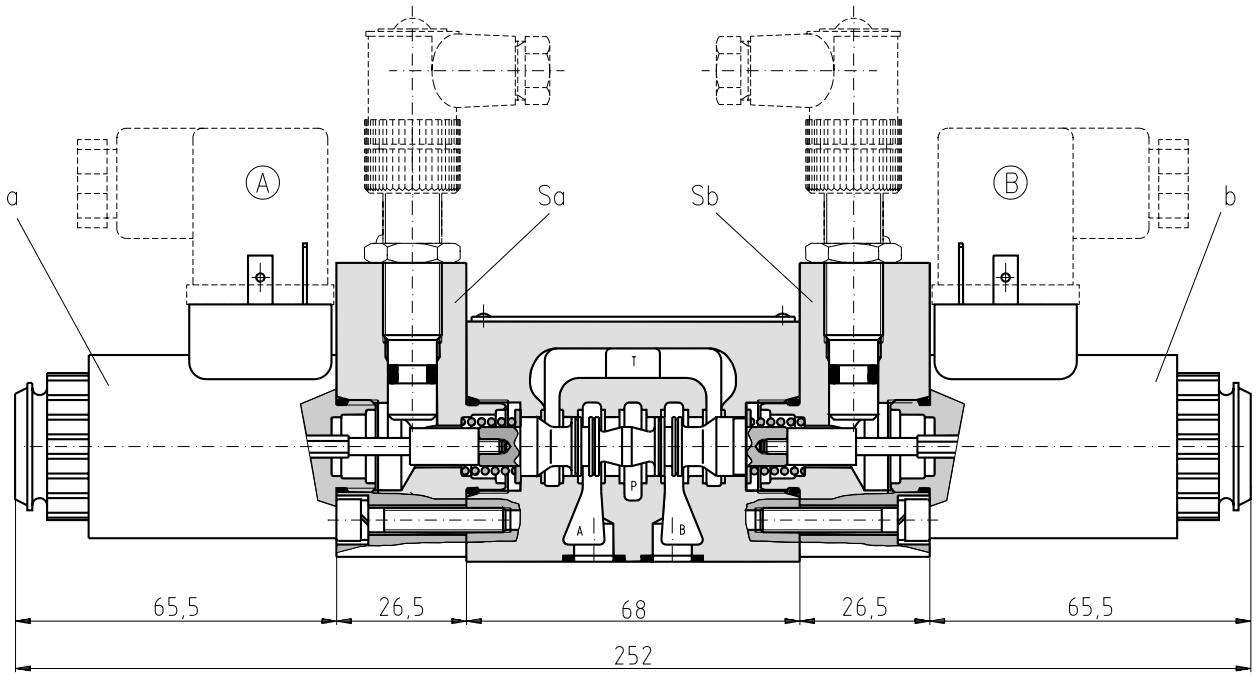
Two Positions Directional Control Valve

Signal of solenoid a (b)	Signal of sensor Sa (Sb)	LED
0	1	ON
1	0	OFF



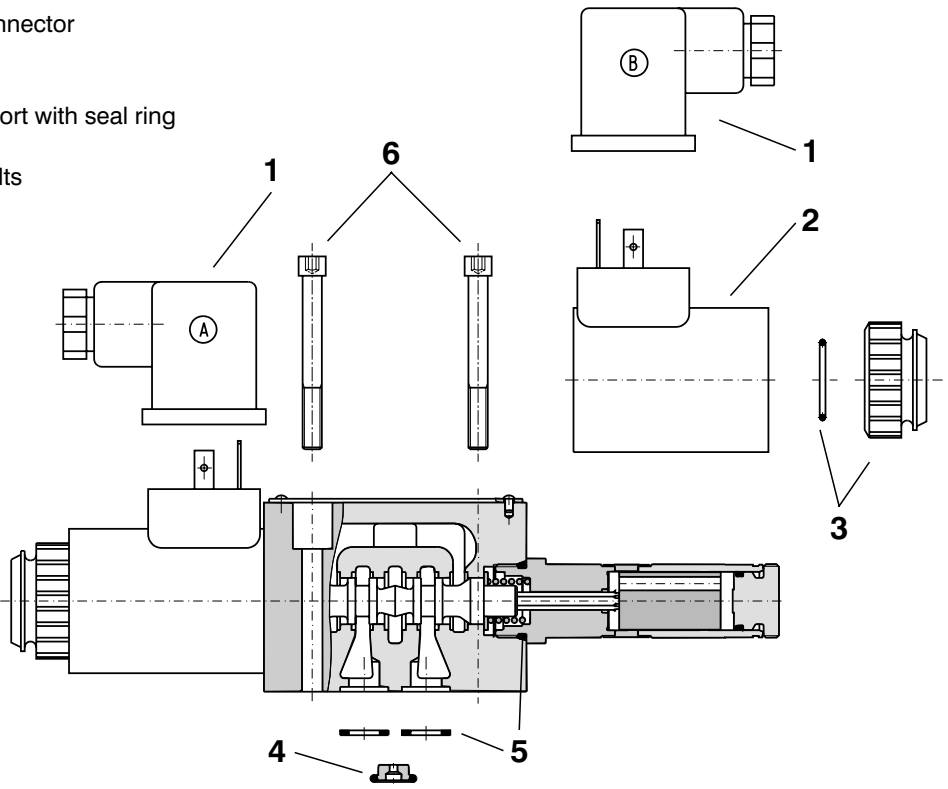
Three Positions Directional Control Valve

Signal of solenoids		Signal of sensors		LED	
a	b	Sa	Sb	Sa - LED	Sb - LED
0	0	1	1	ON	ON
0	1	1	0	ON	OFF
1	0	0	1	OFF	ON



Spare Parts

1 Electrical connector
2 Solenoid coil
3 Nut with seal
4 Orifice in P port with seal ring
5 Seal kit
6 Mounting bolts



Electrical connector, DIN 43 650

Type designation	Connector A grey	Connector B black
	Ordering number	
K1	936-9902	936-9901
K5	936-9906	936-9905
K2	936-9908	936-9907
K3	936-9904	936-9903
K4	936-9910	936-9909

Connector of position sensor

Type designation	Model	Max. input voltage	Ordering number
K02	connector of position sensor with LED	10...30 V DC	936-9940

Solenoid coil

Solenoid type	Coil type						
	E1	E2	E3	E4	E5	E6	E7
	Ordering number						
01200	936-0022	936-0690	936-0670	936-0680		936-4880	936-4882
01400	936-0650	936-0691	936-0673	936-0681		-	-
02100	936-0651	936-0692	936-0674	936-0682		-	-
02400	936-0026	936-0693	936-0672	936-0683		936-4881	936-4883
04200	936-0653	936-0695	936-0676	936-0685		-	-
04800	936-0031	936-0696	936-0677	936-0686		-	-
06000	936-0654	-	-	-		-	-
10200	936-0655	-	-	-		-	-
20500	936-0036	-	-	-		-	-
02450					936-2125		
11550					936-2175		
23050					936-2185		

Solenoid retaining nut with seal

Type of the nut	Seal ring	Ordering number
Standard nut	18 x 1,5	486-9010
Nut with rubber boot		486-9013

Orifice in P port

Type	∅D (mm)	Seal ring	Ordering number
D1	1.0	9.25 x 1.75	484-9973
D2	1.5		484-9974
D3	2.0		484-9975
D4	2.2		484-9977
D5	2.5		484-9976

Seal kit

Type	Dimensions, number		Ordering number
Standard - NBR70	9.25 x 1.68 (4 pcs.)	17 x 1.8 (2 pcs.)	484-9961
Viton	9.25 x 1.78 (4 pcs.)	17.17 x 1.78 (2 pcs.)	484-9971

Mounting bolts

Dimensions, number	Tightening torque	Ordering number
M5 x 45 DIN 912-10.9 (4 pcs.)	8.9 Nm	484-9958

Caution!

- For applications outside the given parameters, please consult us.
- For directional control valves with two solenoids, one solenoids must be without power before the other solenoid can be powered charged. Switching time for directional valves with detent assembly (impulse control) should not be shorter than 60 ms. With directional valves with cushioned spool shifting, the switching time must correspond with the shifting time.
- Other for spool symbols on request.
- The packing foil is recyclable.
- Mounting bolts or studs must be ordered separately.
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law.

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www.argo-hytos.com

ARGO HYTOS

Roller-operated directional control valves

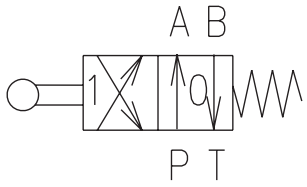
RPK1-06

Size 06 • p_{max} up to 320 bar • Q_{max} up to 80 L/min

HA 4038
5/2004

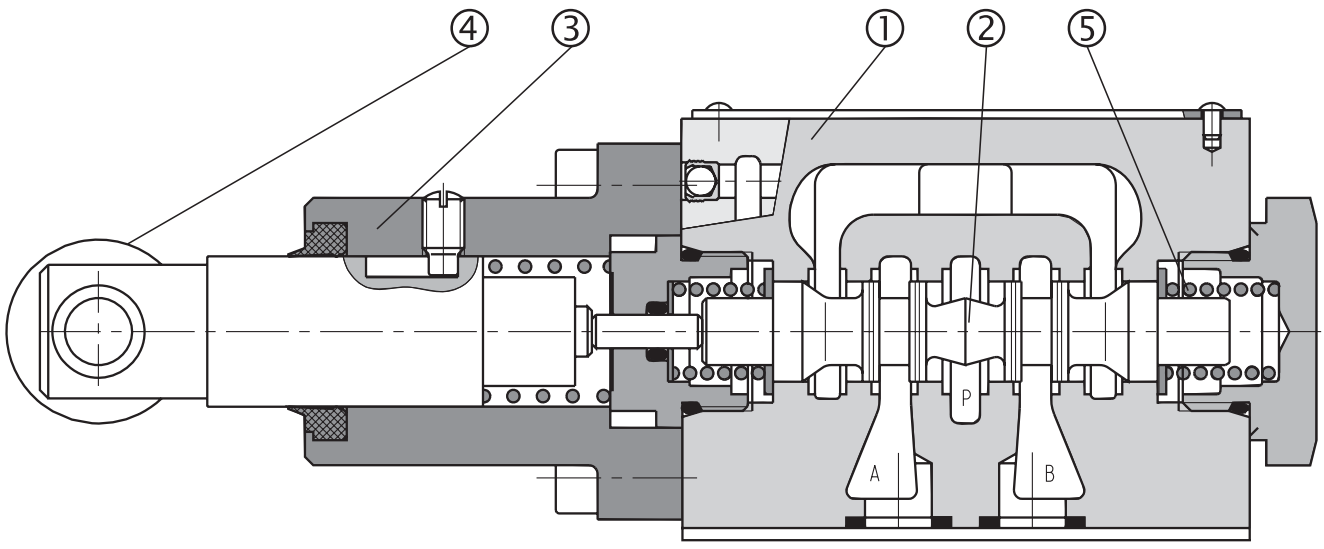
Replaces
HA 4038 11/2003

- **4/2 - way spool type directional control valves**
- **Roller operated**
- **Actuating section can be rotated in four positions 90° apart**
- **12 standard spool configurations**
- **Installation dimensions to ISO 4401-03-02-0-94 and DIN 24 340-A6**



Functional Description

The roller operated directional control valves are used mainly to control start, stop and direction of fluid.
The valves consist of housing (1) with control spool (2) and the actuating section (3). The actuating section consists of the roller- pin (4) and of one return spring (5). The directional control valves are being manufactured as two-position (see table with functional symbols).
The valve housing (1) is phosphate coated.



Ordering Code

RPK1-06 □ □ - □

Hand operated directional control valves

Valve size

Number of valve positions
two positions **2**

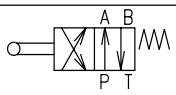
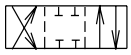
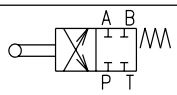
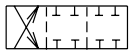
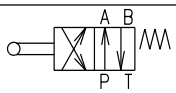
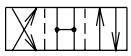
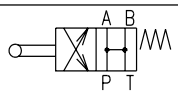
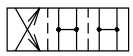
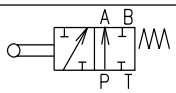
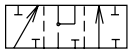
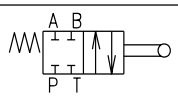
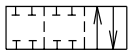
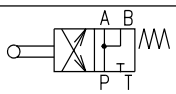
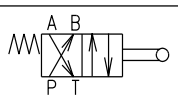
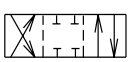
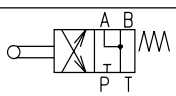
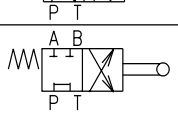
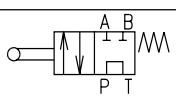
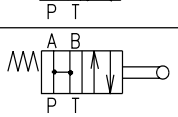
Seals
without designation NBR
V FPM (Viton)

Spool symbols
see the table Spool symbols

Technical Data

Valve size	mm	06
Maximum flow	L/min	80
Maximum operating pressure at ports P, A, B	bar	320
Maximum operating pressure at port T	bar	20
Pressure drop	bar	see Δp -Q characteristics
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP RP 91H in viscosity classes ISO VG 32,46 and 68
Fluid temperature range - NBR	°C	-30 ... +80
Fluid temperature range - Viton	°C	-20 ... +80
Viscosity range	mm^2/s	20 ... 400
Maximum degree of fluid contamination		Class 21/18/15 to ISO 4406 (1999).
Weight	kg	1,6
Mounting position		optional

Spool Symbols

Type	Symbol	Crossover	Type	Symbol	Crossover
R11			Z51		
R21			H51		
A51			Z11		
P51			X11		
Y51			C11		
C51			H11		

Operating Power

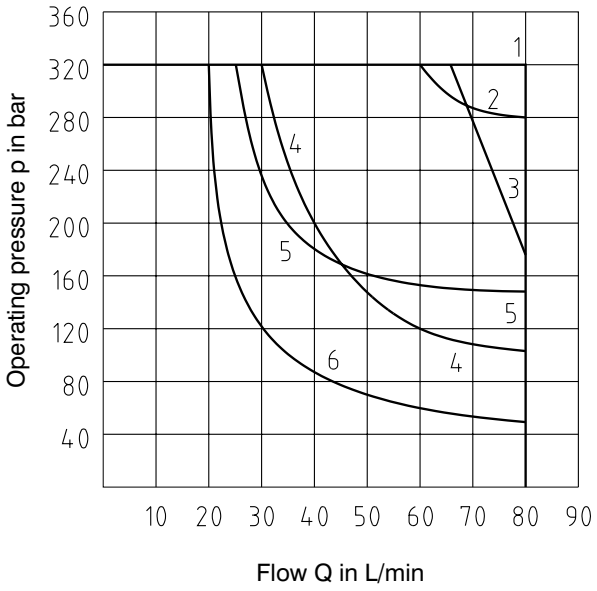
max. Pressure in T port 20 bar

	for 0 bar pressure in T port			for 20 bar pressure in T port		
Operating press.	Stroke begg.	Oper. stroke	Total stroke	Stroke begg.	Oper. stroke	Total stroke
100 bar	35 N	135 N	195 N	60 N	160 N	220 N
200 bar	35 N	135 N	195 N	60 N	160 N	220 N
300 bar	35 N	135 N	195 N	60 N	160 N	220 N

p-Q Characteristics

Measured at ν = 32 mm^2/s and t = 40 °C

Operating limits for maximum hydraulic power tfansferred by the directional valve.

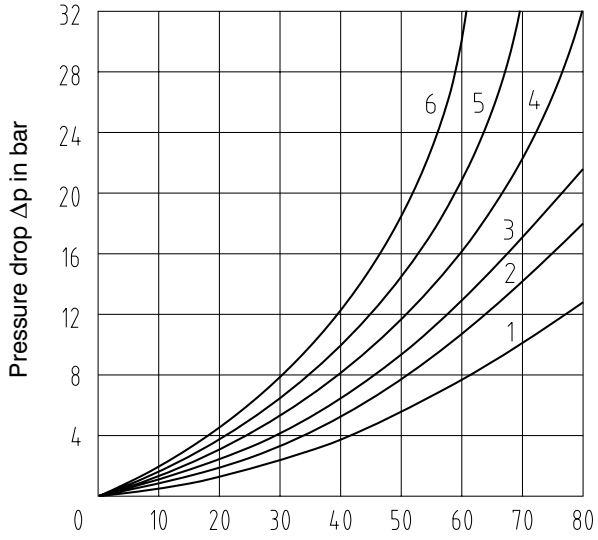


Y11	1
Y51	1
R11	2
Z11	3
Z51	3
C11	4
C51	4
R21	5
H11	6
H51	6

Δp-Q Characteristics

Measured at ν = 32 mm^2/s and t = 40 °C

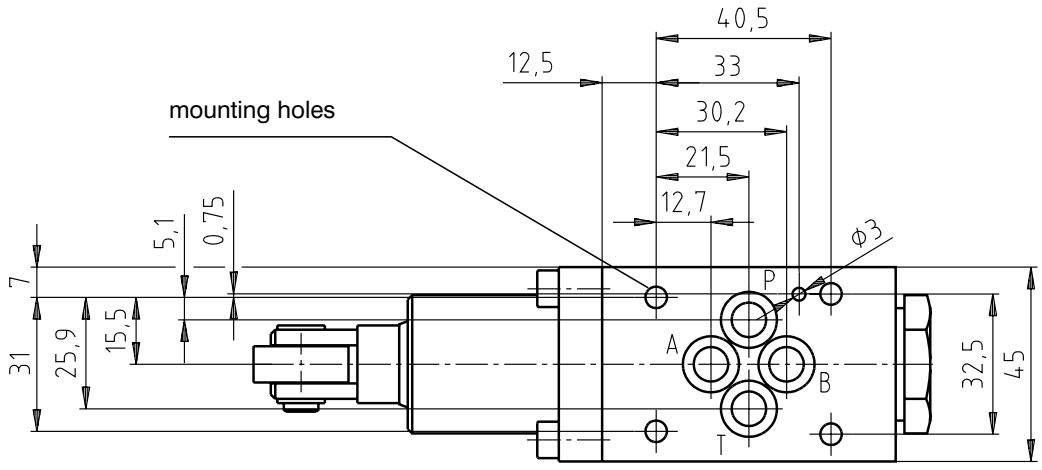
Pressure drop Δp related to flow rate.



	P-A	P-B	A-T	B-T	P-T
Z11	2	2	3	3	
C11	5	5	5	6	3
H11	2	2	2	2	3
R11	2	2	3	3	
R21	2	2	3	3	
A51	2	2			
P51		1	3		
Y51		2	2		
C51	2			3	4
Z51		2	3		
H51		2	3		
X11	2	2	3	3	

Valve Dimensions

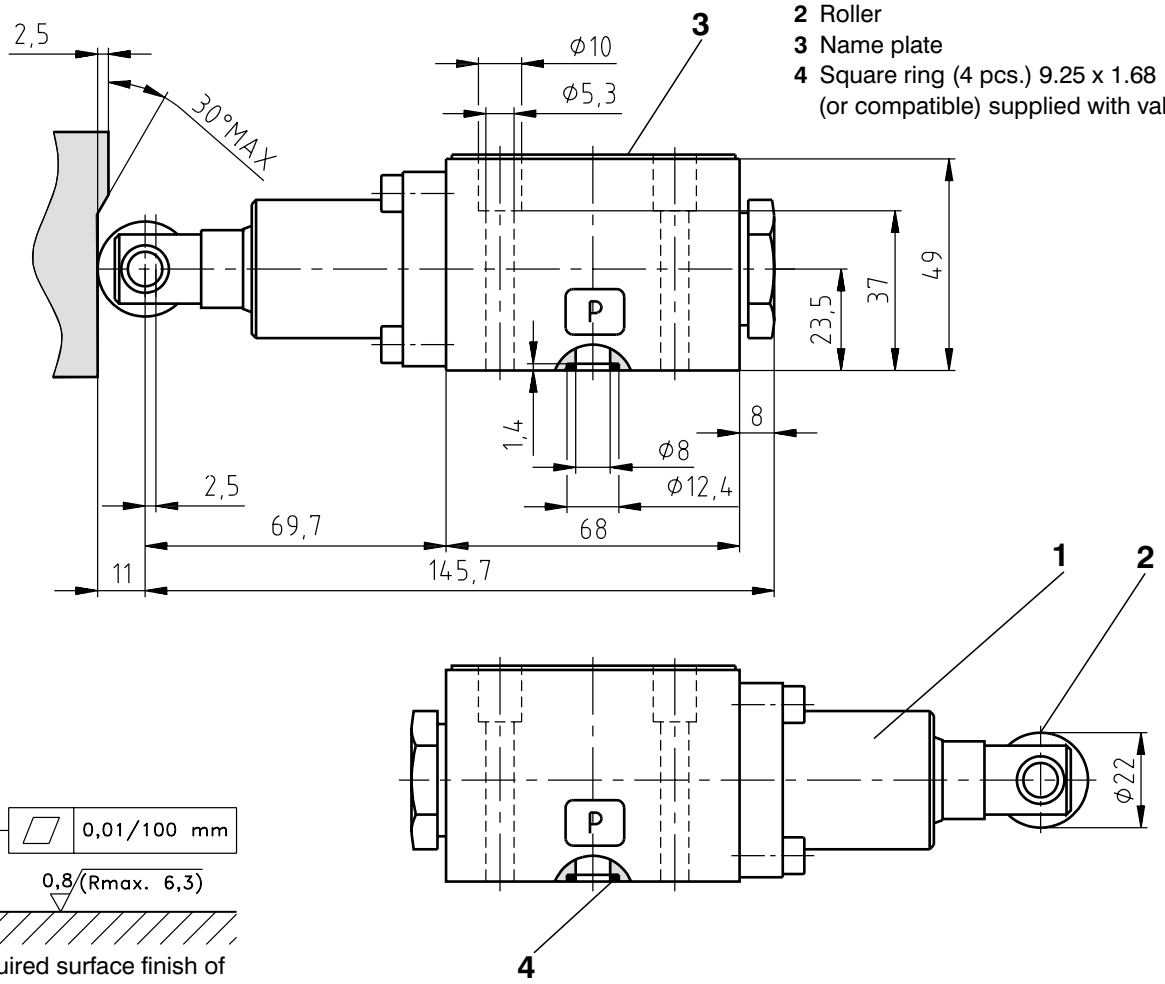
Dimensions in millimeters

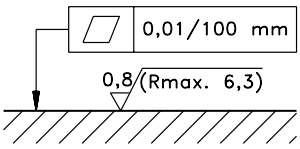


Valve Dimensions

Dimensions in millimeters

1 Actuating section
2 Roller
3 Name plate
4 Square ring (4 pcs.) 9.25 x 1.68 (or compatible) supplied with valve





Required surface finish of interface

Spare Parts

Seal kit

Type	Dimensions, quantity	Ordering number
O-ring - NBR90	17 x 1,8 (2 Pcs.)	482-9004
Square ring - NBR70	9,25 x 1,68 (4 Pcs.)	
O-ring - NBR70	3,68 x 1,78 (1 Pc.)	
Wiper ring	WSW 000180 ASW (1 Pc.)	

Bolt kit (for Studs see HA 0030)

Dimensions, quantity	Bolt torque	Ordering number
M5 x 45 DIN 912-10,9 (4 pcs.)	8,9 Nm	484-9958

Caution!

- With functional symbols A51 and J75 for pressures exceeding 100 bar, the T-port should be connected directly to the tank.
- Directional valves with other functional symbols as those shown in the table above can be delivered on request.
- The packing foil is recyclable.
- The protective plate can be returned to manufacturer.
- Mounting bolts M5x45 DIN 912-10,9 or studs must be ordered separately. Tightening torgue is 8,9 Nm.
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law.

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www.argo-hytos.com

Directional Control Valves Solenoid Operated

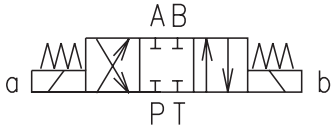
RPE4-10

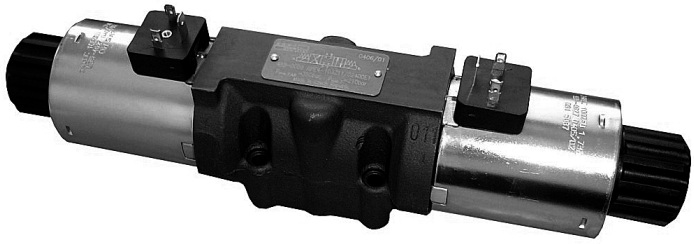
Size 10 • p_{max} up to 350 bar • Q_{max} up to 140 L/min

HA 4039
5/2005

Replaces
HA 4039 6/2004

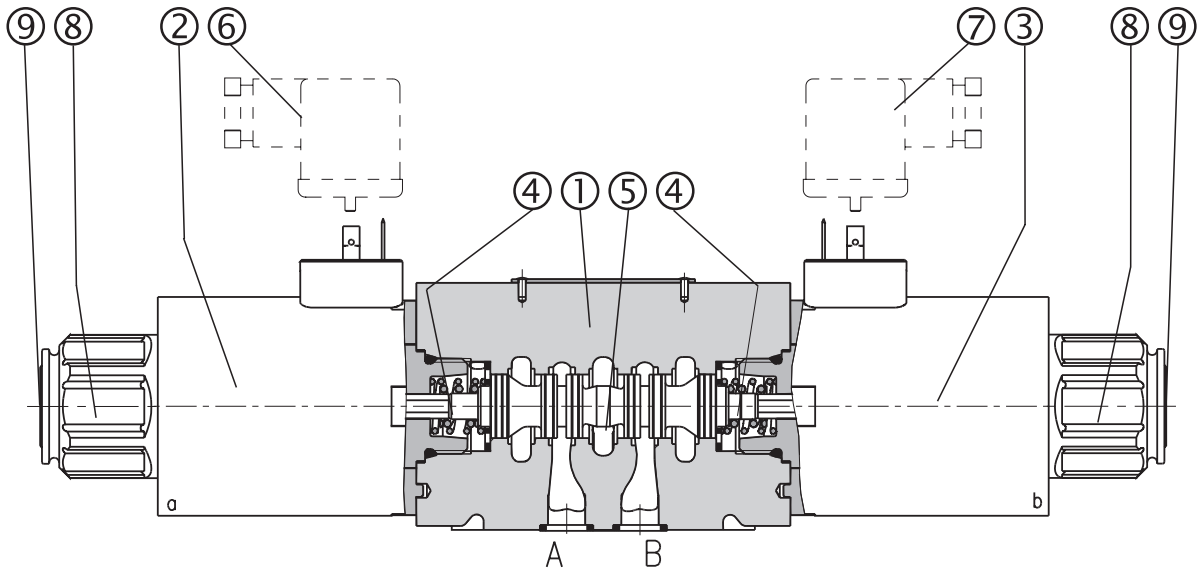
- ❑ **4/3-, 4/2- and 3/2-way directional control valves**
- ❑ **Cylindrical DC solenoids with removable coils. Electrical connectors can be rotated in three positions 90° apart**
- ❑ **Dual frequency solenoids, AC voltage 50/60 Hz**
- ❑ **Wet pin core tubes**
- ❑ **Push button manual override**
- ❑ **With soft shifting option**
- ❑ **Installation dimensions to DIN 24 340, ISO 4401**
- ❑ **Subplates see data sheet HA 0002**





Functional Description

The RPE4-10 directional control valves consist of housing (1), control spool (5), centering springs (4) and operating solenoids (2, 3).
The three-position directional control valves are fitted with two solenoids and two springs. The two position directional control valves have one solenoid and one return spring.
The operating solenoids are DC solenoids and are supplied through connectors (6, 7) without rectifiers. For AC supply the solenoids are provided with rectifiers, which are integrated directly into the connectors (6, 7) or inside the coil.
By loosening the retaining nut (8), the solenoid can be turned on its axis and locked in three positions 90° apart.
Provided that the pressure in T-port does not exceed 363 PSI (25 bar), the spool of the valve can be shifted by manual override (9).
The basic surface treatment of the valve housing (1) is phosphate coated, the operating solenoids (2, 3) are zinc coated.



Ordering Code

RPE4-10 □ □ / □ □ □ □ □

Solenoid operated directional control valves

Nominal size 10

Number of operating positions
two positions **2**
three positions **3**

Functional symbols
see the table functional symbols

Rated supply voltage of solenoids
(at the coil terminals)

12 V DC / 3.17 A	**01200**
24 V DC / 1.73 A	**02400**
106 V DC / 0.35 A	10600
205 V DC / 0.20 A	20500
120 V AC / 0.35 A / 60 Hz	12060
230 V AC / 0.20 A / 50 (60) Hz	**23050**

The AC coils correspond with E5 type.

Type of the solenoid coil

with DIN connector	**E1**
with integrated rectifier and DIN connector	**E5**

Seals

no designation	NBR
V	FPM (Viton)

Damping

no designation	without damping
T2	nozzle
T3	throttle screw

Manual override

no designation	standard
N2	covered with rubber boot

Note: Connectors are to be ordered separately, see pages 6 and 8.

FOR PREFERRED TYPES SEE BOLD TYPING IN ORDERING CODE, FUNCTIONAL SYMBOLS AND TABLE OF PREFERRED TYPES ON PAGE 11

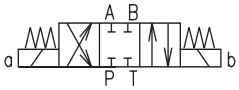
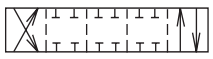
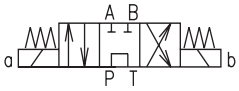
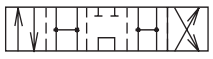
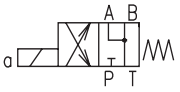
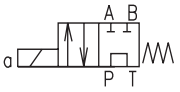
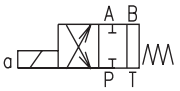
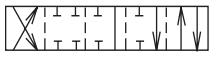
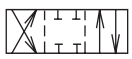
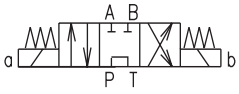
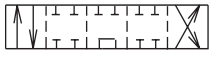
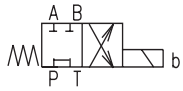
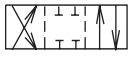
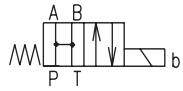
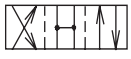
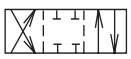
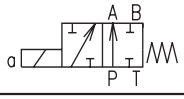
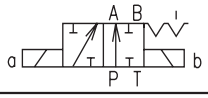
Voltage of Recommended solenoid coils used with electrical connector with rectifiers - see page 6

Rated supply source voltage (permissible rated voltage variation ±10 %)	Type designation of the solenoid voltage
120 V AC / 0.35 A / 50 (60) Hz	10600
230 V AC / 0.20 A / 50 (60) Hz	20500

Technical Data

Nominal size	mm	10	
Maximum flow	L/min	see p-Q characteristics	
Maximum operating pressure at ports P, A, B	bar	350	
Maximum operating pressure at port T	bar	210	
Pressure drop	bar	see Δp-Q characteristics	
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP - RP 91H in viscosity classes ISO VG 32, 46 and 68.	
Fluid temperature range (NBR / Viton)	°C	-30 ... +80	-20 ... +80
Ambient temperature max.	°C	up to +50	
Viscosity range	mm^2/s	20 ... 400	
Maximum degree of fluid contamination		Class 21/18/15 to ISO 4406 (1999)	
Maximum allowable voltage variation	%	AC: ±10	DC: ±10
Maximum switching frequency	1/h	15 000	
Switching time, ON; at $\nu = 32\ mm^2/s$	ms	AC: 80 ... 330	DC: 50 ...12
Switching time, OFF; at $\nu = 32\ mm^2/s$	ms	AC: 100 ... 280	DC: 30 ... 90
Duty cycle	%	100	
Service life	cycles	10^7	
Enclosure type to DIN 40 050		IP 65 (Connector to DIN 43 650)	
Weight - valve with 1 solenoid - valve with 2 solenoids	kg	3.9 5.4	
Mounting position		optional	

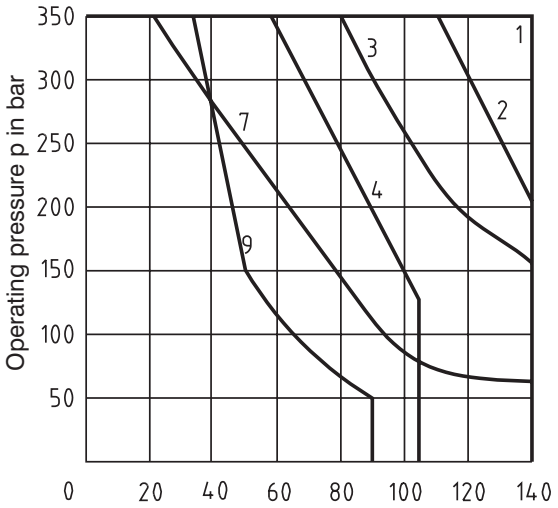
Functional Symbols

Designation	Symbol	Interposition	Designation	Symbol	Interposition
Z11			P51		
C11			**Y51**		
H11			**C51**		
P11			B51		
Y11			**Z51**		
L21			H51		
B11			X11		
C21			C11		
R11			H11		
R21			J15		
A51			J75		

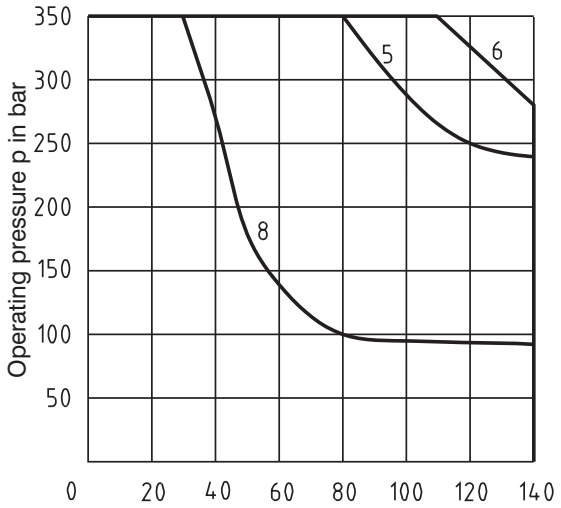
p-Q Characteristics

Measured at $\nu = 32\ mm^2/s$ and $t = 40\ °C$

Operating limits for maximum hydraulic power transferred by the directional valve. For respective spool type - see functional symbols. The power curves hold true for symmetrical valve flows (e.g. flows in directions P-A and B-T are identical). In case of an asymmetric flow, the power curves can lie substantially lower. In such cases we highly recommend to consult the respective power curve with the valve manufacture.



Flow Q in L/min



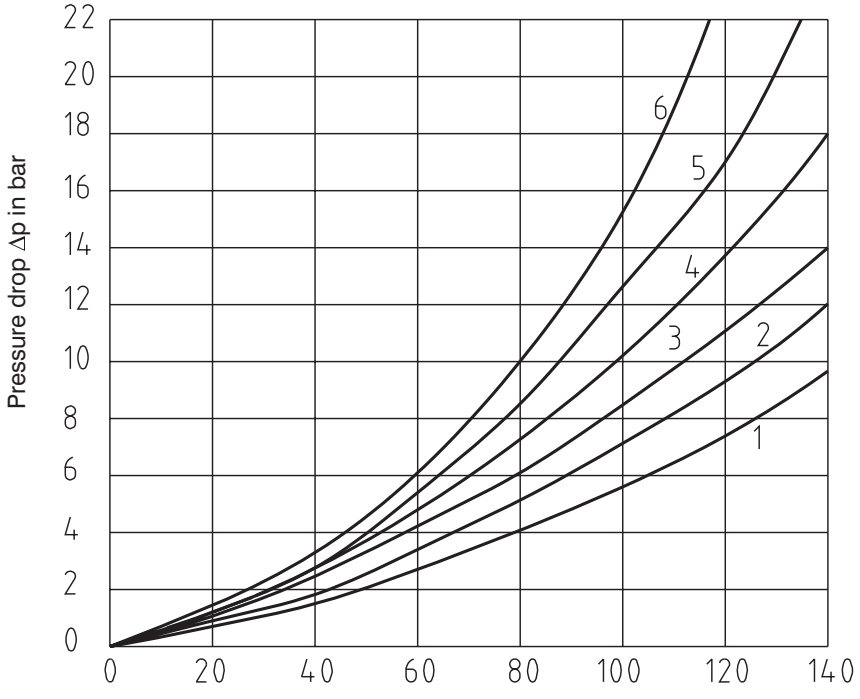
Flow Q in L/min

Z11	Z51	H11	H51	P11	P51	Y11	Y51	C11	C51	R11	X11	B11	B51	L21	R21	J15	J75	A51	C21
1	1	1	1	1	1	5	5	3	3	2	2	4	4	7	2	6	6	8	9

Δp-Q Characteristics

Measured at $\nu = 32\ mm^2/s$ and $t = 40\ °C$

Pressure drop Δp related to flow rate.



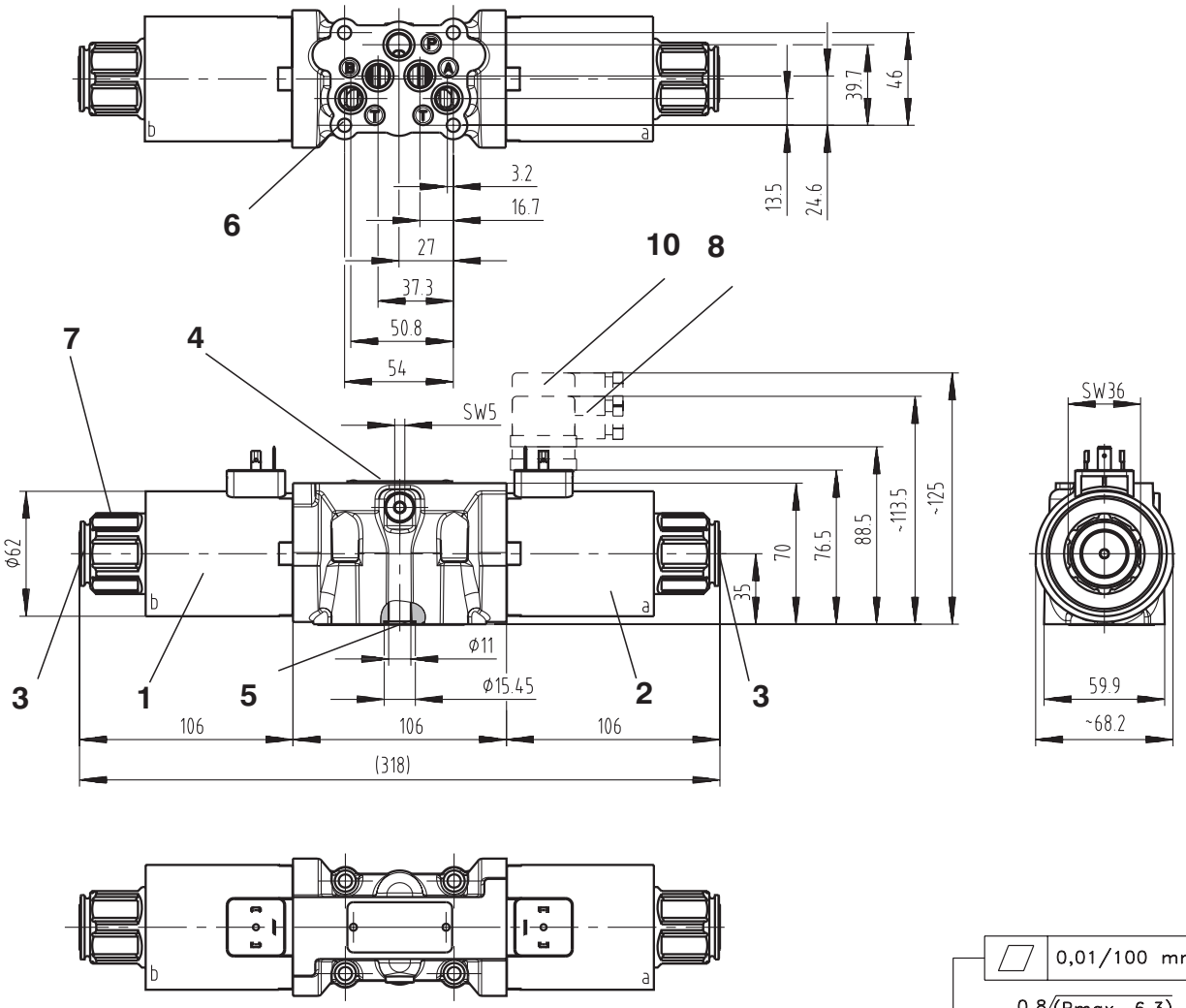
Flow Q in L/min

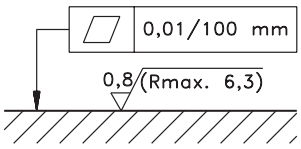
	P-A	P-B	A-T	B-T	P-T
Z11	1	1	2	2	
Z51		1	2		
H11	1	1	2	2	1
H51		1	2		1
P11	1	1	2	2	
P51		1	2		
Y11	1	1	2	2	
Y51		1	2		
C11	4	3	4	5	1
C51	4			5	1
R11	1	1	2	2	
X11	1	1	2	2	
B11	1	1	2	2	
B51		1	2		
L21	1	1	1	2	2
R21	1	1	1	3	
J15	1	1	2	3	
J75	1	1			
A51	1	1			
C21	6	6	6	6	4

Valve Dimensions

Dimensions in millimetres

Valve with two solenoids

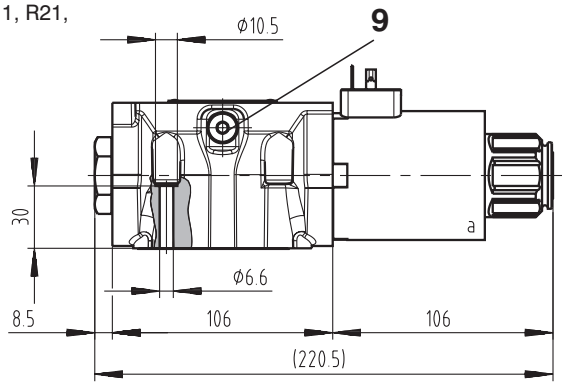


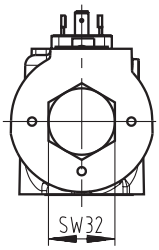


Required surface finish of interface.

Valve with one solenoid a

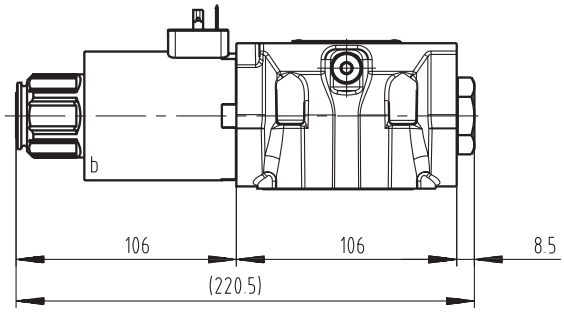
Functional symbols R11, R21, Y51, C51, Z51, H51,





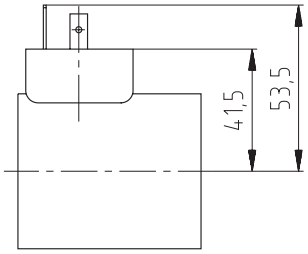
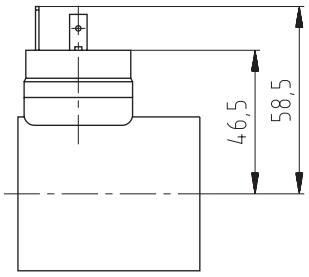
Valve with one solenoid b

Functional symbols C11, H11



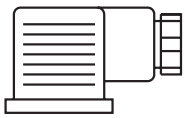
1 Solenoid a
2 Solenoid b
3 Manual override
4 Name plate
5 Square ring 12.42 x 1.68 (5 pcs.) supplied with valve
6 4 mounting holes
7 Retaining nut of the solenoid
8 Electrical connector, DIN 43 650
9 Throttle screw
10 Space reguired to remove connector

Type of the Solenoid Coil

Designation	Dimensional sketch	Description
E1		Solenoid coil with terminal for the electrical connector, DIN 43 650.
E5		Solenoid coil with integrated rectifier and terminal for electrical connector, DIN 43 650.

Electrical Connector, DIN 43 650

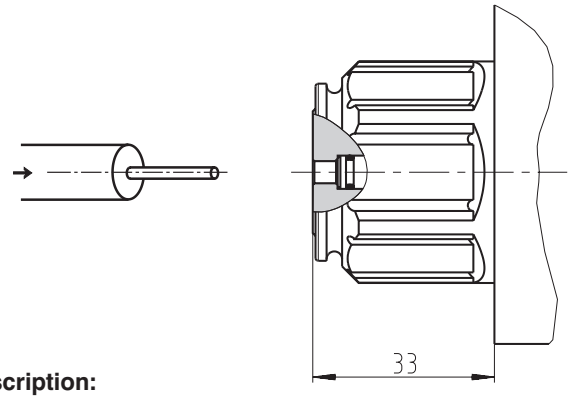
Designation	Type	Model	Max input voltage
K1	Connector B (black)	without rectifier - M16x1.5 (bushing bore ∅ 6-8 mm)	230 V DC
	Connector A (grey)		230 V AC
K5	Connector B (black)	without rectifier - M16x1.5 (bushing bore ∅ 4-6 mm)	230 V DC
	Connector A (grey)		230 V AC
K2	Connector B (black)	without rectifier with LED and quenching diode - M16x1.5 (bushing bore ∅ 6-8 mm)	12 ... 24 V DC
	Connector A (grey)		
K3	Connector B (black)	with rectifier - M16x1.5 (bushing bore ∅ 6-8 mm)	230 V AC
	Connector A (grey)		
K4	Connector B (black)	with rectifier with LED and quenching diode - M16x1.5 (bushing bore ∅ 6-8 mm)	230 V AC
	Connector A (grey)		



Manual Override

Standard

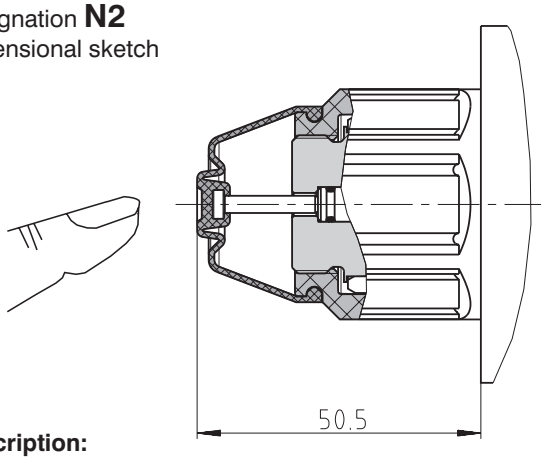
Without designation
Dimensional sketch



Description:
Standard model of the manual override.
Standard retaining nut of the solenoid.

Rubber boot

Designation **N2**
Dimensional sketch

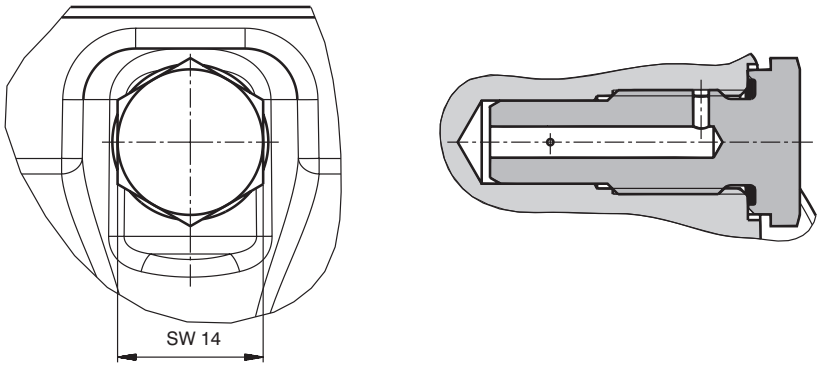


Description:
Manual override protected by rubber boot.

Soft Shifting Spool Options Delay Time

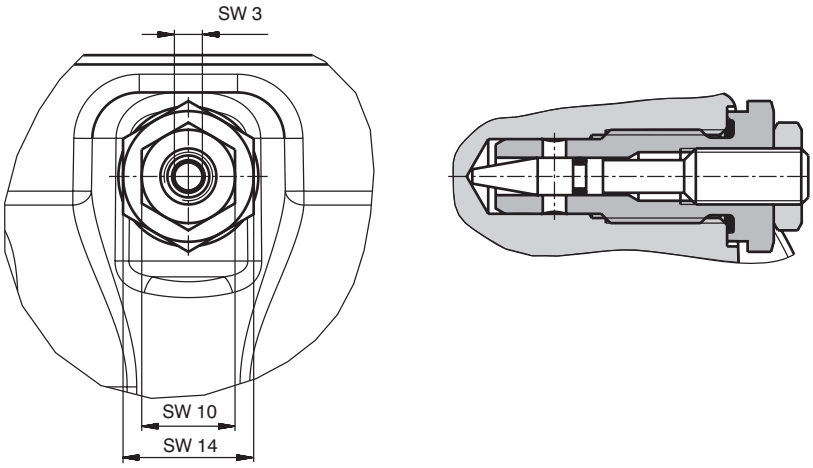
T2 - Noozle ∅ 0,6

The orifice extends the valve shifting time.



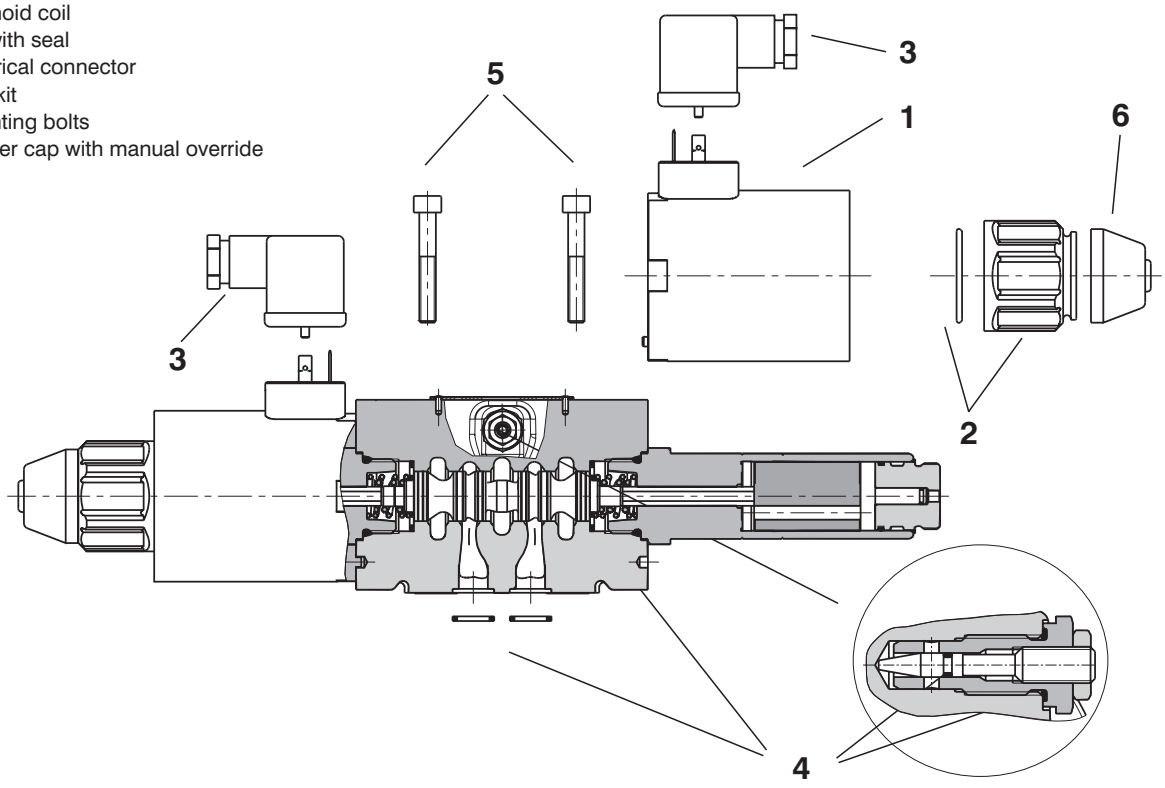
T3 - Throttle Screw

The control orifice allows for stepless adjustment of the valve shifting time.



Spare Parts

1 Solenoid coil
2 Nut with seal
3 Electrical connector
4 Seal kit
5 Mounting bolts
6 Rubber cap with manual override



Solenoid coil

Type designation of the coil voltage	Type of the coil	
	E1	E5
	Ordering number	
01200	936-4610	
02400	936-4627	
10600	936-4679	
20500	936-4685	
12060		936-3480
23050		936-3485

Solenoid retaining nut with seal

Type of the nut	Seal ring	Ordering number
Standard nut	30 x 2	489-9900
Rubber cap with manual override		489-9901

Electrical connector, DIN 43 650

Type designation	Connector A grey	Connector B black
	Ordering number	
K1	936-9902	936-9901
K5	936-9906	936-9905
K2	936-9908	936-9907
K3	936-9904	936-9903
K4	936-9910	936-9909

Seal kit

Type	Dimensions, number		Ordering number
	Square ring	O-ring	
Standard NBR70	12.42 x 1.68 (5 pcs.), 11,9 x 8,4 x 1 (1 pc.)	23.81 x 2.62 (2 pcs.), 1,8 x 1 (1 pc.)	489-9902
Viton	12.42 x 1.68 (5 pcs.), 11,9 x 8,4 x 1 (1 pc.)	23.47 x 2.62 (2 pcs.), 1,8 x 1 (1 pc.)	489-9903

Mounting bolts

Dimensions, number	Tightening torque	Ordering number
M6 x 40 DIN 912-10.9 (4 pcs.)	14+2 Nm	485-9964

Soft Shifting Spool Optionst

T2	10 Nm	489-9905
T3	10 Nm	489-9906

Preffered Types

Type	Ordering number	Type	Ordering number
RPE4-103Z11	489-0001	RPE4-103Z11/02400E1	489-0009
RPE4-102Z51	489-0024	RPE4-102Z51/02400E1	489-0027
RPE4-103C11	489-0002	RPE4-103C11/02400E1	489-0010
RPE4-102C51	489-0025	RPE4-102C51/02400E1	489-0028
RPE4-103H11	489-0004	RPE4-103H11/02400E1	489-0029
RPE4-103Y11	489-0003	RPE4-103Y11/02400E1	489-0030
RPE4-102R11	489-0005	RPE4-102R11/02400E1	489-0013
RPE4-102R21	489-0006	RPE4-102R21/02400E1	489-0031
RPE4-102Y51	489-0026	RPE4-102Y51/02400E1	489-0032
RPE4-103Z11/01200E1	489-0021	RPE4-103Z11/23050E5	489-0033
RPE4-102Z51/01200E1	489-0015	RPE4-102Z51/23050E5	489-0034
RPE4-103C11/01200E1	489-0022	RPE4-103C11/23050E5	489-0035
RPE4-102C51/01200E1	489-0019	RPE4-102C51/23050E5	489-0036
RPE4-103H11/01200E1	489-0014	RPE4-103H11/23050E5	489-0020
RPE4-103Y11/01200E1	489-0011	RPE4-103Y11/23050E5	489-0037
RPE4-102R11/01200E1	489-0023	RPE4-102R11/23050E5	489-0038
RPE4-102R21/01200E1	489-0016	RPE4-102R21/23050E5	489-0039
RPE4-102Y51/01200E1	489-0018	RPE4-102Z51/23050E5	489-0040

Caution!

- In the case of directional valves with two solenoids, any of the solenoids may be energized, but only after switching off the other.
- Directional valves with other functional symbols as those shown in the table, please consult with the manufacturer.
- The packing foil is recyclable.
- The protective plate can be returned to manufacturer.
- Mounting bolts M6 x 40 DIN 912-10.9 or studs must be ordered separately.
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense

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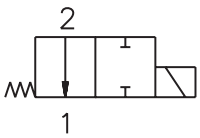
www.argo-hytos.com

2/2 Way Solenoid Operated Directional Control Valves Spool Type

SD2E-A2

3/4-16 UNF • p_{max} 350 bar (5076 PSI) • Q_{max} 30 L/min (7,9 GPM)

HA 4040
1/2005



- ❑ **2/2 Way cartridge valves solenoid operated with spool direction**
- ❑ **Manual override**
- ❑ **No spool sticking by too a high tightening torque**
- ❑ **High transmitted power**

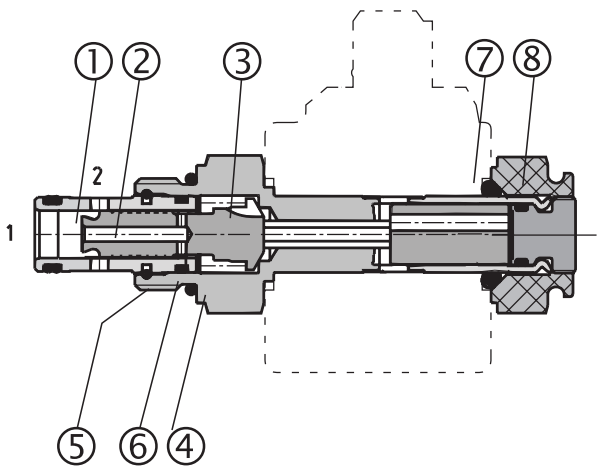
Functional Description

The directly operated 2/2-Way solenoid actuated spool valve controls in the first line the start and stop function of the oil flow. The valve consists of the valve body (1), control spool (2), return spring (3), cartridge with actuating system (4) and of the solenoid coil (7) that is mounted on the actuating system. The valve bushing is screwed into the cartridge part (4).
The valve bushing is fixed in the cartridge by a wire ring (5) and sealed with the seal ring (6). Separation of the valve bushing and the cartridge prevent transmitting the stresses, which could be caused by too high tightening torques. The DC solenoid coils can be delivered for 12 V and 24 V supply voltages. For AC applications 120 V/ 60 Hz or 230 V/ 50 Hz, the suitable rectifiers for the standard solenoid coils are available, with them being mounted in an additional terminal box. With the high power solenoid coils in AC variants, the rectifiers are integrated directly in the connector. By loosening the fixing nut (8), the solenoid coil can be replaced or turned in the range of 360°. The valve body is zinc coated.

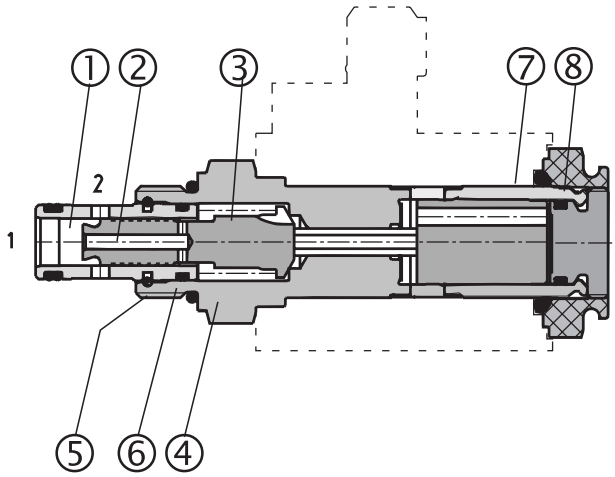
Note:
The valves are supplied without solenoids coils. The solenoid coil, the terminal box and the housing body for line mounting have to be ordered separately.

Cartridge Valve

Standard performance



High performance



Ordering Code

SD2E-A2 / □ □ □ □

2/2 Way Solenoid Operated Directional Control Valves

Standard	**S**
High performance	**H**

Description
Refer to the table with functional symbols

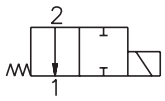
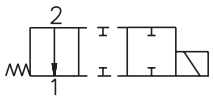
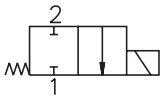
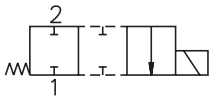
Polyurethan, Viton	**V**
Polyurethan, NBR	**No designation**

Manual override

Push button	**N1**
Socket head screw	**N2**
Without manual override	**No designation**

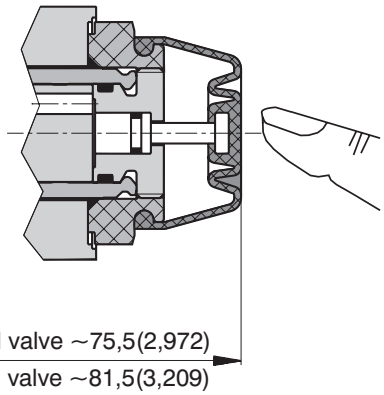
Solenoid coil, terminal box and body for line mounting have to be ordered separately.

Functional Symbols

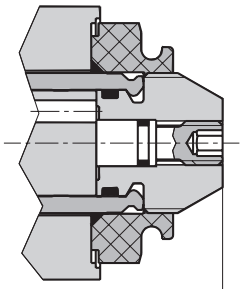
Designation	Symbol	Interposition	Designation	Symbol	Interposition
2111			2112		

Manual Override

Dimensions in inches (millimeters)



Standard valve ~75,5(2,972)
High performance valve ~81,5(3,209)
N1- manual override by pushing



Standard valve ~71,5(2,815)
High performance valve ~77,5(3,051)
N2- manual override with socket head screw 2,5 (0,098)

Technical Data

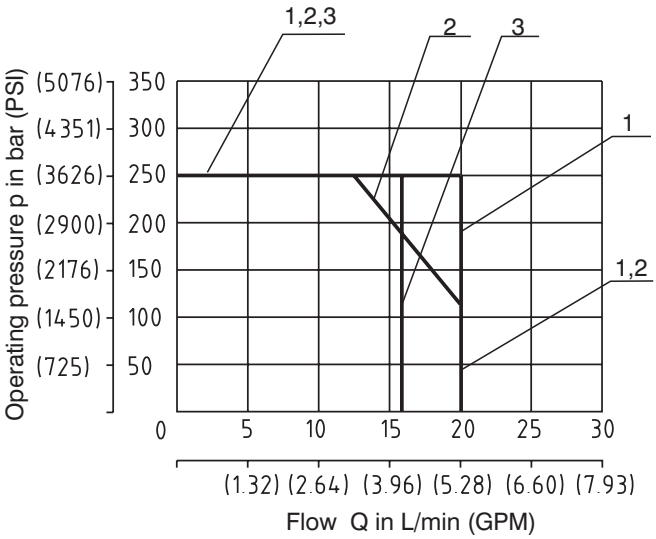
		Standard	High performance
Cartridge thread		3/4-16 UNF-2B	
Maximum flow	L/min (GPM)	20 (5,3)	30 (7,9)
Max. operating pressure	bar (PSI)	250 (3626)	350 (5076)
Pressure drop	bar (PSI)	see Δp-Q characteristics	
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP - RP 91H in viscosity classes ISO VG 32, 46 and 68	
Coil gronps (see the datasheet of coils)		C 51-26	C 04-20
Fluid temperature range	°C (°F)	-20 ... 60 (-4 ... 140)	-20 ... 80 (-4 ...176)
Ambient temperature, max.	°C (°F)	-20 ... 50 (-4 ...122)	-20 ... 80 (-4 ... 176)
Viscosity range	mm^2/s (SUS)	10 ... 500 (49 ... 2450)	
Maximum degree of fluid contamination		Class 21/18/15 according to ISO 4406 (1999).	
Permissible rated voltage variation	%	AC,DC ±10	AC,DC ±15
Max. switching frequency	1/h	15 000	
Duty cycle	%	100	
Service life	cycles	10^7	
Weight	kg(lbs)	0,10 (0,22)	0,20 (0,44)
Maximum valve tightening torque		$30\ ^{+2}$Nm	
Maximum plastic nut tightening torque		$3\ ^{+1}$Nm	$5\ ^{+1}$Nm
Mounting position		optional	

p-Q Characteristics

Measured at ν = 32 mm^2/s (156 SUS)

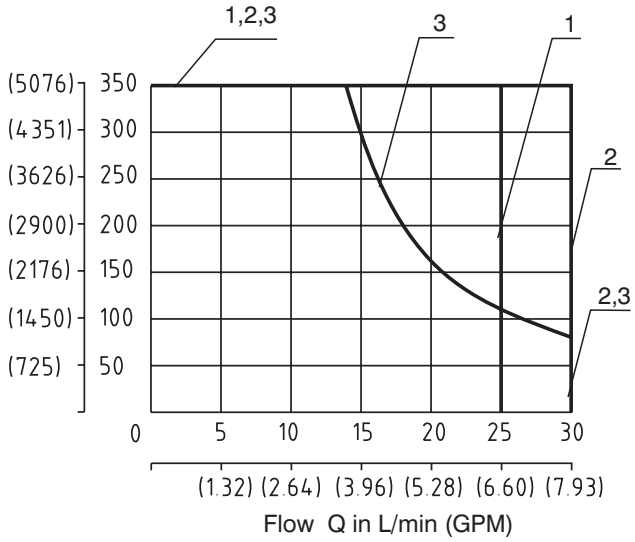
Operating limits for hydraulic power transferred by the directional valve. For respective spool type - see functional symbols.

Standard valve
Oil 60 °C(140 °F) / Ambient temperature 40 °C (104 °F)
Voltage Un [V]



	Connection	Direction
1	2I11	2→1
1	2I12	1→2
2	2I11	1→2
3	2I12	2→1

High performance valve
Oil 80 °C (176 °F) / Ambient temperature 50 °C (122 °F)
Voltage Un -10% [V]



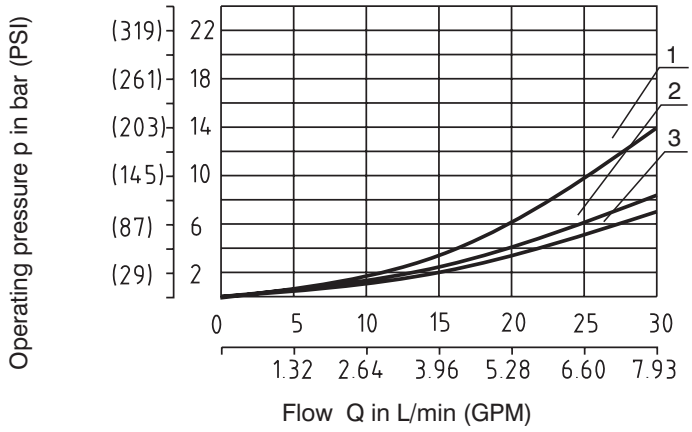
	Connection	Direction
1	2I12	2→1
2	2I12	1→2
2	2I11	2→1
3	2I11	1→2

Δp-Q Characteristics

Measured at ν = 32 mm^2/s (156 SUS)

Pressure drops related to flow rate.

Standard valve + High performance valve

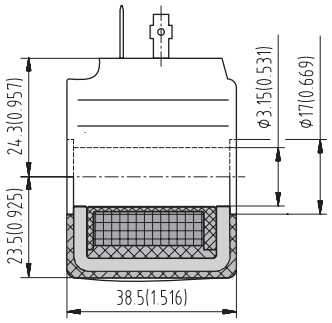


	Connection	Direction
1	2I12	1→2
1	2I12	2→1
2	2I11	1→2
3	2I11	2→1

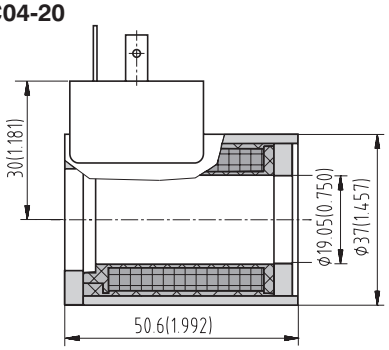
Type of the Solenoid Coils

Dimensions in inches (millimeters)

Coil for Standard valve
C51-26



Coil for High performance valve
C04-20



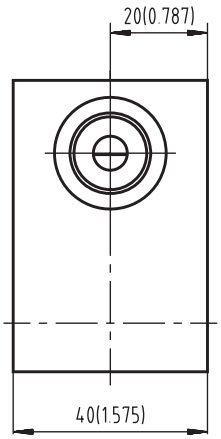
Solenoid	Connector	Standard valve SD2E-A2 / **S...** Type code	High performance valve SD2E-A2 / **H...** Type code
12 VDC	EN 175301-803-A (DIN 43 650) with quenching diode	C51-26-012DC-E2	C04-20-012DC-E2
24 VDC	EN 175301-803-A (DIN 43 650) with quenching diode	C51-26-024DC-E2	C04-20-024DC-E2
12 VDC	AMP (with quenching diode)	C51-26-012DC-E4	C04-20-012DC-E4
24 VDC	AMP (with quenching diode)	C51-26-024DC-E4	C04-20-024DC-E4
120 VAC	EN 175301-803-A (DIN 43 650) with rectifier	-	C04-20-120AC-E5
230 VAC	EN 175301-803-A (DIN 43 650) with rectifier	-	C04-20-230AC-E5
120 VAC	EN 175301-803-A (DIN 43 650)	C51-26-105DC-E1*	C04-20-105DC-E1*
230 VAC	EN 175301-803-A (DIN 43 650)	C51-26-205DC-E1*	C04-20-205DC-E1*

Note: *Use the terminal box with rectifier!

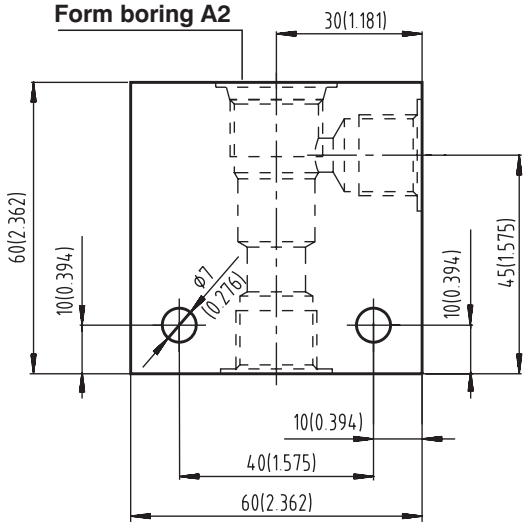
- For other voltages, connector variants, quenching diodes or rectifiers refer to Coil data sheet HA 8007
- Coil size for Standard valve: C51-26
- Coil size for High performance valve: C04-20

Valve Body

Dimensions in inches (millimeters)



Form boring A2



Body material	Connecting size	Type code	Operating pressures
Steel	G3/8	SB-A2-0103ST	420 bar (6091 PSI)
Steel	SAE 6	SB-A2-0102ST	420 bar (6091 PSI)
Aluminium	G3/8	SB-A2-0103AL	250 bar (3626 PSI)
Aluminium	SAE 6	SB-A2-0102AL	250 bar (3626 PSI)

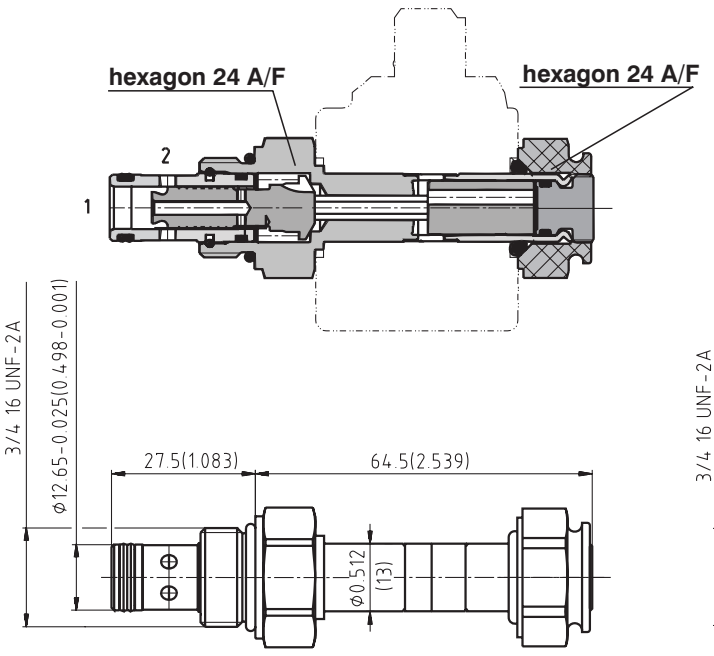
Note:

- For detailed valve body ordering code refer to data sheet HA 0018

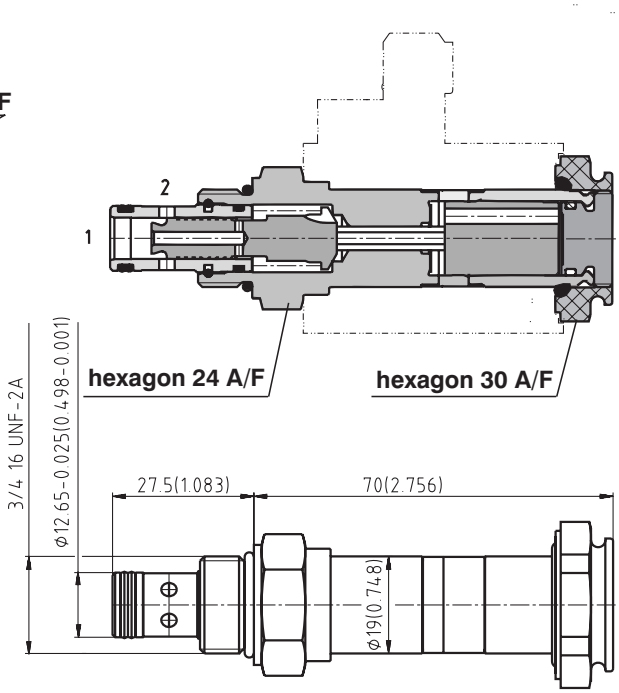
Valve Dimensions

Dimensions in inches (millimeters)

Standard valve

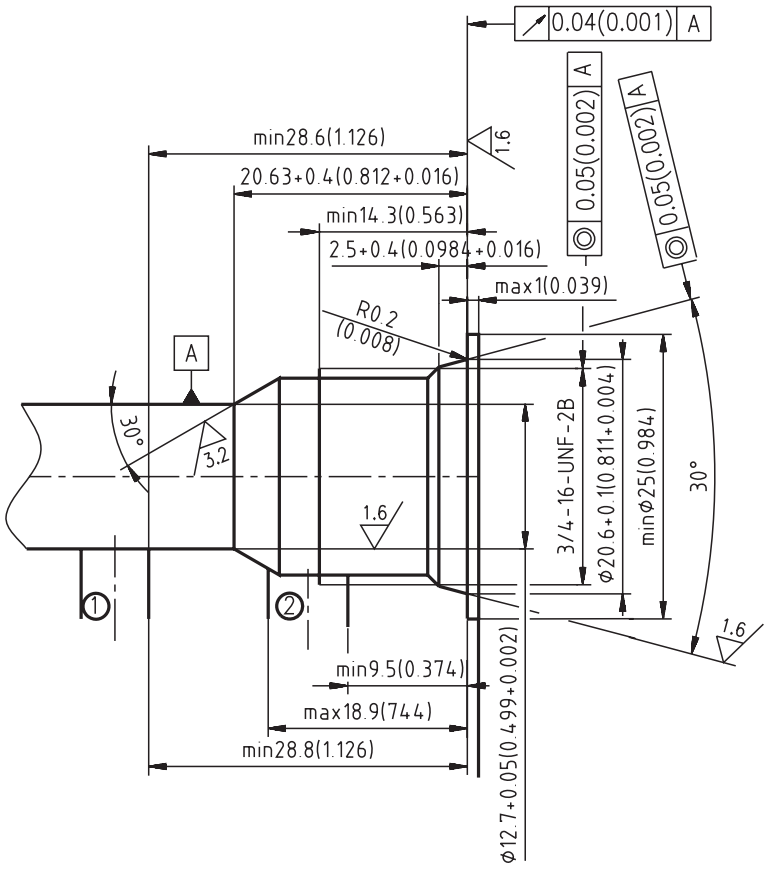


High performance valve



Insatallation Cavity

Dimensions in inches (millimeters)



Spare Parts

Standard and high performance valve

Dualseal - PU	O-ring - NBR	O-ring - Viton	Order number
10,3 x 12,7 x 3,1 (1pc.)	17 x 1,8 (1pc.)	-	408-9001
10,3 x 12,7 x 3,1 (1pc.)	-	17,17 x 1,78 (1pc.)	408-9002

Soenoid retaining nut with seal for standard valve

Type of nut	O-ring - Viton	
Standard nut	12,3 x 2,4 (1pc.)	408-9003
Nut N1	12,3 x 2,4 (1pc.)	408-9010

Solenoid retaining nut with seal for high performance valve

Type of nut	O-ring - Viton	
Standard nut	20 x 2,5 (1pc.)	408-9004
Nut N1	20 x 2,5 (1pc.)	408-9011

Caution!

- The packing foil is recyclable.
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law.

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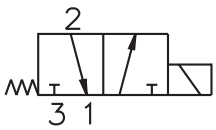
3/2 Way Solenoid Operated Directional Control Valves Spool Type

SD2E-A3

3/4-16 UNF • p_{max} 350 bar (5076 PSI) • Q_{max} 30 L/min (7,9 GPM)

HA 4041
2/2005

- ❑ **3/2 Way cartridge valves solenoid operated with spool direction**
- ❑ **Manual override**
- ❑ **No spool sticking by too a high tightening torque**
- ❑ **High transmitted power**



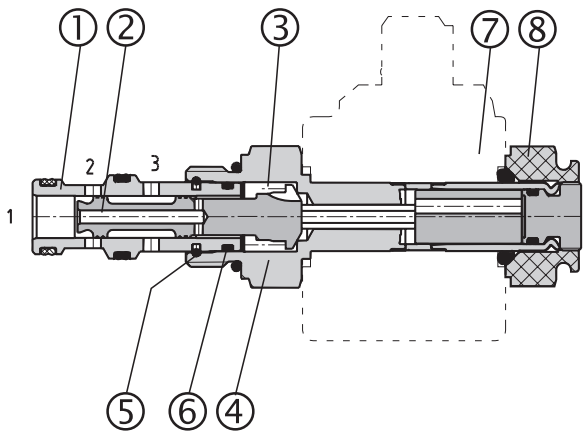
Functional Description

The directly operated 3/2-Way solenoid actuated spool valve controls in the first line the start and stop function of the oil flow. The valve consists of the valve body (1), control spool (2), return spring (3), cartridge with actuating system (4) and of the solenoid coil (7) that is mounted on the actuating system. The valve bushing is screwed into the cartridge part (4).
The valve bushing is fixed in the cartridge by a wire ring (5) and sealed with the seal ring (6). Separation of the valve bushing and the cartridge prevent transmitting the stresses, which could be caused by too high tightening torques. The DC solenoid coils can be delivered for 12 V and 24 V supply voltages. For AC applications 120 V/ 60 Hz or 230 V/ 50 Hz, the suitable rectifiers for the standard solenoid coils are available, with them being mounted in an additional terminal box. With the high power solenoid coils in AC variants, the rectifiers are integrated directly in the connector. By loosening the fixing nut (8), the solenoid coil can be replaced or turned in the range of 360°. The valve body is zinc coated.

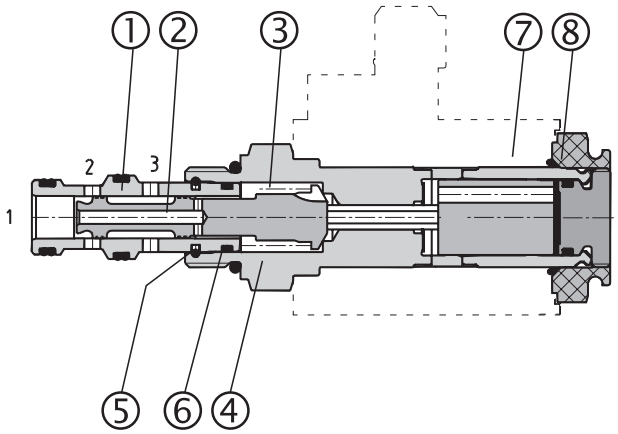
Note:
The valves are supplied without solenoids coils. The solenoid coil, the terminal box and the housing body for line mounting have to be ordered separately.

Cartridge Valve

Standard performance



High performance



Ordering Code

SD2E-A3 / □ □ □ □

3/2 Way Solenoid Operated Directional Control Valve

Standard **S**
High performance **H**

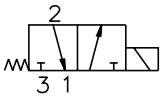
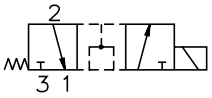
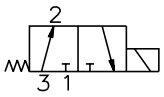
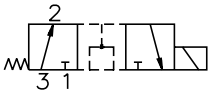
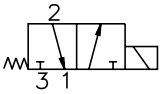
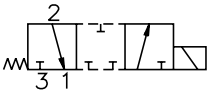
Description
Refer to the table with functional symbols

Polyurethan, Viton **V**
Polyurethan, NBR **No designation**

Manual override
Push button **N1**
Socket head screw **N2**
Without manual override **No designation**

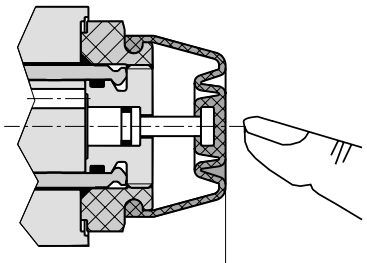
Solenoid coil, terminal box and body for line mounting have to be ordered separately.

Functional Symbols

Designation	Symbol	Interposition	Designation	Symbol	Interposition
2D21			2D26		
2D25					

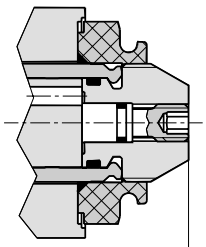
Manual Override

Dimensions in millimeters (inches)



Standard valve ~75,5(2,972)
High performance valve ~81,5(3,209)

N1- manual override by pushing



Standard valve ~71,5(2,815)
High performance valve ~77,5(3,051)

N2- manual override with socket head screw 2,5(0,098)

Technical Data

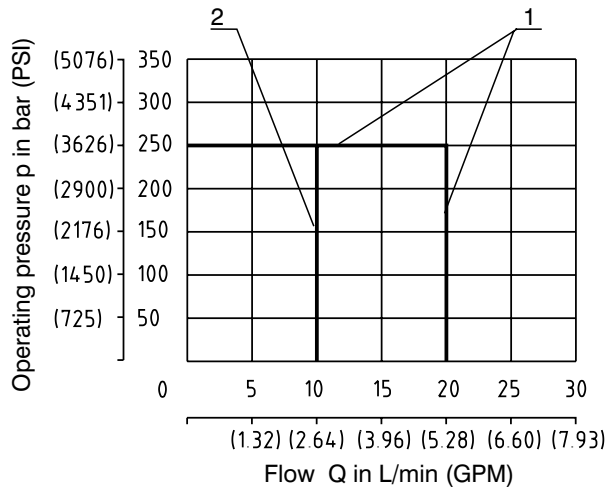
		Standard	High performance
Cartridge thread		3/4-16 UNF- 2B	
Maximum flow	L/min (GPM)	20 (5,3)	30 (7,9)
Max. operating pressure	bar (PSI)	250 (3626)	350 (5076)
Pressure drop	bar (PSI)	see Δp-Q characteristics	
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP - RP 91H in viscosity classes ISO VG 32, 46 and 68	
Coil groups (see the datasheet of coils)		C 51-26	C 04-20
Fluid temperature range	°C (°F)	-20 ... 60 (-4 ... 140)	-20 ... 80 (-4 ...176)
Ambient temperature, max.	°C (°F)	-20 ... 50 (-4 ... 122)	-20 ... 80 (-4 ...176)
Viscosity range	mm^2/s (SUS)	10 ... 500 (149 ... 2450)	
Maximum degree of fluid contamination		Class 21/18/15 according to ISO 4406 (1999).	
Permissible rated voltage variation	%	AC,DC ±10	AC,DC ±15
Max. switching frequency	1/h	15 000	
Duty cycle	%	100	
Service life	cycles	10^7	
Weight	kg (lbs)	0,15 (0,33)	0,20 (0,44)
Maximum valve tightening torque		30 $^{+2}$Nm	
Maximum plastic nut tightening torque		3 $^{+1}$Nm	5 $^{+1}$Nm
Mounting position		optional	

p-Q Characteristics

Measured at $\nu = 32\ mm^2/s$ (156 SUS)

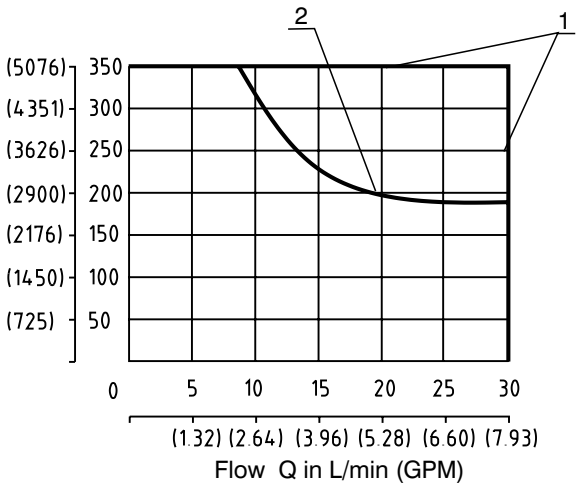
Operating limits for hydraulic power transferred by the directional valve. For respective spool type - see functional symbols.

Standard valve
Oil 60 °C (140 °F) / Ambient temperature 40 °C (104 °F)
Voltage Un [V]



	Connection
1	2D21
1	2D25
2	2D26

High performance valve
Öl 80 °C (176 °F) / Ambient temperature 50 °C (122 °F)
Voltage Un -10% [V]



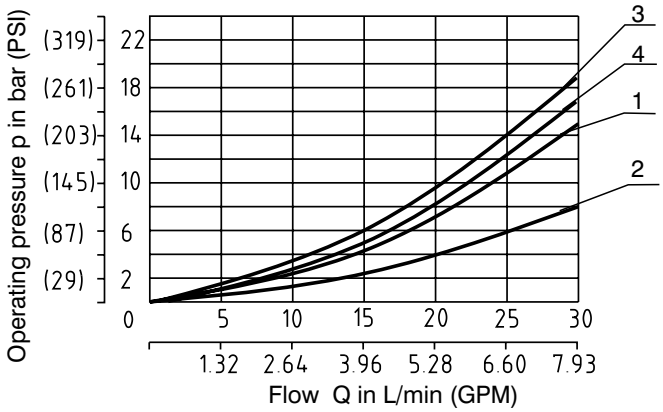
	Connection
1	2D21
1	2D25
2	2D26

Δp-Q Characteristics

Measured at ν = 32 mm^2/s (156 SUS)

Pressure drops related to flow rate.

Standard valve + High performance valve

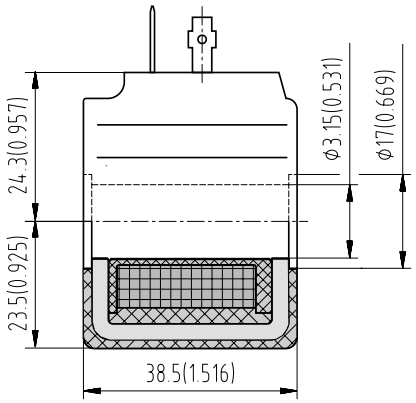


	Connection	Direction
1	2D21	3→2
1	2D25	3→2
2	2D21	2→1
3	2D26	3→2
4	2D25	2→1
4	2D26	2→1

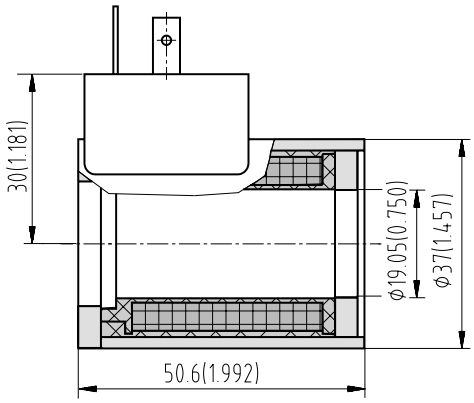
Type of the Solenoid Coils

Dimensions in millimeters (inches)

Coil for Standard valve
C51-26



Coil for High performance valve
C04-20



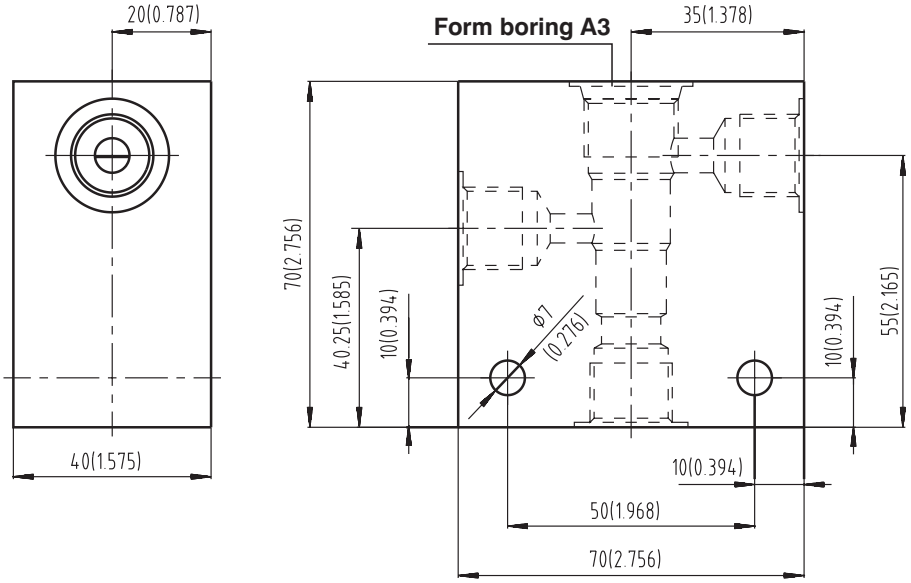
Solenoid	Connector	Standard valve	High performance valve
		SD2E-A3 / **S...**	SD2E-A3 / **H...**
		Type code	**Type code**
12 VDC	EN 175301-803-A (DIN 43 650) with quenching diode	C51-26-012DC-E2	C04-20-012DC-E2
24 VDC	EN 175301-803-A (DIN 43 650) with quenching diode	C51-26-024DC-E2	C04-20-024DC-E2
12 VDC	AMP (with quenching diode)	C51-26-012DC-E4	C04-20-012DC-E4
24 VDC	AMP (with quenching diode)	C51-26-024DC-E4	C04-20-024DC-E4
120 VAC	EN 175301-803-A (DIN 43 650) with rectifier	-	C04-20-120AC-E5
230 VAC	EN 175301-803-A (DIN 43 650) with rectifier	-	C04-20-230AC-E5
120 VAC	EN 175301-803-A (DIN 43 650)	C51-26-105DC-E1*	C04-20-105DC-E1*
230 VAC	EN 175301-803-A (DIN 43 650)	C51-26-205DC-E1*	C04-20-205DC-E1*

*Use the terminal box with rectifier!

Note:
- For other voltages, connector variants, quenching diodes or rectifiers refer to Coil data sheet HA 8007
- Coil size for Standard valve: C51-26
- Coil size for High performance valve: C04-20

Valve Body

Dimensions in millimeters (inches)



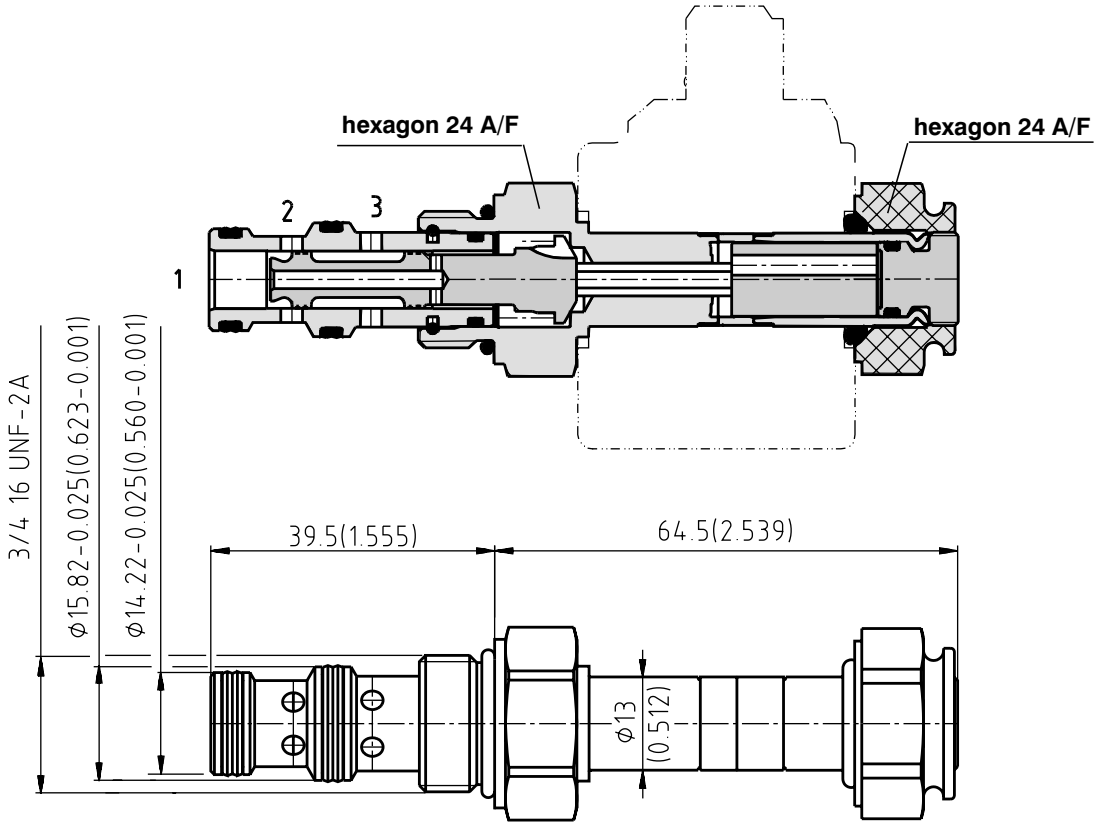
Body material	Connecting size	Type code	Operating pressures
Steel	G3/8	SB-A3-0103ST	420 bar (6091 PSI)
Steel	SAE 6	SB-A3-0102ST	420 bar (6091 PSI)
Aluminium	G3/8	SB-A3-0103AL	250 bar (3626 PSI)
Aluminium	SAE 6	SB-A3-0102AL	250 bar (3626 PSI)

Note:
- For detailed valve body ordering code refer to data sheet HA 0018

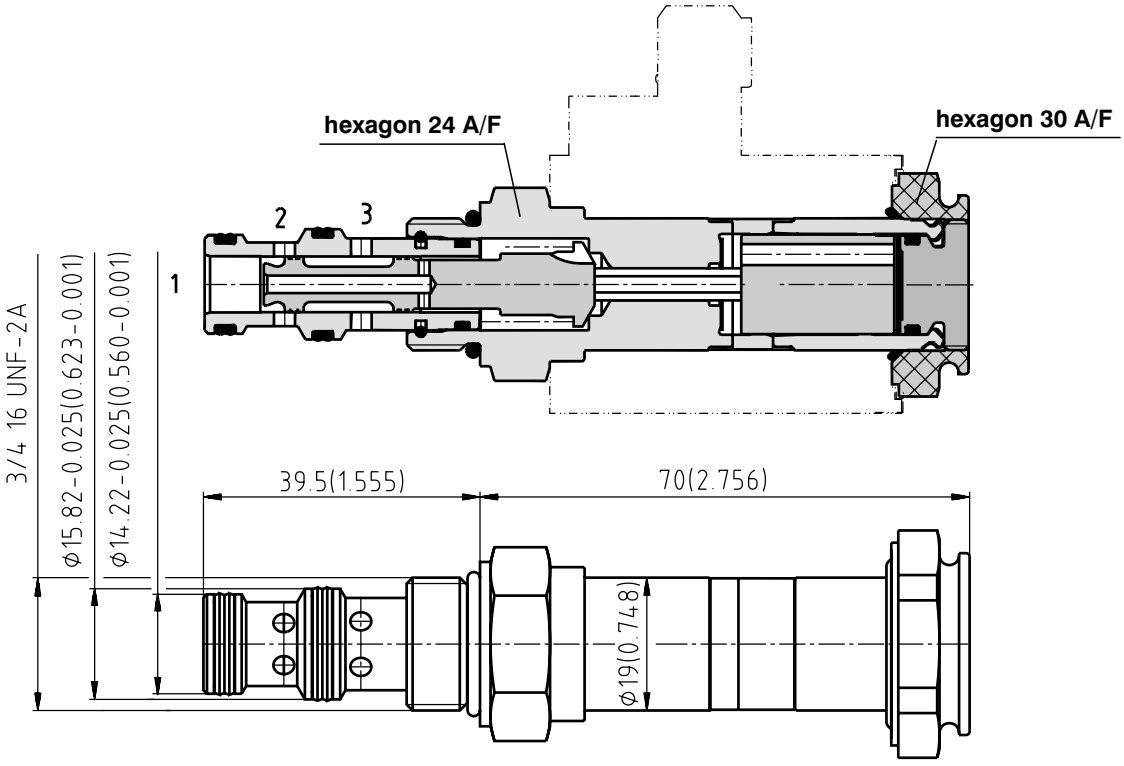
Valve Dimensions

Dimensions in millimeters (inches)

Standard valve

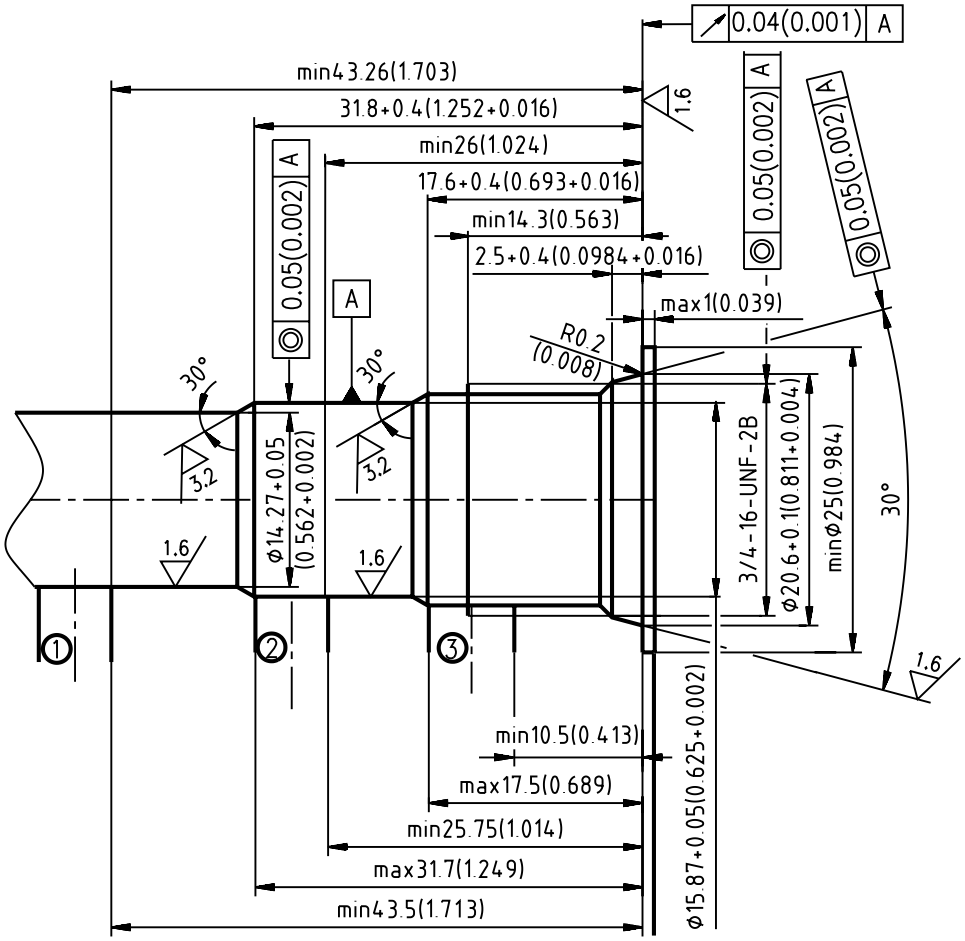


High performance valve



Insatallation Cavity

Dimensions in millimeters (inches)



Spare Parts

Standard and high performance valve

Dualseal - PU	O-ring - NBR	O-ring - Viton	Order number
11,87 x 14,27 x 3,1 (1pc.)	17 x 1,8 (1pc.)	-	408-9006
13,4 x 15,87 x 3,1 (1pc.)			
11,87 x14,27 x 3,1 (1pc)	-	17,17 x 1,78 (1pc.)	408-9007
13,4 x 15,87 x 3,1 (1pc.)			

Soenoid retaining nut with seal for standard valve

Type of nut	O-ring - Viton	
Standard nut	12,3 x 2,4 (1pc.)	408-9003
Nut N1	12,3 x 2,4 (1pc.)	408-9010

Soenoid retaining nut with seal for high performance valve

Type of nut	O-ring - Viton	
Standard nut	20 x 2,5 (1pc.)	408-9004
Nut N1	20 x 2,5 (1pc.)	408-9011

Caution!

- The packing foil is recyclable.
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law.

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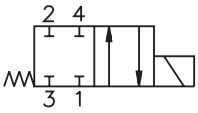
4/2 Way Solenoid Operated Directional Control Valves Spool Type

SD2E-A4

3/4-16 UNF • p_{max} 350 bar (5076PSI) • Q_{max} 30 L/min (7,9 GPM)

HA 4042
01/2005

- ❑ **4/2 Way cartridge valves solenoid operated spool directed**
- ❑ **Manual override**
- ❑ **No spool sticking by too a high tightening torque**
- ❑ **High transmitted power**



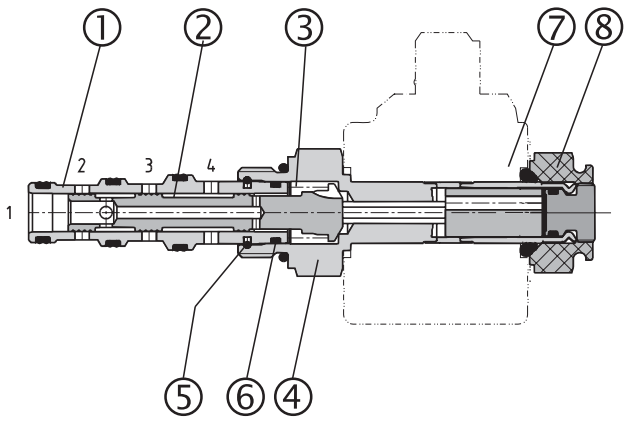
Functional Description

The directly operated 4/2-Way solenoid actuated spool valve controls in the first line the start and stop function of the oil flow. The valve consists of the valve body (1), control spool (2), return spring (3), cartridge with actuating system (4) and of the solenoid coil (7) that is mounted on the actuating system. The valve bushing is screwed into the cartridge part (4).
The valve bushing is fixed in the cartridge by a wire ring (5) and sealed with the seal ring (6). Separation of the valve bushing and the cartridge prevent transmitting the stresses, which could be caused by too high tightening torques. The DC solenoid coils can be delivered for 12 V and 24 V supply voltages. For AC applications 120 V/ 60 Hz or 230 V/ 50 Hz, the suitable rectifiers for the standard solenoid coils are available, with them being mounted in an additional terminal box. With the high power solenoid coils in AC variants, the rectifiers are integrated directly in the connector. By loosening the fixing nut (8), the solenoid coil can be replaced or turned in the range of 360°. The valve body is zinc coated.

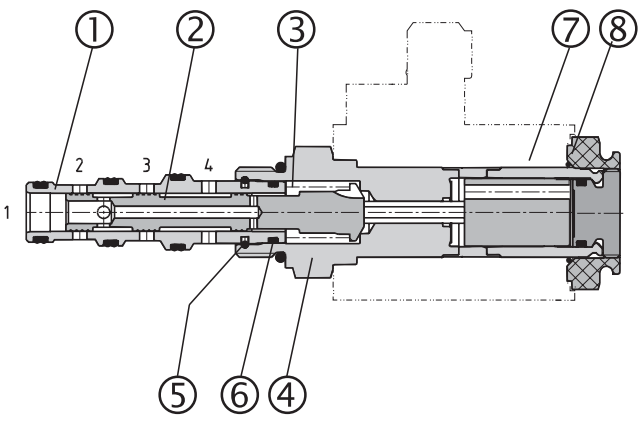
Note:
The valves are supplied without solenoids coils. The solenoid coil, the terminal box and the housing body for line mounting have to be ordered separately.

Cartridge Valve

Standard performance



High performance



Ordering Code

SD2E-A4 / □ □ □ □

4/2 Way Solenoid Operated Directional Control Valve

Standard **S**
High Performance **H**

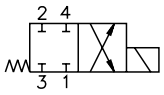
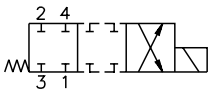
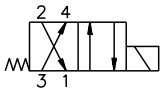
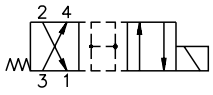
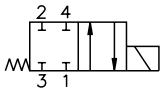
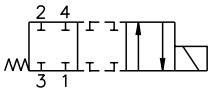
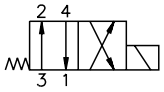
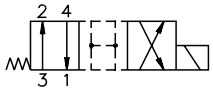
Description
Refer to the table with functional symbols

Polyurethan, Viton **V**
Polyurethan, NBR **No designation**

Manual override
Push button **N1**
Socket head screw **N2**
Without manual override **No designation**

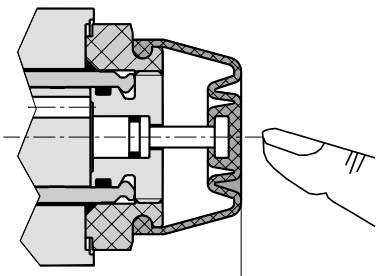
Solenoid coil, terminal box and body for line mounting have to be ordered separately.

Functional Symbols

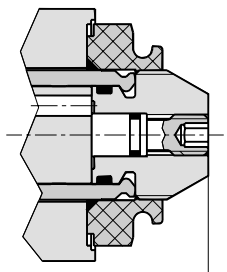
Designation	Symbol	Interposition	Designation	Symbol	Interposition
2Z51			2X21		
2Z11			2R21		

Manual Override

Dimensions in millimeters (inches)



Standard valve ~75,5(2,972)
High performance valve ~81,5(3,209)



Standard valve ~71,5(2,815)
High performance valve ~77,5(3,051)

N1- manual override by pushing

N2- manual override with socket head screw 2,5(0,098)

Technical Data

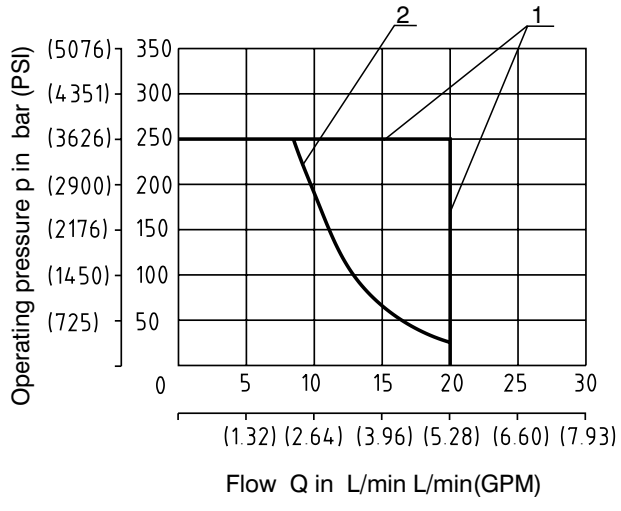
		Standard	High performance
Cartridge thread		3/4-16 UNF- 2B	
Maximum flow	L/min (GPM)	20 (5,3)	30 (7,9)
Max. operating pressure	bar (PSI)	250 (3625)	350 (5076)
Pressure drop	bar (PSI)	see Δp-Q characteristics	
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP - RP 91H in viscosity classes ISO VG 32, 46 and 68	
Coil groups (see the datasheet of coils)		C 51-26	C 04-20
Fluid temperature range	°C (°F)	-20 ... 60 (-4 ... 140)	-20 ... 80 (-4 ... 176)
Ambient temperature, max.	°C (°F)	-20 ... 50 (-4 ...122)	-20 ... 80 (-4 ... 176)
Viscosity range	mm^2/s (SUS)	10 ... 500 (49 ... 2450)	
Maximum degree of fluid contamination		Class 21/18/15 according to ISO 4406 (1999).	
Permissible rated voltage variation	%	AC,DC ±10	AC,DC ±15
Max. switching frequency	1/h	15 000	
Duty cycle	%	100	
Service life	cycles	10^7	
Weight	kg (lbs)	0,18 (0,40)	0,23 (0,51)
Maximum valve tightening torque		30^{+2}Nm	
Maximum plastic nut tightening torque		3^{+1}Nm	5^{+1}Nm
Mounting position		optional	

p-Q Characteristics

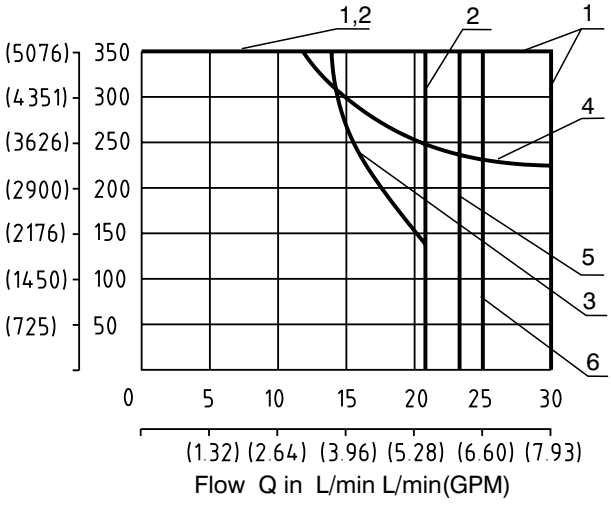
Measured at ν = 32mm^2/s (156 SUS)

Operating limits for maximum hydraulic power transferred by the directional valve. For respective spool type - see functional symbols.

Standard valve
Oil 140 °F (60 °C) / Ambient temperature 104 °F (40 °C)
Voltage Un [V]



High performance valve
Öl 176 °F (80 °C) / Ambient temperature 122 °F (50 °C)
Voltage Un -10% [V]



	Connection	Direction
1	2Z11	3→2
1	2Z11	4→1
1	2Z51	2→1
1	2Z51	3→4
1	2R21	3-4→2-1
1	2X21	3-4→2-1
1	2X21	3-2→4-1
2	2R21	3-2→4-1

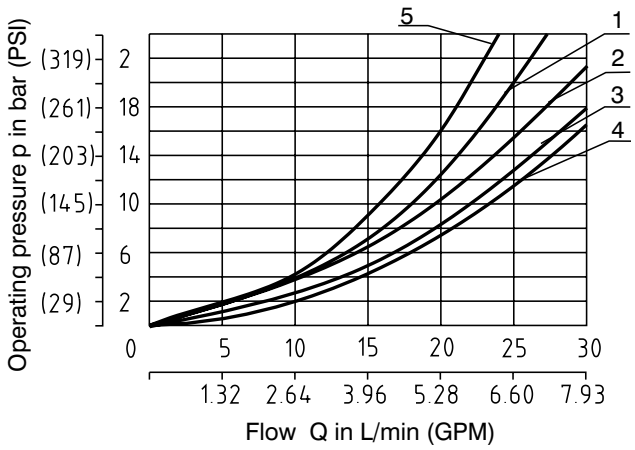
	Connection	Direction
1	2Z51	3→4
1	2Z51	2→1
2	2Z11	3→2
2	2Z11	4→1
3	2R21	3-2→4-1
4	2X21	3-4→2-1
5	2X21	3-2→4-1
6	2R21	3-4→2-1

Δp-Q Characteristics

Measured at ν = 32mm^2/s (156 SUS)

Pressure drops related to flow rate.

Standard valve + High performance valve

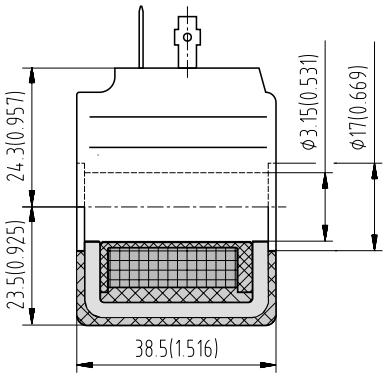


	Connection	Direction
1	2Z11	4→1
1	2R21	2→1
2	2Z11	3→2
2	2Z51	2→1
2	2X21	3→4
2	2X21	4→1
2	2R21	3→2
3	2Z51	3→4
4	2X21	3→2
3	2R21	3→4
4	2X21	2→1
5	2R21	4→1

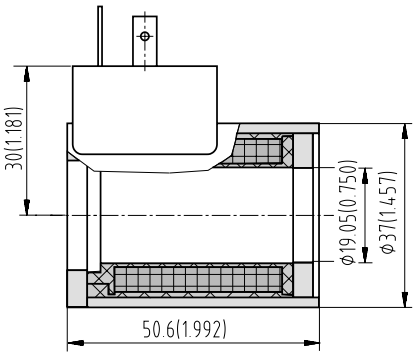
Type of the Solenoid Coils

Dimensions in millimeters (inches)

Coil for Standard valve
C51-26



Coil for High performance valve
C04-20



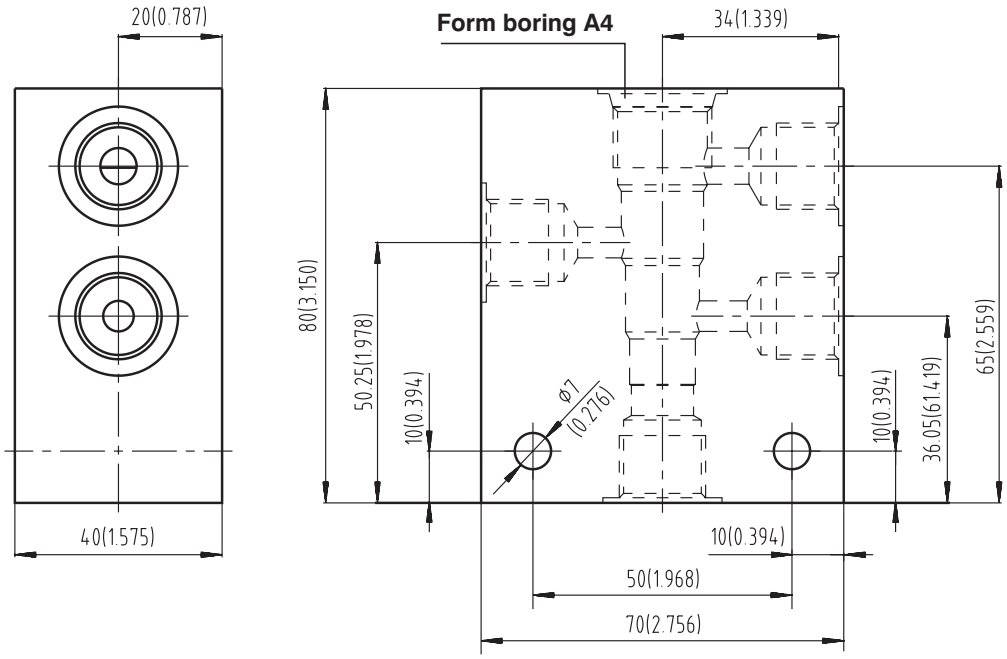
Solenoid	Connector	Standard valve	High performance valve
		SD2E-A4 / **S...**	SD2E-A4 / **H...**
		Type code	**Type code**
12 VDC	EN 175301-803-A (DIN 43 650) with quenching diode	C51-26-012DC-E2	C04-20-012DC-E2
24 VDC	EN 175301-803-A (DIN 43 650) with quenching diode	C51-26-024DC-E2	C04-20-024DC-E2
12 VDC	AMP (with quenching diode)	C51-26-012DC-E4	C04-20-012DC-E4
24 VDC	AMP (with quenching diode)	C51-26-024DC-E4	C04-20-024DC-E4
120 VAC	EN 175301-803-A (DIN 43 650) with rectifier	-	C04-20-120AC-E5
230 VAC	EN 175301-803-A (DIN 43 650) with rectifier	-	C04-20-230AC-E5
120 VAC	EN 175301-803-A (DIN 43 650)	C51-26-105DC-E1*	C04-20-105DC-E1*
230 VAC	EN 175301-803-A (DIN 43 650)	C51-26-205DC-E1*	C04-20-205DC-E1*

*Use the terminal box with rectifier!

Note:
- For other voltages, connector variants, quenching diodes or rectifiers refer to Coil data sheet HA 8007
- Coil size for standard valve: C51-26
- Coil size for high performance valve: C04-20

Valve Body

Dimensions in millimeters (inches)



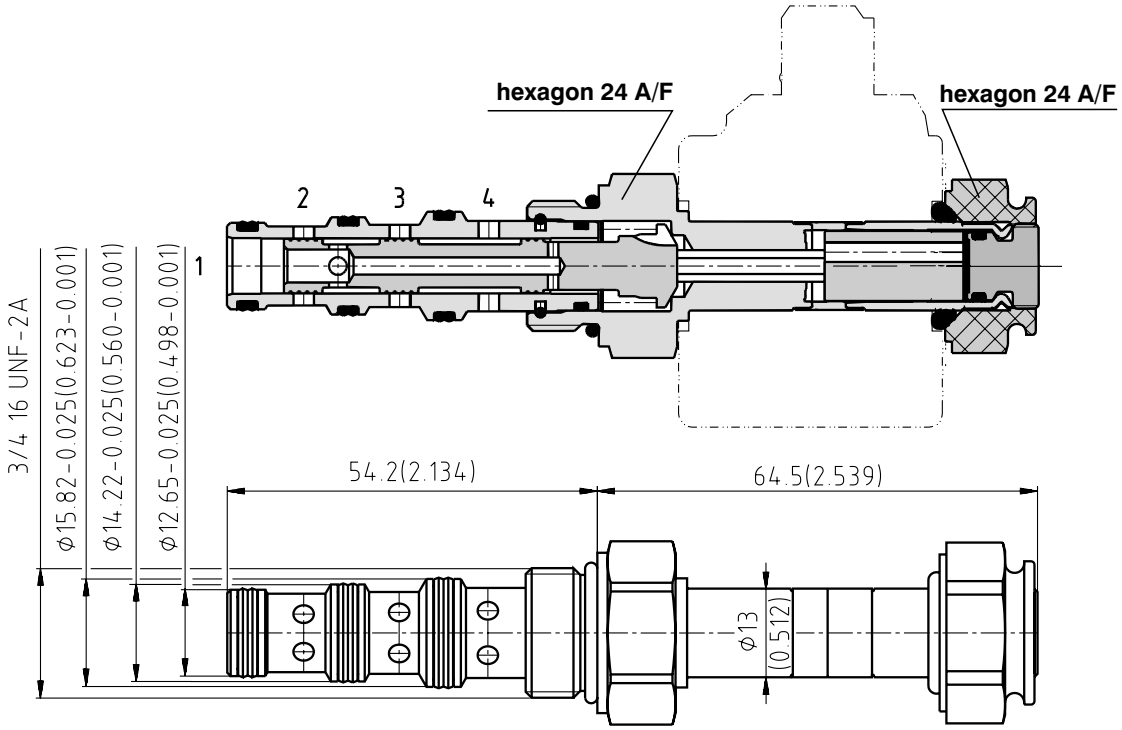
Body material	Connecting size	Type code	Operating pressures
Steel	G3/8	SB-A4-0103ST	420 bar (6091 PSI)
Steel	SAE 6	SB-A4-0102ST	420 bar (6091 PSI)
Aluminium	G3/8	SB-A4-0103AL	250 bar (3626 PSI)
Aluminium	SAE 6	SB-A4-0102AL	250 bar (3626 PSI)

Note:
- For detailed valve body ordering code refer to data sheet HA 0018

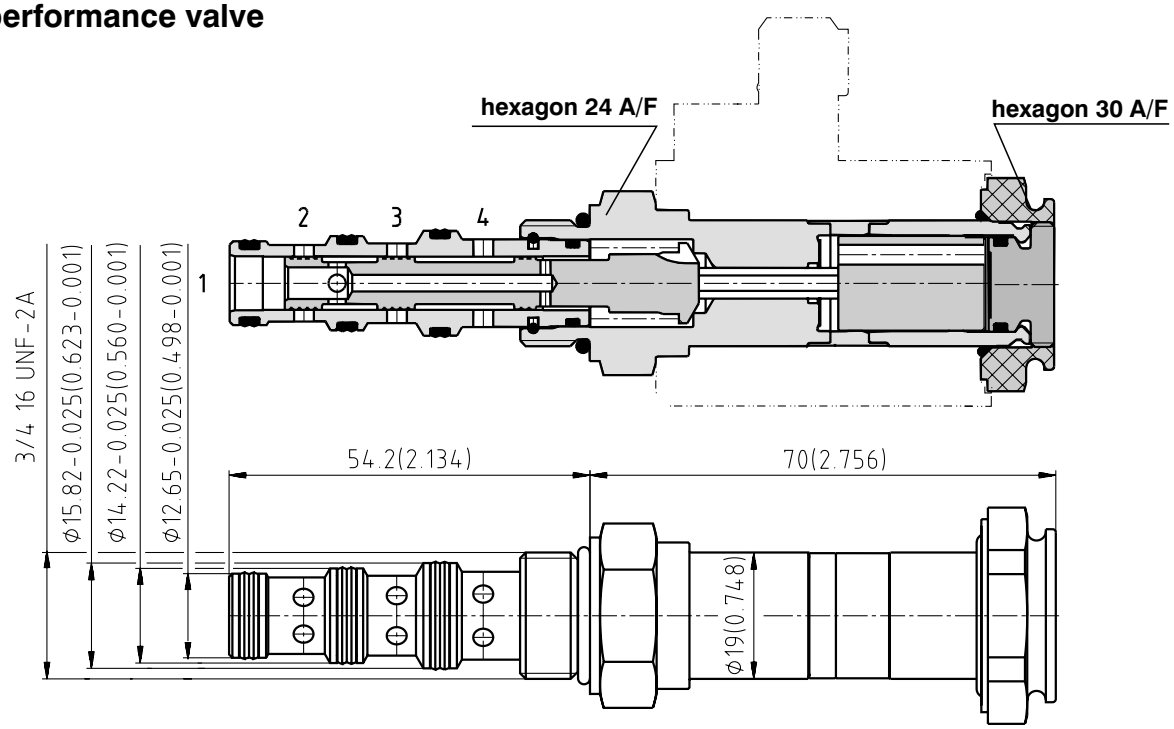
Valve Dimensions

Dimensions in millimeters (inches)

Standard valve

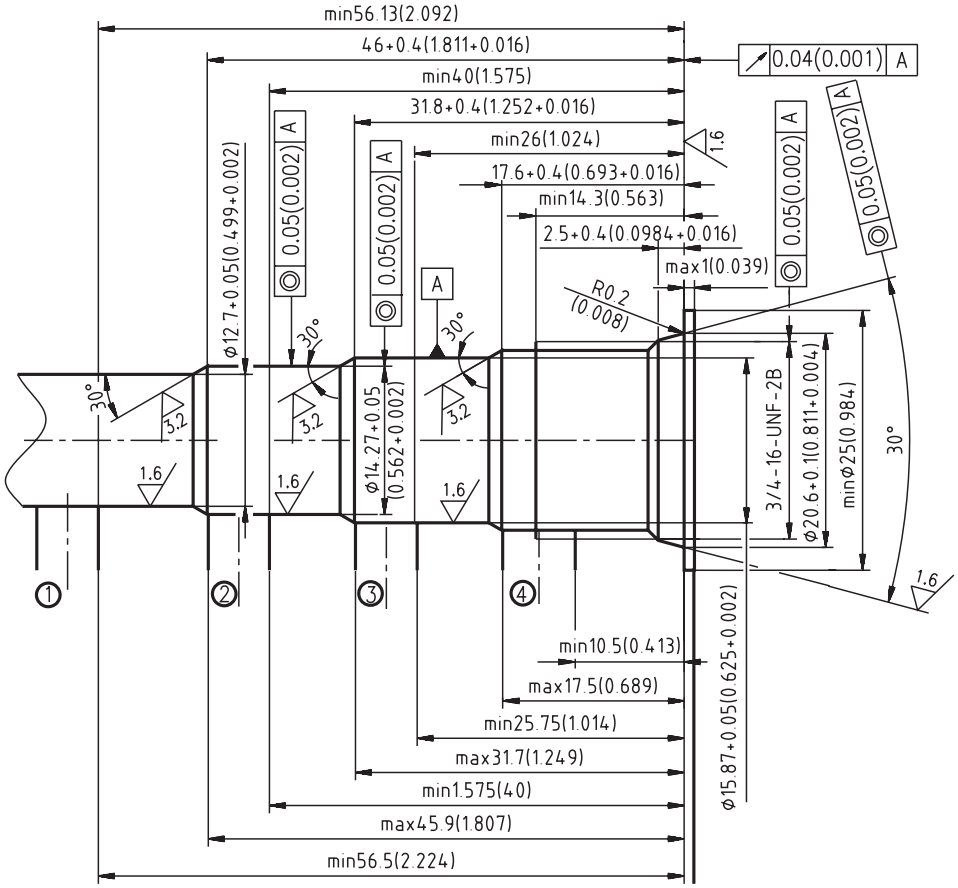


High performance valve



Insatallation Cavity

Dimensions in millimeters (inches)



Spare parts

Standard and high performance valve

Dualseal - PU	O-ring - NBR	O-ring - Viton	Order number
10,3 x 12,7 x 3,1 (1pc.)	17 x 1,8 (1pc.)	-	408-9008
11,87 x 14,27 x 3,1 (1pc.)			
13,4 x 15,87 x 3,1 (1pc.)			
10,3 x 12,7 x 3,1 (1pc.)	-	17,17 x 1,78 (1pc.)	408-9009
11,87 x 14,27 x 3,1 (1pc.)			
13,4 x 15,87 x 3,1 (1pc.)			

Solenoid retaining nut with seal for standard valve

Type of nut	O-ring - Viton	
Standard nut	12,3 x 2,4 (1pc.)	408-9003
Nut N1	12,3 x 2,4 (1pc.)	408-9010

Solenoid retaining nut with seal for high performance valve

Mutterausführung	O-ring - Viton	
Standard nut	20 x 2,5 (1pc.)	408-9004
Nut N1	20 x 2,5 (1pc.)	408-9011

Caution!

- The packing foil is recyclable.
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law.

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2/2 Way Solenoid Operated Directional Control Valves Poppet Type SD3E-A2

3/4-16 UNF • p_{max} 420 bar (6091 PSI) • Q_{max} 30 L/min (7,9 GPM)

HA 4043
01/2005

- ❑ **Cartridge and module design as well as housing for pipeline mounting**
- ❑ **Poppet design – no internal oil leakage**
- ❑ **High switching reliability also after long stand times**
- ❑ **High transmitted power**

Functional Description

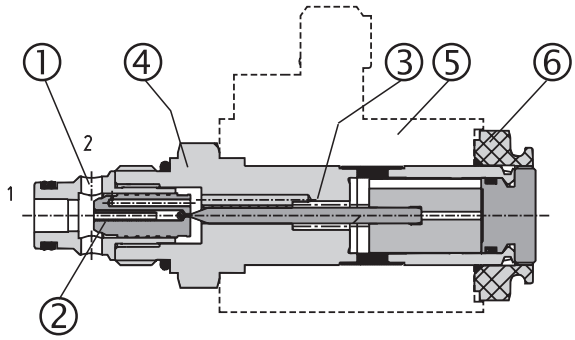
The pilot operated 2/2-Way solenoid actuated poppet valves control in the first line the start and stop function of the oil flow. The valve consists of the valve bushing (1), main control spool (2), return spring (3), cartridge with actuating system (4) and of the solenoid coil (5) that is mounted on the actuating system. The valve bushing is screwed into the cartridge part (4).
In the variant normally closed and normally opened, the valve is securely held in the respective basic position by a spring. By energizing the solenoid coil the spring force is overcome and the pilot valve is pressed onto the seat or lifted. Opening and closing of the main control spool is hydraulically supported through the orifice boring created in the main control spool.

The DC solenoid coils can be delivered for 12 V and 24 V supply voltages. For AC applications 120 V/ 60 Hz or 230 V/ 50 Hz, the suitable rectifiers for the standard solenoid coils are available, with them being mounted in an additional terminal box. With the AC high power solenoid coils, the rectifiers are integrated directly in the connector. By loosening the fixing nut (6), the solenoid coil can be replaced or turned in the range of 360°.

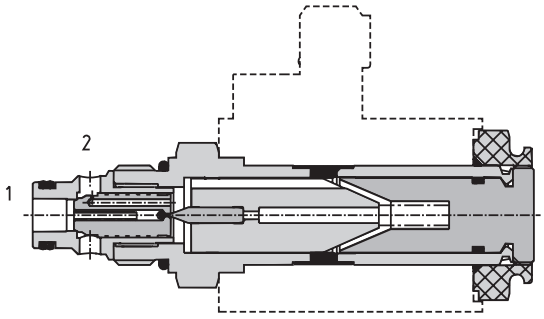
Notice.
The valves are supplied without solenoids coils. The solenoid coil, the terminal box and the body for line mounting have to be ordered separately.

Cartridge Valve

Absence of current opened 2O2



Absence of current closed 2L2



Ordering Code

SD3E-A2 / □ □ □ □

2/2 Way Solenoid Operated Directional Control Valves

Standard **S**
High Performance **H**

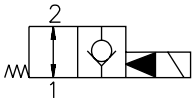
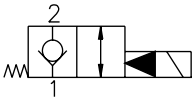
Description
Refer to the table with functional symbols

Polyurethan, Viton **V**
Polyurethan, NBR **No designation**

Manual override
Push button **N1**
Socket head screw **N2**
Without manual override **No designation**

Solenoid coil, terminal box and body for line mounting have to be ordered separately.

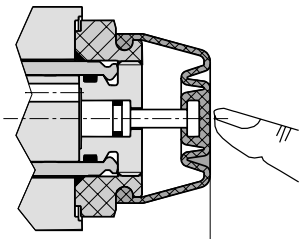
Functional Symbols

Designation	Symbol	Designation	Symbol
2O2		2L2	

Manual Override

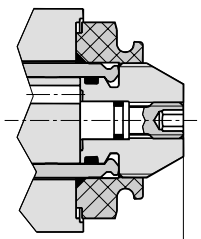
Dimensions in millimeters (inches)

N1- manual override by pushing only for symbols **2O2**



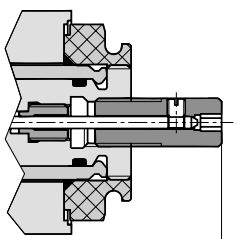
Standard valve ~71(2,759)
High performance valve ~81,5(3,209)

N2- manual override by screwing in of the socket head screw 2,5(0,098) for symbols **2O2**



Standard valve ~67(2,638)
High performance valve ~77,5(3,051)

N2- manual override by screwing in of the socket head screw 2,5(0,098) for symbols **2L2**



Standard valve ~71,5(2,815)
High performance valve ~89(3,504)

Technical Data

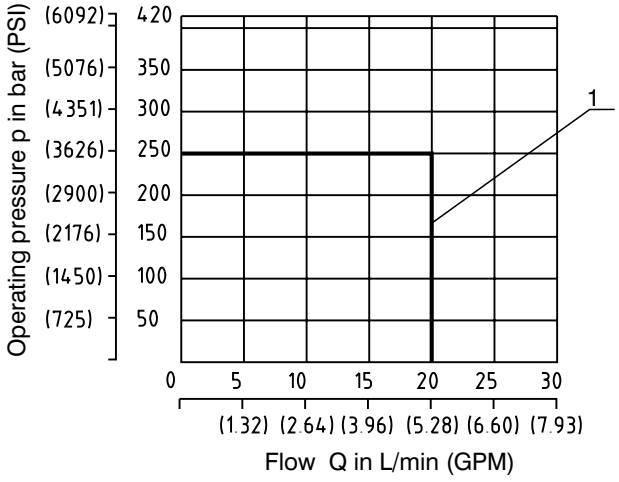
		Standard	High performance
Cartridge thread		3/4-16 UNF -2B	
Maximum flow	L/min (GPM)	20 (5,3)	30 (7,9)
Max. operating pressure	bar (PSI)	250 (3626)	420 (6091)
Pressure drop	bar (PSI)	see Δp-Q characteristics	
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP - RP 91H in viscosity classes ISO VG 32, 46 and 68	
Fluid temperature range	°C (°F)	-20 ... 60 (-4 ... 140)	-20 ... 80 (-4 ...176)
Ambient temperature, max.	°C (°F)	-20 ... 50 (-4 ... 122)	-20 ... 80 (-4 ...176)
Viscosity range	mm^2/s (SUS)	10 ... 500 (49 ... 2450)	
Maximum degree of fluid contamination		Class 21/18/15 according to ISO 4406 (1999).	
Coil gronps (see the datasheet of coils)		C 51-26	C 04-20
Permissible rated voltage variation	%	AC,DC ±10	AC,DC ±15
Max. switching frequency	1/h	15 000	
Duty cycle	%	100	
Service life	cycles	10^7	
Weight	kg (lbs)	0,10 (0,22)	0,20 (0,44)
Maximum valve tightening torque		30 $^{+2}$ Nm	
Maximum plastic nut tightening torque		3 $^{+1}$Nm	5 $^{+1}$Nm
Mounting position		optional	

p-Q Characteristics

Measured at $\nu = 32\ mm^2/s$ (156 SUS)

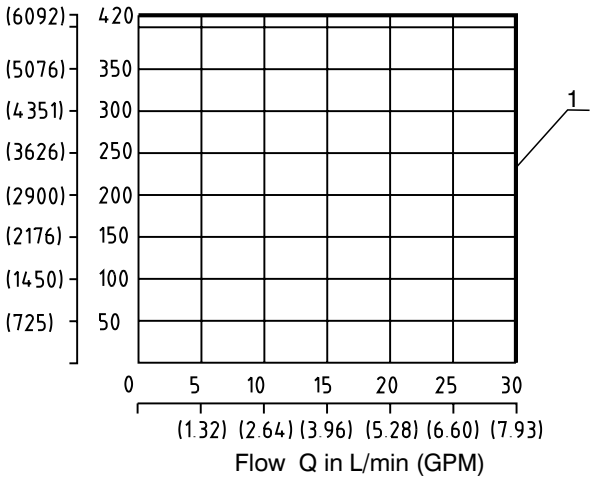
Operating limits for hydraulic power transferred by the directional valve. For respective spool type - see functional symbols.

Standard valve
Oil 60 °C (140 °F) / Ambient temperature 40 °C (104 °F)
Voltage Un [V]



	Connection
1	2L2
1	2O2

High performance valve
Oil 80 °C (176 °F) / Ambient temperature 50 °C (122 °F)
Voltage Un -10% [V]



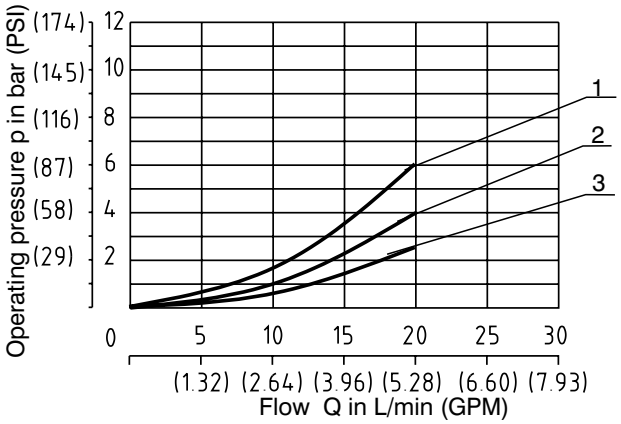
	Connection
1	2L2
1	2O2

Δp-Q Characteristics

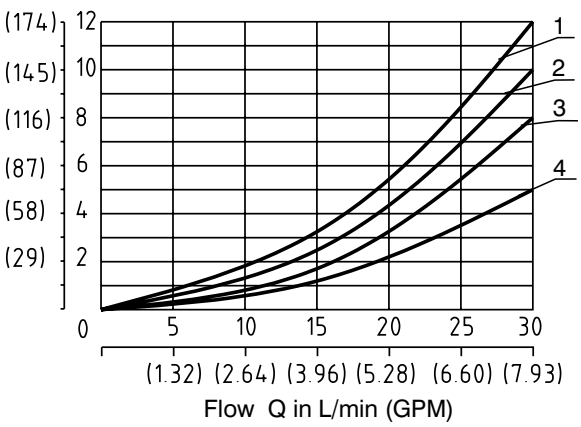
Measured at ν = 32 mm^2/s (156 SUS)

Pressure drops related to flow rate.

Standard valve + High performance valve



	Connection	Dirrection
1	2L2	1→ 2
1	2L2	2→ 1
2	2O2	1→ 2*
2	2O2	2→ 1
	*Solenoid switched off	

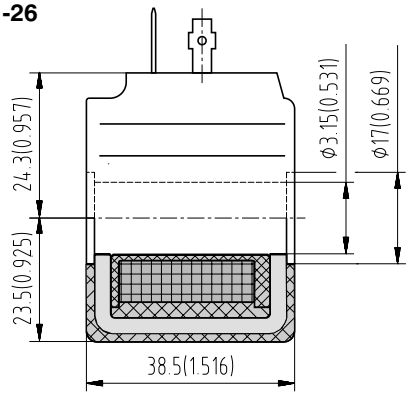


	Connection	Dirrection
1	2L2	1→ 2
1	2L2	2→1
2	2O2	1→ 2*
2	2O2	2→1
	*Solenoid switched off	

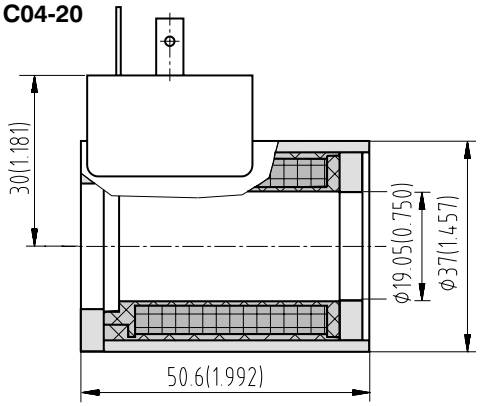
Type of the Solenoid Coils

Dimensions in millimeters (inches)

Coil for Standard valve
C51-26



Coil for High performance valve
C04-20



Solenoid	Connector	Standard SD3E-A2 / **S...** Type code	High performance SD3E-A2 / **H...** Type code
12 VDC	EN 175301-803-A (DIN 43 650) with quenching diode	C51-26-012DC-E2	C04-20-012DC-E2
24 VDC	EN 175301-803-A (DIN 43 650) with quenching diode	C51-26-024DC-E2	C04-20-024DC-E2
12 VDC	AMP (with quenching diode)	C51-26-012DC-E4	C04-20-012DC-E4
24 VDC	AMP (with quenching diode)	C51-26-024DC-E4	C04-20-024DC-E4
120 VAC	EN 175301-803-A (DIN 43 650) with rectifier	-	C04-20-120AC-E5
230 VAC	EN 175301-803-A (DIN 43 650) with rectifier	-	C04-20-230AC-E5
120 VAC	EN 175301-803-A (DIN 43 650)	C51-26-105DC-E1*	C04-20-105DC-E1*
230 VAC	EN 175301-803-A (DIN 43 650)	C51-26-205DC-E1*	C04-20-205DC-E1*

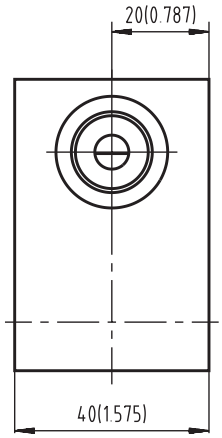
*Use the terminal box with rectifier!

Note:

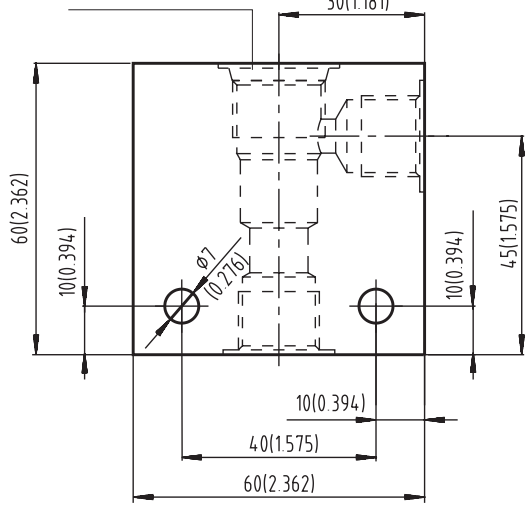
- For other voltages, connector variants, quenching diodes or rectifiers refer to Coil data sheet HA 8007
- Coil size for standard valve: C51-26
- Coil size for high performance valve: C04-20

Valve Body

Dimensions in millimeters (inches)



Form boring A2



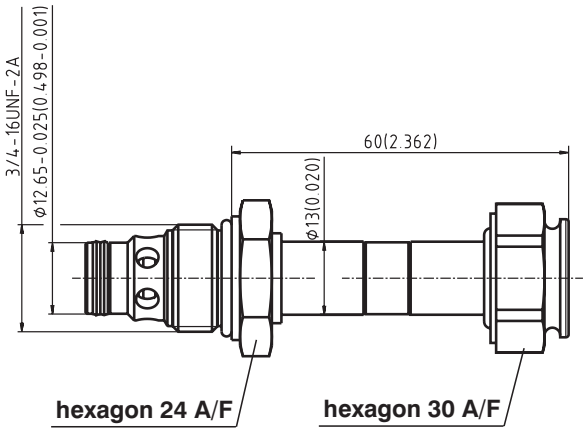
Body material	Connecting size	Type code	Operating pressures
Steel	G3/8	SB-A2-0103ST	420 bar (6091 PSI)
Steel	SAE 6	SB-A2-0102ST	420 bar (6091 PSI)
Aluminium	G3/8	SB-A2-0103AL	250 bar (3626 PSI)
Aluminium	SAE 6	SB-A2-0102AL	250 bar (3626 PSI)

Note:
- For detailed valve body ordering code refer to data sheet HA 0018

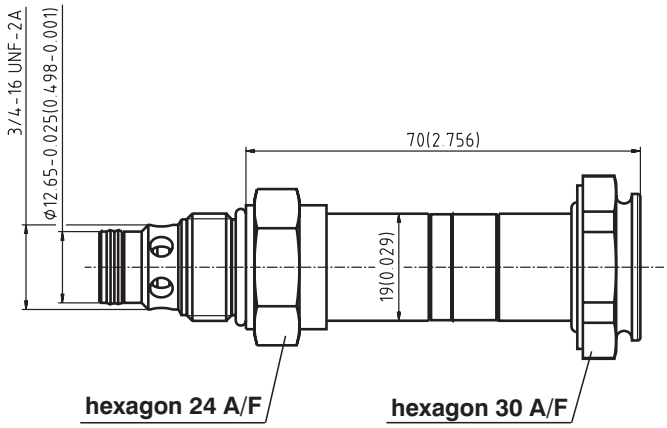
Valve Dimensions

Dimensions in millimeters (inches)

Standard valve

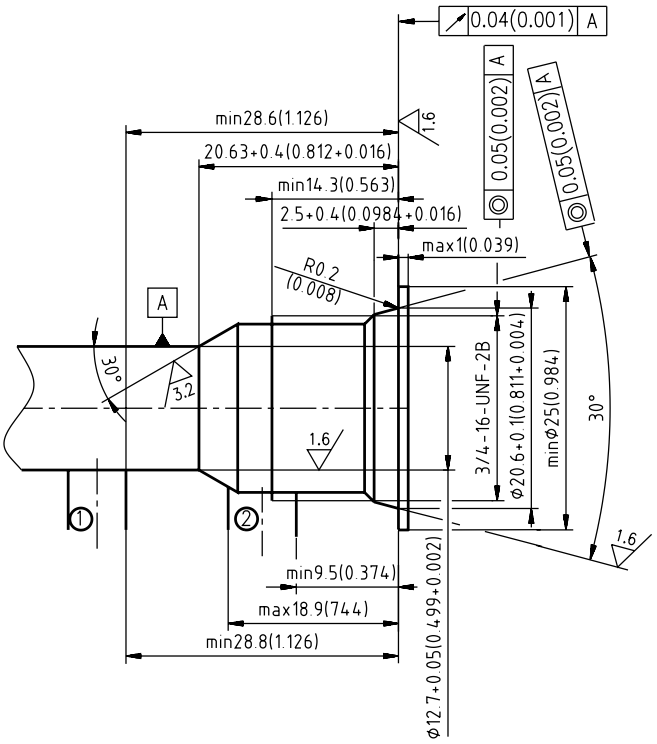


High performance valve



Insatallation Cavity

Dimensions in millimeters (inches)



Spare Parts

Standard and high performance valve

Dualseal - PU	O-ring - NBR	O-ring - Viton	Order number
10,3 x 12,7 x 3,1 (1pc.)	17 x 1,8 (1pc.)	-	408-9001
10,3 x 12,7 x 3,1 (1pc.)	-	17,17 x 1,78 (1pc.)	408-9002

Soenoid retaining nut with seal for standard valve

Type of nut	O-ring - Viton	
Standard nut	12,3 x 2,4 (1pc.)	408-9003
Nut N1	12,3 x 2,4 (1pc.)	408-9010

Solenoid retaining nut with seal for high performance valve

Type of nut	O-ring - Viton	
Standard nut	20 x 2,5 (1pc.)	408-9004
Nut N1	20 x 2,5 (1pc.)	408-9011

Caution!

- The packing foil is recyclable.
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law.

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www.argo-hytos.com

ARGO HYTOS

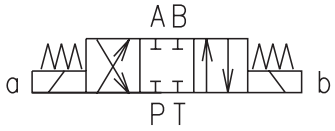
Directional Control Valves Solenoid Operated

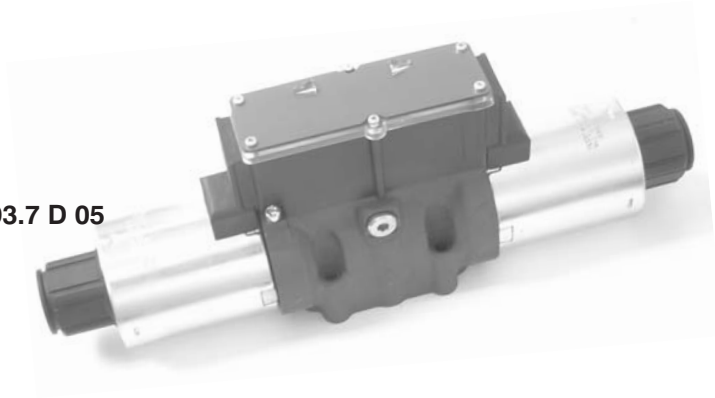
RPEW4-10

Size 10 (D 05) • ... 350 bar (5076 PSI) • ...140 L/min (37 GPM)

HA 4044
02/2006

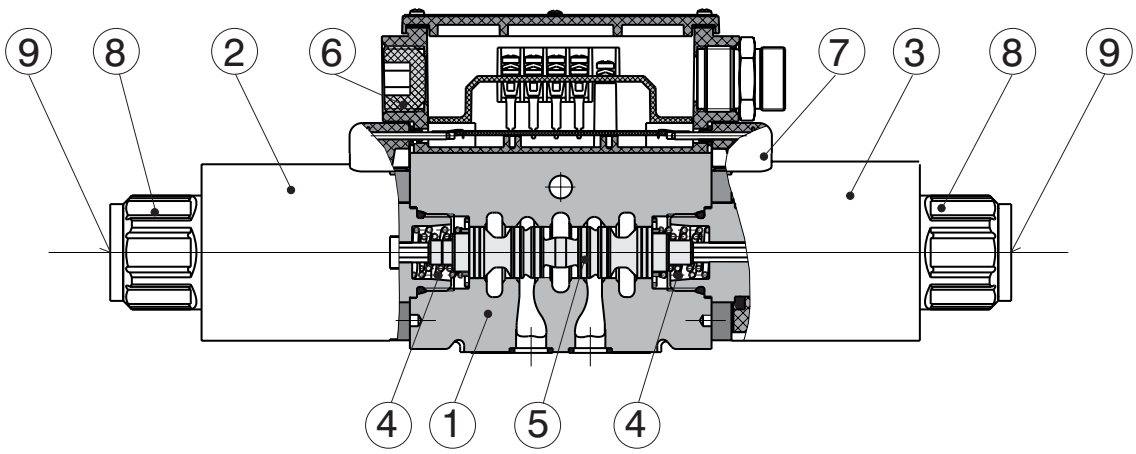
- ❑ **4/3-, 4/2- and 3/2-way directional control valves**
- ❑ **Dual frequency solenoids, AC voltage 50/60 Hz**
- ❑ **Wet pin core tubes**
- ❑ **Push button manual override**
- ❑ **With soft shift option**
- ❑ **Installation dimensions to DIN 24 340, ISO 4401, NFPA T3.5.1M R1 and ANSI B 93.7 D 05**
- ❑ **Subplates see data sheet HU 0002**
- ❑ **CSA Upon request**





Functional Description

The RPEW4 directional control valves consist of housing (1), a control spool (5) with two centering springs (4) and cylindrical operating solenoids (2, 3), electric wirebox (9) and connector (6).
The three-position directional control valves are fitted with two solenoids and two springs. Two-position directional control valves have either one solenoid and one return spring or two solenoids and a detent assembly.
The solenoids are supplied with DC and AC - voltage through the 1/2 NPT Ports on the wirebox (optional on both sides) or through Connector Item (3 - Pin single solenoid, 5 - Pin - double solenoid) see wiring diagram (page 7). The wires are connected to a terminal plate inside the wirebox. Optional lights are installed on this terminal plate for shift indication. The lights are visible as raised arrows on the valve label. The solenoids are retained by the Nut (7) and plug-in to the wirebox. Plug -in design allows easy removal without wire change.
In the case of solenoid malfunction or power failure, the spool of the valve can be shifted by manual override (8), provided the pressure in T- port does not exceed 363 PSI (25 bar).
The valve housing (1) is phosphate coated and the solenoids (2, 3) are zinc coated.



Ordering Code

RPEW4 - 10 ☐☐ / ☐☐☐☐☐☐☐

Solenoid Operated Directional Control Valves with Wirebox

Valve Size **10 (05)**

Number of Valve Positions
two positions **2**
three positions **3**

Functional symbols
see the table functional symbols

Rated Supply Voltage of Solenoids
(at the wirebox terminals)
12 V DC / 2.64 A **01200**
24 V DC / 1.32 A **02400**
120V AC/60Hz **12060**

Note: For other voltages consult factory

Type of Solenoid Coil for Wiring Box (Plug-In-Coil)
DC solenoid (DC and AC - rectified) **EW1**

Type of Wirebox
Wirebox for DC **K**
Wirebox AC rectified (rectifier in wirebox) **R**

Seals
omit NBR
V FPM (Viton)

Damping
no designation without damping
T2 nozzle
T3 throttle screw

Manual override
no designation standard
N2 covered with rubber boot

Wirebox Configurations:

50 Standard wiring box with 1/2 NPT both ends (Either side can be used for wiring, Remove cover -plug accordingly)

51 Standard wiring box with 1/2 NPT both ends and lights (B- side plugged, A - side covert for shipping)

52 Wiring box with 3 PIN connector ANSI/B93.55M mounted on A-side (B-side plugged, only for single solenoid valves)

53 Wiring box with 3 PIN connector ANSI/B93.55M mounted on B-side (A-side plugged, only for single solenoid valves)

54 Wiring box with 3 PIN connector ANSI/B93.55M mounted on A-side with light (B-side plugged, only for single solenoid valves)

55 Wiring box with 3 PIN connector ANSI/B93.55M mounted on B-side with light (A-side plugged, only for single solenoid valves)

56 Wiring box with 5 PIN connector ANSI/B93.55M mounted on A-side (B-side plugged, only for double solenoid valves)

57 Wiring box with 5 PIN connector ANSI/B93.55M mounted on B-side (A-side plugged, only for double solenoid valves)

58 Wiring box with 5 PIN connector ANSI/B93.55M mounted on A-side with light (B-side plugged, only for double solenoid valves)

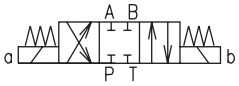
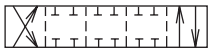
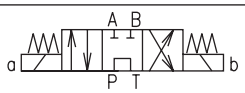
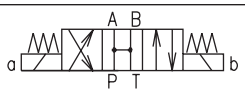
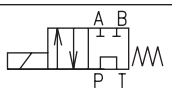
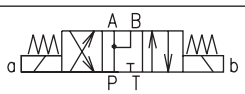
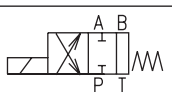
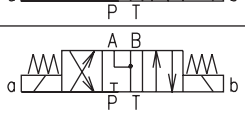
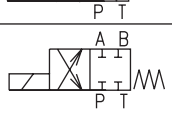
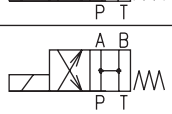
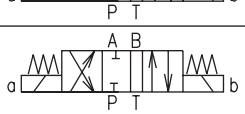
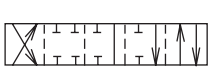
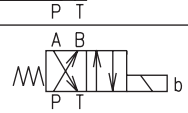
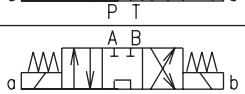
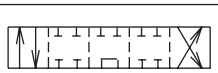
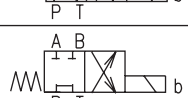
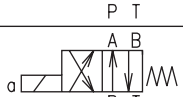
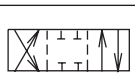
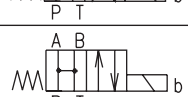
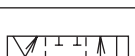
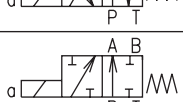
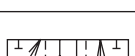
59 Wiring box with 5 PIN connector ANSI/B93.55M mounted on B-side with light (A-side plugged, only for double solenoid valves)

CSA Upon request

Technical Data

Valve size	mm (US)	10 (D 05)	
Maximum flow	L/min (GPM)	see p-Q characteristics	
Maximum operating pressure at ports P, A, B	bar (PSI)	350 (5076)	
Maximum operating pressure at port T	bar (PSI)	210 (3050)	
Pressure drop	bar (PSI)	see Δp-Q characteristics	
Hydraulic fluid		Hydraulic oils of power classes (HL, HLP) to DIN 51 524	
Fluid temperature range (NBR / Viton)	°C (°F)	-30 ... +80 (-22 ... +176) / -20 ... +80 (-4 ... +176)	
Ambient temperature max.	°C (°F)	up to +50 (+122)	
Viscosity range	mm^2/s (SUS)	20 ... 400 (98 ... 1840)	
Maximum degree of fluid contamination		Class 18/15 to ISO 4406. A filter with a retention rate $\beta_{10} \geq 75$ is recommended.	
Maximum allowable voltage variation	%	AC: ±10	DC: ±10
Maximum switching frequency	1/h	15 000	
Switching time, ON; at ν = 32 mm^2/s (156 SUS)	ms	AC: 50 ... 330	DC: 50 ... 120
Switching time, OFF; at ν =32 mm^2/s (156 SUS)	ms	AC: 100 ... 300	DC: 30 ... 90
Duty cycle	%	100	
Service life	cycles	10^7	
Enclosure type to DIN 40 050		IP 65	
Weight - valve with 1 solenoid - valve with 2 solenoids	kg (lbs)	3.9 (8.60) 5.4 (11.90)	
Mounting position		any	

Spool Symbols

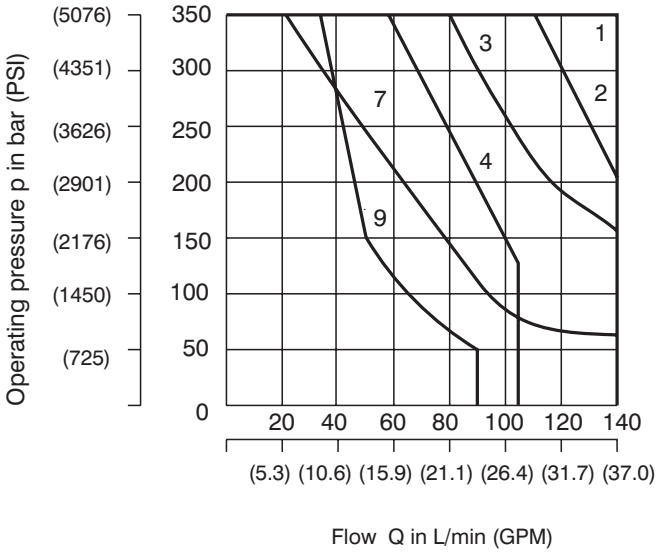
Designation	Symbol	Interposition	Designation	Symbol	Interposition
*Z11			*P51		
*C11			*Y51		
*H11			*C51		
*P11			B51		
*Y11			*Z51		
L21			H51		
B11			*X11		
C21			*C11		
*R11			*H11		
R21			J15		
*A51			J75		

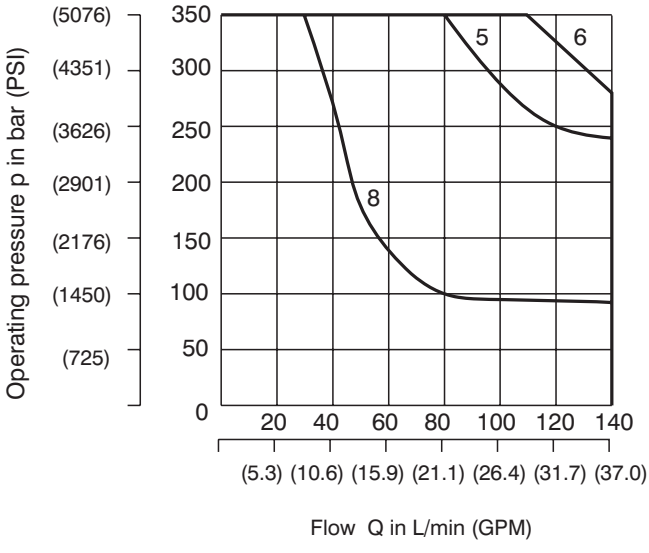
* CSA Upon request

p-Q Characteristic

Measured at $\nu = 32\ mm^2/s$ (156 SUS) and $t = 40\ °C$ (104 °F)

Operating limits for maximum hydraulic power transferred by the directional valve. For respective spool type - see spool symbols.The power curves hold true for symmetrical valve flows (e.g. flows in directions P-A and B-T are identical). In case of an asymmetric flow, the power curves can lie substantially lower. In such cases we highly recommend to consult the respective power curve with the valve manufacture.



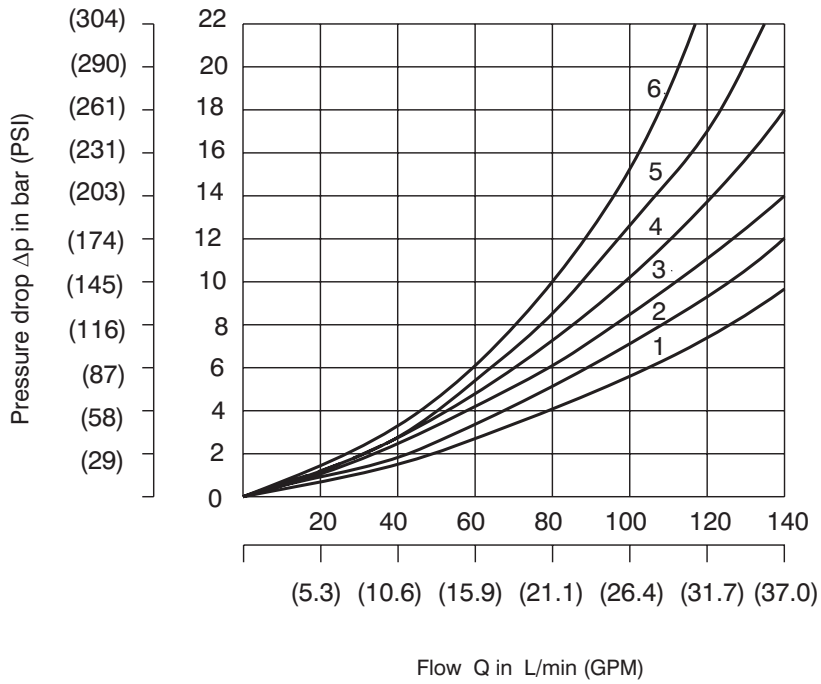


Z11	Z51	H11	H51	P11	P51	Y11	Y51	C11	C51	R11	X11	B11	B51	L21	R21	J15	J75	A51	C21
1	1	1	1	1	1	5	5	3	3	2	2	4	4	7	2	6	6	8	9

Δp-Q Characteristic

Measured at $\nu = 32\ mm^2/s$ (156 SUS) and $t = 40\ °C$ (104 °F)

Pressure drop Δp related to flow rate.

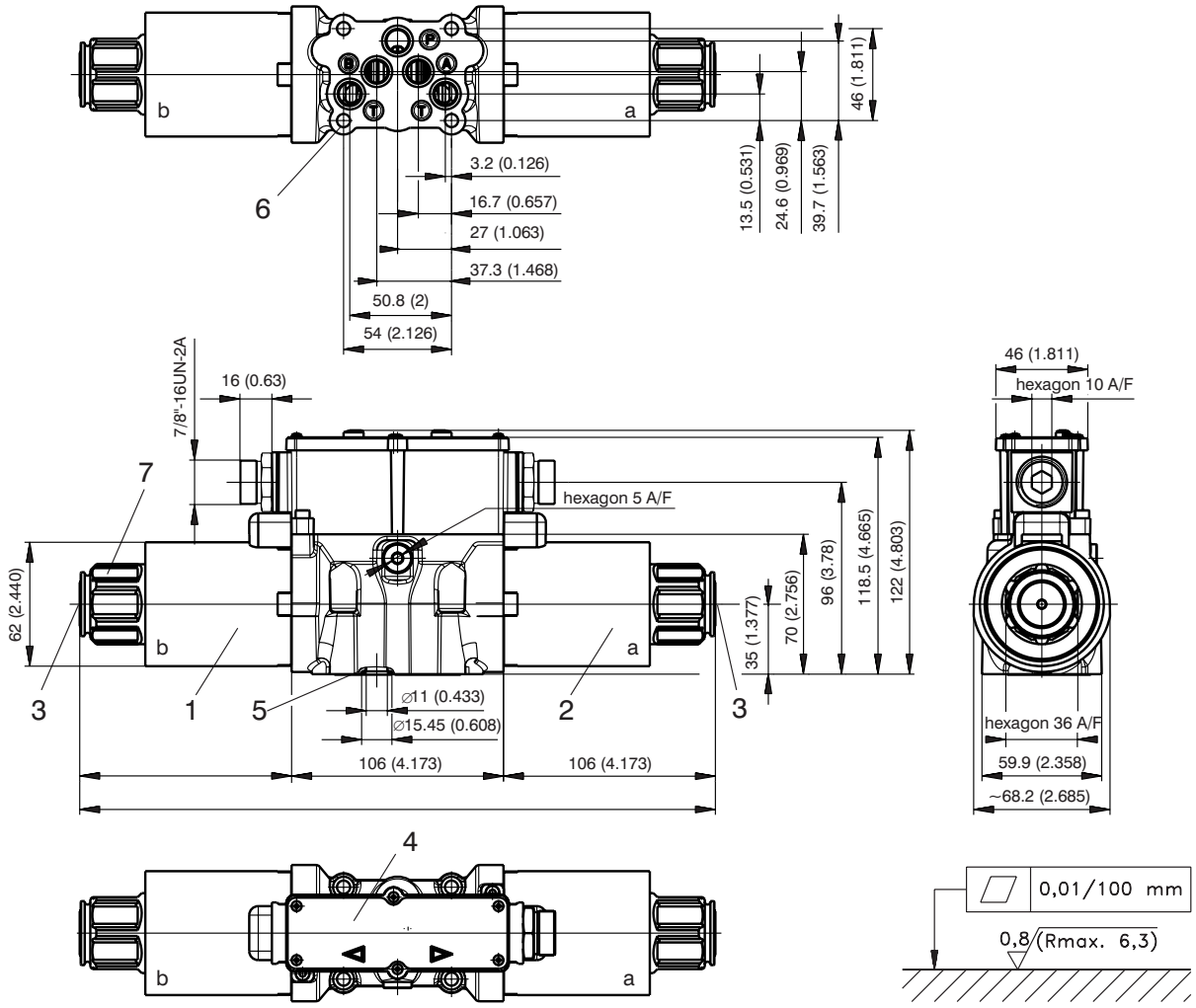


	P-A	P-B	A-T	B-T	P-T
Z11	1	1	2	2	
Z51		1	2		
H11	1	1	2	2	1
H51		1	2		1
P11	1	1	2	2	
P51		1	2		
Y11	1	1	2	2	
Y51		1	2		
C11	4	3	4	5	1
C51	4			5	1
R11	1	1	2	2	
X11	1	1	2	2	
B11	1	1	2	2	
B51		1	2		
L21	1	1	1	2	2
R21	1	1	1	3	
J15	1	2	2	3	
J75	1	1			
A51	1	1			
C21	6	6	6	6	4

Valve Dimensions

Dimensions in millimeters and inches

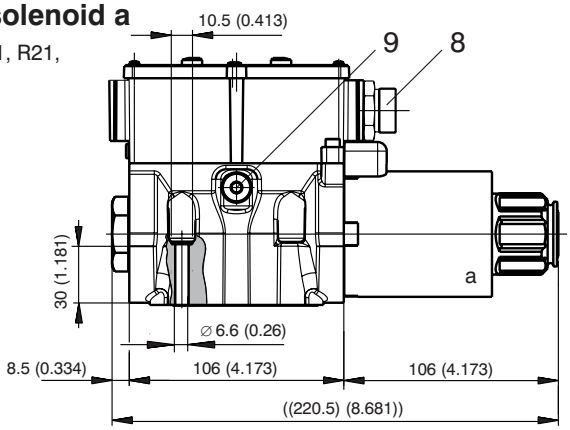
Valve with two solenoids

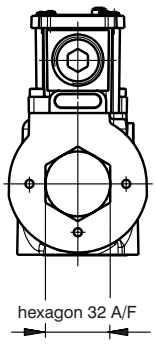


Required surface finish of interface.

Valve with one solenoid a

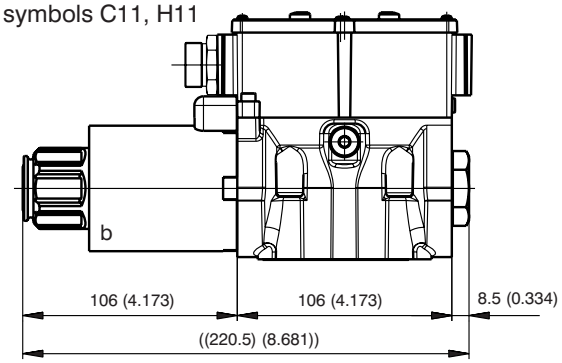
Functional symbols R11, R21, Y51, C51, Z51, H51,





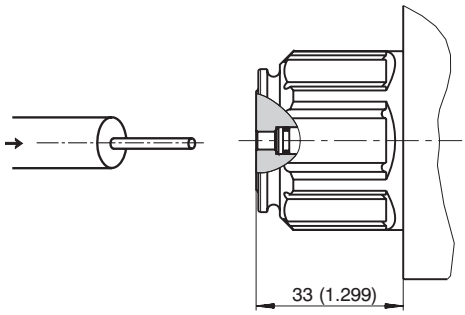
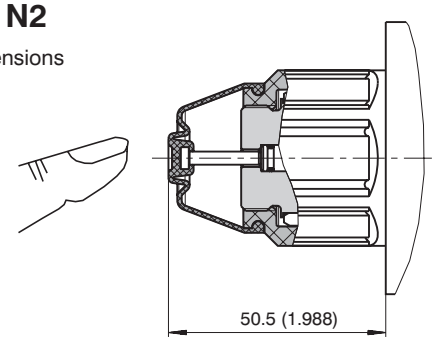
Valve with one solenoid b

Functional symbols C11, H11



1 Solenoid a (Nut torque 6Nm)
2 Solenoid b (Nut torque 6Nm)
3 Manual override
4 Name plate
5 Square ring 12.42 x 1.68 (5 pcs.) supplied with valve
6 4 mounting holes
7 Retaining nut of the solenoid
8 Electrical connector
9 Throttle screw

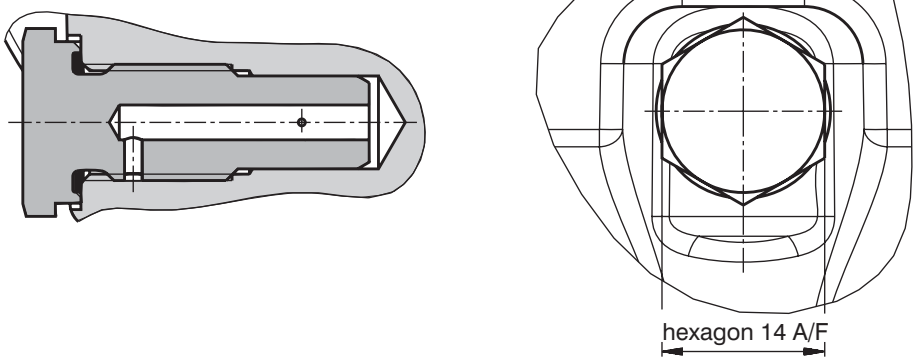
Manual Override

Sandard	Rubber boot
Dimensions  Standard model of the manual override. Standard retaining nut of the solenoid.	Type **N2** Dimensions  Manual override protectedby the rubber boot.

Soft Shifting Spool Options Delay Time

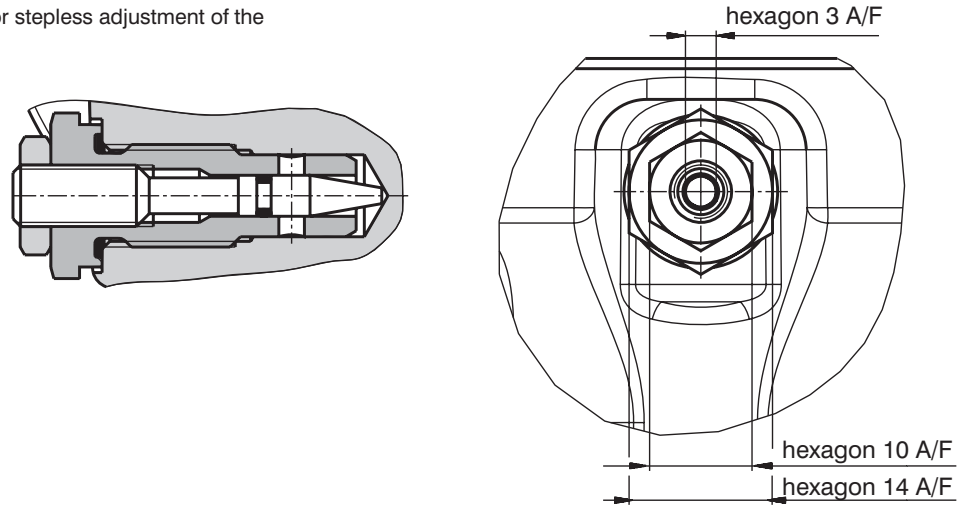
T2 - Noozle ∅ 0.157 (0.6)

The orifice extends the valve shifting time.



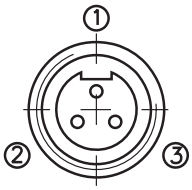
T3 - Throttle Screw

The control orifice allows for stepless adjustment of the valve shifting time.

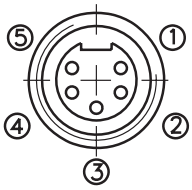


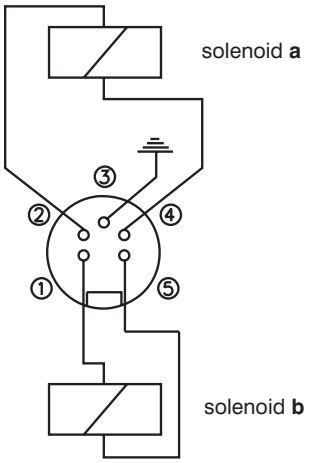
Connector - US - Standard - ANSI/B93.55M

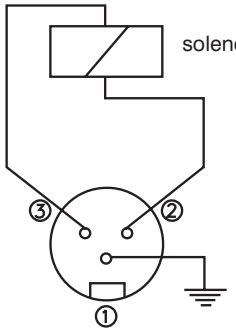
1 - green
2 - black
3 - white



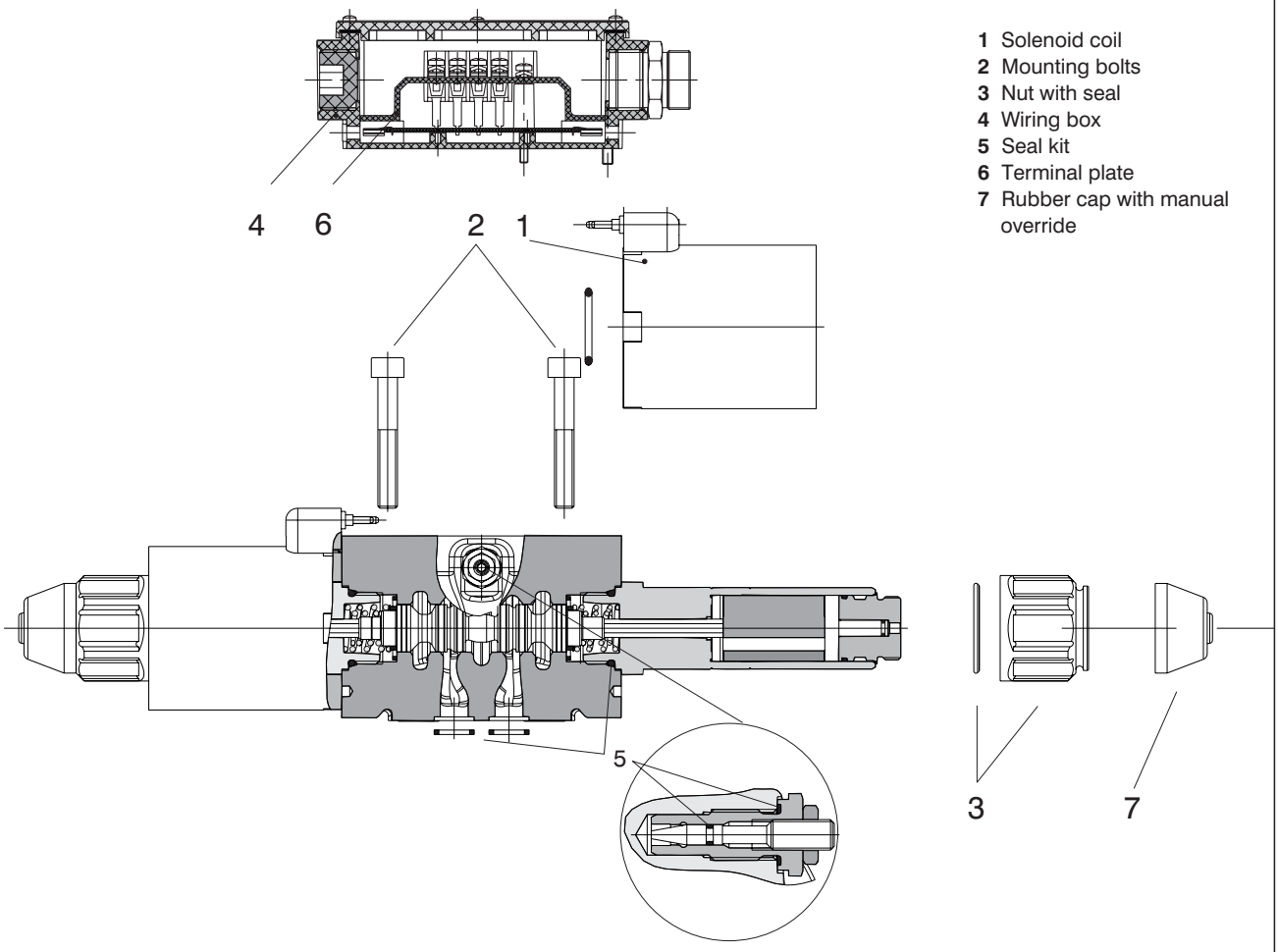
1 - white
2 - red
3 - green
4 - orange
5 - black







Spare Parts



1 Solenoid coil
2 Mounting bolts
3 Nut with seal
4 Wiring box
5 Seal kit
6 Terminal plate
7 Rubber cap with manual override

Wiringbox

Type	Order number
Wiring box without terminal plate	945-8025
Terminal Plates	
Type	Order number
Terminal plate - basic design A+B	945-8000
Terminal plate 12V DC - lights A+B	945-8001
Terminal plate 24V DC - lights A+B	945-8002
*Terminal plate 120V AC - rectifier A+B	945-8003
*Terminal plate 120V AC - rectifier A+B and lights A+B	945-8004

* CSA Upon request

Solenoid Coil

Voltage rating	Type	Order number
01200 DC	EW1	945-0005
02400 DC	EW1	945-0006
10600 DC (120V/60Hz rectified)	EW1	945-0007

Solenoid Retaining Nut with Seal

Type of the nut	Seal ring	Order number
Standard nut	30 x 2	489-9900
Nut with rubber boot		489-9901

Electrical Connector, ANSI/B93.55M

Type	Order number
3 PIN	937-0616
5 PIN	937-0617

Seal kit

Type	Dimensions		Ordering number
	Square ring	O-ring	
Standard NBR70	12.42 x 1.68 (5 pcs.), 11,9 x 8,4 x 1 (1 pc.)	23.81 x 2.62 (2 pcs.), 1,8 x 1 (1 pc.)	489-9902
Viton	12.42 x 1.68 (5 pcs.), 11,9 x 8,4 x 1 (1 pc.)	23.47 x 2.62 (2 pcs.), 1,8 x 1 (1 pc.)	489-9903

Mounting bolts

Dimensions	Tightening torque	Ordering number
M6 x 40 DIN 912-10.9 (4 pcs.)	14+2 Nm (10.33+1.48 lbf.ft)	485-9964
Soft Shift Conversion Kit		
T2	10 Nm (7.376 lbf.ft)	489-9905
T3	10 Nm (7.376 lbf.ft)	489-9906

Caution!

- In the case of directional control valves with two solenoids, any of the solenoids may be energized, but only after powering off the other.
- For directional control valves with other spool symbols as those shown in the table, please consult with the manufacturer.
- Other spool symbols on request.
- The plastic packaging is recyclable.
- Mounting bolts, studs and DIN-connectors must be ordered separately.
- Certified documentation is available per request.

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E-mail: sales.cz@argo-hytos.com
www.argo-hytos.com

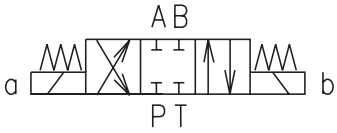
Directional control valves solenoid operated

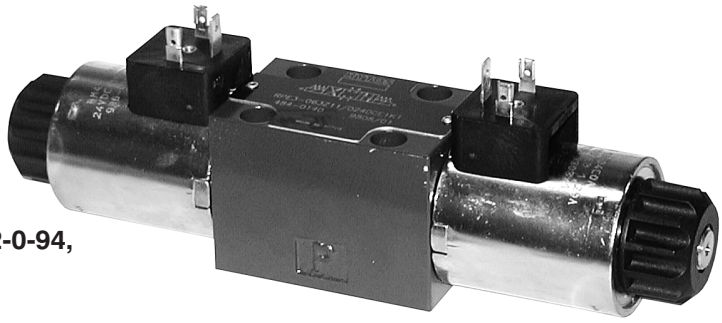
RPEB3-06

HA 4045
8/2006

Size 06 (D03) • ... 320 bar (4600 PSI) • ... 80 L/min (21 GPM)

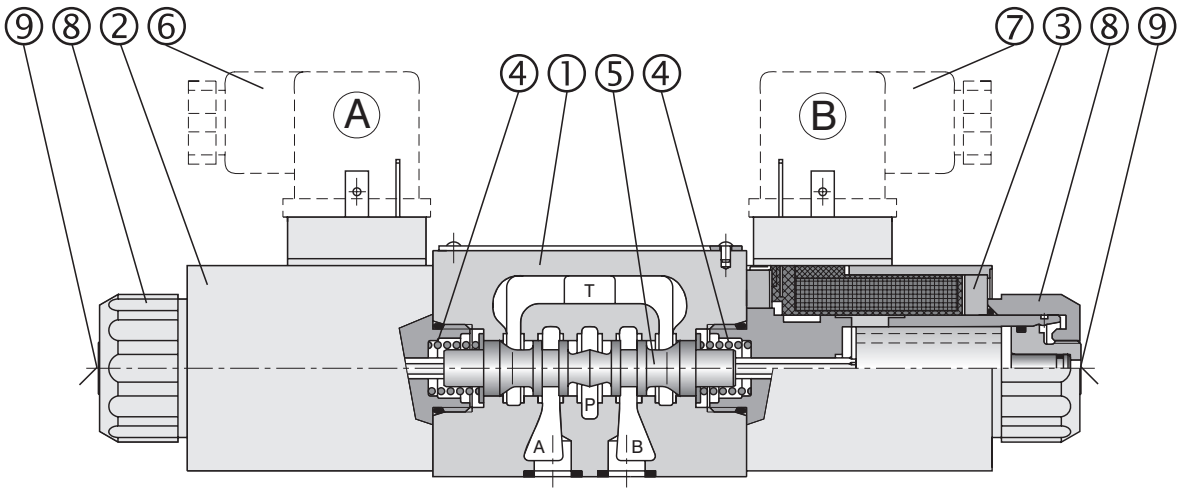
- **4/3-, 4/2- and 3/2- way directional control valves**
- **Cylindrical AC or DC, solenoids with removable coils - Electrical connector can be rotated in either direction by 90°**
- **Dual frequency solenoids AC voltage with 50/60 Hz**
- **Four-land spool - reduced functional dependence on fluid viscosity**
- **Wet pin core tubes**
- **Push button manual override**
- **Installation dimensions to ISO 4401-03-02-0-94, DIN 24 340-A6, NFPA T3.5.1 M R1 and ANSI B 93.7 D 03**
- **Subplates see data sheet HU 0002**





Functional Description

The RPEB3 directional control valves consist of housing (1), a control spool (5) with two centering springs (4) and cylindrical operating solenoids (2, 3).
The three-position directional control valves are fitted with two solenoids and two springs. Two-position directional control valves have either one solenoid and one return spring or two solenoids and a detent assembly.
The operating solenoids are DC solenoids. For AC supply the solenoids are provided with a rectifiers which are integrated in the DIN connector socket as part of the solenoid. The connectors (6, 7) can be turned by 90°. By loosening the nut (8), the solenoids can be turned or replaced without interfering with any seals of the valve.
In the case of solenoid malfunction or power failure, the spool of the valve can be shifted by manual override (9), provided the pressure in T-port does not exceed 25 bar.
The valve housing (1) is phosphate coated and the solenoids (2, 3) are zinc coated.



Order Code

RPEB3-06 □ □ / □ □ □ □ □ □ □ □

Solenoid operated directional control valves

Nominal size

Number of operating positions
two positions **2**
three positions **3**

Functional symbols
see the table Functional symbols

Rated supply voltage of solenoids
(at the coil terminals)

12 V DC / 2.72 A	01200
14 V DC / 1.93 A	01400
21 V DC / 1.54 A	02100
24 V DC / 1.29 A	02400
42 V DC / 0.80 A	04200
48 V DC / 0.61 A	04800
60 V DC / 0.49 A	06000
102 V DC / 0.30 A	10200
205 V DC / 0.15 A	20500
24 V AC / 1.54 A / 50 (60) Hz	02450
115 V AC / 0.35 A / 50 (60) Hz	11550
230 V AC / 0.17 A / 50 (60) Hz	23050

The AC coils correspond with E5 type.

Type of solenoid coil

with DIN connector	E1
with DIN connector and quenching diode	E2
with AMP connector	E3
with AMP connector and quenching diode	E4
with integrated rectifier and DIN connector	E5

Note: For other solenoid coil consult factory

Sensing of the end position

no designation	without sensing
S1	sensing of the end position

Seals

no designation	NBR
V	FPM (Viton)

Orifice in P port

no designation	without orifice
D1	∅1.0 mm (0.039 in)
D2	∅1.5 mm (0.059 in)
D3	∅2.0 mm (0.078 in)
D4	∅2.2 mm (0.087 in)
D5	∅2.5 mm (0.098 in)

Spool speed control orifice

no designation	without damping
T1	orifice ∅ 0.7 mm(0.028 in) in solenoid

Manual overide

no designation	standard
N1	covered with retaining nut
N2	covered with rubber boot
N3	with detent assembly

***Electrical connector, EN 1745301-803-A**

no designation	without connector
K1	connector without rectifier
K2	connector without rectifier with LED and quenching diode
K3	connector with rectifier
K4	connector with rectifier with LED and quenching diode
K5	connector without rectifier

*other information on pages 6 and 9

Note: Connector of the position sensor is not supplied (see ordering number on page 9)

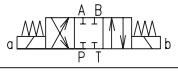
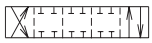
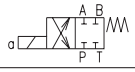
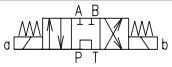
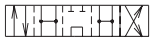
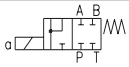
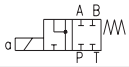
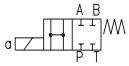
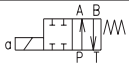
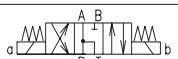
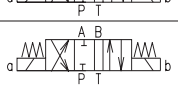
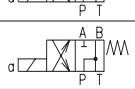
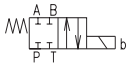
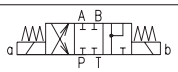
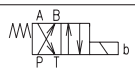
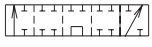
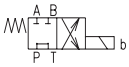
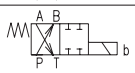
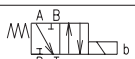
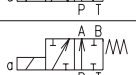
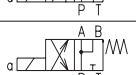
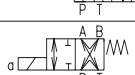
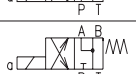
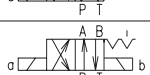
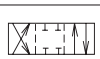
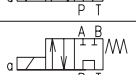
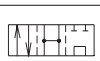
Recommended solenoid coils used with elektrical connector with rectifiers - type designation K3, K4

Rated supply source voltage (permissible rated voltage variation ±10 %)	Type designation of the solenoid voltage
24 V AC / 1.54 A / 50 (60) Hz	02100
115 V AC / 0.35 A / 50 (60) Hz	10200
230 V AC / 0.17 A / 50 (60) Hz	20500

Technical Data

Valve size	mm(US)	06 (D 03)	
Maximum flow	L/min(GPM)	see p-Q characteristics	
Max. operating pressure at porte P, A, B	bar (PSI)	320 (4600)	
Max. operating pressure at port T	bar (PSI)	210 (3000)	
Pressure drop	bar (PSI)	see Δp-Q characteristics	
Hydraulic fluid		Petroleum oils (HM, HL, HLP) Phosphate ester fluids (HFD-R)	
Fluid temperature range for NBR seals	°C (°F)	-30 ... +80 (-22 ... +176)	
Fluid temperature range for FPM seals	°C (°F)	-20 .... +80 (-4 ... +176)	
Ambient temperature max.	°C (°F)	up to +50(+122)	
Viscosity range	mm^2/s (SUS)	20 ... 400 (98 ... 1840)	
Maximum degree of fluid contamination		Class 21/18/15 to ISO 4406 (1999).	
Max. allowable voltage variation	%	DC: ±10	AC: ±10
Max. switching frequency	1/h	15 000	
Switching time, on: at ν=156 SUS (32 mm^2/s)	ms	DC: 30 ... 50	AC: 30 ... 40
Switching time, off: at ν=156 SUS (32 mm^2/s)	ms	DC: 10 ... 50	AC: 30 ... 70
Duty cycle	%	100	
Service life	cycles	10^7	
Enclosure type to DIN 40 050		IP 65	
Weigt - valve with 1 solenoid - valve with 2 solenoids	kg (lbs)	1.6 (3.52) 2.2 (4.85)	
Mounting position		any	

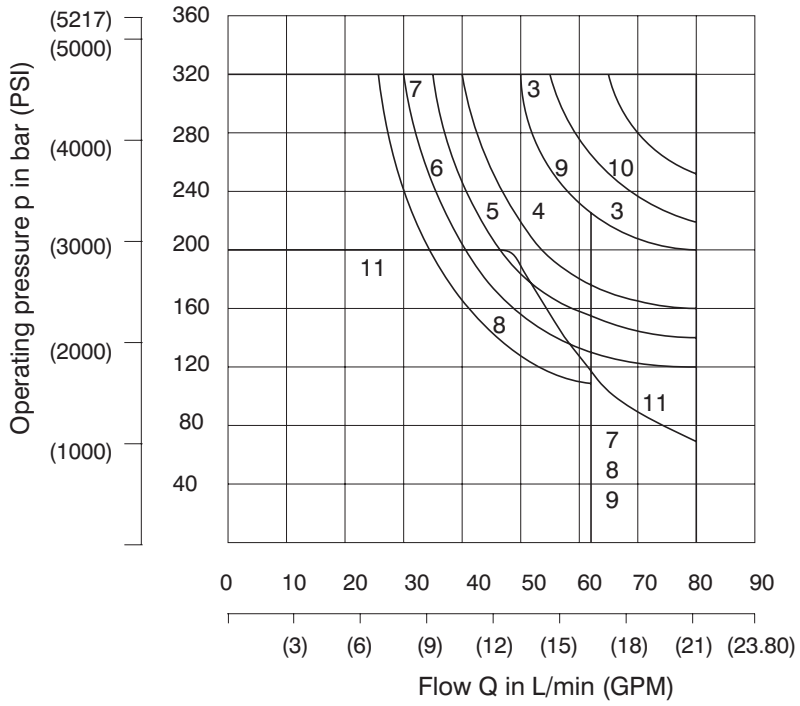
Spool Symbols

Type	Symbol	Crossover	Type	Symbol	Crossover
Z11			Z51		
C11			Z71		
H11			Z81		
P11			Z91		
Y11			R31		
L21			H51		
B11			F51		
Y41			Z11		
Z21			X11		
C41			C11		
F11			H11		
R11			K11		
R21			N11		
A51			F11		
P51			X25		
Y51			**J15**		
C51			J75		

p-Q Characteristics

Measured at ν = 32 mm^2/s (156 SUS) and t = 40 °C (104 °F)

Operating limits for maximum hydraulic power transferred by the directional valve.
For respective spool type - see spool symbols.

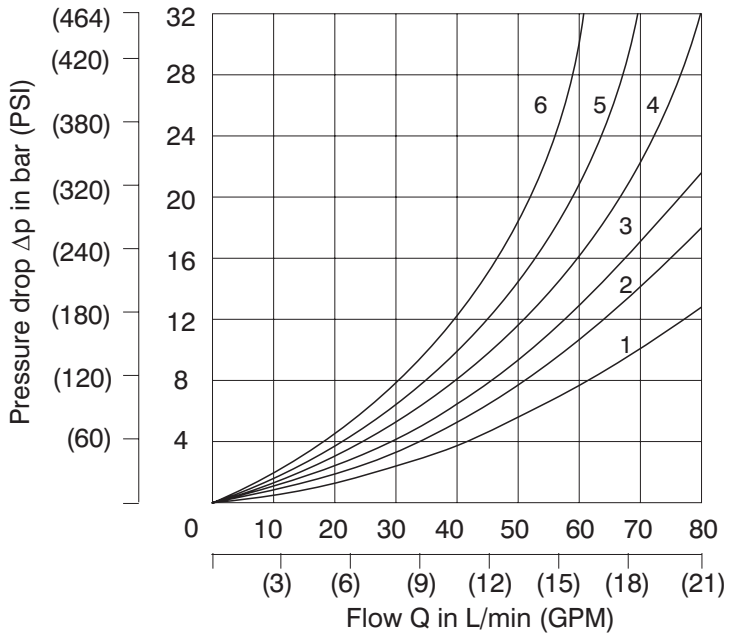


Z11	1
C11	7
H11	4
P11	1
Y11	3
L21	6
B11	9
Y41	7
Z21	1
C41	6
F11	6
R11	4
R21	5
A51	6
P51	1
Y51	3
C51	7
Z51	1
Z71	8
Z81	8
Z91	8
R31	6
H51	8
F51	8
X11	4
K11	8
N11	8
X25	11
J15	1
J75	10

Δp-Q Characteristics

Measured at ν = 32 mm^2/s (156 SUS) and t = 40 °C (104 °F)

Pressure drop Δp related to flow rate.

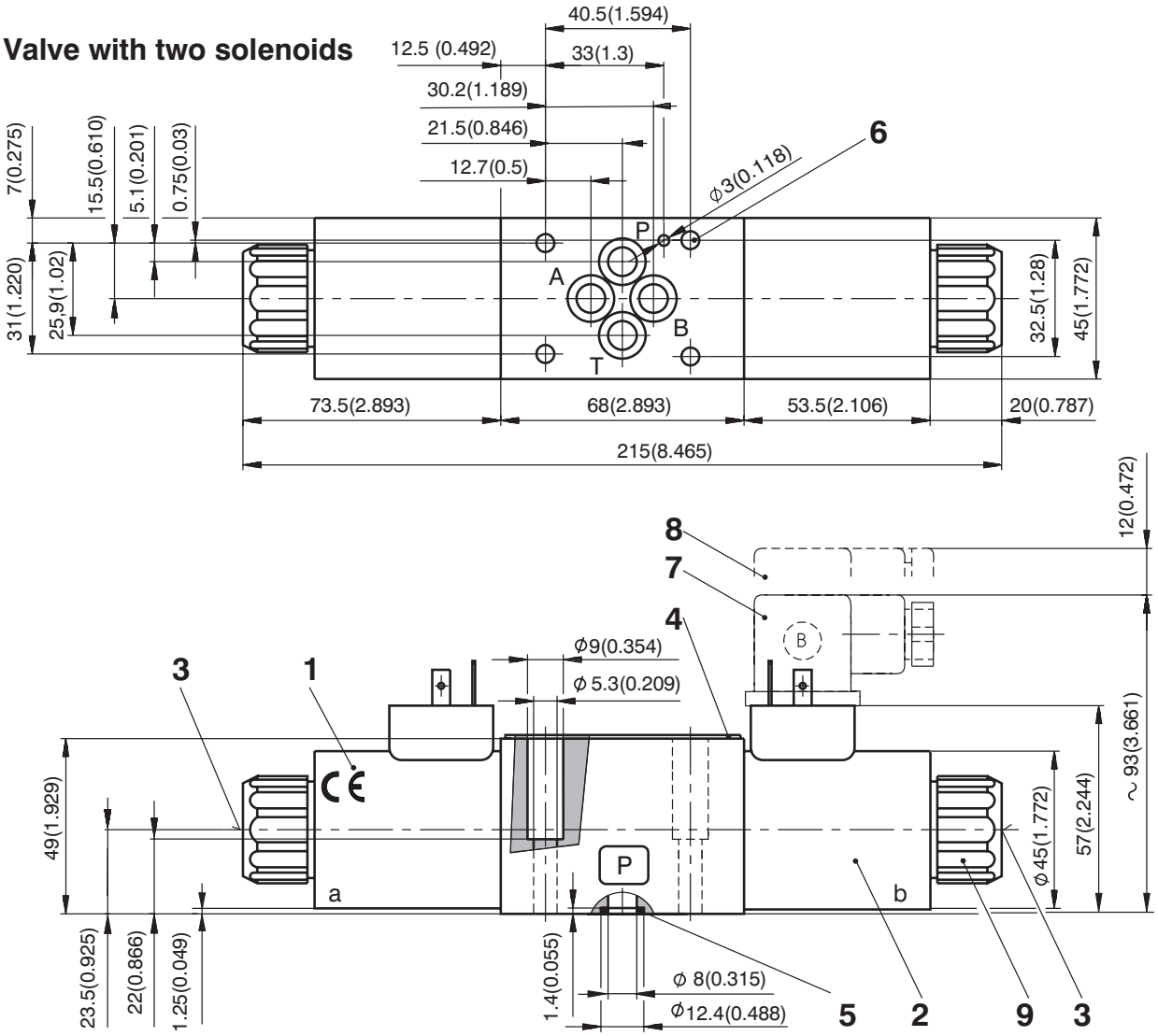


	P-A	P-B	A-T	B-T	P-T
Z11	2	2	3	3	
C11	5	5	5	6	3
H11	2	2	2	3	3
P11	1	1	3	3	
Y11	2	2	2	2	
L21	2	2	3	3	
B11	2	2	3	3	
Y41	3	3	3	3	
Z21		2	3		
C41	4	4			5
F11	1	2		3	3
R11	2	2	3	3	
R21	2	2	3	3	
A51	2	2			
P51		1	3		
Y51		2	2		
C51	2			3	4
Z51		2	3		
Z71	3	3			
Z81			3	3	
Z91	3			3	3
R31	2			3	
H51		2	3		
F51		2	3		
X11	2	2	3	3	
K11		2	3		
N11	2	2	3	3	
X25	3	3	3		
J15	2	2	3	3	
J75	2	2			

Valve Dimensions

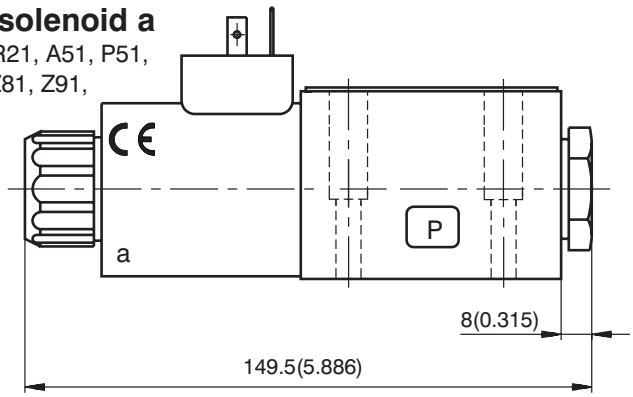
Dimensions in millimeters (inches)

Valve with two solenoids

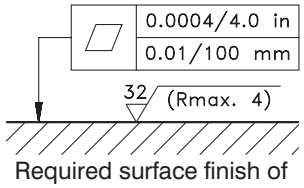


Valve with one solenoid a

Spool symbols R11, R21, A51, P51, Y51, Z51, C51, Z71, Z81, Z91, R31, H51, F51, X25



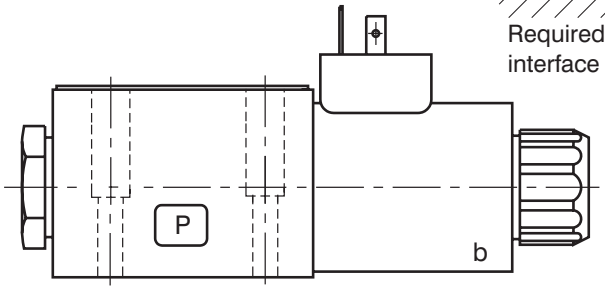
1 Solenoid a
2 Solenoid b
3 Manual override
4 Name plate
5 Square ring (4 pcs.)
9.25 x 1.68 supplied with valve
6 4 mounting holes
7 Electrical connecto, DIN 43 650
8 Space required to remove connector
9 Solenoid fixing nut
[Nut torque 2.95 ft-lbs (4 Nm)]



Required surface finish of interface

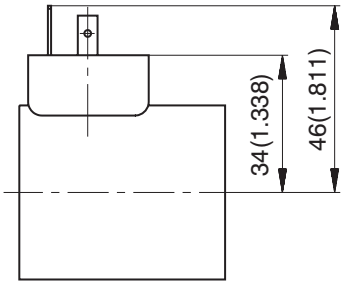
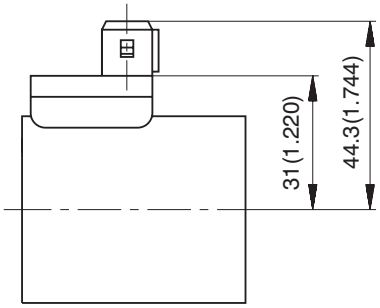
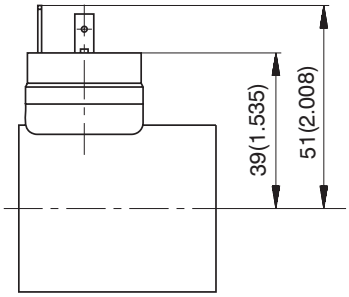
Valve with one solenoid b

Spool symbols X11, Z11, C11, H11, K11, N11, F11



Type of the Solenoid Coil

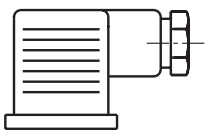
Dimensions in millimeters (inches)

Designation	Dimensional sketch	Description
E1		Solenoid coil with terminal for the electrical connector, EN 1745301-803-A.
E2		Solenoid coil with integrated quenching diode (bipolar transil diode) and terminal for the electrical connector, EN 1745301-803-A.
E3		Solenoid coil with terminal for AMP electrical connector.
E4		Solenoid coil with integrated quenching diode (bipolar transil diode) and terminal for AMP electrical connector.
E5		Solenoid coil with integrated rectifier and terminal for the electrical connector, EN 1745301-803-A.

Electrical Connector, EN 1745301-803-A

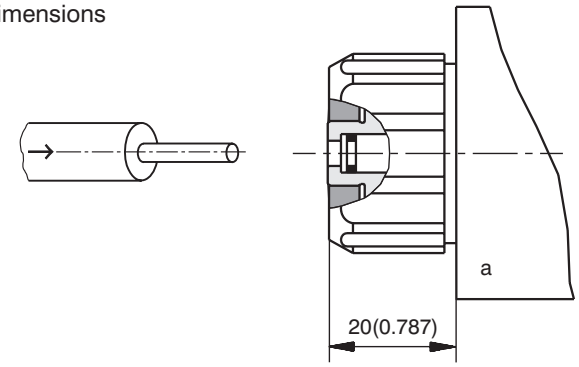
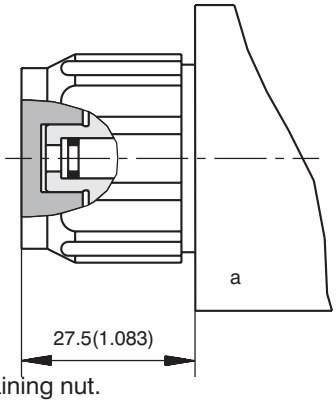
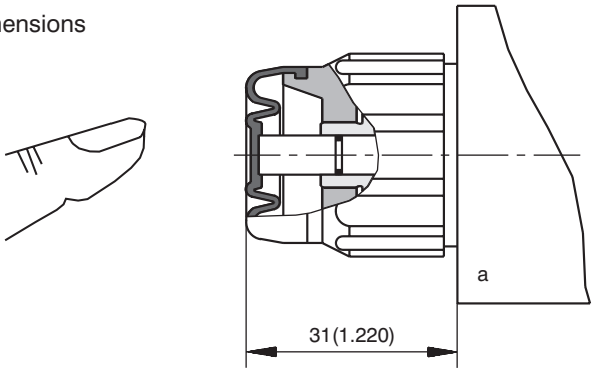
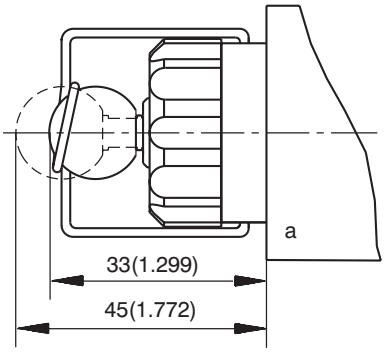
Dimensions in millimeters (inches)

Designation	Type	Model	Max. input voltage
K1	Connector B (black)	without rectifier - M16x1.5 (bushing bore ∅ 6-8 mm ((∅ 0.236-0.315in))	230 V DC
	Connector A (grey)		230 V AC
K5	Connector B (black)	without rectifier - M16x1.5 (bushing bore ∅ 4-6 mm ((∅ 0.157-0.236 in))	230 V DC
	Connector A (grey)		230 V AC
K2	Connector B (black)	without rectifier with LED and quenching diode - M16x1.5 (bushing bore ∅ 6-8 ((∅ 0.236-0.315 in))	12...24 V DC
	Connector A (grey)		12...24 V DC
K3	Connector B (black)	with rectifier - M16x1.5 (bushing bore ∅ 6-8 mm ((∅ 0.236-0.315 in))	230 V AC
	Connector A (grey)		230 V AC
K4	Connector B (black)	with rectifier with LED and quenching diode - M16x1.5 (bushing bore ∅ 6-8 mm ((∅ 0.236-0.315 in))	230 V AC
	Connector A (grey)		230 V AC



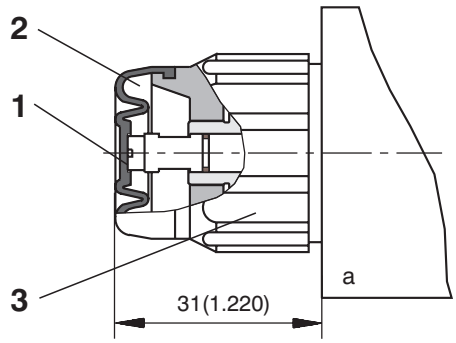
Manual Override

Dimensions in millimeters (inches)

STANDARD	CLOSED NUT
Dimensions  Standard model of the manual override. Standard retaining nut of the solenoid.	Type **N1** Dimensions  Manual override with retaining nut. Can be used after removing nut.
RUBBER BOOT	**DETENT ASSEMBLY**
Type **N2** Dimensions  Manual override protected by rubber boot.	Type **N3** Dimensions  Manual override holds the spool in the shiftet position.

Spool Speed Control Orifice

Dimensions in millimeters (inches)

Type	Dimension	Description
T1		Important: This direstional valve provides control spool soft shifting by means of orifice situated in the solenoid armature.To ensure the proper function of the valve, perfect air bleeding of the solenoid is required (by us of bleeding plug (1)). The plugs are accessible after removing the rubber boot (2) from the solenoid retaining nut (3).

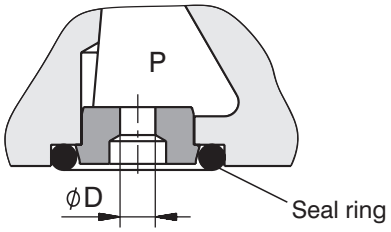
Switching times

Total switching time, on	ms	300 ... 500
Total switching time, off	ms	400 ... 800
Time of the pressure change, switching on	ms	80 ... 200
Time of the pressure change, switching off	ms	80 ... 400

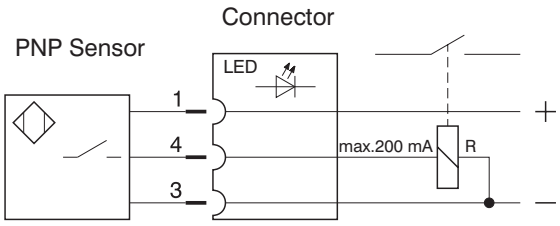
The switching times shown are valid for viscosity ν = 156 SUS (32 mm^2/s), valve temperature t = 140 °F (40 °C) and nominal voltage. They are dependent upon working pressure and flow rate of the directional control valve.

Orifice in P-Port

Dimensions in millimeters (inches)

Type	∅D mm (in)	Dimensions	Description
D1	1.0 (0.039)		P-port orifices limit the flow into the directional control valve.
D2	1.5 (0.059)		
D3	2.0 (0.078)		
D4	2.2 (0.087)		
D5	2.5 (0.098)		

Sensing of the Spool end Position

Type	Circuit diagram of the sensor	Description
S1		The proximity sensor transforms the spool position into an electrical step signal. Can be used with directional control valves with one or two solenoids.

Technical Data of the Sensor

Rared voltage	V	24 DC
Power supply voltage range	V	10 ... 30 DC
Rated current	mA	200
Max. operating pressure	bar (PSI)	up to 50 (725)
Switching frequency	Hz	1000
Ambient temperature range	°C (°F)	(-25 ... +80) -13 ... +176

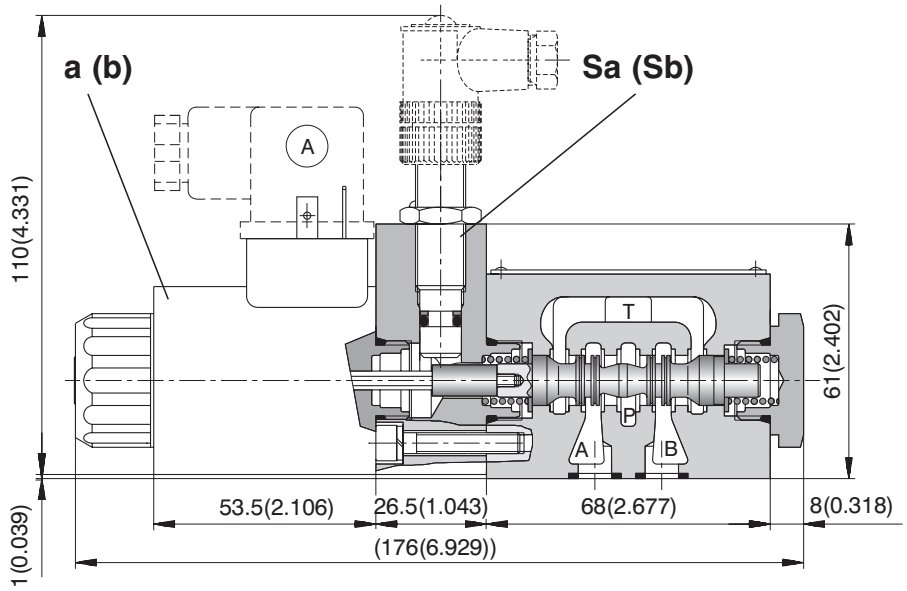
Technical Data of the Connector

Power supply voltage range	V	10 ... 30 DC
Ambient temperature range	°C (°F)	-25 ... +80 (-13 ... +176)
Indication		yellow LED

Two Positions Directional Control Valve

Dimensions in millimeters (inches)

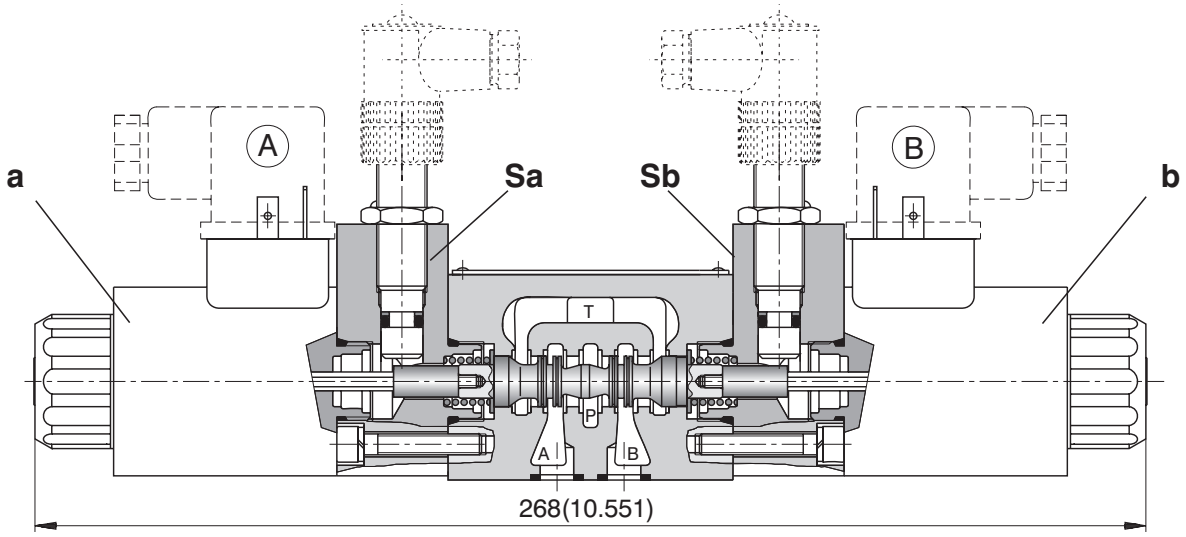
Signal of solenoid a (b)	Signal of sensor Sa (Sb)	LED
0	1	ON
1	0	OFF



Three Positions Directional Control Valve

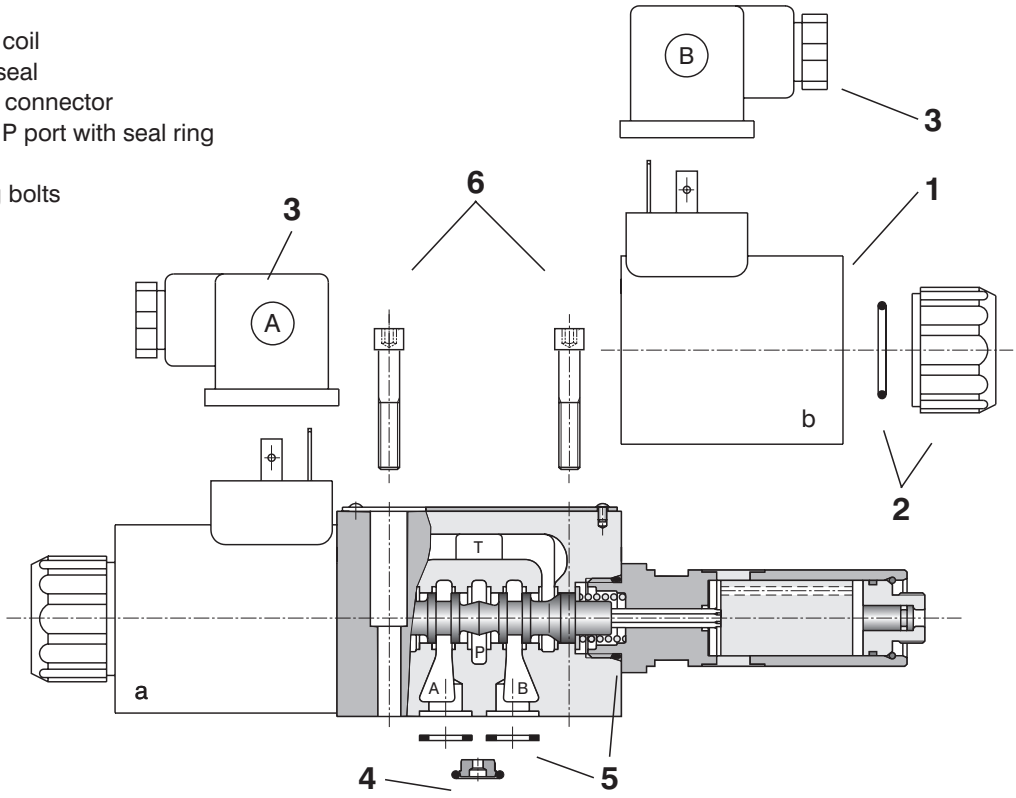
Dimensions in millimeters (inches)

Signal of solenoids		Signal of sensors		LED	
a	b	Sa	Sb	Sa - LED	Sb - LED
0	0	1	1	ON	ON
0	1	1	0	ON	OFF
1	0	0	1	OFF	ON



Spare Parts

1 Solenoid coil
2 Nut with seal
3 Electrical connector
4 Orifice in P port with seal ring
5 Seal kit
6 Mounting bolts



Electrical connector, EN 1745301-803-A

Type designation	Connector A grey	Connector B black
	Ordering number	
K1	936-9902	936-9901
K5	936-9906	936-9905
K2	936-9908	936-9907
K3	936-9904	936-9903
K4	936-9910	936-9909

Connector of position sensor

Type designation	Model	Max. input voltage	Ordering number
K02	connector of position sensor with LED	10...30 V DC	936-9940

Solenoid coil

Solenoid type	Coil type				
	E1	E2	E3	E4	E5
	Ordering number				
01200	944-0012	944-0013	936-4306	936-4305	
01400	944-0047	-	-	-	
02400	944-0024	944-0025	936-4327	936-4325	
04800	944-0038	-	-	-	
06000	944-0039	-	-	-	
10200	944-0042	-	-	-	
20500	944-0014	-	-	-	
02450					936-2325
11550					936-2375
23050					936-2385

Solenoid retaining nut with seal

Type of the nut	Seal ring	Ordering number
Standard nut	22 x 2	484-9951
Closed nut		484-9952
Nut with rubber boot		484-9953
Nut with detent assembly		484-9954

Orifice in P port

Type	∅D mm (in)	Seal ring	Ordering number
D1	1.0 (0.039)	9.25 x 1.75	484-9973
D2	1.5 (0.059)		484-9974
D3	2.0 (0.078)		484-9975
D4	2.2 (0.087)		484-9977
D5	2.5 (0.098)		484-9976

Seal kit

Type	Dimensions, number		Ordering number
Standard - NBR70	9.25 x 1.68 (4 pcs.)	17 x 1.8 (2 pcs.)	484-9961
Viton	9.25 x 1.78 (4 pcs.)	17.17 x 1.78 (2 pcs.)	484-9971

Mounting bolts

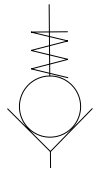
Dimensions, number	Tightening torque	Ordering number
M5 x 30 DIN 912-10.9 (4 pcs.)	8.9 Nm	484-9959

Caution!

- For applications outside the given parameters, please consult us.
- With spool symbols A51 and J75 for pressures exceeding 3000 PSI (210 bar), the T-port must be connected directly to the tank.
- For directional control valves with two solenoids, one solenoids must be without power before the other solenoid can be powered charged. Switching time for directional valves with detent assembly (impulse control) should not be shorter than 60 ms. With directional valves with cushioned spool shifting, the switching time must correspond with the shifting time.
- Other spool symbols on request.
- The plastic packaging foil is recyclable.
- Mounting bolts, studs and DIN-connectors must be ordered separately.
- Certified documentation is available per request.

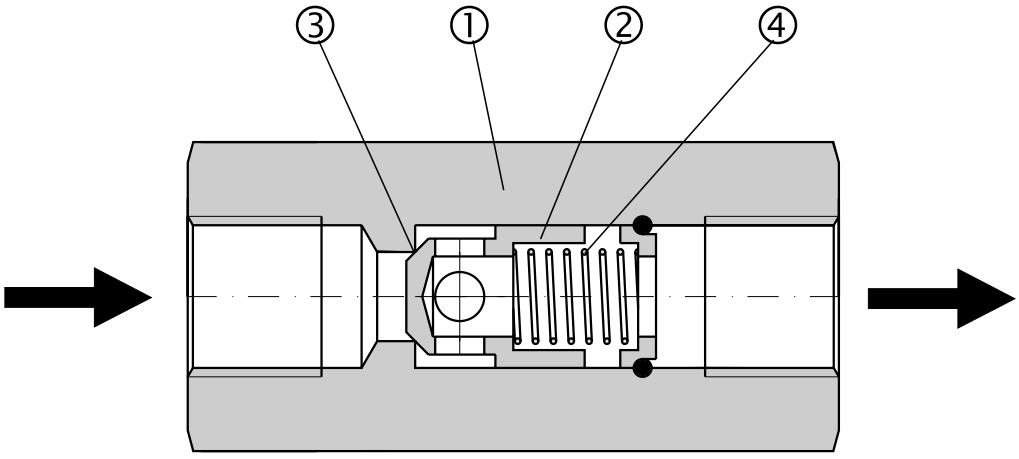
ARGO-HYTOS a. s. CZ - 543 15 Vrchlabí
Tel.: +420-499-403111, Fax: +420-499-403421
E-mail: sales.cz@argo-hytos.com
www.argo-hytos.com

- **Three mounting styles:**
  - **for in-line mounting**
  - **straight valve cartridge**
  - **right angled valve cartridge**
- **Four sizes**
- **Poppet design**
- **Leakfree closure in one direction**
- **Three cracking pressures**



Functional Description

The check valve is used to allow flow in one direction and prevent flow in the other. The poppet design guarantees leakfree closure.
The seat (3) is created directly in the housing (1) and the poppet (2) is pushed onto the seat by the compression spring (4). The cracking pressure depends on the spring selected and the pressurised poppet surface area. Three cracking pressures are available.
The basic surface treatment of the valve housing is zinc coated.



Ordering Code

VJ2 - □ - □ - □

Check valve

Nominal size

06	**06**
10	**10**
16	**16**
20	**20**

Model

M1	For in-line mounting with metric threads
02	Straight valve cartridge
03	Straight valve cartridge

Cracking pressure in bar

005	0.5
015	1.5
030	3.0

Technical Data

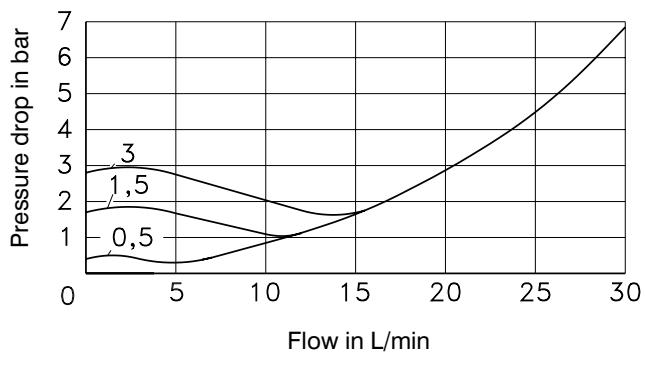
Nominal size	mm	06	10	16	20
Maximum flow rate	L/min	30	60	160	250
Maximum pressure	bar	320			
Cracking pressure	bar	0.5	1.5	3.0	
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP RP 91 H in viscosity classes ISO VG 32, 46 and 68			
Fluid temperature range - model M1 - models 02, 03	°C	-40 ... +80 -30 ... +80			
Ambient temperature range	°C	-40 ... +55			
Viscosity range	mm^2/s	10 ... 400			
Maximum degree of fluid contamination		Class 21/18/15 according to ISO 4406 (1999).			
Weight - model M1 - models 02, 03	kg	0.11 0.05	0.34 0.09	0.52 0.22	0.95 0.26
Mounting position		optional			

Performance Curves

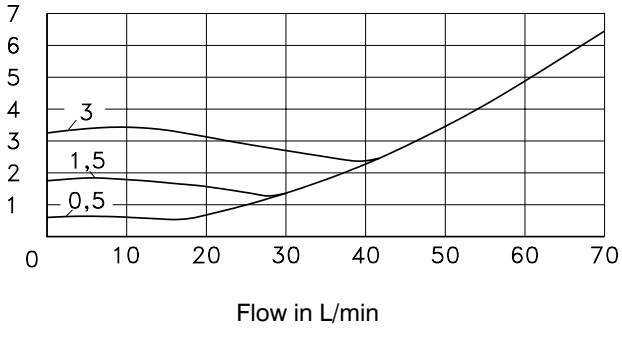
Measured at $\nu = 35\ mm^2/s$ and $t = 40°C$

Pressure drop dependent upon flow

Nominal size 06



Nominal size 10

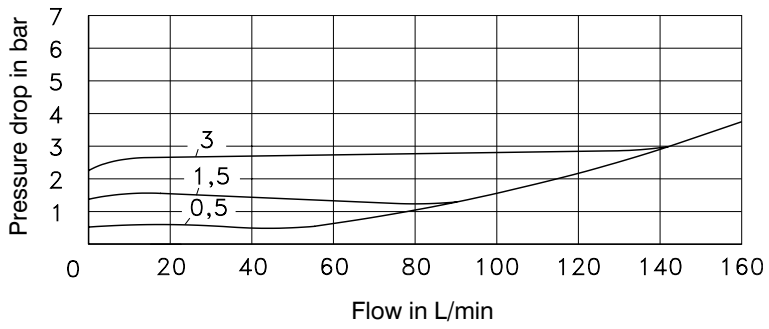


Performance Curves

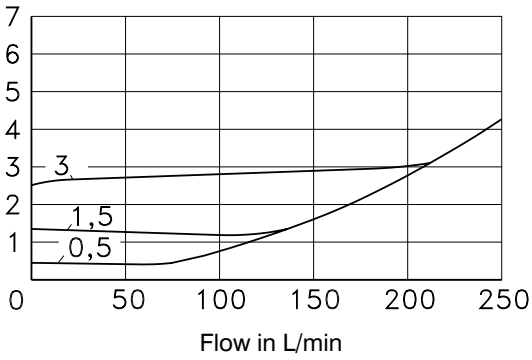
Measured at ν = 35 mm^2/s and t = 40°C

Pressure drop dependent upon flow

Nominal size 16



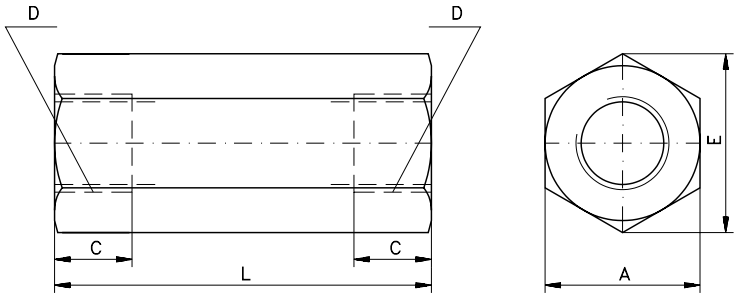
Nominal size 20



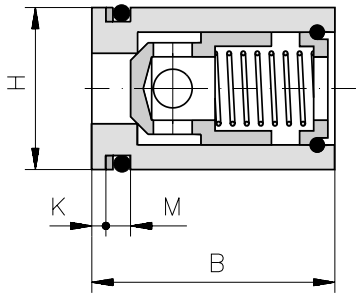
Valve Dimensions

Dimensions in millimetres

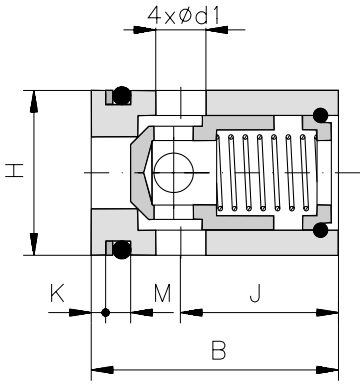
Model M1



Model 02



Model 03



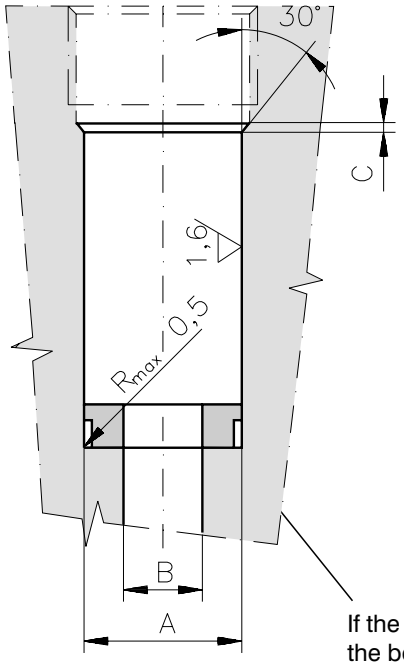
Size	A	B	C	D	d	E
			M1	M1		
06	19	27 - 0.2	12	M14 x 1.5	3.5	22
10	30	32 - 0.2	15	M18 x 1.5	5.5	34.5
16	36	45 - 0.2	20.5	M27 x 2	8.5	41.5
20	46	45 - 0.2	20.5	M33 x 2	10.5	53

Size	H	J	K	L	M	O - Ring	Back-up ring	
06	∅ 20 f8	18	1.6	62	4.4 + 0.2	15.08 x 2.62	BBP 80 B 113-N 9	14.66 x 19.02 x 1.14
10	∅ 25 f8	20	1.6	73	4.4 + 0.2	20 x 2.65	M8 - 116	19.43 x 23.79 x 1.14
16	∅ 35 f8	27	2.2	97	5.3 + 0.2	28 x 3.55	S8 - 216	28.98 x 34.98 x 1.02
20	∅ 40 f8	25	2.2	104	5.3 + 0.2	Shambak Rings S-55382	0400 A	101A

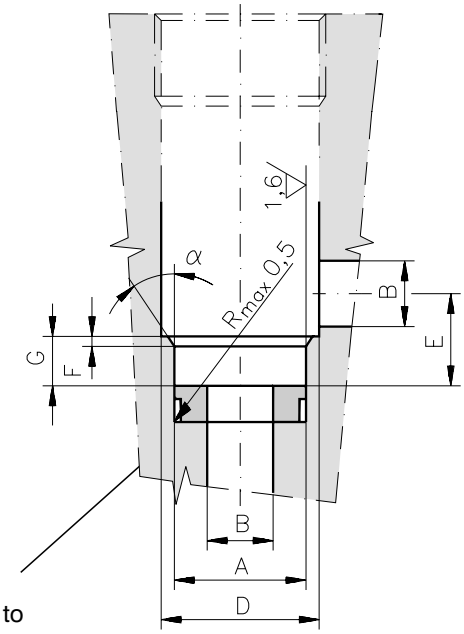
Installation Cavity

(length according to distance ring)

Model 02



Model 03



If the hole cannot be reamed to the bottom, the use of a distance ring is recommended

Size	A	B	C	D*	E	F	G	α
06	∅20 H8	∅ 6	2	∅ 26	10.5	1	7 - 0.3	20°
10	∅ 25 H8	∅ 10	2	∅ 32	14	1.5	8 + 0.2	30°
16	∅35 H8	∅ 16	2	∅ 44	22	2	13 + 0.2	30°
20	∅40 H8	∅ 20	2	∅ 48	25	2	14 + 0.2	30°

* minimum diameter recommended

Caution!

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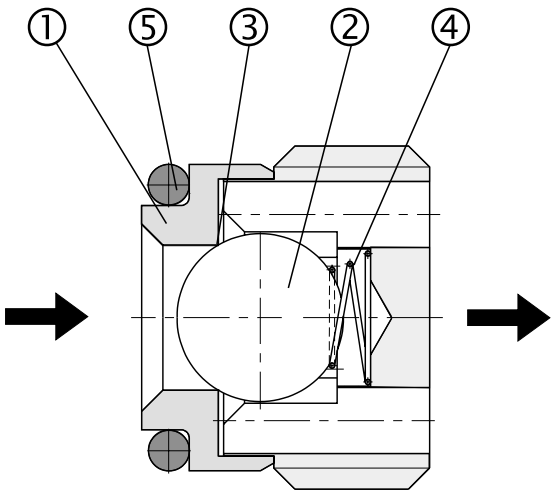
- **Small dimensions**
- **Two models**
- **Poppet design**
- **Leak-free closure in one direction**

VJO1-06/SG-1

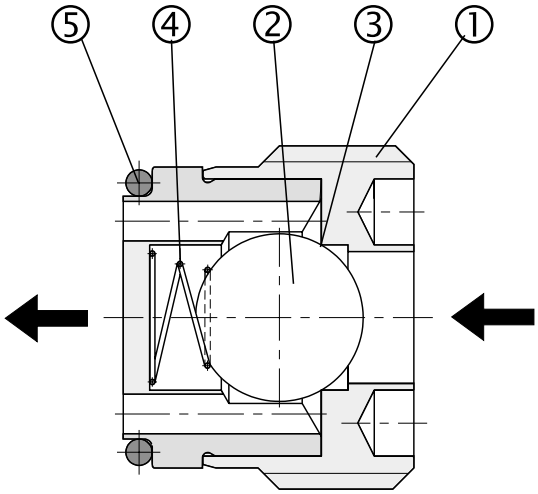
VJO1-06/SG-2

Functional Description

The check valves VJO1 are developed to be built directly into the lines of the hydraulic circuits. Their features designate them for all applications, where tight closure in one direction and small dimensions are required. The valve is provided with two holes for a mounting mandrel. The shut-off edge (3) of the valve is engineered in the housing (1) and the shut-off function is accomplished by the ball (2) which is pushed onto the seat by spring (4). Sealing of the valve body (1) in the mounting cavity is provided by the sealing ring (5). During the assembly, the valve has to be secured against loosening by means of a suitable glue or cement (Loctite, etc.).



Model 01



Model 02

Ordering Code

VJO1-06/SG- ☐ ☐

Check valve

Nominal size

Cartridge **S**

Thread
pipe thread G1/4 **G**

Seals
omit NBR
V FPM (Viton)

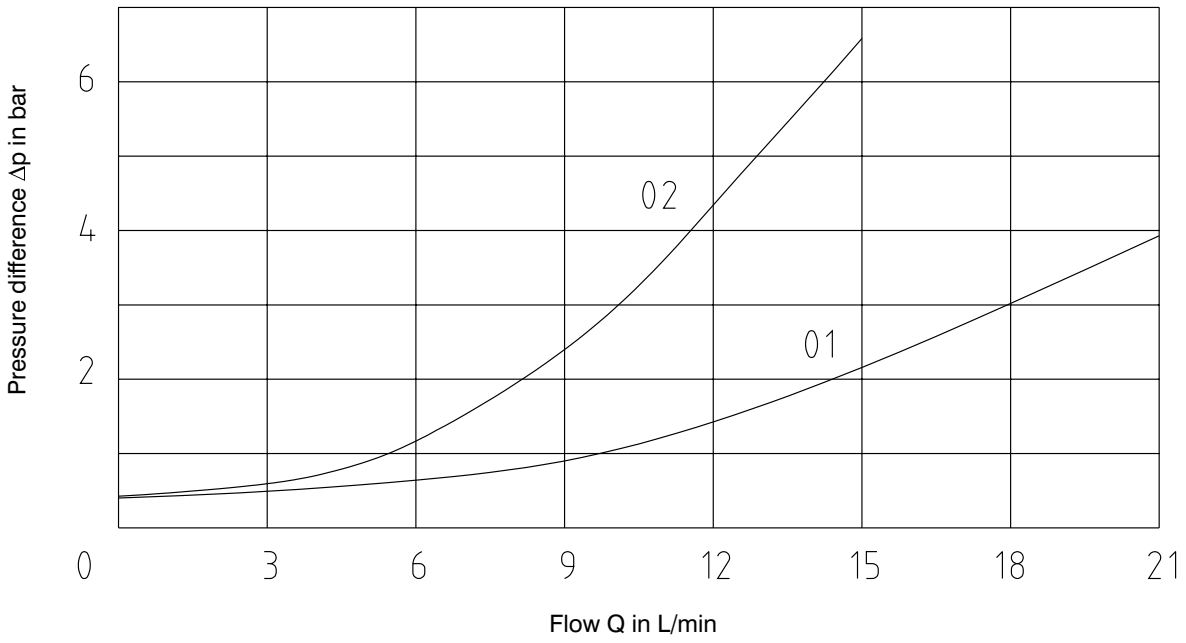
Flow direction
1 model 01
2 model 02

Technical Data

Nominal size	mm	06
Maximum flow rate	L/min	20
Maximum operating pressure	bar	320
Cracking pressure	bar	0.25
Hydraulic fluid		Hydraulic fluids of power classes HM, HV to CETOP - RP 91H in viscosity classes ISO VG 32, 46 and 68
Fluid temperature range for standard sealing (NBR)	°C	-30 ... +80
Fluid temperature range for Viton sealing (FPM)	°C	-20 ... +80
Viscosity range	mm^2/s	20 ... 400
Maximum degree of fluid contamination		Class 21/18/15 according to ISO 4406 (1999).
Weight	kg	0.007
Mounting position		optional

Δp-Q Characteristics

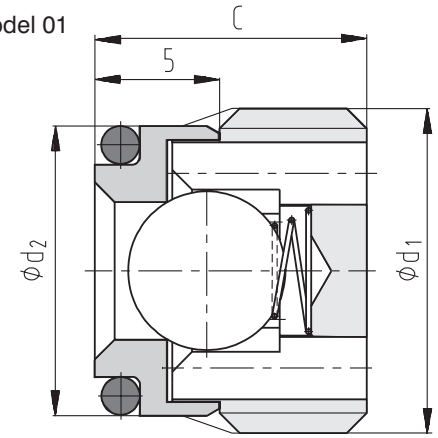
Measured at $\nu = 35\ mm^2/s$ and $t = 40\ °C$



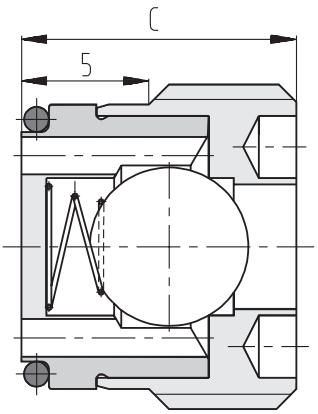
Valve Dimensions

Dimensions in millimetres

Model 01

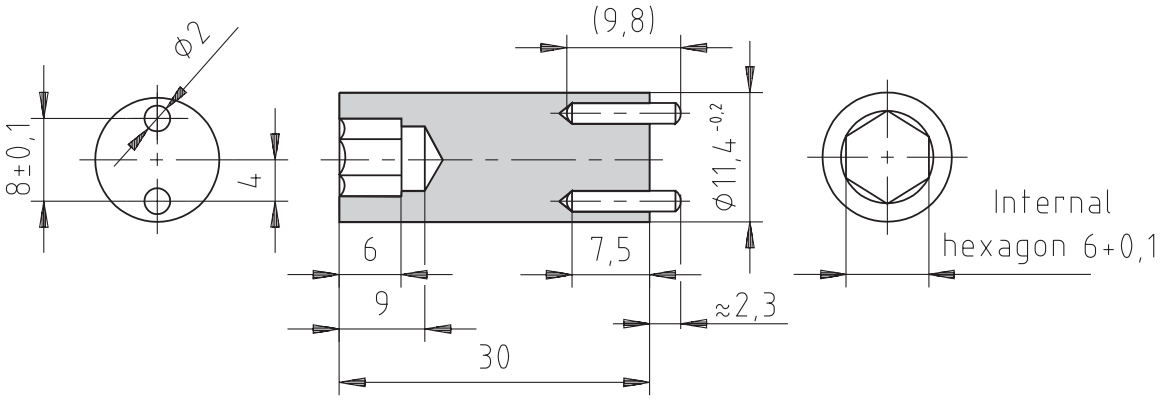


Model 02



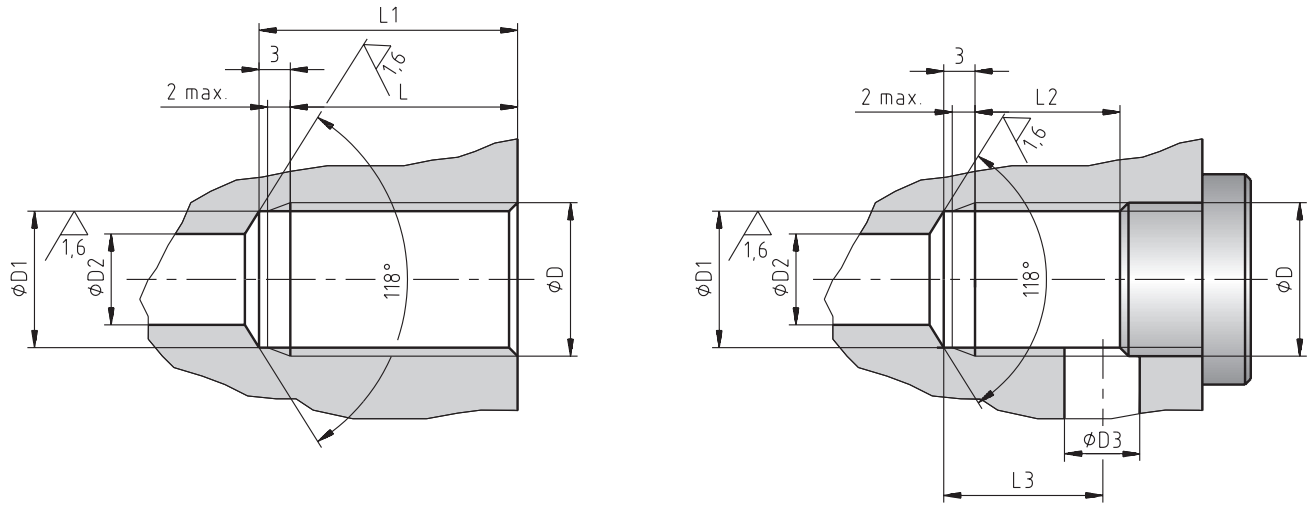
Type	∅d1	∅d2	C	O-Ring
VJO1-06/SG-1	G1/4	$11.4^{+0.05}$	11	8 x 1.5
VJO1-06/SG-2	G1/4	$11.4^{+0.05}$	11	9 x 1

Mounting Mandrel



Type	Tightening torque	Ordering number
VJO1-06	15 Nm	530-0506

Mounting Cavity



Type	∅D	∅D1	∅D2	∅D3	L	L1	L2	L3
VJO1-06	G1/4	$11.5^{+0.1}$	max. 7	6	20	23	14	14

Spare Parts

Seal kit

Type		Dimension, number	Ordering number
Standard NBR90	VJO1-06/SG-1	O-ring 8 x 1.5 (1 pc.)	530-0516
	VJO1-06/SG-2	O-ring 9 x 1 (1 pc.)	530-0517
Viton	VJO1-06/SG-1	O-ring 8 x 1.5 (1 pc.)	530-0518
	VJO1-06/SG-2	O-ring 9 x 1 (1 pc.)	530-0519

Caution!

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Logical 3-way check valves

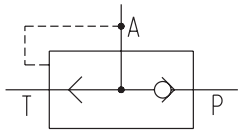
VJL2-304

Size 04 • p_{max} up to 210 bar • Q_{max} up to 15 L/min

HA 5007
3/2002

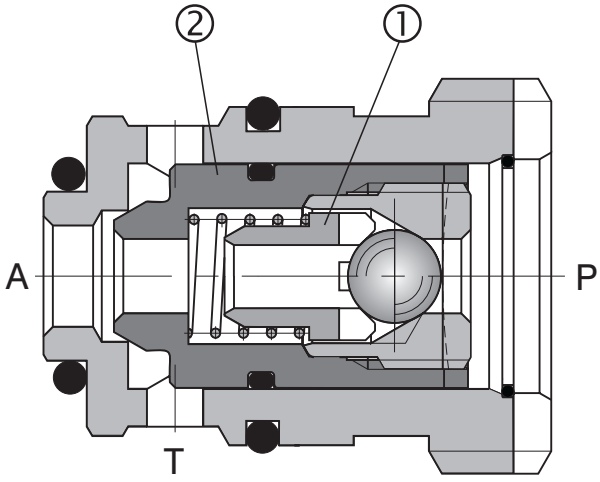
Replaces
HA 5007 6/2001

- ❑ **Screw-in cartridge valve**
- ❑ **For leak-free applications**
- ❑ **Simple design**
- ❑ **High reliability**



Functional Description

The fluid pressure in port P opens the ball check valve (1), thus allowing the fluid to pass to port A. Due to the area and pressure differential between ports P and A, the poppet (2) closes tightly the connection between ports A and T.
If there is no pressure in port P, then any pressure in port A causes the fluid to pass in the direction A → T. At the same time, the ball check valve provides a leak free closure between ports A and P.
The valve housing and the poppet are made of steel and hardened steel respectively.
The valve is delivered without any surface treatment.



Ordering Code

VJL2 - 304 - ☐ ☐

Logical check valve

3-way design

Nominal size

Seals
without designation — Standard (NBR)
V — Viton (FPM)

Type of the connecting thread
M — Metric thread (M22 x 1.5)
G — Pipe thread (G1/2)

Spare Parts

Seal kit

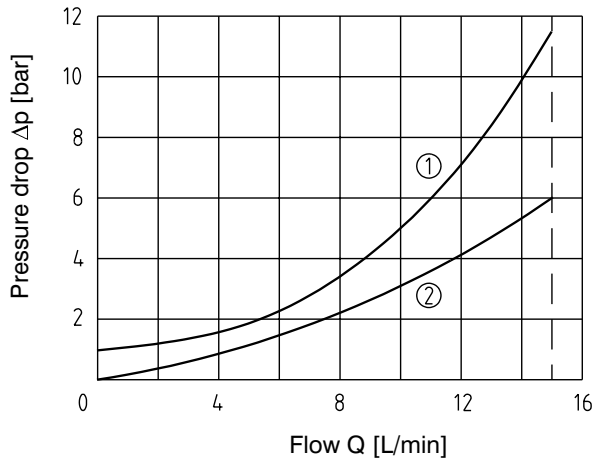
Type	Dimensions, quantity		Ordering number
Standard NBR	O-ring	14 x 1.78 (1 pc.)	531-0205
		9 x 1.8 (1 pc.)	
		10 x 1 (1 pc.)	
Viton		14 x 1.78 (1 pc.)	531-0206
		9.25 x 1.78 (1 pc.)	
		10 x 1 (1 pc.)	

Technical Data

Nominal size	mm	04
Nominal flow rate P → A	L/min	10
Nominal flow rate A → T	L/min	15
Maximum working pressure	bar	210
Pressure drop	bar	see the characteristic
Hydraulic fluid		Hydraulic fluids of power classes HM, HV to CETOP-RP 91H in viscosity classes ISO VG 32, 46 and 68
Fluid temperature range (NBR)	°C	-30 ... +80
Fluid temperature range (Viton)	°C	-20 ... +80
Viscosity range	mm^2/s	20 ... 400
Maximum degree of fluid contamination		Class 21/18/15 to ISO 4406 (1999).
Weight	kg	0.04
Mounting position		optional

Δp-Q Characteristics

Measured at $\nu = 35\ mm^2/s$ and $t = 40\ °C$

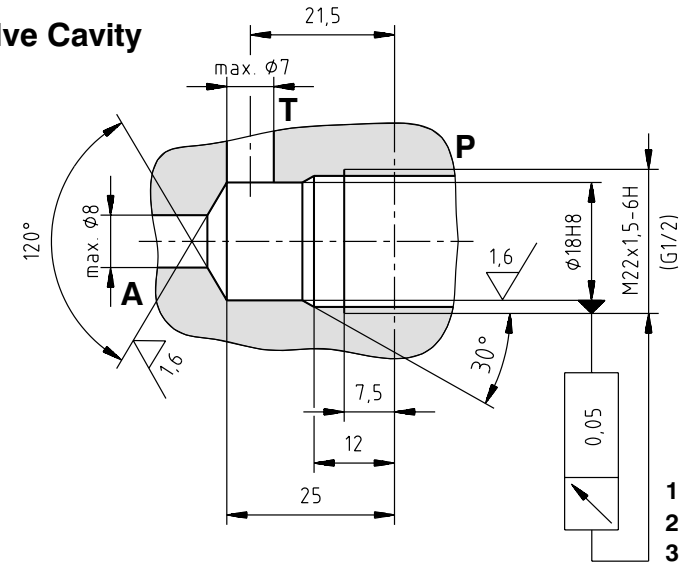


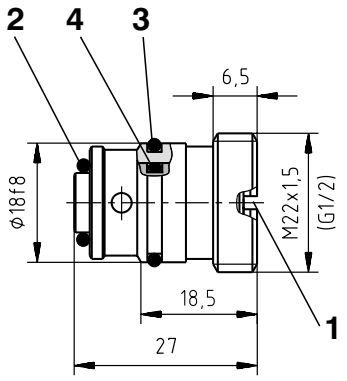
① Flow direction P → A
② Flow direction A → T

Valve Dimensions

Dimensions in millimetres

Valve Cavity





1 Screw driver slot for valve in cavity
2 O-Ring 9 x 1.8 NBR70 (1 pc.), supplied with valve
3 O-Ring 14 x 1.78
4 O-Ring 10 x 1 (1 pc.), supplied with valve

Caution!

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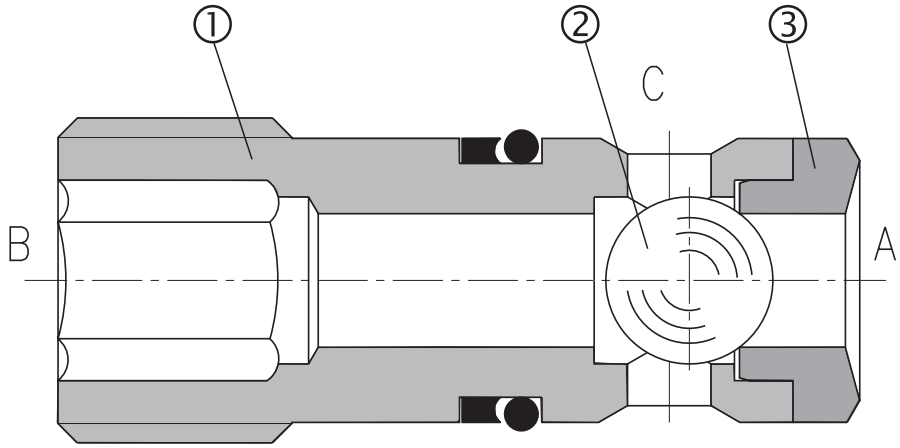
- ❑ **Compact design**
- ❑ **Poppet design**
- ❑ **Comparing and transmitting a pressure signal**

Functional Description

LV1-043 is 2/3-way poppet valve consists of the valve housing (1), the seat (3) and the ball (2).

It connects the users A or B with C according to the size of the control signal in these ports.



Ordering Code

LV1-043

Logical valve	
Nominal size	**3 - way design**

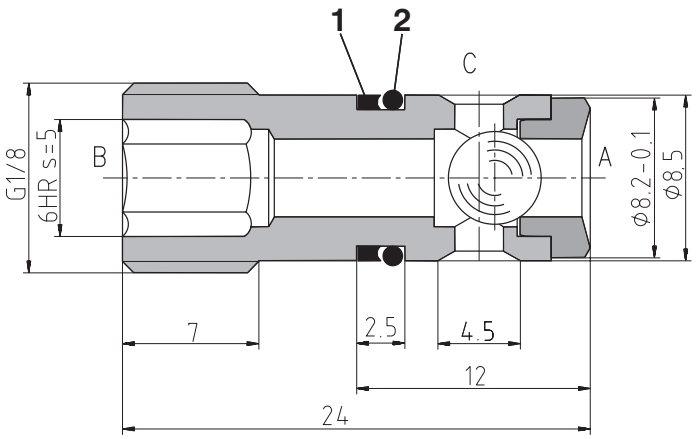
Technical Data

Nominal size	mm	04
Maximum flow rate	L/min	8
Maximum working pressure	bar	500
Hydraulic fluid		Hydraulic fluids of power classes HM,HV to CETOP-RP 91 H in viscosity classes ISO VG 32, 46 and 68.
Maximum degree of fluid contamination		Class 21/18/15 to ISO 4406 (1999).
Mounting position		optional
Weight	kg	0,01

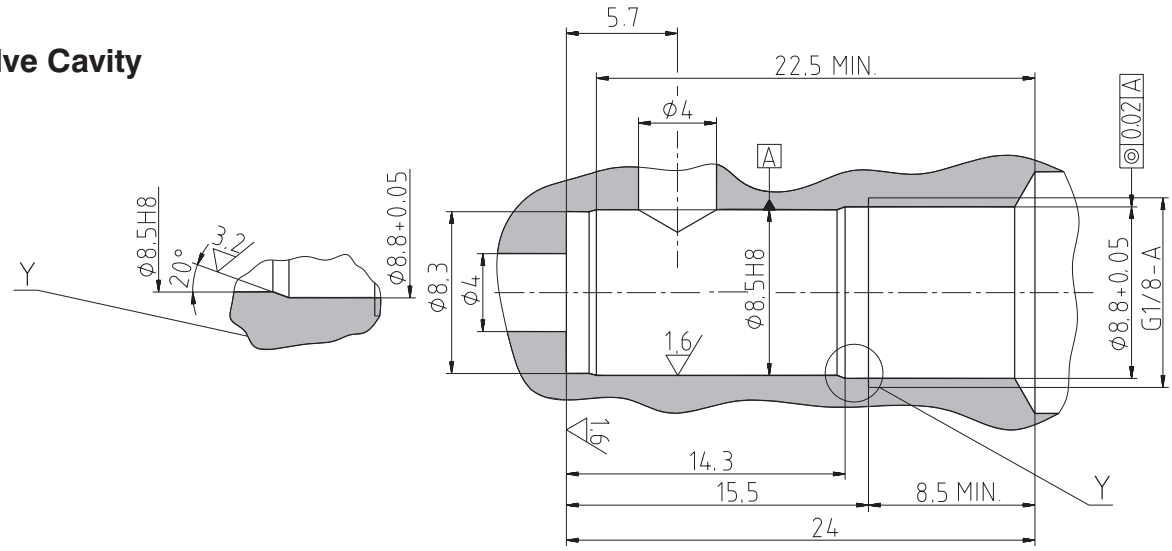
Valve Dimensions

Dimensions in millimetres

1 Thrust ring 8,5 x 6,8 x 1 (1 pc.)
2 O-ring 6 x 1 (1 pc.)
(supplied with valve)



Valve Cavity



Spare Parts

Seal kit

Type	Dimensions, quantity	Ordering number
O-ring	6 x 1 (1 pc.)	531-0313
Thrust ring	8,5 x 6,8 x 1 (1 pc.)	

Caution!

- The packing foil is recyclable.
- Tightening torque 12 Nm.
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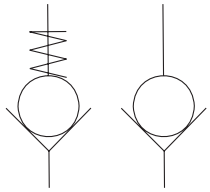
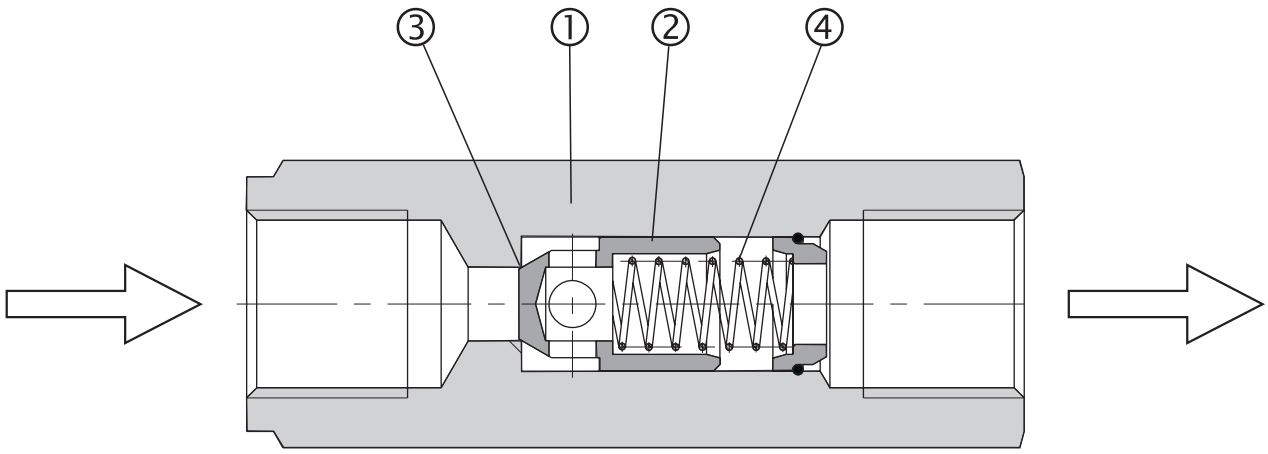


- **Mounting styles:**
  - **for in-line mounting**
  - **straight valve cartridge**
  - **right angled valve cartridge**
- **Six sizes**
- **Poppet design**
- **Leakfree closure in one direction**
- **Three cracking pressures**

Functional Description

The check valve is used to allow flow in one direction and prevent flow in the other. The poppet design guarantees leakfree closure.
The seat (3) is created directly in the housing (1) and the poppet (2) is pushed onto the seat by the compression spring (4). Design without spring pushes the poppet (2) on to the seat by presssure of the fluid. The cracking pressure depends on the spring selected and the pressurised poppet surface area. Three cracking pressures are available. The valve without cracking pressure is also available (without spring).
The basic surface treatment of the valve housing is zinc coated.



Ordering Code

VJ3 - □ - □ - □

Check valve

Nominal size

06	**06**
10	**10**
16	**16**
20	**20**
25	**25**
30	**30**

Model

G1	For in-line mounting with G threads
02*	Straight valve cartridge
03*	Straight valve cartridge

Cracking pressure in bar

000	Without spring
005	0,5
015	1,5
030	3,0
	0.5

*For sizes 06, 10, 16, 20 only

FOR PREFERRED TYPES SEE BOLD TYPING IN ORDERING CODE AND TABLE OF PREFERRED TYPES ON PAGE 4

Technical Data

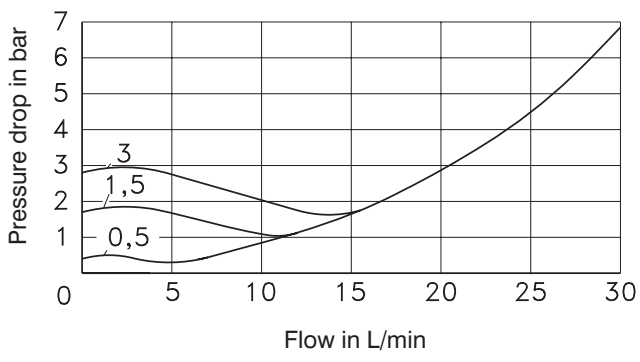
Nominal size	mm	06	10	16	20	25	30
Maximum flow rate	L/min	30	60	160	250	300	400
Maximum pressure	bar	320					
Cracking pressure	bar	0,5		1,5		3,0	
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP RP 91 H in viscosity classes ISO VG 32, 46 and 68					
Fluid temperature range - model G1 - models 02, 03	°C	-40 ... +80 -30 ... +80					
Ambient temperature range	°C	-40 ... +55					
Viscosity range	mm^2/s	10 ... 400					
Maximum degree of fluid contamination		Class 21/18/15 according to ISO 4406 (1999).					
Weight - model G1 - models 02, 03	kg	0,11 0,05	0,34 0,09	0,52 0,22	0,95 0,26	1,95 -	2,35 -
Mounting position		optional					

Performance Curves

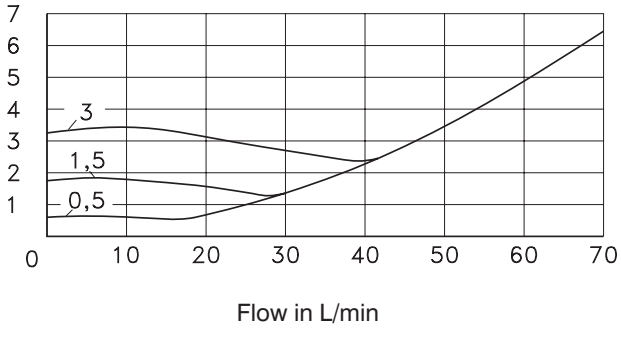
Measured at ν = 35 mm^2/s and t = 40°C

Pressure drop dependent upon flow

Nominal size 06



Nominal size 10

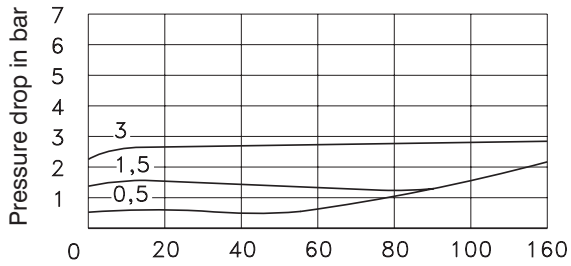


Performance Curves

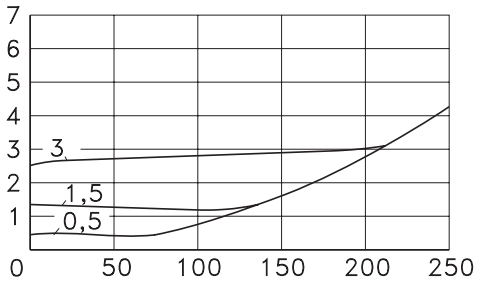
Measured at ν = 35 mm^2/s and t = 40°C

Pressure drop dependent upon flow

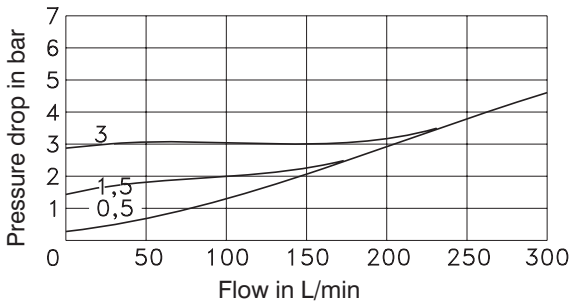
Nominal size 16



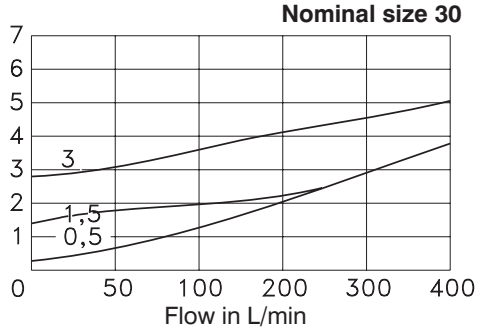
Nominal size 20



Nominal size 25



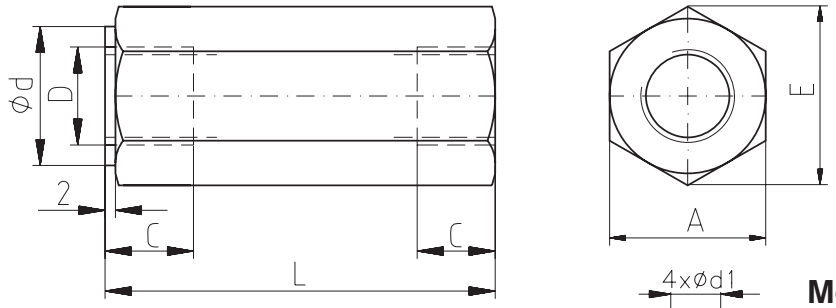
Nominal size 30



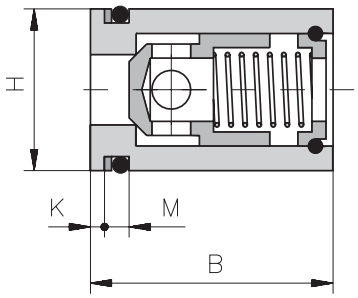
Valve Dimensions

Dimensions in millimetres

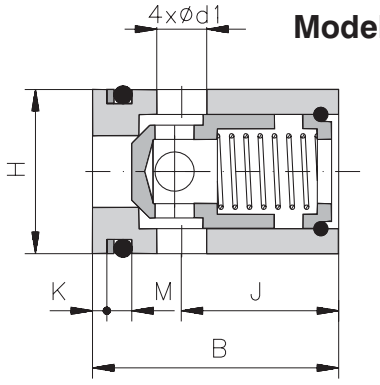
Model G1



Model 02



Model 03



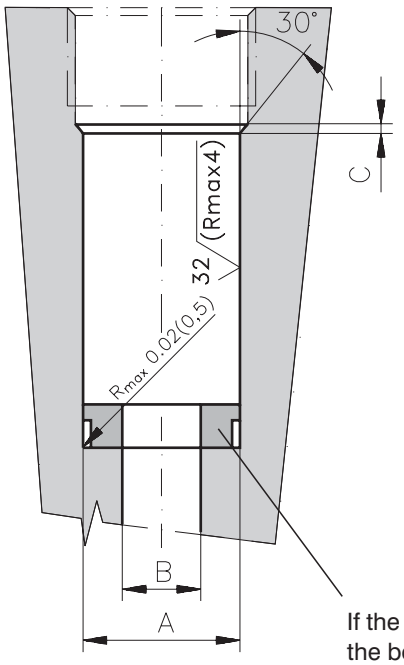
Size	A	B	C	D	∅ d	∅ d1	E
			G1	G1			
06	19	27 - 0,2	12	G 1/4	19	3,5	22
10	30	32 - 0,2	14	G 1/2	30	5,5	34,5
16	36	45 - 0,2	16	G 3/4	36	8,5	41,5
20	46	45 - 0,2	18	G 1	46	10,5	53
25	60	-	20	G1 1/4	60	-	69
30	65	-	22	G1 1/2	65	-	75

Size	H	J	K	L	M	O-ring	Back-up ring
06	∅ 20 f8	18	1,6	58	4,4 +0,2	15,08 x 2,62	BBP 80 B 113 - N90 14,66 x 19,02 x 1,14
10	∅ 25 f8	20	1,6	72	4,4 +0,2	20 x 2,65	M 8 - 116 19,43 x 23,79 x 1,14
16	∅ 35 f8	27	2,2	85	5,3 +0,2	28 x 3,55	S 8 - 216 28,98 x 34,98 x 1,02
20	∅ 40 f8	25	2,2	98	5,3 +0,2	32,92 x 3,53 BBP80B219-N90 33,88 x 34,98 x 1,02	
25	-	-	-	120	-	-	
30	-	-	-	132	-	-	

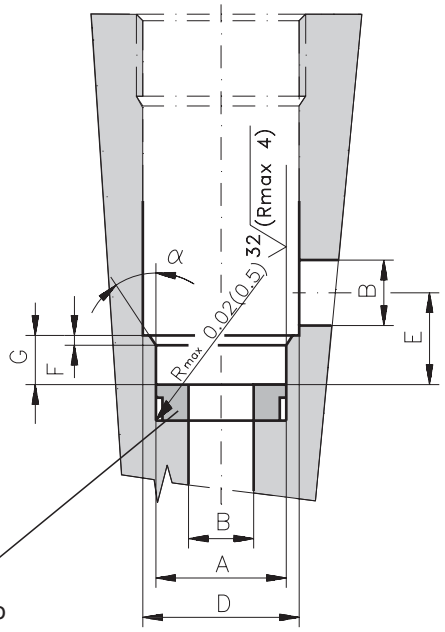
Installation Cavity

(length according to distance ring)

Model 02



Model 03



If the hole cannot be reamed to the bottom, the use of a distance ring is recommended

Size	A	B	C	D*	E	F	G	α
06	∅ 20 H8	∅ 6	2	∅ 26	10.5	1	7 - 0,3	20°
10	∅ 25 H8	∅ 10	2	∅ 32	14	1.5	8 + 0,2	30°
16	∅ 35 H8	∅ 16	2	∅ 44	22	2	13 + 0,2	30°
20	∅ 40 H8	∅ 20	2	∅ 48	25	2	14 + 0,2	30°

* minimum diameter recommended

Preferred Types of Valves

Type	Ordering Number
VJ3-06-005-G1	530-0237
VJ3-10-005-G1	530-0240
VJ3-16-005-G1	530-0243
VJ3-20-005-G1	530-0246
VJ3-25-005-G1	530-0250
VJ3-30-005-G1	530-0260

Caution!

- The packing foil is recyclable.
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3/4-16 UNF • ... 420 bar (6091 PSI) • ... bis 40 L/min (10,6 GPM)

- **Standard and High performance variant**
- **Poppet design**
- **Leak free closure in one direction**

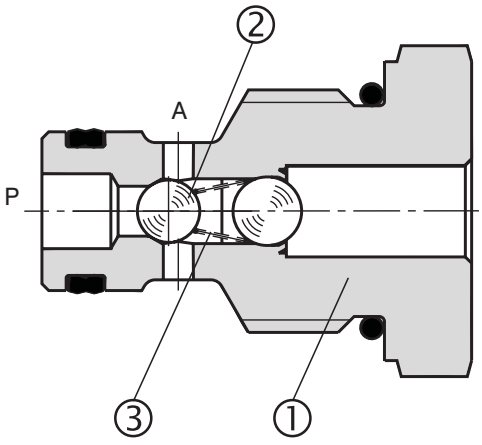
Functional Description

The check valve serves the leak free closure in one direction and allows flow in the opposite direction. The poppet design provides leak free closure.
The seat is created directly in the valve housing (1) and the small ball (2) is pushed by spring (3) through the thumb ring (4)* onto the seat. The cracking pressure depends on the spring selected, its preloading and the pressurized poppet surface area. Four* cracking pressures are available.
The surface of the valve housing is zinc coated.

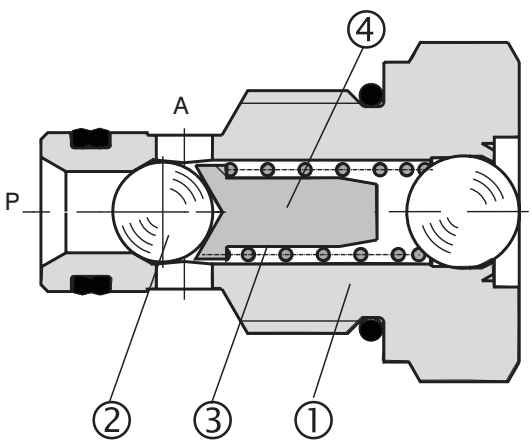
* With the High performance valve

Cartridge Valve

Standard performance



High performance



Ordering Code

SC1F-A2 / □ □ □

Check valves

Standard	**S**
High performance	**H**

Polyurethan, Viton	**V**
Polyurethan, NBR	**No designation**

Cracking pressure

***005**	0,5 bar (7,2 PSI)
015	1,5 bar (21,7 PSI)
035	3,5 bar (50,7 PSI)
070	7,0 bar (101,5 PSI)

* The cracking pressure with a standard valve is 0,5 bar (7,25 PSI)

Kenngrößen

		Standard valve	High performance
Cartridge thread		3/4 16UNF - 2B	
Maximum flow rate	L/min (GPM)	20 (5,3)	40 (10,6)
Maximum operating pressure	bar (PSI)	350 (5076)	420 (6091)
Cracking pressure	bar (PSI)	0,5* (7,25) 1,5 (21,76)	3,5 (50,76) 7,0 (101,53)
Hydraulic fluid		Mineral oil (HM, HV) to DIN 51 254	
Fluid temperature range	°C (°F)	-20 ...+80 (-4 ... +176)	
Ambient temperature range	°C (°F)	-20 ... +80 (-4 ... +176)	
Viscosity range	mm^2/s (SUS)	10 ... 500 (49 ... 2300)	
Maximum degree of fluid contamination		Class 21/18/15 according to ISO 4406 (1999).	
Weight	kg (lbs)	0,054 (0,119)	0,063 (0,139)
Maximum valve tightening torque		30 $^{+2}$Nm	
Mounting position		optional	

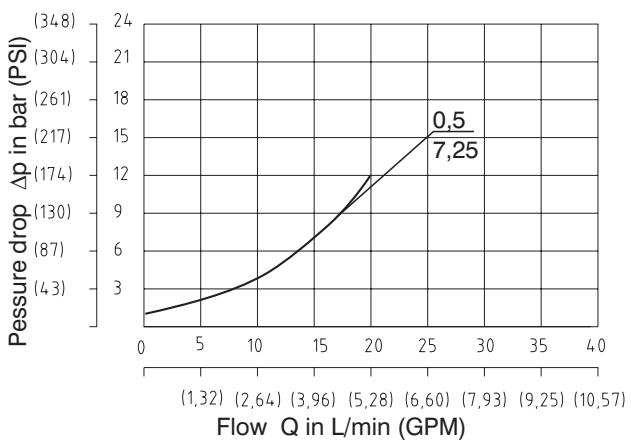
* The cracking pressure with a standard valve is 0,5 bar (7,25 PSI)

Δp-Q Characteristics

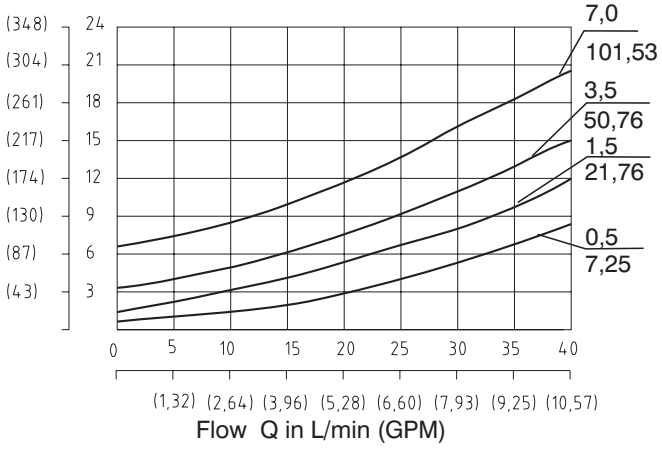
Measured at $\nu = 32\ mm^2/s$ (156SUS)

Pressure drops related to flow rate.

Standard valve

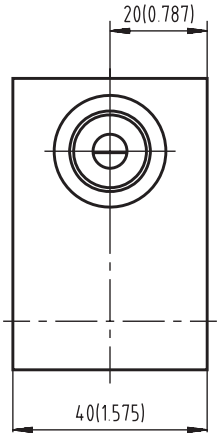


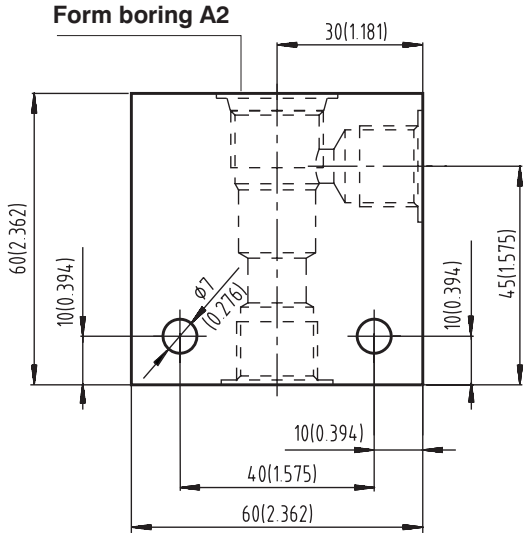
High performance valve



Body with Valve

Dimensions in millimeters (inches)





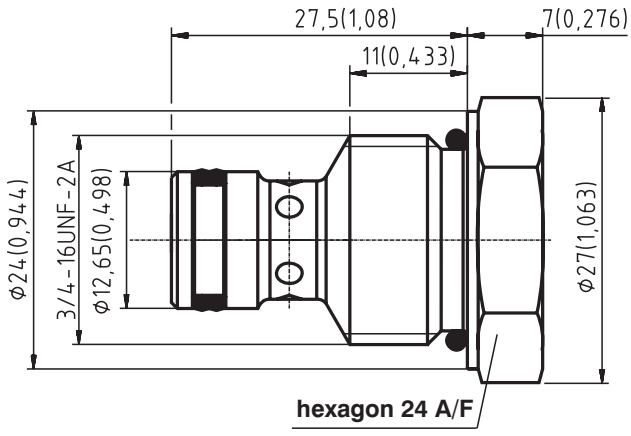
Body material	Connecting size	Type code	Operating pressures
Steel	G3/8	SB-A2-0103ST	420 bar (6091 PSI)
Steel	SAE 6	SB-A2-0102ST	420 bar (6091 PSI)
Aluminium	G3/8	SB-A2-0103AL	250 bar (3626 PSI)
Aluminium	SAE 6	SB-A2-0102AL	250 bar (3626 PSI)

Note:
- For detailed valve body ordering code refer to the data sheet HA 0018.

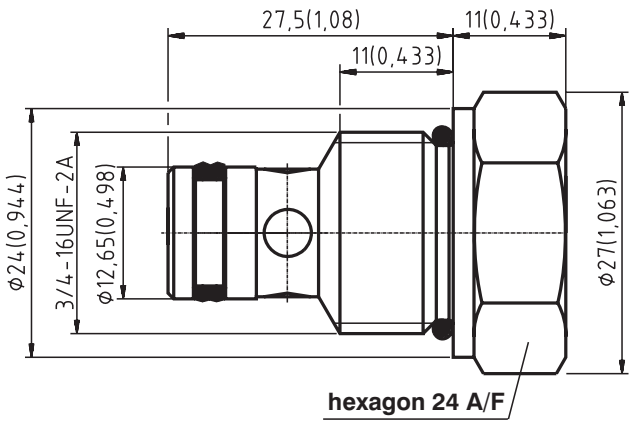
Valve Dimensions

Dimensions in millimeters (inches)

Standard valve

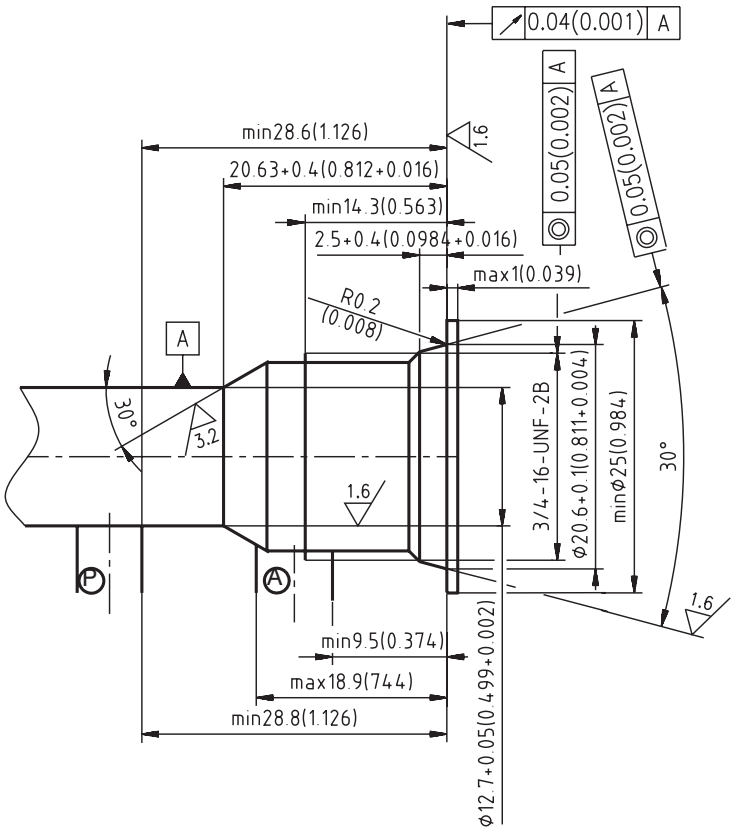


High performance valve



Insatallation cavity

Dimensions in millimeters (inches)



Spare parts

Standard and high performance valve

Dualseal - PU	O-ring - NBR	O-ring - Viton	Order number
10,3 x 12,7 x 3,1 (1pc.)	17 x 1,8 (1pc.)	-	531-9005
10,3 x 12,7 x 3,1 (1pc.)	-	17,17 x 1,78 (1pc.)	531-9006

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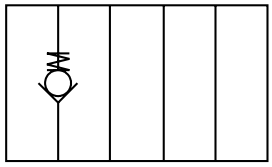
Check valve sandwich plates VJO1-04/M

Size 04 • p_{max} up to 320 bar • Q_{max} up to 30 L/min

HA 5012
1/2003

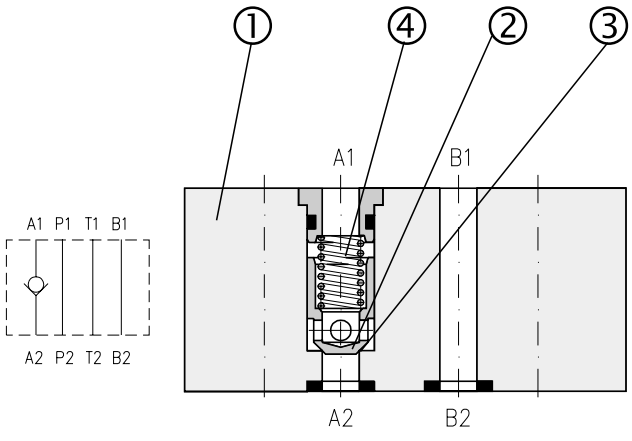
Replaces
HA 5012 1/2000



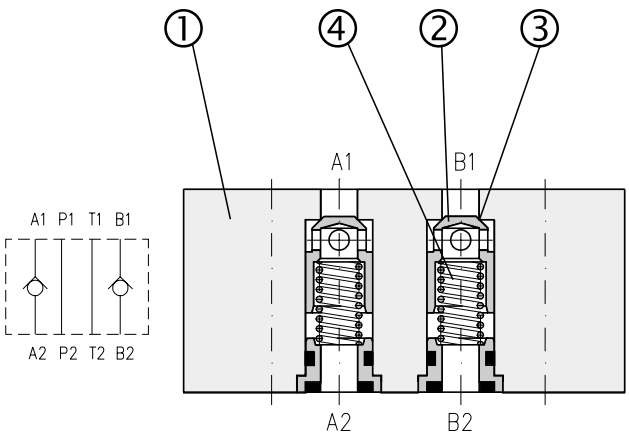
- **Sandwich plate design for use in vertical stacking assemblies**
- **Poppet design**
- **Leakfree closure of one or two service ports, as required**
- **Eight different check variations**
- **Installation dimensions to ISO 4401 CETOP - RP 121H**

Functional Description

The check valves sandwich plate are used to allow flow in one direction and prevent flow in the other in the port in which the check element is installed. The sandwich design enables stacking with other components of the same size. The check elements are build into one or two ports, the other ports being through-holes. The seat (3) is machined directly in the housing (1) and the poppet (2) is pushed onto the seat by the compression spring (4). The cracking pressure depends on the spring selected and the pressurised poppet surface area. The valve housing surface is phosphate coated.



Model A



Model D

Ordering Code

VJO1-04/M ☐ - ☐ ☐

Sandwich check valve plate for stacking assemblies

Nominal size

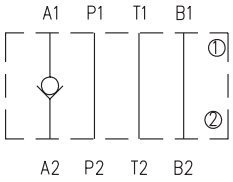
Sandwich plate design

	Seal
without designation	NBR
V	Viton (FPM)

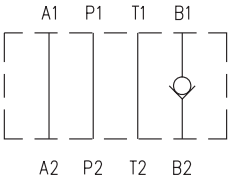
	Cracking pressure
05	0.5 bar
15	1.5 bar
30	3 bar

Model

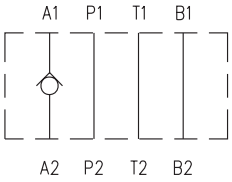
A



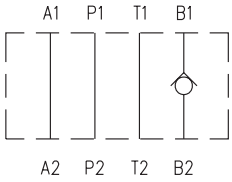
B



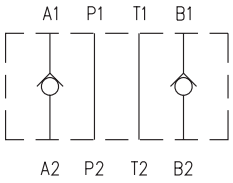
E



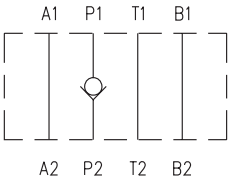
F



D



P



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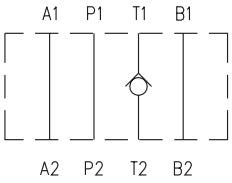
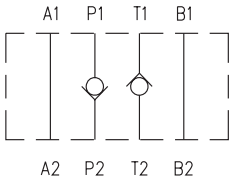


H



Notes: Symbol orientation on the label corresponds with the valve function.
① valve side
② subplate or manifold side

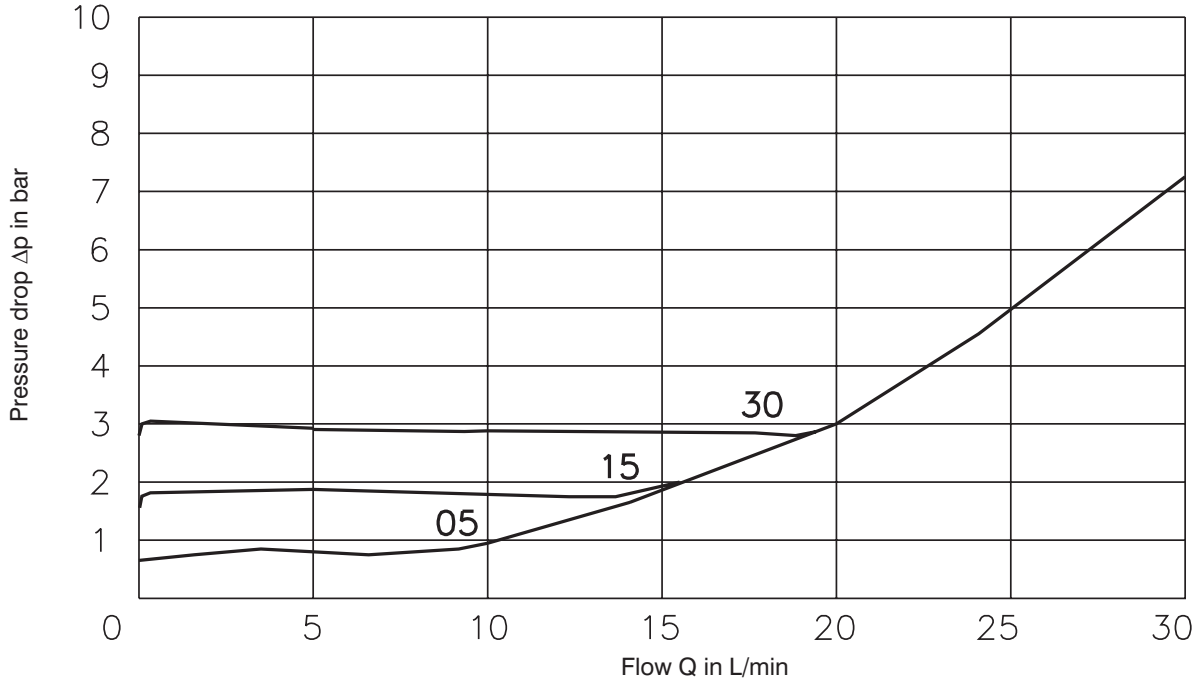
FOR PREFERRED TYPES SEE BOLD TYPING IN ORDERING CODE AND TABLE OF PREFERRED TYPES ON PAGE 4

Technical Data

Nominal size	mm	04		
Maximum flow	L/min	30		
Maximum operating pressure	bar	320		
Cracking pressure	bar	0.5	1.5	3
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP RP 91H in viscosity classes ISO VG 32, 46 and 68		
Fluid temperature range for standard sealing (NBR)	°C	-30 ... +80		
Fluid temperature range for Viton seals (FPM)	°C	-20 ... +80		
Viscosity range	mm^2/s	20 ... 400		
Maximum degree of fluid contamination		Class 21/18/15 to ISO 4406 (1999).		
Weight	kg	0.40		
Mounting position		optional		

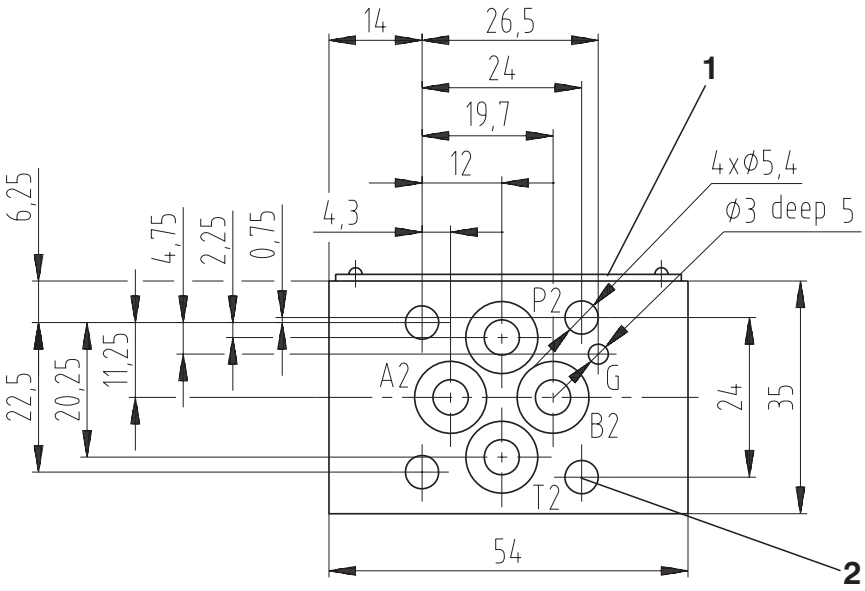
Δp-Q Characteristic

Measured at ν = 35 mm²/s and t = 40 °C

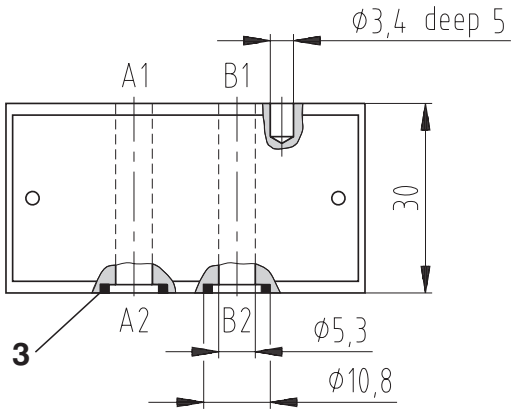


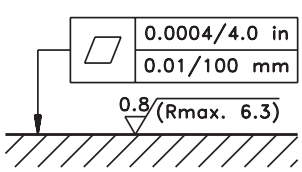
Valve Dimensions

Dimensions in millimeters



1 Name plate
2 4 through mounting holes
3 Square ring (4 pcs.):
standard (NBR) - SR 010 6.07 x 1.68
Viton (FPM) - 6.07 x 1.78
supplied with valve





Required surface finish of interface

Spare Parts

Seal kit

Type	Dimensions, quantity		Ordering number
	Square ring	O-ring	
Standard NBR	6.07 x 1.68 (6 pcs.)	-	530-0197
Viton	-	6.07 x 1.78 (6 pcs.)	530-0204

Preferred Types of Valves

Type	Ordering Number
VJO1-04/MP-05	530-0106

Caution!

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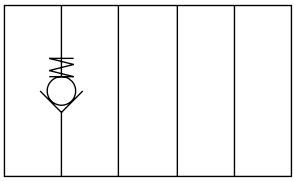
Check valve sandwich plates MVJ2-06

Size 06 • p_{max} up to 320 bar • Q_{max} up to 30 L/min

HA 5013
1/2003

Replaces
HA 5013 1/2000

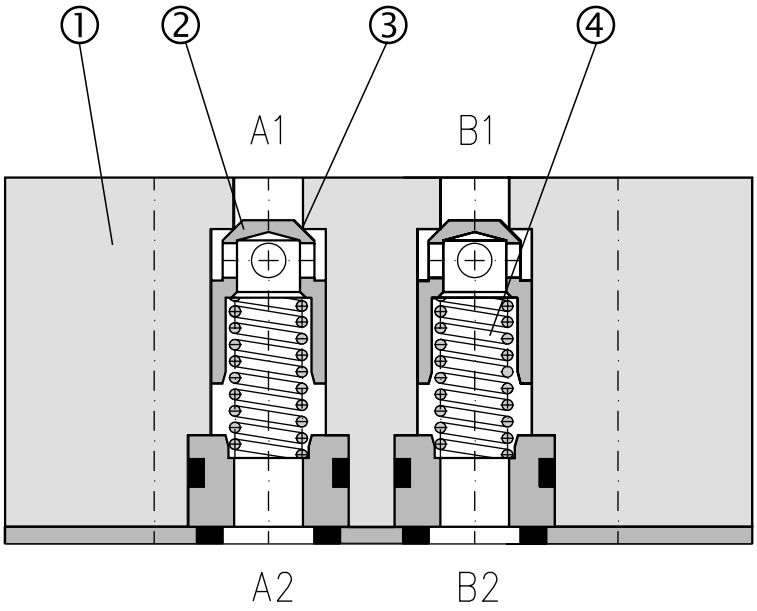


- **Sandwich plate design for use in vertical stacking assemblies**
- **Poppet design**
- **Leakfree closure in one or two service ports**
- **8 different models**
- **Installation dimensions to ISO 4401-03-02-0-94 and DIN 24 340 - A6**

Functional Description

The check valve sandwich plates are used to allow flow in one direction and prevent flow in the other one. The sandwich design enables vertical stacking with other components of the same size. The check elements can be built into one or two ports, the other ports being through-holes.

The seat (3) is machined directly in the housing (1) and the poppet (2) is pushed onto the seat by compression spring (4). The cracking pressure depends on the spring used, on its preload and on the pressurized poppet surface area.
The valve housing surface is phosphate coated.



Ordering Code

MVJ2-06 ☐ - ☐ **-1** ☐

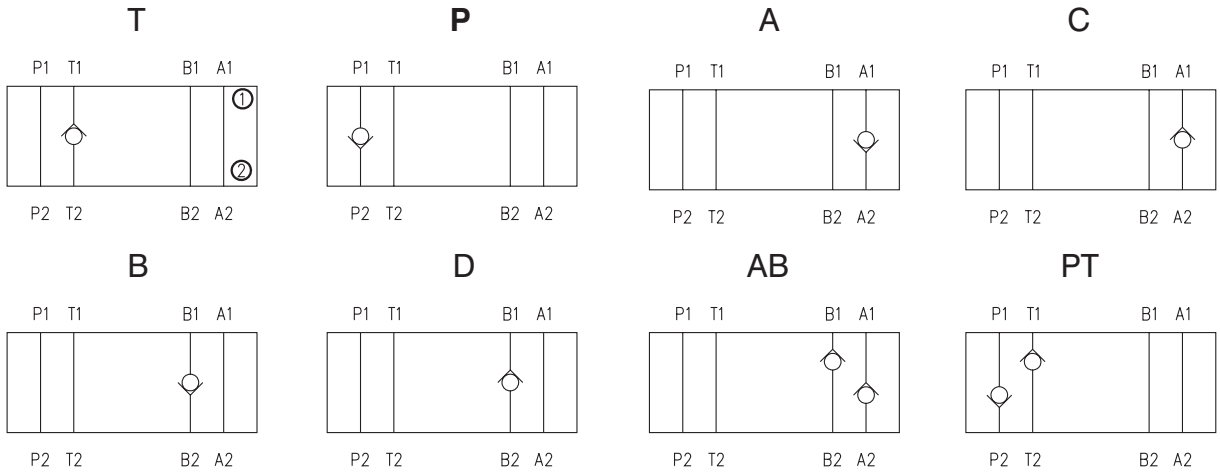
Sandwich check valve plate for stacking assemblies

Nominal size
6 mm **06**

without designation
V **Seals** NBR, FPM (Viton)

005 **Cracking pressure** 0.5 bar

Functional symbols



Notes: The orientation of the symbol on the name plate corresponds with the valve function.
① valve side
② subplate or manifold side

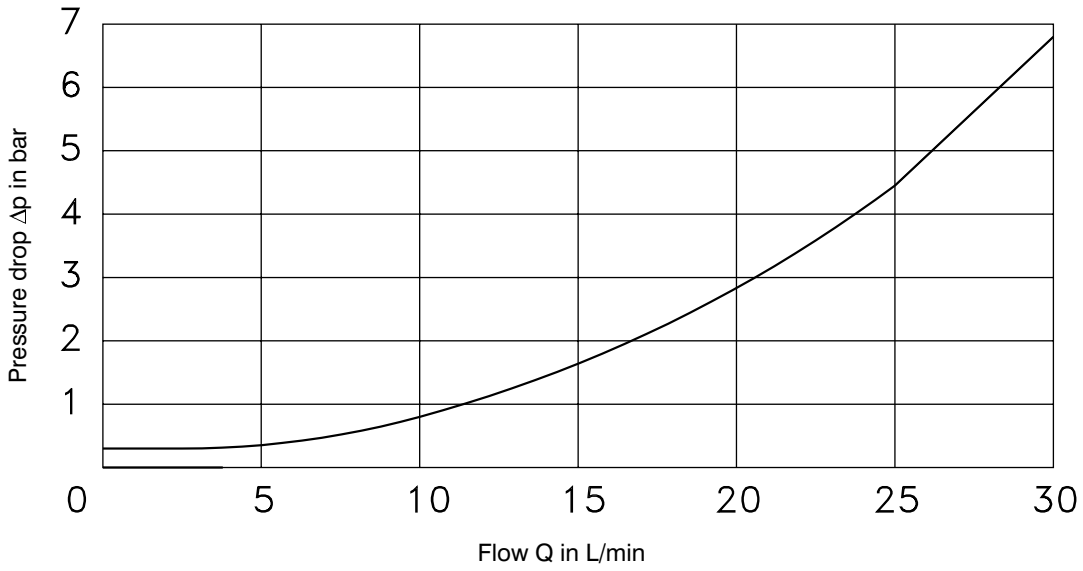
FOR PREFERRED TYPES SEE BOLD TYPING IN ORDERING CODE AND TABLE OF PREFERRED TYPES ON PAGE 4

Technical Data

Nominal size	mm	06
Maximal flow rate	L/min	30
Maximum operating pressure	bar	320
Cracking pressure	bar	0.5
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP RP 91H in viscosity classes ISO VG 32, 46 and 68
Fluid temperature range for standard sealing (NBR)	°C	-30 ... +80
Fluid temperature range for Viton seals (FPM)	°C	-20 ... +80
Viscosity range	mm^2/s	20 ... 400
Maximum degree of fluid contamination		Class 21/18/15 to ISO 4406 (1999).
Weight	kg	0.8
Mounting position		optional

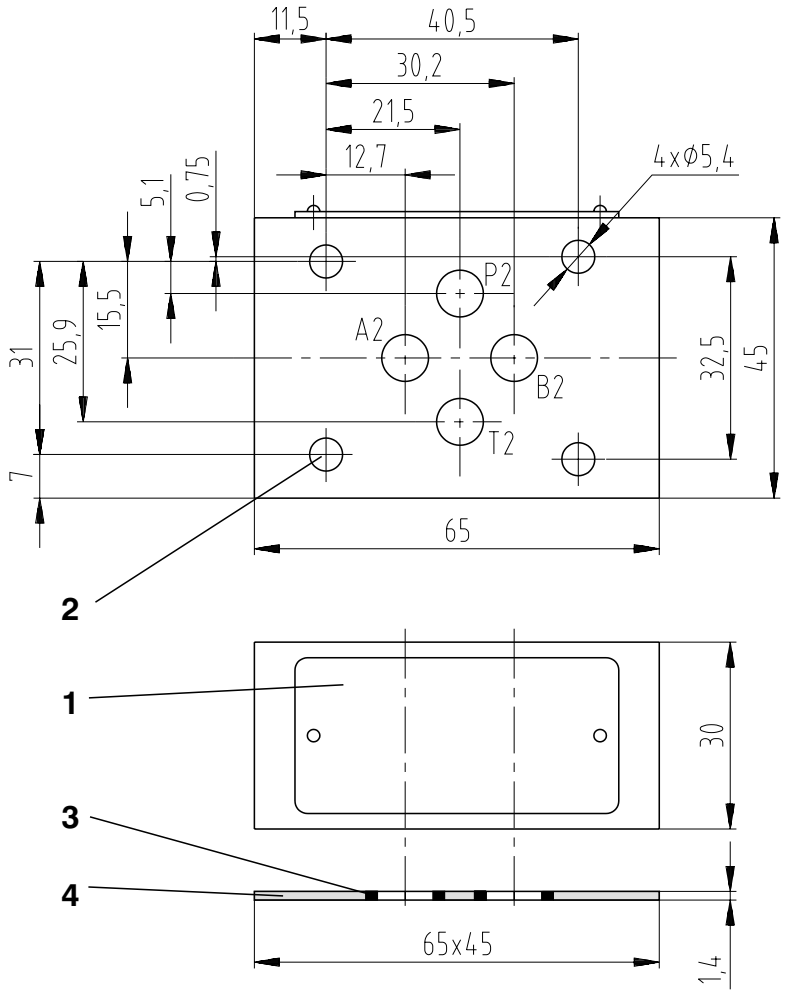
Δp-Q Characteristic

Measured at ν = 35 mm^2/s and t = 40 °C

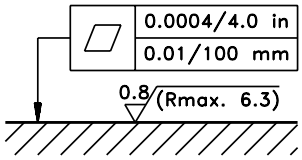


Valve Dimensions

Dimensions in millimetres



1 Name plate
2 4 mounting through-holes
3 Square ring 9.25x1.68 (4 pcs.) supplied with valve
4 Square-ring plate supplied with valve



Required surface finish of interface

Spare Parts

Seal kit

Type	Dimensions, quantity		Ordering number
	O-ring	Square ring	
Standard NBR70	10 x 1.8 (2 pcs.)	9.25 x 1.68 (4 pcs.)	530-0198
Viton	9.75 x 1.78 (2 pcs.)	9.25 x 1.78 (4 pcs.)	530-0202

Preferred Types of Valves

Type	Ordering Number
MVJ2-06/P-005-1	530-0049

Caution!

- The packing foil is recyclable.
- Mounting bolts M5 must be ordered separately. Tightening torque of the bolts is 8.9 Nm.
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ARGO HYTOS

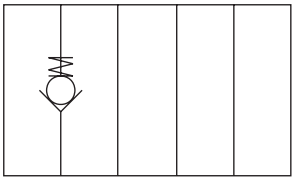
Check Valve Sandwich Plates MVJ2-10

Size 10 • p_{max} up to 350 bar • Q_{max} up to 60 L/min

HA 5014
2/2005

Replaces
HA 5014 1/2003

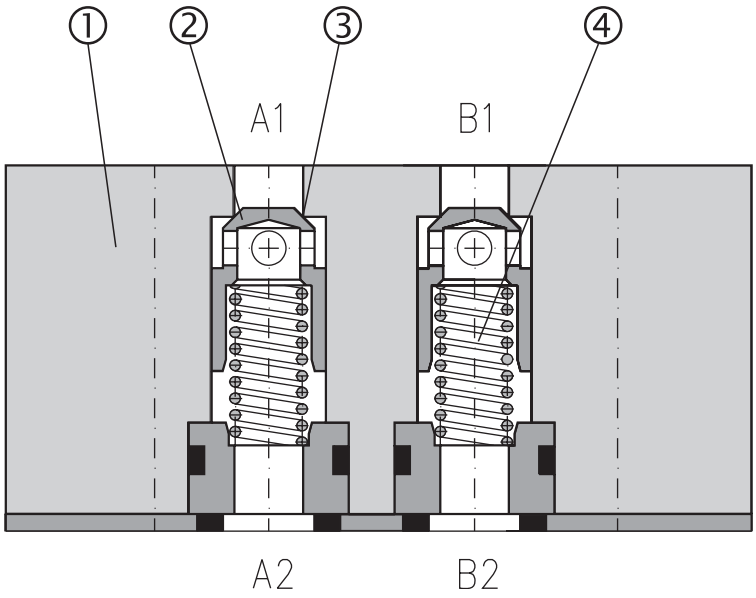
- ❑ **Sandwich plate design for use in vertical stacking assemblies**
- ❑ **Poppet design**
- ❑ **Leakfree closure in one or two service ports**
- ❑ **8 different models**
- ❑ **Installation dimensions to ISO 4401-05-04-0-94 and DIN 24-340-A10**



Functional Description

The check valve sandwich plates are used to allow flow in one direction and prevent flow in the other one. The sandwich design enables vertical stacking with other components of the same size. The check elements can be built into one or two ports, the other ports being through-holes. This does not apply to models T and PT where the port T' is blocked.

The seat (3) is machined directly in the housing (1) and the poppet (2) is pushed onto the seat by compression spring (4). The cracking pressure depends on the spring used, on its preload and on the pressurized poppet surface area.
The valve housing surface is phosphate coated.



Ordering Code

MVJ2-10 ☐ - ☐ **-1** ☐

Sandwich check valve plate for stacking assemblies

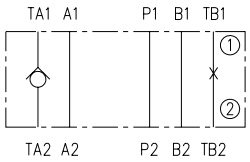
Seals
without designation NBR
V Viton

Nominal size
10 mm **10**

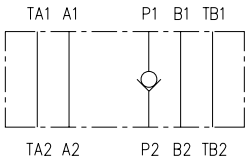
Cracking pressure
005 0.5 bar

Functional symbols

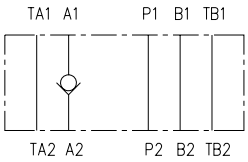
T



P



A



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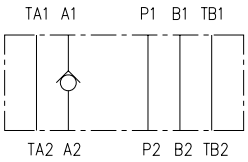
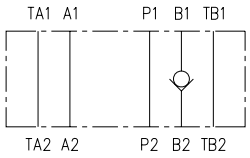
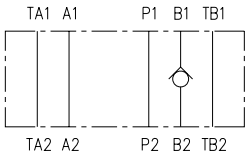


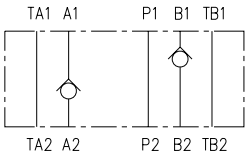
B



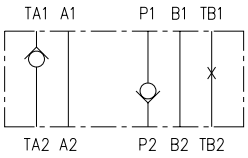
D



AB



PT



Notes: Port TB is closed with models T and PT.
The orientation of the symbol on the name plate corresponds with the valve function.
① valve side
② subplate or manifold side

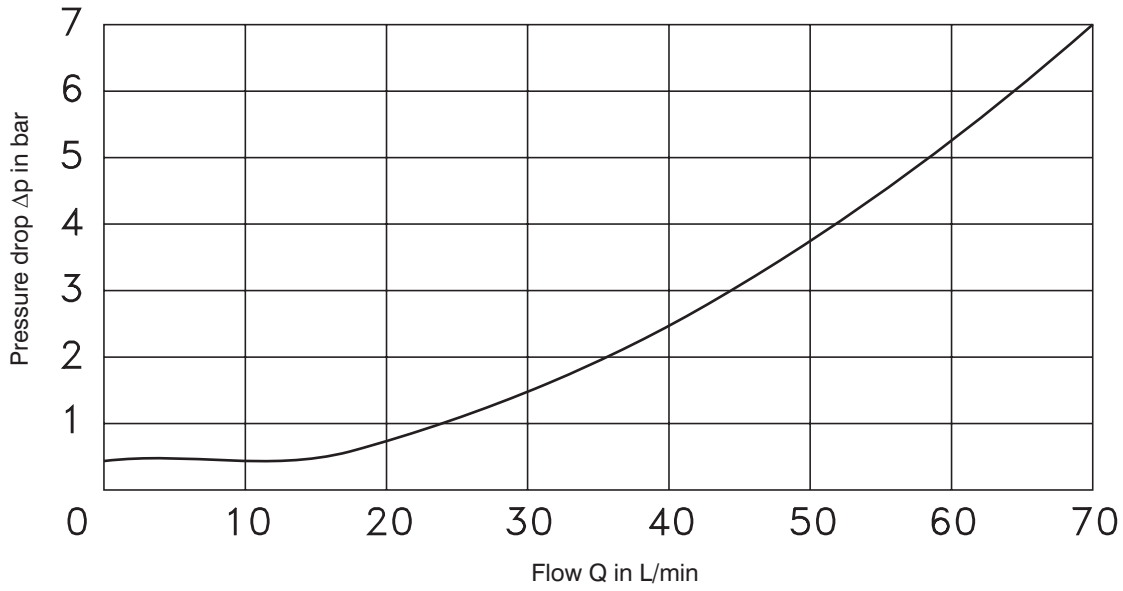
FOR PREFERRED TYPES SEE BOLD TYPING IN ORDERING CODE AND TABLE OF PREFERRED TYPES ON PAGE 4

Technical Data

Nominal size	mm	10
Maximum flow rate	L/min	60
Maximum operating pressure	bar	350
Cracking pressure	bar	0.5
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP RP 91H in viscosity classes ISO VG 32, 46 and 68
Fluid temperature range for standard sealing (NBR)	°C	-30 ... +80
Fluid temperature range for Viton seals (FPM)	°C	-20 ... +80
Viscosity range	mm^2/s	20 ... 400
Maximum degree of fluid contamination		Class 21/18/15 to ISO 4406 (1999).
Weight	kg	2.3
Mounting position		optional

Δp-Q Characteristic

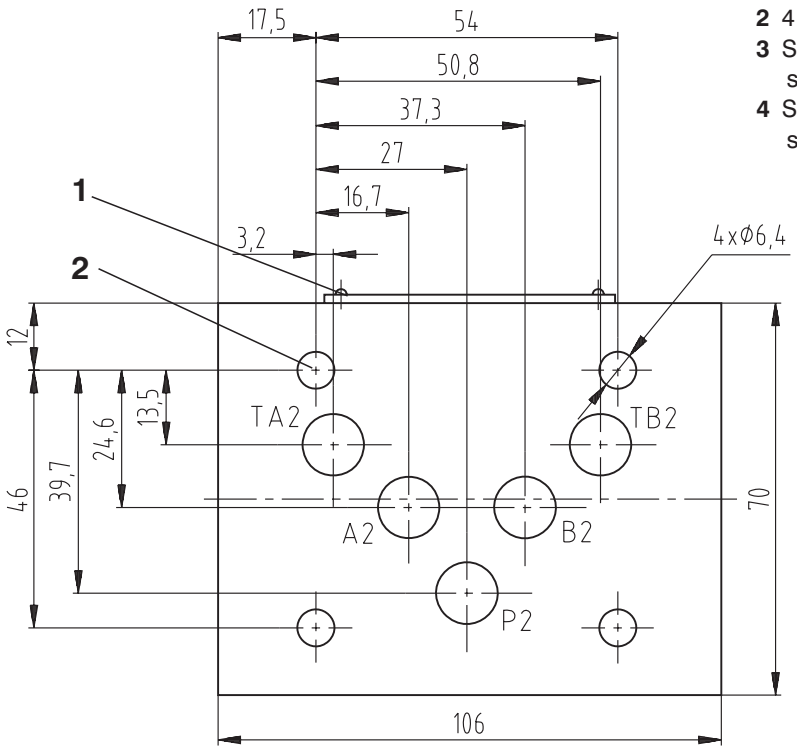
Measured at ν = 35 mm²/s and t = 40 °C

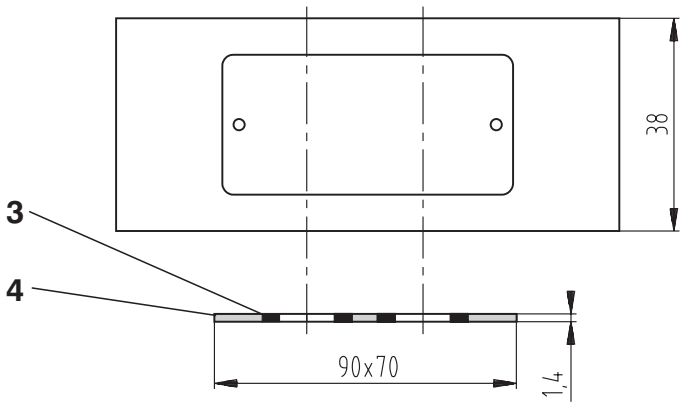


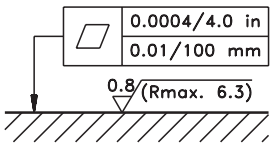
Valve Dimensions

Dimensions in millimetres

1 Name plate
2 4 mounting through-holes
3 Square ring 12.42 x 1.68 (5 pcs.) supplied with valve
4 Square-ring plate supplied with valve







Required surface finish of interface

Spare Parts

Seal kit

Type	Dimensions, quantity		Ordering number
	Square ring	O-ring	
Standard NBR70	12.42 x 1.68 (5 pcs.)	15 x 1.8 (2 pcs.)	530-0199
Viton	-	15 x 1.8 (2 pcs.)	530-0201
	-	12.42 x 1.78 (5 pcs.)	

Preferred Types of Valves

Type	Ordering Number
MVJ2-10/P-005-1	530-0057

Caution!

- The packing foil is recyclable.
- The transport plate can be returned to the supplier.
- Mounting bolts M6 must be ordered separately. Tightening torque of the bolts is 15 Nm.
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law.

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ARGO HYTOS

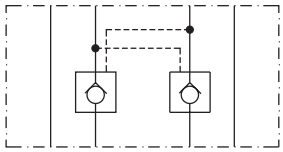
Pilot operated check valves sandwich plates

2RJV1-06

Size 06 • p_{max} up to 320 bar • Q_{max} up to 60 L/min

HA 5021
1/2003

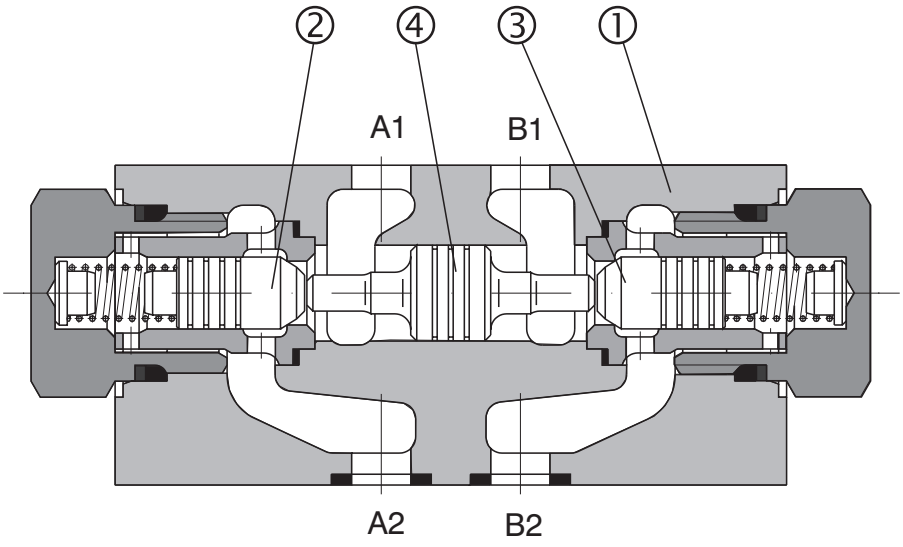
Replaces
HA 5021 8/2001



- **Sandwich plate design for use in vertical stacking assemblies**
- **Three models:**
  - leakfree closure in lines A and B
  - leakfree closure in line A
  - leakfree closure in line B
- **Installation dimensions to ISO 4401-AB-03-4-A and DIN 24 340-A6**

Functional Description

Model 2RJV1-06 are pilot operated check valves in a sandwich plate design used to give leakfree closure of one or two actuator ports under pressure, even during long idle periods.
They basically consist of the cast iron housing (1), one or two check valves (2), (3) and the pilot piston (4).
When fluid flows from A1 (B1) to A2 (B2) it opens the check valve (2), (3) and at the same time shifts the pilot piston (4) to the right (left), thus opening the way B2 → B1 (A2 → A1). When the pressure drops (e. g. after shifting the directional valve into its middle position), the springs push the poppets onto the seats and the circuit between the check valve and the cylinder is closed.
To ensure that the poppet valves seat properly, the actuator ports A2 and B2 of the directional valve should be connected to tank T in neutral position (functional symbol Y).
The basic surface treatment of the valve body is phosphate coated, whereas the surfaces of the other parts are zinc coated.



Ordering Code

2RJV1-06-M □ □

Pilot operated check valve

Nominal size

Sandwich plate design

Seals
without designation NBR
V Viton

Model
A Check valve in line A
B Check valve in line B
C Check valves in lines A and B

FOR PREFERRED TYPES SEE BOLD TYPING IN ORDERING CODE AND TABLE OF PREFERRED TYPES ON PAGE 4

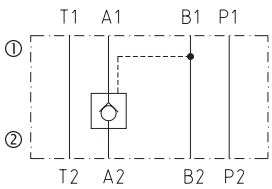
Technical Data

Nominal size	mm	06
Maximum flow	L/min	60
Max. operating pressure	bar	320
Cracking pressure	bar	see the Performance Curves
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP RP 91 H in viscosity classes ISO VG 32, 46 and 68
Fluid temperature range for standard sealing (NBR)	°C	-30 ... +80
Fluid temperature range for Viton sealing (FPM)	°C	-20 ... +80
Viscosity range	mm^2/s	20 ... 400
Maximum degree of fluid contamination		Class 21/18/15 according to ISO 4406 (1999).
Area rations (pilot piston/poppet)		3
Mounting position		optional
Weight	kg	0.8

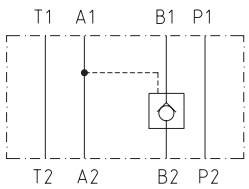
Functional symbols

Arrangement of the check valves in the valve body

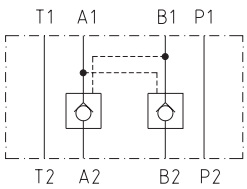
2RJV1-06-MA



2RJV1-06-MB

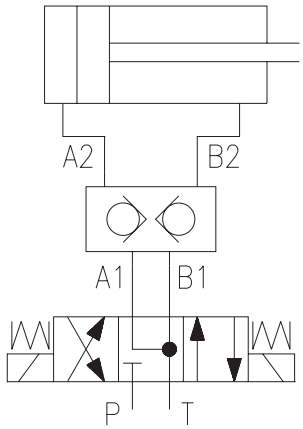


2RJV1-06-MC



① valve side
② subplate side

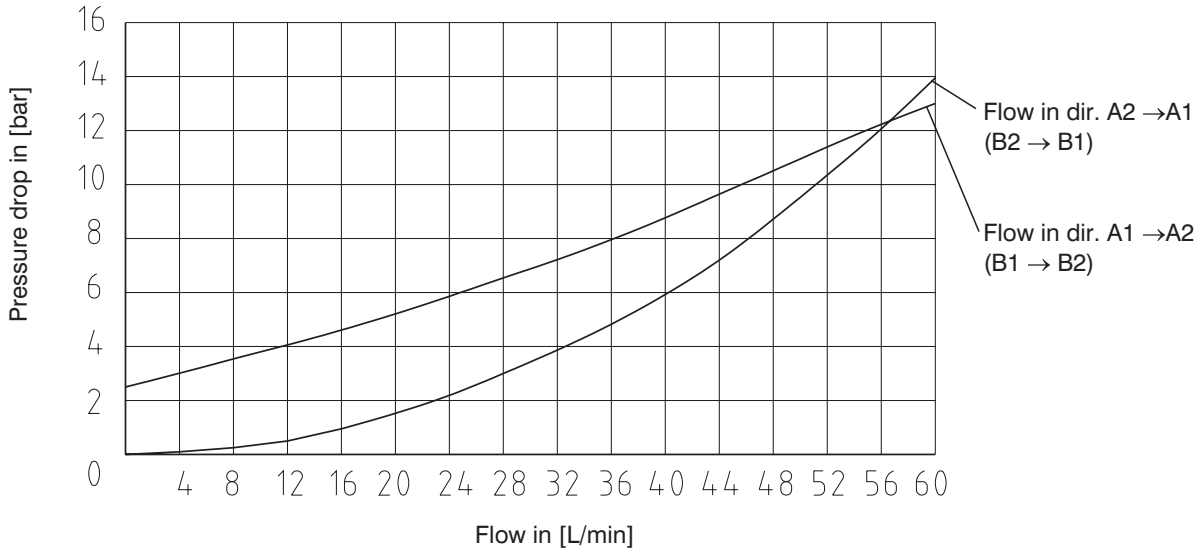
Typical circuit



Performance Curves

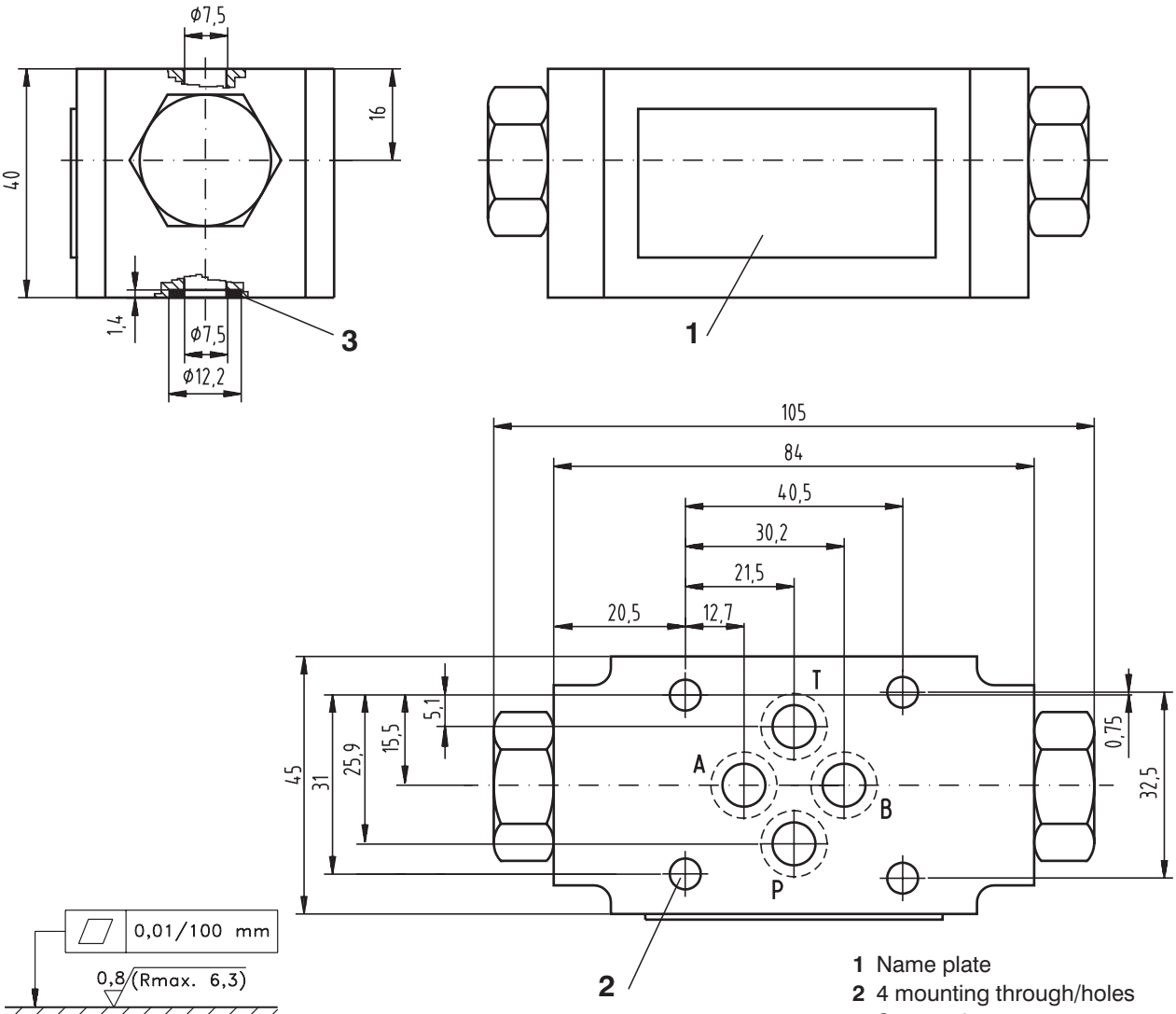
Measured at ν = 35 mm^2/s and t = 40 °C

Pressure drop



Valve Dimensions

Dimensions in millimetres



Required surfacefinish of interface

1 Name plate
2 4 mounting through/holes
3 Square ring 012
(9.25 x 1.68 NBR70 - 4 pcs.),
supplied with each valve

Spare Parts

Seal kit

Type	Dimensions, quantity			Ordering number
	O-ring	Square ring	Back-up ring	
Standard NBR	14 x 1,78 NBR90 (2 pcs.)	9,25 x 1,68 NBR70 (4 pcs.)	17,83 x 22,19 x 1,14 (2 pcs.)	535-0093
	18 x 2,65 NBR70 (2 pcs.)	-	-	
Viton	9,25 x 1,78 (4 pcs.)	-	17,83 x 22,19 x 1,14 (2 pcs.)	535-0122
	14 x 1,78 (2 pcs.)	-	-	
	17,12 x 2,62 (2 pcs.)	-	-	

Preferred Types of Valves

Type	Ordering Number
2RJV1-06-MC	535-0021

Caution!

- The packing foil is recyclable.
- The transport plate is to be returned to the supplier.
- Studs bolt must be ordered separately.
  Tightening torque of the bolts is 8.9 Nm.
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law.

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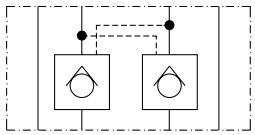
Pilot operated check valves sandwich plate

VJR1-04/M

Size 04 • p_{max} up to 320 bar • Q_{max} up to 20 L/min

HA 5023
1/2003

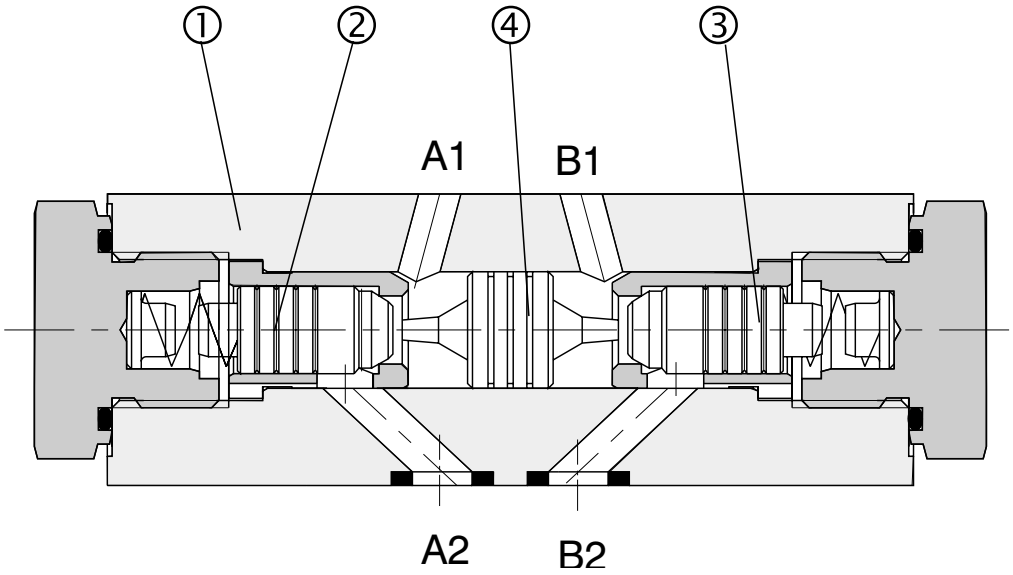
Replaces
HA 5023 1/2000



- **Sandwich plate design for use in vertical stacking assemblies**
- **3 models:**
  - leakfree closure of both sides with check valves in lines A and B
  - leakfree closure with check valve in line A
  - leakfree closure in line B
- **Installation dimensions acording to ISO 4401 CETOP - RP 121H**

Functional Description

A pilot operated check valve is used to provide leakfree closure of a hydraulic circuit under pressure. It protects the load against dropping should a line break occur and ensures a stable position of a hydraulic actuator under pressure, even during long idle periods.
The valve basically consists of housing (1), one or two check valves (2), (3) and pilot piston (4).
When fluid flows from A1 (B1) to A2 (B2) it opens the check valve (2), (3) and at the same time shifts the pilot piston (4) to the right (left), thus opening the way B2 B1 (A2 A1). When the pressure drops (e.g. after shifting the directional valve into its middle position), the springs push the balls onto the seats and the circuit between the check valve and the actuator is closed under pressure. To ensure that the ball valves seat properly and that they perfectly close ports A2 and B2, a directional valve with functional symbol Y is to be used, which connects in its neutral position both sides of the pilot piston (4) with tank.
The valve housing surface is phophate coated, the surfaces of the other parts are zinc coated.



Bestellangaben

VJR1-04/M □ □

Rückschlagventil - Zwischenplatte

Nenngröße

Modul - Bauweise

Dichtung

ohne Bezeichnung	Standard (NBR)
V	FPM (Viton)

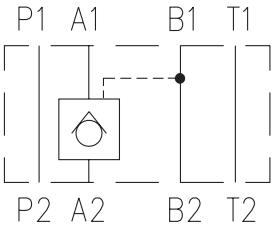
Ausführungen

A	Rückschlagventil im Kanal A
B	Rückschlagventil im Kanal B
C	Rückschlagventil in Kanälen A und B

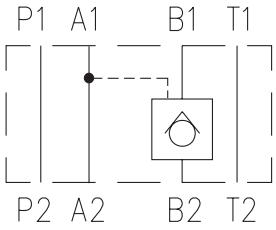
Vorzugstypen finden Sie fett markiert in den Bestellangaben und in der Tabelle auf der Seite 4

Ausführungsvarianten

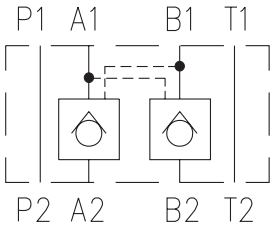
VJR1-04/MA



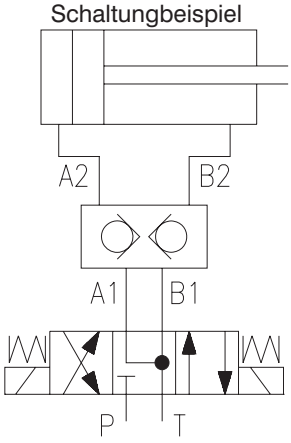
VJR1-04/MB



VJR1-04/MC



Schaltungbeispiel

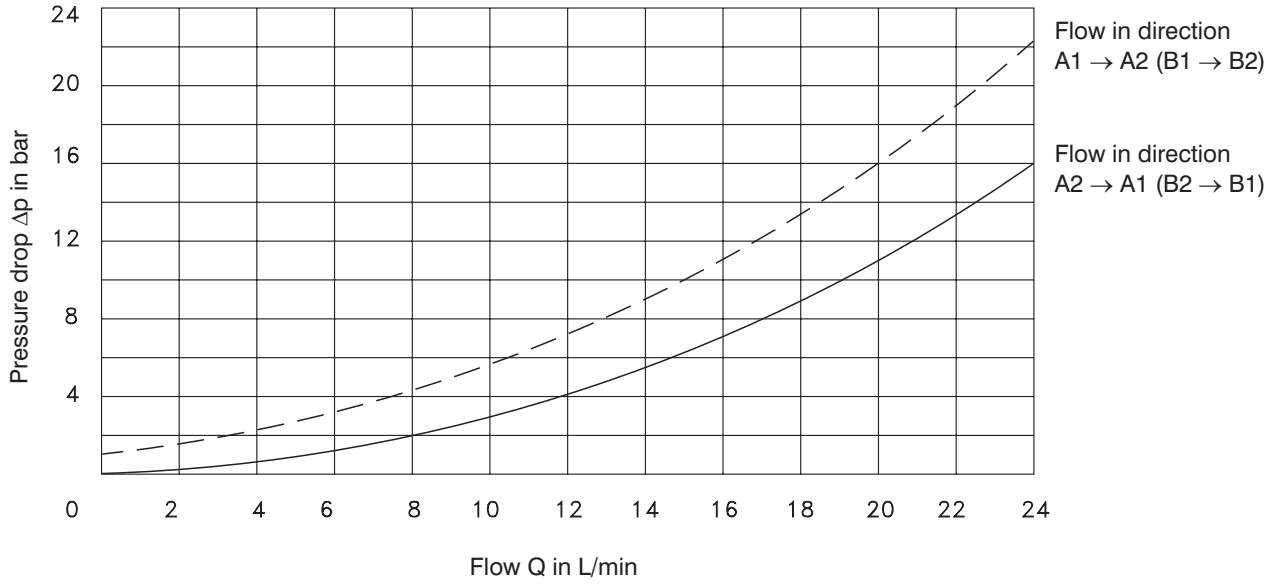


Kenngrößen

Nenngröße	mm	04
Max. Volumenstrom	l/min	20
Max. Betriebsdruck	bar	320
Öffnungsdruck	bar	1
Druckflüssigkeit		Mineralöl (HM, HV) nach DIN 51 254
Flüssigkeitstemperaturbereich (NBR)	°C	-30 ... +80
Flüssigkeitstemperaturbereich (Viton)	°C	-20 ... +80
Viskositätsbereich	mm^2/s	20 ... 400
Verschmutzungsgrad		Max. zulässiger Verschmutzungsgrad der Flüssigkeit nach ISO 4406 (1999), Klasse 21/18/15.
Flächenverhältnis Steuerkolben / Ventilsitz		3 : 1
Masse	kg	0,7
Einbaulage		beliebig

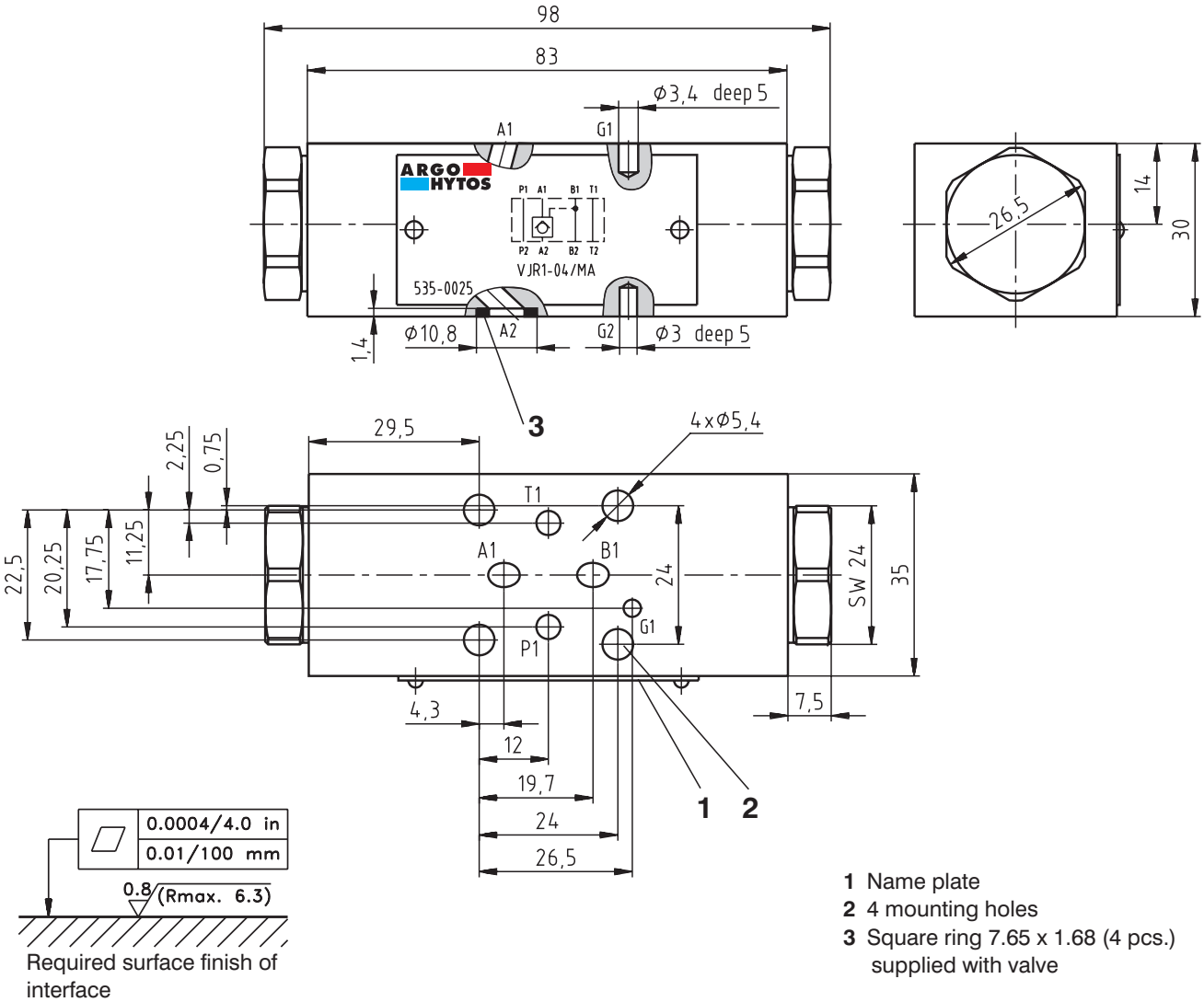
Δp-Q Characteristics

Measured at ν = 35 mm²/s and t = 40 °C



Valve Dimensions

Dimensions in millimeters



Required surface finish of interface

1 Name plate
2 4 mounting holes
3 Square ring 7.65 x 1.68 (4 pcs.) supplied with valve

Spare Parts

Seal kit

Type	Dimensions, quantity		Ordering number
	Square ring	O-ring	
Standard NBR70	7.65 x 1.68 (4 pcs.)	17 x 1.8 (2 pcs.)	535-0098
Viton	-	7.65 x 1.78 (4 pcs.)	535-0123
		17.17 x 1.78 (2 pcs.)	

Preferred Types of Valves

Type	Ordering Number
VJR1-04/MC	535-0024

Caution!

- The packing foil is recyclable.
- Mounting bolts M5 x 55 DIN 912-10.9 or studs must be ordered separately.
  Tightening torque is 5 Nm.
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law.

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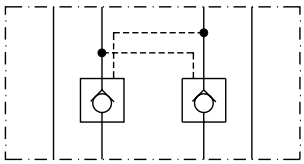
Pilot operated check valves sandwich plates

VJR2-06/M

HA 5024
8/2001

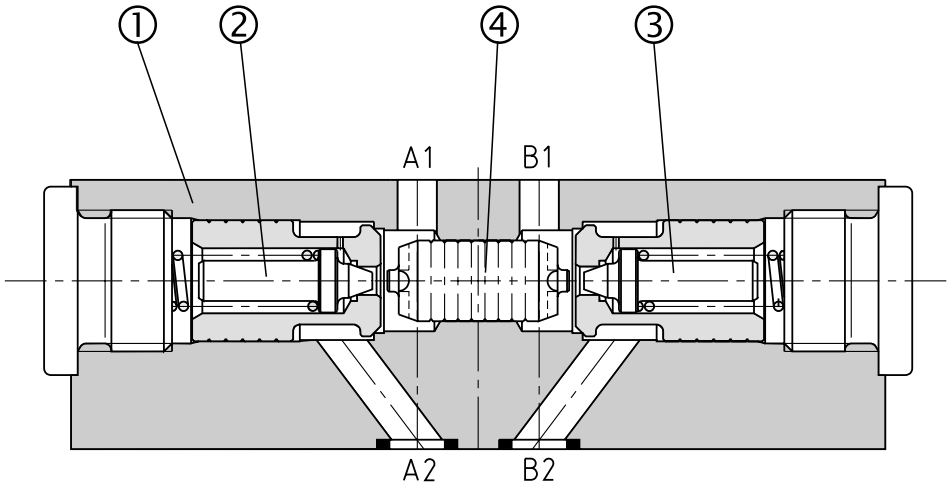
Size 06 • p_{max} up to 320 bar • Q_{max} up to 45 L/min



- **Pilot operated check valve sandwich plate for use in stacking assemblies**
- **3 models**
  - **double valve with check valves in lines A and B**
  - **single valve with check valve in line A**
  - **single valve with check valve in line B**
- **Installation dimensions to ISO 4401:1994 and DIN 24 340-A6**

Functional Description

A pilot operated check valve closes tightly the hydraulic circuit between the valve and the actuator. The valve consists of the steel housing (1), one or two check valves (2), (3) and the pilot piston (4). The main poppets of the check valves are provided with pilot poppets (5) which enable opening the check valve under pressure.
When fluid flows from A1 to A2 it opens the check valve (2) and at the same time shifts the pilot piston (4) which opens by means of the pilot poppet (5) the check valve (3). When the pressure in channels A1 and B1 drops, the springs push the poppets onto the seats and the circuit between the check valve and the actuator is closed under pressure.
To ensure that the check valves close tightly, a directional valve with functional symbol Y is to be used, which connects in its middle position the ports A1 and B1 with tank T (see the typical circuit diagram).
The valve housing (1) is phosphate coated, the surfaces of the other parts are zinc coated.



Ordering Code

VJR2-06/M □ □

Pilot operated check valve sandwich plate

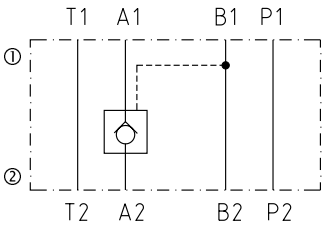
Nominal size

Modular design

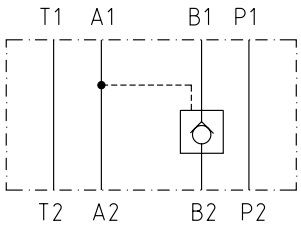
Seals	
without designation	NBR
V	Viton

Functional Symbols

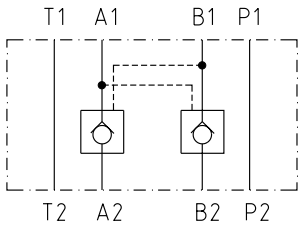
A
valve in line A



B
valve in line B

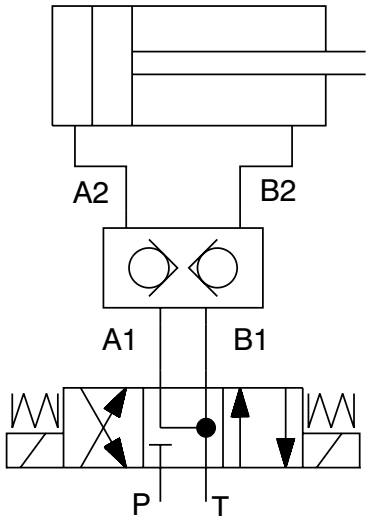


C
valves in line A and B



① valve side
② subplate side

Typical circuit with pilot operated check valve

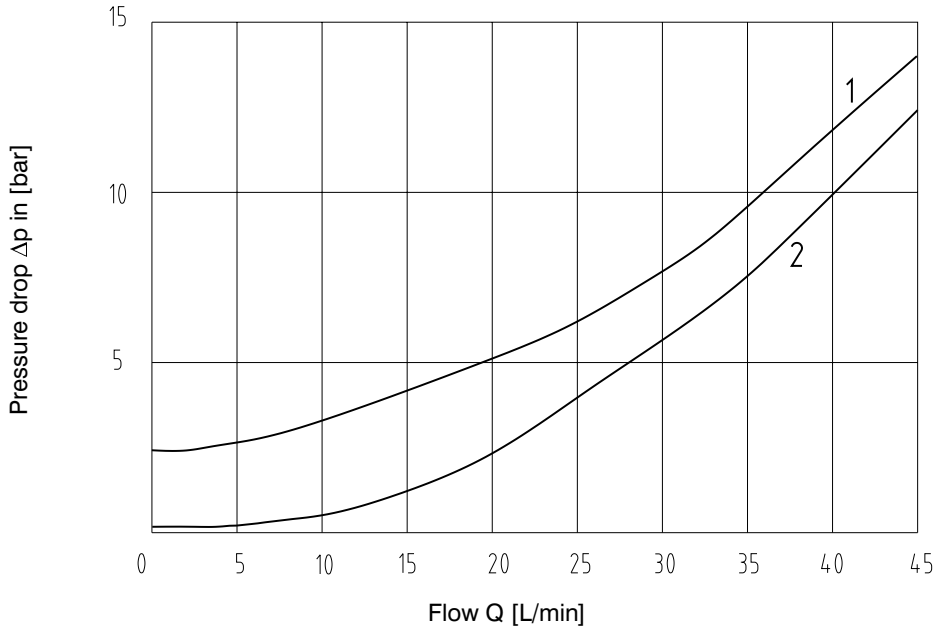


Technical Data

Nominal size	mm	06
Maximum flow	L/min	45
Maximum operating pressure	bar	320
Cracking pressure	bar	2
Hydraulic fluid		Hydraulic fluids of power classes HM, HV to CETOP RP 91H in viscosity classes ISO VG 32,46 and 68
Fluid temperature range (NBR)	°C	-30 ... +80
Fluid temperature range (Viton)	°C	-20 ... +80
Viscosity range	mm^2/s	20 ... 400
Maximum degree of fluid contamination		Class 21/18/15 to ISO 4406 (1999).
Area ration (pilot piston / seat)		8.16 : 1
Weight	kg	1.6

Δp-Q Characteristics

Measured at ν = 35 mm^2/s and t = 40 °C



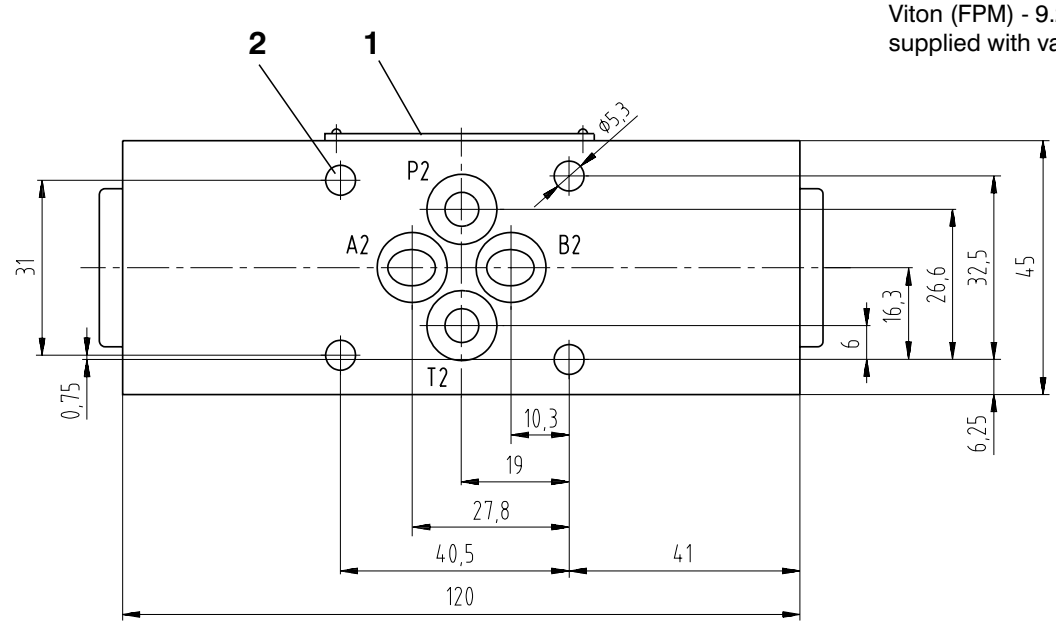
1 A1 → A2 and B1 → B2

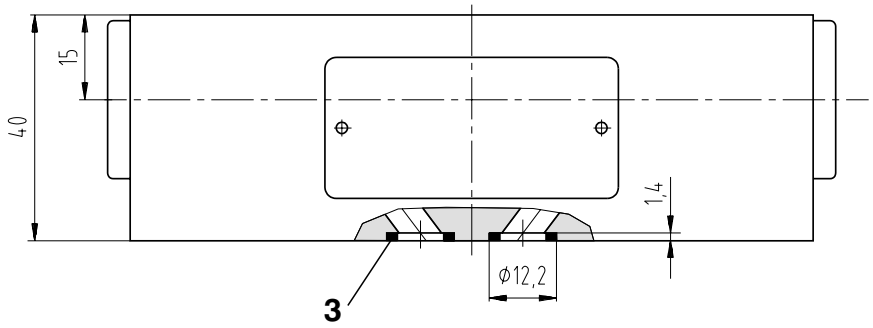
2 A2 → A1 and B2 → B1

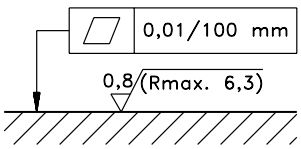
Valve Dimensions

Dimensions in millimetres

1 Name plate
2 4 mounting holes
3 Seal ring (4 pcs.):
Standard (NBR) - 9.25 x 1.68
Viton (FPM) - 9.25 x 1.78
supplied with valve







Required surface finish of interface

Spare Parts

Seal kit

Type	Dimensions, quantity		Ordering number
	Square ring	O-ring	
Standard NBR 70	9.25 x 1.68 (4 pcs.)	-	535-0045
Viton	-	9.25 x 1.78 (4 pcs.)	535-0046

Caution!

- The packing foil is recyclable.
- The protecting plate can be returned to the manufacturer.
- Tightening torque of the screws is 8.9 Nm.
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law.

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ARGO HYTOS

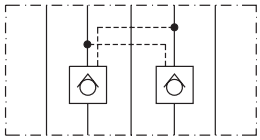
Pilot operated check valves sandwich plates

VJR2-10/M

Size 10 • p_{max} up to 350 bar • Q_{max} up to 100 L/min

HA 5025
2/2005

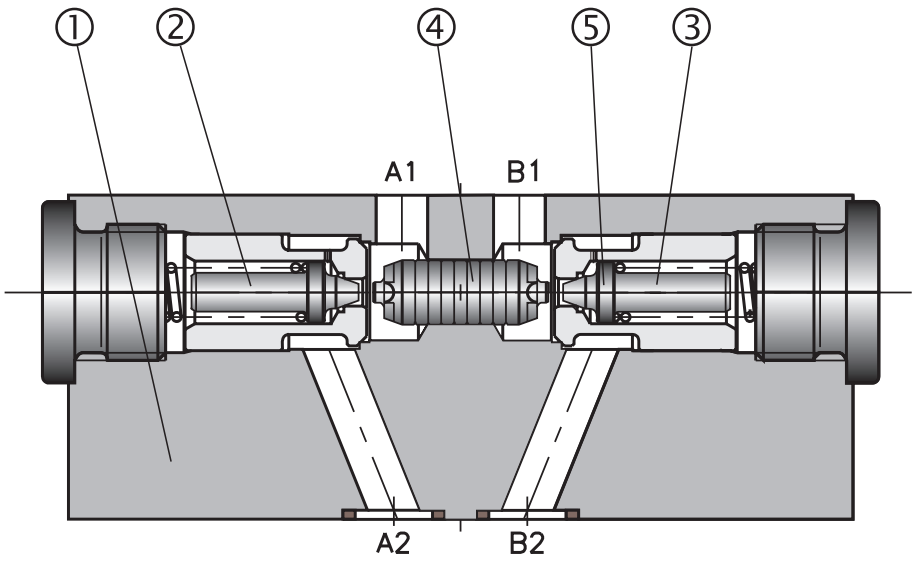
Replaces
HA 5025 1/2003



- **Pilot operated check valve sandwich plate for use in stacking assemblies**
- **3 models**
  - **double valve with check valves in lines A and B**
  - **single valve with check valve in line A**
  - **single valve with check valve in line B**
- **Installation dimensions to ISO 4401-05-04-0-94 and DIN 24 340-A10**

Functional Description

A pilot operated check valve closes tightly the hydraulic circuit between the valve and the actuator. The valve consists of the housing (1), one or two check valves (2), (3) and the pilot piston (4). The main poppets of the check valves are provided with pilot poppets (5) which enable opening the check valve under pressure.
When fluid flows from A1 to A2 it opens the check valve (2) and at the same time shifts the pilot piston (4) which opens by means of the pilot poppet (5) the check valve (3). When the pressure in channels A1 and B1 drops, the springs push the poppets onto the seats and the circuit between the check valve and the actuator is closed under pressure.
To ensure that the check valves close tightly, a directional valve with functional symbol Y is to be used, which connects in its middle position the ports A1 and B1 with tank T (see the typical circuit diagram).
The valve housing (1) is phosphate coated, the surfaces of the other parts are zinc coated.



Ordering Code

VJR2-10/M □ □

Pilot operated check valve sandwich plate

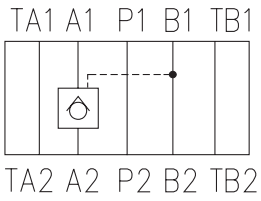
Nominal size

Modular design

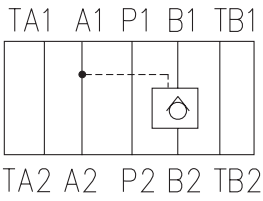
Seals	
without designation	NBR
V	Viton

Functional Symbols

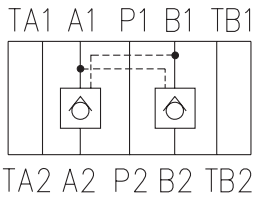
A
valve in line A



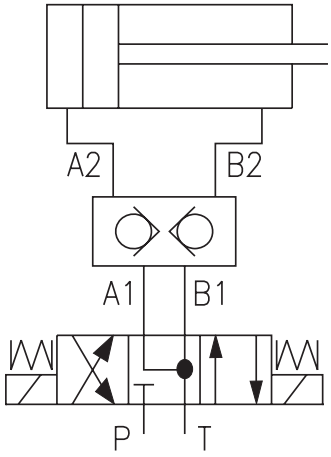
B
valve in line B



C
valves in line A and B



Typical circuit with pilot operated check valve



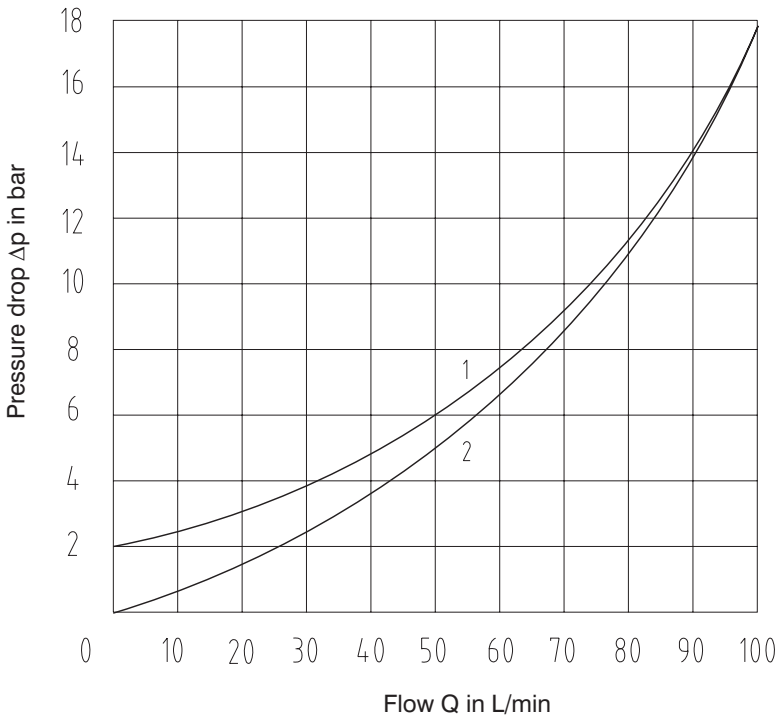
FOR PREFERRED TYPES SEE BOLD TYPING IN ORDERING CODE AND TABLE OF PREFERRED TYPES ON PAGE 4

Technical Data

Nominal size	mm	10
Maximum flow	L/min	100
Maximum operating pressure	bar	350
Cracking pressure	bar	2
Hydraulic fluid		Hydraulic fluids of power classes HM, HV to CETOP RP 91H in viscosity classes ISO VG 32,46 and 68
Fluid temperature range (NBR)	°C	-30 ... +80
Fluid temperature range (Viton)	°C	-20 ... +80
Viscosity range	mm^2/s	20 ... 400
Maximum degree of fluid contamination		Class 21/18/15 to ISO 4406 (1999).
Area ration (pilot piston / seat)		5.6 : 1
Weight	kg	3

Δp-Q Characteristics

Measured at ν = 35 mm²/s and t = 40 °C

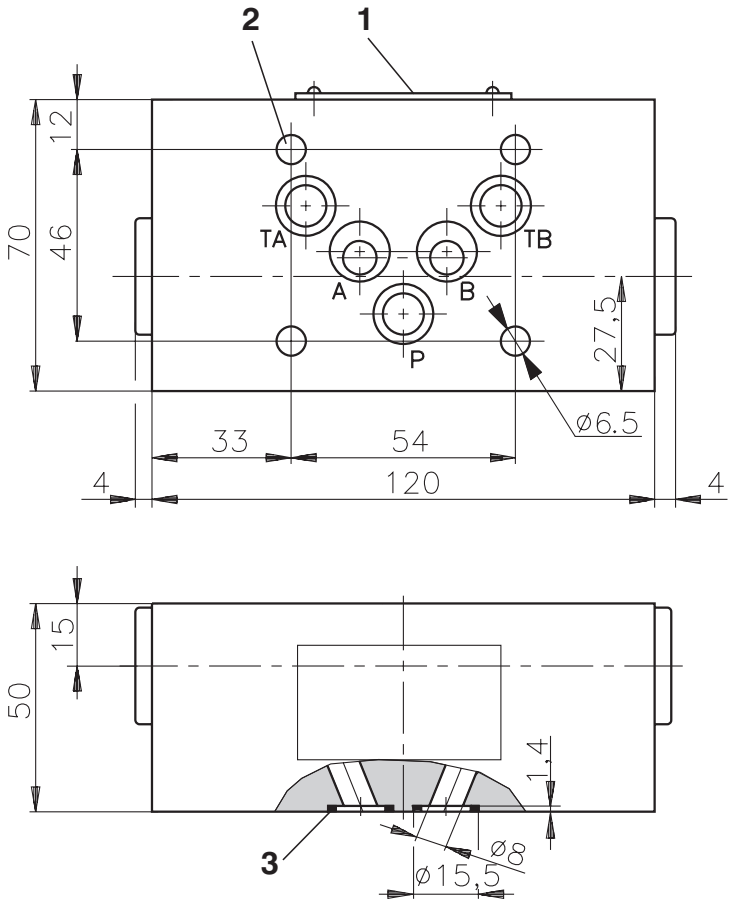


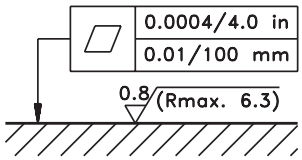
① A1 → A2 B1 → B2

② A2 → A1 B2 → B1

Valve Dimensions

Dimensions in millimeters





Required surface finish of interface

1 Name plate
2 4 mounting holes
3 Seal ring (5 pcs.):
Standard (NBR) - ring NBR 70 12.42 x 1.68
Viton (FPM) - ring 12.42 x 1.78
supplied with valve

Spare Parts

Seal kit

Type	Dimensions, quantity		Ordering number
	Square ring	O-ring	
Standard NBR 70	12.42 x 1.68 (5 pcs.)	-	535-0124
Viton	-	12.42 x 1.78 (5 pcs.)	535-0095

Preferred Types of Valves

Type	Ordering Number
VJR2-10/MC	535-0053

Caution

- The packing foil is recyclable.
- Tightening torque of the screws is 15 Nm.
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law.

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ARGO HYTOS

2-way flow control valves

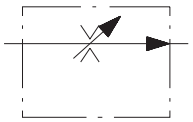
VSS1-206

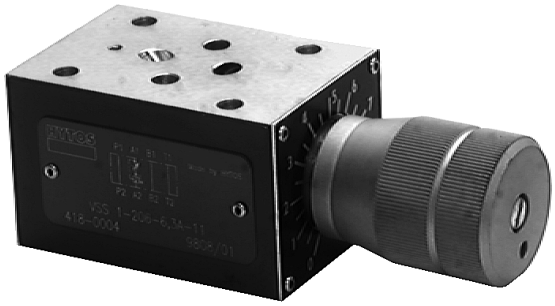
Size 06 • ...4641 PSI (320 bar) • ...5.8 US GPM (22 L/min)

HA 5032
1/2003

Replaces
HA 5032 1/2000

- **2-way pressure compensated flow control valve**
- **Sandwich plate design for use in vertical stacking assemblies**
- **For use in meter-in, meter-out or bleed-off applications**
- **Available with reverse free-flow check valve**
- **Flow rate setting with adjustment knob**
- **Installation dimensions to ISO 4401-AB-03-4-A and DIN 24 340 -A6**
- **Subplates - see catalogue HA 0002**





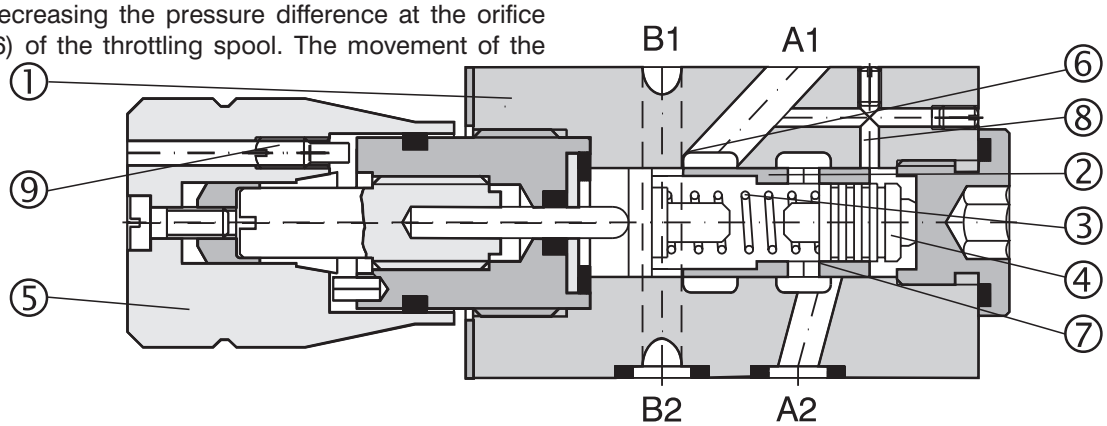
Functional Description

Pressure compensated flow control valves are designed to provide adjustable controlled flow rates independent of changes in inlet and/or outlet pressure.
2-way valves are used in meter-in, meter-out or bleed-off and or parallel applications.
The flow control valve consists basically of housing (1), throttling spool (2), spring (3), pressure compensator (4) and a hand knob (5) with adjustment mechanism.

Flow control valve VSS1-206-A
Fluid from port A1 passes through orifice area (6) of the throttling spool, proceeds through its internal bore to the orifice area (7) modulated via the metering edge of the pressure compensator (4) and onwards to port A2. The flow rate depends on the orifice area (6) and is determined by rotating the adjustment knob (5). The knob can be fixed at the adjusted position via tightening screw (9). The spring pushes both the throttling spool and the spool of the pressure compensator to their extreme positions and provided that there is no flow through the valve, holds the orifice area (7) fully open. An introduction of flow to port A1 exposes inlet pressure through bore (8) to the bottom area of the compensator spool and causes this spool to move in closing direction, thus decreasing the pressure difference at the orifice area (6) of the throttling spool. The movement of the compensator stops as soon as a new equilibrium is reached. The pressure compensator compares continuously the pressure difference at the orifice area (6) with the amount preset by the spring pretension and modulates the orifice area (6) accordingly, thus holding the flow rate constant.

Flow control valve VSS1-206-B
This type of valve functions on the same principle as the previous one, however, reverse free-flow from port A2 to port A1 is provided for by the built-in check valve.
Connection of port A1 with port P1 is ensured by cover plate or by directional valve situated at the upper face of housing (1) - see Functional symbols (vertical stacking assemblies).

Flow control valve VSS1-206-C
This valve has the same function as the valve described above, the only difference being the changed flow direction, i.e. controlled flow in direction A2 → A1 and free-flow in direction A1 → A2.
The basic surface treatment of the valve housing is phosphate coated, whereas the surface of the other parts are zinc coated.



Ordering Code

VSS1-206- □ □ □

Flow control valve

2-way design

Nominal size

Flow rate in US GPM (L/min)

Q = 1.66 (6.3)	**6.3**
Q = 3.17 (12)	**12**
Q = 5.81 (22)	**22**

Seals

without designation	NBR
V	Viton

Model

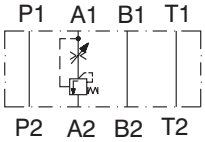
A-02	for subplate mounting - without check valve
A-11	sandwich plate design - without check valve
B-11	sandwich plate design - with check valve, meter-in mode
C-11	sandwich plate design - with check valve, meter-out mode

FOR PREFERRED TYPES SEE BOLD TYPING IN ORDERING CODE AND TABLE OF PREFERRED TYPES ON PAGE 6

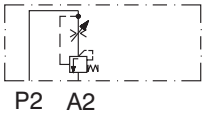
Functional Symbols

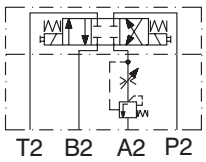
A - without check valve

Model A-11



Model A-02

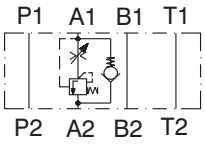


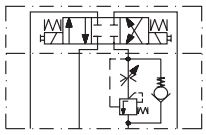


Typical application of the valve in stacking assembly *

B - with check valve, meter-in mode

Model B-11

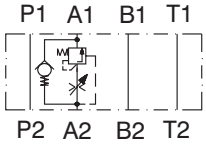


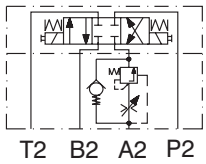


Typical application of the valve in stacking assembly *

C - with check valve, meter-out mode

Model C-11





Typical application of the valve in stacking assembly *

* Directional valve must be ordered separately.

Technical Data

Nominal size	mm	06		
Maximum flow rate	US GPM (L/min)	1.66 (6.3)	3.17 (12)	5.81 (22)
Minimum flow rate	cu.in./min (cm^3/min)	3.66 (60)		
Max. operating pressure	PSI (bar)	4641 (320)		
Minimum pressure drop	PSI (bar)	see performance curves		
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP RP 91 H in viscosity classes ISO VG 32, 46 and 68		
Fluid temperature range (NBR / Viton)	°F (°C)	-22 ... +176 (-30 ... +80) / -4 ... +176 (-20 ... +80)		
Viscosity range	SUS (mm^2/s)	98 ... 1840 (20 ... 400)		
Maximum degree of fluid contamination for Q ≤ 0.26 US GPM (1 L/min) for Q > 0.26 US GPM (1 L/min)		Class 20/17/14 according to ISO 4406 (1999). Class 21/18/15 according to ISO 4406 (1999).		
Weight	lbs (kg)	1.8 (0.8)		
Mounting position		optional		

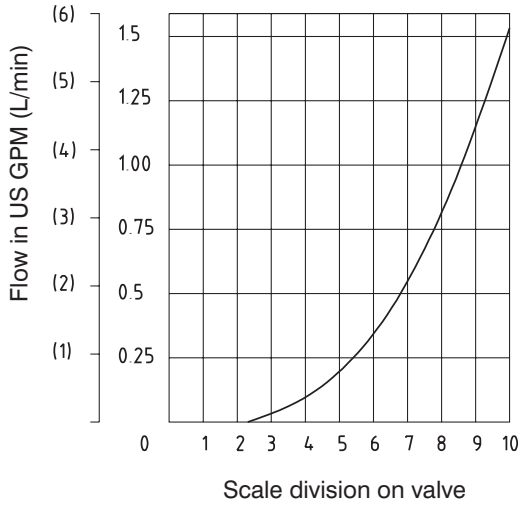
p-Q Characteristics

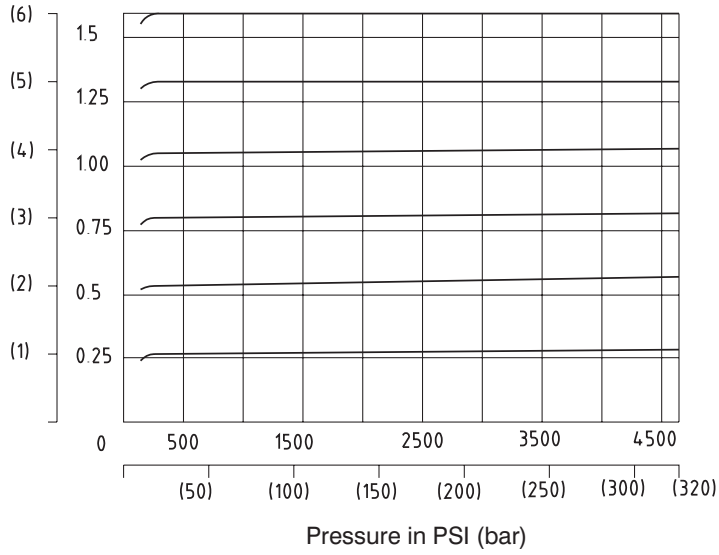
Measured at ν = 166 SUS (35 mm^2/s) and t = 104 °F (40 °C)

Flow rate dependent upon scale adjustment setting (flow control P → A)

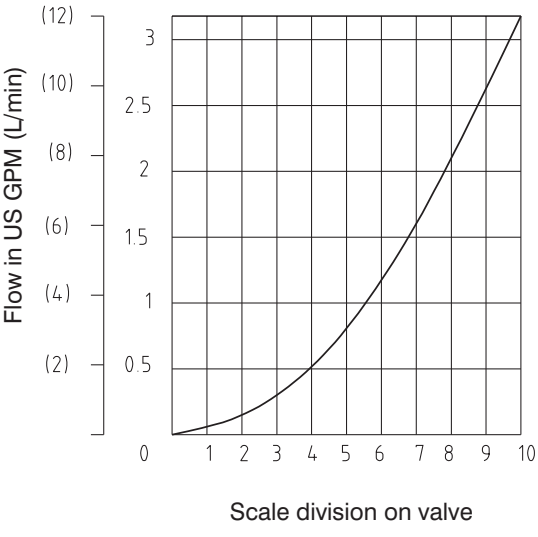
Flow rate dependent upon pressure

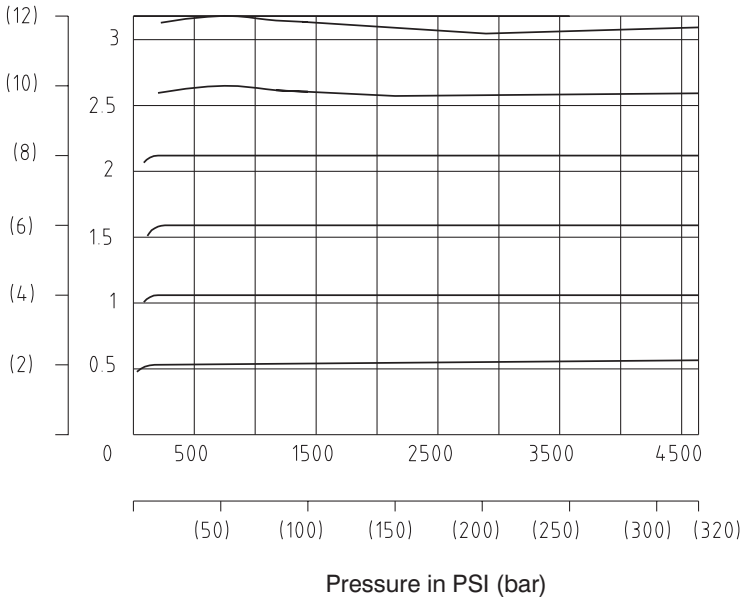
Model
VSS1-206-6.3x-xx





Model
VSS1-206-12x-xx





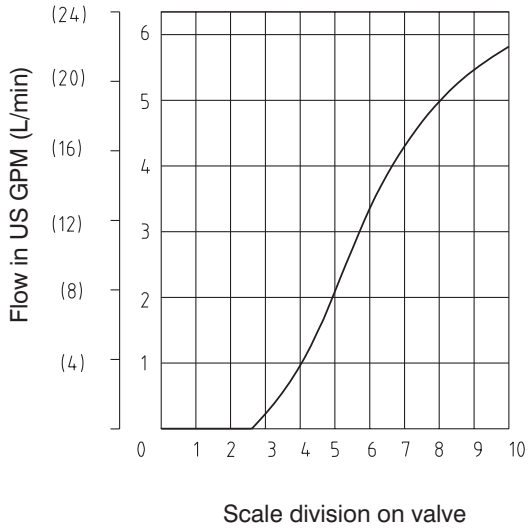
p-Q Characteristics

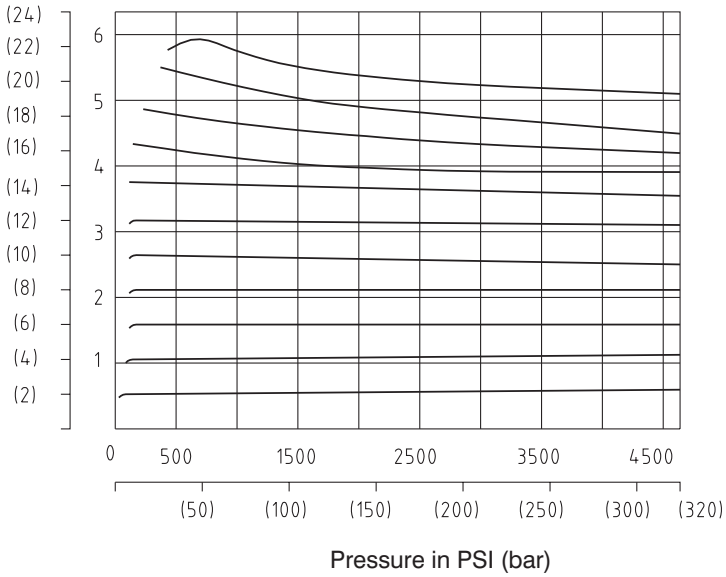
Measured at ν = 166 SUS (35 mm^2/s) and t = 104 °F (40 °C)

Flow rate dependent upon scale adjustment setting (flow control P → A)

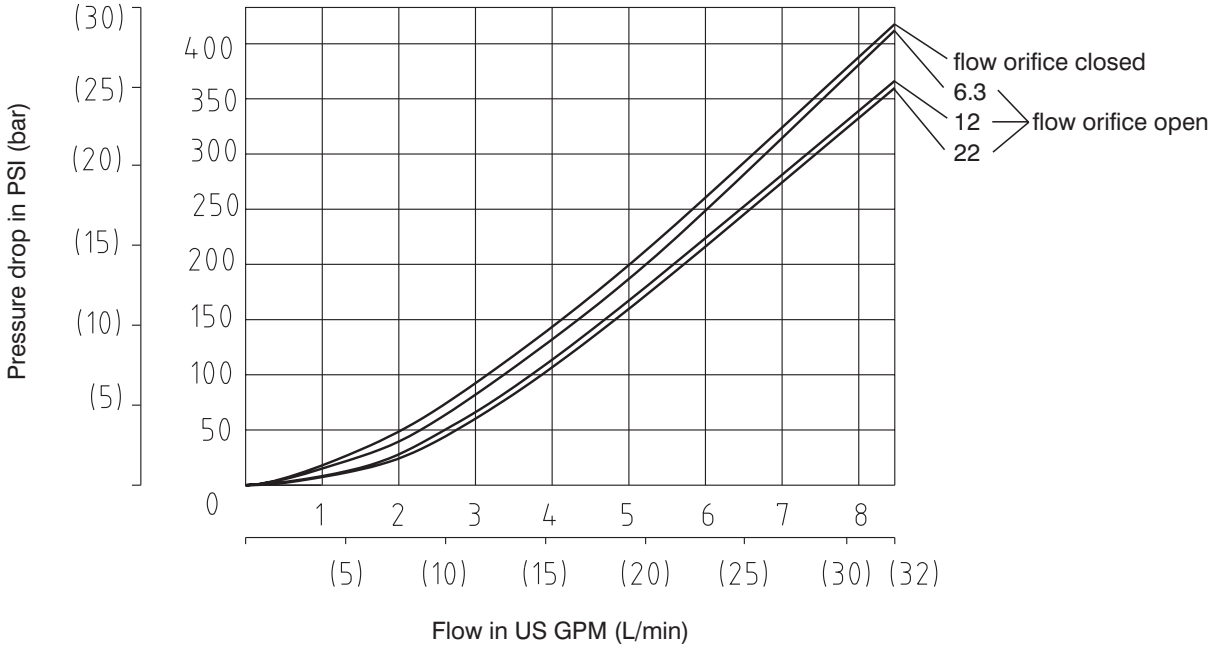
Flow rate dependent upon pressure

Model
VSS1-206-22x-xx





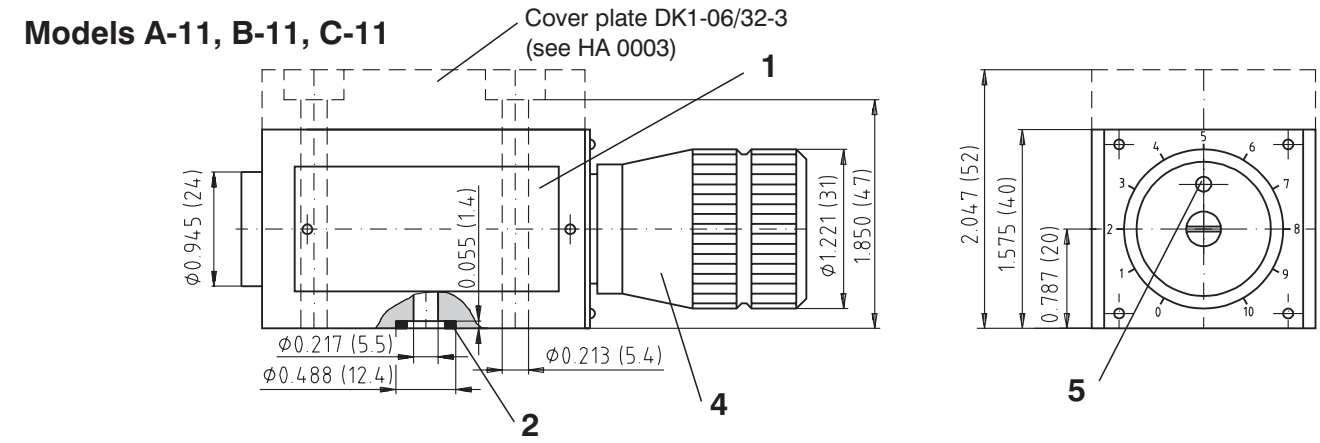
Presssure drop across check valve during reverse flow (A → P)

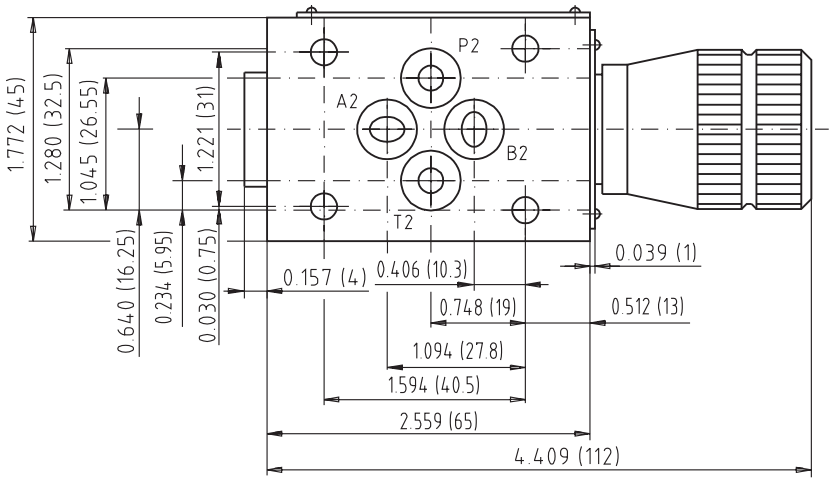


Valve Dimensions

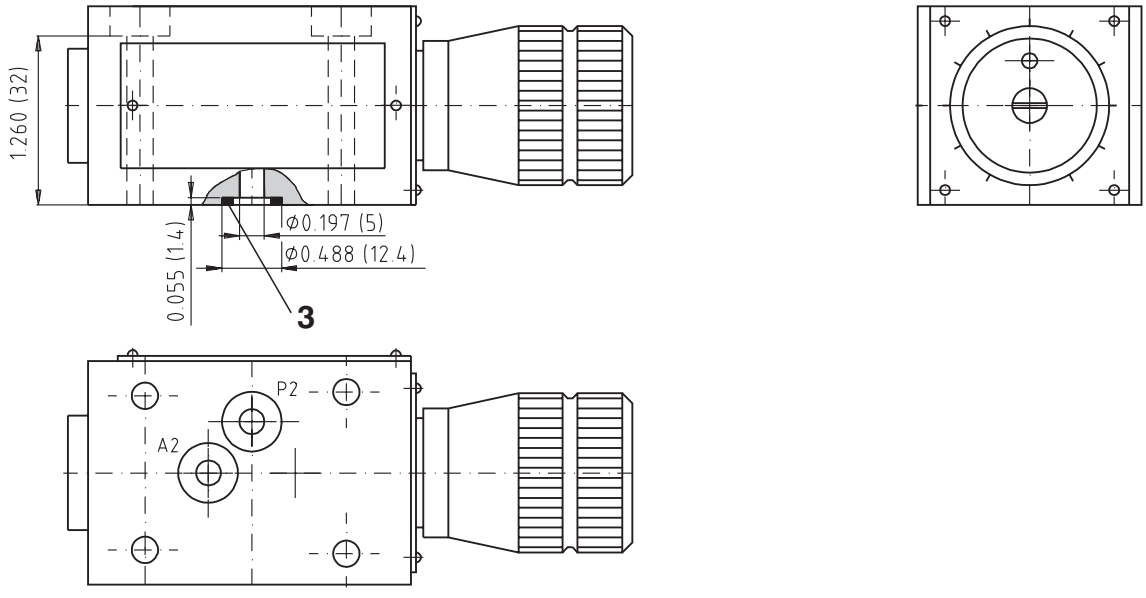
Dimensions in inches and millimetres (in brackets)

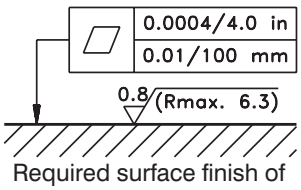
Models A-11, B-11, C-11





Models A-02





Required surface finish of interface

1 Name plate
2 O-rings, Type Square ring 012
(9.25x1.68) (4pcs.) or compatible supplied in delivery packet
3 O-rings,Type Square ring 012
(9.25x1.68) (2pcs.) or compatible supplied in delivery packet
4 Adjustment mechanism:
clockwise rotation - flow decrease
counter-clockwise rotation - flow incraese
5 Hole with set screw for fixing the handknob in set position

Spare Parts

Seal kit

Type	Dimensions, quantity		Ordering number
	O-ring	Square ring	
Standard NBR	24/20 (1 pc.)	9.25 x 1.68 (4 pcs.)	418-9900
	8/4 1078 NBR80 (1 pc.)	-	
	16 x 2 (1 pc.)	-	
	14 x 2 (1 pc.)	-	
	10/6 (1 pc.)	-	
Viton	19.3 x 2.4 (1 pc.)	-	418-9800
	3 x 2.4 (1 pc.)	-	
	16 x 2 (1 pc.)	-	
	9.25 x 1.78 (4 pcs.)	-	
	14 x 2 (1 pc.)	-	
	5.3 x 2.4 (1 pc.)	-	

Preferred Types of Valves

Type	Ordering Number	Type	Ordering Number
VSS1-206-6,3A-11	418-0004	VSS1-206-12B-11	418-0032
VSS1-206-6,3B-11	418-0028	VSS1-206-22A-11	418-0012
VSS1-206-12A-11	418-0008	VSS1-206-22B-11	418-0036

Caution!

- The packing foil is recyclable.
- The transport plate is to be returned to the supplier.
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law.

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ARGO HYTOS

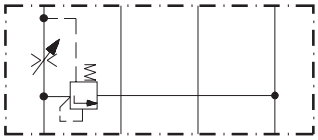
3-way flow control valves

VSS1-306

Size 06 • ...4641 PSI (320 bar) • ...4.2 US GPM (16 L/min)

HA 5033
1/2003

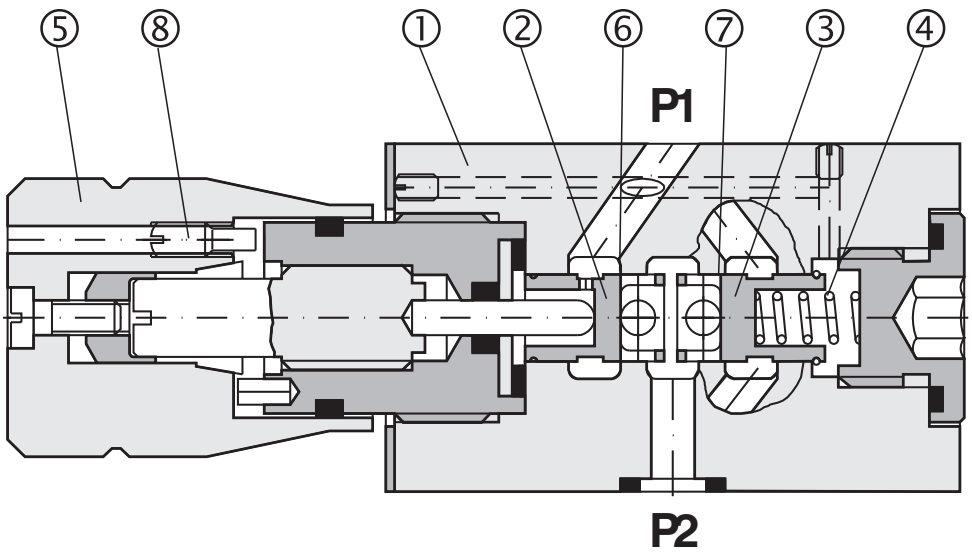
Replaces
HA 5033 1/2000



- **Sandwich plate design for use in vertical stacking assemblies**
- **Flow rate setting with adjustment knob**
- **Installation dimensions to ISO 4401-03-02-0-94 and DIN 24 340-A6**
- **Subplates - see Data Sheet HA 0002**

Functional Description

3-way pressure compensated flow control valves are designed to provide adjustable controlled flow rates independent of changes in system pressure.
The flow control valve consists basically of housing (1), throttling spool (2), pressure compensator (3), spring (4) and hand knob (5) with adjustment mechanism.
Fluid from port P2 is divided into two parts, one part of flow passes through orifice area (6) of the throttling spool and onwards through bore P to port P1, the other part proceeds through orifice area (7) of the compensator to port T. The flow rate depends on the orifice area (6) and is determined by rotating the adjustment knob (5). The knob can be fixed at the set position via adjustment screw (8). The compensator compares continuously the pressure difference at the orifice area (6) with the amount preset by the spring pretension and modulates accordingly the orifice area (7) of the compensator which relieves the excessive flow to tank, thus holding the flow rate constant.
The valve housing is phosphate coated, the surfaces of the other parts are zinc coated.



Ordering Code

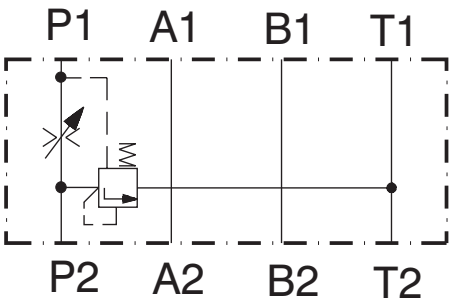
VSS1-306-16-11 ☐

- **Flow control valves**
- **3-way design**
- **Valve size**
- **Flow rate**
  Q = 4,2 US GPM (16 L/min)
- **Sandwich plate design without cover plate**
- **Seal**
  omit NBR
  V FPM (Viton)

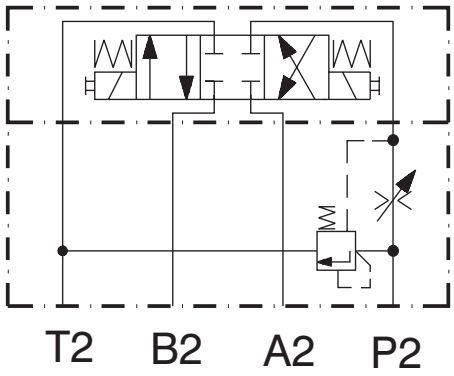
FOR PREFERRED TYPES SEE BOLD TYPING IN ORDERING CODE AND TABLE OF PREFERRED TYPES ON PAGE 3

Functional Symbols

Functional symbol of the valve



Typical application of the valve in stacking assembly*



*Directional valve must be ordered separately

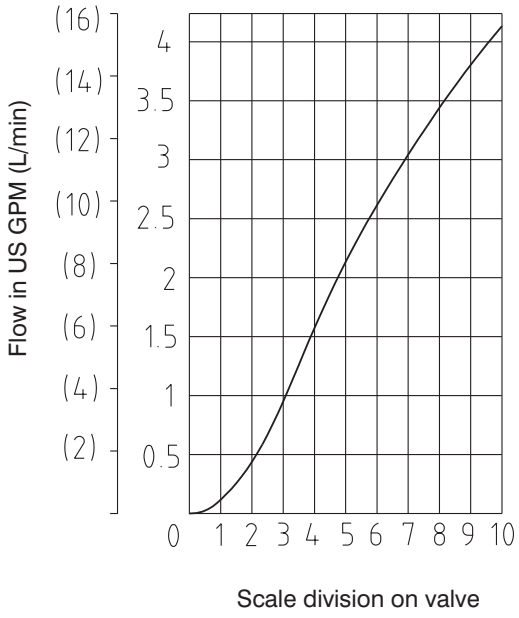
Technical Data

Valve size	mm	06
Maximum flow	US GPM (L/min)	4.2 (16)
Minimum flow	cu.in./min (cm^3/min)	3.66 (60)
Maximum operating pressure	PSI (bar)	4641 (320)
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP RP 91H in viscosity classes ISO VG 32, 46 and 68
Fluid temperature range for standard sealing (NBR)	°F (°C)	-22 ... +176 (-30 ... +80)
Fluid temperature range for Viton seals (FPM)	°F (°C)	-4 ... +176 (-20 ... +80)
Viscosity range	SUS (mm^2/s)	98 ... 1840 (20 ... 400)
Maximum degree of fluid contamination		Class 21/18/15 to ISO 4406 (1999).
Permissible flow rate variation at pressure change 6 ... 100%	%	± 10
Weight	lbs (kg)	1.8 (0.8)
Mounting position		optional

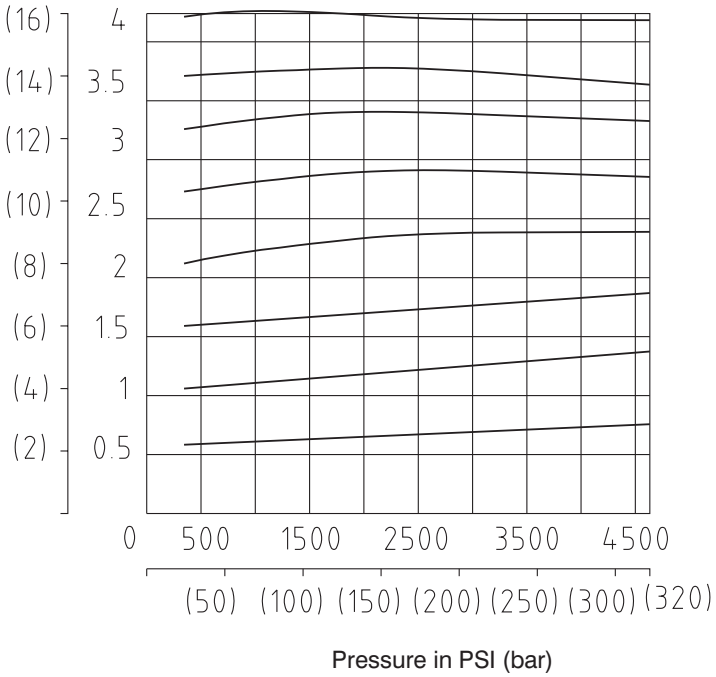
Characteristics

Measured at ν = 166 SUS (35 mm^2/s) and t = 104 °F (40 °C)

Flow rate dependent upon scale adjustment setting



Flow rate dependent upon pressure



Spare Parts

Seal kit

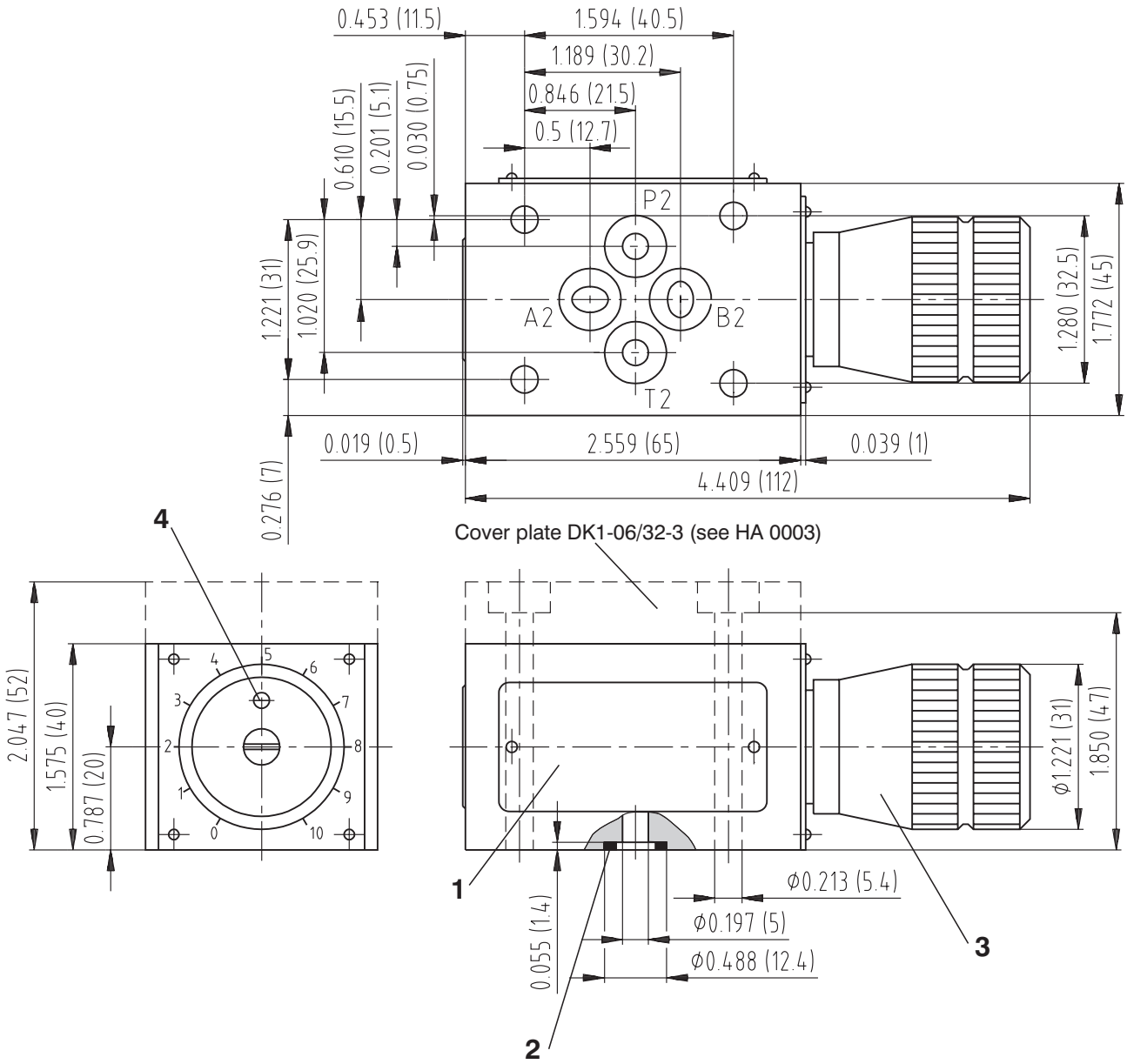
Type	Dimensions, quantity O-ring	Ordering number
Standard NBR	24/20 (1pc.)	417-9900
	8/4 1078 NBR80 (1 pc.)	
	16 x 2 (1 pc.)	
	8 x 2 (4 pcs.)	
	14 x 2 (1 pc.)	
Viton	19.3 x 2.4 (1 pc.)	417-9800
	3 x 2.4 (1 pc.)	
	16 x 2 (1 pc.)	
	9.25 x 1.78 (4 pcs.)	
	14 x 2 (1 pc.)	

Preferred Types of Valves

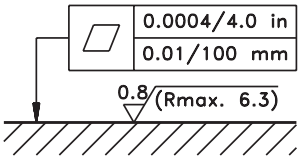
Type	Ordering Number
VSS1-306-16-11	417-0004

Valve Dimensions

Dimensions in inches and millimeters (in brackets)



1 Name plate
2 O-ring 8 x 2 (4 pcs.), supplied with valve
3 Adjustment mechanism: clockwise rotation=flow decrease
counter-clockwise rotation=flow increase
4 Hole with set screw for fixing the handknob in set position



Required surface finish of interface

Caution!

- The packing foil is recyclable.
- The transport plate is to be returned to the supplier.
- Mounting bolts M5x60 or assembly studs (4 pcs.) must be ordered separately. Tightening torque 6.6 ft-lbs (8.9 Nm).
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law.

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ARGO HYTOS

2-way flow control valves

VSS2-206

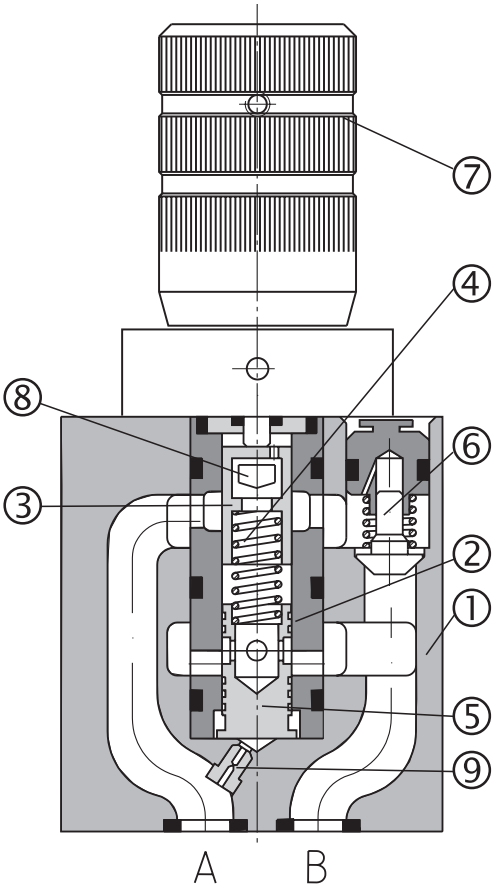
Size 06 • ...4641 PSI (320 bar) • ...8.5 US GPM (32 L/min)

HA 5041
1/2003

Replaces
HA 5041 1/2000

- **2-way pressure compensated flow control valve with integral reverse check valve**
- **Subplate mounting**
- **Flow rate setting:**
  - with adjustment knob
  - with adjustment knob and keylock
- **For use in meter-in, meter-out or bleed-off applications**
- **External pilot closing of pressure compensator**
- **Installation dimensions to ISO 4401-03-02-0-94 and DIN 24 340-A6**
- **Subplates - see catalogue HA 0002**

Functional Description

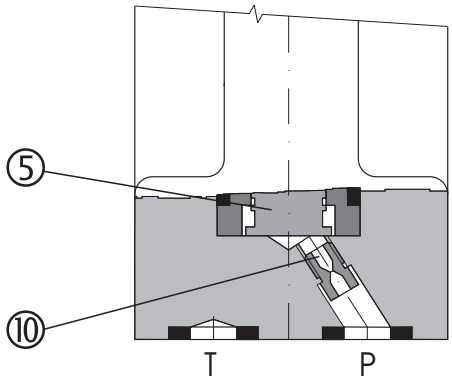


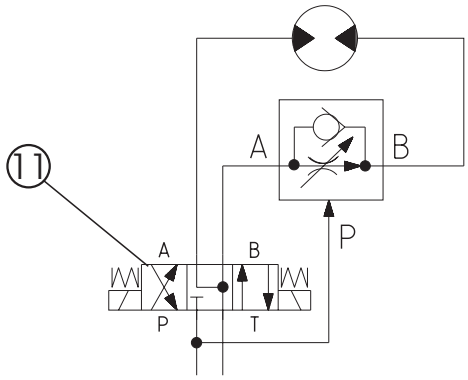
Pressure compensated flow control valves VSS2-062 are designed to provide adjustable controlled flow rates independent of changes in pressure and temperature.
They consist basically of housing (1), sleeve (2), throttling spool (3), spring (4), pressure compensator (5) and hand knob (7) with the respective setting mechanism.
The valve housing is phosphate coated.

Flow control valve VSS2-062-xxQ/Jx0-1
(without external pilot closing of pressure compensator)
Flow throttling in direction A → B takes place at the throttling area (8) which can be adjusted by hand knob (7). To ensure the flow rate stability in port B, a pressure compensator (5) is located behind the throttling area (8).
The spring (4) pushes both the throttling spool (3) and the pressure compensator (5) into their extreme positions, and provided that there is no flow through the valve, holds the pressure compensator open.
An introduction of flow to port A exposes inlet pressure through orifice (9) to the bottom area of the compensator spool and causes this spool to move in closing direction, thus decreasing the pressure difference at the throttling area (8). The movement of the compensator spool stops as a new equilibrium is reached. The pressure compensator compares continuously the pressure difference at the throttling area (8) with the amount preset by the spring preloading and accomplishes the required control, thus holding the flow rate constant.

Flow control valve VSS2-206-x/JxA-1
(with external pilot closing of pressure compensator)

This model functions on the same principle as the previous one. However, with this type of valve, the bottom surface area of the compensator is connected to an external port P via orifice (10), rather then being internally connected to port A. This arrangement enables external pilot closing of pressure compensator, which function can be described using the circuit diagram shown.
When there is no flow through the valve (directional valve (11) in its middle position), pressure in port P acts at the bottom area of the compensator via orifice (10) and holds the compensator in its upper closed position. When the directional valve is shifted to its left position, the port A is connected to the system pressure, but the closed compensator avoids abrupt flow increase in port B. Hence, lunge of the actuator during start-up is prevented. The function of the compensator is the same, as the function described above.
This model with external pilot closing of the compensator can only be used in meter-in circuits.
Reverse free-flow from port B to port A, with both types of the flow control valves, is provided for by a built-in check valve (6).





Ordering Code

VSS2-206- ☐ **/J** ☐ ☐ **-1** ☐

Flow control valves

2-way design

Nominal size

Max. flow rate in US GPM (L/min)

0.42 (1.6)	1,6Q
0.85 (3.2)	3,2Q
1.66 (6.3)	**06Q**
4.23 (16)	**16Q**
8.45 (32)	**32Q**

Built-in check valve

Seals

without designation	NBR
V	FPM (Viton)

Design

Variant

A	with external pilot closing of the pressure compensator
O	without external pilot closing of the pressure compensator

Adjustment

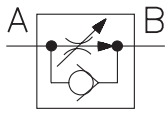
Z	hand knob with keylock
O	hand knob without keylock

FOR PREFERRED TYPES SEE BOLD TYPING IN ORDERING CODE AND TABLE OF PREFERRED TYPES ON PAGE 3

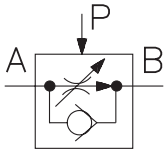
Functional Symbols

Flow control valve: simplified

without external pilot

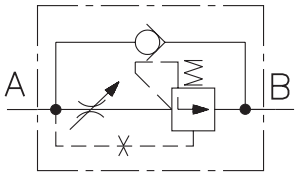


with external pilot

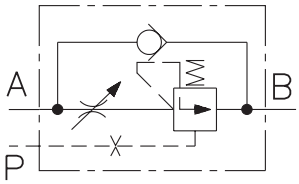


Flow control valve: detailed

without external pilot



with external pilot



Technical Data

Nominal size	mm	06				
Maximum flow	US GPM (L/min)	0.42 (1.6)	0.85 (3.2)	1.66 (6.3)	4.23 (16)	8.45 (32)
Minimum flow	cu.in./min (cm^3/min)	0.92 (15)	1.22 (20)	1.53 (25)	3.67 (60)	15.30 (250)
Maximum working pressure at port A	PSI (bar)	4641 (320)				
Maximum working pressure at port B	PSI (bar)	4641 (320)				
Pressure drop	PSI (bar)	123 ... 203 (8.5 ... 14)				
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP RP 91H in viscosity classes ISO VG 32, 46 and 68				
Fluid temperature range for standard sealing (NBR)	°F (°C)	-22 ... +176 (-30 ... +80)				
Fluid temperature range for Viton seals (FPM)	°F (°C)	-4 ... +176 (-20 ... +80)				
Viscosity range	SUS (mm^2/s)	98 ... 1840 (20 ... 400)				
Maximum degree of fluid contamination - for Q ≤ 0.26 US GPM (L/min) - for Q > 0.26 US GPM (L/min)		Class 20/17/14 to ISO 4406 (1999). Class 21/18/15 to ISO 4406 (1999).				
Permissible flow rate variation for Q > 2.5 Q_{min} at pressure change 6 to 100%	%	± 5				
Weight	lbs (kg)	2.418 (1.1)				
Mounting position		optional				

Spare Parts

Seal kit

Type	Dimensions, quantity			Ordering number
	O-ring	Square ring	Back-up ring	
Standard NBR	15 x 1.8 NBR70 (4 pcs.)	9.25 x 1.68 NBR70 (4 pcs.)	3.56 x 6.26 x 1.14 (1 pc.)	521-0021
	9 x 1.8 NBR70 (1 pc.)	-	8.31 x 11.01 x 1.14 (2 pcs.)	
	4 x 1.75 (1 pc.)	-	13.16 x 15.86 x 1.14 (1 pc.)	
	12.42 x 1.78 (1 pc.)	-	14.73 x 17.43 x 1.14 (1 pc.)	
Viton	15 x 1.8 (4 pcs.)	-	3.56 x 6.26 x 1.14 (1 pc.)	521-0032
	9.25 x 1.78 90SH FPM SW (4 pcs.)	-	8.31 x 11.01 x 1.14 (2 pcs.)	
	4 x 1.75 (1 pc.)	-	13.16 x 15.86 x 1.14 (1 pc.)	
	12.42 x 1.78 (1 pc.)	-	14.73 x 17.43 x 1.14 (1 pc.)	
	9.25 x 1.78 FPM70 (1 pc.)	-	-	

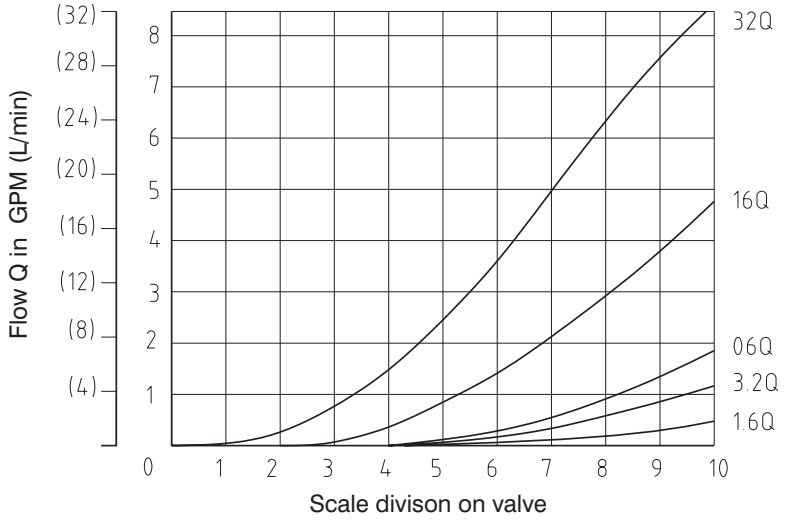
Preferred Types of Valves

Type	Ordering Number
VSS2-206-06Q/JZO-1	521-0003
VSS2-206-16Q/JZO-1	521-0004
VSS2-206-32Q/JZO-1	521-0005

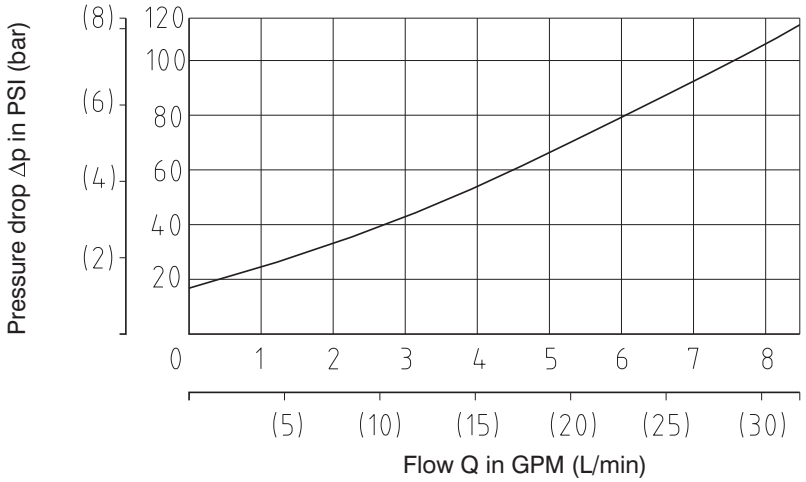
p-Q Characteristics

Measured at ν = 166 SUS (35 mm^2/s) and t = 104 °F (40 °C)

Flow rate A → B dependent upon scale adjustment setting

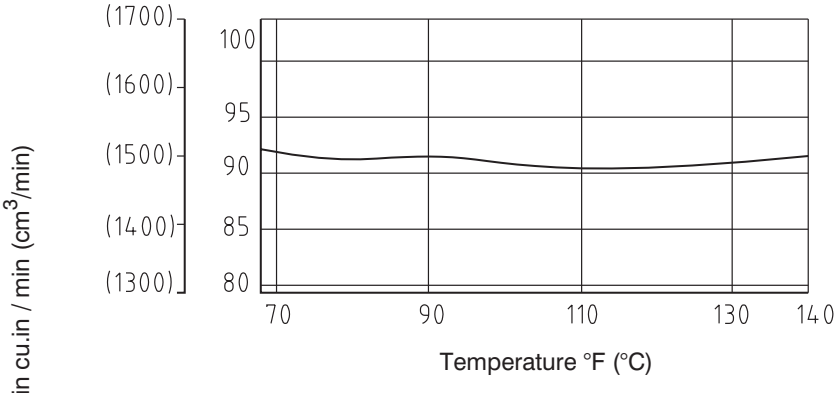


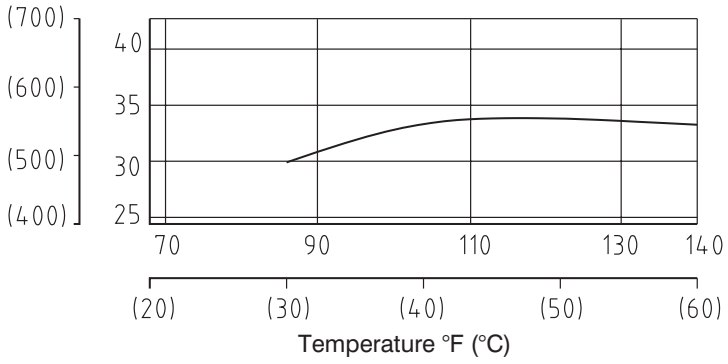
Check Valve Characteristic Δp = f (Q)



Flow direction (B → A)
Throttling area closed

Dependency Flow-Temperature

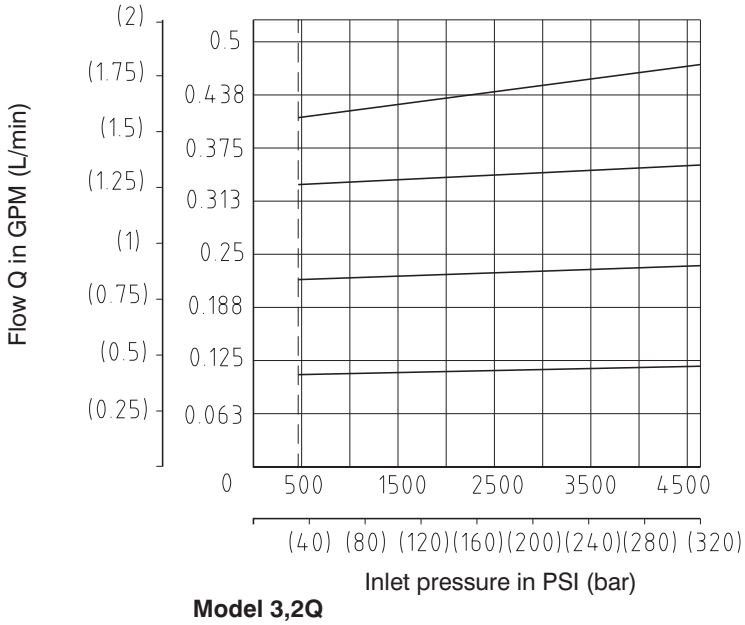




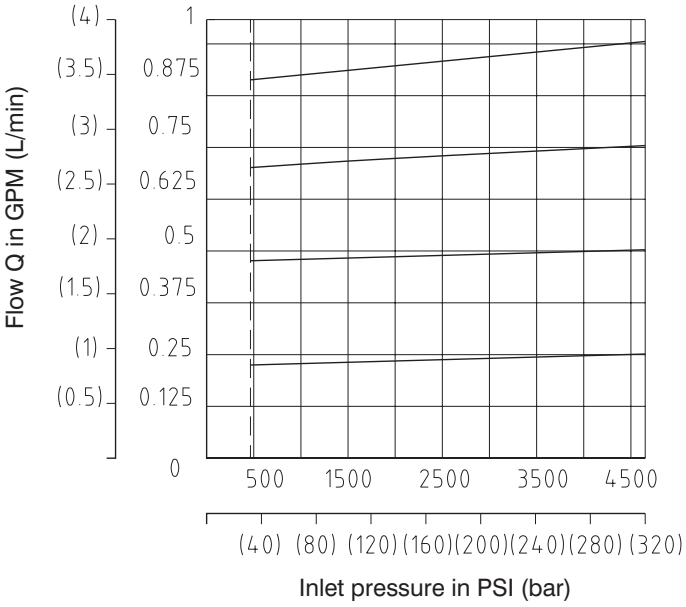
Characteristics Q = f(p)

Flow rate dependent upon pressure

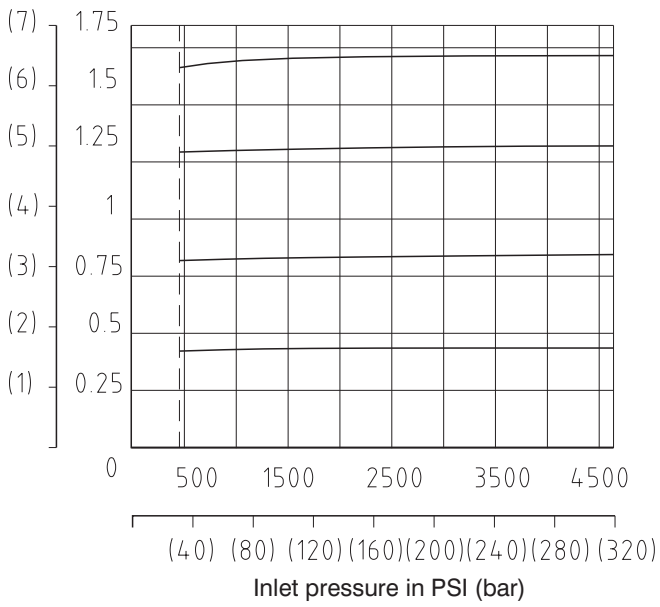
Model 1,6Q



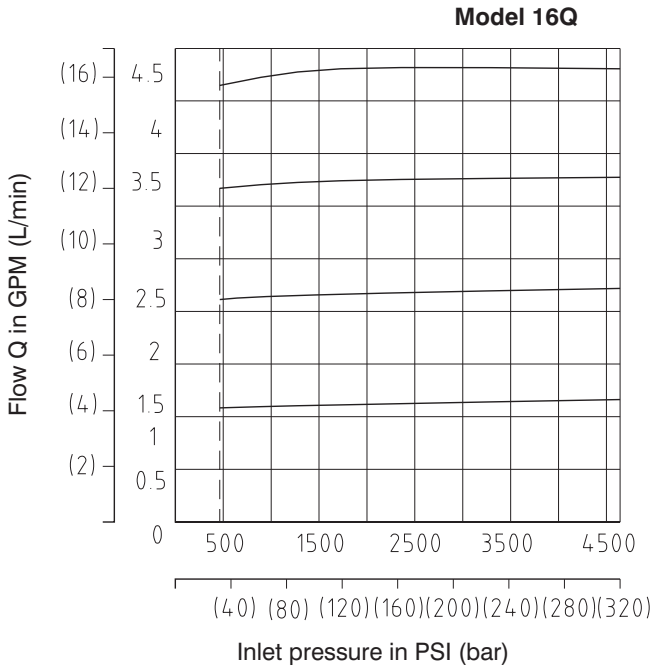
Model 3,2Q



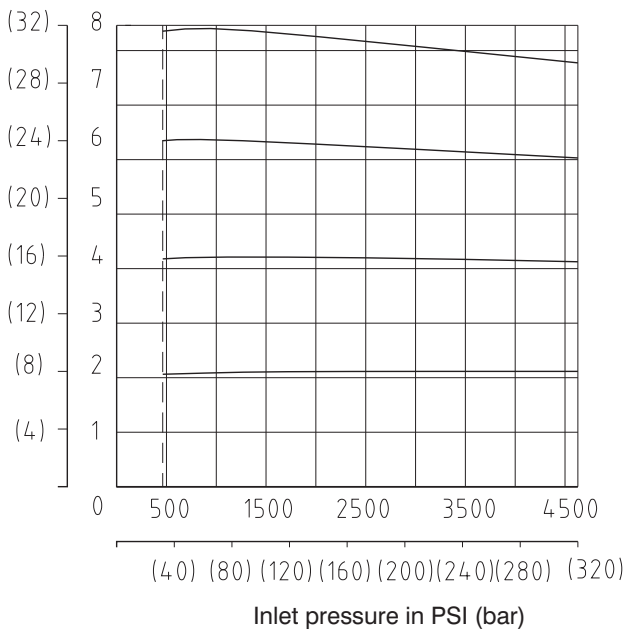
Model 06Q



Model 16Q



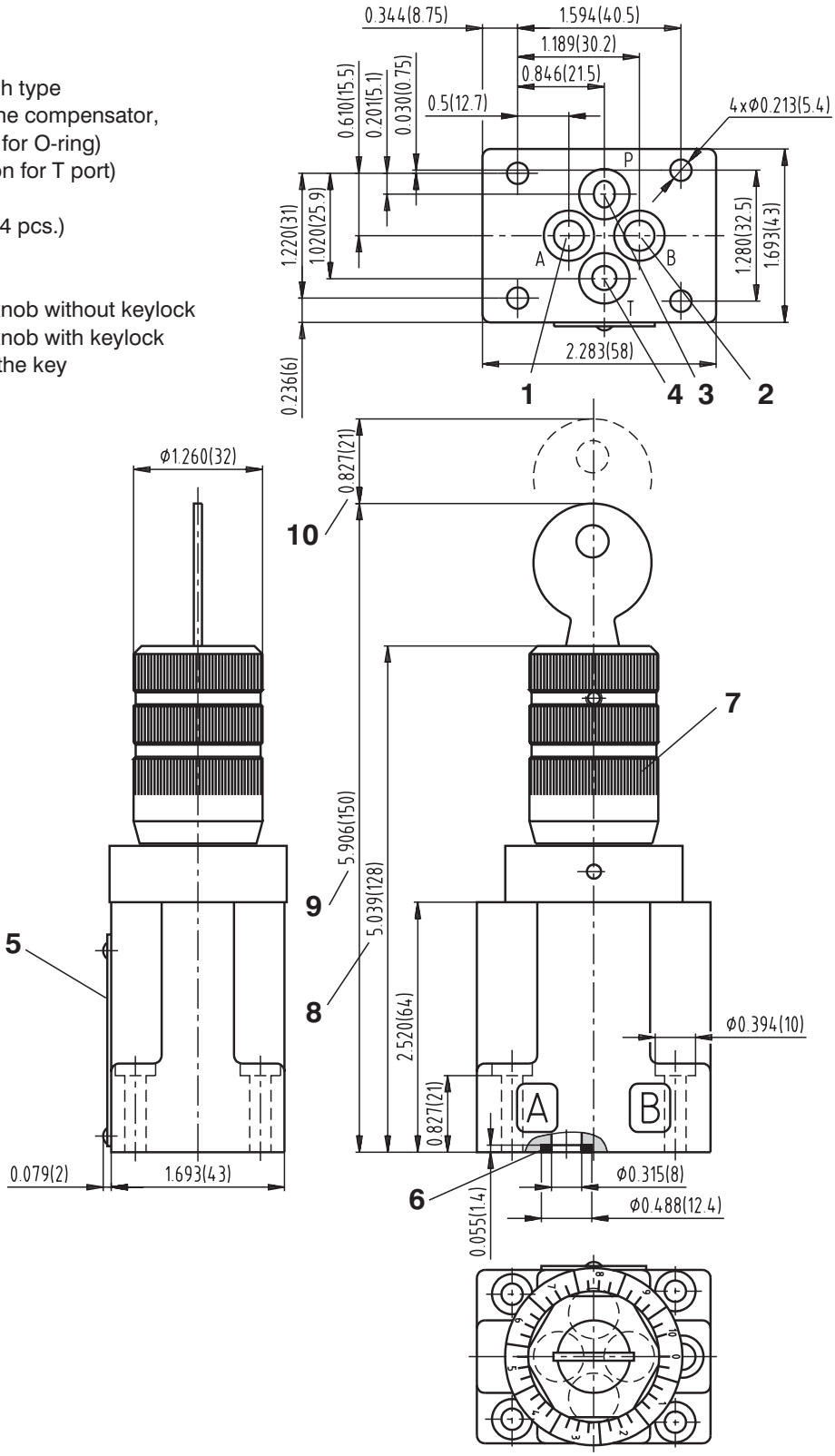
Model 32Q

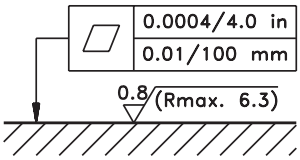


Valve Dimensions

Dimensions in inches and millimeters (in brackets)

1 Port A (inlet)
2 Port B (outlet)
3 Port P(hole ∅5.2 mm solely with type permitting external closing of the compensator, otherwise just the counterbore for O-ring)
4 Counterbore for O-ring (position for T port)
5 Name plate
6 Square ring 012 - KANTSEAL (4 pcs.) (9.25x1.68 NBR70)
7 Flow adjustment knob
8 Height of the valve with hand knob without keylock
9 Height of the valve with hand knob with keylock
10 Distance required to remove the key





Required surface finish of interface

Caution!

- The packing foil is recyclable.
- Mounting bolts M5x30 DIN 912-10.9 (4 pcs.) must be ordered separately. Tightening torque of the bolts is 6.6 ft-lbs (8.9 Nm).
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law.

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www.argo-hytos.com

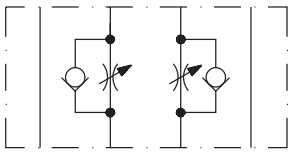
Double throttle check valves sandwich plates

2VS3-06

Size 06 • ...4641 PSI (320 bar • ...21.13 US GPM (80 L/min)

HA 5051
1/2003

Replaces
HA 5051 1/2000

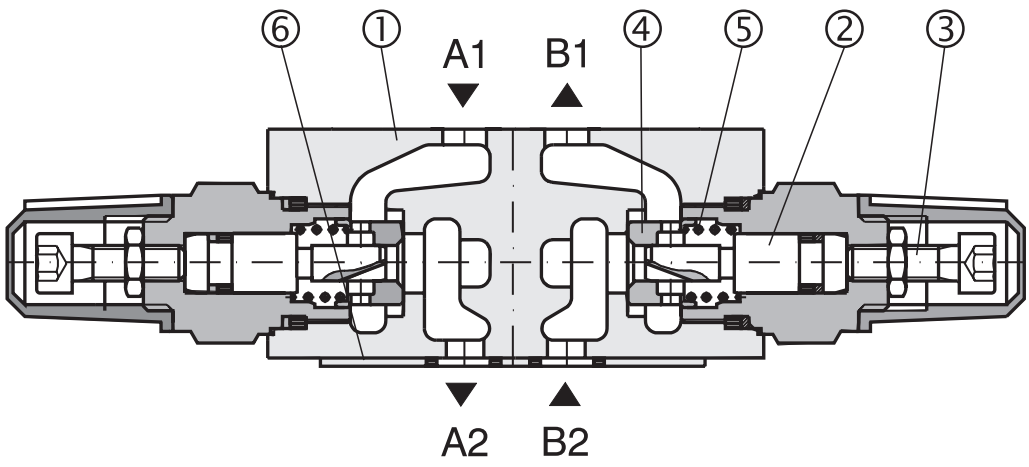


- **Sandwich plate design for use in vertical stacking assemblies**
- **Meter-in or meter-out control as required**
- **Three possible arrangements:**
  - throttle valve in channel A
  - throttle valve in channel B
  - throttle valves in channels A and B
- **Flow adjustment - three adjustment elements**
- **Installation dimensions to ISO 4401:1994 and DIN 24 340-A6**
- **Subplates - see Catalogue HA 0002**

Functional Description

Double throttle valves are used to control flow rates in two separate lines (A, B) of a hydraulic circuit. The modular design provides six functional symbols.
The throttle valve is built into channel A or B or into channels A and B. The valve restricts the fluid flow in one direction while providing reverse free-flow in the opposite direction. The throttling spool (2) is adjusted by means of a set screw (3) and each spool position corresponds with a certain passage area.
Fluid entering port A1 is throttled to port A2 via a groove and an annulus area. Fluid returning from port B2 shifts the valve seat (4) against the spring (5), thus creating a passage which allows reverse free-flow to port B1 (function as a check valve).

The sandwich design enables simple stacking with other components of the same size.
The separate O-ring plate (6) with fitted O rings provides sealing of the valve connecting surface. According to the valve arrangement, the meter-in or meter-out control is provided. Changing the meter-in mode into the meter-out mode can be done by turning the valve by 180° around its horizontal axis. The orientation of the throttle check valves in the valve body corresponds with the symbols shown on the name plate. The set screw can be operated by a key, by a hand knob or by a hand knob with keylock.
The basic surface treatment of the valve housing is phosphate coated, whereas the surfaces of the other parts are zinc coated.



Ordering Code

2VS3-06- □ □ □

Double throttle check valve

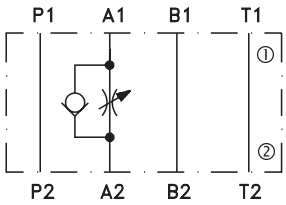
Nominal size

Seals
without designation NBR
V Viton

Adjustment element
S Hexagon set screw with locknut and protective cap
R Hand knob with scale
Z Hand knob with scale and keylock

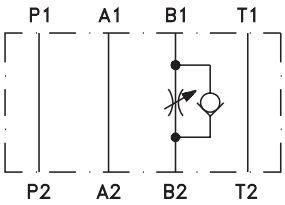
Functional symbol

A



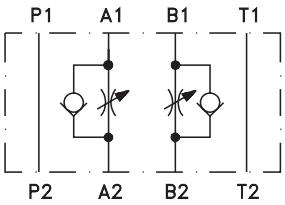
valve in channel A

B



valve in channel B

C



valves in channels A and B

Notes: ① valve side
② subplate or manifold side
The orientation of the throttle check valves in the valve body corresponds with symbols shown on the name plate.

FOR PREFERRED TYPES SEE BOLD TYPING IN ORDERING CODE AND TABLE OF PREFERRED TYPES ON PAGE 3

Technical Data

Nominal size	mm	06
Maximum flow rate	US GPM (L/min)	21.13 (80)
Maximum operating pressure	PSI (bar)	4641 (320)
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP RP 91 H in viscosity classes ISO VG 32, 46 and 68
Fluid temperature range for standard sealing (NBR)	°F (°C)	-22 ... +176 (-30 ... +80)
Fluid temperature range for Viton sealing (FPM)	°F (°C)	-4 ... +176 (-20 ... +80)
Viscosity range	SUS (mm^2/s)	98 ... 1840 (20 ... 400)
Maximum degree of fluid contamination		Class 21/18/15 according to ISO 4406 (1999).
Weight	lbs (kg)	2.65 (1.2)
Mounting position		optional

Spare Parts

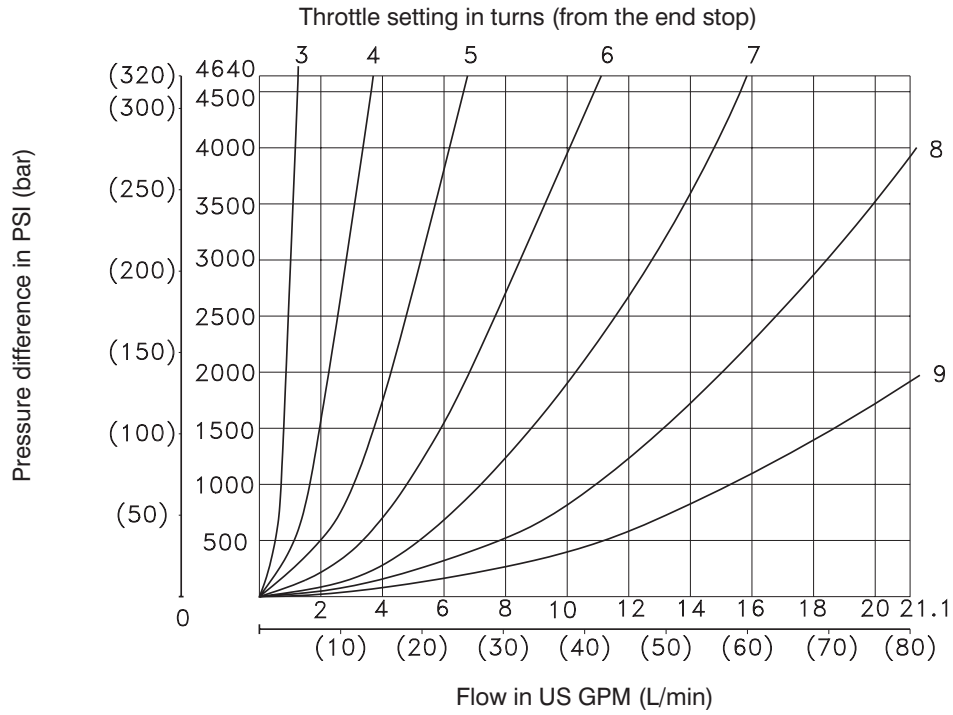
Seal kit

Type	Dimensions, quantity			Ordering number
	O-ring	Square ring	Back-up ring	
Standard NBR	18 x 2.65 NBR70 (2 pcs.)	9.25 x 1.68 (4 pcs.)	6.73 x 9.43 x 1.14 (2 pcs.)	525-9900
	6.9 x 1.8 NBR70 (2 pcs.)	-	17.83 x 22.19 x 1.14 (2 pcs.)	
Viton	17.12 x 2.62 (2 pcs.)	-	9.43 x 6.73 x 1.14 (2 pcs.)	525-9940
	9.25 x 1.78 (4 pcs.)	-	17.83 x 22.19 x 1.14 (2 pcs.)	
	6.75 x 1.78 (2 pcs.)	-	-	

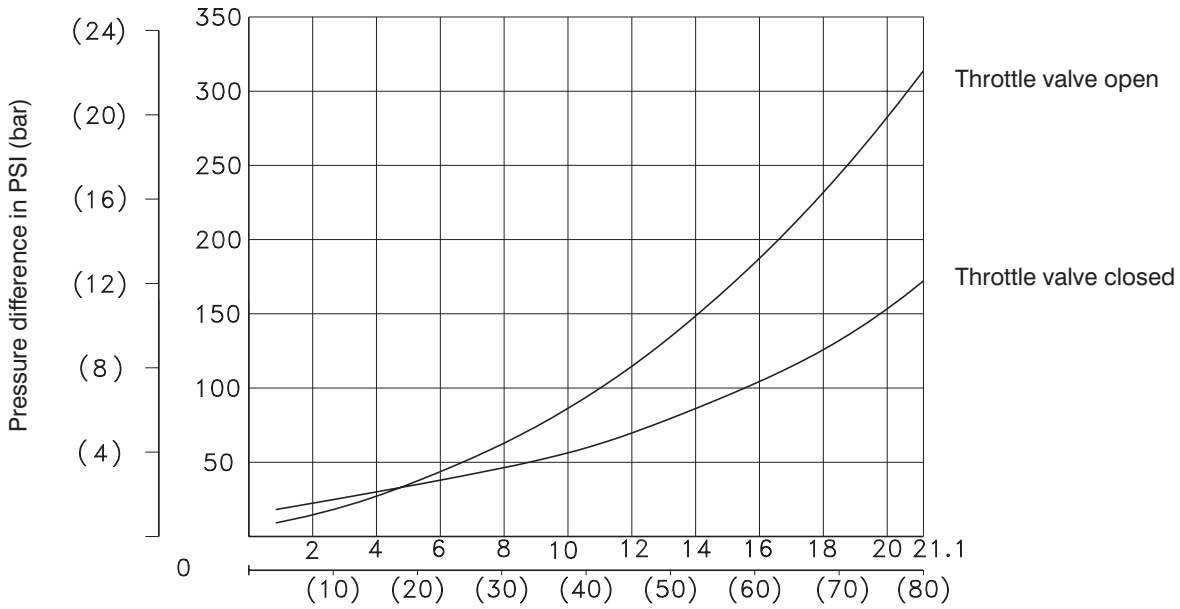
Characteristics

Measured at ν = 166 SUS (35 mm^2/s) and t = 104 °F (40 °C)

Throttle valve - Pressure difference related to flow



Check valve - Pressure difference related to flow from A2 to A1 (from B2 to B1)



Preferred Types of Valves

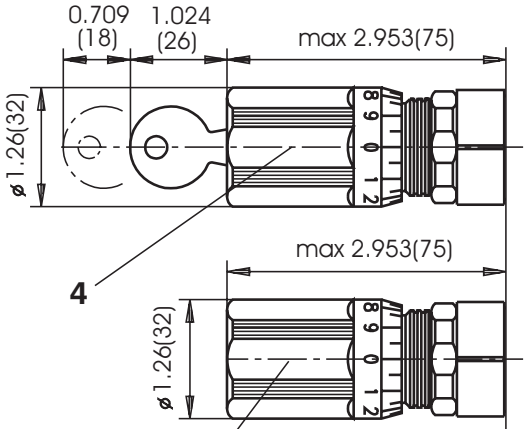
Type	Ordering Number
2VS3-06-CS	525-0023

Caution!

- The packing foil is recyclable.
- The transport plate is to be returned to the supplier.
- Mounting bolts must be ordered separately. Tightening torgue is 6.6 ft-lbs (8.9 Nm).
- If the valve is used separately without a directional valve, a cover plate DK1-06/32-1 is to be ordered. This plate connects port A1 with B1 and A2 with B2 respectively (suitable for models 2VS3-06-Ax and 2VS3-06-Bx) - see catalogue Cover Plates and Crossover Cover Plates HA 0003.
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law.

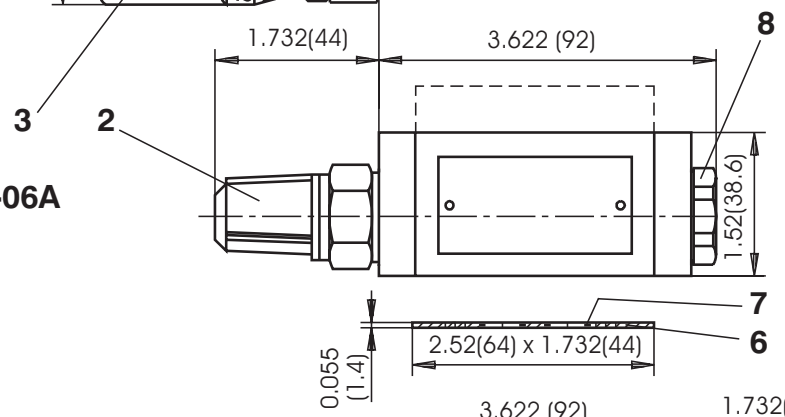
Valve Dimensions

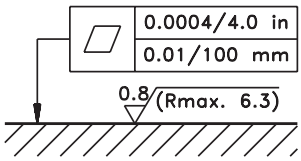
Dimensions in inches and millimetres (in brackets)



1 Name plate
2 Adjustment element - hexagon screw 5 mm with lock nut and protective cup
3 Adjustment element - hand knob with scale
4 Adjustment element - hand knob with scale and keylock
With all adjustment elements:
clockwise rotation reduces flow
counter - clockwise rotation increases flow
5 Locknut (hex. 10 mm)
6 O-ring plate - supplied in delivery packet
7 Square ring 9.25x1.68 (4 pcs.) - supplied in delivery packet
8 Closing screw

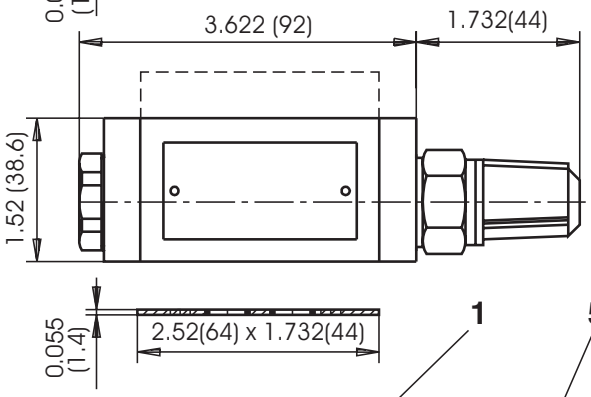
2VS3-06A



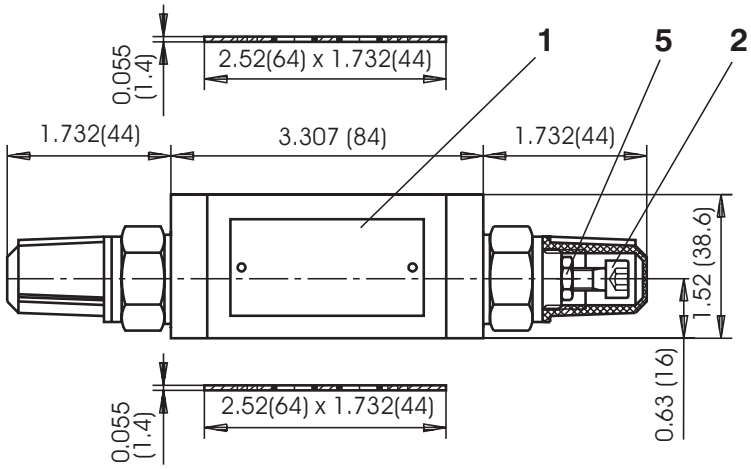


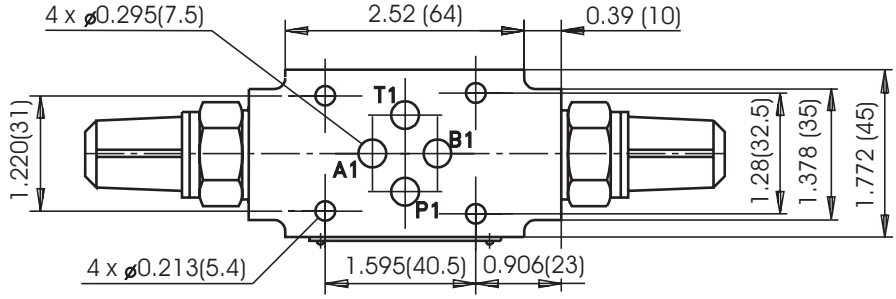
Required surface finish of interface

2VS3-06B



2VS3-06C





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www.argo-hytos.com

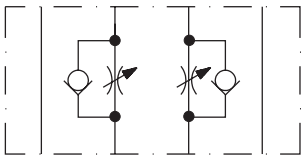
Double throttle check valves sandwich plates

VSO1-04/M

Size 04 • ...4600 PSI (320 bar) • ...6.6 US GPM (25 L/min)

HA 5053
1/2003

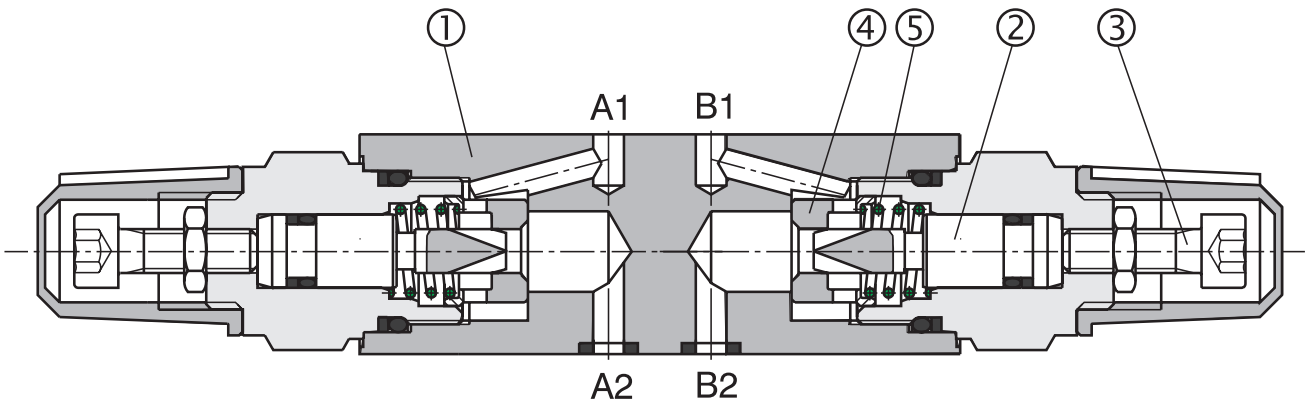
Replaces
HA 5053 1/2000



- **Sandwich plate design for use in vertical stacking assemblies**
- **Meter-in or meter-out control as required**
- **Three possible arrangements:**
  - throttle valve in channel A
  - throttle valve in channel B
  - throttle valves in channels A and B
- **Flow adjustment - hexagon set screw with locknut and protective cap**
- **Installation dimensions to ISO 4401 CETOP-RP 121H**

Functional Description

Double throttle valves are used to control flow rates in two separate lines (A,B) of a hydraulic circuit. The modular design provides six functional symbols.
The valve body (1) has drilled channels and the throttle valve is built into channel A or B or into channels A and B. They restrict the fluid flow in one direction while providing reverse free-flow in the opposite direction. The throttling spool (2) is adjusted by means of a set screw (3) and each spool position corresponds with a certain area of passage.
Fluid entering port A1 is throttled to port A2 via a groove and an annulus area. Fluid returning from port B2 shifts the valve seat (4) against the spring (5), thus creating a passage which allows reverse free-flow to port B1 (function of a check valve).
The sandwich design enables simple stacking with other components of the same size.
According to the valve arrangement, the meter-in or meter-out control is provided. The orientation of the throttle check valves in the valve body corresponds with the symbols shown on the name plate.
The valve housing (1) is phosphate coated, the surfaces of the other parts are zinc coated.



Ordering Code

VSO1-04/M ☐ S ☐

Throttle valves

Nominal size

Modular design

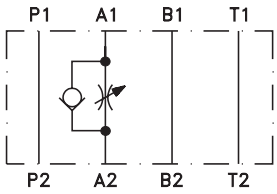
Seals
without designation NBR
V FPM (Viton)

Adjustment element
Hexagon set screw with locknut and protective cap

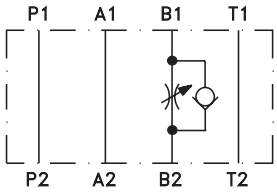
Functional Symbols

Meter-in control

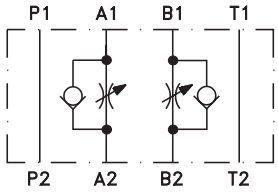
A



B

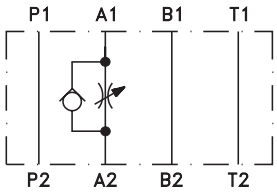


C

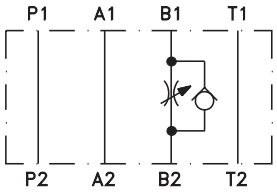


Meter-out control

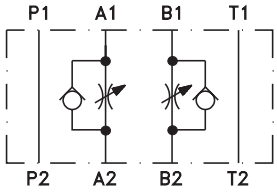
E



F



D



FOR PREFERRED TYPES SEE BOLD TYPING IN ORDERING CODE AND TABLE OF PREFERRED TYPES ON PAGE 5

Technical Data

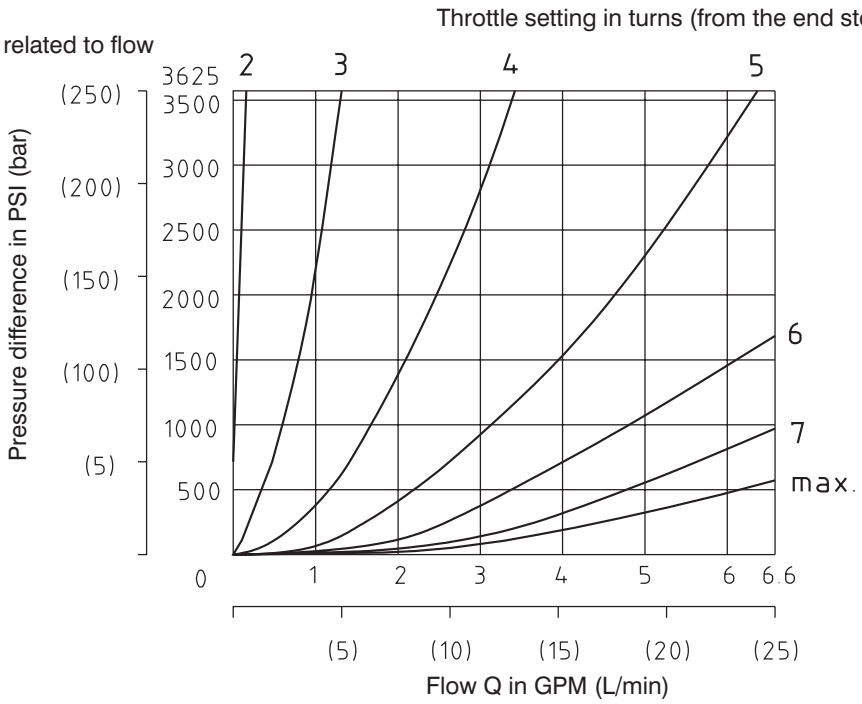
Nominal size	mm	04
Maximum flow	US GPM (L/min)	6.6 (25)
Maximum operating pressure	PSI (bar)	4641 (320)
Hydraulic fluid		Hydraulic oils of power classes HM, HV, to CETOP RP 91H in viscosity classes ISO VG 32, 46 and 68
Fluid temperature range for standard sealing (NBR)	°F (°C)	-22 ... +176 (-30 ... +80)
Fluid temperature range for Viton seals (FPM)	°F (°C)	-4 ... +176 (-20 ... +80)
Viscosity range	SUS (mm^2/s)	98 ... 1840 (20 ... 400)
Maximum degree of fluid contamination		Class 21/18/15 to ISO 4406 (1999).
Weight	lbs (kg)	1.76 (0.8)
Mounting position		optional

Δp-Q Characteristics

Measured at ν = 166 SUS (35 mm²/s) and t = 104 °F (40 °C)

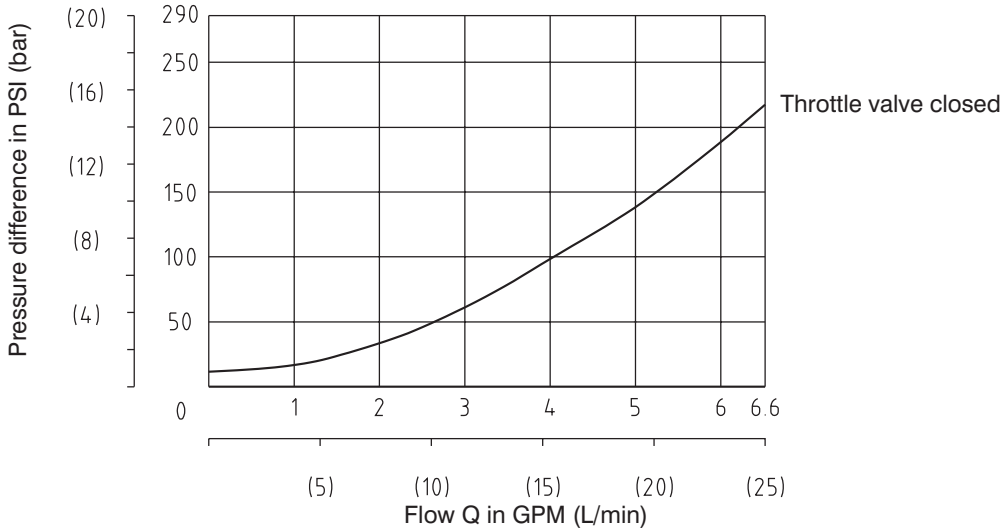
Throttle valve

pressure difference related to flow



Check valve

pressure difference related to flow from A2 to A1 (from B2 to B1)



Spare Parts

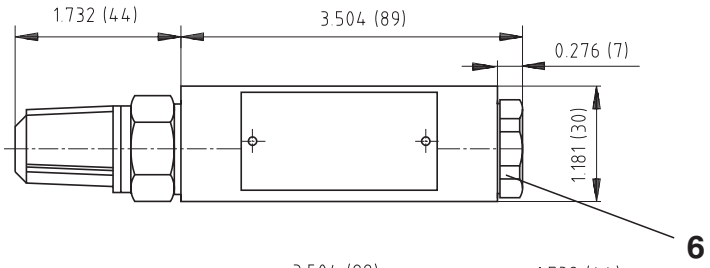
Seal kit

Type	Dimensions, quantity			Ordering number
	O-ring	Square ring	Back-up ring	
Standard NBR	18 x 2.65 NBR70 (2 pcs.)	7.65 x 1.68 (4 pcs.)	6.73 x 9.43 x 1.14 (2 pcs.)	525-9920
	6.9 x 1.8 NBR70 (2 pcs.)	-	17.83 x 22 x 19 x 1.14 (2 pcs.)	
Viton	17.12 x 2.62 (2 pcs.)	-	6.73 x 9.43 x 1.14 (2 pcs.)	525-9950
	7.65 x 1.78 (4 pcs.)	-	17.83 x 22.19 x 1.14 (2 pcs.)	
	6.75 x 1.78 (2 pcs.)	-	-	

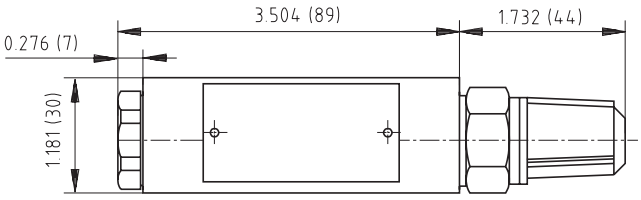
Valve Dimensions

Dimensions in inches and millimeters (in brackets)

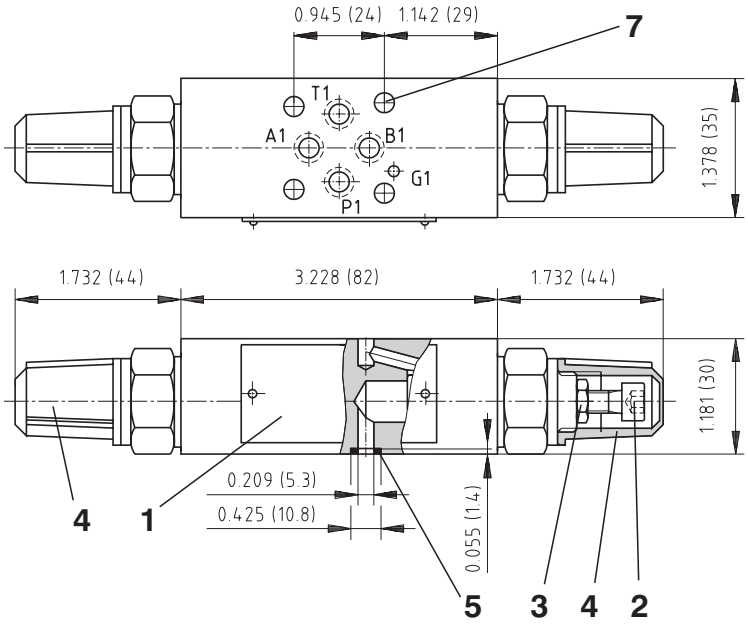
Typ VSO1-04/MAS
Typ VSO1-04/MES



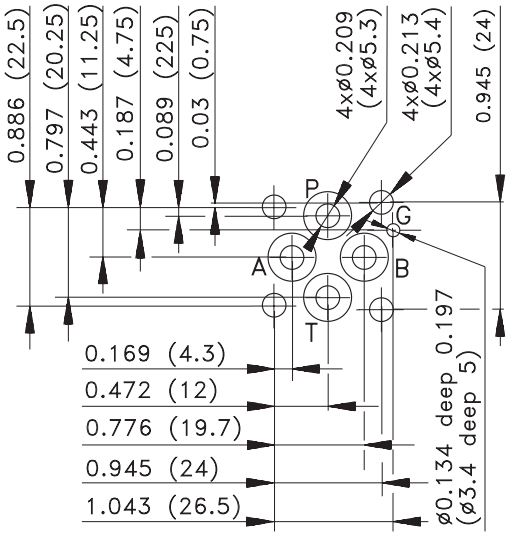
Typ VSO1-04/MBS
Typ VSO1-04/MFS



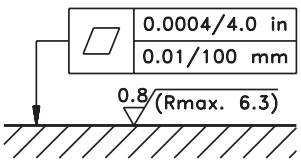
Typ VSO1-04/MCS
Typ VSO1-04/MDS



Instalation Dimensions



1 Name plate
2 Set screw - inside hexagon 5 mm
Clockwise rotation = flow decrease
Counterclockwise rotation = flow increase
3 Locknut, hex. 10 mm
4 Protective cap
5 Square ring (4 pcs.) supplied with valve
6 Closing screw
7 4 mounting holes



Required surface finish of interface

Preferred Types of Valves

Type	Ordering Number
VSO1-04/MCS	525-0043
VSO1-04/MDS	525-0046

Caution!

- The packing foil is recyclable.
- The plastic protective plate can be returned to manufacturer for disposal.
- A cover plate DK 1-04/32-x with the respective channel connection can be ordered separately - see catalogue HA 0003 - Cover plates.
- Mounting bolts M6x40 DIN 912-10.9 or studs must be ordered separately. Tightening torque 3.7 ft-lbs. (5 Nm).
- For applications outside these parameters, please consult the manufacturer.
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law.

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www.argo-hytos.com

ARGO HYTOS

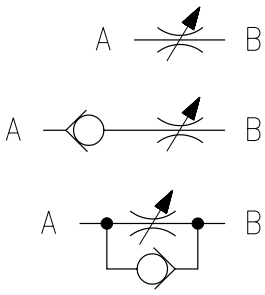
Fine throttle valves

VSO1-04/R

Size 04 • ...1449.28 PSI (100 bar) • ...5.29 US GPM (20 L/min)

HA 5054
3/2001

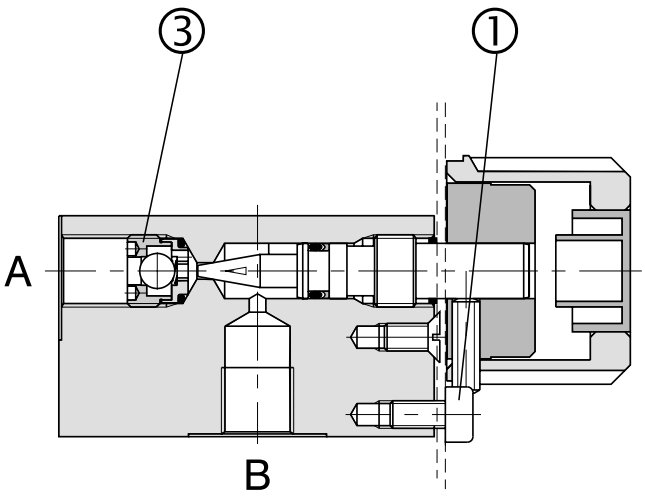
Replaces
HA 5054 5/2000



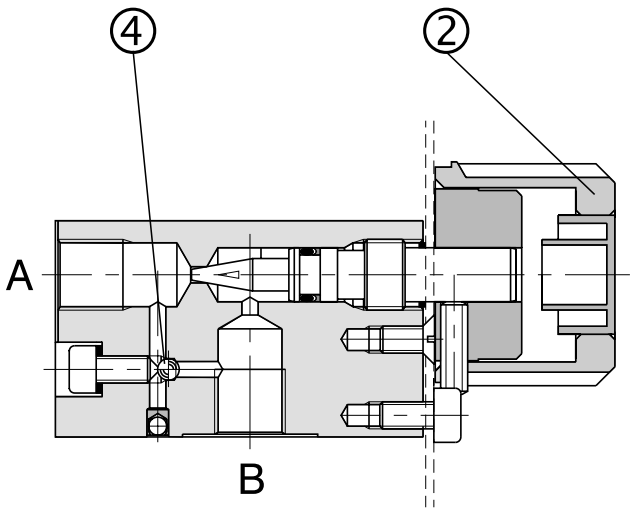
- **In-line mounting**
- **Attachment under panel**
- **Three models:**
  - **Fine throttle valve**
  - **Fine throttle valve + check valve in parallel**
  - **Fine throttle valve + check valve in series**
- **Four throttle seat diameters**

Functional Description

Fine throttle valves are used to control flow rates of pressure fluid. The connection threads in the valve body enable direct installation in line or hose. The valve is designed to be attached on the backside of a control panel by means of two bolts M6 (1). The outer bolt with the cylindrical head serves at the same time to limit to one revolution the hand knob.
The adjustment sensitivity of flow rate can be selected by using the respective seat diameter in the range from 2 up to 3.5 mm (see the flow characteristics).
The attachment under the panel is carried out after removing the hand knob (2). The position of the hand knob can then be adjusted either to the stop of the mounting bolt, or in line with the requested flow limitation, in a smaller angle of rotation.
If needed, the simple fine throttle valve can be completed with a check valve of the type VJO1-06/SG (3) HA 5004 which is installed in series.
To ensure the reverse free-flow through the valve, the model VSO1-04/Rx-O with a parallel ball valve (4) can be used.
The valve body is made of aluminum, the other parts of the valve do not have any surface treatment.



Model - VSO1-04/Rx-J



Model - VSO1-04/Rx-O

Ordering Code

VSO1-04/R □-□

Fine throttle valve

Nominal size

In-line mounting

Model

without designation	without check valve
J	with check valve in series
O	with check valve in parallel

Seat diameter

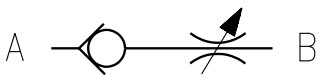
2	0.079 in. (2 mm)
2,5	0.098 in. (2.5 mm)
3	0.118 in. (3 mm)
3,5	0.138 in. (3.5 mm)

Other seat diameters after consultation.

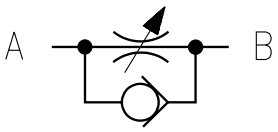
Functional Symbols

VSO1-04/Rx
without check valve

VSO1-04/Rx-J
with check valve in series



VSO1-04/Rx-O
with check valve in parallel



Technical Data

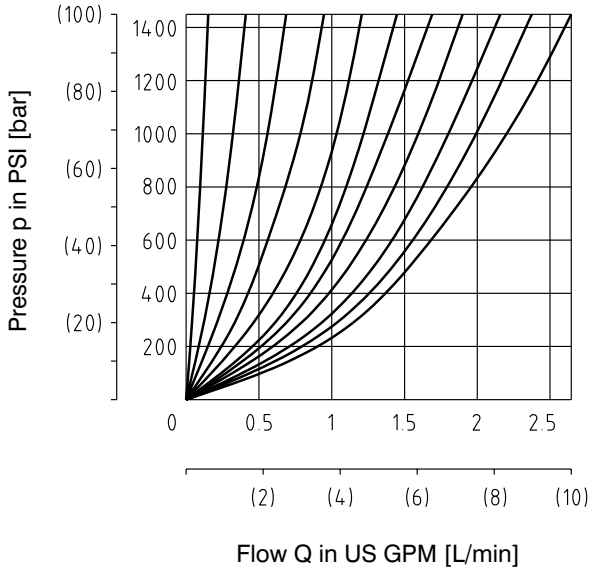
Nominal size	mm	04
Max. operating pressure	PSI (bar)	1449.28 (100)
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP - RP 91H in viscosity classes ISO VG 32, 46 and 68.
Fluid temperature range	°F (°C)	-22 ... +176 (-30 ... +80)
Viscosity range	SUS (mm^2/s)	60 ... 1840 (10 ... 400)
Maximum degree of fluid contamination		Class 21/18/15 to ISO 4406 (1999).
Weight	lbs (kg)	0.48 (0.22)
Mounting position		optional

p-Q Characteristics

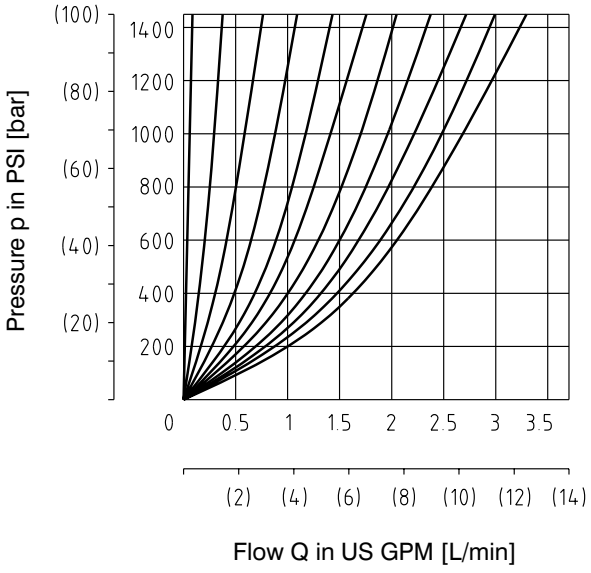
Measured at ν = 166 SUS (35 mm^2/s) and t = 104 °F (40 °C)

The characteristics were measured at hand knob positions set by 30°.

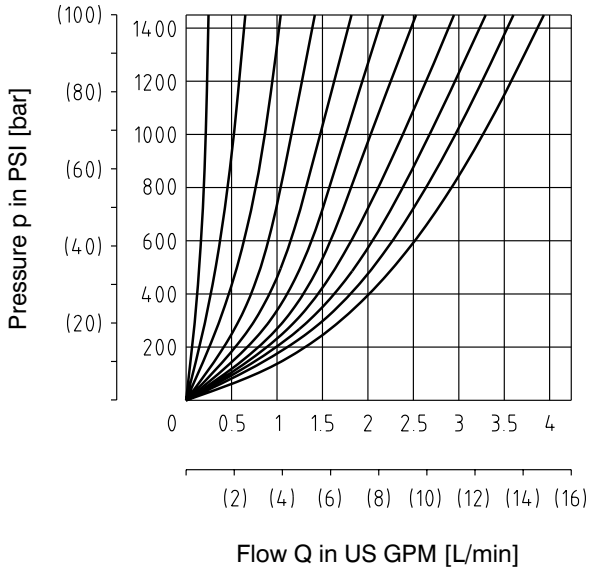
Seat diameter 0.079 in. (2 mm)



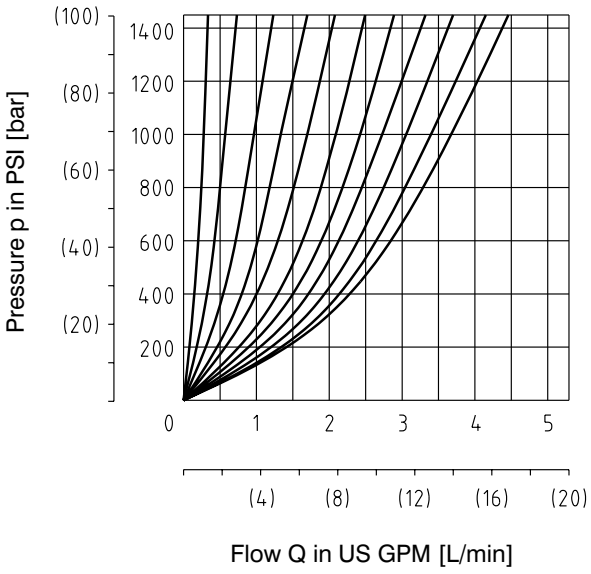
Seat diameter 0.098 in. (2.5 mm)



Seat diameter 0.118 in. (3 mm)



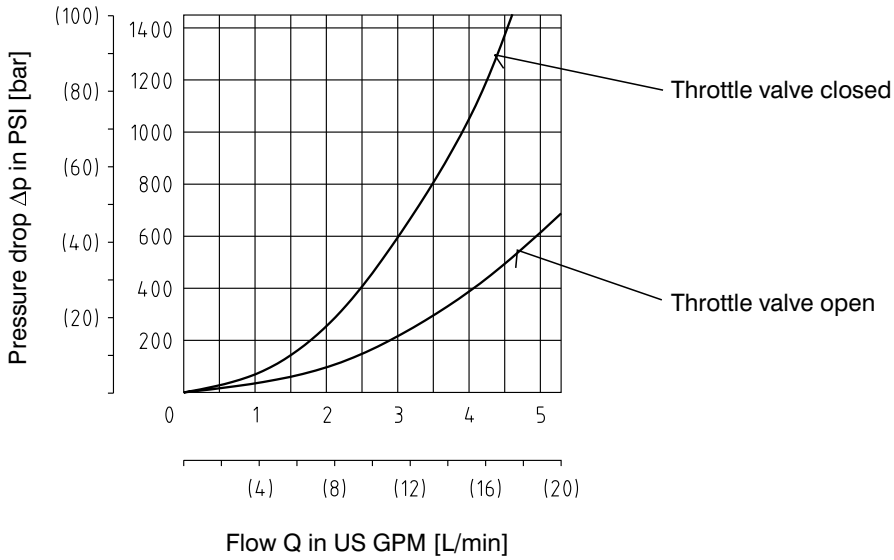
Seat diameter 0.138 in. (3.5 mm)



Δp-Q Characteristics

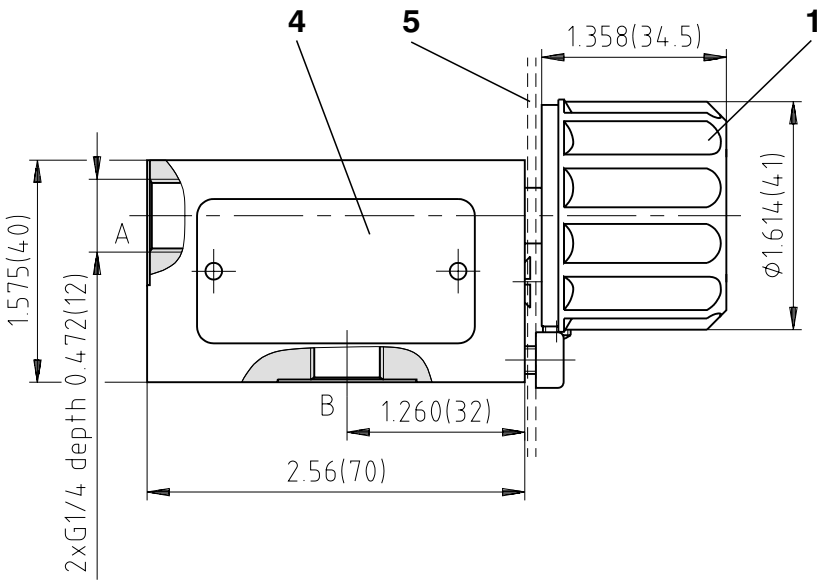
Measured at ν = 166 SUS (35 mm^2/s) and t = 104 °F (40 °C)

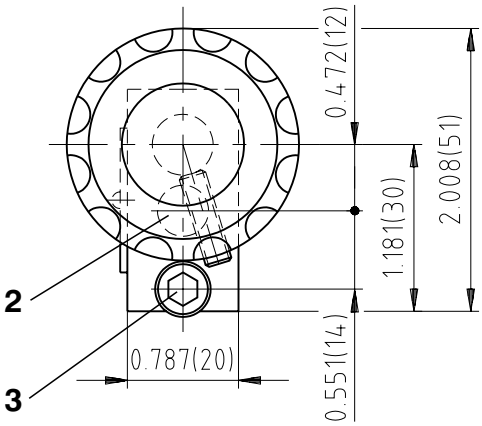
Valid for model VSO1-04/R2O, flow direction B-A



Valve Dimensions

Dimensions in inches and millimetres (in brackets)

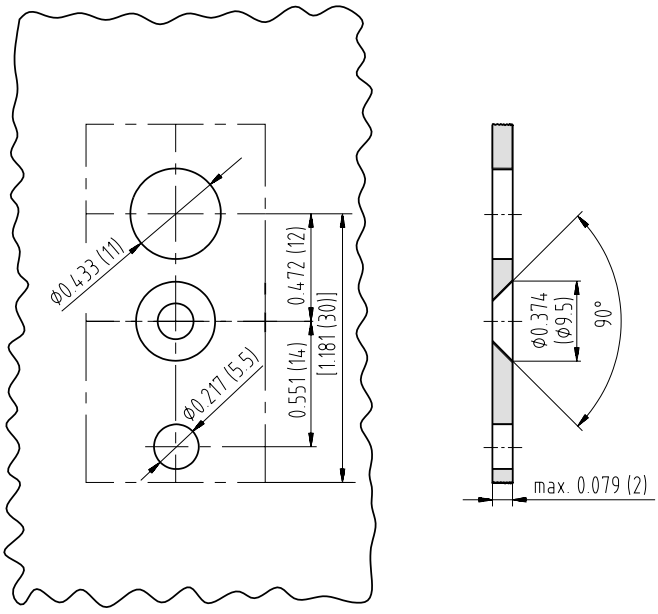




1 Hand knob
2 Bolt for valve attachment under plate of control panel
3 Bolt for valve attachment, limits the hand knob rotation
4 Name plate
5 Control panel plate

BOARD

Installation Dimensions



Caution!

- The packing foil is recyclable.
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law.

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ARGO HYTOS

Double throttle check valves sandwich plates

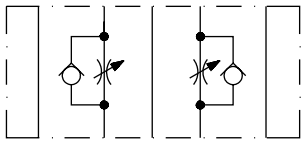
VSO2-10/M

Size 10 ...5076 PSI (350 bar) ...26.42 US GPM (100 L/min)

HA 5056
2/2005

Replaces
HA 5056 1/2003

- **Modular design for use in vertical stacking assemblies**
- **Meter-in or meter-out control**
- **Three functional symbols:**
  - throttle valve in line A
  - throttle valve in line B
  - throttle valves in lines A and B
- **Flow adjustment - hexagon set screw with locknut and protective cap**
- **Installation dimensions to ISO 4401-05-04-0-94 and DIN 24 340-A10**

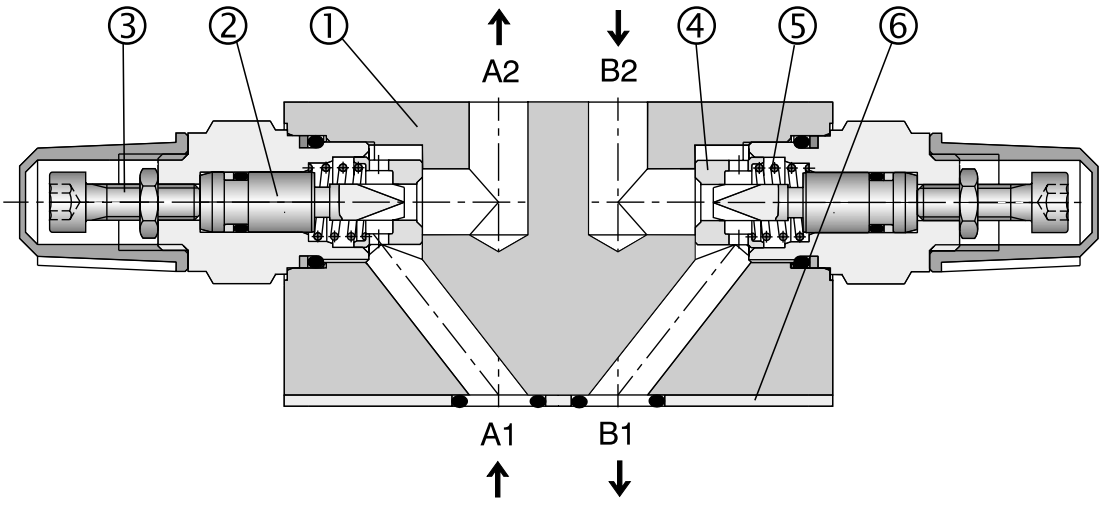


Type VSO2-10/MCS

Functional Description

Double throttle valves are used to control flow rates in two separate lines (A, B) of a hydraulic circuit.
The valve body (1) has drilled channels and the throttle valve is built into channel A or B or into channels A and B. They restrict the fluid flow in one direction while providing reverse free-flow in the opposite direction. The throttling spool (2) is adjusted by means of set screw (3) and each spool position corresponds with a certain area of the flow passage.
Fluid entering port A1 is throttled to port A2 via a groove and an annulus area. Fluid entering port B2 shifts the valve seat (4) against the spring (5), thus creating a passage which allows reverse free-flow to port B1 (function of a check valve).

The modular design enables simple vertical stacking with other components of the same size. A separate O-ring plate (6) with fitted O-rings is mounted underneath the valve body, thus providing its sealing. According to the valve arrangement, the meter-in or meter-out control is provided. Changing the meter-in mode into the meter-out mode can be done by turning the valve body by 180° around its x-axis.
The orientation of the throttle/check valves in the valve body corresponds with the symbols shown on the name plate.
The basic surface treatment of the valve housing (1) is phosphate coated, whereas the surfaces of the other parts are zinc coated.



VSO2-10/MCS (meter-out control)

Ordering Code

VSO2-10/M ☐ ☐ ☐

Double throttle check valve sandwich plate

Nominal size

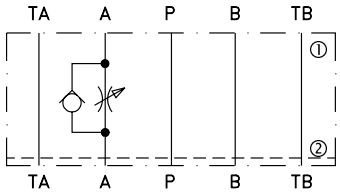
Modular design

Seals
no designation Standard (NBR)
V Viton (FPM)

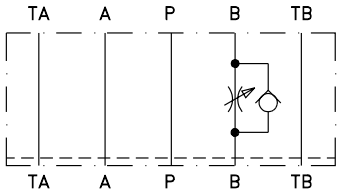
Adjustment element
S Set screw with inside hexagon

Functional symbols

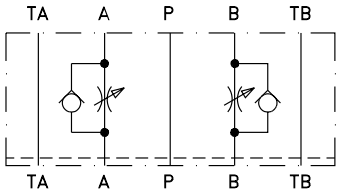
A



B



C



Notes: ① valve side
② subplate or manifold side
The orientation of the symbol shown on the name plate corresponds with the function of the valve (meter-out control).

FOR PREFERRED TYPES SEE BOLD TYPING IN ORDERING CODE

Technical Data

Nominal size	mm	10
Maximum flow rate	US GPM (L/min)	26.42 (100)
Maximum operating pressure	PSI (bar)	5076 (350)
Hydraulic fluid		Hydraulic fluids of power classes HM, HV to CETOP RP 91 H in viscosity classes ISO VG 32, 46 and 68
Fluid temperature range for standard sealing (NBR)	°F (°C)	-22 ... +176 (-30 ... +80)
Fluid temperature range for Viton sealing (FPM)	°F (°C)	-4 ... +176 (-20 ... +80)
Viscosity range	SUS (mm^2/s)	98 ... 1840 (20 ... 400)
Maximum degree of fluid contamination		Class 21/18/15 according to ISO 4406 (1999).
Weight	lbs (kg)	4.725 (2.15)
Mounting position		optional

Preferred Types of Valves

Type	Ordering Number
VSO2-10/MCS	525-0123

Caution!

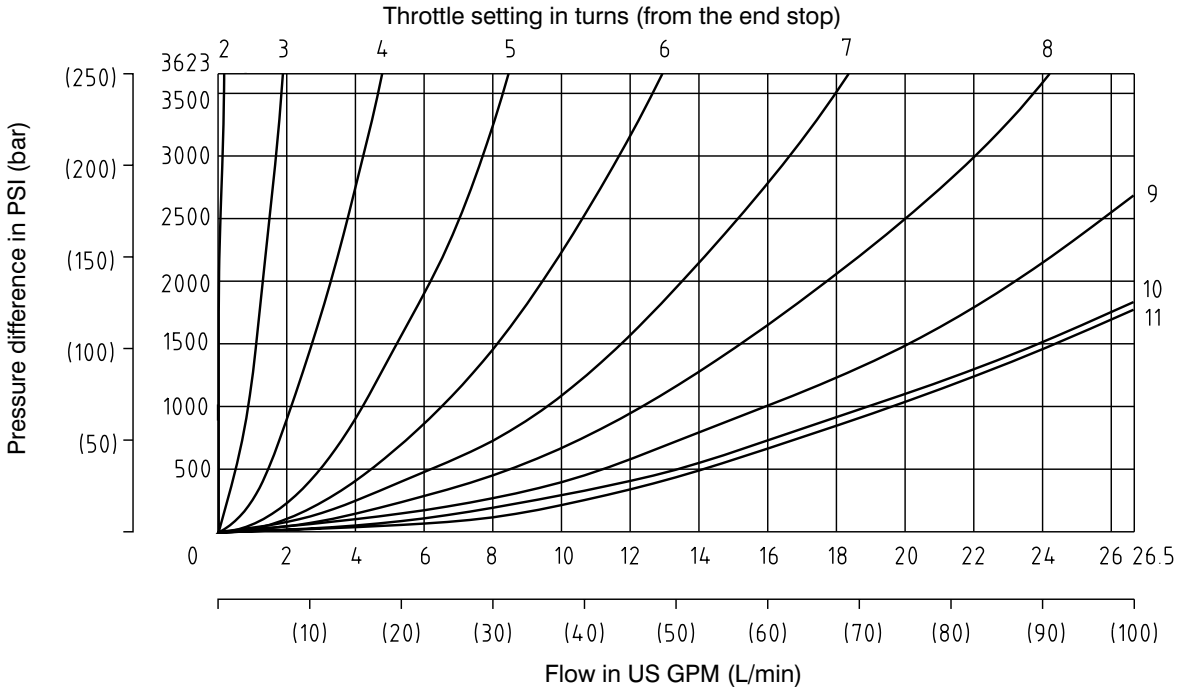
- The packing foil is recyclable.
- The protecting plate can be returned to the manufacturer.
- Tightening torque of the screws is 11.13 ft-lbs (15 Nm).
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law.

Characteristics

Measured at ν = 166 SUS (35 mm^2/s) and t = 104 °F (40 °C)

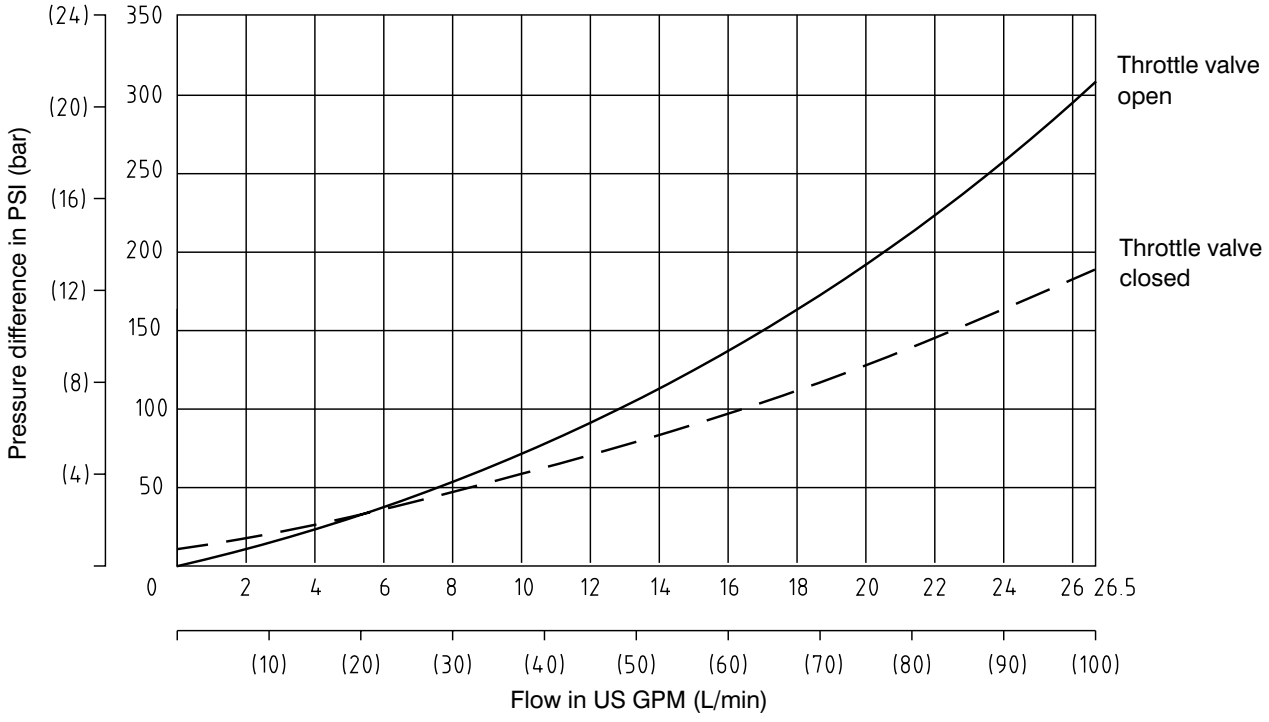
Throttle valve

Pressure defference Δp related to flow from A1 to A2, (from B1 to B2)



Check valve

Pressure difference Δp related to flow from A2 to A1, (from B2 to B1)



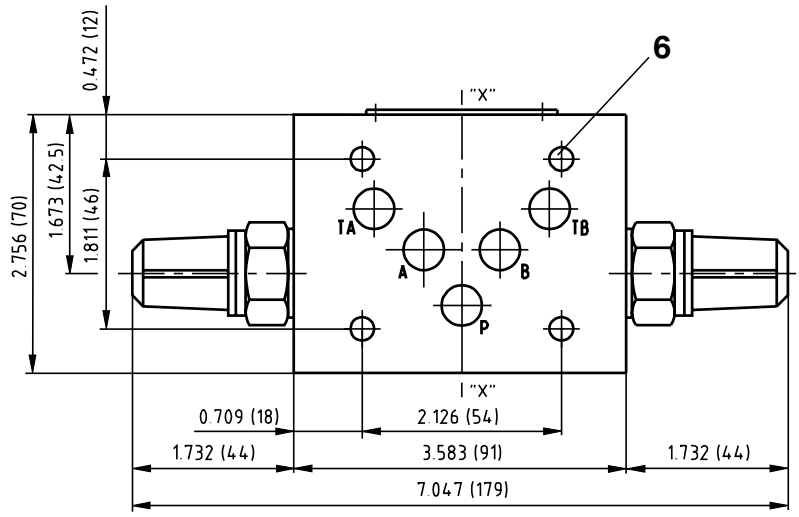
Spare Parts

Seal kit

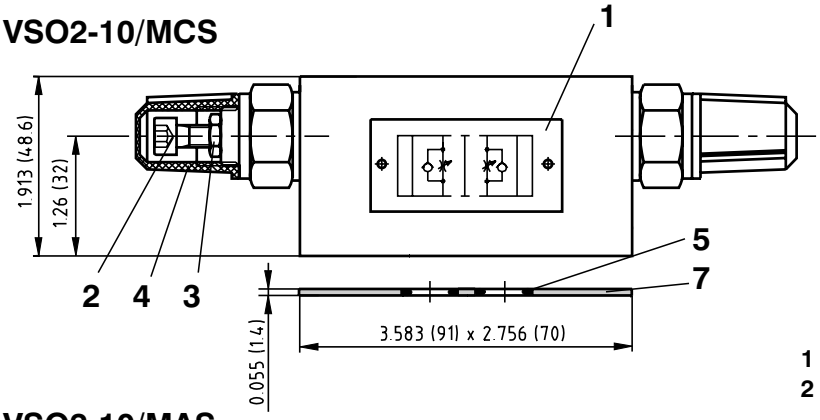
Typ	Dimensions, quantity			Ordering number
	O-ring	Square ring	Back-up ring	
Standard NBR	18 x 2.65 NBR70 (2 pcs.)	12.42 x 1.68 (5 pcs.)	7,1 x 10 x 1,2 PTGB (2 pcs.)	525-9930
	6.9 x 1.8 NBR70 (2 pcs.)	-	17,5 x 22 x 1,2 PTGB (2 pcs.)	
Viton	17.12 x 2.62 (2 pcs.)	-	7,1 x 10 x 1,2 PTGB (2 pcs.)	525-9960
	6.75 x 1.78 (2 pcs.)	-	17,5 x 22 x 1,2 PTGB (2 pcs.)	
	12.42 x 1.78 (5 pcs.)	-	-	

Valve Dimensions

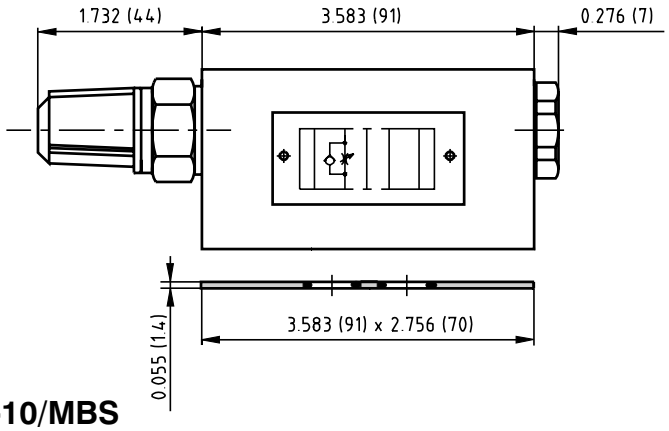
Dimensions in inches and millimetres (in brackets)



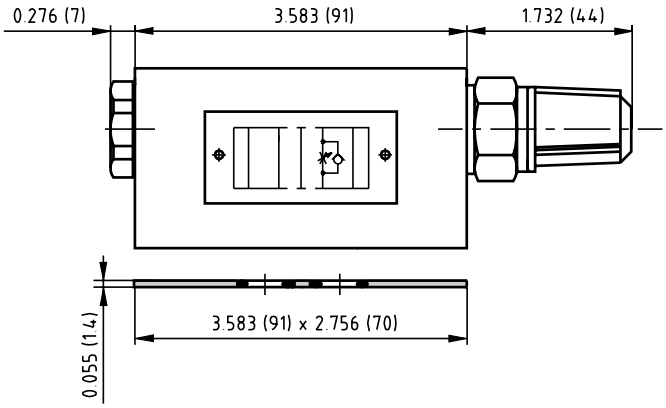
Type VSO2-10/MCS



Type VSO2-10/MAS

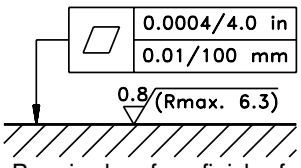


Type VSO2-10/MBS



1 Name plate
2 Set screw with inside hexagon 5 mm
Clockwise rotation = flow increase
Counterclockwise rotation =
= flow decrease
3 Lock nut hex. 10 mm
4 Protective cap
5 Sealing ring (5 pcs.)
Standard (NBR) R 014S 12.42 x 1.68
Viton (FPM) 12.42 x 1.78
supplied in each delivery packet
6 4 mounting holes (⌀ 6.4 mm)
7 O-ring plate

Turning the valve around the x-axis changes the meter-out control mode into the meter-in one.



Required surface finish of interface

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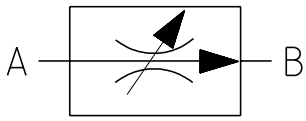
2-way cartridge flow control valves

VSS3-062

Size 06 • ...4641 PSI (320 bar) • ...11.888 US GPM (45 L/min)

HA 5057
1/2000

Replaces
HA 5057 3/99

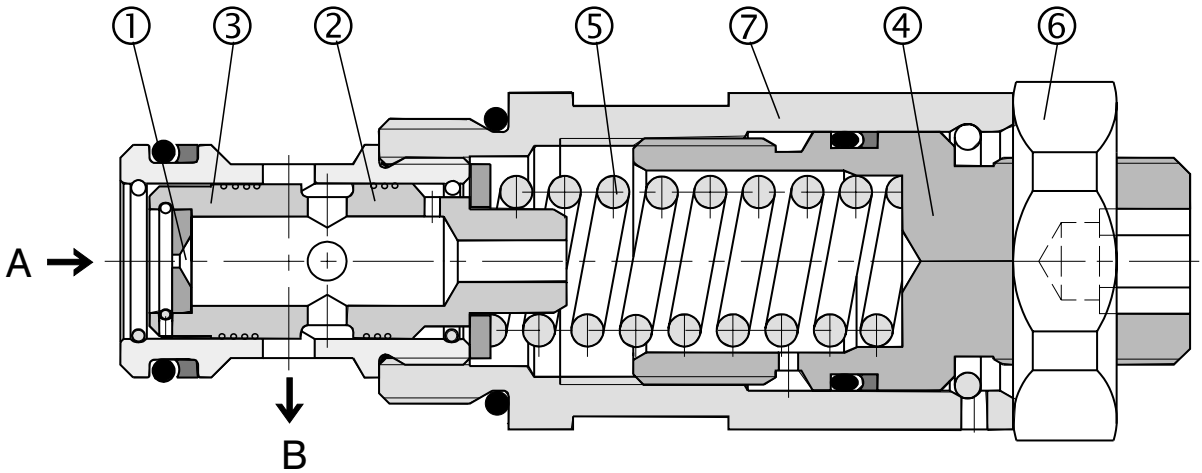


- **Cartridge design**
- **Flow rate setting with adjustment screw**
- **For use in meter-in, meter-out and bleed-off applications**

Functional Description

Pressure compensated flow control valves VSS3-062 are employed in hydraulic systems where only small speed or revolution variation due to load changing are required.
The valve consists basically of throttling orifice (1), pressure compensator (2), bushing (3), adjustment screw (4) and spring (5).
Throttling in direction A B takes place on the throttling orifice. The flow rate depends on the orifice diameter and on the pressure difference at the orifice. The pressure difference can be adjusted in a certain range through preloading the spring (5), which results in the respective flow change. The allocation of the orifice diameters and the corresponding flow rates is apparent from the respective characteristics. The flow rate adjustment can be accomplished by adjustment screw (4). The clockwise rotation increases the flow rate, the anticlockwise rotation decreases the flow rate.

The flow rate stabilization is provided for by pressure compensator (2), which is situated behind the throttling orifice and mounted into bushing (3). The pressure compensator continuously compares the pressure difference at the throttling orifice (1) with the value given by the spring parameters and the spring preloading and accomplishes the necessary control actions, thus holding the flow rate constant.
The valve cannot be closed. As mentioned above, only small flow rate adjustments can be realized.
In flow direction B A, the valve works as an ordinary throttle valve. The pressure losses depend on the orifice diameter – see the respective characteristics.
The valve housing (7), the nut (6) and the adjustment screw (4) are zinc coated.



Ordering Code

VSS3-062/S- ☐ ☐

Flow control valves

Nominal size

2-way design

Cartridge

Seals

without designation	Standard (NBR)
V	Viton (FPM)

Nominal flow rates

1.6	0.423 US GPM (1.6 L/min)
4	1.057 US GPM (4 L/min)
6.3	1.664 US GPM (6.3 L/min)
10	2.642 US GPM (10 L/min)
16	4.227 US GPM (16 L/min)
20	5.283 US GPM (20 L/min)

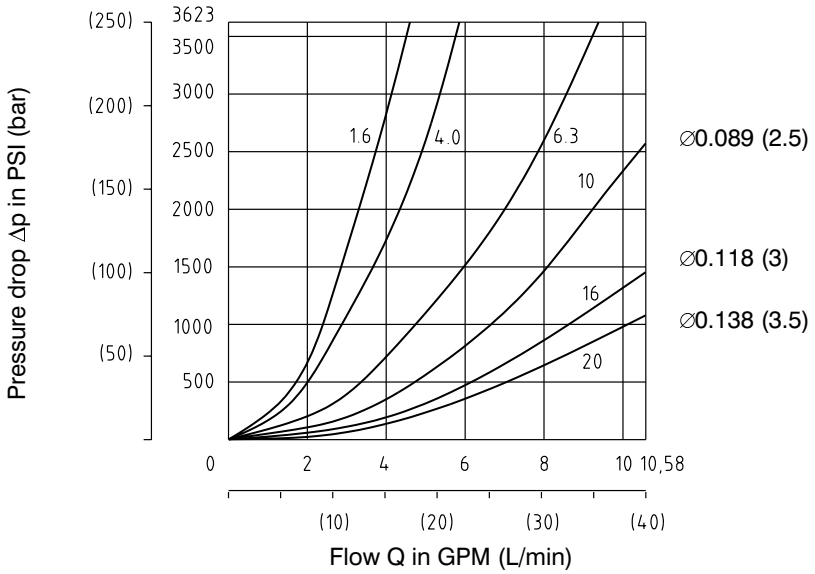
Technical Data

Nominal size	mm	06					
Nominal flow rates	US GPM (L/min)	0.423 (1.6)	1.057 (4)	1.664 (6.3)	2.642 (10)	4.227 (16)	5.283 (20)
Flow range		see Q-Δp characteristic					
Maximum working pressure	PSI (bar)	4641 (320)					
Pressure difference	PSI (bar)	see Q-Δp characteristic					
Pressure drop B - A	PSI (bar)	see Q-Δp characteristic					
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP RP 91H in viscosity classes ISO VG 32, 46 and 68					
Fluid temperature range (NBR)	°F (°C)	-22 ... +176 (-30 ... +80)					
Fluid temperature range (Viton)	°F (°C)	-4 ... +176 (-20 ... +80)					
Viscosity range	SUS (mm^2/s)	98 ... 1840 (20 ... 400)					
Maximum degree of fluid contamination		Class 21/18/15 to ISO 4406 (1999).					
Weight	lbs (kg)	0.423 (0.192)					
Mounting position		optional					

Δp-Q Characteristic

Measured at ν = 166 SUS (35 mm^2/s) and t = 104 °F (40 °C)

Flow directional B → A (Throttling without stabilization)

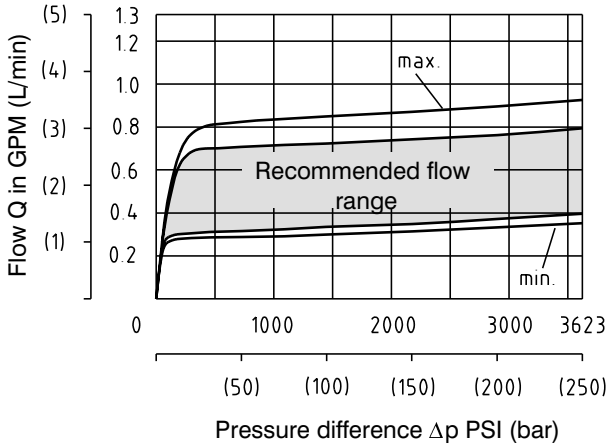


Δp-Q Characteristics

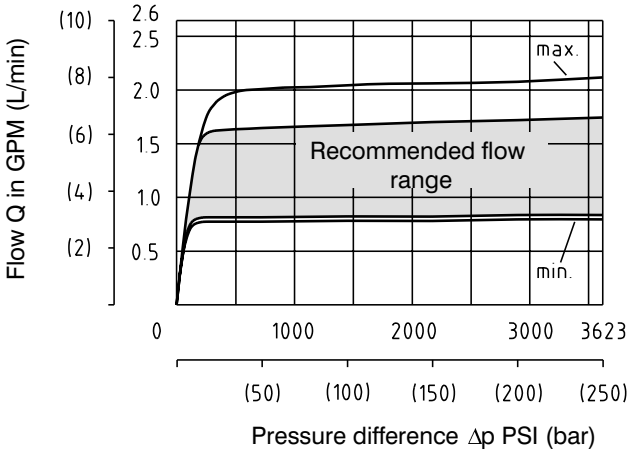
Measured at ν = 166 SUS (35 mm²/s) and t = 104 °F (40 °C)

Flow directional A → B (Controlled flow)

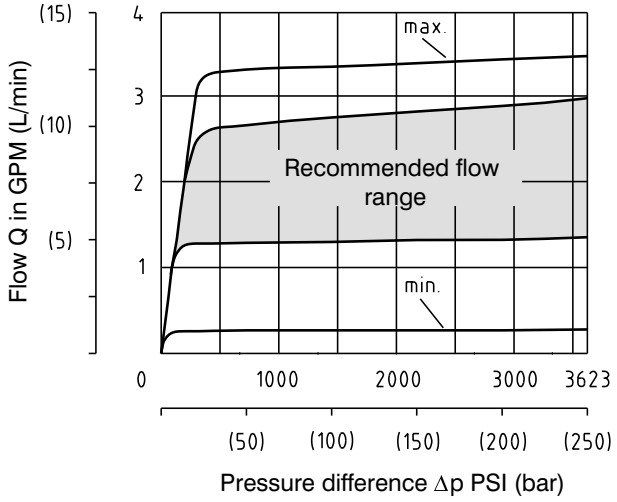
Nominal flow rate 1.6 L/min



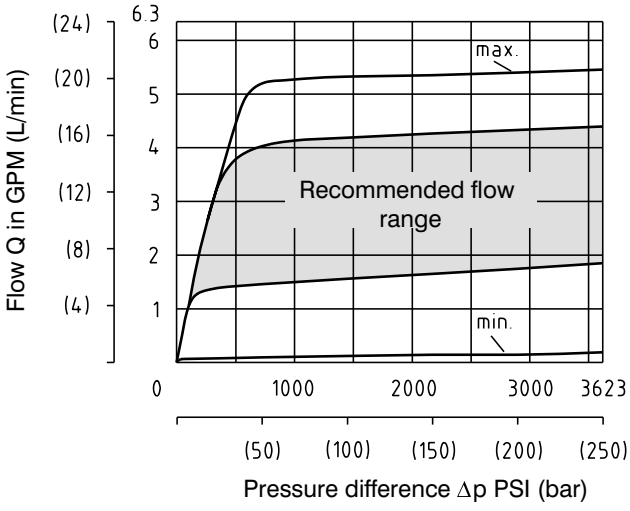
Nominal flow rate 4 L/min



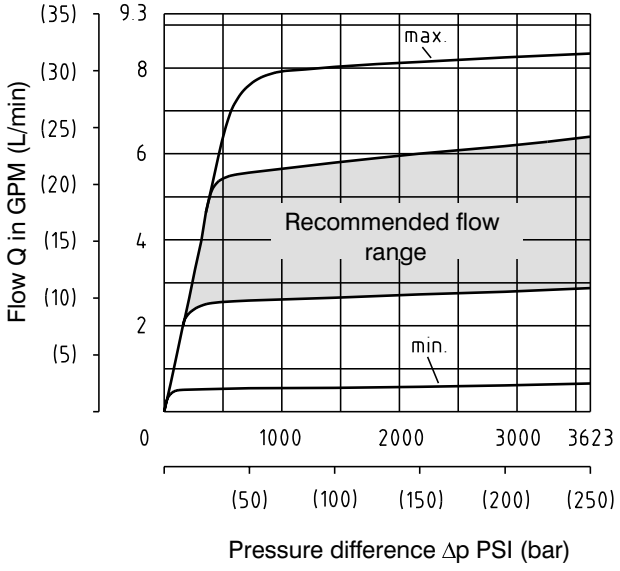
Nominal flow rate 6.3 L/min



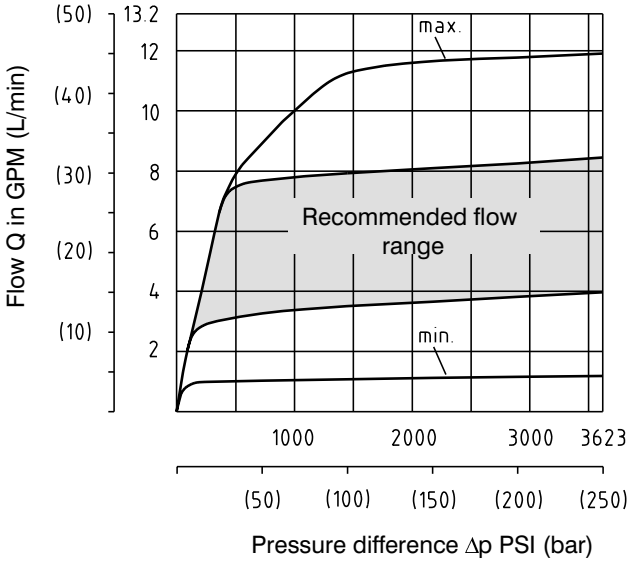
Nominal flow rate 10 L/min



Nominal flow rate 16 L/min

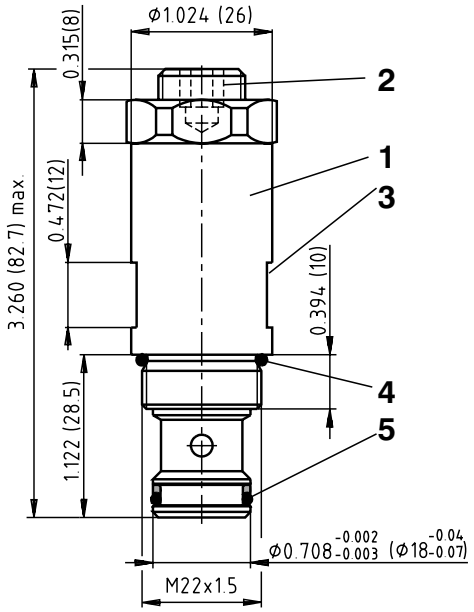


Nominal flow rate 20 L/min



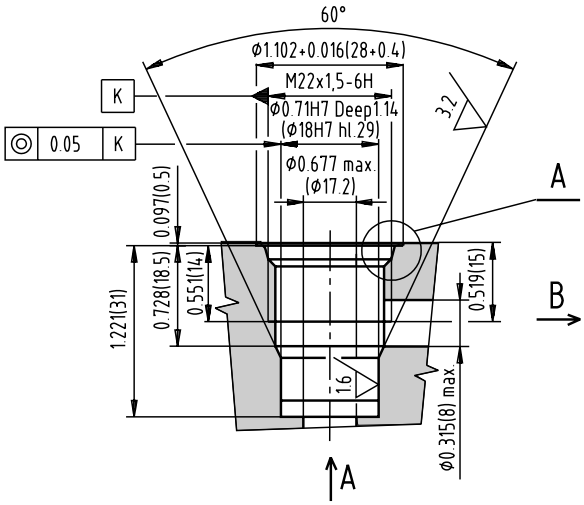
Valve Dimensions

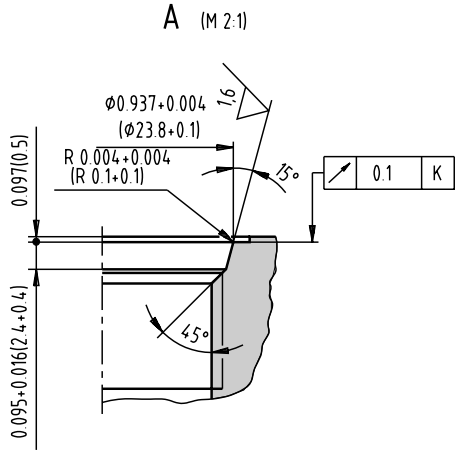
Dimensions in inches and millimeters (in brackets)



1 Type designation (stamped)
2 Screw for fine flow adjustment
- inside hexagon 6 mm
- anticlockwise rotation = flow decrease
- clockwise rotation = flow increase

3 Wrench flats size 24 mm,
tightening torque 44.25 ft-lbs (60 Nm)
4 Sealing: O-ring 19.4 x 2.1
supplied with valve
5 Combined sealing: O-ring 14x1.78
Back-up ring BBP80B015-N9
14.73 x 17.43 x 1.14





Spare Parts

Seal kit

Type	Dimensions, quantity		Ordering number
	O-ring	Back-up ring	
Standard - NBR	19.4 x 2.1 NBR80 (1 pc.)	17.4 x 1.3 (1pc.)	520-0299
	17.17 x 1.78 NBR90 (1pc.)	14.73 x 17.43 x 1.14 (1 pc.)	
	14 x 1.78 NBR90 (1pc.)	-	
Viton	19.4 x 2.1 (1 pc.)	17.4 x 1.3 (1pc.)	520-0298
	17.17 x 1.78 (1pc.)	14.73 x 17.43 x 1.14 (1 pc.)	
	14 x 1.78 (1pc.)	-	

Caution!

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www.argo-hytos.com

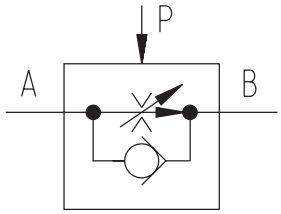
2-way flow control valves

VSS4-062

Size 06 • ...4637.68 PSI (320 bar) • ...1.85 US GPM (7 L/min)

HA 5058
5/2000

- ❑ **2-way pressure compensated flow control valve with external pressure compensator closing**
- ❑ **Subplate mounting**
- ❑ **Installation dimensions to DIN 24 340-A6 and ISO 4401-AB-03-4-A**
- ❑ **Subplates - see Catalogue HA 0002**



Ordering Code

VSS4-062/P-3

Flow control valve	
Nominal size	
2-way design	
	3 — **Flow (A → B)** 0.85 US GPM (3.2 L/min). Other flow rates after consultation.
	Subplate mounting

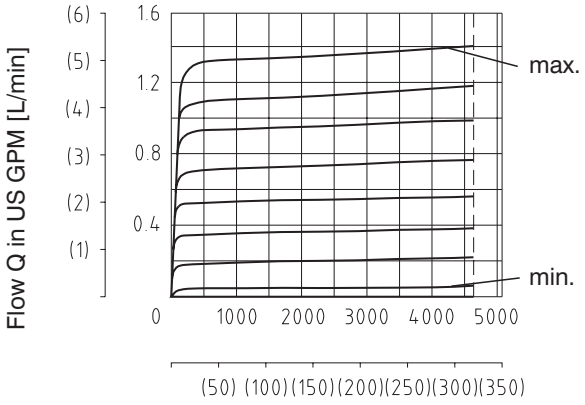
Technical Data

Nominal size	mm	06
Max. flow rate (A → B)	US GPM (L/min)	0.85 (3.2)
Max. flow rate (B → A)	US GPM (L/min)	6.61 (25)
Max. working pressure	PSI (bar)	4637.68 (320)
Cracking pressure (B → A)	PSI (bar)	14.49 (1)
Pressure losses (B → A)	PSI (bar)	see Δp-Q characteristics
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP - RP 91H in viscosity classes ISO VG 32, 46 a 68.
Fluid temperature range	°F (°C)	-22 ... +176 (-30 ... +80)
Viscosity range	SUS (mm^2/s)	98 ... 1840 (20 ... 400)
Maximum degree of fluid contamination		Class 21/18/15 to ISO 4406 (1999).
Weight	lbs (kg)	2.63 (1.2)
Mounting position		optional

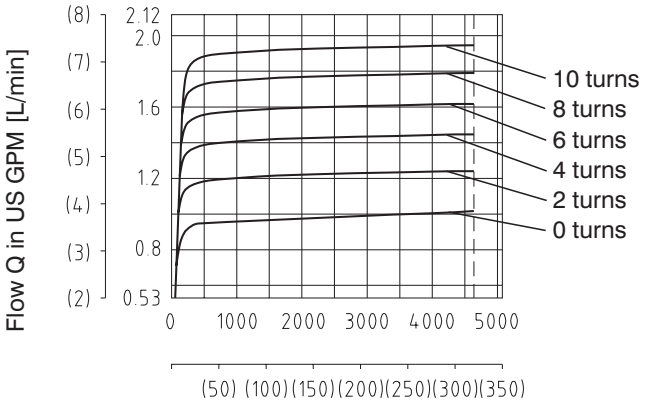
Q-p Characteristics

Measured at ν = 166 SUS (35 mm²/s) and t = 104 °F (40 °C)

Flow Q = 0 - max.
Compensator = 6 turns



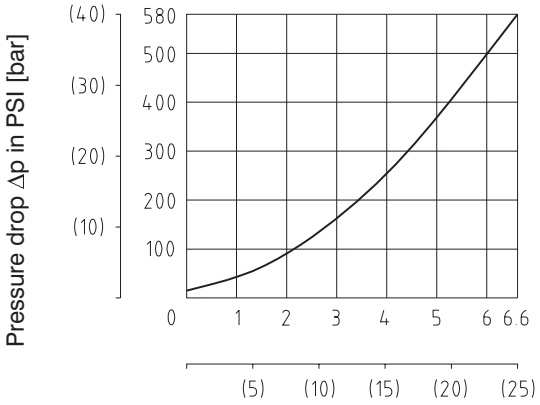
Flow Q = max.
Compensator = 0; 2; 4; 6; 8; 10 turns



Δp-Q Characteristics (B → A)

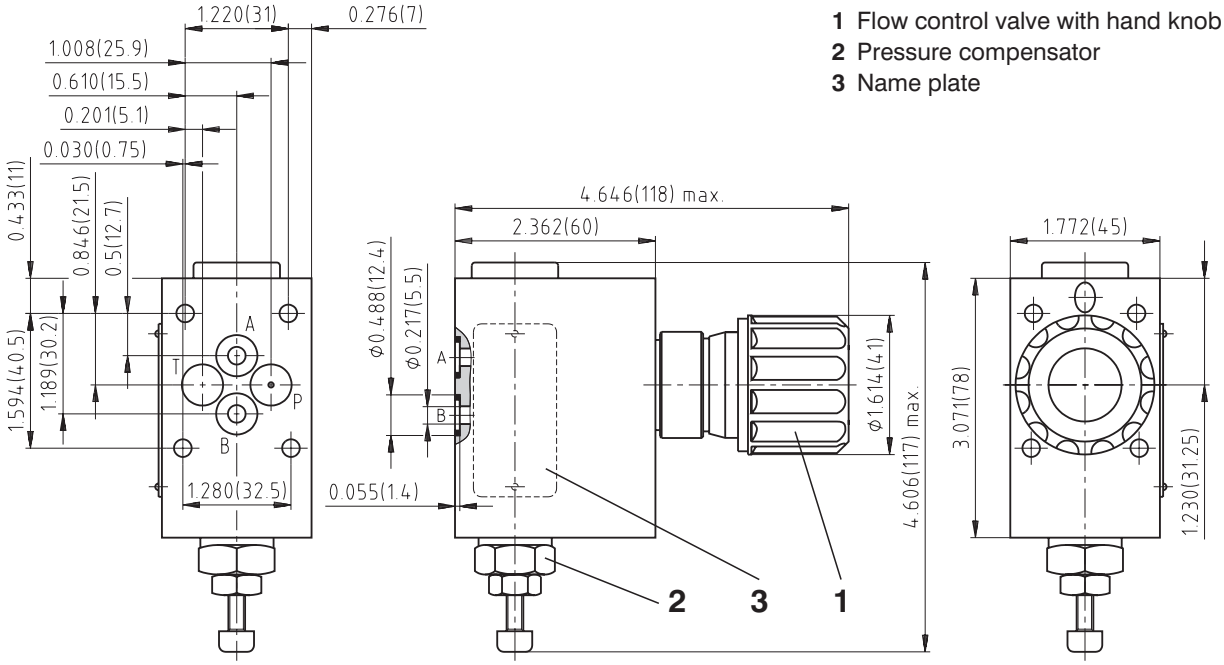
Measured at ν = 166 SUS (35 mm²/s) and t = 104 °F (40 °C)

Flow Q = 0 - max.
Compensator = 6 turns



Valve Dimensions

Dimensions in inches and millimetres (in brackets)



1 Flow control valve with hand knob
2 Pressure compensator
3 Name plate

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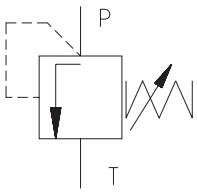
E-mail: sales.cz@argo-hytos.com
www.argo-hytos.com

Directly operated pressure relief valves VPP1

Size 06, 10 • ...4641 PSI (320 bar) • ...31.7 US GPM (120 L/min)

HA 5061
2/2000

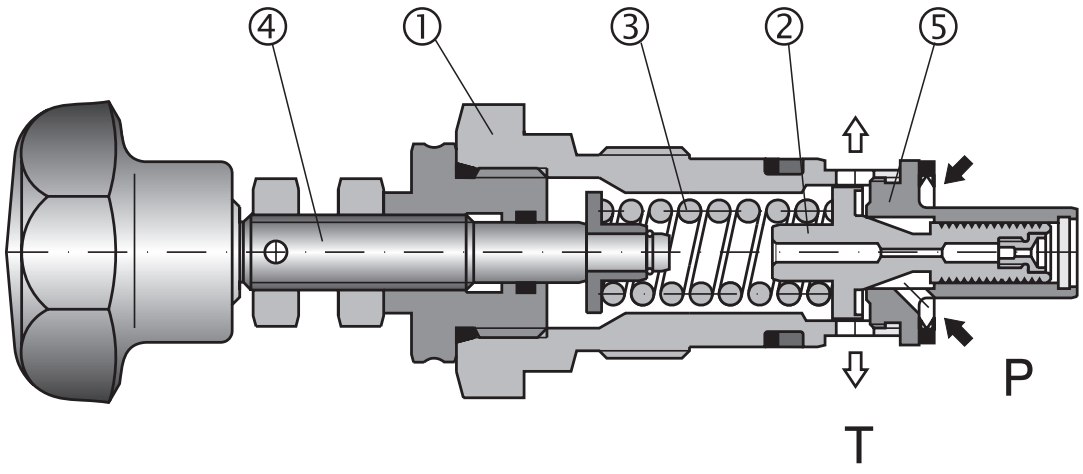
Replaces
HA 5061 8/99



- ❑ **Single-stage pressure relief valve**
- ❑ **Cartrige in threaded housing - with metric or BSP threads**
- ❑ **Cartrige in subplate mounted housing**
- ❑ **Four pressure adjustment options**
- ❑ **Six pressure ranges**
- ❑ **Subplates - see catalogue HA 0002**

Functional Description

Pressure relief valves VPP1 were designed for applications requiring a safety valve or a pressure regulating valve working over a wide range of pressures and flow rates.
The valve basically consists of the valve body (1), poppet with damping spool (2) and compression spring (3). Pressure is manually set by an adjustment screw (4). The spring pushes the poppet into the seat (5) holding the valve in its normally closed position. When the force, caused by the pressure acting on the exposed surface area of the poppet, exceeds the spring force, the valve opens and the flow passes from port P to port T. To optimize the valve performance, five pressure ranges are available. Choosing the closest range is recommended. The design enables the valve to be used as a screw-in cartridge for manifold mounting, built into a hreaded housing or in a subplate mounted housing. Both the threaded and the subplate mounted housings can be delivered either with metric or pipe threads.
The basic surface treatment of the valve body and the adjustment screw are zinc coated.



Ordering Code

VPP1- ☐ **-** ☐ ☐ **/** ☐ ☐

Direct operated relief pressure valve

Nominal size

Size 06	**06**
Size 08 - only models M and G valve is congruent with size 10	**08**
Size 10	**10**

Adjustment option

Hexagon set screw locknut 0.197 in (5 mm)	**S**
Adjustable handknob	**R**
Lockable cylindrical handknob	**O**
Non-lockable cylindrical handknob	**Z**

Model

V	screw-in cartridge valve
M	cartridge in threaded housing - with metric threads
G	cartridge in threaded housing - with BSP threads
P	cartridge in subplate mounted housing

Pressure range in PSI (bar)

2.5	up to 363 (25)
6.3	up to 913 (63)
10	up to 1450 (100)
16	up to 2321 (160)
25	up to 3625 (250)
32	up to 4641 (320)

Seals

without designation	NBR
V	FPM (Viton)

Technical Data

Nominal size	mm	06	10
Maximum flow	US GPM (L/min)	13.2 (50)	4.724 (120)
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP RP 91H in viscosity classes ISO VG 32, 46 and 68	
Fluid temperature range for standard sealing (NBR)	°F (°C)	-22 ... +176 (-30 ... +80)	
Fluid temperature range for Viton seals (FPM)	°F (°C)	-4 ... +176 (-20 ... +80)	
Viscosity range	SUS (mm^2/s)	98 ... 1840 (20 ... 400)	
Maximum degree of fluid contamination		Class 21/18/15 to ISO 4406 (1999)	
Weight - screw-in cartridge valve other models	lbs (kg)	0.879 (0.4) 3.297 (1.5)	1.099 (0.5) 8.132 (3.7)
Mounting position		optional	

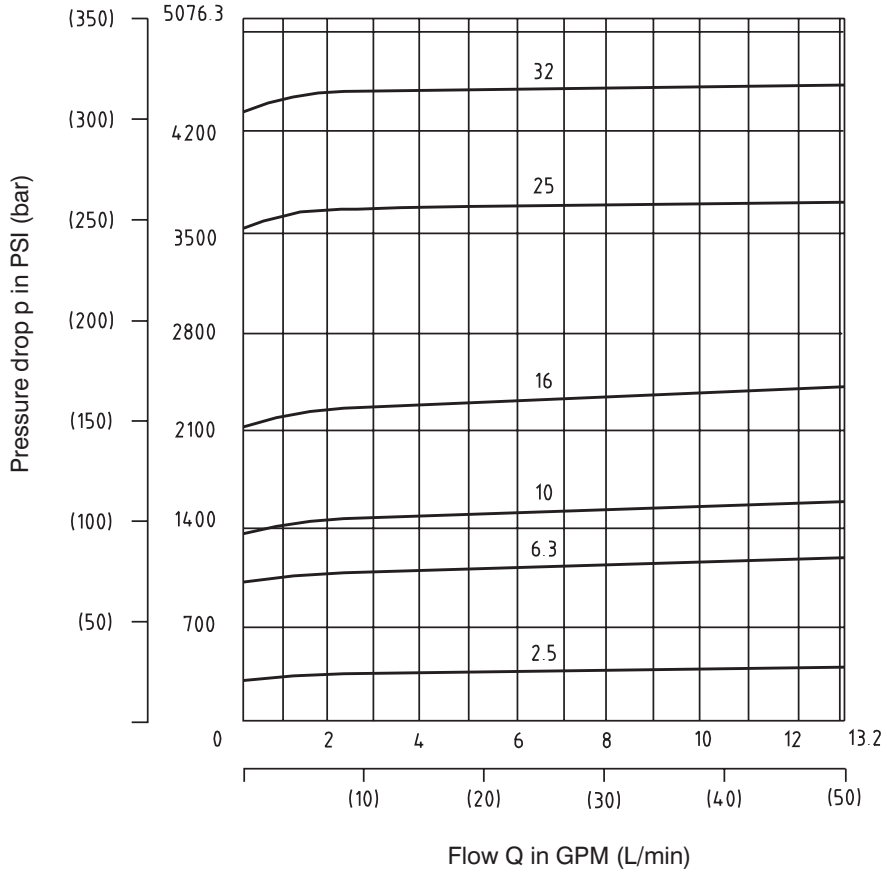
Caution!

- The packing foil is recyclable.
- For applications outside these parameters, please consult the manufacturer.
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law.

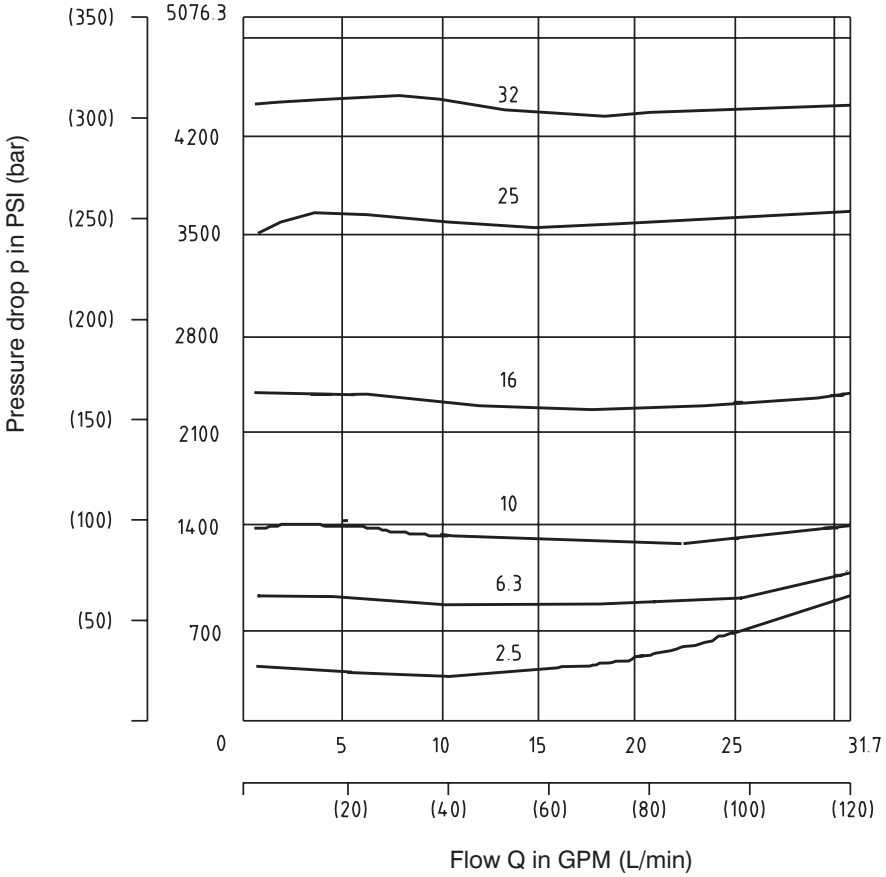
Δp-Q Characteristics

Measured at ν = 166 SUS (35 mm²/s) and t = 104 °F (40 °C)

Size 06



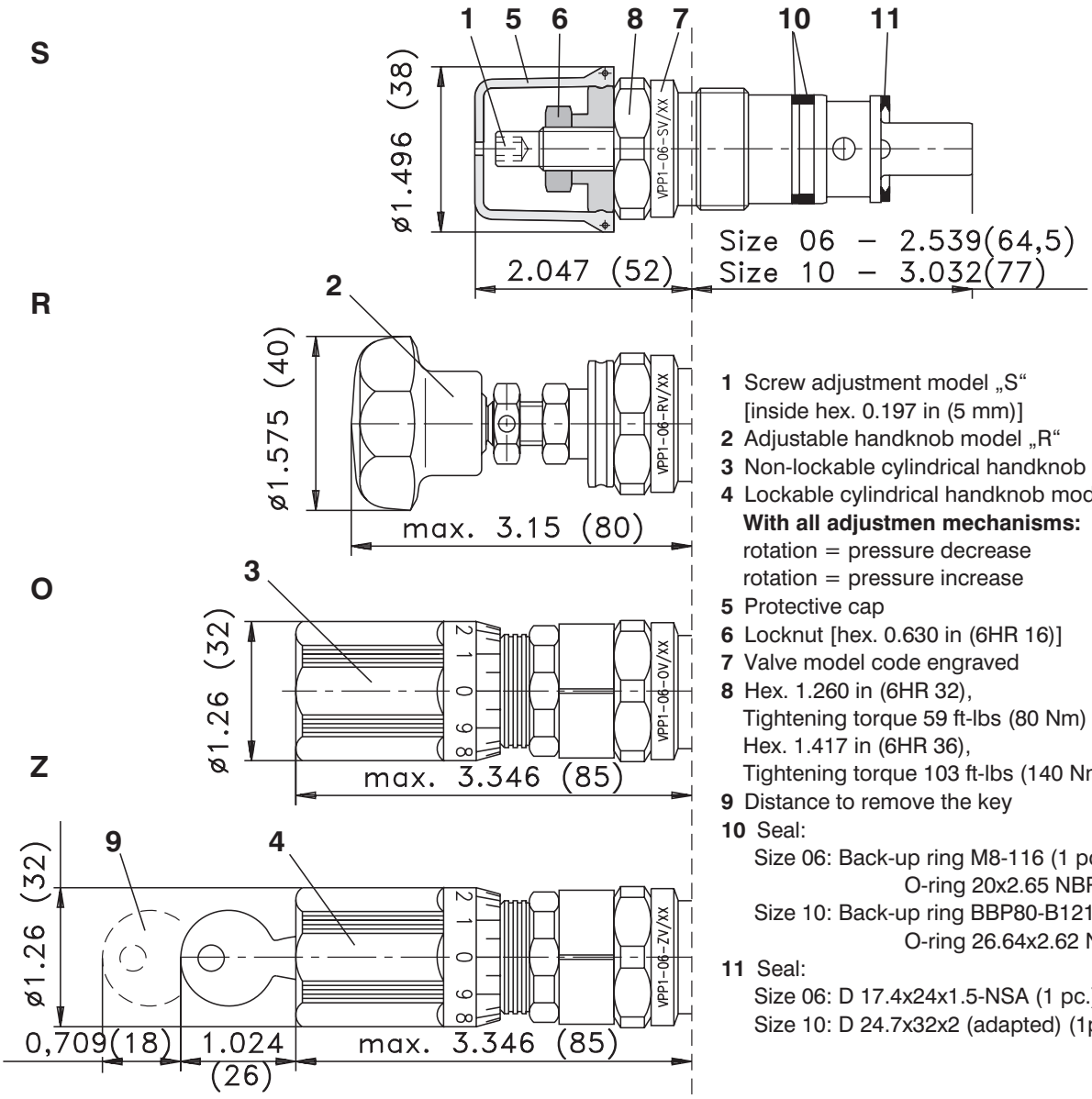
Size 10



Valve Dimensions

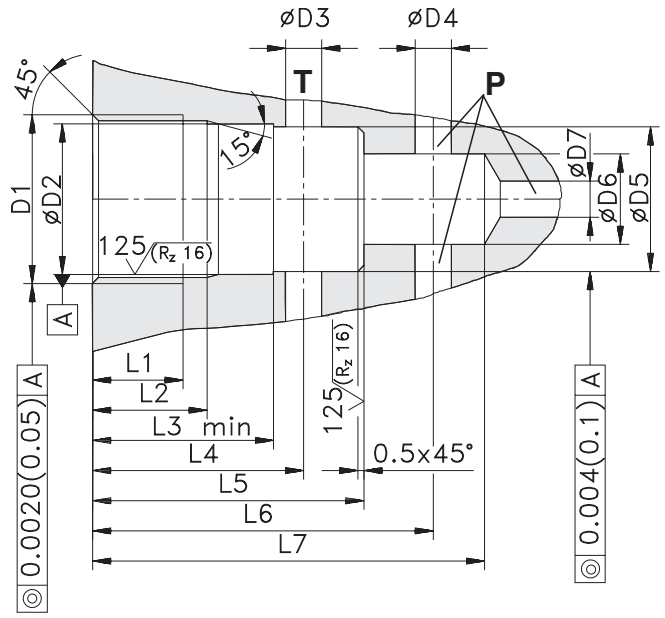
Dimensions in inches and millimeters (in brackets)

Cartridge valve - model „V“



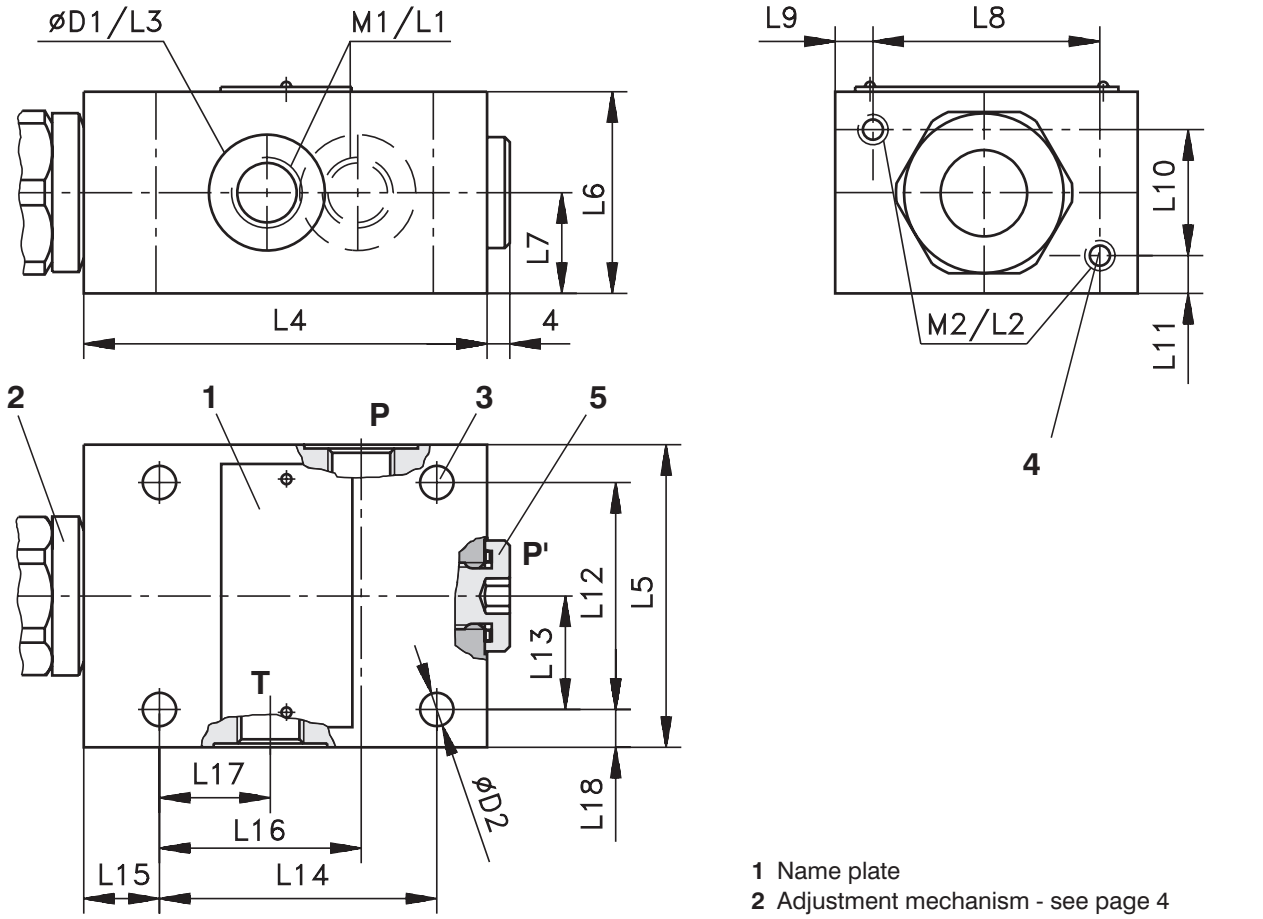
1 Screw adjustment model „S“
[inside hex. 0.197 in (5 mm)]
2 Adjustable handknob model „R“
3 Non-lockable cylindrical handknob model „O“
4 Lockable cylindrical handknob model „Z“
With all adjustmen mechanisms:
rotation = pressure decrease
rotation = pressure increase
5 Protective cap
6 Locknut [hex. 0.630 in (6HR 16)]
7 Valve model code engraved
8 Hex. 1.260 in (6HR 32),
Tightening torque 59 ft-lbs (80 Nm) for Size 06
Hex. 1.417 in (6HR 36),
Tightening torque 103 ft-lbs (140 Nm) for Size 10
9 Distance to remove the key
10 Seal:
Size 06: Back-up ring M8-116 (1 pc.)
O-ring 20x2.65 NBR70 (1 pc.)
Size 10: Back-up ring BBP80-B121-N9 (1 pc.)
O-ring 26.64x2.62 NBR70 (1 pc.)
11 Seal:
Size 06: D 17.4x24x1.5-NSA (1 pc.)
Size 10: D 24.7x32x2 (adapted) (1pc.)

Installation Cavity



	Size 06	Size 10
	Dimensions in inches (millimeters)	Dimensions in inches (millimeters)
D1	M28x1.5	M35x1.5
∅D2	0.984+0.0021 (25 H9)	1.260+0.0021 (32 H9)
∅D3	0.236 (6)	0.394 (10)
∅D4	0.236 (6)	0.394 (10)
∅D5	0.980 (24.9)	1.256 (31.9)
∅D6	0.591 (15)	0.728 (18.5)
∅D7	0.236 (6)	0.394 (10)
L1	0.591 (15)	0.709 (18)
L2	0.748 (19)	0.906 (23)
L3	1.260 (32)	1.378 (35)
L4	1.378 (35)	1.614 (41)
L5	1.772(45)	2.047 (52)
L6	2.224±0.217 (56.5±5.5)	2.658±0.295 (67.5±7.5)
L7	2.560 (65)	3.150 (80)

Cartridge in threaded housing - models „M“ and „G“

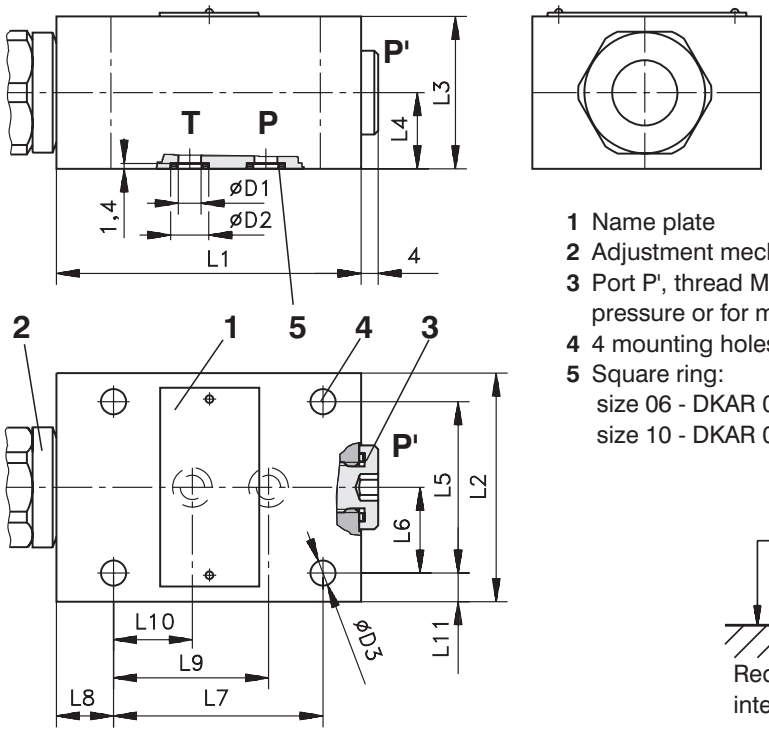


1 Name plate
2 Adjustment mechanism - see page 4
3 4 mounting holes
4 2 threaded holes (other mounting possibility)
5 Port P', thread G 1/4 can be used as input pressure or for measuring

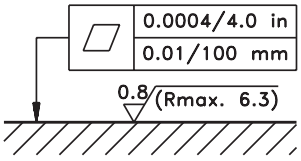
Model	**M1**	**M2**	**⌀D1**	**⌀D2**	**L1**	**L2**	**L3**	**L4**	**L5**	**L6**
VPP1-06-xM/x	M14 x 1.5	M6	0.984 (25)	0.260 (6.6)	0.472 (12)	0.394 (10)	0.020 (0.5)	3.150 (80)	2.362 (60)	1.575 (40)
VPP1-06-xG/x	G 1/4									
VPP1-08-xM/x	M18 x 1.5	M8	1.181 (30)	0.354 (9)	0.630 (16)	0.787 (20)		3.937 (100)	3.150 (80)	2.362 (60)
VPP1-08-xG/x	G 3/8		1.102 (28)							
VPP1-10-xM/x	M22 x 1.5		1.339 (34)							
VPP1-10-xG/x	G 1/2									

Model	**L7**	**L8**	**L9**	**L10**	**L11**	**L12**	**L13**	**L14**	**L15**	**L16**	**L17**	**L18**
VPP1-06-xM/x	0.787 (20)	1.770 (45)	0.295 (7.5)	0.984 (25)	0.295 (7.5)	1.772 (45)	0.886 (22.5)	2.165 (55)	0.591 (15)	1.575 (40)	0.787 (20)	0.295 (7.5)
VPP1-06-xG/x												
VPP1-08-xM/x	1.181 (30)	2.362 (60)	0.394 (10)	1.575 (40)	0.394 (10)	2.362 (60)	1.181 (30)	2.756 (70)	0.787 (20)	1.929 (49)	0.827 (21)	0.394 (10)
VPP1-08-xG/x												
VPP1-10-xM/x												
VPP1-10-xG/x												

Cartridge in subplate mounted housing - model „P“



1 Name plate
2 Adjustment mechanism - see page 4
3 Port P', thread M1/H1 can be used as input pressure or for measuring
4 4 mounting holes
5 Square ring:
size 06 - DKAR 00011 [7.65x1.68 (2 pcs.)]
size 10 - DKAR 00014 [12.42x1.68 (2 pcs.)]



Required surface finish of interface

Model	M1	H1	∅D1	∅D2	∅D3	L1	L2	L3
VPP1-06-xP/x	G 1/4	0.472 (12)	0.236 (6)	0.425 (10.8)	0.260 (6.6)	3.150 (80)	2.362 (60)	1.575 (40)
VPP1-10-xP/x			0.394 (10)	0.614 (15.6)	0.354 (9)	3.937 (100)	3.150 (80)	2.362 (60)

Model	L4	L5	L6	L7	L8	L9	L10	L11
Vpp1-06-xP/x	0.787 (20)	1.772 (45)	0.886 (22.5)	2.165 (55)	0.591 (15)	1.575 (40)	0.787 (20)	0.295 (7.5)
Vpp1-10-xP/x	1.181 (30)	2.362 (60)	1.181 (30)	2.756 (70)	0.787 (20)	1 772 (45)	0.827 (21)	0.394 (10)

Spare Parts

Accessories (delivered with subplate model „P“)

	Bolt kit	Square ringe
Size 06	M6x50 DIN 912-10.9 (4 pcs.) Tightening torque 6.6 ft-lbs (8.9 Nm)	DKAR 00011 7.65 x 1.68 (2 pcs.)
Size 10	M8x70 DIN 912-10.9 (4 pcs.) Tightening torque 11.13 ft-lbs (15 Nm)	DKAR 00014 12.42 x 1.68 (2 pcs.)

Seak kit for cartridge valve

Type		Dimensions, quantity			Ordering number
		O-ring	Back-up ring	U-Seal	
Size 06	Standard NBR	8 x 1.8 (1 pc.)	19.43 x 23.79 x 1.14 (1 pc.)	17.4 x 24 x 1.5 (1 pc.)	551-0091
		20 x 2.65 (1 pc.)	-	-	
		20 x 2 (1 pc.)	-	-	
	Viton	20 x 2 (1 pc.)	19.43 x 23.79 x 1.14 (1 pc.)	17.4 x 24 x 1.5 (1 pc.)	551-0089
		20.29 x 2.62 (1 pc.)	-	-	
		7.65 x 1.78 (1 pc.)	-	-	
Size 10	Standard NBR	8 x 1.8 (1 pc.)	BBP 80-B121-N9 (1 pc.)	24.7 x 32 x 2 (1 pc.)	551-0092
		20 x 2 (1 pc.)	-	-	
		26.64 x 2.62 (1 pc.)	-	-	
	Viton	20 x 2 (1 pc.)	BBP 80-B121 (1 pc.)	24.7 x 32 x 2 (1 pc.)	551-0090
		7.65 x 1.78 (1 pc.)	-	-	
		26.64 x 2.62 (1 pc.)	-	-	

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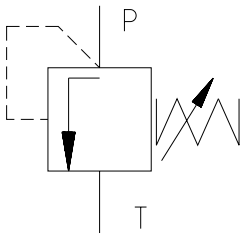
Directly operated pressure relief valves

VPP2-06

Size 06 p_{max} up to 320 bar Q_{max} up to 50 L/min

HA 5062
2/99

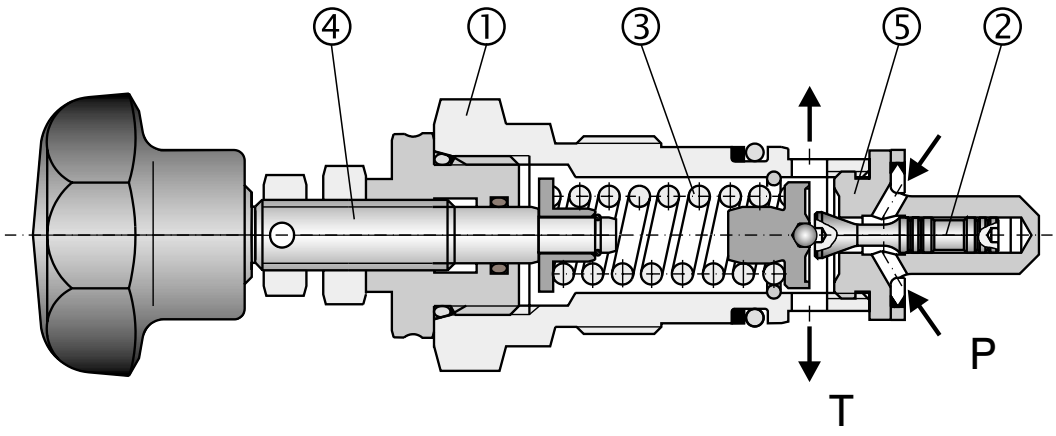
Replaces
HA 5062 3/97



- **Single-stage pressure relief valve**
- **Cartrige in threaded housing - with metric or BSP threads**
- **Cartrige in subplate mounted housing**
- **Four pressure adjustment options**
- **Six pressure ranges**
- **Subplates - see catalogue HA 0002**

Functional Description

Pressure relief valves VPP2-06 were designed for applications requiring a safety valve or a pressure regulating valve working over a wide range of pressures and flow rates.
The valve basically consists of the valve body (1), poppet with damping spool (2) and compression spring (3). Pressure is manually set by an adjustment screw (4). The spring pushes the poppet into the seat (5) holding the valve in its normally closed position. When the force, caused by the pressure acting on the exposed surface area of the poppet, exceeds the spring force, the valve opens and the flow passes from port P to port T.
To optimize the valve performance, five pressure ranges are available. Choosing the closest range is recommended. The design enables the valve to be used as a screw-in cartridge for manifold mounting, built into a hreaded housing or in a subplate mounted housing. Both the threaded and the subplate mounted housings can be delivered either with metric or pipe threads.



Ordering Code

VPP2-06 [ ] [ ] / [ ]

Direct operated relief pressure valves

Nominal size

Adjustment option

Hexagon set screw locknut 5 mm	**S**
Adjustable handknob	**R**
Lockable cylindrical handknob	**O**
ANon-lockable cylindrical handknob	**Z**

Pressure range

2.5	up to 25 bar
6.3	up to 63 bar
10	up to 100 bar
16	up to 160 bar
25	up to 250 bar
32	up to 320 bar

Model

V	screw-in cartridge valve
M	cartridge in threaded housing - with metric threads
G	cartridge in threaded housing - with BSP threads
P	cartridge in subplate mounted housing

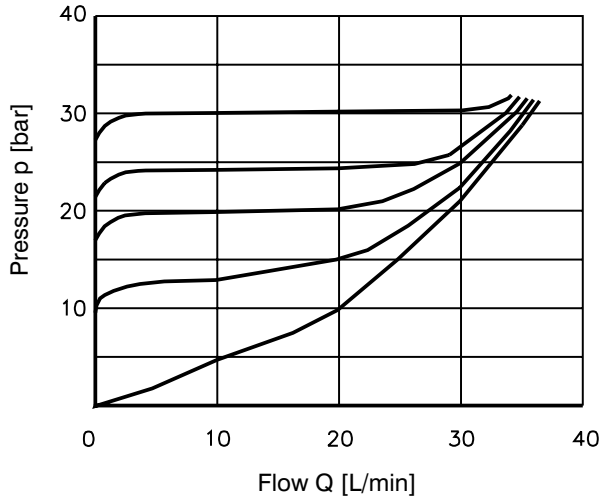
Technical Data

Nominal size	mm	06					
Maximal flow rate	L/min	50					
Maximum pressure	bar	25	63	100	160	250	320
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP - RP 91H in viscosity classes ISO VG 32, 46 and 68					
Fluid temperature range	°C	-30 ... +80					
Viscosity range	mm^2/s	20 ... 400					
Maximum degree of fluid contamination		Class 21/18/15 to ISO 4406 (1999).					
Weight	kg	0,4 1,5					
Mounting position		optional					

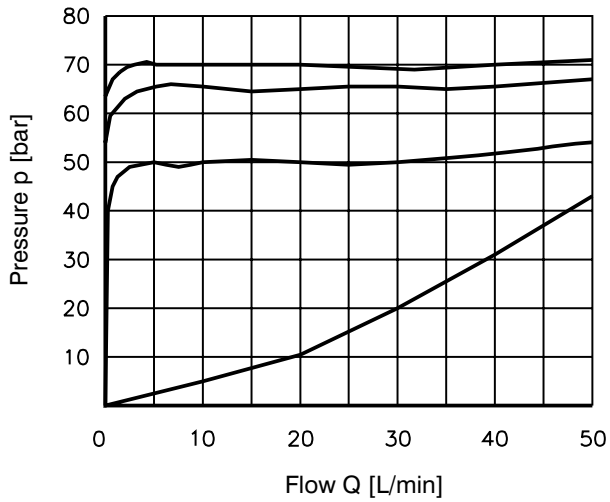
p-Q Characteristics

Measured at ν = 35 mm^2/s and t = 40 °C

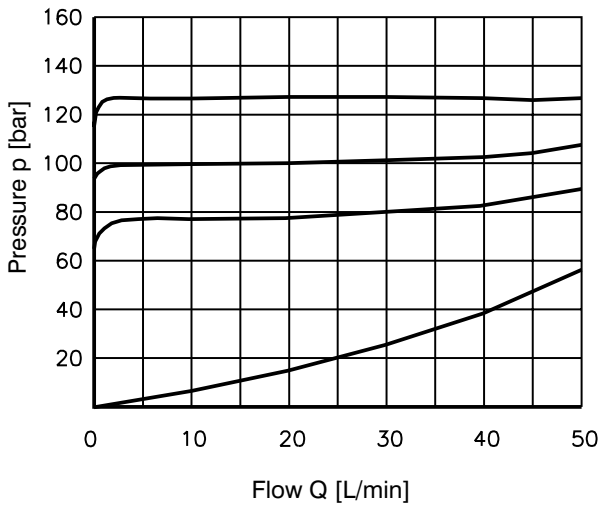
Pressure range 25 bar



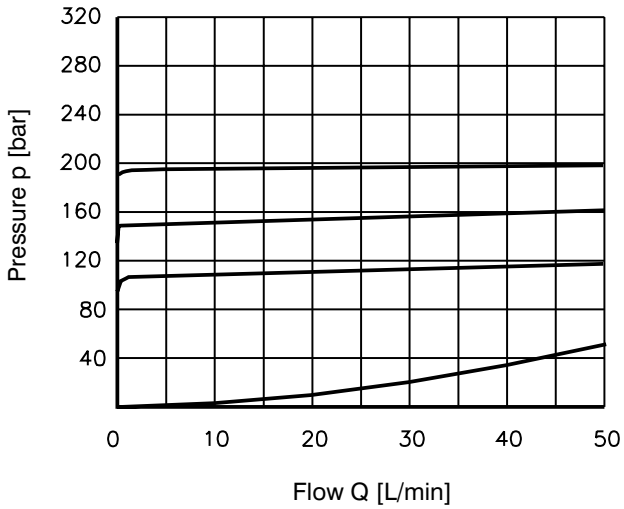
Pressure range 63 bar



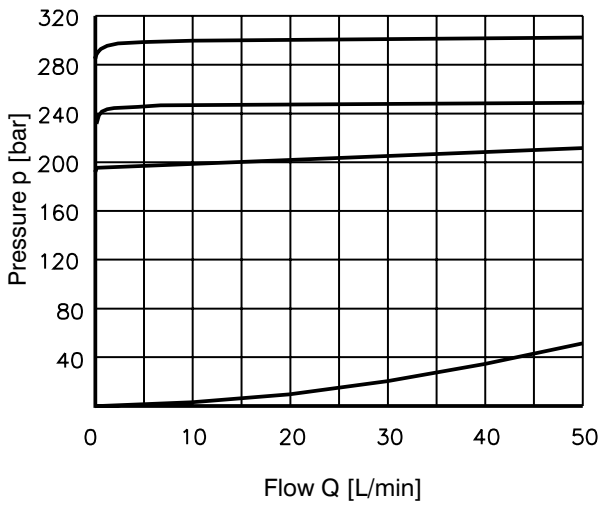
Pressure range 100 bar



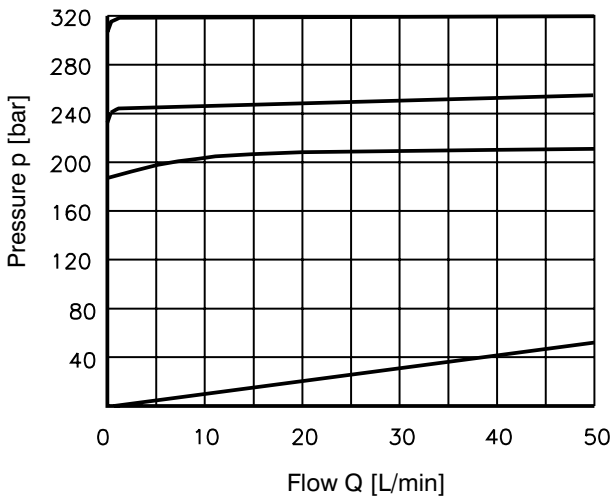
Pressure range 160 bar



Pressure range 250 bar



Pressure range 320 bar

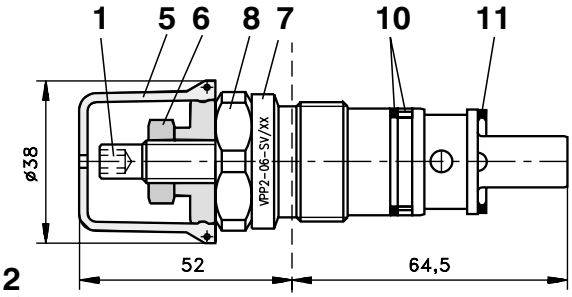


Valve Dimensions

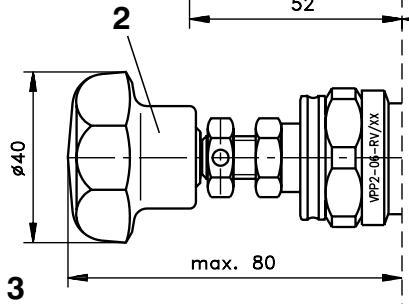
Dimensions in millimeters

Cartridge valve - model "V"

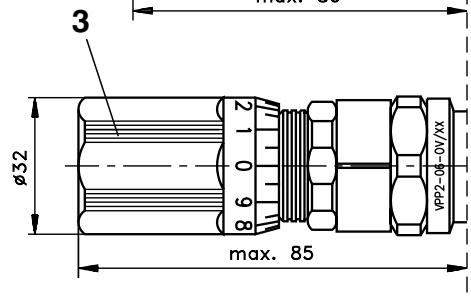
S



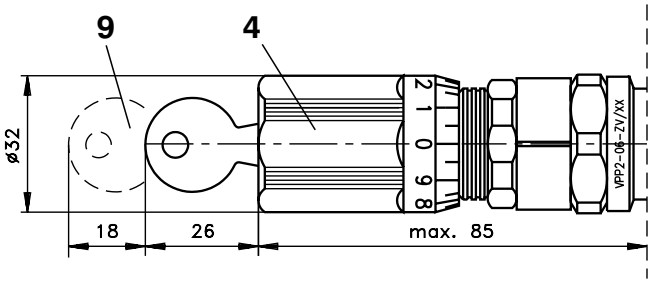
R



O

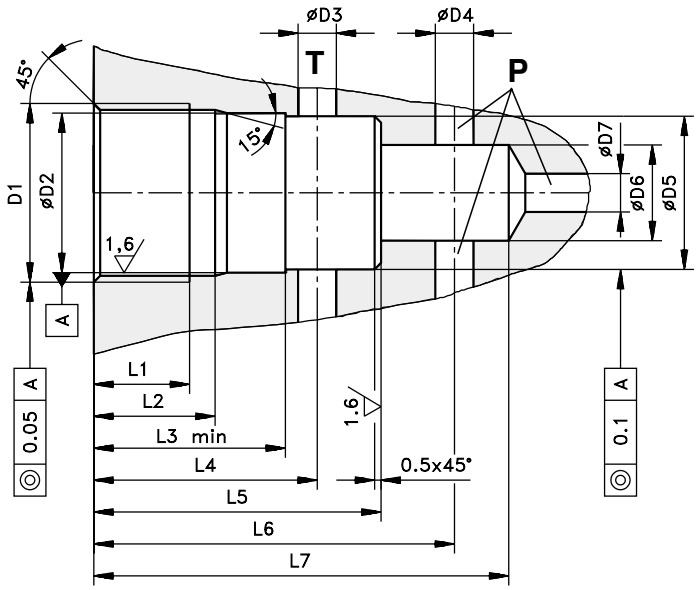


Z



1 Screw adjustment model "S" (inside hex. 5 mm)
2 Adjustable handknob model "R"
3 Non-lockable cylindrical handknob model "O"
4 Lockable cylindrical handknob model "Z"
With all adjustmen mechanisms:
rotation = pressure decrease
rotation = pressure increase
5 Protective cap
6 Locknut (hex. 6HR 16)
7 Valve model code engraved
8 Hex. 6HR 32, tightening torque 80 Nm
9 Distance to remove the key
10 Seal: Back-up ring M8-116
O-ring 20 x 2.65 NBR70
supplied with valve
11 Seal: D 17.4 x 24 x 1.5-NSA
supplied with delivery

Mounting Cavity

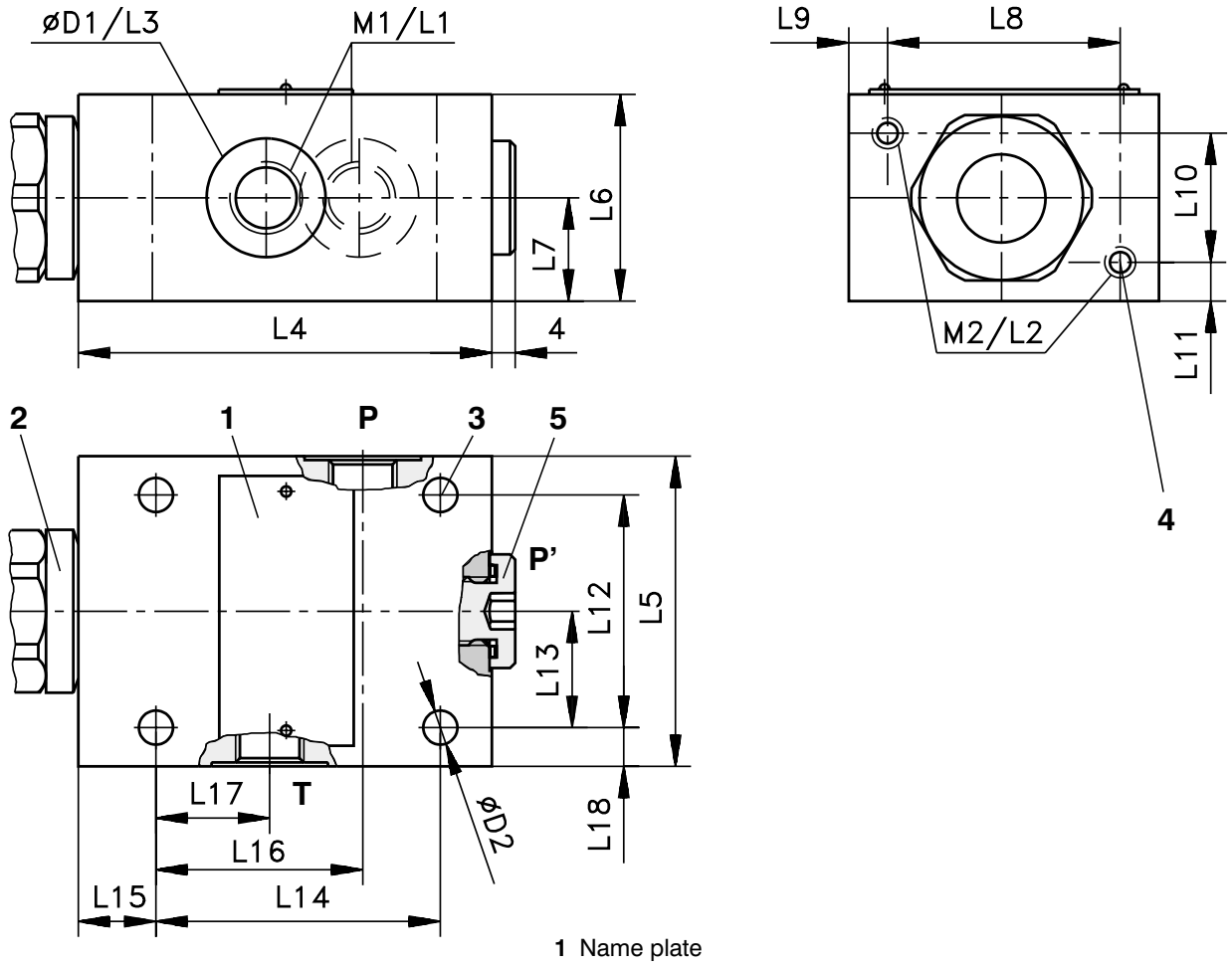


	D1	D2	D3	D4	D5	D6	D7	L1	L2	L3	L4	L5	L6	L7
Size 06	M28x1.5	25 H9	6	6	24.9	15	6	15	19	32	35	45	56.5±5.5	65

Valve Dimensions

Dimensions in millimeters

Cartridge in threaded housing - models "M" and "G"



1 Name plate
2 Adjustment mechanism - see page 4
3 4 mounting through - holes
4 2 threaded holes (other mounting possibility)
5 Port P' (either P or P' can be used as input port), thread M1 / L1

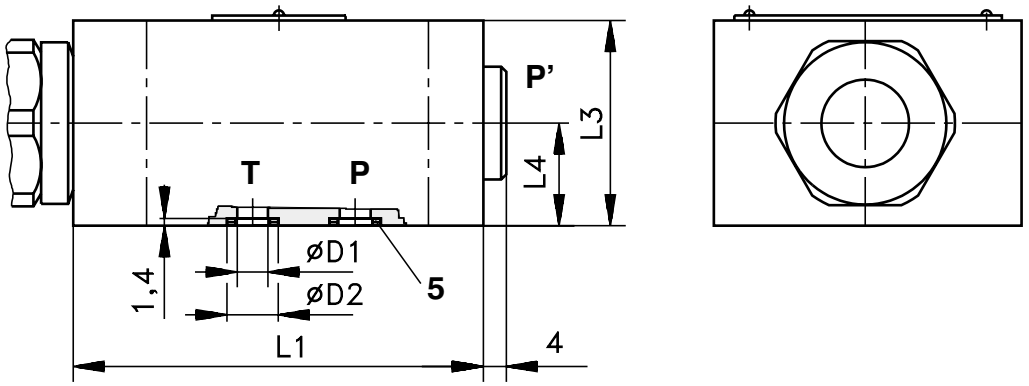
Model	M1	M2	D1	D2	L1	L2	L3	L4	L5	L6	L7
VPP2-06-xM/x	M14x1.5	M6	25	6.6	12	10	0.5	80	60	40	20
VPP2-06-xG/x	G1/4										

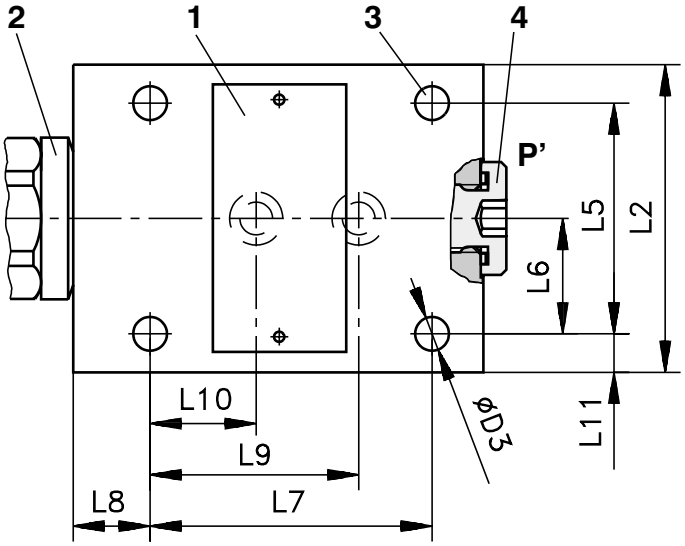
Model	L8	L9	L10	L11	L12	L13	L14	L15	L16	L17	L18
VPP2-06-xM/x	45	7.5	25	7.5	45	22.5	55	15	40	20	7.5
VPP2-06-xG/x											

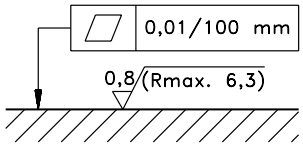
Valve Dimensions

Dimensions in millimeters

Cartridge in subplate mountedhousing - model "P"







Required surface finish of interface

1 Name plate
2 Adjustment mechanism - see page 4
3 4 mounting through - holes
4 Port P' (e.g. for pressure measuring), thread M14 x 1.5 deep 12 mm
5 Square ring 7.65 x 1.68 (2 pcs.), supplied with delivery

Model	D1	D2	D3	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	L11
VPP2-06-xP/x	6	10.8	6.6	80	60	40	20	45	22.5	55	15	40	20	7.5

Caution!

- The packing foil is recyclable.
- The protective plate can be returned to manufacturer.
- For model "P" is mounting bolts M6 x 50 DIN 912-10.9 are supplied with delivery. Tightening torque of the screws
- is 8.9 Nm.
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law.

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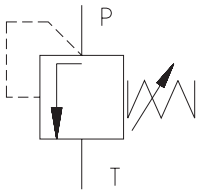
Directly Operated Pressure Relief Valves

SR1A-A2

3/4-16 UNF • p_{max} 350 bar (5076 PSI) • Q_{max} 30 L/min (7,9 GPM)

HA 5063
1/2005



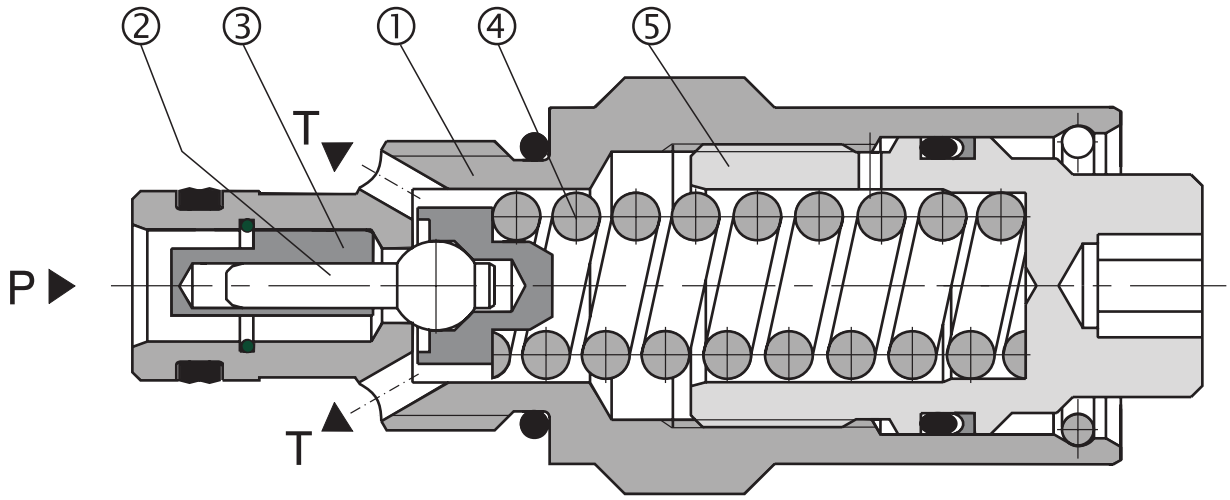
- ❑ **Screw-in cartridge design**
- ❑ **4 pressure ranges**
- ❑ **Pressure setting by hexagon socket**

Functional Description

The directly operated pressure relief valve SR1A-A2 consists basically of the valve housing (1), ball with damping spool (2), damping bush (3), spring (4) and setting screw (5). The pressure setting is accomplished by setting screw (5) with hexagon socket. The spring pushes the ball into the valve seat created directly in the valve housing and holds the valve closed. When the pressure in port P exceeds the pressure magnitude set by the setting screw, the ball is lifted up from the seat and the fluid flows out to port T. To optimize the valve performance, the whole pressure range is divided into 4 pressure ranges. Choosing the next higher pressure range is always recommended.

In basic version the valve housing and the setting screw are zinc coated.

Cartridge Valve



Ordering Code

SR1A-A2 / S □ □

Directly operated pressure relief valve

Standard **S**

Pressure range

10 up to 100 bar (1450 PSI)
16 up to 160 bar (2320 PSI)
25 up to 250 bar (3626 PSI)
35 up to 350 bar (5076 PSI)

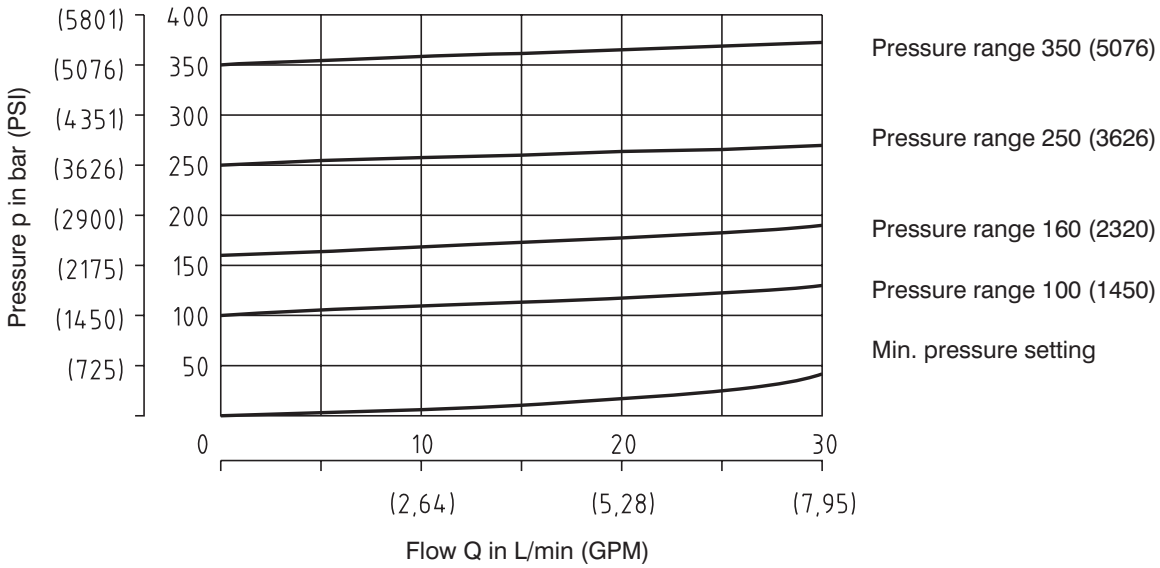
Polyuretan, Viton **V**
Polyuretan, NBR **Without designation**

Technical Data

Cartridge thread		3/4 - 16 UNF - 2B			
Max. flow rate	L/min (GPM)	30 (7,9)			
Max. input pressure (port P)	bar (PSI)	100 (1450)	160 (2320)	250 (3626)	350 (5076)
Max. output pressure (port T)	bar (PSI)	160 (2320)			
Working pressure related to flow	bar (PSI)	see p-Q characteristics			
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP - RP 91H in viscosity classes ISO VG 32, 46 and 68.			
Fluid temperature range for standard sealing (NBR)	°C (°F)	-20 ... +80 (-4 ... +176)			
Fluid temperature range for Viton sealing (FPM)	°C (°F)	-20 ... +80 (-4 ... +176)			
Viscosity range	mm^2/s (SUS)	20 ... 500 (98 ... 2450)			
Max. degree of fluid contamination		Class 21/18/15 according to ISO 4406 (1999).			
Weight	kg (lbs)	0,13 (2,866)			
Maximum valve tightening torque		30^{+2}Nm			
Mounting position		optional			

p-Q Characteristics

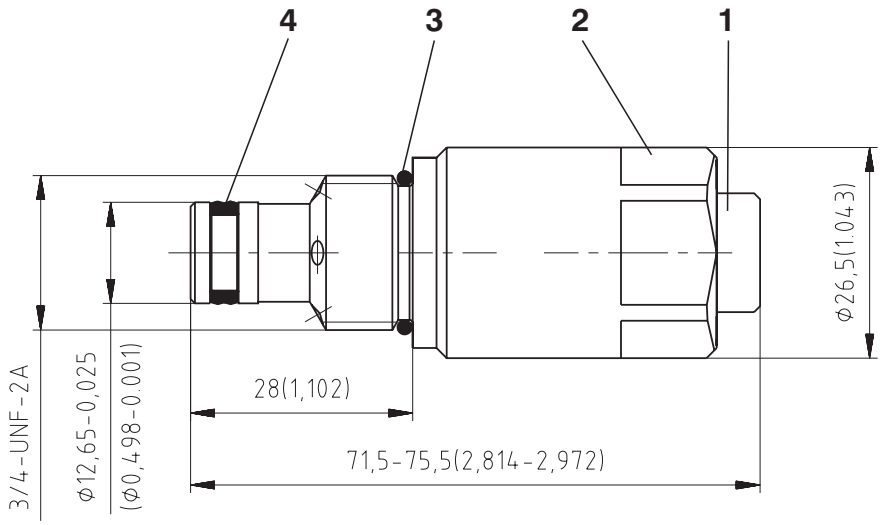
Measured at $\nu = 35\ mm^2/s$ (171 SUS)



Valve Dimensions

Dimensions in millimetres (inches)

Screw-in Cartridge Design



1 Adjustment element (screw with internal hexagon 6 mm)
Clockwise rotation = pressure increase
Anticlockwise rotation = pressure decrease

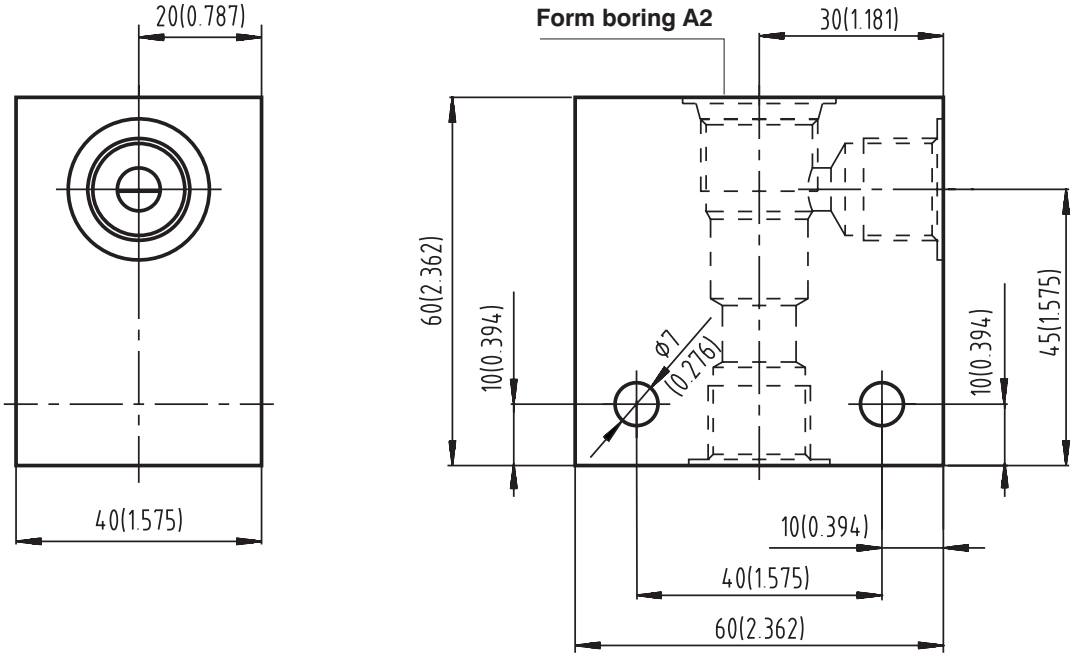
2 Wrench flats s = 24 mm
- tightening torque 30 Nm

3 O-ring 17 x 1,8
(supplied with valve)

4 Combined sealing:
Dualseal DRYZ000004Z20
10,3 x 12,7 x 3,1
(supplied with valve)

Valve Body

Dimensions in millimetres (inches)

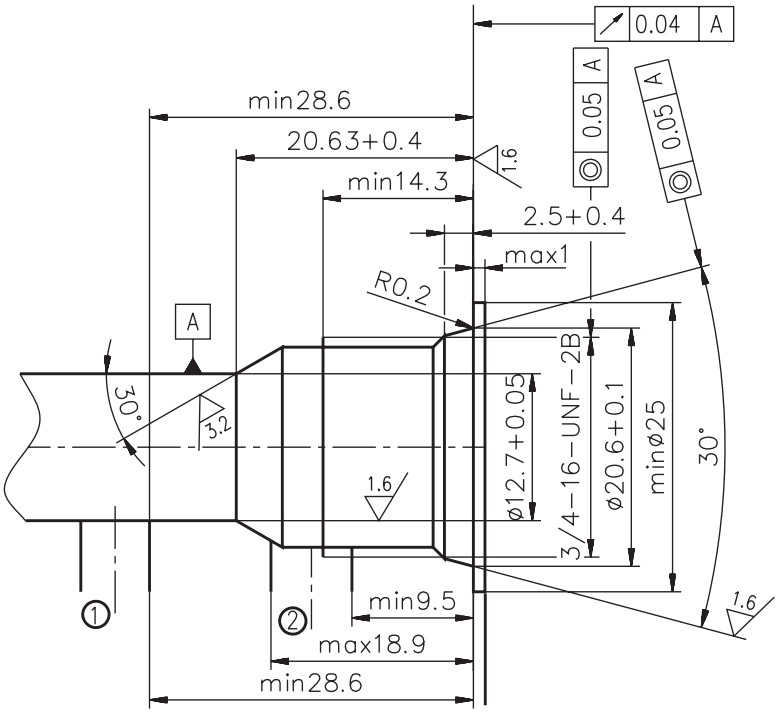


Body material	Connecting size	Type code	Operating pressures
Steel	G3/8	SB-A2-0103ST	420 bar (6092 PSI)
Steel	SAE 6	SB-A2-0102ST	420 bar (6092 PSI)
Aluminium	G3/8	SB-A2-0103AL	250 bar (3626 PSI)
Aluminium	SAE 6	SB-A2-0102AL	250 bar (3626 PSI)

Note:
- For detailed valve body ordering code refer to data sheet HA 0018

Installation Cavity

Dimensions in millimetres (inches)



Spare Parts

Seal kit				Order number
Dualseal - PU	**O-ring - NBR**	**O-ring - NBR**	**Back-up ring - NBR**	513-0604
10,3 x 12,7 x 3,1 (1pc.)	17 x 1,8 (1pc.)	17,17 x 1,78 (1pc.)	16,33 x 19,03 x 1,14 (1pc.)	
Dualseal - PU	**O-ring - Viton**	**Back-up ring - Viton**		513-0599
10,3 x 12,7 x 3,1 (1pc.)	17,17 x 1,78 (2pcs.)	16,33 x 19,03 x 1,14 (1pc.)		

Caution!

- The packing foil is recyclable.
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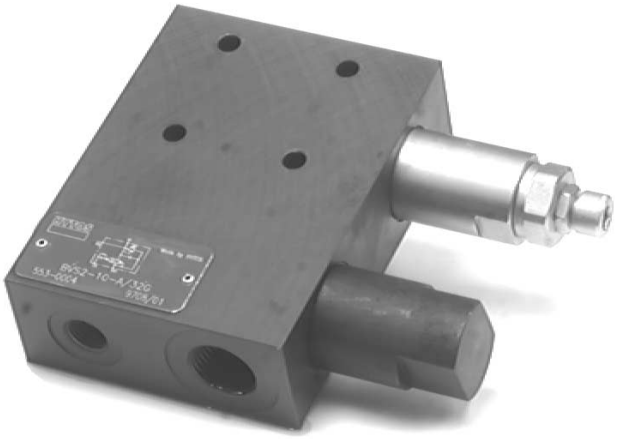
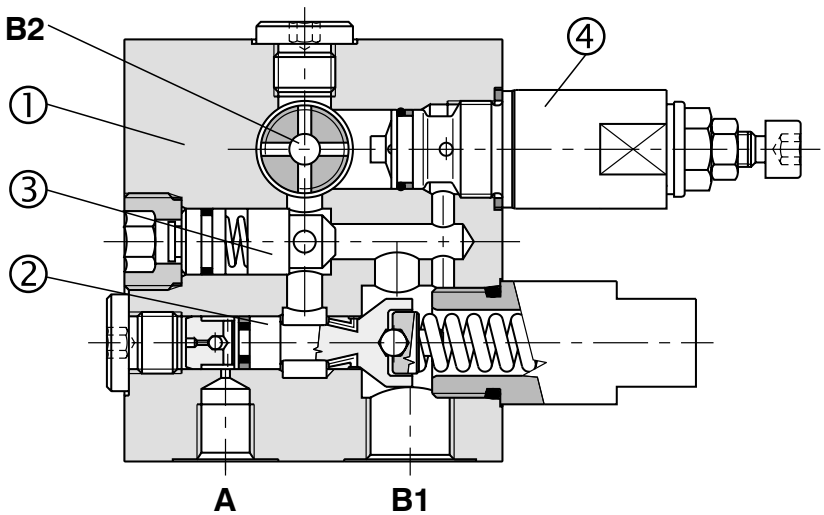
HYTOS	*COUNTERBALANCE AND ANTI-BURST VALVES*	***BVS2-10***	**HA 5081 11/98**
	Size 10	...4641 PSI (320 bar)	...11.9 US GPM (45 L/min)	Replaces HA 5081 8/95

- **Automatic load counterbalancing**
- **Holds load after pipe or hose failure**
- **By-pass valve in the lifting direction**
- **Leakage free**
- **Direct mounting on the hydraulic motor or cylinder**



Functional Description

The counterbalance valve prevents the load moving due to leaks or hose burst, but allows normal operation using by-pass spool and has built in relief valve protection. The valve also provides velocity control on descending load.
It consists of valve body (1), balancing spool (2), by-pass valve (3) and relief valve (4). The valve assembly is mounted directly on to the actuator or motor using hydraulic gasket or a hollow bolt connection. Direct mounting eliminates pipes and hoses that may fail.
When lifting the load, the fluid passes from port B1 through the check valve and port B2 to the consumer. During sinking, the flow directions is opposite - from B2 to B1. The check valve is closed and the flow to the output B1 is not possible until after the balancing spool is lifted through the input pressure. This pressure is led to port A and acts on the face of the balancing spool. The displacement of the balancing spool is proportional to the cracking pressure corresponding with the load. A low load corresponds with higher cracking pressure and smaller breaking action. At a high load it is the opposite. To ensure the necessary damping of the balancing spool, the input pressure is led to the face of the balancing spool through an annular gap, damping, and a small check valve. This arrangement provides for increased damping in the opening direction.
Pressure relief valve (4) prevents the system from an excessive increase of pressure during fast stopping of the load. This valve can be adjusted over the range from 725 to 4640 PSI (from 50 to 320 bar). In the closed state, a perfect leak free closure is ensured.
The basic surface treatment of the valve housing is phosphate coated, whereas the pressure relief valve is zinc coated.



Ordering Code

BVS2-10 □ / □ □ □

Counterbalance and anti-burst valve

Nominal size

Mounting to consumer - port B2

Flange-model - 4 bolts M6	**A**
Hollow bolt with thread M18 x 1.5	**B**
Hollow bolt with thread M22 x 1.5	**C**
Hollow bolt with thread G1/2	**D**
Hollow bolt with thread G3/8	**E**

without designation	Standard model
S	Special models (according to agreement)

	Port B1	Port A, M
M	M22 x 1.5	M12 x 1.5
G	G1/2	G1/4

Pressure range of the relief valve

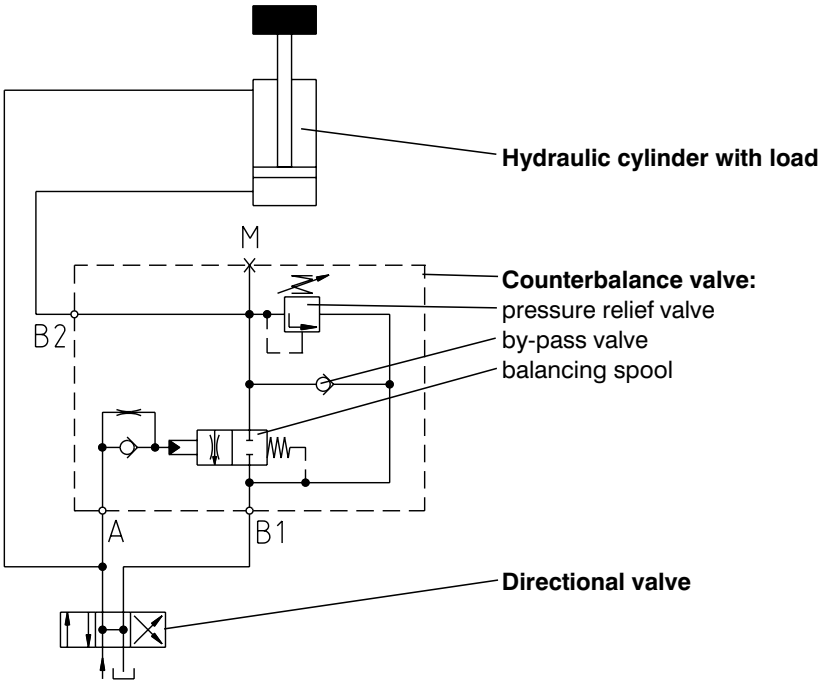
10	1450 PSI (100 bar)
32	4640 PSI (320 bar)

Technical Data

Nominal size	mm	10
Maximum flow	US GPM (L/min)	11.9 (45)
Adjustment of the relief valve	PSI (bar)	725 ... 4640 (50 ... 320)
Pressure losses	PSI (bar)	see performance curves
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP - RP 91H in viscosity classes ISO VG 32, 46 and 68.
Fluid temperature range	°F (°C)	-22 ... +176 (-30 ... +80)
Viscosity range	SUS (mm^2/s)	96 ... 1840 (20 ... 400)
Maximum degree of fluid contamination		Class 18/15 to ISO 4406. Therefore we recommend a filter with a retention rate $\beta_{10} \geq 75$.
Weight	lbs (kg)	5.7 (2.6)
Mounting position		optional

Hydraulic Circuit

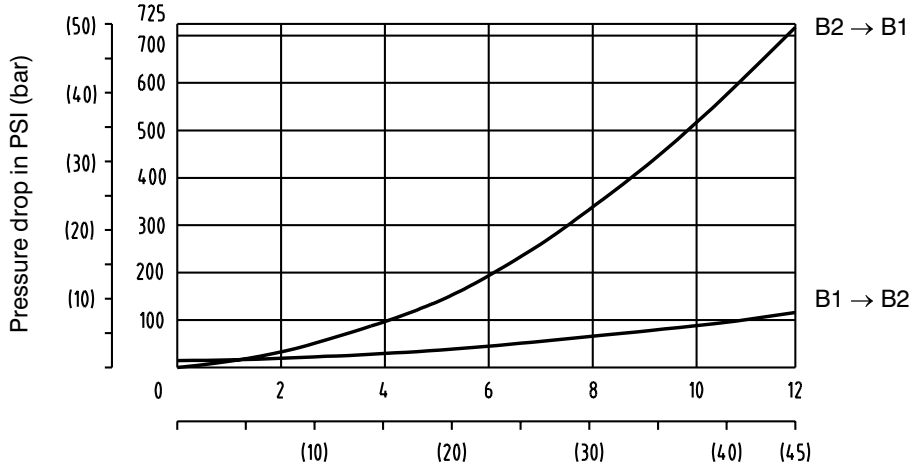
Typical circuit



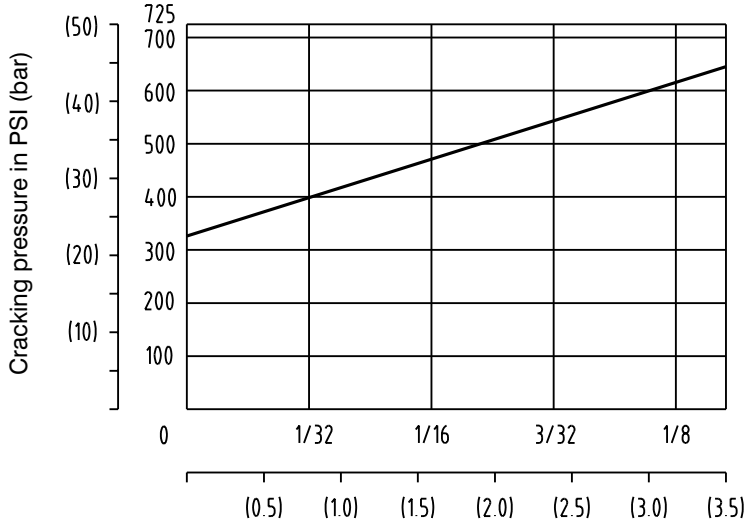
Δp-Q Characteristics

Measured at ν = 166 SUS (35 mm²/s) and t = 104 °F (40 °C)

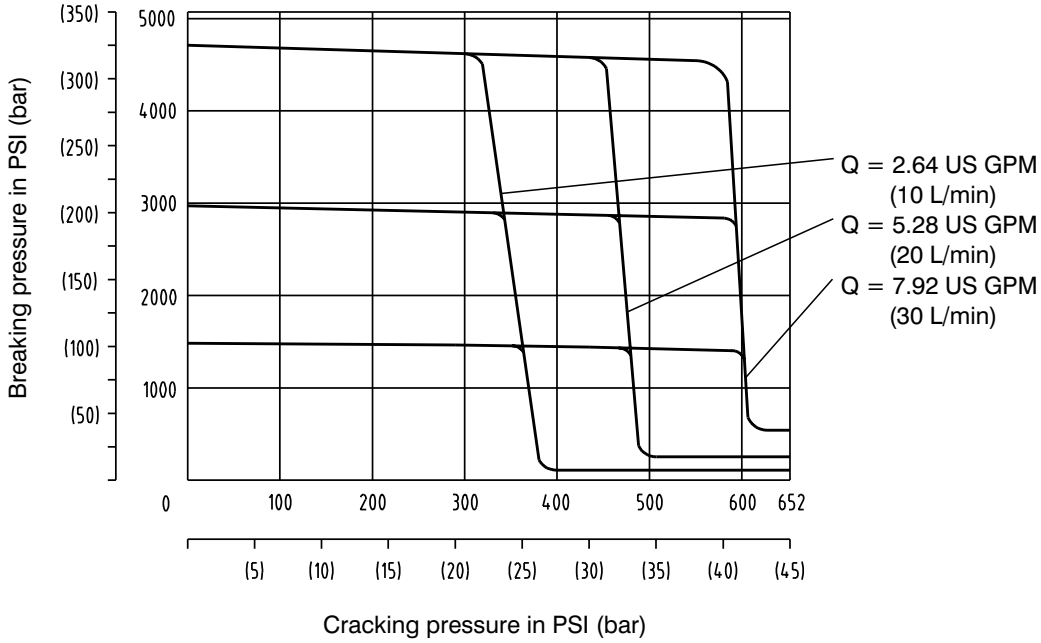
Pressure losses



Cracking pressure related to balancing spool displacement



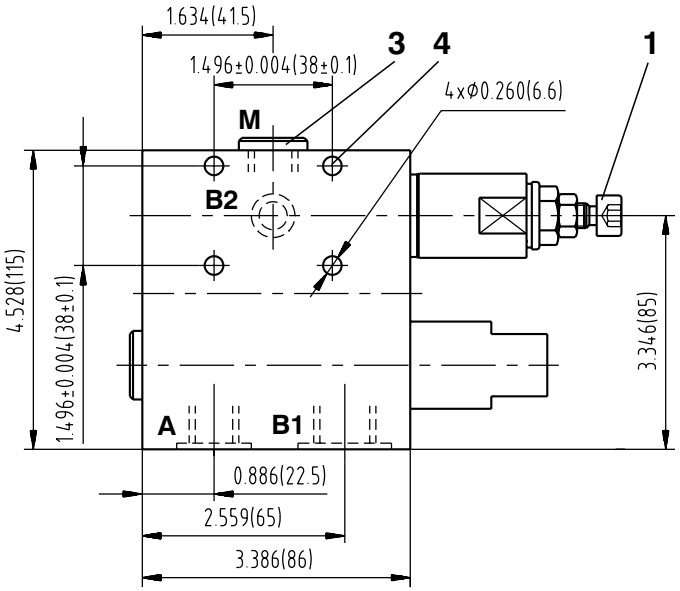
Breaking pressure related to cracking pressure



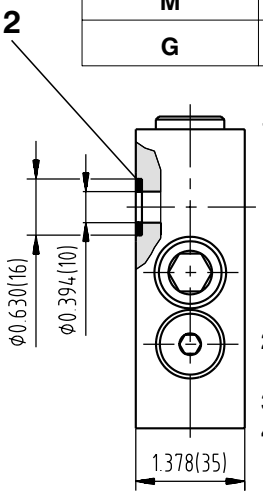
Valve Dimensions

Dimensions in inches and millimeters (in brackets)

Model A - flange (4 bolts M6)



Model	A, M	B1
M	M12 x 1.5	M22 x 1.5
G	G1/4	G1/2



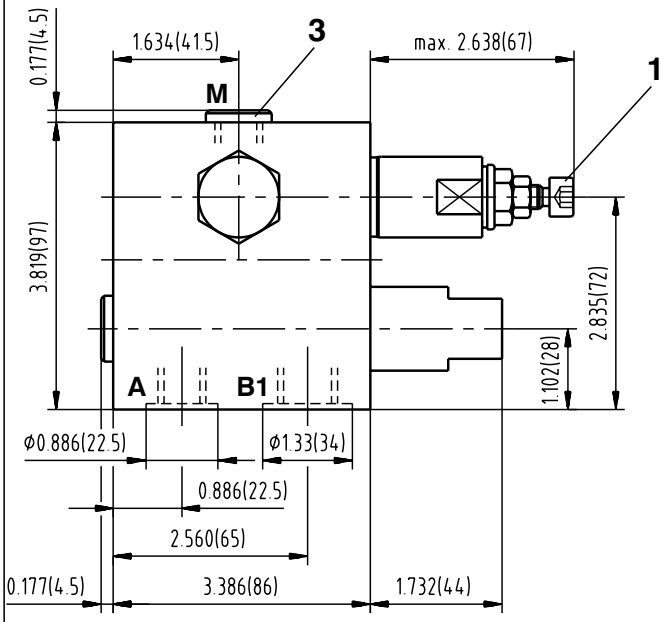
1 Adjustment element for relief valve (screw with inside hexagon 6 mm)
- anticlockwise rotation = = pressure decrease
- clockwise rotation = = pressure increase

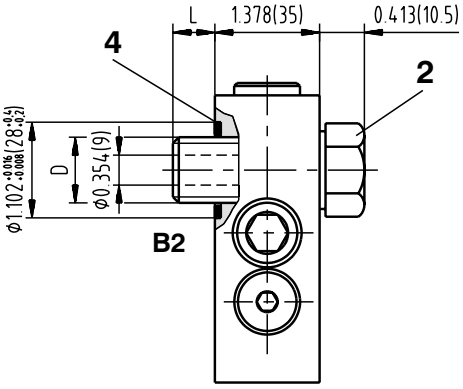
2 Sealing ring 12.42 x 1.78 (1 pc) supplied with valve

3 Manometer port

4 4 mounting holes

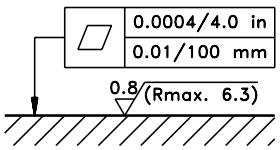
Models B, C, D, E - hollow bolt





Model	A, M	B1
M	M12 x 1.5	M22 x 1.5*
G	G1/4	G1/2

* Max. diameter of the chamfer for the internal thread 22.2 mm.



Required surfacefinish of interface

1 Adjustment element for relief valve (screw with inside hexagon 6 mm)

2 Hollow bolt (hex. 27mm)

3 Manometer port

4 Sealing ring U-SEAL 22.5 x 28 x 1.5 (1 pc) supplied with valve

Hollow bolt	D	L	Tightening torque [ft-lbs] (Nm)
B	M18x1.5	0.650 (16.5)	22.1+2.2 (30+3)
C	M22x1.5	0.650 (18.5)	51.6+3.7 (70+5)
D	G3/8	0.650 (16.5)	51.6+3.7 (70+5)
E	G1/2	0.650 (18.5)	18.4+2.2 (25+3)

Caution!

- The packing foil is recyclable.
- Mounting bolts M6 x 45 DIN 912-10.9 must be ordered separately. Tightening torque of the bolts is 6.5 ft-lbs (8.9 Nm).
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law.

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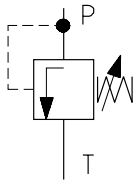
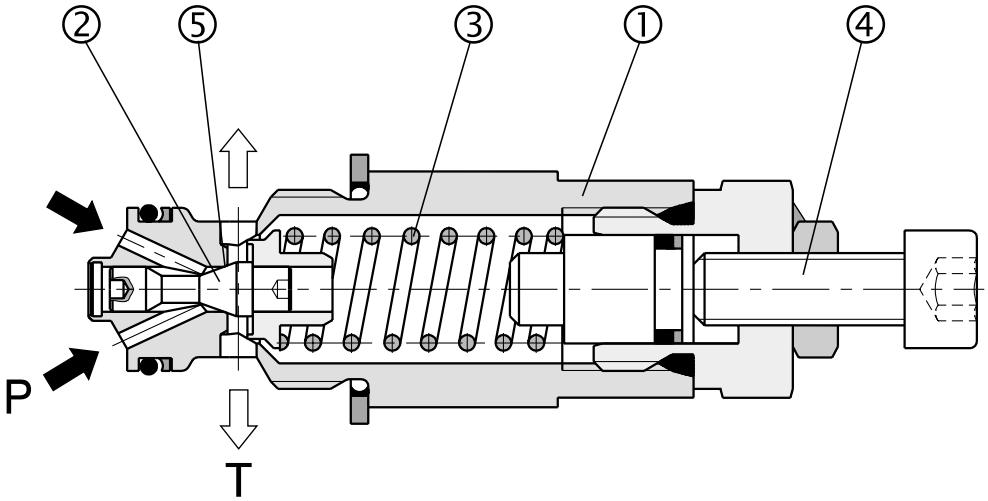
HYTOS	*DIRECTLY OPERATED PRESSURE RELIEF VALVES*	***DVB2***	**HA 5091 9/99**
	Size 04, 06	...4641 PSI (320 bar)	10.57 US GPM (40 L/min)
			Replaces HA 5091 2/99



- **Screw-in cartridge valve for manifold mounting - up to 4641.21 PSI (320 bar)**
- **Cartridge in subplate mounted housing - five functional symbols - up to 4641.21 PSI (320 bar)**
- **Four pressure ranges**
- **Two pressure adjustment options:**
  - hexagon set screw with locknut
  - hand knob
- **Installation dimensions to ISO 4401, CETOP - RP 121 H and DIN 24 340**

Functional Description

Pressure relief valves DVB were designed for applications requiring a safely valve or a pressure regulating valve working over a wide range of pressures and flow rates.
The valve basically consists of the valve body (1), poppet with damping spool (2) and compression spring (3). The string pushes the poppet onto the seat (5) holding the valve in its normally closed position. When the force, caused by the pressure acting on the exposed surface area of the poppet, exceeds the spring force, the valve opens and and the flow passes from port P to port T.
To optimize the valve performance, four pressure ranges are available. Choosing the closest range is recommended. The design enables the valve to be used as a screw-in cartridge for manifold mounting, or in a subplate mounted housing.
The basic surface treatment of the valve housing is zinc coated.



Ordering Code

DVB2 - ☐ - D ☐ ☐ / ☐

Pressure relief valve

Nominal size

04	**04**
06	**06**

Directly operated

Adjustment option

Hexagon set screw with locknut	**R**
Handknob (for pressure ranges 10 and 32 only)	**H**

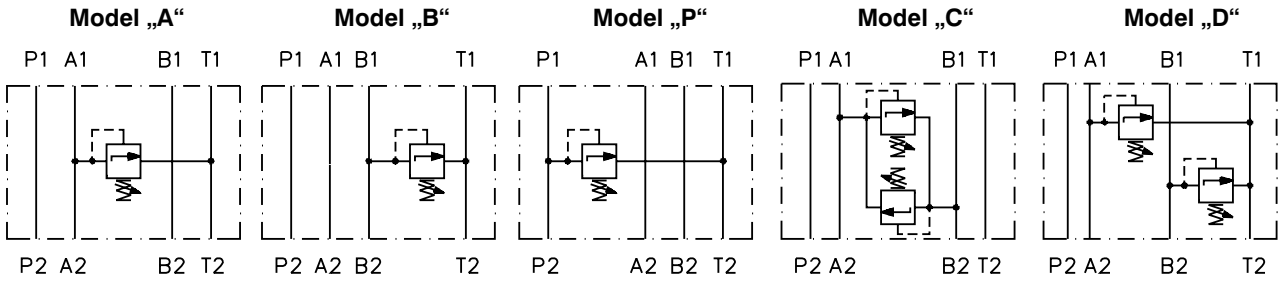
Pressure range

10	up to 1450 psi (100 bar)
16	up to 2321 psi (160 bar)
25	up to 3626 psi (250 bar)
32	up to 4641 psi (320 bar)

Model

E	screw-in cartridge
A	modular valve - connection of A with T
B	modular valve - connection of B with T
P	modular valve - connection of P with T
C	modular valve - connection A with B, B with A
D	modular valve - connection of A and B with T

Functional Symbol



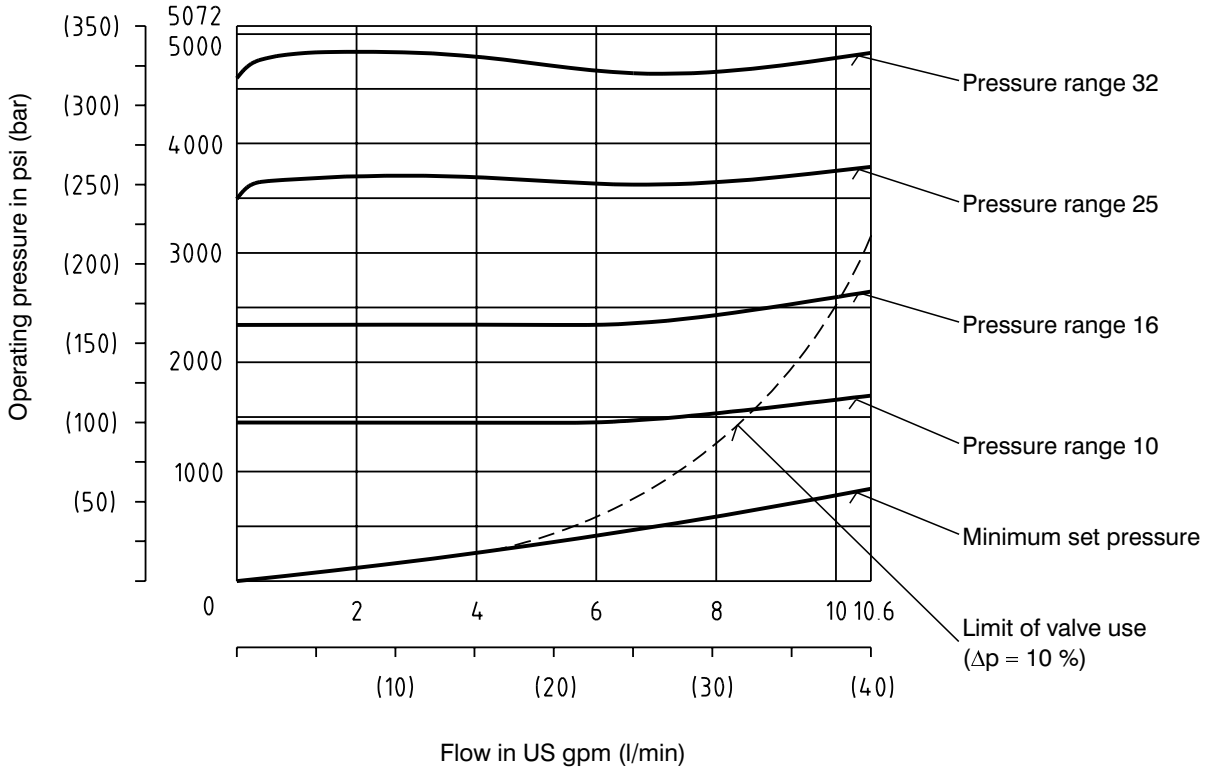
Technical Data

Nominal size	mm	04	06
Maximum flow	US gpm (l/min)	10.567 (40)	
Maximum pressure at the input	psi (bar)	1450 (100) 2321 (160) 3626 (250) 4641(320)	
Maximum pressure at the output (port T)	psi (bar)	6525 (450)	
Operating pressure related to flow rate	psi (bar)	see Performance Curves - pg. 3	
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP - RP 91H in viscosity classes ISO VG 32, 46 and 68.	
Fluid temperature range	°F (°C)	-22 ... 176 (-30 ... +80)	
Viscosity range	SUS (mm^2/s)	98 ... 1840 (20 ... 400)	
Maximum degree of fluid contamination		Class 18/15 to ISO 4406. Therefore we recommend a filter with a retention rate $\beta_{10} \geq 75$.	
Weight of the valve - model E - models C, D - models A, B, P	lb (kg)	0.49 (0.22) 2.65 (1.20) 1.02 (0.85)	0.49 (0.22) 3.31 (1.50) 2.65 (1.20)
Mounting position		optional	

Performance Curves

Measured at ν = 166 SUS (35 mm^2/s) and t = 104 °F (40 °C)

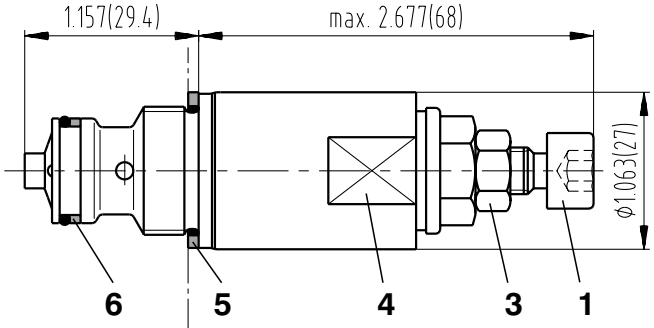
For model „E“



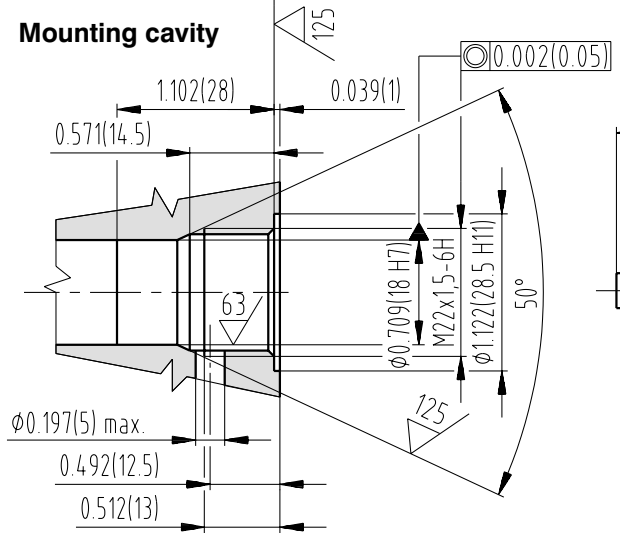
Valve Dimensions

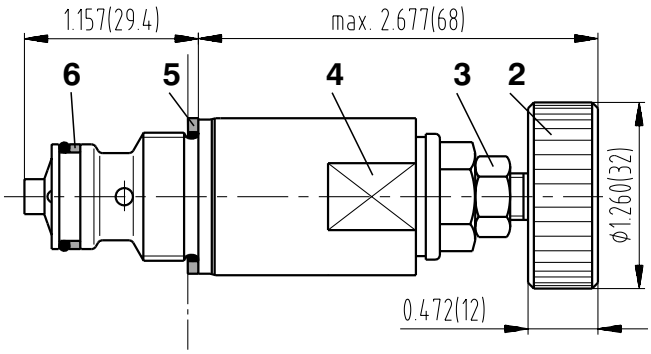
Dimensions in inches and millimetres (in brackets)

Model „E“



Mounting cavity





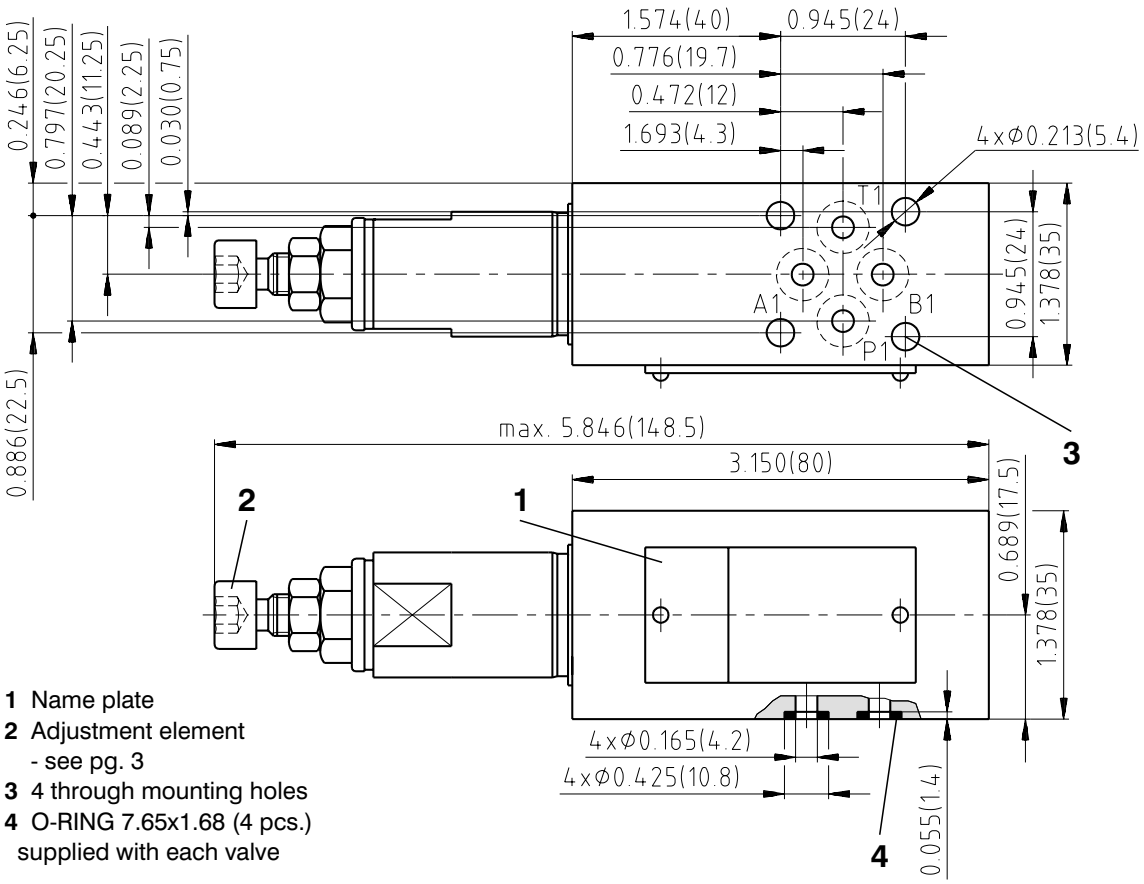
1 Adjustment element R
(screw with inside hexagon 6 mm)
2 Adjustment element H (handknob)
With both adjustment machanismus:
counter-clockwise rotation = pressure decrease
clockwise rotation = pressure increase
3 Locknut (hex. 13 mm)
4 Wrench flats - size 21 mm - Tightening torque 22.1 lb-ft (30 Nm)
5 Sealing ring U-SEAL D22.5/28/1.5 Busak supplied with each valve
6 Combined seal:
O-RING 14 x 1.78
back-up ring SU 14.73 x 17.43 x 1.14
supplied with each valve

Valve Dimensions

Dimensions in inches and millimetres (in brackets)

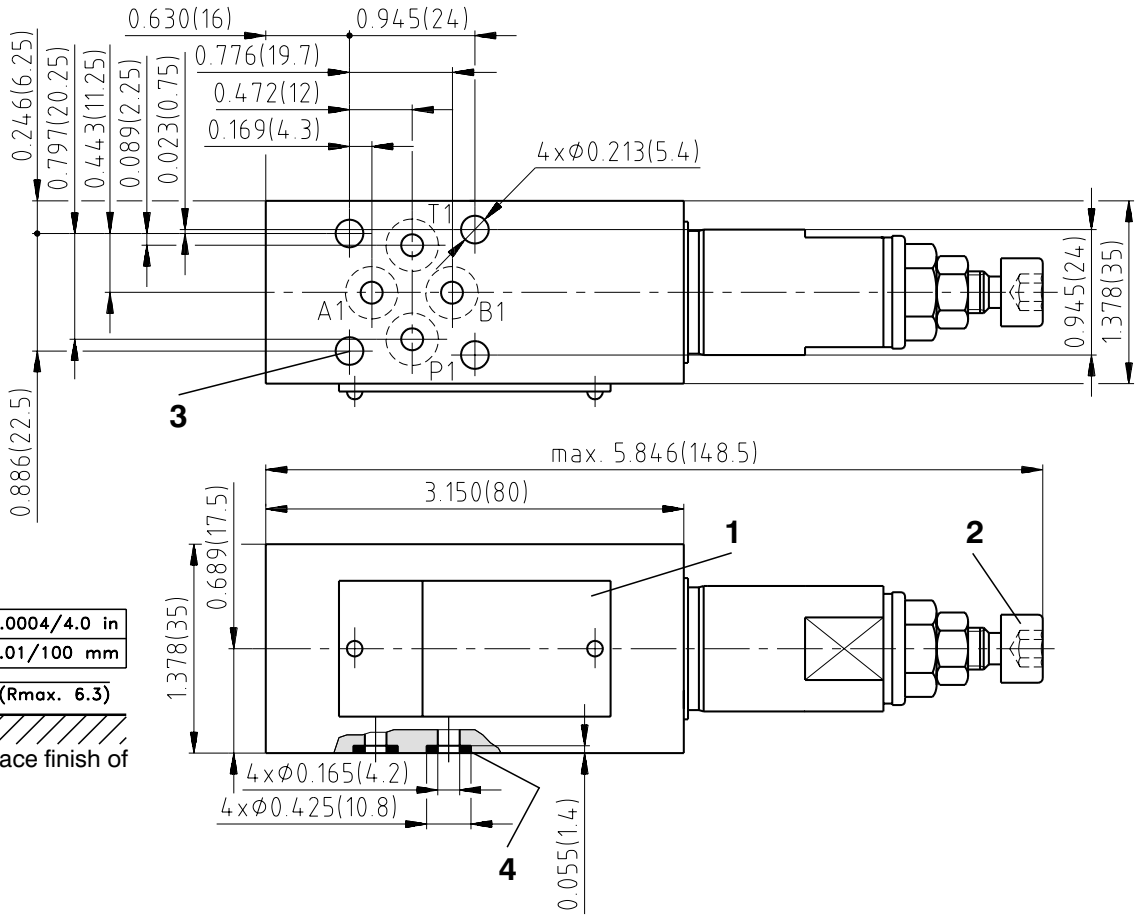
Size 04 (Installation dimensions to ISO 4401-02-01-0-94 and CETOP - RP 121H)

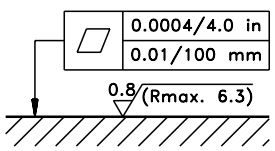
Model „A“



1 Name plate
2 Adjustment element
- see pg. 3
3 4 through mounting holes
4 O-RING 7.65x1.68 (4 pcs.)
supplied with each valve

Models „B“ and „P“





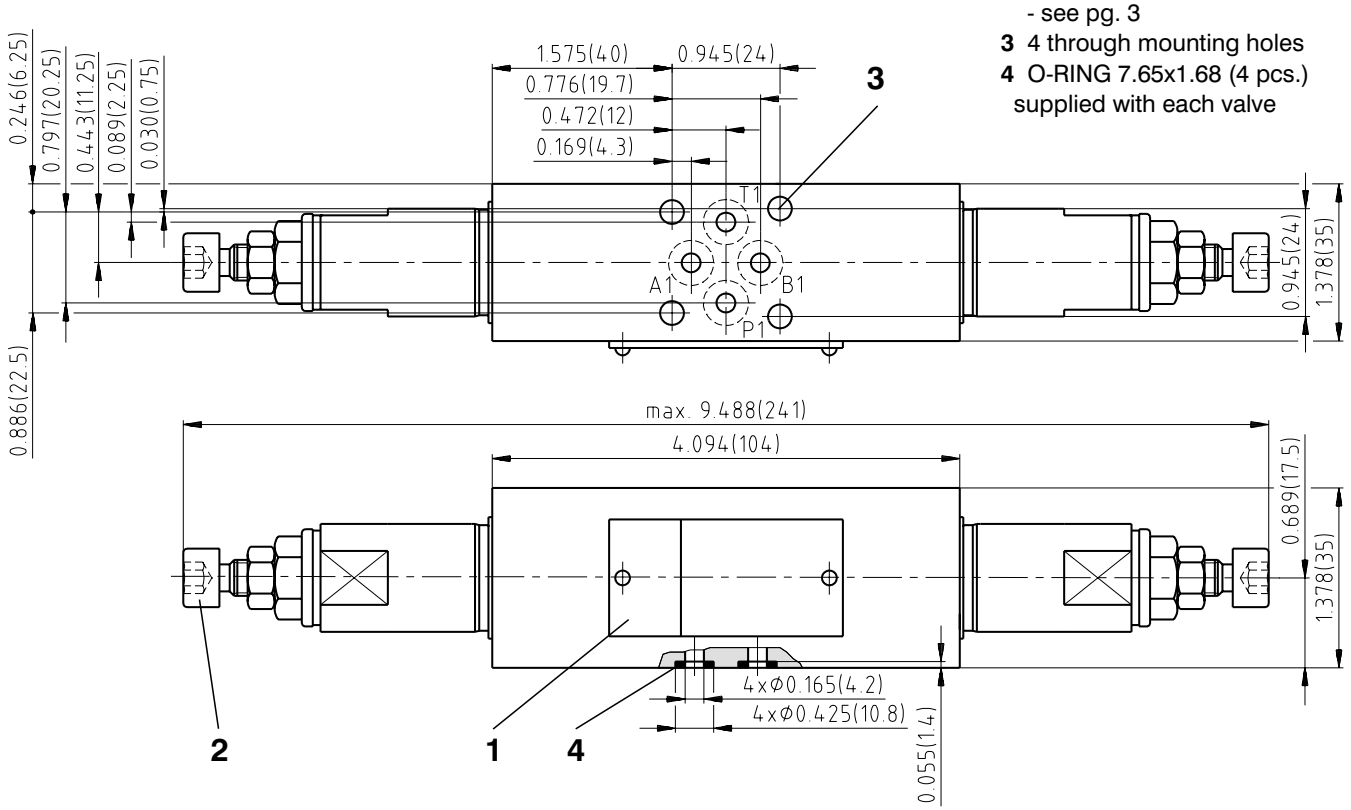
Required surface finish of interface.

Valve Dimensions

Dimensions in inches and millimetres (in brackets)

Models „C“ and „D“

1 Name plate
2 Adjustment element - see pg. 3
3 4 through mounting holes
4 O-RING 7.65x1.68 (4 pcs.) supplied with each valve



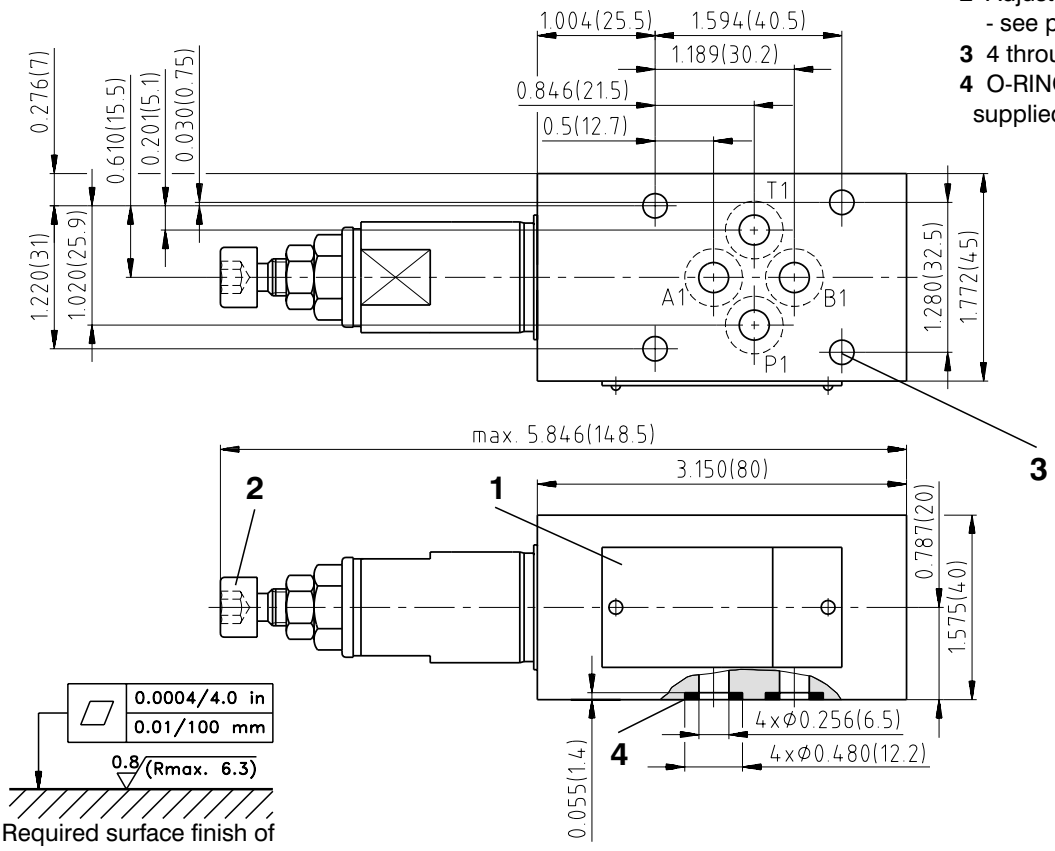
Valve Dimensions

Dimensions in inches and millimetres (in brackets)

Size 06 (Installation dimensions to ISO 4401-03-02-0-94 a DIN 24 340-A6)

Model „A“

1 Name plate
2 Adjustment element - see pg. 3
3 4 through mounting holes
4 O-RING 9,25x1.68 (4 pcs.) supplied with each valve



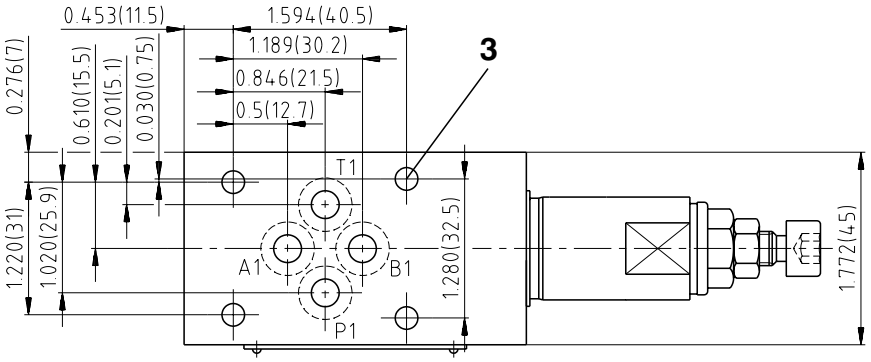
Required surface finish of interface.

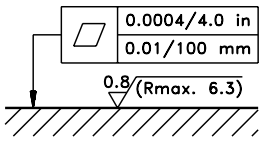
Valve Dimensions

Dimensions in inches and millimetres (in brackets)

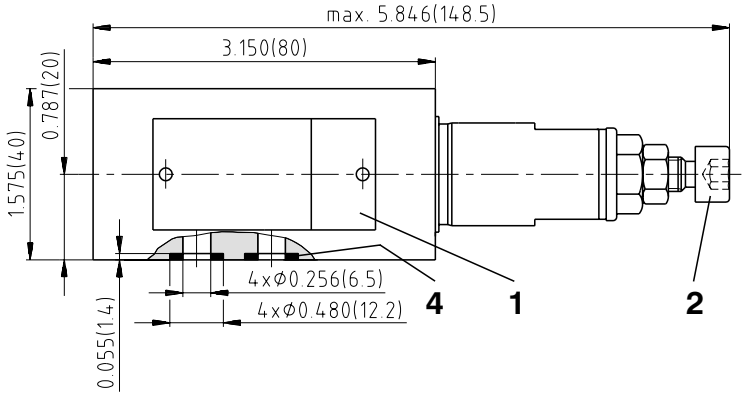
Models „B“ and „P“

1 Name plate
2 Adjustment element
- see pg. 3
3 4 through mounting holes
4 O-RING 9.25x1.68 (4 pcs.)
supplied with each valve

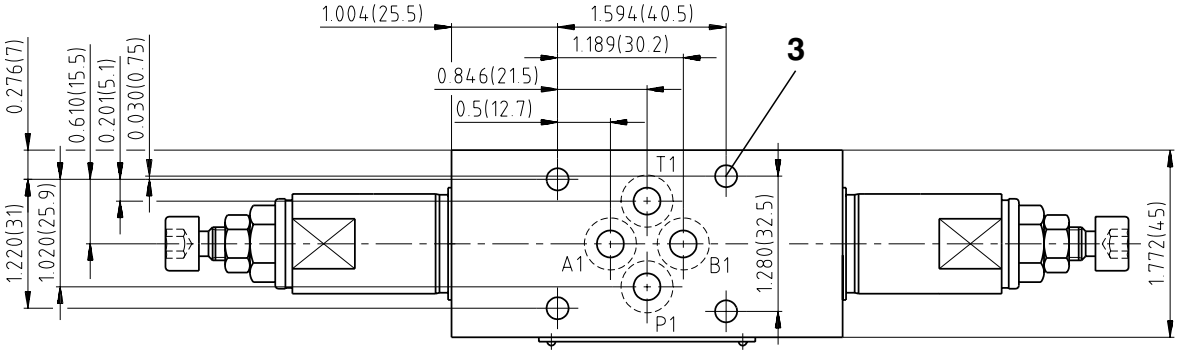


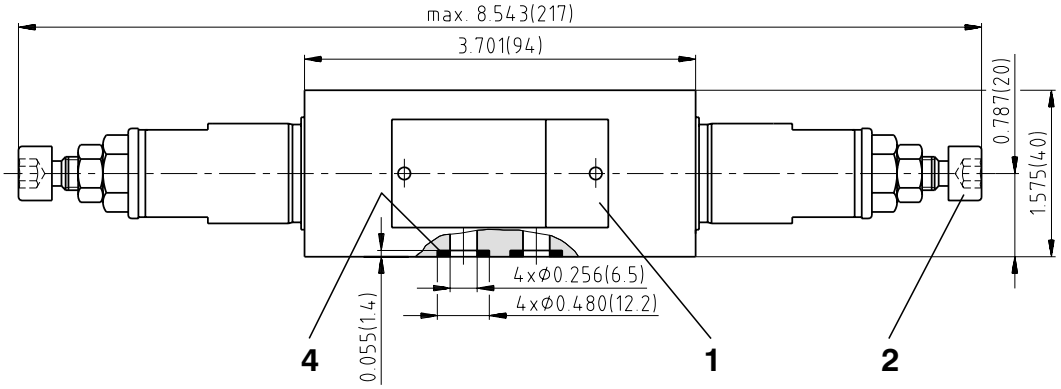


Required surface finish of interface.



Models „C“ and „D“





Caution!

- The packing foil is recyclable.
- The transport plate is to be returned to the supplier.
- Mounting bolts M5 DIN 912-10.9 must be ordered separately. Tightening torques of the bolts are: size 04 - 3.7 lb-ft (5 Nm), size 06 - 6.6 lb-ft (8.9 Nm).
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law.

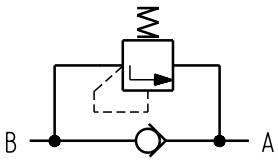
HYTOS a.s. CZ - 543 15 Vrchlabí

Tel.: +420-499-403111, Fax: +420-499-403421, e-mail: sales@hytos.cz

Combined relief-check valves DBV2-420

Size 10 • ...6091.68 PSI (420 bar) • ...52.84 US GPM (200 L/min)

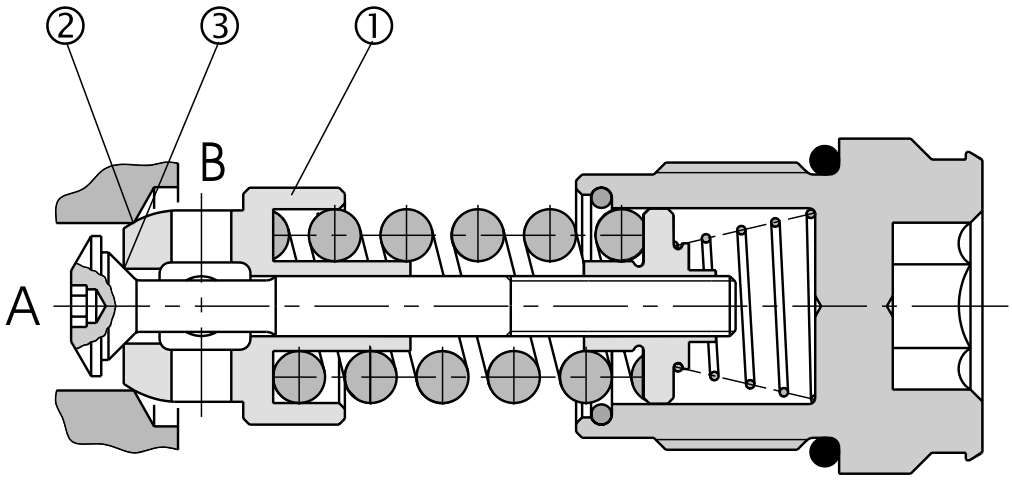
HA 5092
11/98



- **Compact design**
- **High pressure capabilities**
- **Cartridge model – built into the mounting cavity with the seat in manifold**
- **Factory set pressure setting**
- **Simple mounting – the valve and the screw plug build up an integral unit**

Functional Description

The high-pressure relief-check valve DBV2-420 is delivered as a cartridge unit without bushing, i.e. for direct mounting into the cavity with the seat machined directly in the manifold. In the direction A-B the fluid passes freely through the check valve (1). The direction B-A is closed by main seat (2) and as the pressure increases above the factory set value the fluid is drained through the seat of the main cone (3). The adjusted pressure is defined as the pressure, which is necessary to open the relief valve at the flow rate 5.28 US GPM (20 L/min).
The valve is delivered without any surface treatment.



Ordering Code

DBV2 - 420

Combined relief-check valve

Pressure

420 adjusted pressure 6091.68 PSI (420 bar)

Technical Data

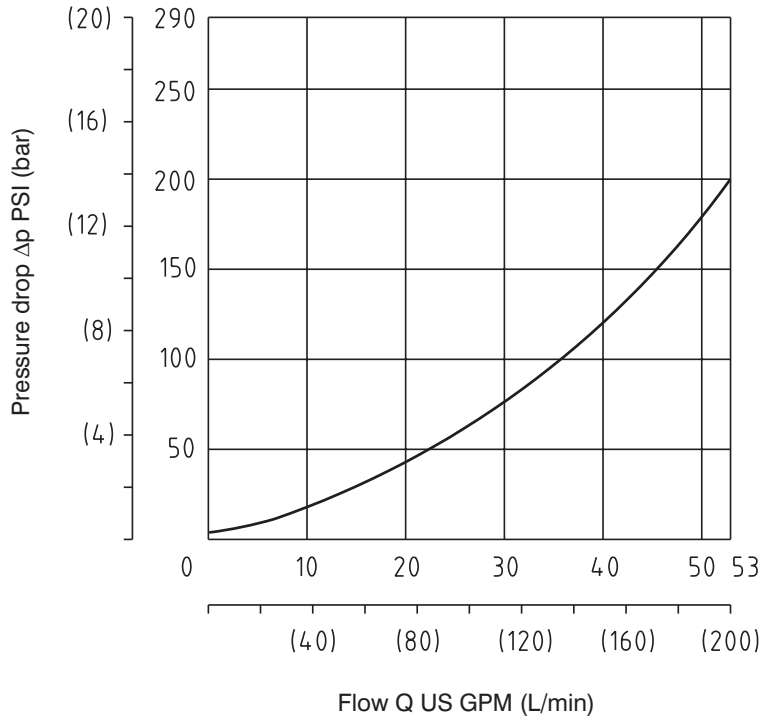
Nominal size	mm	10
Maximum flow rate	US GPM (L/min)	52.84 (200)
Nominal pressure	PSI (bar)	6091.68 (420) + 217.56 (15)
Pressure losses	PSI (bar)	see the characteristics
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP - RP 91H in viscosity classes ISO VG 32, 46 and 68.
Fluid temperature range	°F (°C)	-22 ... +176 (-30 ... +80)
Viscosity range	SUS (mm^2/s)	97.3 ... 1840 (20 ... 400)
Maximum degree of fluid contamination		Class 21/18/15 to ISO 4406 (1999).
Weight	lbs (kg)	0.300 (0.138)
Mounting position		optional

Δp-Q Characteristics

Measured at ν = 166 SUS (35 mm²/s) and t = 104 °F (40 °C)

Check Valve

Pressure drop of the check valve.

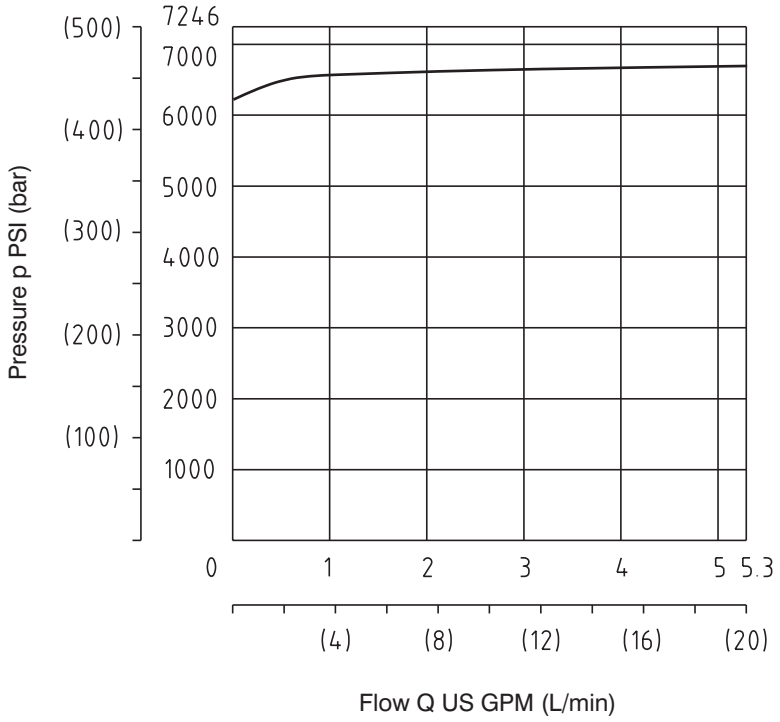


p-Q Characteristics

Measured at ν = 166 SUS (35 mm²/s) and t = 104 °F (40 °C)

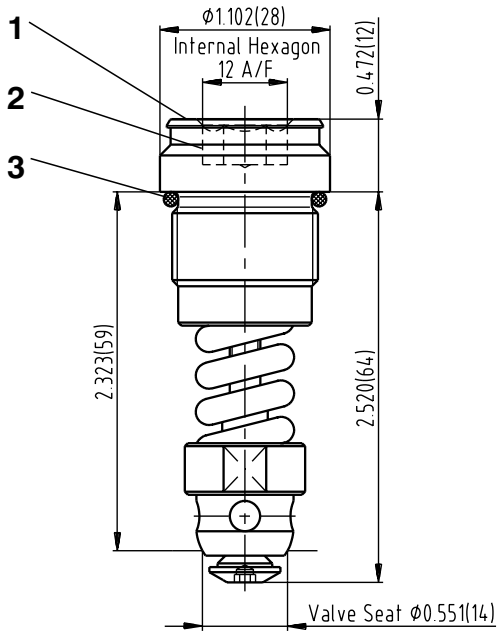
Relief Valve

Static characteristic of the relief valve.

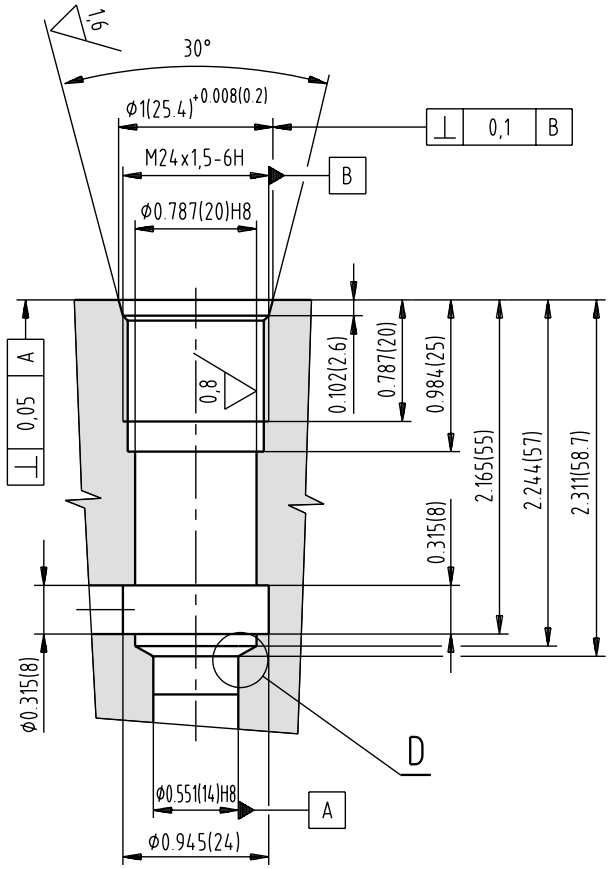


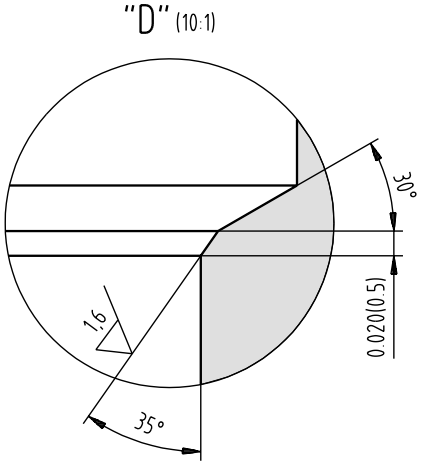
Valve Dimensions

Dimensions in inches and millimeters (in brackets)



1 Nominal pressure
2 Inside hexagon for valve mounting into the cavity
Tightening torque 36.97 + 7.37 ft-lbs (50 + 10 Nm)
3 Seals: O-ring 20.35 x 1.78
(supplied with valve)





Caution!

- The packing foil is recyclable.
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law.

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www.argo-hytos.com

ARGO HYTOS

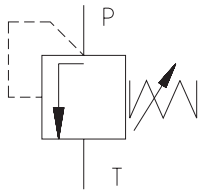
Directly operated pressure relief valves

VPP2-04

Size 04, 06 • p_{max} up to 320 bar • Q_{max} up to 40 L/min

HA 5093
1/2003

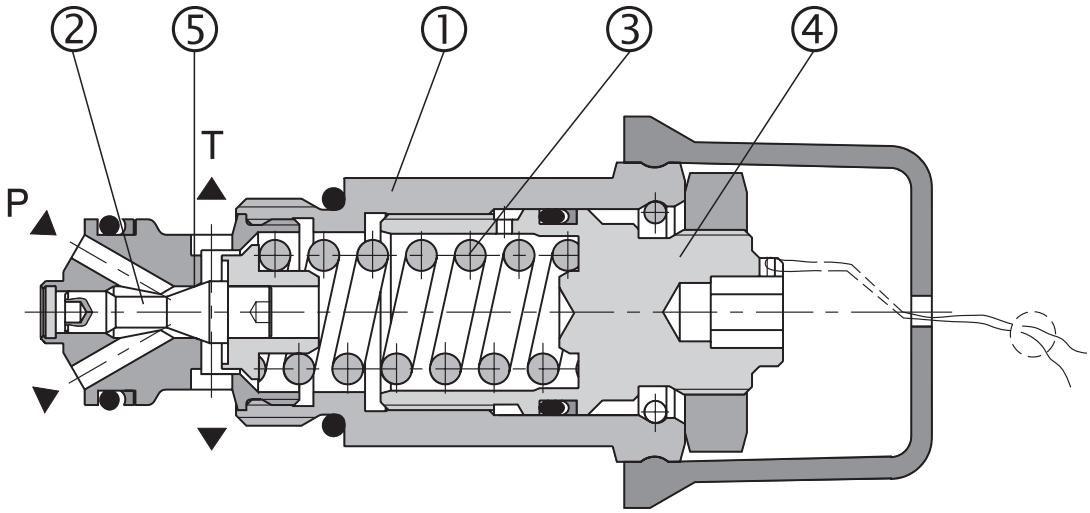
Replaces
HA 5093 3/2002



- **Screw-in cartridge, modular and in-line design**
- **Six pressure ranges**
- **Pressure adjustment option:**
  - screw with internal hexagon

Functional Description

Pressure relief valves VPP2-04 were designed for applications requiring a safely valve or a pressure regulating valve working over a wide range of pressures and flow rates.
The valve basically consists of the valve body (1), poppet with damping spool (2) and compression spring (3). The spring pushes the poppet onto the seat (5) holding the valve in its normally closed position. When the force, caused by the pressure acting on the exposed surface area of the poppet, exceeds the spring force, the valve opens and and the flow passes from port P to port T.
To optimize the valve performance, six pressure ranges are available. Choosing the closest range is recommended. The design enables the valve to be used as a screw-in cartridge for manifold mounting, or in a subplate and/or in-line mounted housing.
The valve body and the adjustment screw are zinc coated. With models M and R the valve bodies are phosphate coated.



Ordering Code

VPP2-04/ □ - □ □

Directly operated pressure relief valve

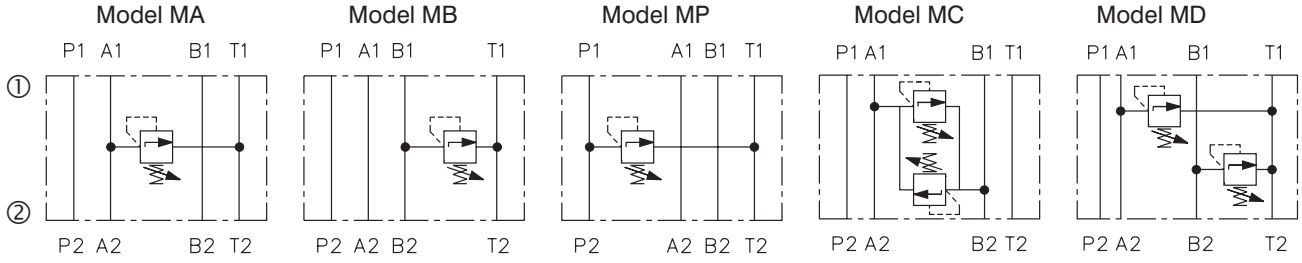
Model	
screw in cartridge	**S**
modular valve, connection A - T	MA04
modular valve, connection B - T	MB04
modular valve, connection P - T	**MP04**
modular valve, connection A - B and B - A	MC04
modular valve, connection A - T and B - T	MD04
modular valve, connection A - T	MA06
modular valve, connection B - T	MB06
modular valve, connection P - T	**MP06**
modular valve, connection A - B and B - A	MC06
modular valve, connection A - T and B - T	MD06
in-line valve, thread G3/8 - P1, P2, T	RA1
in-line valve, thread G1/2 - P1, P2, T	**RA2**
in-line valve, thread G3/8 - P, T	RB1
in-line valve, thread G1/2 - P, T	RB2

Seals	
without designation	NBR
V	Viton

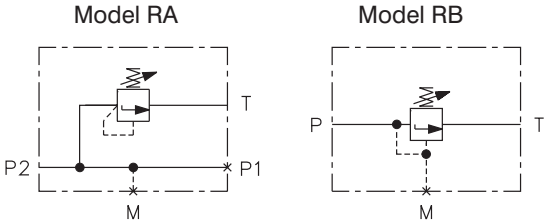
Pressure range	
2	up to 25 bar
6	up to 63 bar
10	up to 100 bar
16	up to 160 bar
25	up to 250 bar
32	up to 320 bar

FOR PREFERRED TYPES SEE BOLD TYPING IN ORDERING CODE AND TABLE OF PREFERRED TYPES ON PAGE 11

Functional Symbols



① Valve side
② Subplate side



Ordering Numbers of Sandwich / Valve Bodies (without screw-in cartridge)

Valve body for modular valve - NBR	Ordering number	Valve body for modular valve - Viton	Ordering number
MA04-VP	513-0350	MA04-VP/V	513-0360
MB04-VP	513-0351	MB04-VP/V	513-0361
MP04-VP	513-0352	MP04-VP/V	513-0362
MC04-VP	513-0353	MC04-VP/V	513-0363
MD04-VP	513-0354	MD04-VP/V	513-0364
Valve body for modular valve - NBR	**Ordering number**	**Valve body for modular valve - Viton**	**Ordering number**
MA06-VP	556-0330	MA06-VP/V	556-0430
MB06-VP	556-0331	MB06-VP/V	556-0431
MP06-VP	556-0332	MP06-VP/V	556-0432
MC06-VP	556-0333	MC06-VP/V	556-0433
MD06-VP	556-0334	MD06-VP/V	556-0434

Ordering Numbers of Sandwich / Valve Bodies (without screw-in cartridge)

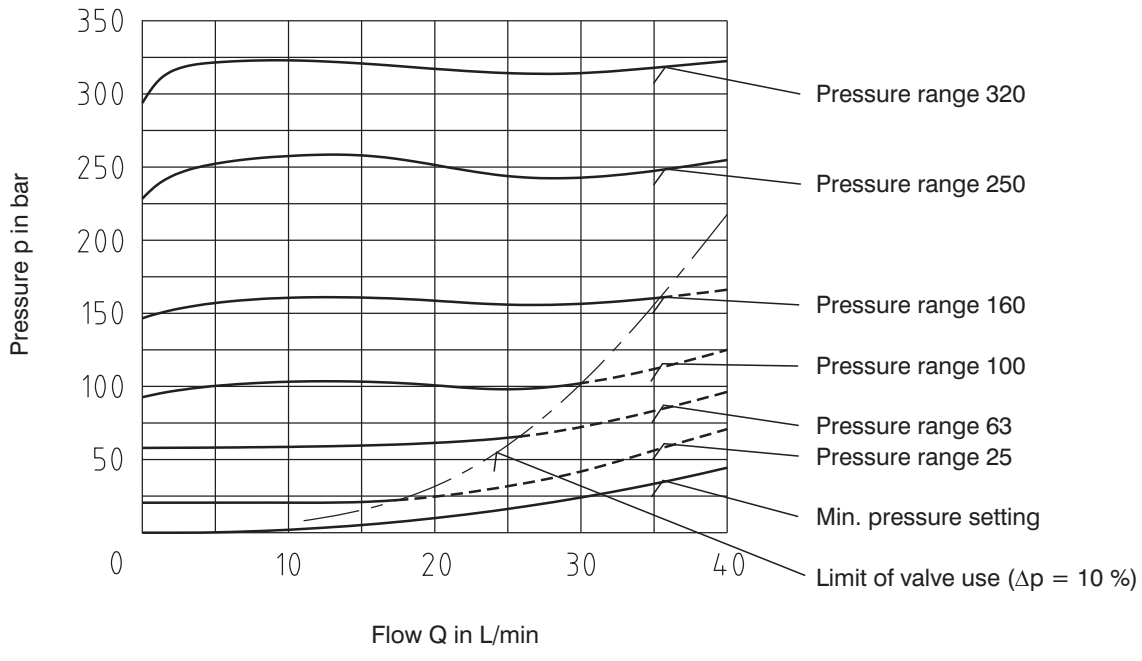
Valve body for in-line valve - NBR	Ordering number	Valve body for in-line valve - Viton	Ordering number
RA1-06-VP	556-0336	RA1-06-VP/V	556-0436
RA2-06-VP	556-0337	RA2-06-VP/V	556-0437
RB1-06-VP	556-0338	RB1-06-VP/V	556-0438
RB2-06-VP	556-0339	RB2-06-VP/V	556-0439

Technical Data for Model S

Nominal size	mm	04
Max. flow rate	L/min	40
Max. input pressure (ports P, A, B)	bar	25 63 100 160 250 320
Max. output pressure (port T)	bar	320
Working pressure related to flow	bar	see p-Q characteristics
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP - RP 91H in viscosity classes ISO VG 32, 46 and 68.
Fluid temperature range for standard sealing (NBR)	°C	-30 ... +80
Fluid temperature range for Viton sealing (FPM)	°C	-20 ... +80
Viscosity range	mm^2/s	20 ... 400
Max. degree of fluid contamination		Class 21/18/15 according to ISO 4406 (1999).
Weight	kg	0.17
Mounting position		optional
Weight - models MA04, MB04, MP04	kg	0.82
- models MC04, MD04	kg	1.32
- models MA06, MB06, MP06	kg	1.12
- models MC06, MD06	kg	1.42
- models RA1, RA2, RB1, RB2	kg	1.17

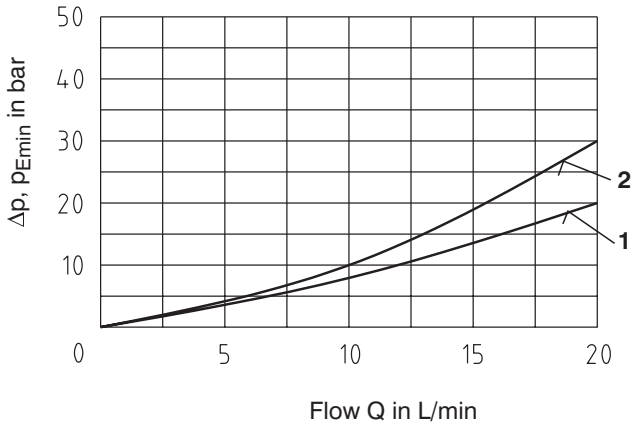
p-Q Characteristics for Model S

Measured at $\nu = 35\ mm^2/s$ and $t = 40\ °C$

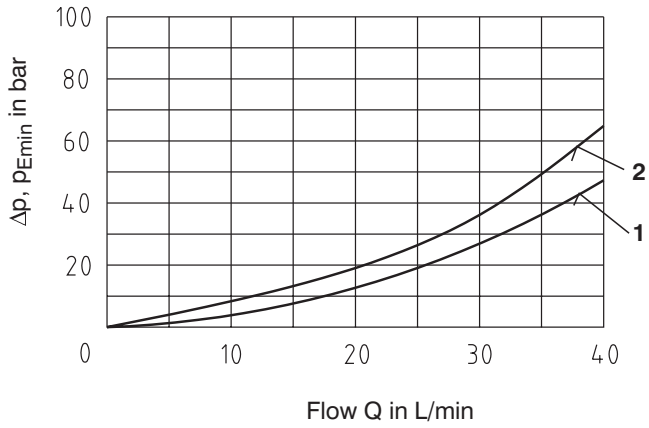


Δp-Q Characteristics, min. pressure setting

Measured at $\nu = 35\,mm^2/s$ and $t = 40\,°C$



1 - MA04, MB04, MP04, MD04
2 - MC04

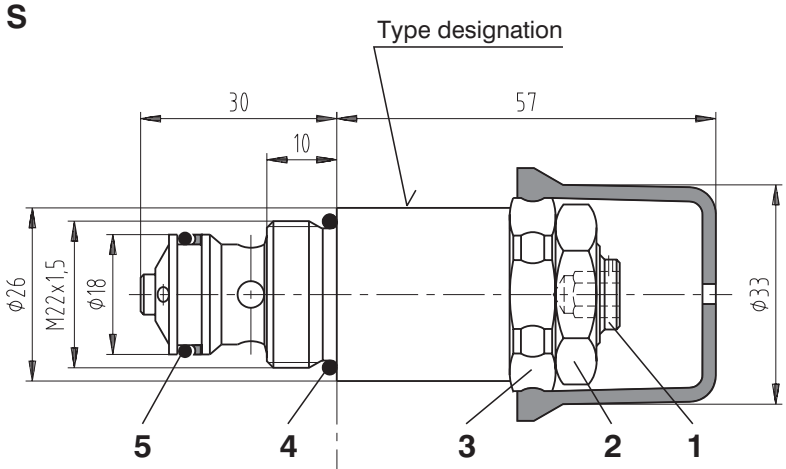


1 - MA06, MB06, MP06, MD06
2 - MC06

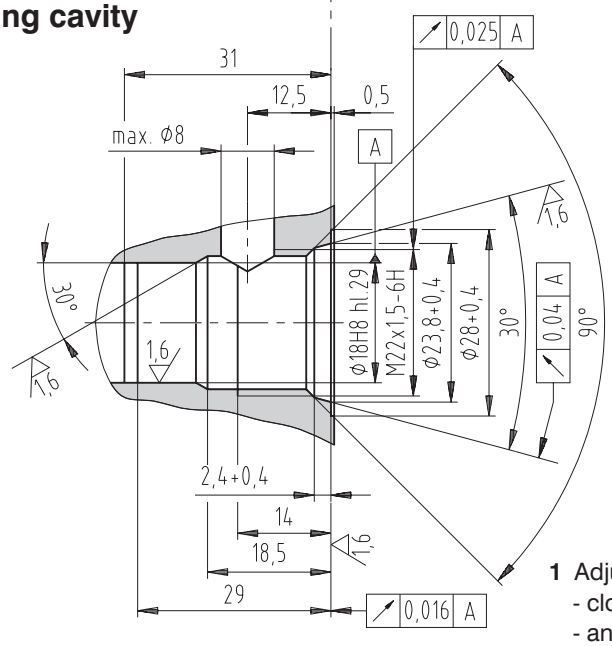
Valve Dimensions

Dimensions in millimetres

Model S



Mounting cavity



1 Adjustment element (screw with internal hexagon 6 mm)
- clockwise rotation - pressure increase
- anticlockwise rotation - pressure decrease

2 Locknut hex. 24 mm

3 Wrench flats s = 27 mm - tightening torque 30 Nm

4 O-ring 19.4 x 2.1 (1 pc.), supplied with valve

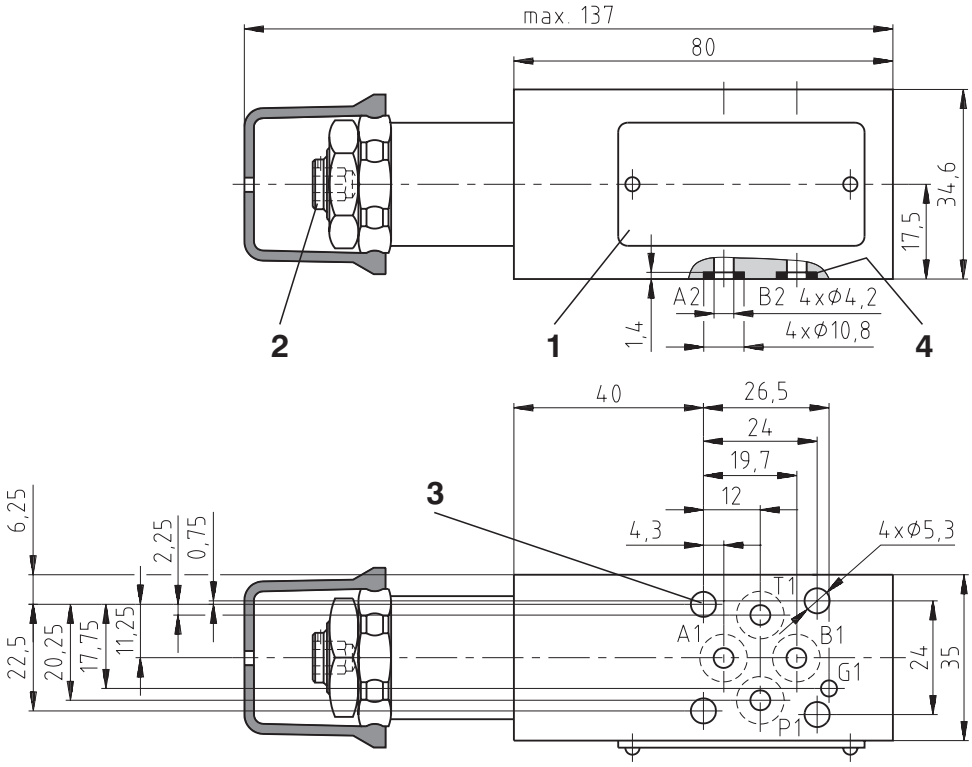
5 Combined sealing:
O-ring 14 x 1.78 (1 pc.)
Back-up ring BBP80B015-N9 = 14.73 x 17.43 x 1.14 (1 pc.)
supplied with valve

Valve Dimensions

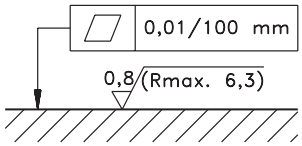
Dimensions in millimetres

Size 04 (Installation dimensions to ISO 4401, CETOP - RP 121H)

Model MA

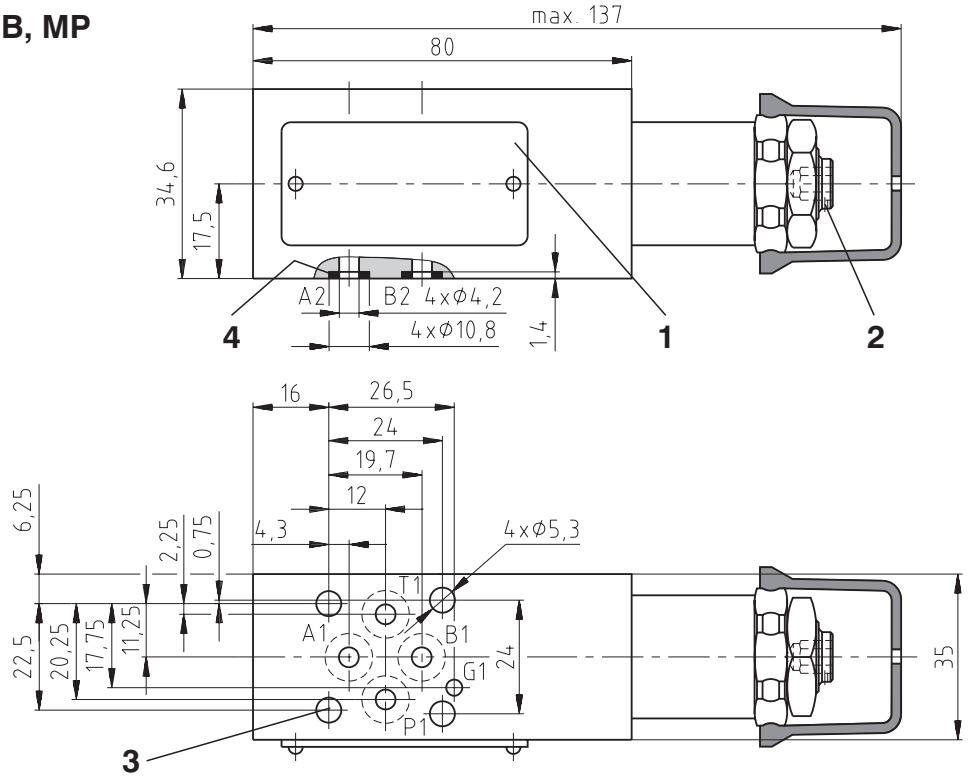


1 Name plate
2 Adjustment element for pressure setting
3 4 through mounting holes
4 Square rings 7.65 x 1.68 (4 pcs.) supplied with valve



Required surface finish of interface

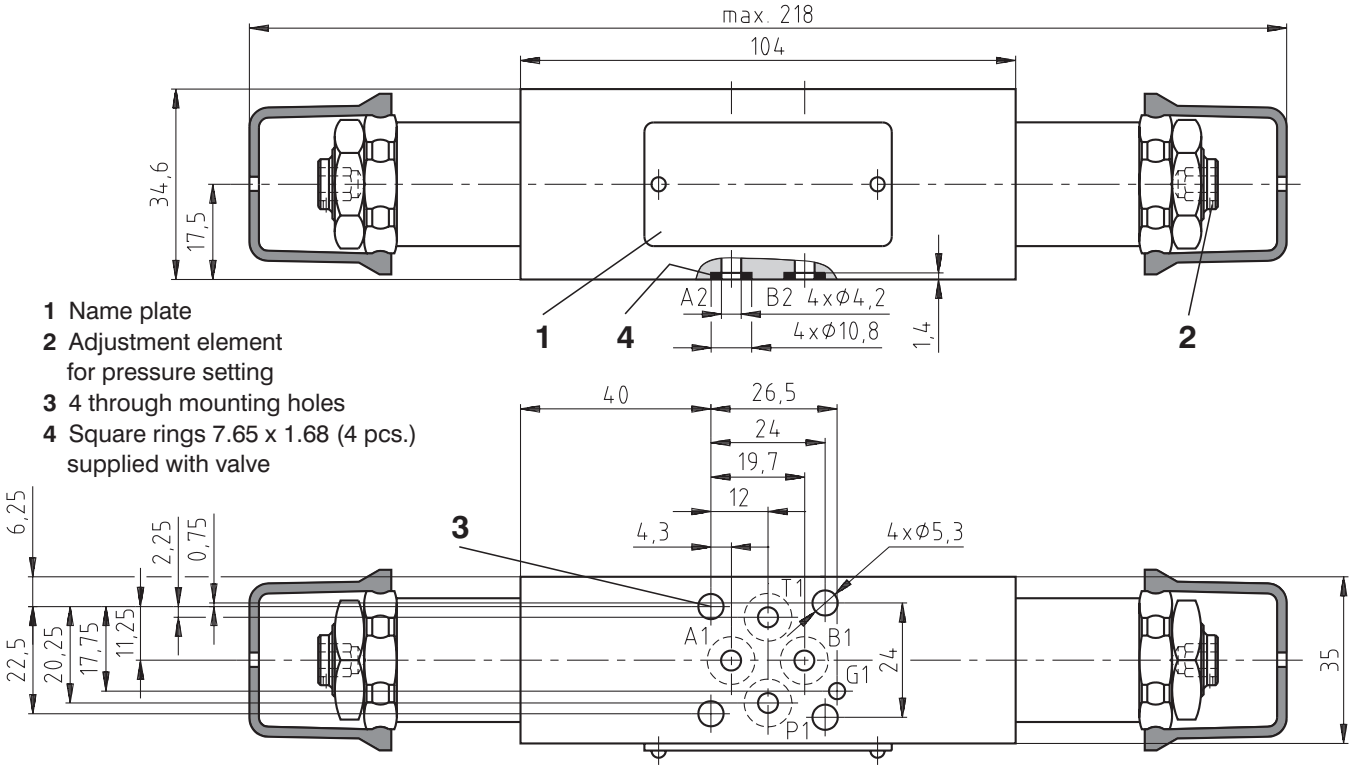
Models MB, MP



Valve Dimensions

Dimensions in millimetres

Models MC, MD



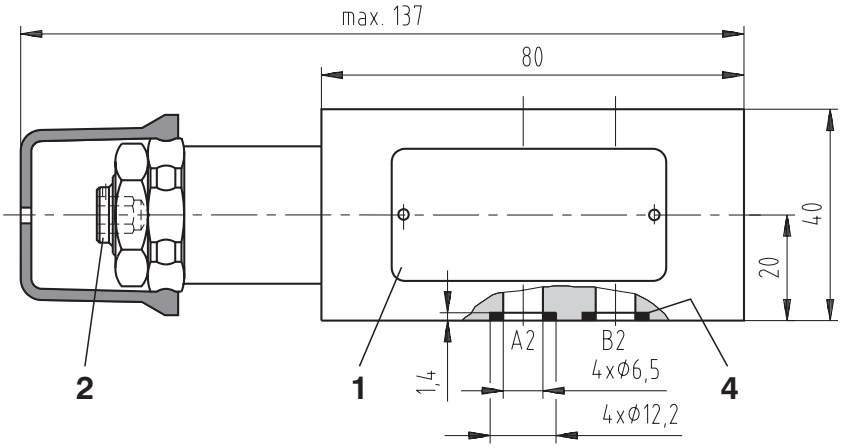
1 Name plate
2 Adjustment element for pressure setting
3 4 through mounting holes
4 Square rings 7.65 x 1.68 (4 pcs.) supplied with valve

Valve Dimensions

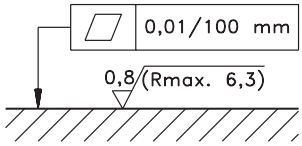
Dimensions in millimetres

Size 06 (Installation dimensions to ISO 4401, DIN 24 340)

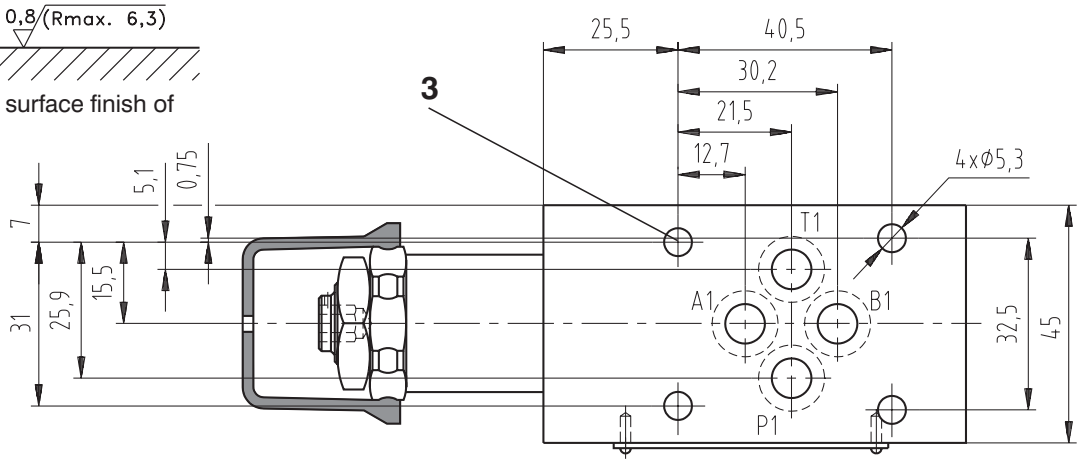
Model MA



1 Name plate
2 Adjustment element for pressure setting
3 4 through mounting holes
4 Square rings 9.25 x 1.68 (4 pcs.) supplied with valve



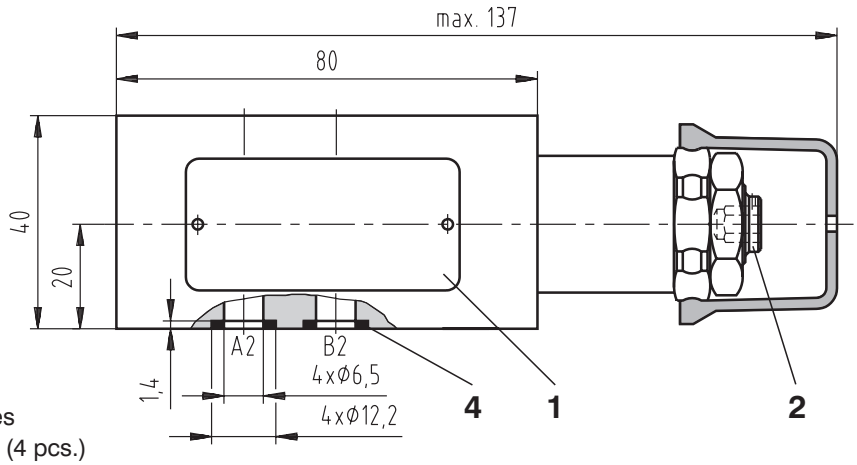
Required surface finish of interface



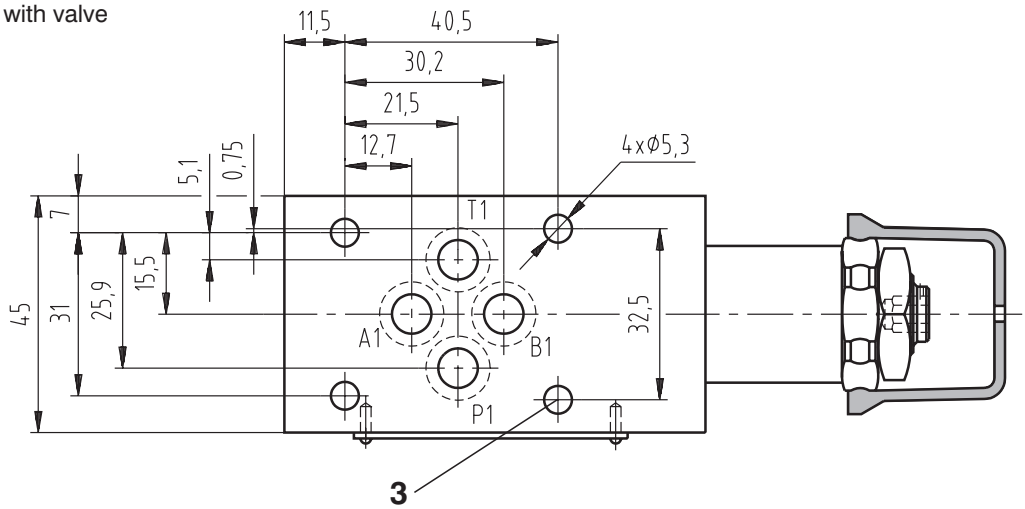
Valve Dimensions

Dimensions in millimetres

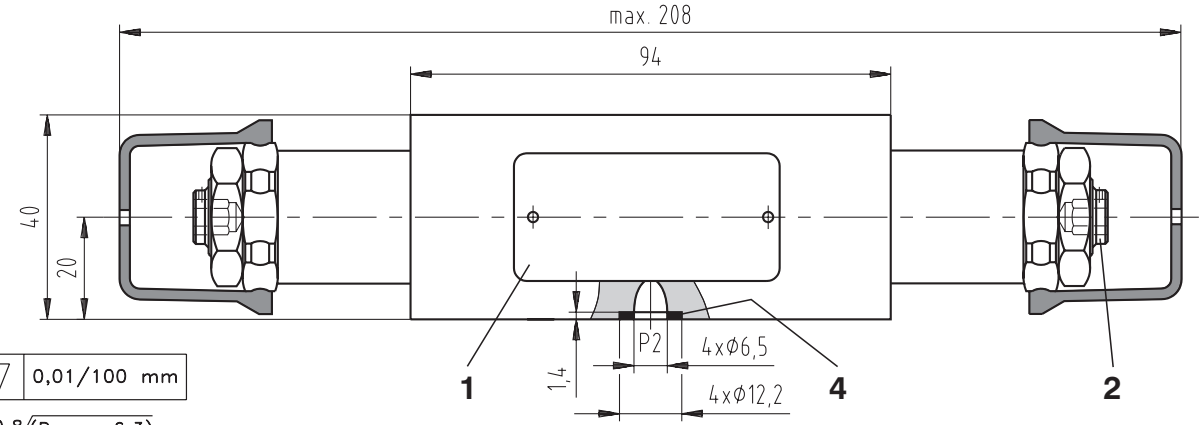
Models MB, MP

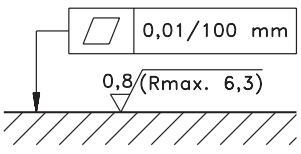


1 Name plate
2 Adjustment element for pressure setting
3 4 through mounting holes
4 Square rings 9.25 x 1.68 (4 pcs.) supplied with valve

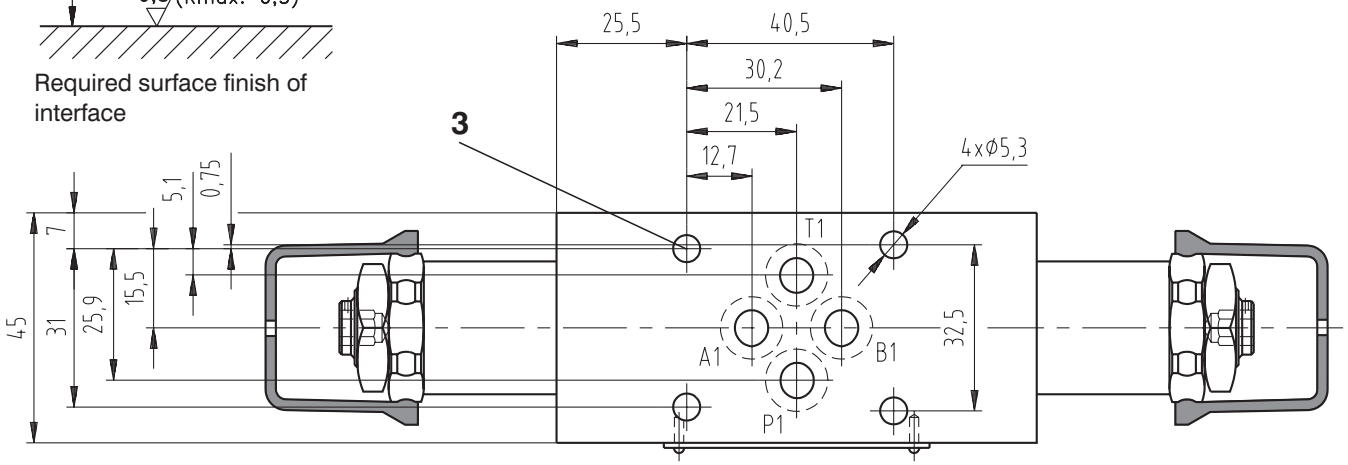


Models MC, MD





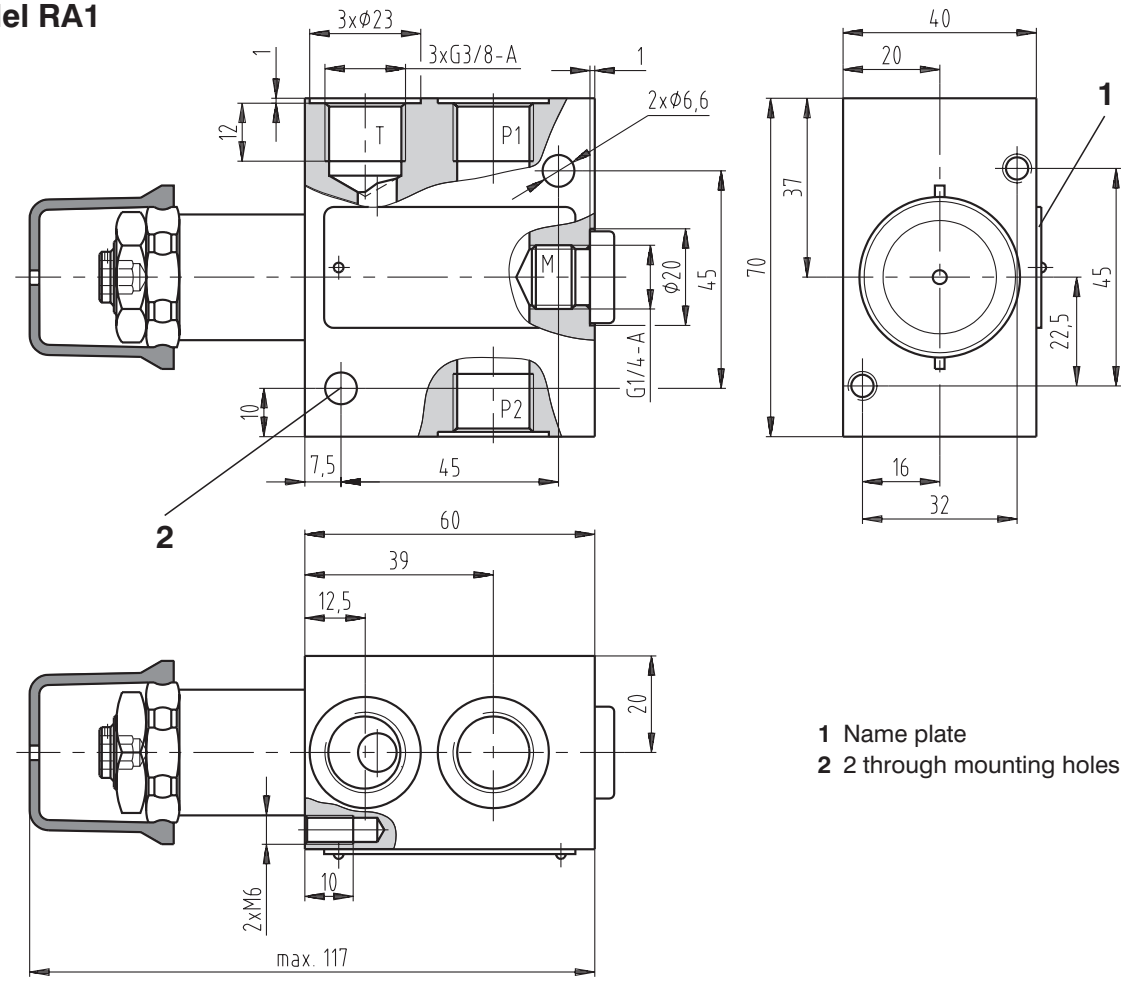
Required surface finish of interface



Valve Dimensions

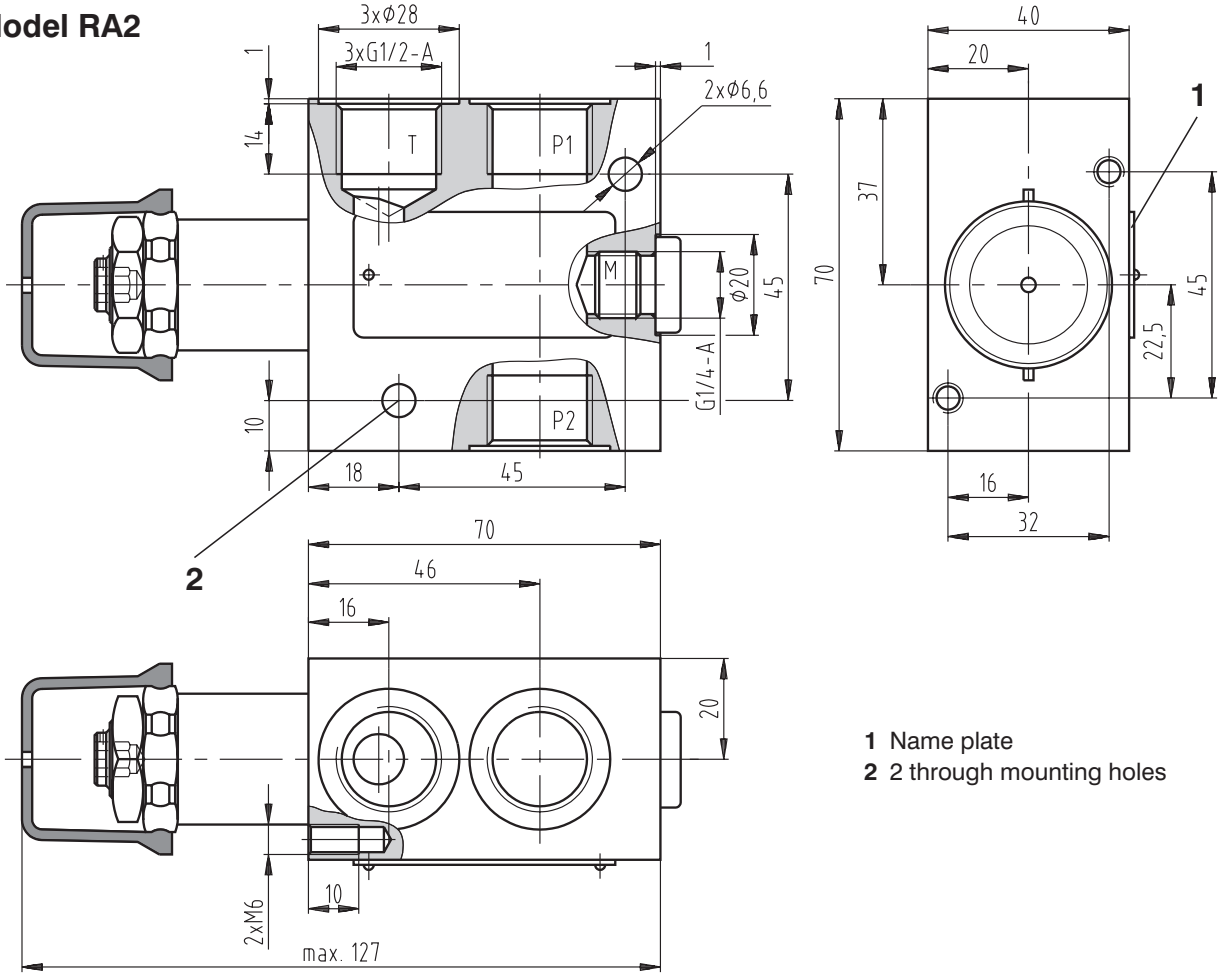
Dimensions in millimetres

Model RA1



1 Name plate
2 2 through mounting holes

Model RA2

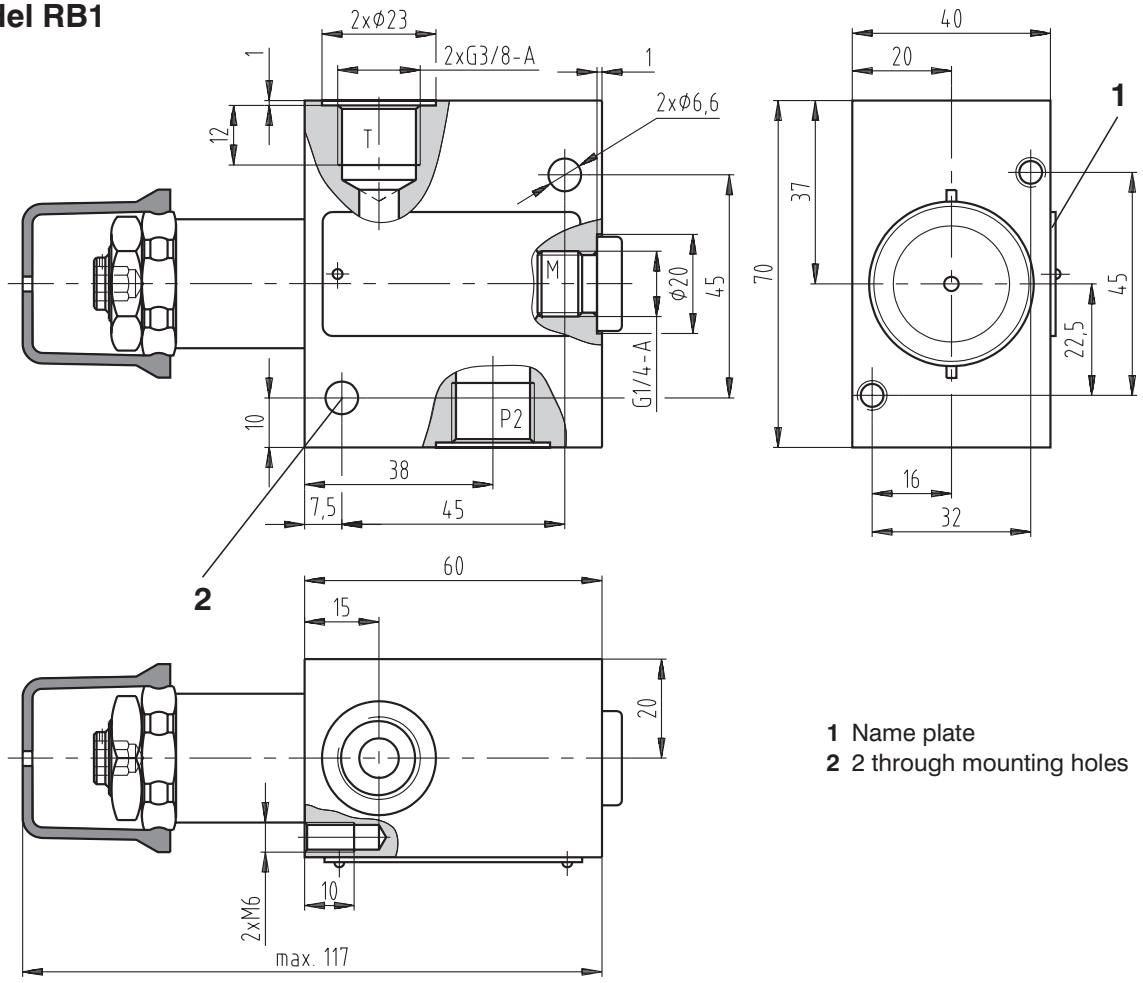


1 Name plate
2 2 through mounting holes

Valve Dimensions

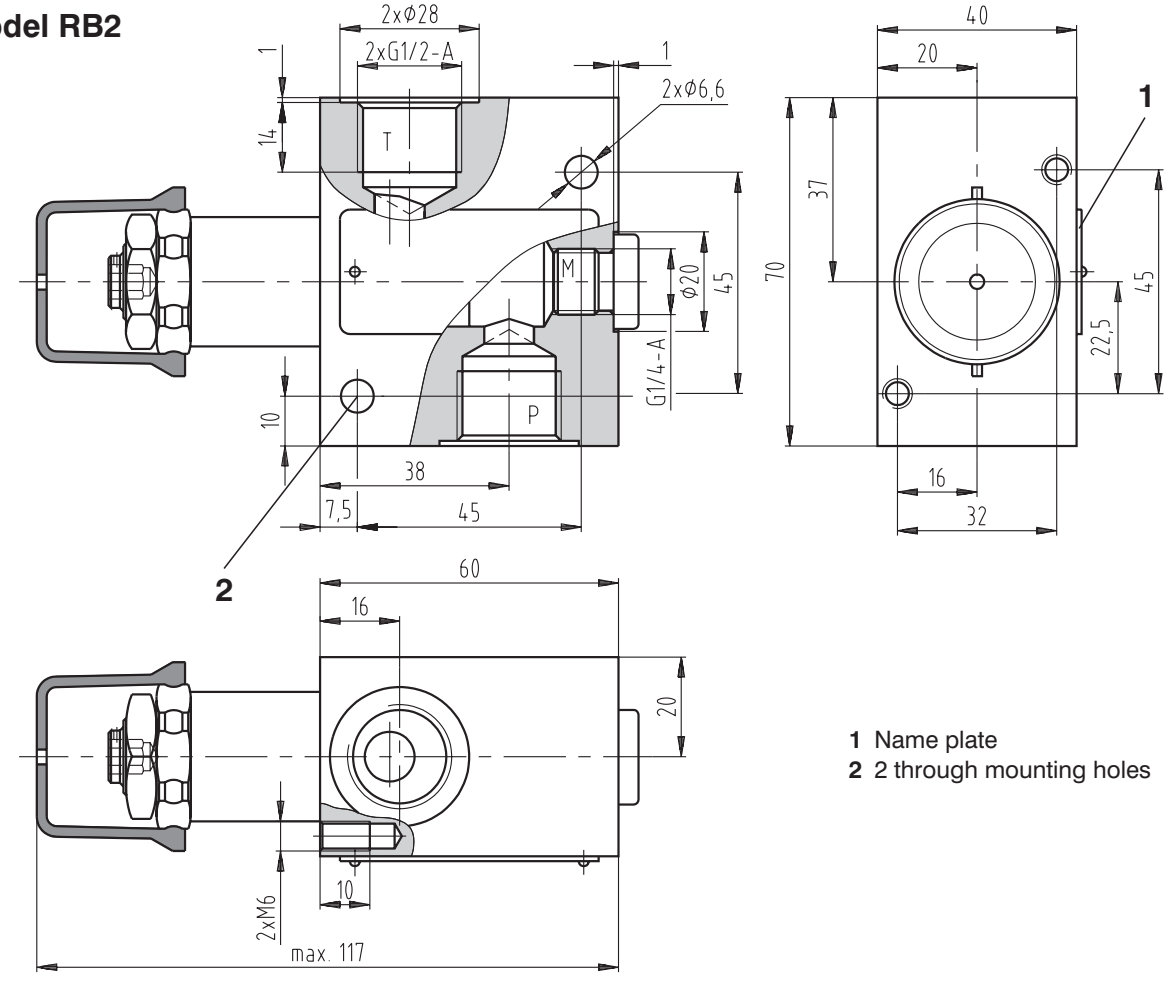
Dimensions in millimetres

Model RB1



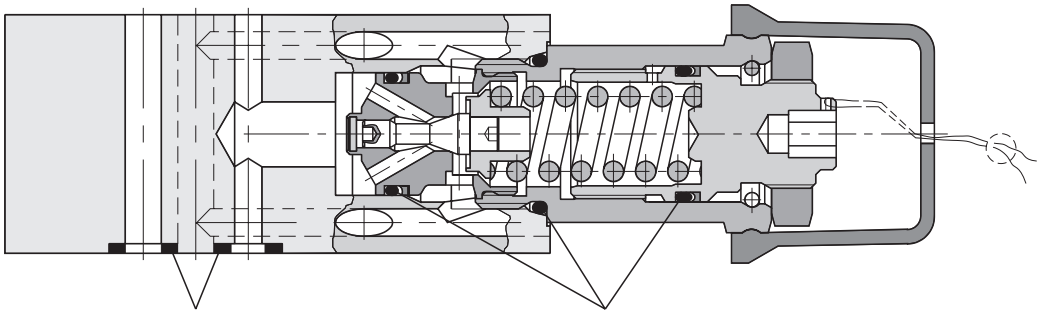
1 Name plate
2 2 through mounting holes

Model RB2



1 Name plate
2 2 through mounting holes

Spare Parts



Model	Dimensions, quantity	Ordering number
Screw-in cartridge - NBR	O-ring 14 x 1.78 NBR 90 (1 pc.)	513-0396
	O-ring 17 x 1.8 NBR 70 (1 pc.)	
	O-ring 19.4 x 2.1 NBR 80 (1 pc.)	
	Back-up ring BBP80B015-N9 14.73 x 17.43 x 1.14 (1 pc.)	
	Back-up ring BBP80B016-N9 16.33 x 19.03 x 1.14 (1 pc.)	
Screw-in cartridge - Viton	O-ring 14 x 1.78 (1 pc.)	513-0397
	O-ring 17.17 x 1.78 (1 pc.)	
	O-ring 19.4 x 2.1 (1 pc.)	
	Back-up ring BBP80B015 14.73 x 17.43 x 1.14 (1 pc.)	
	Back-up ring BG1300174-PT00 17.4 x 1.3 (1 pc.)	

Model	Dimensions, quantity	Ordering number
Modular valve size 04 - NBR	Square ring 7.65 x 1.68 (4 pcs.)	513-0398
Modular valve size 04 - Viton	O-ring 7.65 x 1.78 (4 pcs.)	513-0399
Modular valve size 06 - NBR	Square ring 9.25 x 1.68 (4 pcs.)	556-0397
Modular valve size 06 - Viton	O-ring 9.25 x 1.78 (4 pcs.)	556-0396

Model	Typ, quantity	Ordering number
In-line valve RA1 - NBR	VSTI R1/4-ED (1 pc.) VSTI R3/8-ED (1 pc.)	556-0395
In-line valve RA2 - NBR	VSTI R1/4-ED (1 pc.) VSTI R1/2-ED (1 pc.)	556-0393
In-line valve RB1 - NBR	VSTI R1/4-ED (1 pc.)	556-0394
In-line valve RB2 - NBR		
In-line valve RA1 - Viton	VSTI R1/4-ED - Viton (1 pc.) VSTI R3/8-ED - Viton (1 pc.)	556-0392
In-line valve RA2 - Viton	VSTI R1/4-ED - Viton (1 pc.) VSTI R1/2-ED - Viton (1 pc.)	556-0390
In-line valve RB1 - Viton	VSTI R1/4-ED - Viton (1 pc.)	556-0391
In-line valve RB2 - Viton		

Preferred Types of Valves

Type	Ordering Number	Type	Ordering Number
VPP2-04/S-10	513-0302	VPP2-04/MP06-10	513-0435
VPP2-04/S-25	513-0304	VPP2-04/MP06-25	513-0463
VPP2-04/S-32	513-0305	VPP2-04/MP06-32	513-0477
VPP2-04/MP04-10	513-0430	VPP2-04/RA2-10	513-0439
VPP2-04/MP04-25	513-0458	VPP2-04/RA2-25	513-0467
VPP2-04/MP04-32	513-0472	VPP2-04/RA2-32	513-0481

Caution!

- The packing foil is recyclable.
- The protecting plate can be returned to the manufacturer.
- Mounting studs must be ordered separately. Tightening torques are: size 04 - 5 Nm, size 06 - 8.9 Nm.
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law.

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HYTOS

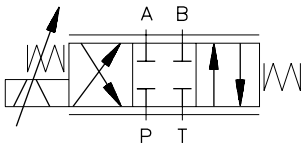
PROPORTIONAL DIRECTIONAL VALVES WITH LINEAR MOTOR — *PRL1*

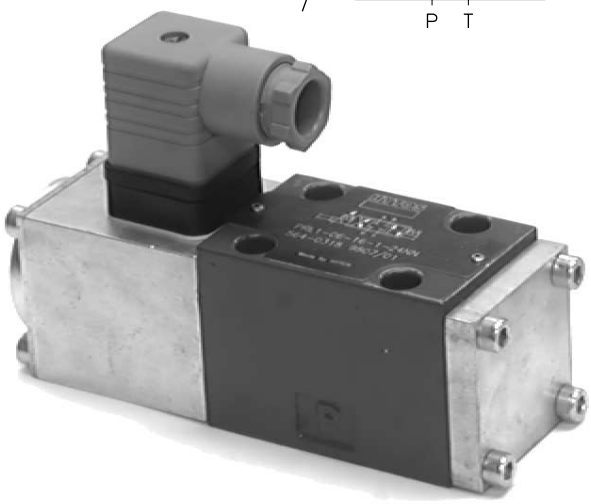
HA 5101 1/2002

Size 06	p_{max} 250 bar	Q_{max} 32 L/min

Replaces HA 5101 12/98

- **Proportional valve for remote control of hydraulic motors and actuators**
- **High reliability**
- **Centre position maintained by springs consuming no electrical current**
- **Does not require level of filtration usually demanded by normal servo valves**
- **Single-stage design ensures high dynamic performance independent of pressure**
- **Can be supplied as a complete unit consisting of proportional directional valve, electronic control unit and electronic remote control lever**
- **Model with manual override can be supplied by request**
- **Installation dimensions to ISO 4401-AB-03-4-A and DIN 24 340-A6**
- **Subplates - see catalogue HA 0002**





Functional Description

Proportional directional valves PRL1 are designed for remote control of hydraulic motors and actuators. Great reliability is ensured by the robust direct single-stage design. The valves ability to operate with less stringent oil cleaning filters reduces system costs.

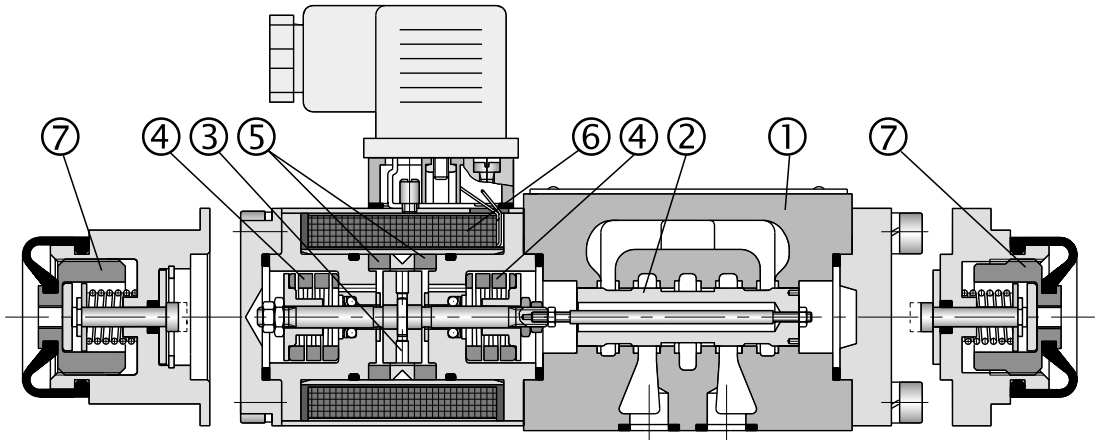
The valve comprises basically two sections. The hydraulic section consists of a casting valve body (1) with control spool (2). The actuating section is a linear motor. The core (3) of the linear motor is centered by means of two integral rigid springs (4) and the two working gaps are magnetized in the opposite direction by permanent magnets (5) made from rare earth. With the control coil (6) energized, the core and the control spool connected with it are shifted from the middle position, the displacement being directly proportional to the control current and the displacement direction to the direction of the current. A big advantage of the linear motor is in its ability to shift the core into its middle position should a disconnection of the supply voltage or failure of the cable occur. Electronic control unit EL2 has been developed to control the proportional valve.

The manual override enables the control spool to be continuously shifted into the required position. This can be done either from the side of the valve or from the side of the linear motor. The shifting is provided through a size 4 hexagon screw (7). It is not allowed to shift the spool from both sides simultaneously, so as to avoid the deformation of the push/pull rod. It is permitted to shift the spool from one side only, leaving the manual override at the other side free.

In spite of being developed for flow control, the PRL1-valve can also be used as a pilot stage for bigger proportional valves (in this case as a unit controlling the pilot pressure).

The dynamic properties of the PRL1 valves allow them to be used in closed loop control systems.

With the basic surface treatment, all the manufactured components are phosphate coated. Whereas all the connecting components are zinc coated.



Ordering Code

PRL1-06□-□-□□

Proportional directional valve with linear motor

Nominal size

Nominal flow in L/min at the pressure difference at the valve Δp = 70 bar and 10 bar

3.2 L/min 1.1 L/min	**03**
16 L/min 6.3 L/min	**16**
32 L/min 12.5 L/min	**32**

Spool lap

„Z“ zero	**0**
„Z“ 25% overlap	**1**
„Y“ 25% overlap	**2**
„H“ pressure valve	**3**

Model

without designation	basic
N	manual override on the valve
NN	manual override on both the valve and linear motorr

Nominal supply voltage of the control electronic

12	12V DC (11.2 - 14.7)
24	24V DC (22.4- 27.5)

	Spool lap			
	0	**1**	**2**	**3**
PRL1-06-03-.-24 (12)	●	●	●	●
PRL1-06-16-.-24 (12)	●	●	●	
PRL1-06-32-.-24 (12)	❍	❍	❍	

● - common types
❍ - restricted max. parameters, consultation with the manufacturer necessary Additional flow rates delivered by request.

Technical Data

Nominal size	mm	06		
Nominal pressure	bar	250		
Rated flow at Δp = 70 bar	L/min	3.2	16	32
Rated flow at Δp = 10 bar	L/min	1	6.3	12.5
Hysteresis	%	< 7		
Threshold	%	< 2		
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP - RP 91H in viscosity classes ISO VG 32, 46 and 68		
Fluid temperature range	°C	-30 ... +80		
Ambient temperature, max.	°C	+50		
Viscosity range	mm^2/s	20 ... 400		
Maximum degree of fluid contamination		Class 16/13 according to ISO 4406. Therefore we recommend a filter with a retention rate $\beta_{10} \geq 75$.		
Mounting position		optional		
Weight	kg	1.8		

Flow losses in L/min - at input pressure 100 bar, viscosity 35 mm^2/s and middle position of spool

	Spool lap			
	0	**1**	**2**	**3**
PRL1-06-03-.-24 (12)	< 0.8	< 0.2	< 0.2	< 2.0
PRL1-06-16-.-24 (12)	< 1.5	< 0.2	< 0.2	-
PRL1-06-32-.-24 (12)	< 1.5	< 0.2	< 0.2	-

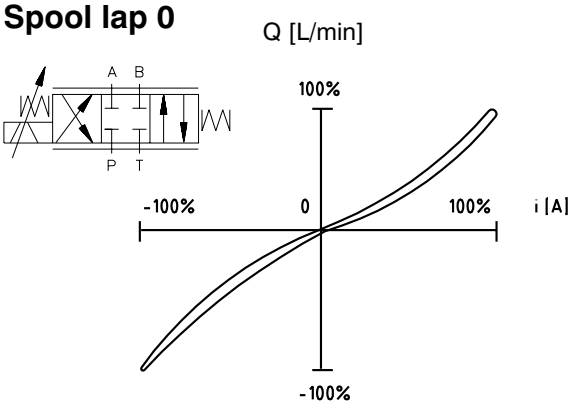
Performance Curves

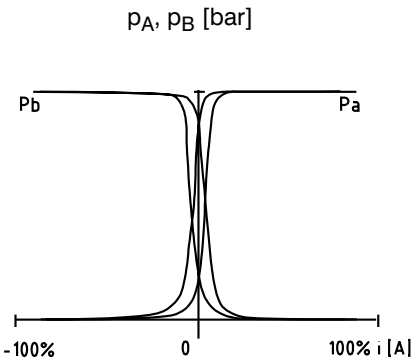
Measured at ν = 35 mm^2/s and t = 40 °C

Flow characteristic

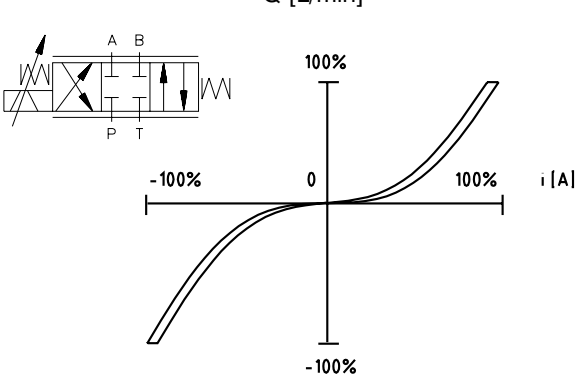
Pressure characteristic

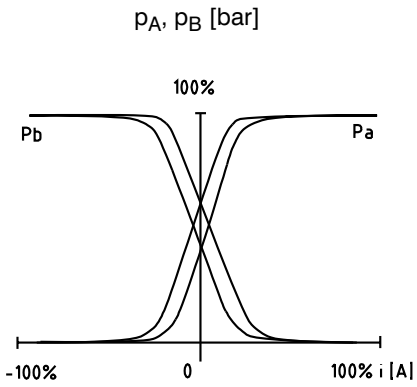
Spool lap 0



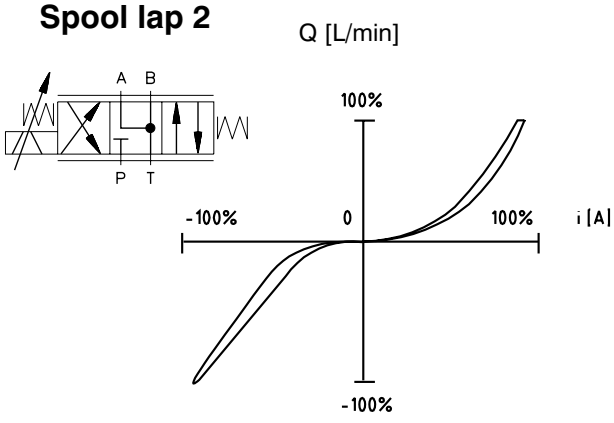


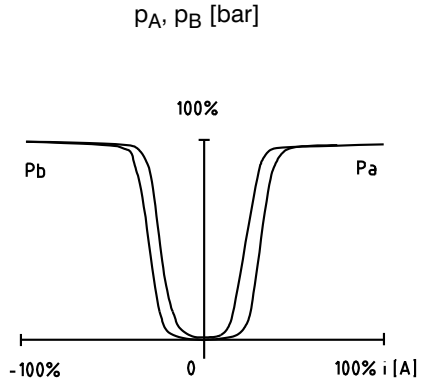
Spool lap 1



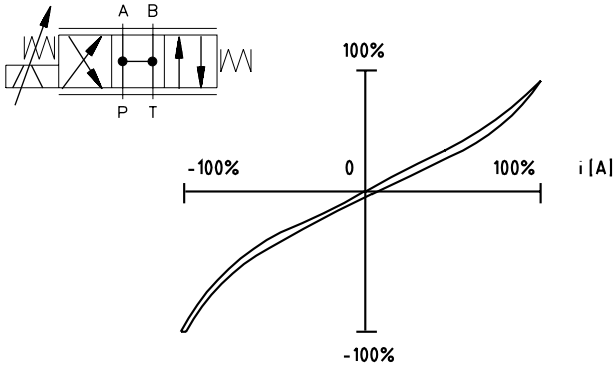


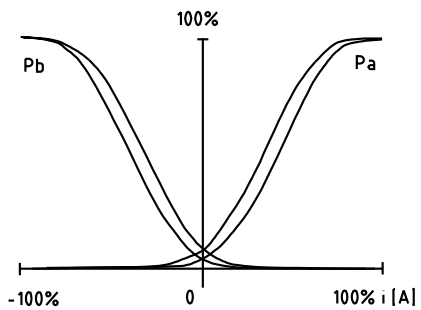
Spool lap 2





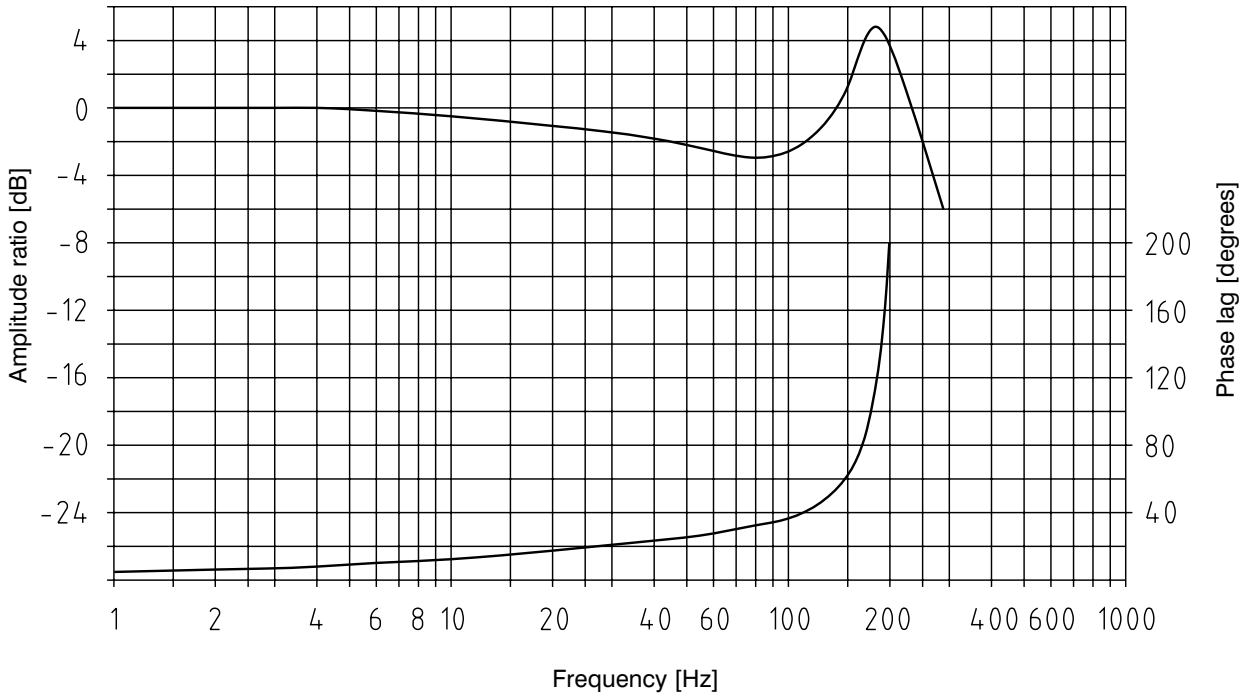
Spool lap 3





Frequency Response

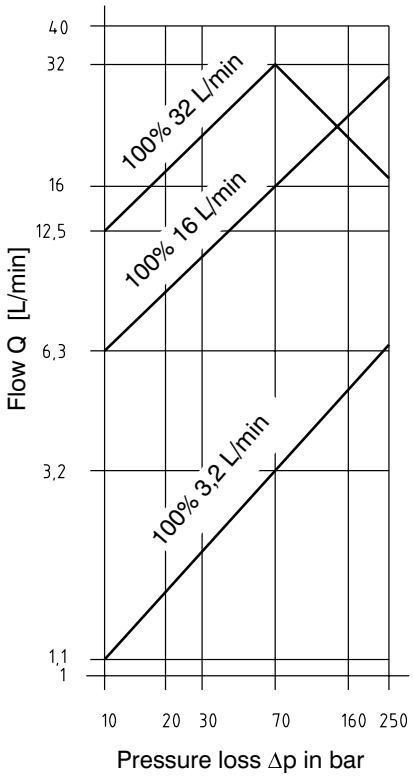
PRL1-06-16-0-24
p_o = 100 bar
x = 25%



Power characteristics

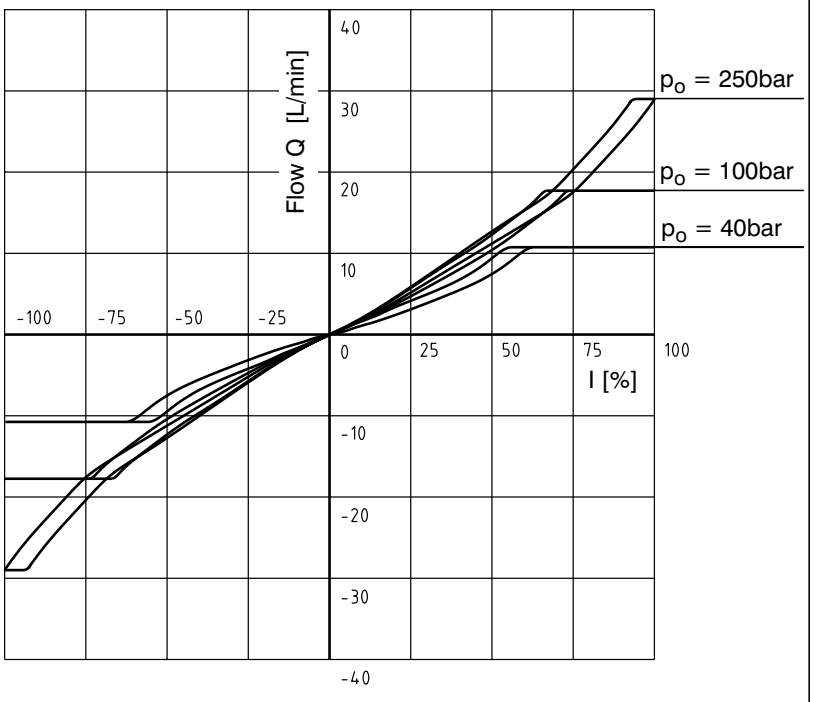
Measured at ν = 35 mm^2/s and t = 40 °C

For nominal flow rates: 3,2; 16; 32



Flow characteristics

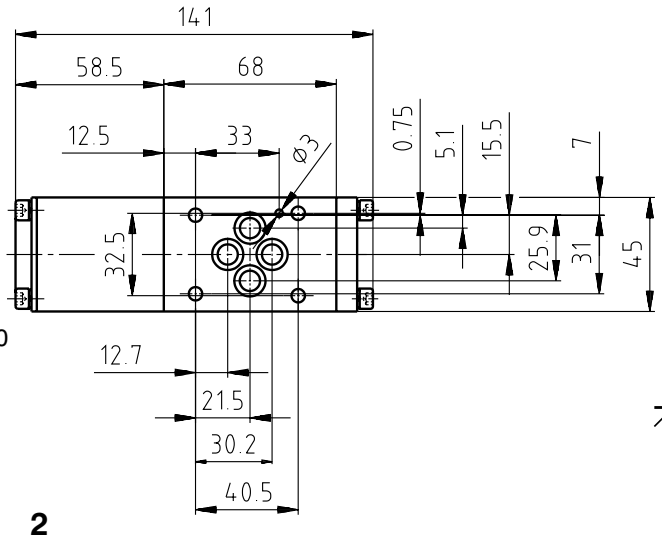
PRL1-06-16-0-24



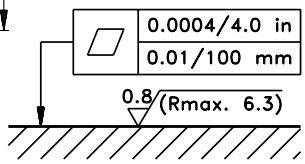
Valve Dimensions

Dimensions in millimetres

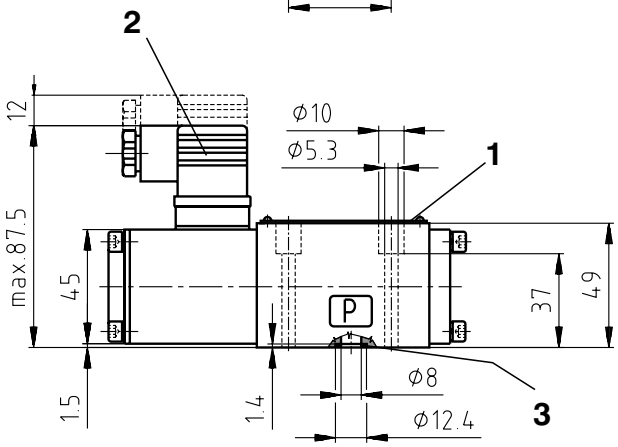
PRL1-06-..-.-..

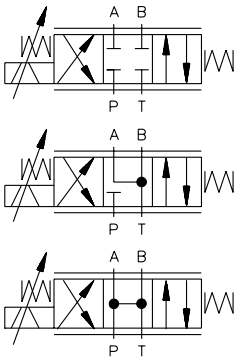


1 Name plate
2 Connector plug to DIN 43 650 (supplied with valve)
3 Square ring 012 9.25 x 1.68 (4 pcs.) (supplied with valve)

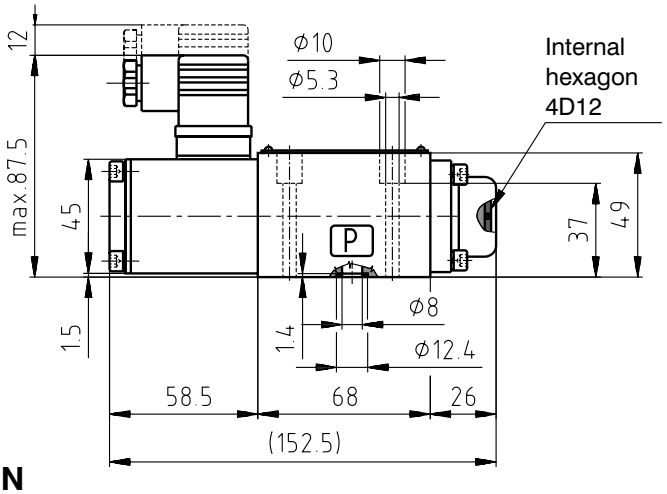


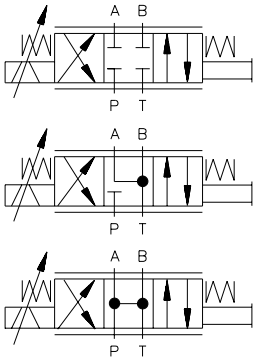
Required surface finish of interface





PRL1-06-..-.-..N





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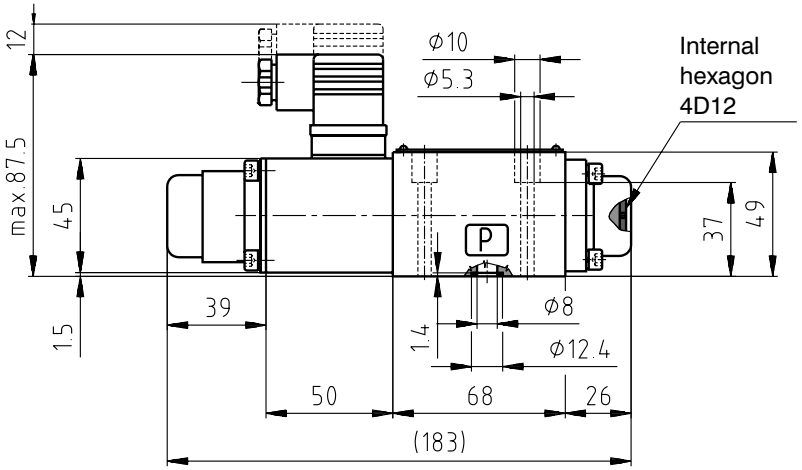

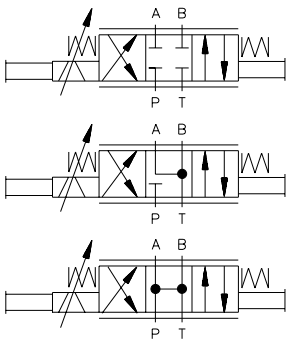

Spare Parts

Set of the seal for PRL1-06-..-.-..

Model	Dimensions, number		Ordering number
Standard - NBR70	O-Ring 22 x 2 (3 pcs.)	Square ring 9.25 x 1.68 (4 pcs.)	564-9900

Set of the seal for PRL1-06-..-.-..N

Model	Dimensions, number				Ordering number
Standard - NBR70	Rubber cup (1 pcs.)	O-Ring 4 x 1.75 (1 pcs.)	O-Ring 22 x 2 (3 pcs.)	Square ring 9.25 x 1.68 (4 pcs.)	564-9910

Set of the seal for PRL1-06-..-.-..NN

Model	Dimensions, number				Ordering number
Standard - NBR70	Rubber cup (2 pcs.)	O-Ring 4 x 1.75 (2 pcs.)	O-Ring 22 x 2 (3 pcs.)	Square ring 9.25 x 1.68 (4 pcs.)	564-9920

Mounting bolts - set

Dimensions, number	Tightening torque	Ordering number
M5 x 45 DIN 912-10.9 (4 pcs.)	8.9 Nm	484-9958

Caution!

- The packing foil is recyclable.
- Mounting bolts M5 x 45 DIN 912-10.9 must be ordered separately. Tightening torque of the bolts is 8.9 Nm.
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law.

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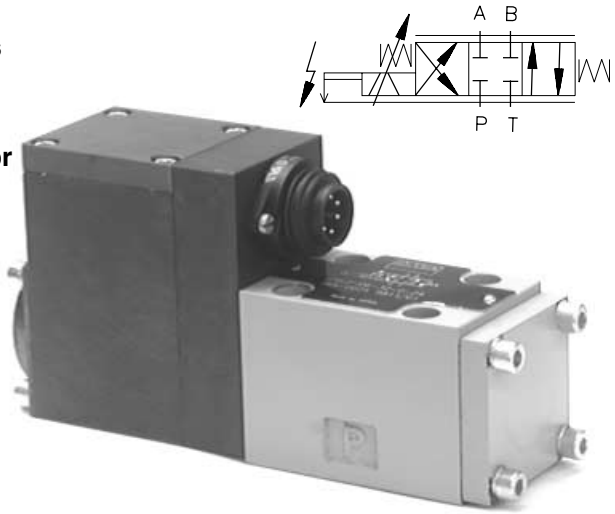
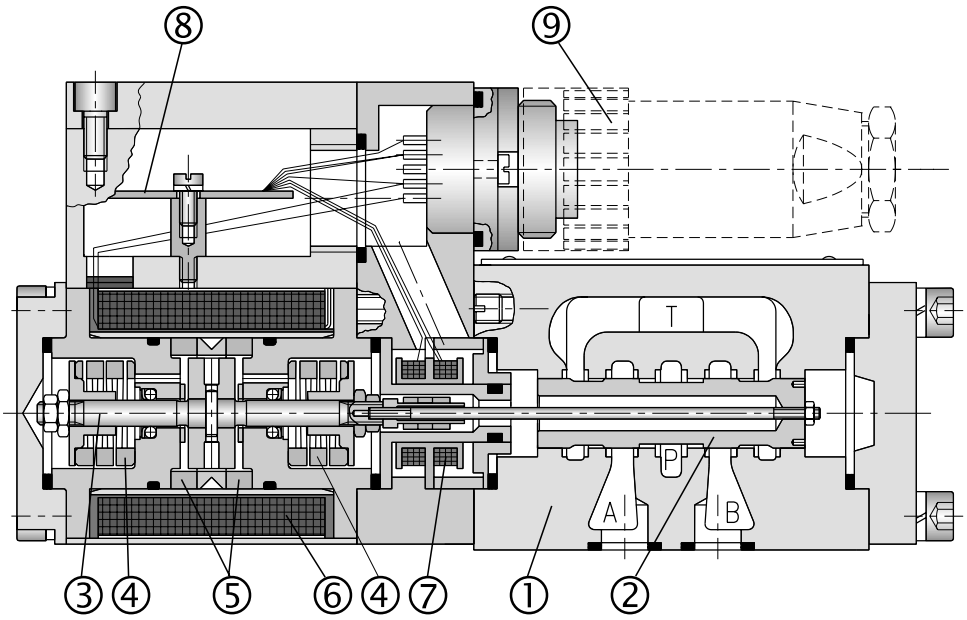
HYTOS	*PROPORTIONAL DIRECTIONAL VALVES WITH LINEAR MOTOR*	***PRL2***	**HA 5103 1/2002**
	Size 06	p_{max} 250 bar	Q_{max} 32 L/min
			Replaces HA 5103 12/98

- **Proportional valve for control of hydraulic motors and actuators**
- **Single-stage control of the spool by a linear motor**
- **Electronic spool-position feedback**
- **High reliability**
- **Less stringent oil filtration requirements**
- **Installation dimensions to ISO 4401-AB-03-4-A and to DIN 24 340-A6**



Functional Description

Proportional directional valves PRL2 are designed for continuous remote control of hydraulic motors and actuators. The single-stage robust design and the internal electronic feedback ensure reliability, reduce the oil filtration requirements and provide the valve with very good static and dynamic properties.
The valve comprises basically three sections. The hydraulic section consists of a casting valve body (1) with the control spool (2) with its meetering edges engineered to ensure the required function. The actuating section is a linear motor. The core (3) of the linear motor is centered by means of springs (4) and the working gaps are premagnetized in the opposite direction by permanent magnets (5) made from rare earth. With the control coil (6) energized, the core and the control spool connected with it are shifted from the middle position, the displacement being directly proportional to the control current and the displacement direction to the direction of the current. On failure of the cable or disconnection of the supply voltage, the springs return the core and spool in the middle position.
The third main section of the valve PRL2 is the inductive displacement transducer (7). Information about the spool position is processed in the integrated electronic circuit (8), which also enables the null and gain adjustment. Then the information is transmitted to the controller in the electronic control unit EL2. The valve uses an AMPHENOL connector (9) of the enclosure type IP 65. The connection of the valve with the electronic control card EL2-24BA is made by a six-core cable. This cabel is to be ordered according to the length required.
With the basic surface treatment, all the manufactured components are phosphate coated. Whereas all the connecting components are zinc coated.



Ordering Code

PRL2-06 - □ - □ - □

Proportional directional valve with linear motor and displacement transducer

Nominal size

Nominal flow in L/min with the pressure difference at the valve Δp = 70 bar and 10 bar

3.2 L/min 1.1 L/min	**03**
16 L/min 6.3 L/min	**16**
32 L/min 12.5 L/min	**32**

Spool lap

0	„Z“ zero
1	„Z“ 25% overlap
2	„Y“ 25% overlap
3	(only Q_n 03) „Y“ pressure valve

Nominal supply voltage

24 24V DC (22.4 - 27.5)

	Spool lap			
	0	**1**	**2**	**3**
PRL2-06-03-.-24	●	●	●	●
PRL2-06-16-.-24	●	●	●	
PRL2-06-32-.-24	❍	❍	❍	

● - common types
❍ - restricted max. parameters, consultation with the manufacturer necessary.
Additional flow rates delivered by request.

Technical Data

Nominal size	mm	06		
Nominal pressure	bar	250		
Rated flow at Δp = 70 bar	L/min	3.2	16	32
Rated flow at Δp = 10 bar	L/min	1	6.3	12.5
Hysteresis	%	< 1		
Threshold	%	< 0.5		
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP - RP 91H in viscosity classes ISO VG 32, 46 and 68		
Fluid temperature range	°C	-30 ... +80		
Ambient temperature, max.	°C	+50		
Viscosity range	mm^2/s	20 ... 400		
Maximum degree of fluid contamination		Class 16/13 according to ISO 4406. Therefore we recommend a filter with a retention rate $\beta_{10} \geq 75$		
Mounting position		optional		
Weigh	kg	2.3		

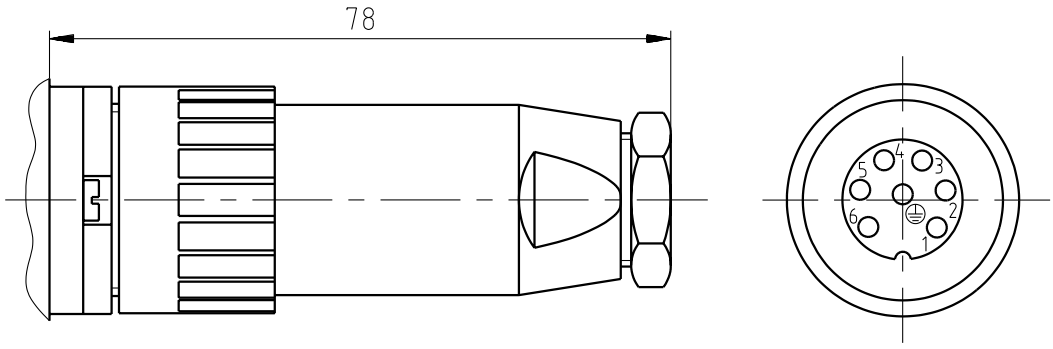
Flow losses in L/min - at input pressure 100 bar, viscosity 35 mm^2/s and middle position of spool

	Spool lap			
	0	**1**	**2**	**3**
PRL2-06-03-.-24	< 0.8	< 0.2	< 0.2	< 2.0
PRL2-06-16-.-24	< 1.5	< 0.2	< 0.2	-
PRL2-06-32-.-24	< 1.5	< 0.2	< 0.2	-

Electric Connection

Connector plug AMPHENOL T 3105 101 DIN 43 563-BF6-3/Pg11
6-core cable 2 x 1 + 4 x 0.15

Connector plug is to be ordered either separately or as part of the connecting cable - ordering number see the table bellow.



Model	Ordering number
Connector plug AMPHENOL T3105 101	625-0050
Connector plug/connecting cable PRL2 - 2 m	625-0051
Connector plug/connecting cable PRL2 - 3 m	625-0054
Connector plug/connecting cable PRL2 - 5 m	625-0052
Connector plug/connecting cable PRL2 - 10 m	625-0053
Connector plug/connecting cable PRL2 - 15 m	625-0055

Connector Connection

Signal	Contact - wire colour
Inverted transducer output	1 - black
Noninverted transducer output	2 - green
Transducer supply 24V	3 - red
Transducer supply 0V	4 - white + screening
Input 1 of the linear motor PRL2	5 - white strong
Input 2 of the linear motor PRL2	6 - red strong

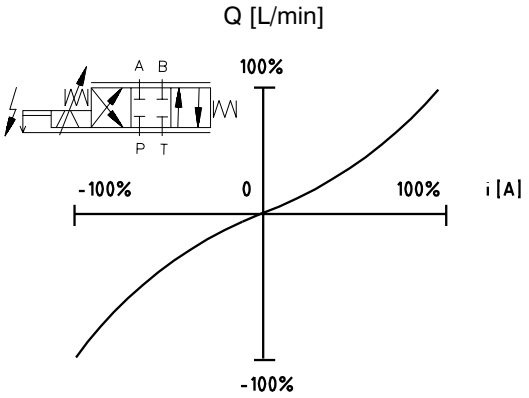
Performance Curves

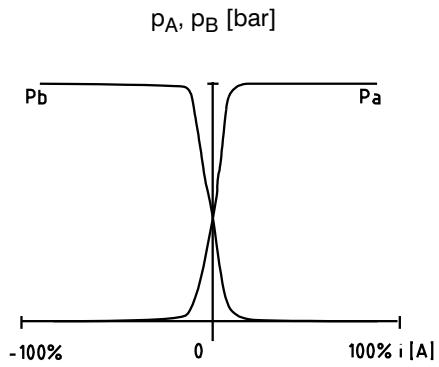
Measured at ν = 35 mm^2/s and t = 40 °C

Flow characteristic

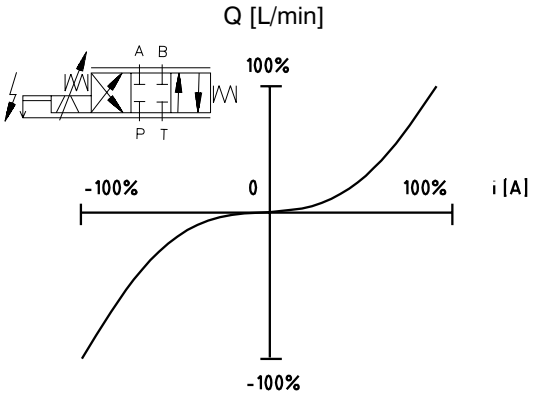
Pressure characteristic

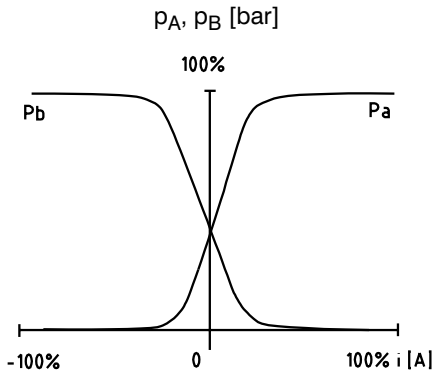
Spool lap 0



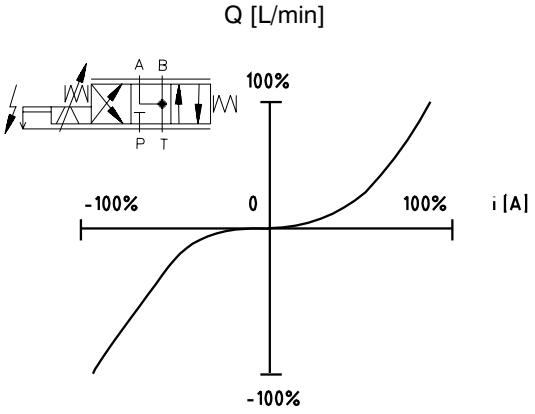


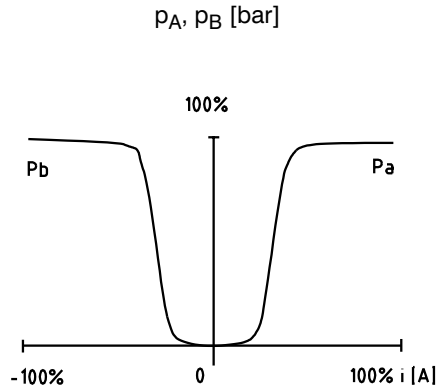
Spool lap 1



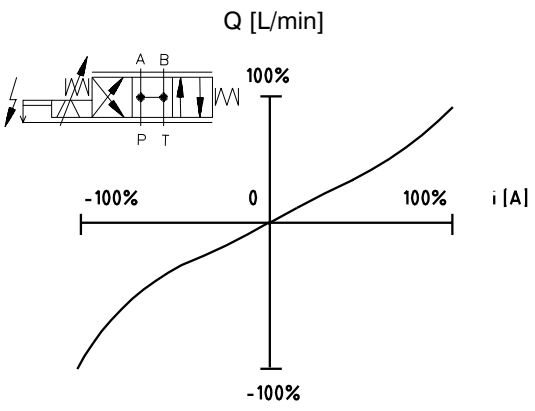


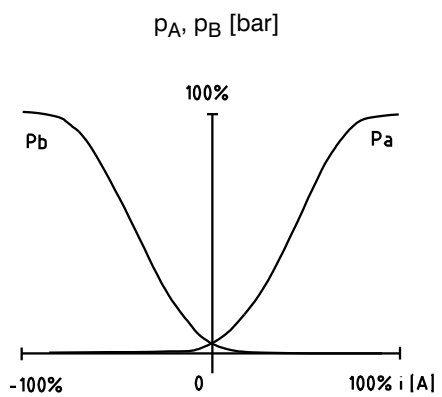
Spool lap 2





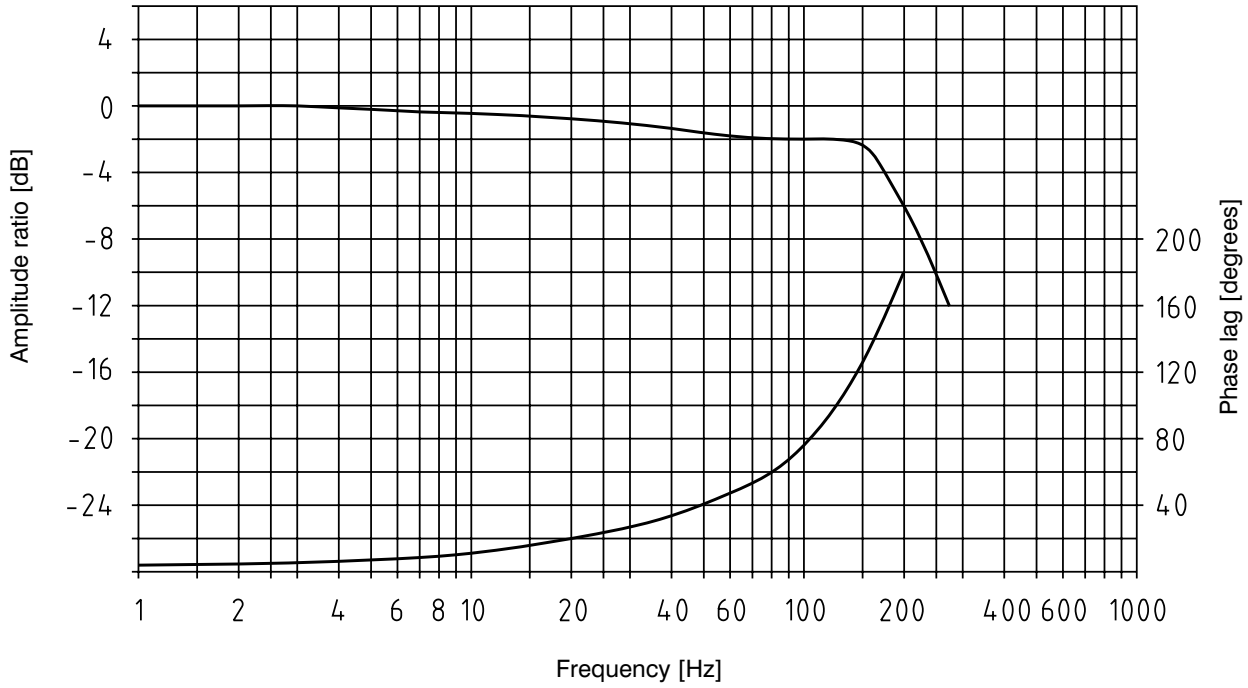
Spool lap 3





Frequency Reponse

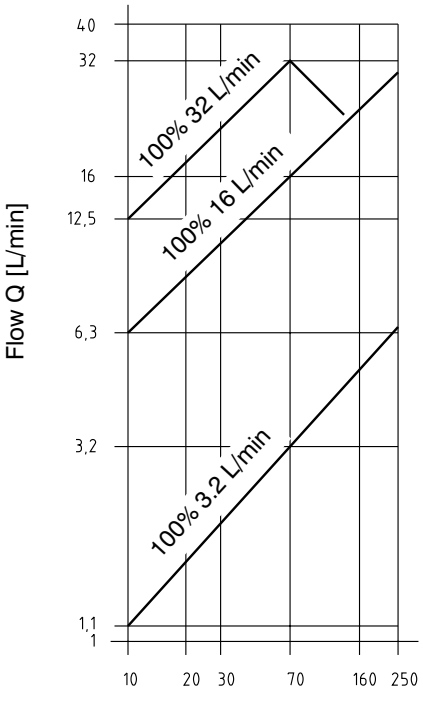
PRL2-06-16-0-24
p_o = 100 bar
x = 25%



Power characteristics

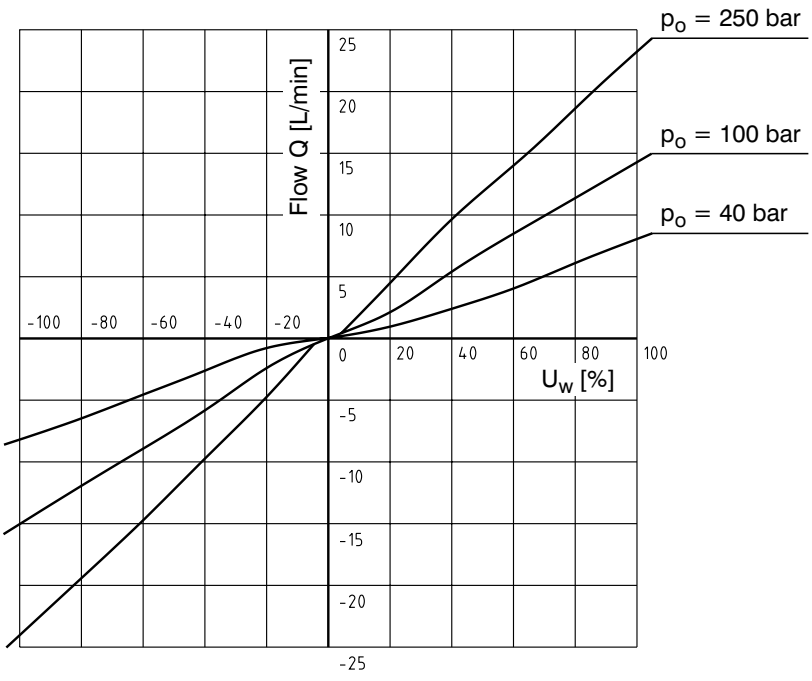
Measured at ν = 35 mm^2/s and t = 40 °C

For nominal flow rates: 3.2; 16; 32



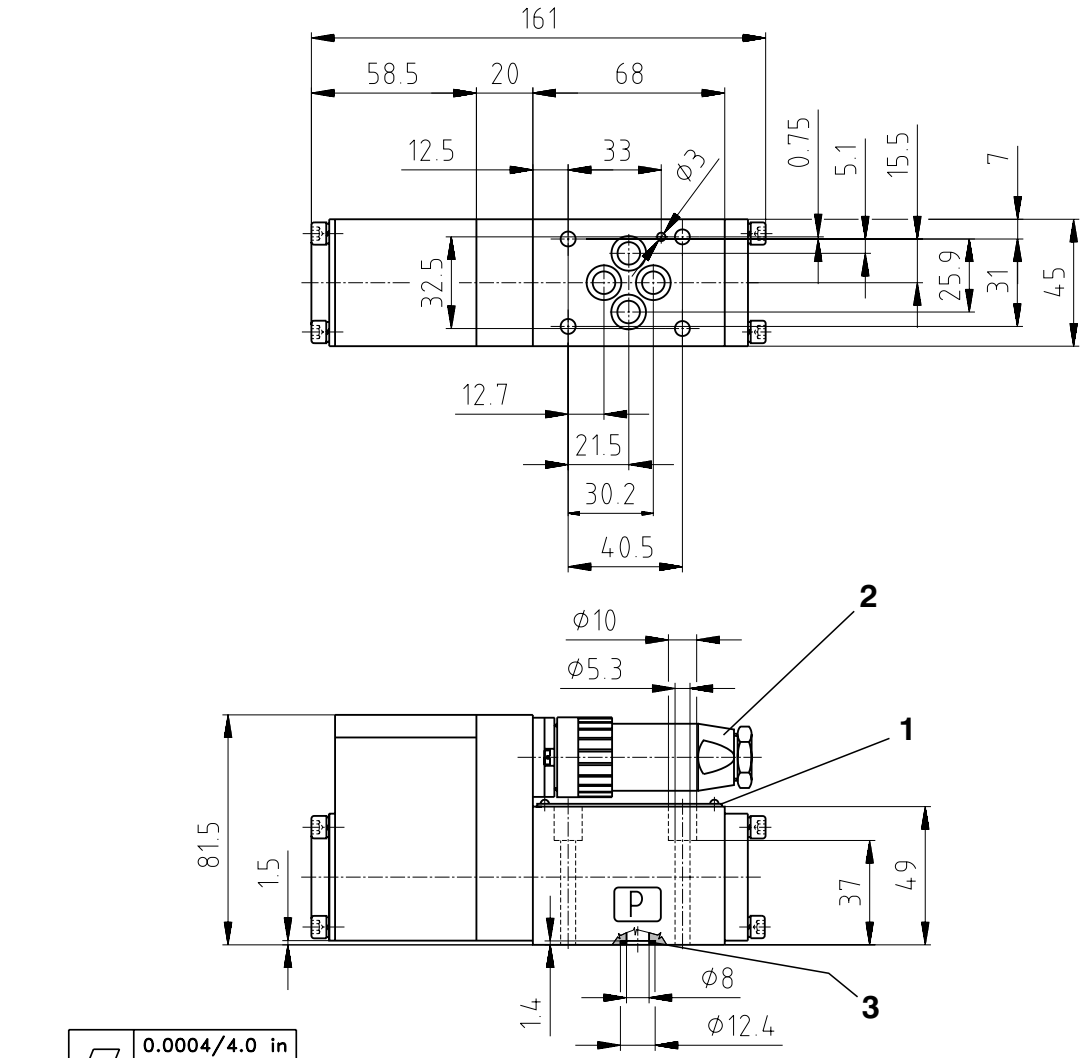
Flow characteristics

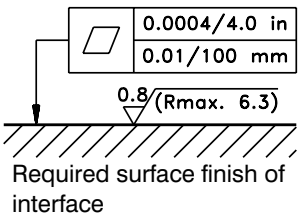
PRL2-06-16-0-24
Input Pressure Differential



Valve Dimensions

Dimensions in millimetres





Required surface finish of interface

1 Name plate
2 Connector AMPHENOL T 3105 101
Connector plug is to be ordered either separately or as part of the connecting cable.
3 Seal ring (4 pcs.), supplied with valve
Type: Square ring 012 (9.25 x 1.68)

Spare Parts

Set of the seal

Type	Dimensions, number				Ordering number
Standard - NBR70	Square ring 9.25 x 1.68 (4 pcs.)	O-Ring 22 x 2 (4 pcs.)	O-Ring 18 x 2 (1 pc.)	O-Ring 6 x 2 (1 pc.)	564-9930

Mounting bolts - set

Dimensions, number	Tightening torque	Ordering number
M5 x 45 DIN 912-10.9 (4 pcs.)	8.9 Nm	484-9958

Caution!

- The packing foil is recyclable.
- 4 mounting bolts M5 x 45 DIN 912-10.9 must be ordered separately.
  Tightening torque of the bolts is 8.9 Nm.
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law.

HYTOS a.s. CZ - 543 15 Vrchlabí

Tel.: +420-499-403111, Fax: +420-499-403421, e-mail: sales@hytos.cz

Proportional directional control valve

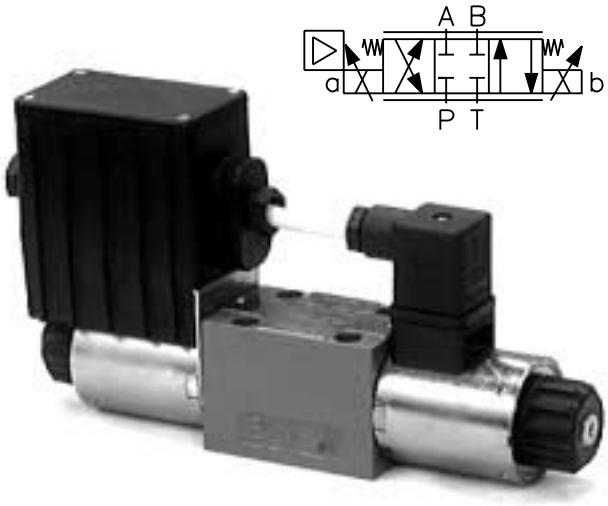
PRM2-06

Size 06 • p_{max} up to 320 bar • Q_{max} up to 40 L/min

HA 5104
1/2005

Replaces
HA 5104 9/2003

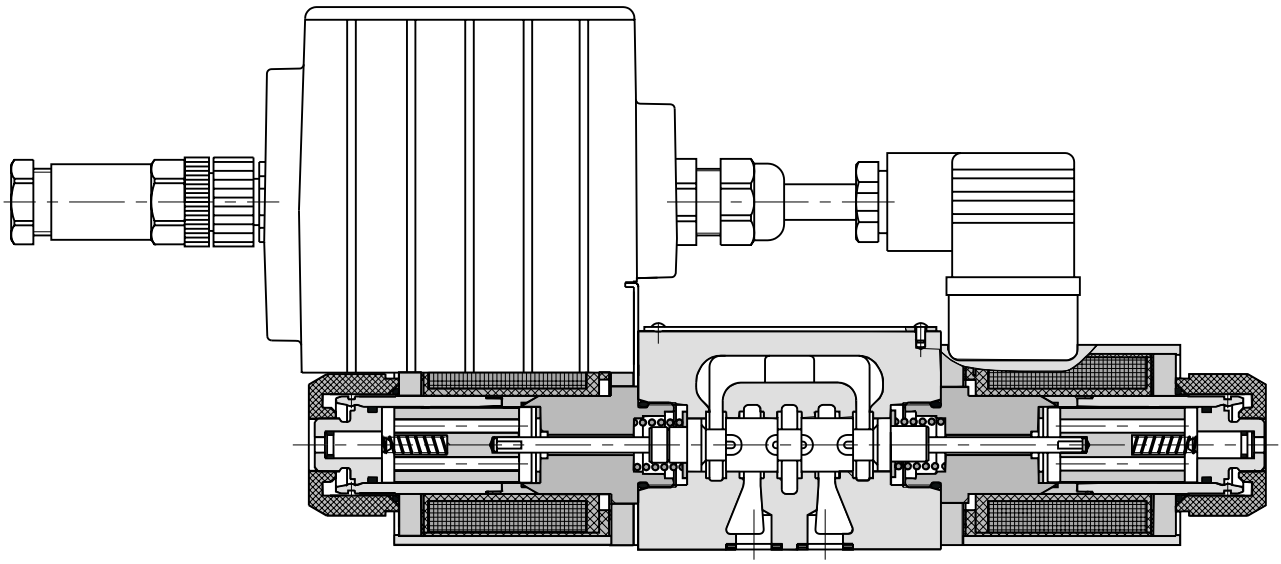
- ❑ **Compact design with integrated electronics**
- ❑ **High reliability**
- ❑ **Simple replacement of the exciting coils including electronics without opening the hydraulic circuits**
- ❑ **Continuous flow control in both directions**
- ❑ **Installation dimensions to DIN 24 340-A6 and ISO 4401-AB-03-4-A**



Functional Description

The proportional directional valve consists of a cast-iron housing, a special control spool, two centering springs with supporting washers and one or two proportional solenoids. A control box, which comprises one or two electronic control cards, depending on the number of the controlled solenoids, can be mounted onto either solenoid. With the model with two solenoids, the solenoid mounted apposite the control box is connected with the box by means of a DIN connector, a two-cored cable and a bushing. The connection of the control box with the supply source and with the control signal is realized by means of a 4-pin connector, type M12 x 1. The solenoid coils, including the control box, can be turned in the range of $\pm 90^{o}$.
The electric control unit supplies the solenoid with current, which varies with the control signal. The solenoid shifts the control spool to the required position, proportional to the control current.

The electronic control unit provides the following adjustment possibilities: Offset, Gain, rise and drop-out time of the ramp generator, frequency (2 frequencies) and amplitude of the dither signal generator. The correct function of the control unit is signaled by LED-diodes.
Stabilized voltage +10V (+5V for voltage 12V) is also available for the user. By the use of this voltage, a voltage control signal can be made by means of a potentiometer ≥ 1 kΩ.
The electronic control card enables voltage or current control to be used, according to the positions of the switches SW1 to SW3 (see table on page 6).
The basic surface treatment of the valve housing is phosphate coated, the operating solenoids are zinc coated.

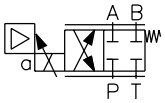
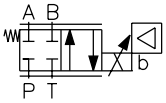
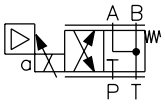
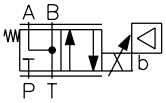
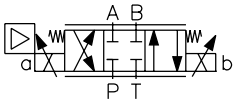
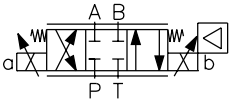
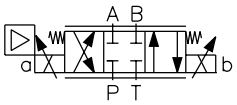
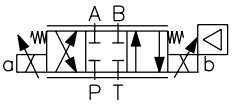
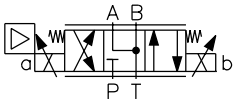
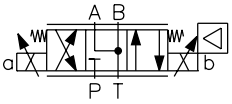
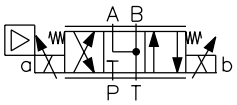
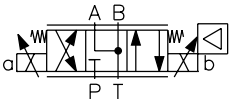


Ordering Code

PRM2-06 □ / □ - □ □ □

Proportional directional valve

Nominal size **06**

	**2Z51**
	**2Z11**
	**2Y51**
	**2Y11**
	**3Z11**
	**3Z11B**
 $\frac{q_A}{q_B} = \frac{1}{2}$*	**3Z12**
 $\frac{q_A}{q_B} = \frac{1}{2}$*	**3Z12B**
	**3Y11**
	**3Y11B**
 $\frac{q_A}{q_B} = \frac{1}{2}$*	**3Y12**
 $\frac{q_A}{q_B} = \frac{1}{2}$*	**3Y12B**

Seals

without designation	NBR
V	FPM (Viton)

Electronics

without designation	without electronics
EK	connection by connector M12 x 1 (4-pin connector) (supplied with counterpart)

Nominal supply voltage

12	12 V DC
24	24 V DC

Nominal flow rate at Δp = 10 bar

15	15 L/min
30	30 L/min

***** Model for cylinders with asymmetric piston rod, piston area ratio 1:2

Technical Data

Nominal size	mm	06	
Maximum operating pressure at ports P, A, B	bar	320	
Maximum operating pressure at port T	bar	160	
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP - RP 91H in viscosity classes ISO VG 32, 46 and 68	
Fluid temperature range (NBR/Viton)	°C	-30 ... +80	-20 ... +80
Ambient temperature, max.	°C	up to +50	
Viscosity range	mm^2/s	20 ... 400	
Maximum degree of fluid contamination		Class 21/18/15 according to ISO 4406 (1999).	
Nominal flow rate Q_n at Δp = 10 bar (ν = 35 $mm^2 \cdot s^{-1}$)	L/min	15	30
Hysteresis	%	≤ 6	
Weight PRM2-062 PRM2-063	kg	1.9 2.40	
Mounting position		any, preferably horizontal	
Enclosure type		IP65	

Technical Data of the Proportional Solenoid

Type of coil	V	12 DC		24 DC
Limit current	A	2.5	1.6 (12 V electronic)	1.0
Resistance at 20 °C	Ω	2.3	5.2 (12 V electronic)	13.4

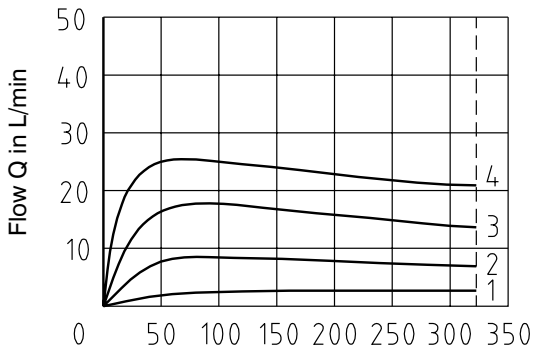
Technical Data of the Electronics

Nominal supply voltage U_{cc}	V	12 DC	24 DC
Supply voltage range	V	11.2 ... 14.7	20 ... 30 DC
Stabilized voltage for control	V	5 DC (R > 1kΩ)	10 DC (R ≥ 1kΩ)
Control signal		see table of switches configuration (page 6)	
Maximum output current	A	2.4 for R < 4Ω	1.5 for R < 10Ω
Ramp adjustment range	s	0.05 ... 3	
Dither frequency	Hz	90/60	

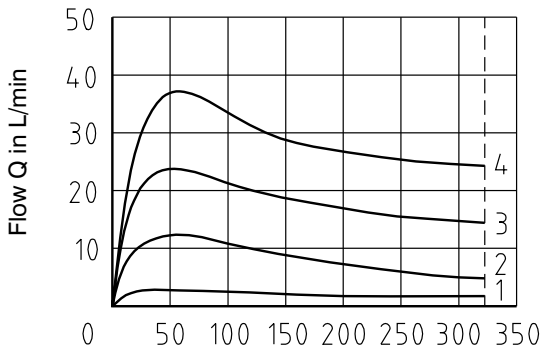
Limit power

Measured at ν = 35 mm^2/s P → A / B → T or P → B / A → T

Nominal flow 15 L/min



Nominal flow 30 L/min

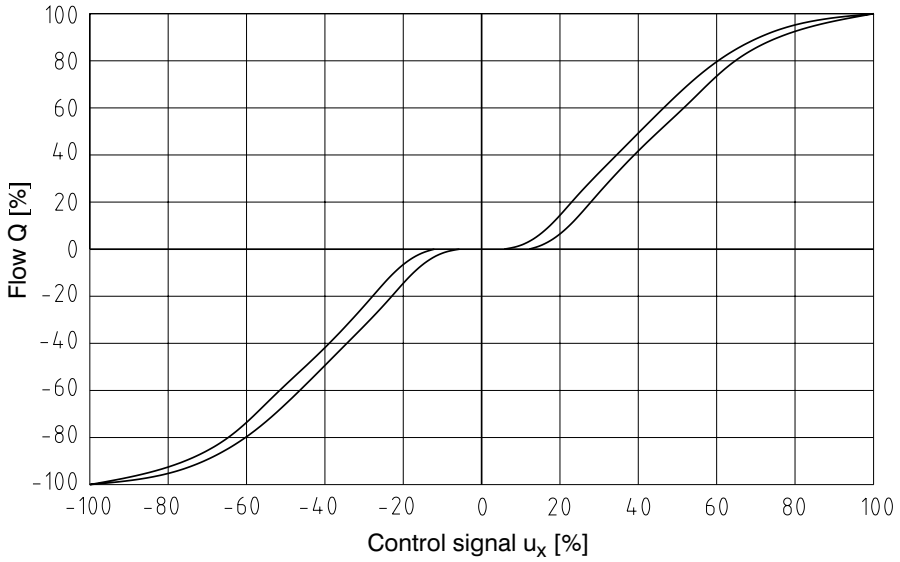


Solenoid current:

1 = 40%
2 = 60%
3 = 80%
4 = 100%

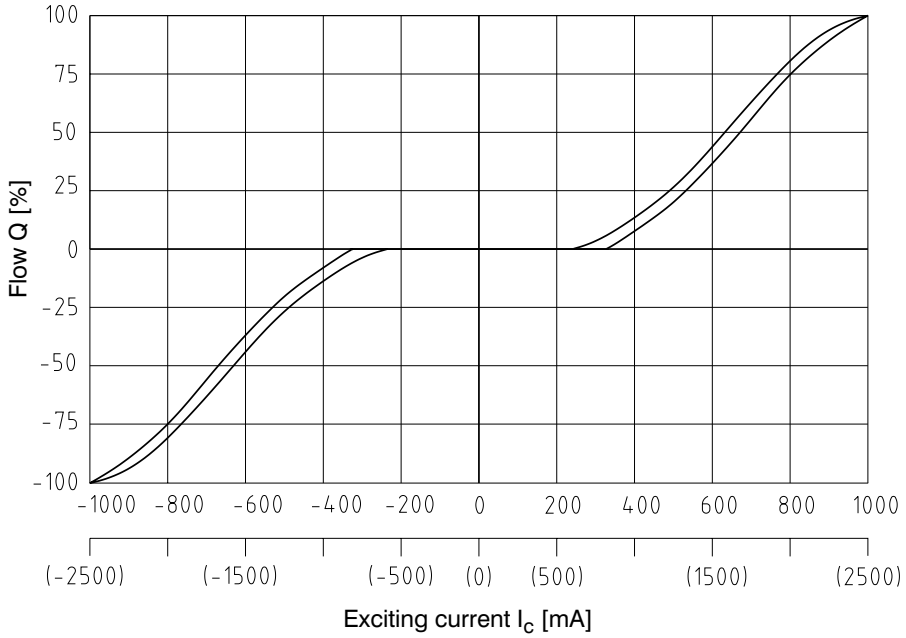
Flow characteristic with integrated electronics

Measured at $\Delta p = 10$ bar, $\nu = 35$ mm^2/s



Flow characteristic without integrated electronics

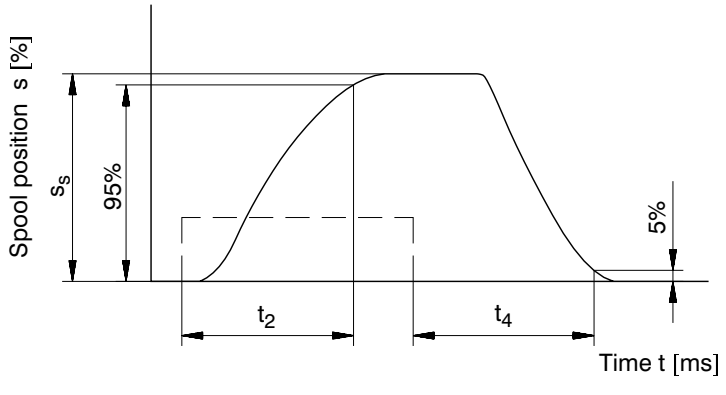
Measured at $\Delta p = 10$ bar, $\nu = 35$ mm^2/s, values in parenthesis are valid for the supply voltage 12 V



The coil current which initializes the flow through the proportional directional valve can differ due to the production tolerances about in a range of ± 6% of the limit current.

Transient characteristic

Measured at $\Delta p = 10$ bar, $\nu = 35$ mm^2/s; $Q = 80\ \%Q_n$

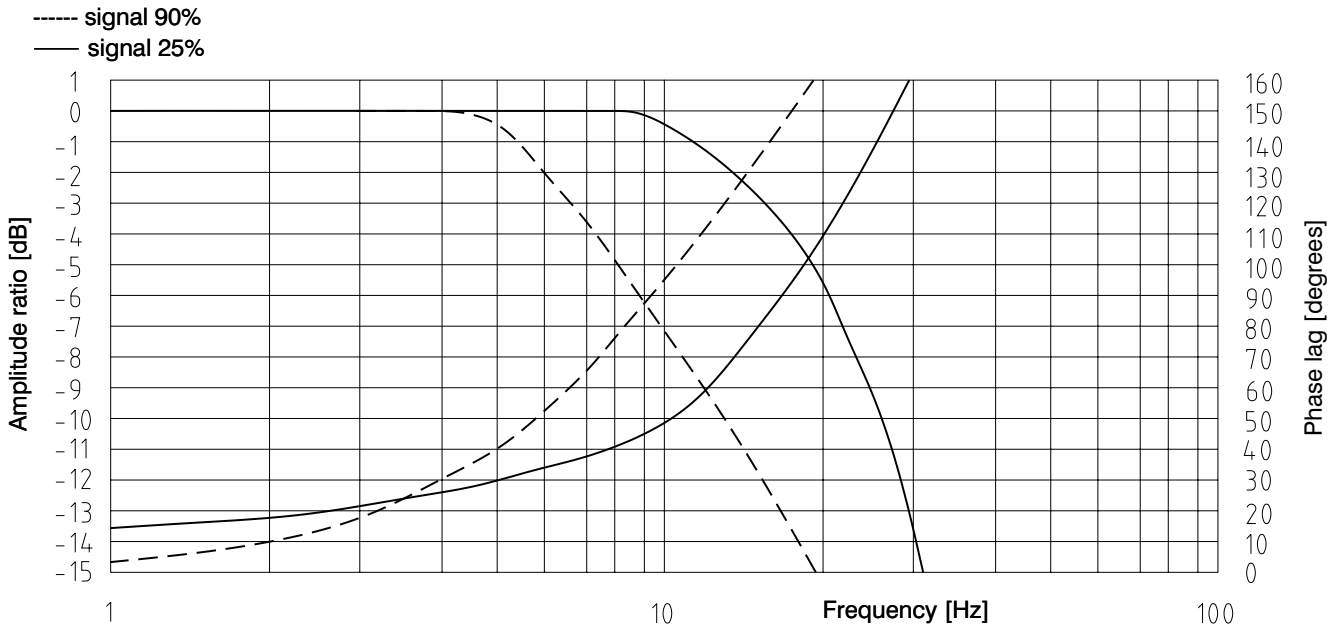


— — — the control signal course of the integrated electronics

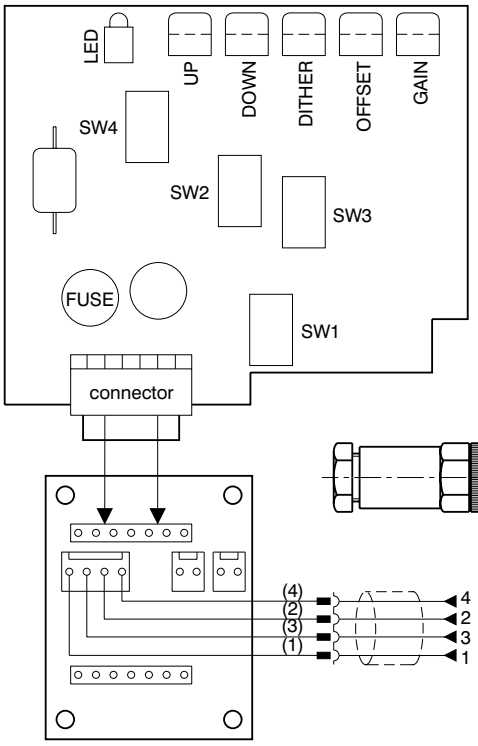
Steady spool position s_s [%]	t_2 [ms]	t_4 [ms]
100	85	100
75	70	85
50	55	75
25	45	55

The values in table have only an informative character.
The times of the transient characteristics at pressure or flow control will be in a particular hydraulic circuit always longer.

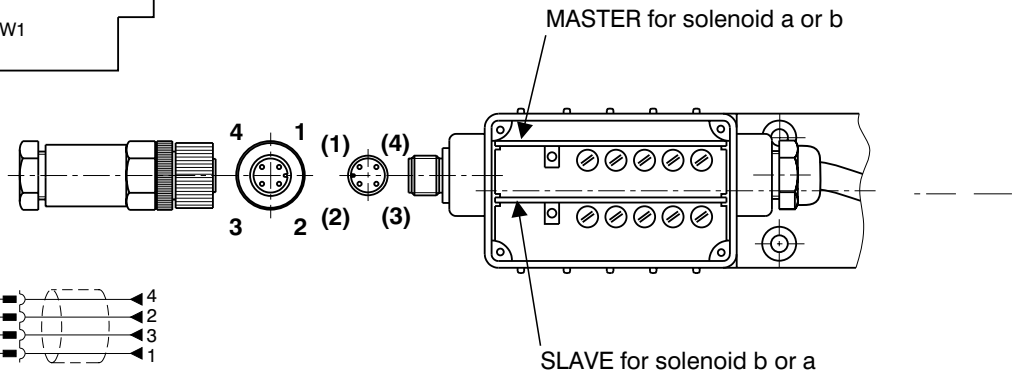
Frequency Reponse



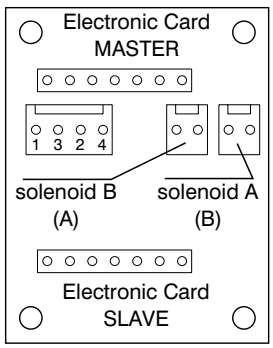
Component Arrangement on the Electronic Card



SW1 - control signal choice
SW2 - control signal choice
SW3 - control signal choice
SW4 - dither frequency



Description basic subplatte



PIN	Description
1	+24 V (U_{cc}) (+12 V)
2	control
3	0 V
4	+10 V (+5 V)

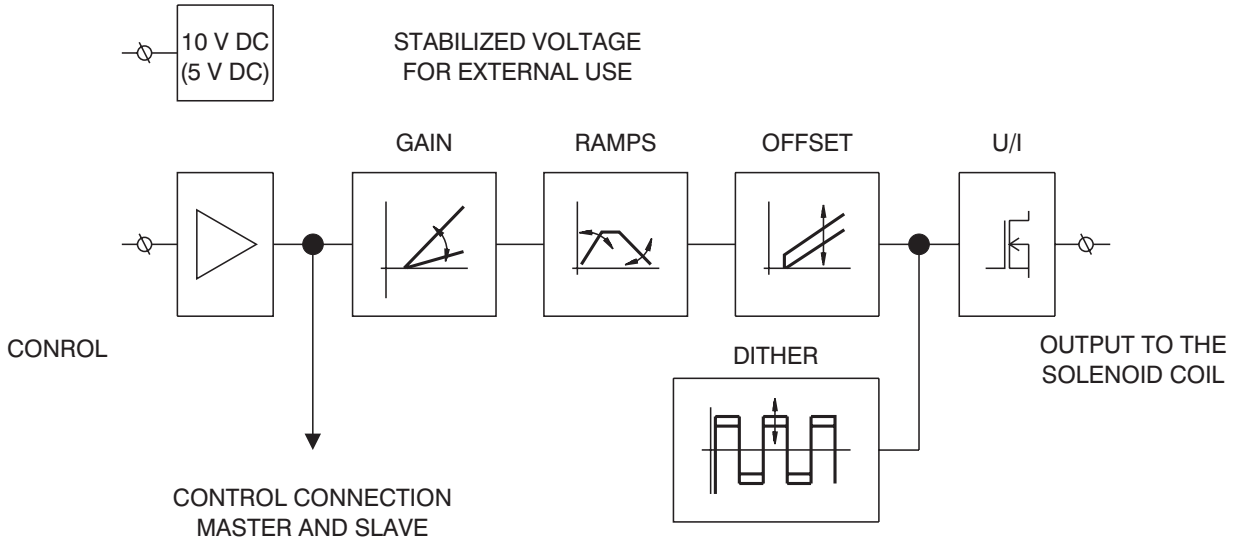
Table of the Switch Configuration for the Control Signal Choices

		PRM2-062				PRM2-063	
		0 ... 5 V	0 ... 10 V (0 ... 5 V)*	0 ... 20 mA	4 ... 20 mA	$U_{cc}/2$ ± 10 V (± 5 V)*	± 10 V (± 5 V)*
MASTER M	SW1						
	SW2						
	SW3						
	SW4	90 Hz 			60 Hz 		
SLAVE S	SW1						
	SW2						
	SW3						
	SW4					90 Hz 	60 Hz 

Designation of the basic manufacture setting.
The ramp functions are adjusted on their minimum values, the dither is set to the optimal value with respect to hysteresis. Offset and Gain are adjusted according to the characteristic on page 3 and 4. The manufacturer does not recommend these adjusted values to be changed.

* Input signal level for the 12 V electronic unit.

Block Diagram



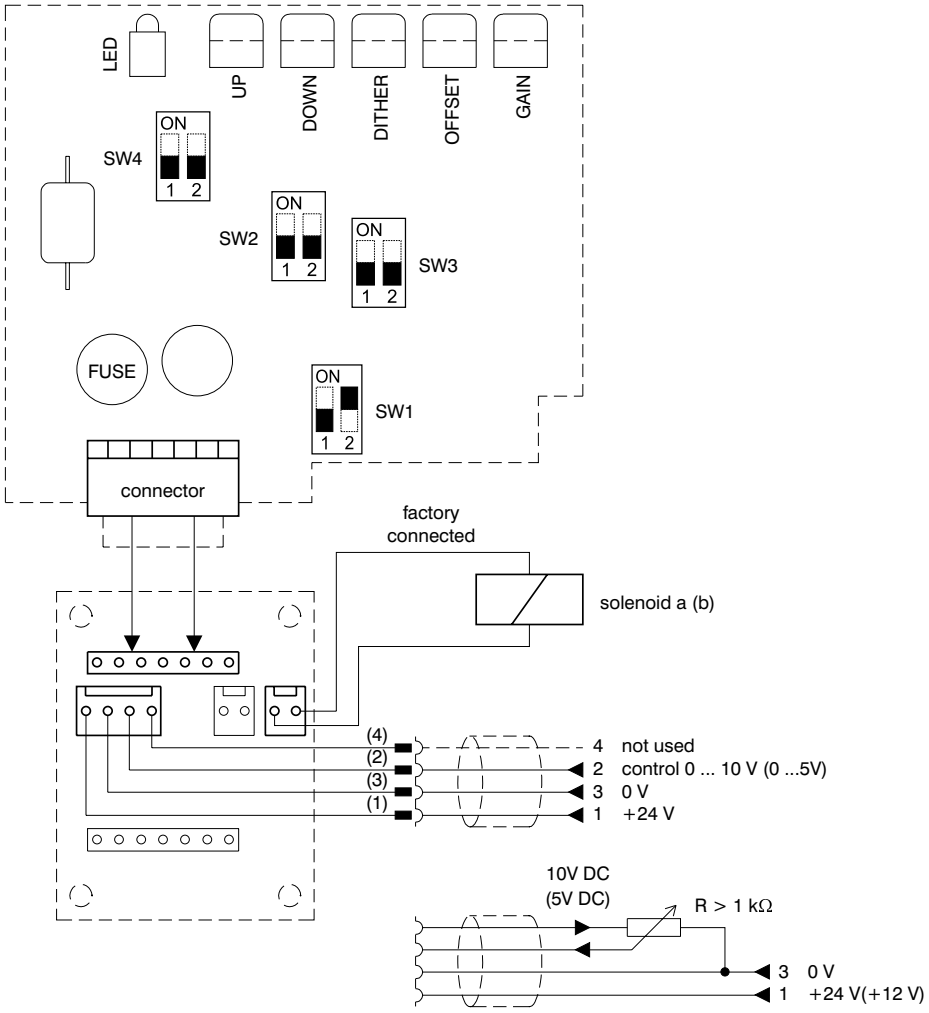
Valve PRM2-062 (with one solenoid)

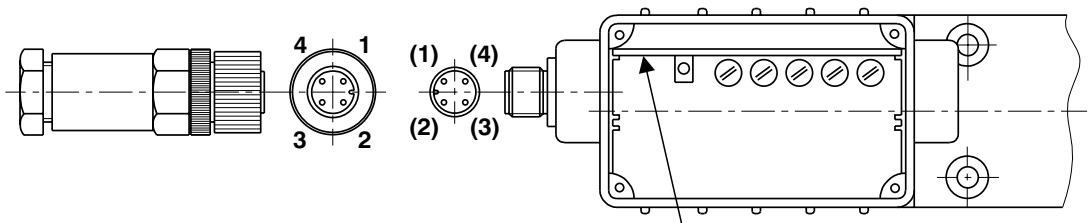
1 Factory setting

1.1 Control with external voltage source 0 ... 10 V (0 ... 5 V) or with external potentiometer R >1 kΩ

Notice:
The control signal must have the same ground potential as the supply source.

Master card for solenoid a (b)





MASTER for solenoid a (b)

Wire colours (connection connector - electronics):
(1) - brown
(2) - white
(3) - blue
(4) - black

Factory set values:
Control signal: 0 - 10 V (0 - 5V)
Dither: frequency 90Hz
amplitude - optimum
Ramps: 0.05 s
Offset, Gain: according to the characteristics on page 3, 4

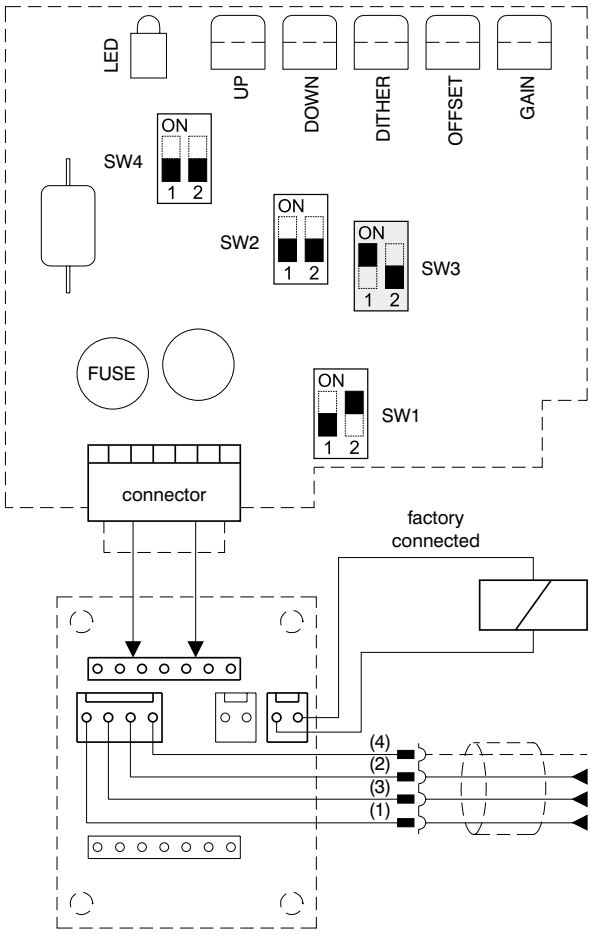
Valve PRM2-062 (with one solenoid)

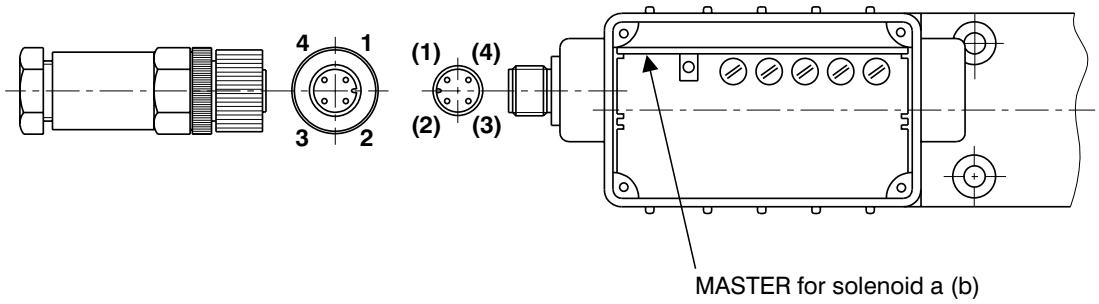
2 Other control possibilities

2.1 Control with external source 0 ... 5 V

Notice:
The control signal must have the same ground potential as the supply source.

Master card for solenoid a (b)





For the factory setting modification for this case of application, the following steps are required:

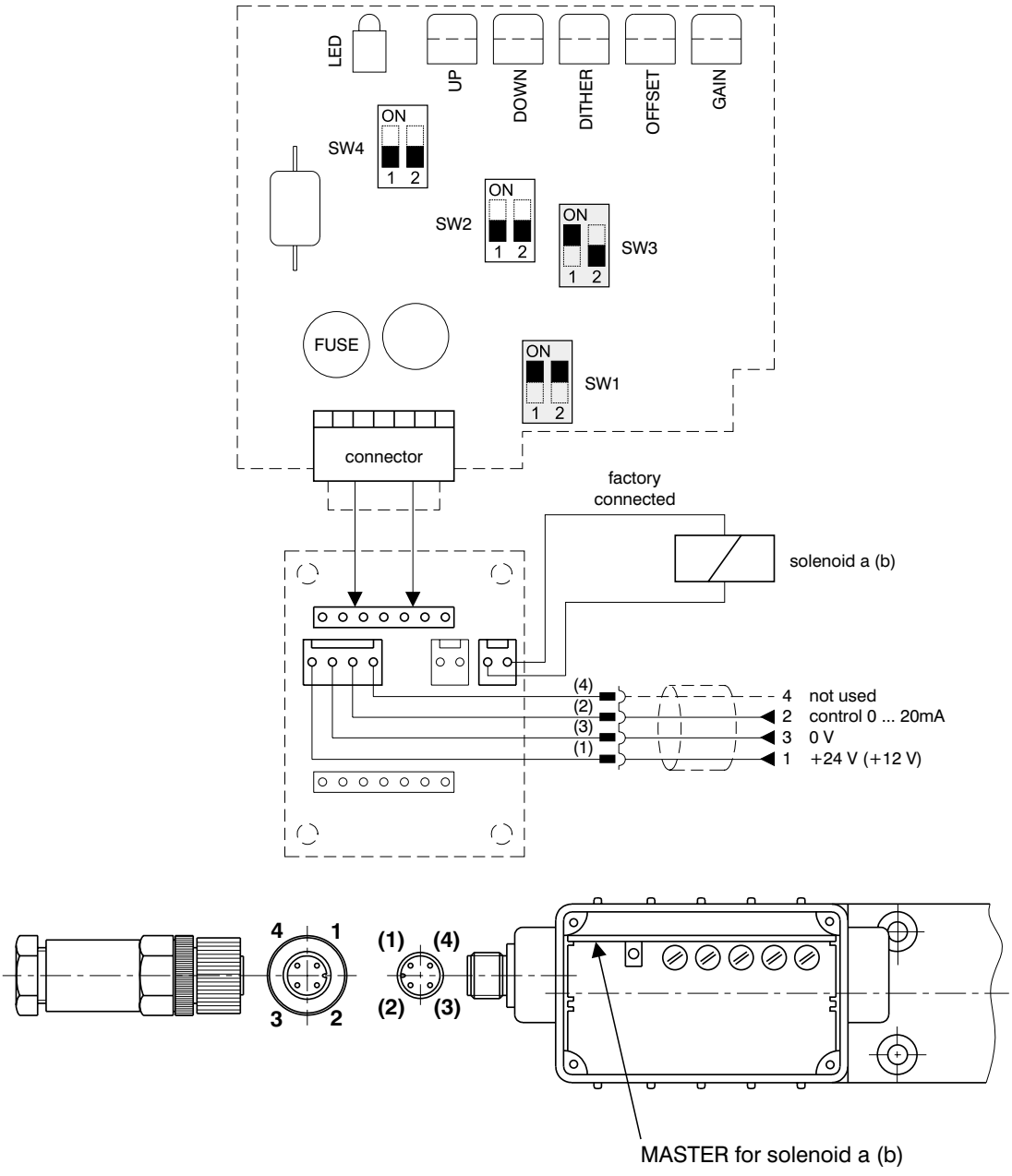
1. Unscrew the electronics cover
2. Carefully remove the Master card
3. Flip the switch SW3 in position shown in the picture
4. Put in the Master card and fix the electronics cover
5. Connect the voltage +24 V from an external supply source to terminals 1 and 3 of the connector
6. Connect the control voltage 0 … 5 V from an external source to terminals 2 and 3 of the connector

Valve PRM2-062 (with one solenoid)

2.2 Control with external source 0 ... 20 mA

Notice:
The control signal must have the same ground potential as the supply source.

Master card for solenoid a (b)



For the factory setting modification for this case of application, the following steps are required:

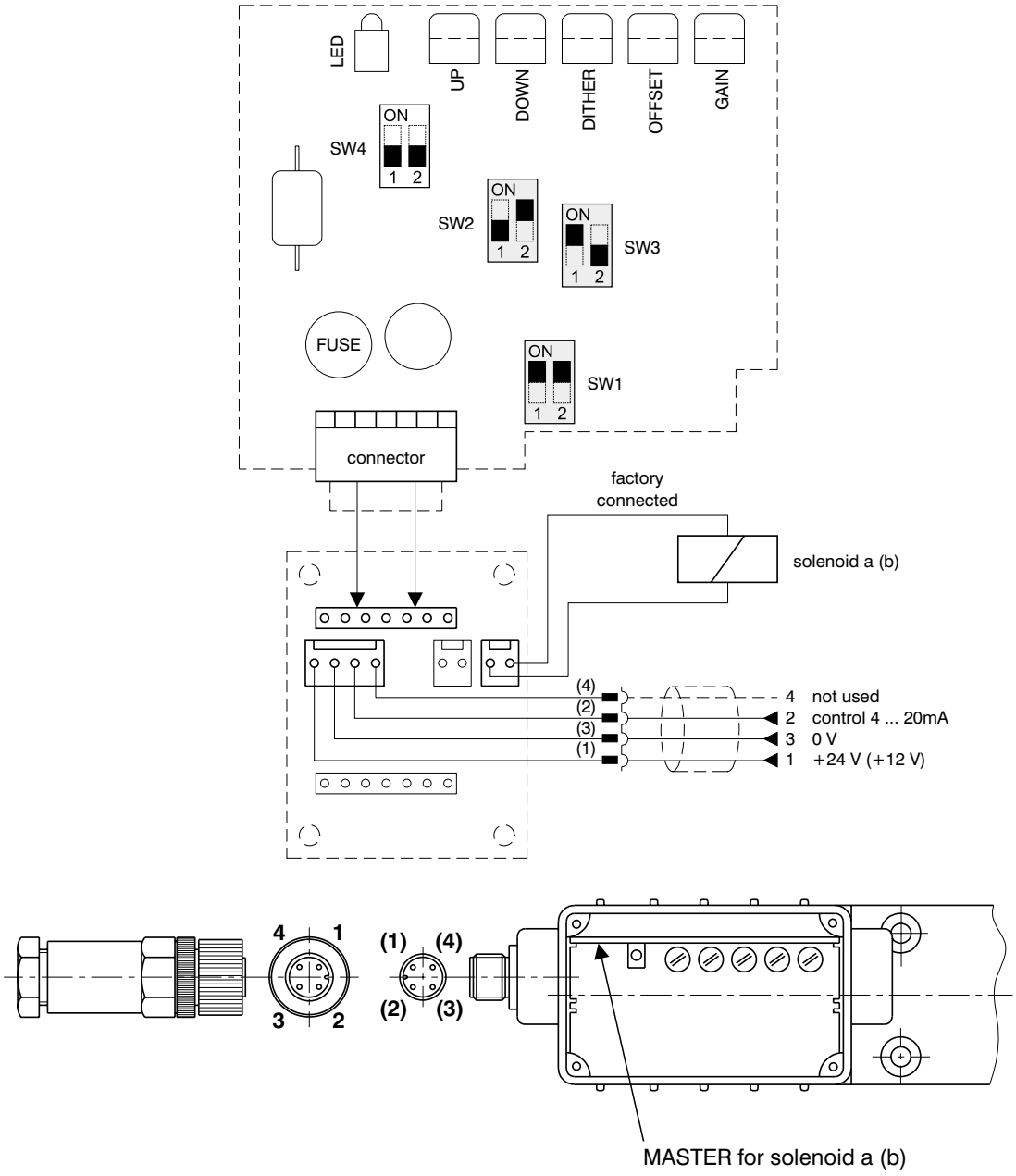
1. Unscrew the electronics cover
2. Carefully remove the Master card
3. Flip the switch SW1 and SW3 in position shown in the picture
4. Put in the Master card and fix the electronics cover
5. Connect the voltage +24 V (+12 V) from an external supply source to terminals 1 and 3 of the connector
6. Bring the control current 0 … 20 mA from an external source to terminals 2 and 3 of the connector

Valve PRM2-062 (with one solenoid)

2.3 Control with external source 4 ... 20 mA

Notice:
The control signal must have the same ground potential as the supply source.

Master card for solenoid a (b)



For the factory setting modification for this case of application, the following steps are required:

1. Unscrew the electronics cover
2. Carefully remove the Master card
3. Flip the switch SW1, SW2 and SW3 in position shown in the picture
4. Put in the Master card and fix the electronics cover
5. Connect the voltage +24 V (+12 V) from an external supply source to terminals 1 and 3 of the connector
6. Bring the control current 4 … 20 mA from an external source to terminals 2 and 3 of the connector

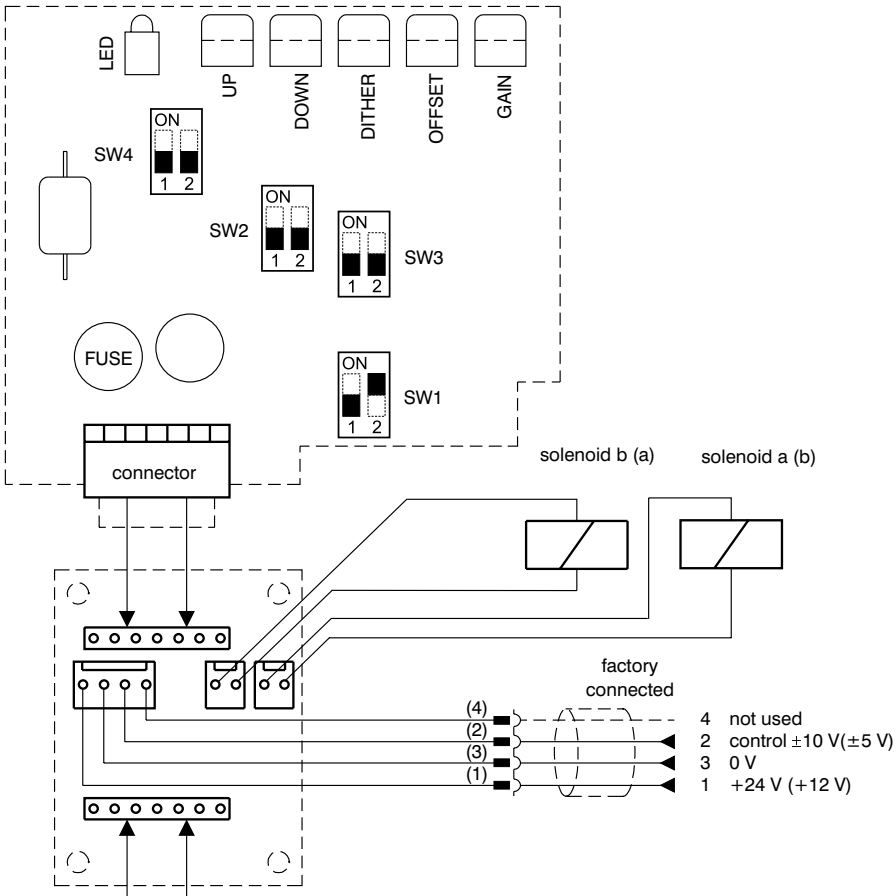
Valve PRM2-063 (with two solenoids)

3 Factory setting

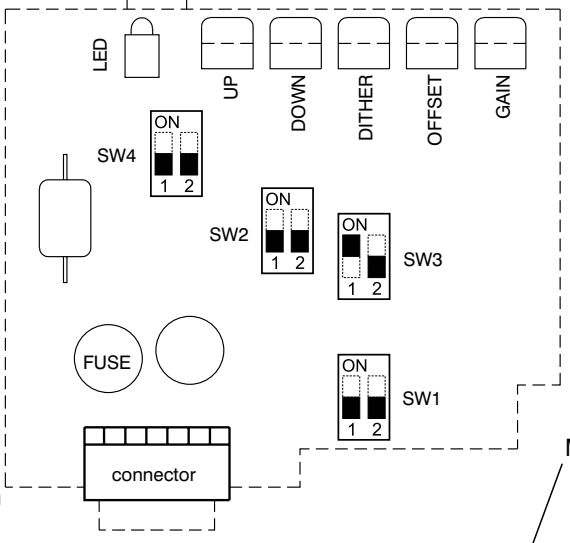
3.1 Control with external source 0 ± 10 V (0 ± 5 V)

Notice:
The control signal must have the same ground potential as the supply source.

Master card for solenoid a (b)

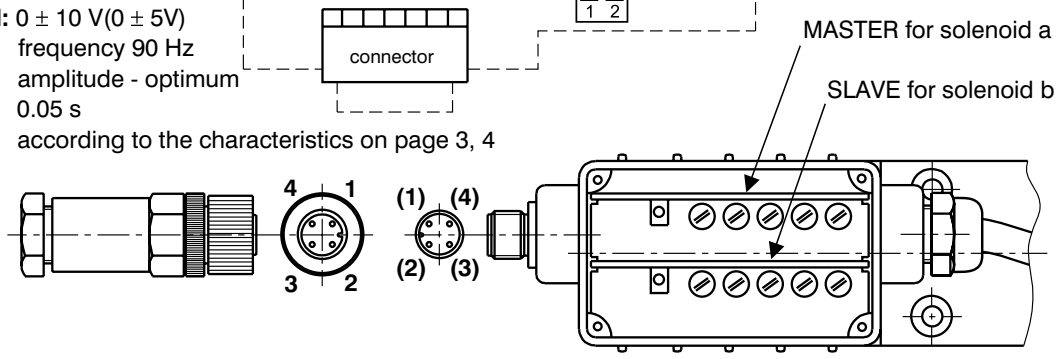


Slave card for solenoid b (a)



Factory set values:

Control signal: 0 ± 10 V(0 ± 5V)
Dither: frequency 90 Hz
amplitude - optimum
Ramps: 0.05 s
Offset, Gain: according to the characteristics on page 3, 4

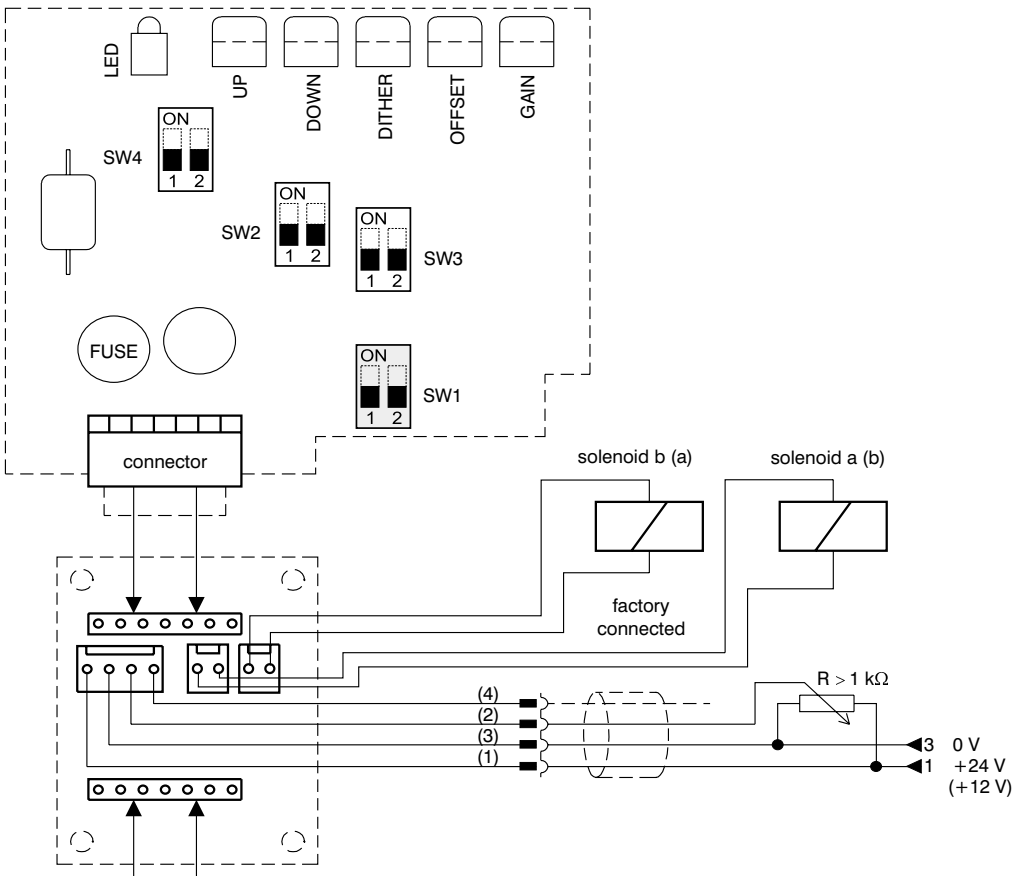


Valve PRM2-063 (with two solenoids)

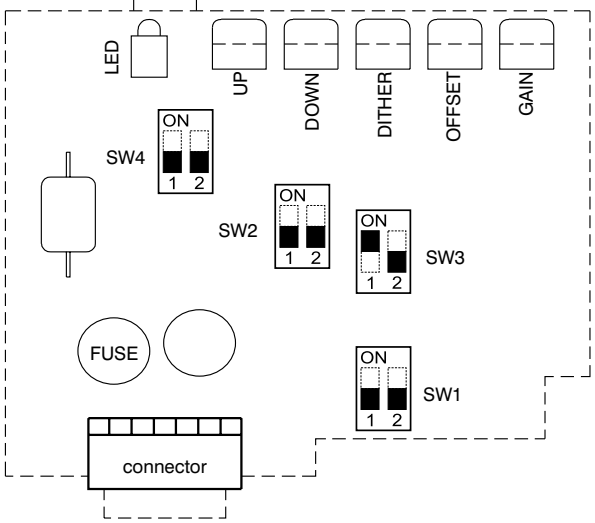
3.2 Other control possibilities

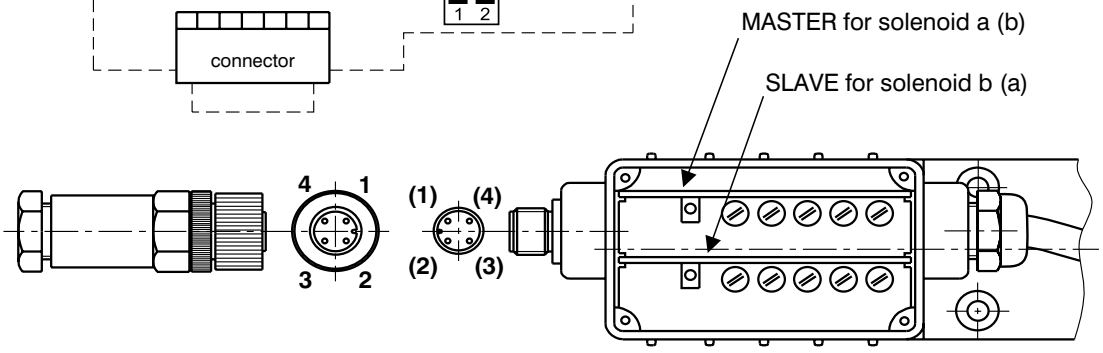
Control $U_{cc}/2 \pm 10$ V($U_{cc}/2 \pm 5$V) external potentiometer R > 1 kΩ

Master card for solenoid a (b)



Slave card for solenoid b (a)



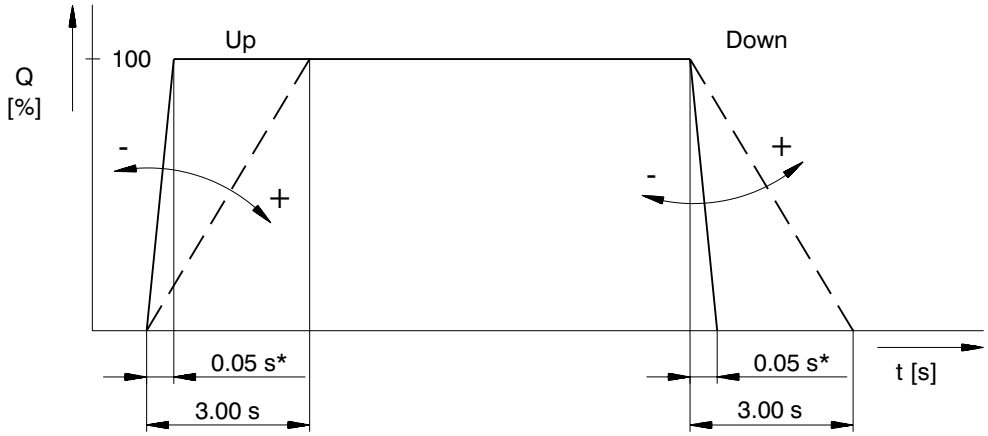


For the factory setting modification for this case of application, the following steps are required:

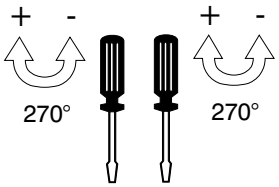
1. Unscrew the electronics cover
2. Carefully remove the Master card
3. Flip the switch SW1 in position shown in the picture
4. Put in the Master card and fix the electronics cover
5. Connect the voltage +24 V (+12 V) from an external supply source to terminals 1 and 3 of the connector

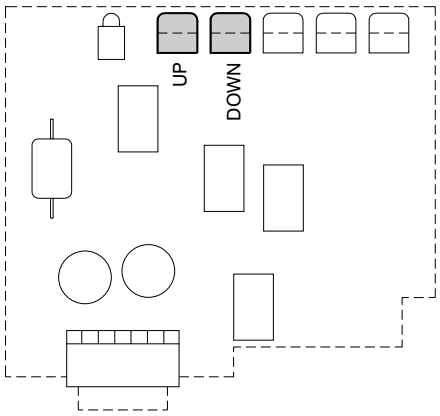
Ramp Adjustment (Up, Down)

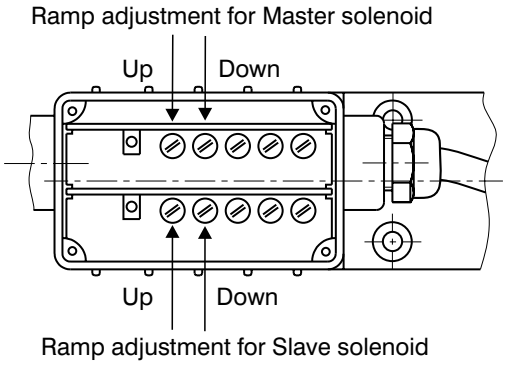
Notice: The factory setting of the ramp functions is to the minimum values.



*The value has only an informative character with respect to the particular type of the proportional directional valve (see page 4)



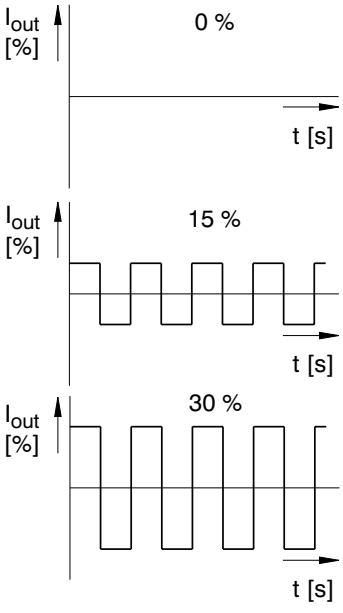


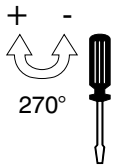


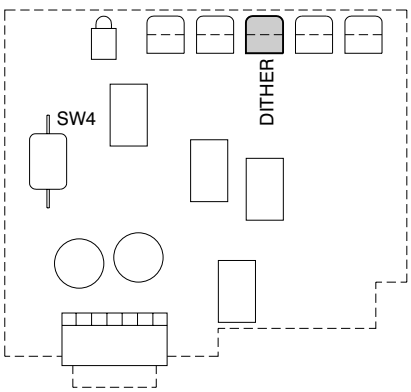
Dither Adjustment

Notice: The dither is adjusted with regard to the minimum hysteresis.

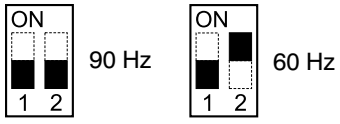
Amplitude - potentiometer (dither) (0 - 30 %)

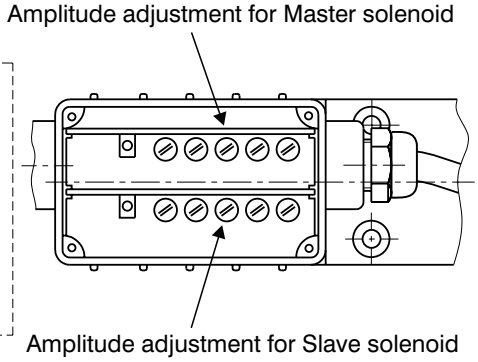






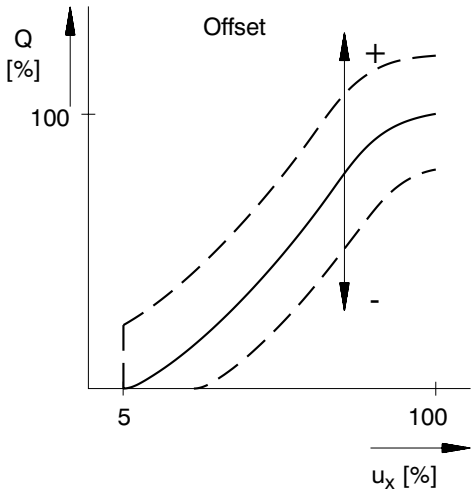
Frequency - switch SW4

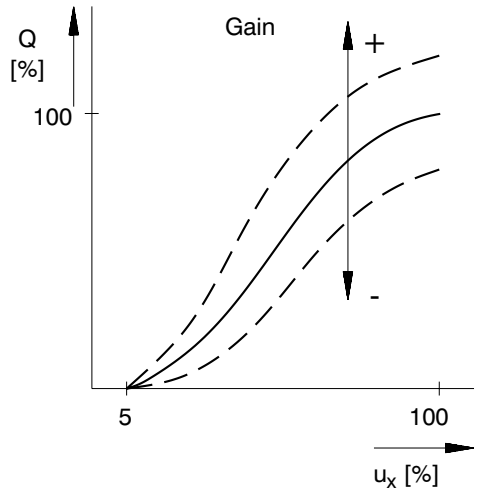


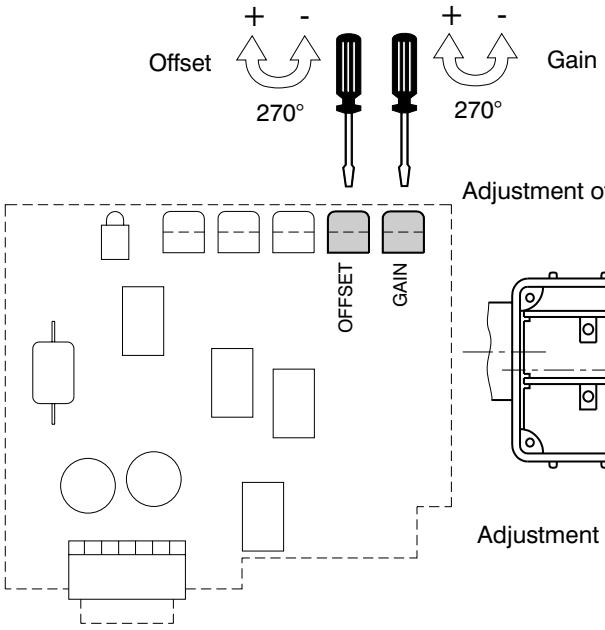


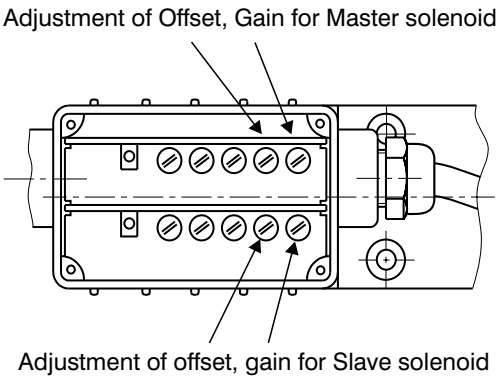
Adjustment of Offset, Gain Parameters

Notice: The factory setting of the Offset and Gain parameters is specific for the solenoids used.
The manufacturer does not recommend this setting to be changed.





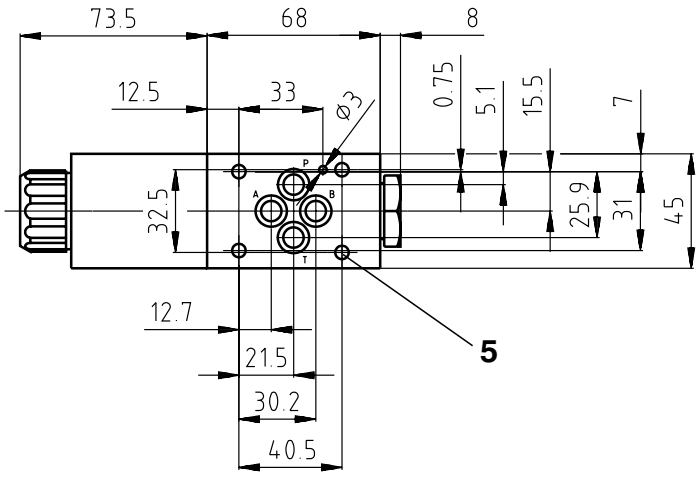




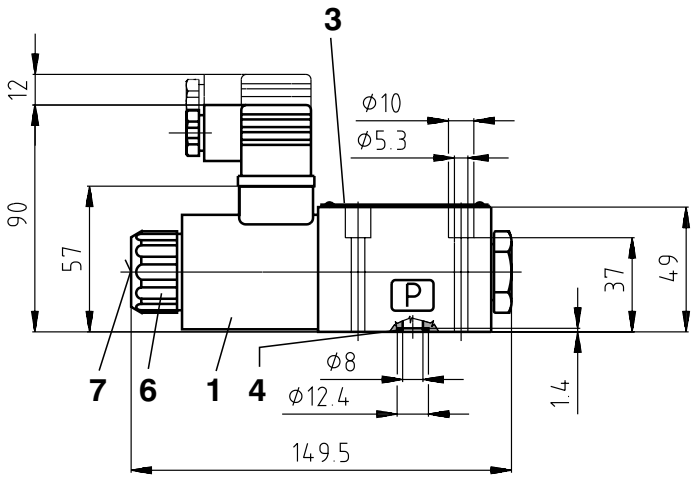
Valve Dimensions

Dimensions in millimetres

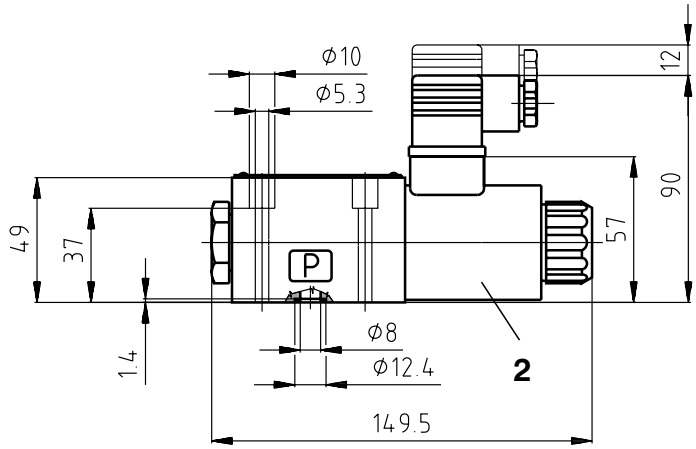
PRM2-062..../..-...



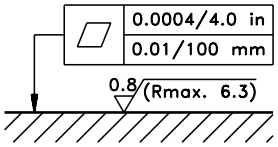
Functional symbols
2Z51, 2Y51



Functional symbols
2Z11, 2Y11



1 Solenoid a
2 Solenoid b
3 Name plate
4 Square ring 9.25 x 1.68 (4 pcs.) supplied in delivery packet
5 4 through mounting holes
6 Solenoid fixing nut (Nut torque 4 Nm)
7 Manual override

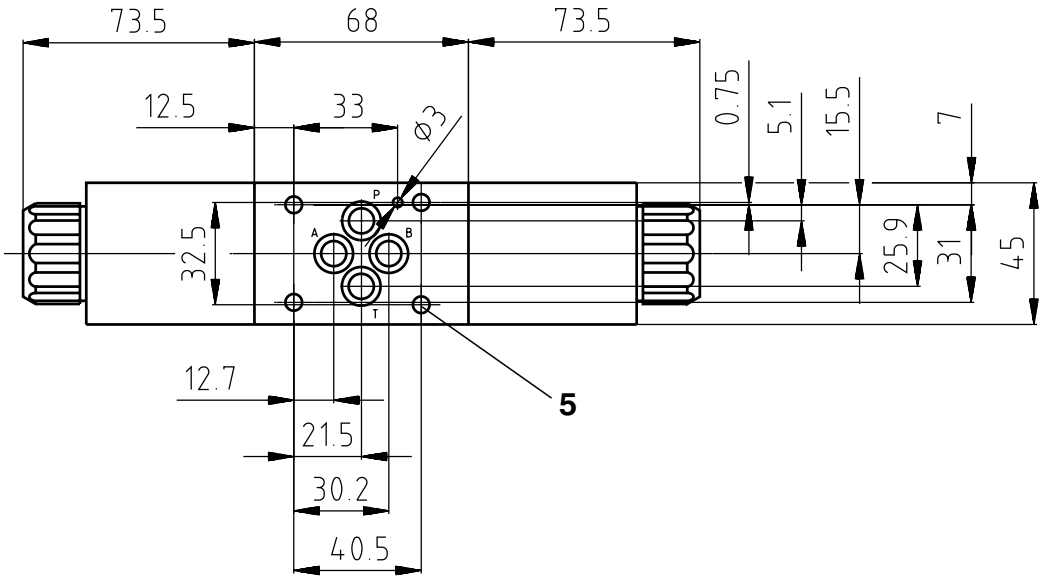


Required surface finish of interface.

Valve Dimensions

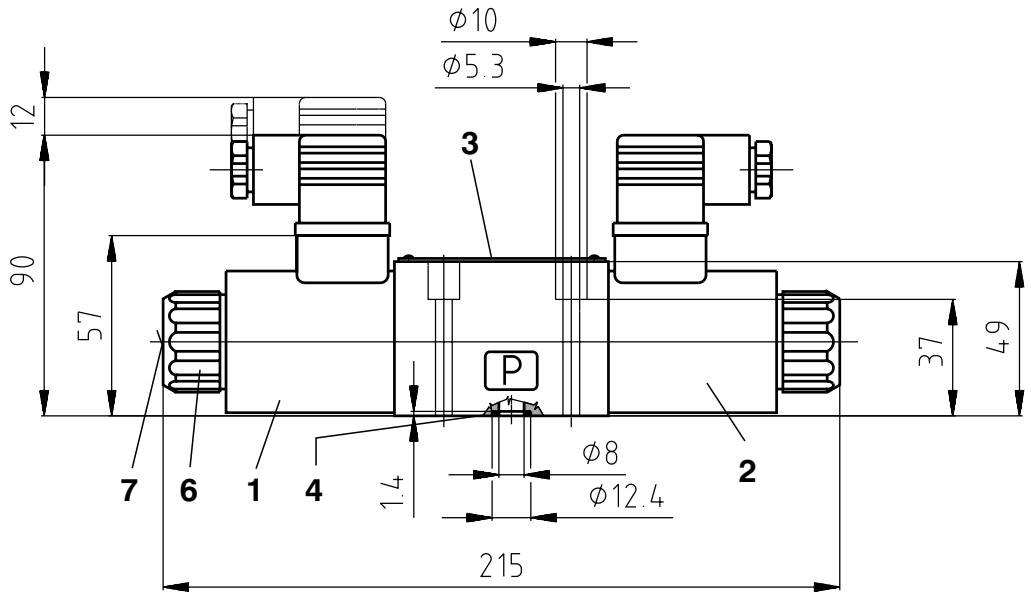
Dimensions in millimetres

PRM2-063..../..-...

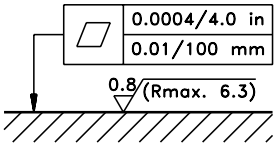


Functional symbols

3Z11, 3Z12, 3Y11, 3Y12



1 Solenoid a
2 Solenoid b
3 Name plate
4 Square ring 9.25 x 1.68 (4 pcs.) supplied in delivery packet
5 4 through mounting holes
6 Solenoid fixing nut (Nut torque 4 Nm)
7 Manual override

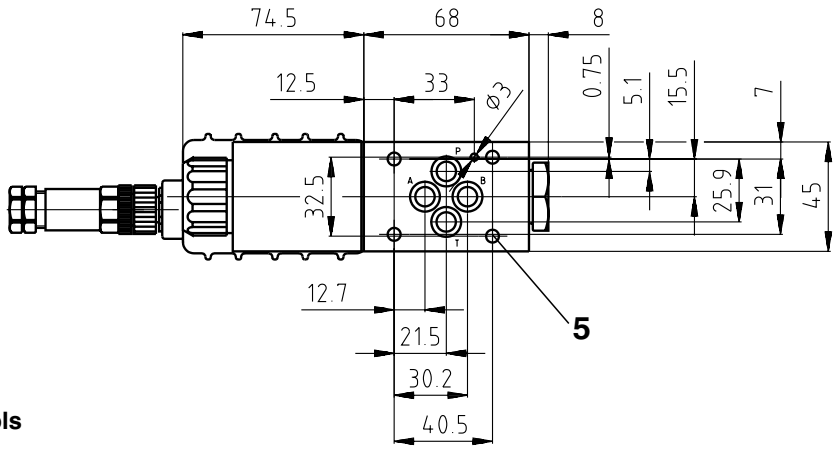


Required surface finish of interface.

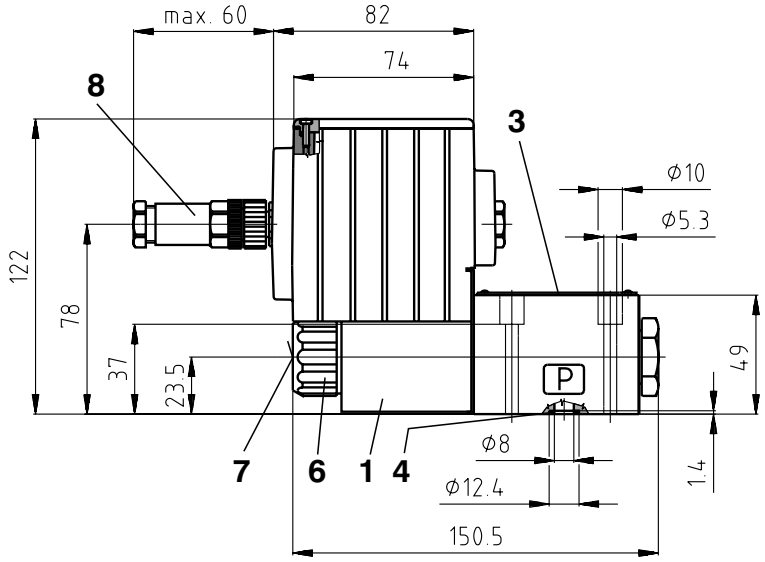
Valve Dimensions

Dimensions in millimetres

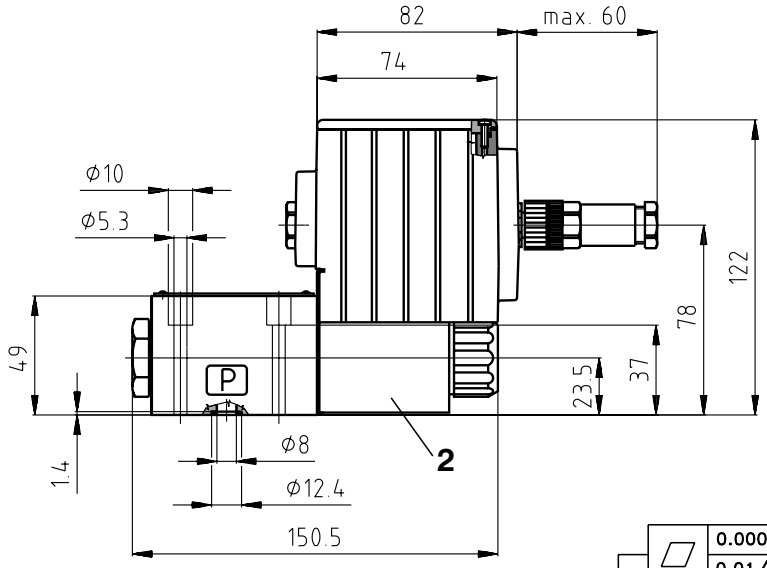
PRM2-062..../..-..EK.



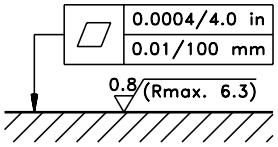
Functional symbols
2Z51, 2Y51



Functional symbols
2Z11, 2Y11



1 Solenoid a
2 Solenoid b
3 Name plate
4 Square ring 9.25 x 1.68 (4 pcs.) supplied in delivery packet
5 4 through mounting holes
6 Solenoid fixing nut (Nut torque 4 Nm)
7 Manual override
8 4- pin connector (M12 x 1) for external supply voltage

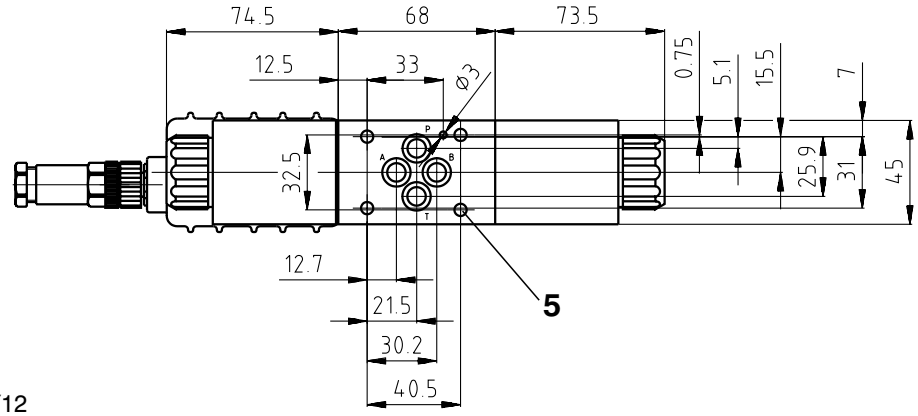


Required surface finish of interface.

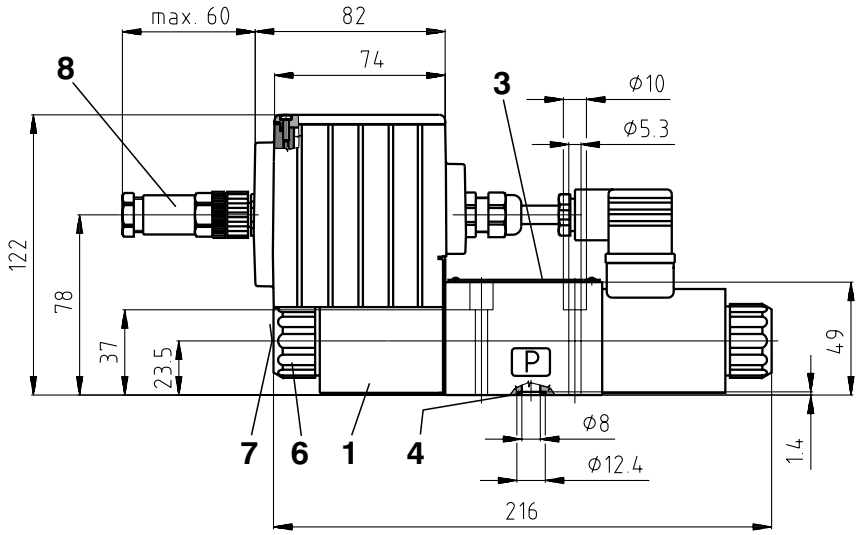
Valve Dimensions

Dimensions in millimetres

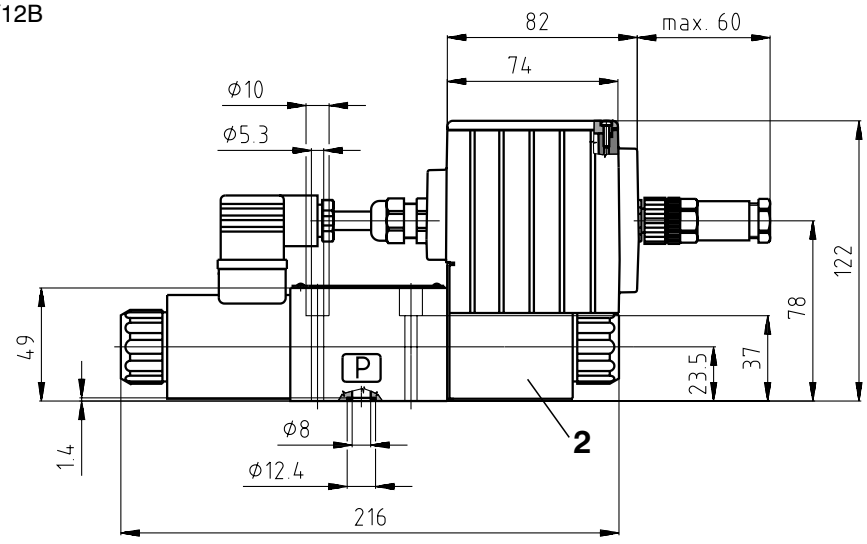
PRM2-063..../..-..EK.



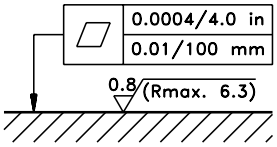
Functional symbols
3Z11, 3Z12, 3Y11, 3Y12



Functional symbols
3Z11B, 3Z12B, 3Y11B, 3Y12B



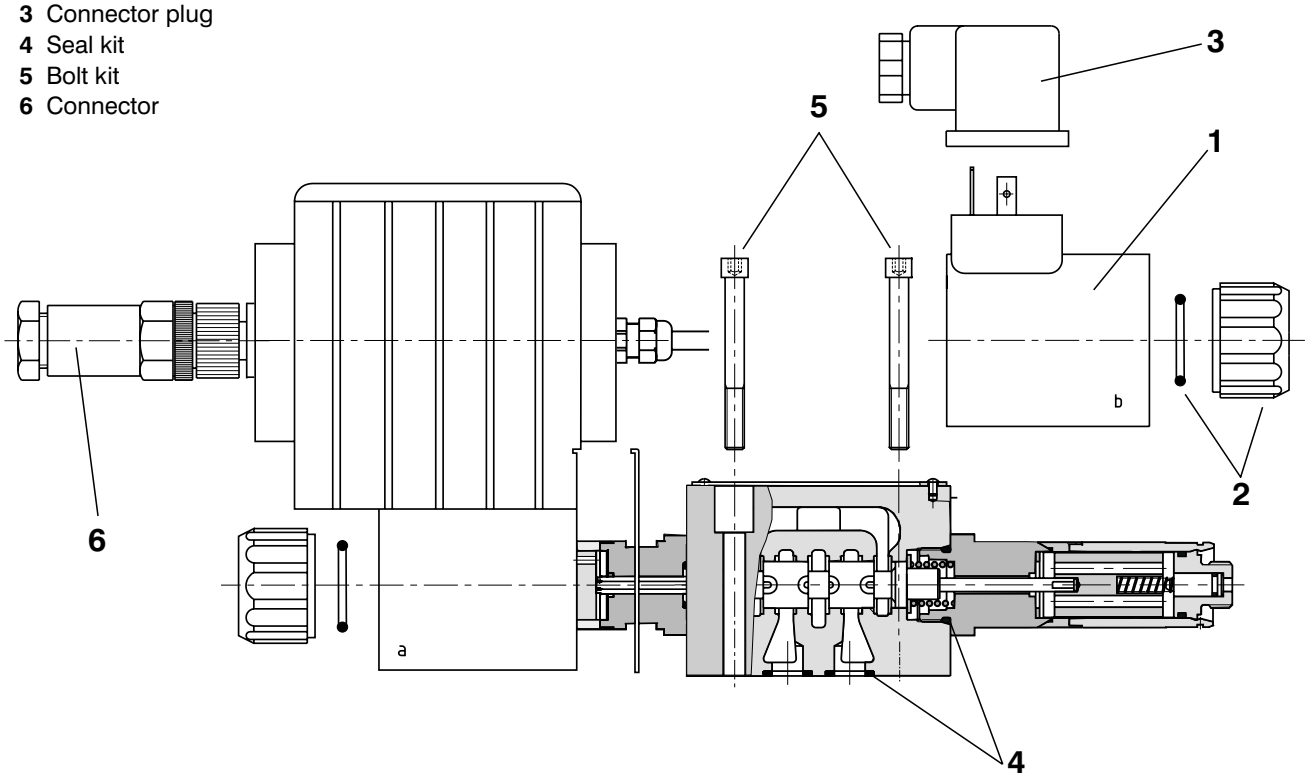
1 Solenoid a
2 Solenoid b
3 Name plate
4 Square ring 9.25 x 1.68 (4 pcs.) supplied in delivery packet
5 4 through mounting holes
6 Solenoid fixing nut (Nut torque 4 Nm)
7 Manual override
8 4- pin connector (M12 x 1) for external supply voltage



Required surface finish of interface.

Spare Parts

1 Solenoid coil
2 Nut + seal ring
3 Connector plug
4 Seal kit
5 Bolt kit
6 Connector



1. Solenoid coil

Nominal supply voltage[V]	Ordering number
12	936-0061
12	936-0107 (1,6A) (for 12V electronic unit integrated)
24	936-0067

2. Solenoid retaining nut with seal ring

Model of the nut	Seal ring	Ordering number
Standard nut	22 x 2	484-9951

3. Connector plug to DIN 43 650

Type designation	Type	Maximum input voltage	Connector plug A gray	Connector plug B black
			Ordering number	
K5	without rectifier - M16x1.5 (bushing bore ∅ 4-6 mm)	230 V DC	936-9906	936-9905

4. Seal kit

Type	Dimensions, number		Ordering number
Standard - NBR 70	9.25 x 1.68 (4 pcs.)	17 x 1.8 (2 pcs.)	484-9961
Viton	9.25 x 1.78 (4 pcs.)	17.17 x 1.78 (2 pcs.)	484-9971

5. Bolt kit

Dimensions, number	Tightening torque	Ordering number
M5 x 45 DIN 912-10.9 (4 pcs.)	8.9 Nm	484-9958

6. Connector	Ordering number
M12 x 1 (4-pin connector)	358358904012

Caution!

- The packing foil is recyclable.
- The protective plate can be returned to manufacturer.
- Mounting bolts M5 x 45 DIN 912-10.9 or studs must be ordered separately.
  Tightening torque of the bolts is 6.6 ft-lbs (8.9 Nm).
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of law.

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E-mail: sales.cz@argo-hytos.com
www.argo-hytos.com

Proportional directional control valves

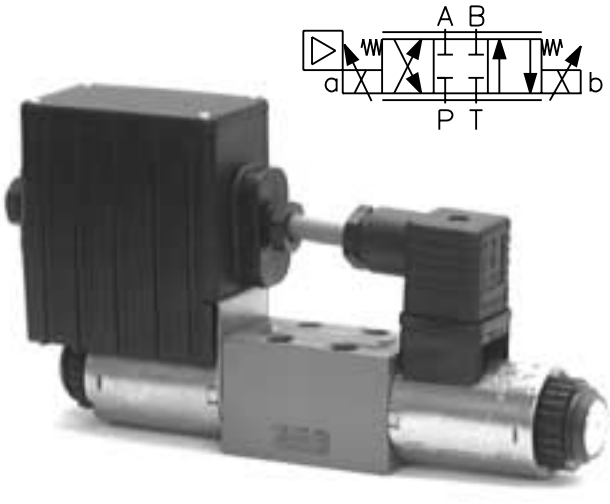
PRM2-04

Size 04 • p_{max} up to 320 bar • Q_{max} up to 20 L/min

HA 5105
1/2005

Replaces
HA 5105 9/2003

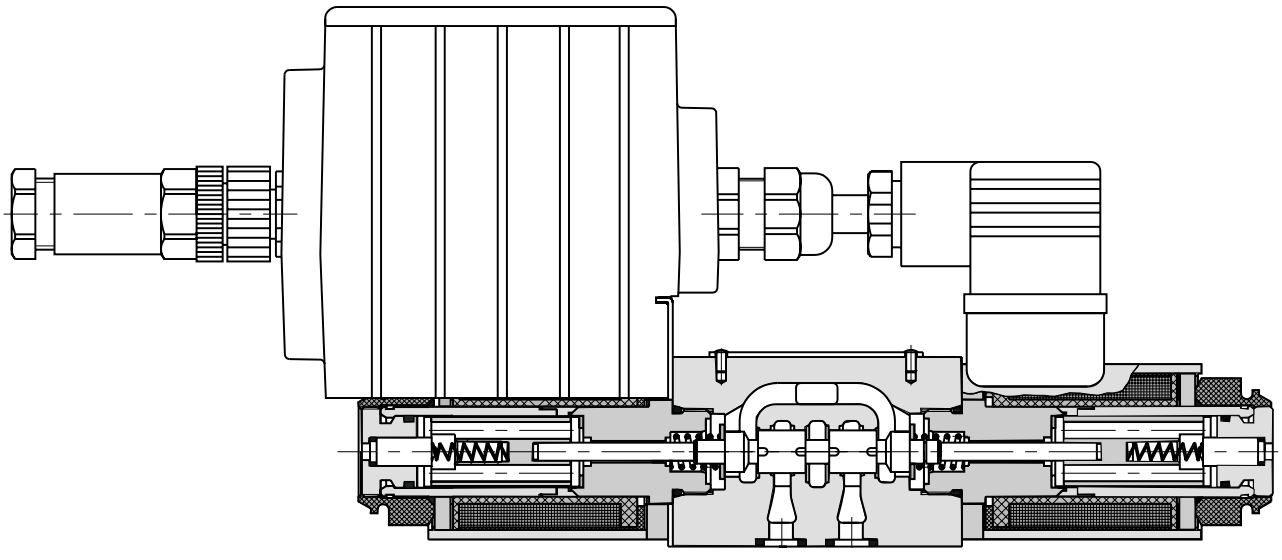
- ❑ **Compact design with integrated electronics**
- ❑ **High reliability**
- ❑ **Simple replacement of the exciting coils including electronics without opening the hydraulic circuits**
- ❑ **Continuous flow control in both directions**
- ❑ **Installation dimensions to ISO 4401 CETOP - RP 121H**



Functional Description

The proportional directional valve consists of a cast-iron housing, a special control spool, two centering springs with supporting washers and one or two proportional solenoids. A control box, which comprises one or two electronic control cards, depending on the number of the controlled solenoids, can be mounted onto either solenoid. With the model with two solenoids, the solenoid mounted apposite the control box is connected with the box by means of a DIN connector, a two-cored cable and a bushing. The connection of the control box with the supply source and with the control signal is realized by means of a 4-pin connector, type M12 x 1. The solenoid coils, including the control box, can be turned in the range of $\pm 90^{o}$.
The electric control unit supplies the solenoid with current, which varies with the control signal. The solenoid shifts the control spool to the required position, proportional to the control current.

The electronic control unit provides the following adjustment possibilities: Offset, Gain, rise and drop-out time of the ramp generator, frequency (2 frequencies) and amplitude of the dither signal generator. The correct function of the control unit is signaled by LED-diodes.
Stabilized voltage +10V (+5V for 12V voltage) is also available for the user. By the use of this voltage, a voltage control signal can be made by means of a potentiometer ≥ 1 kΩ.
The electronic control card enables voltage or current control to be used, according to the positions of the switches SW1 to SW3 (see table on page 6).
The basic surface treatment of the valve housing is phosphate coated and the operating solenoids are zinc coated.

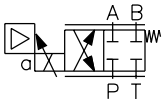
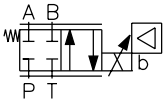
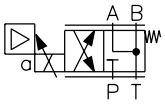
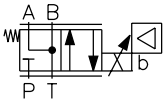
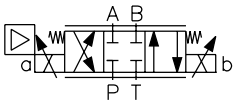
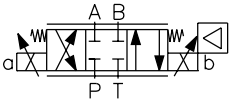
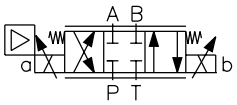
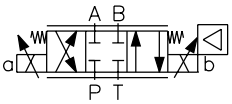
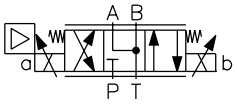
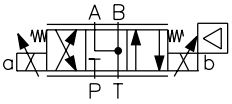
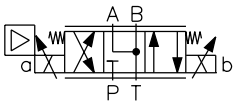
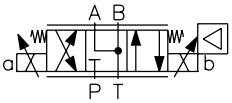


Ordering Code

PRM2-04 □ / □ - □ □ □

Proportional directional control valve

Nominal size **04**

	**2Z51**
	**2Z11**
	**2Y51**
	**2Y11**
	**3Z11**
	**3Z11B**
 $\frac{q_A}{q_B} = \frac{1}{2}$*	**3Z12**
 $\frac{q_A}{q_B} = \frac{1}{2}$*	**3Z12B**
	**3Y11**
	**3Y11B**
 $\frac{q_A}{q_B} = \frac{1}{2}$*	**3Y12**
 $\frac{q_A}{q_B} = \frac{1}{2}$*	**3Y12B**

Seals

without designation	NBR
V	FPM (Viton)

Electronics

without designation	without electronics
EK	connection by connector M12 x 1 (4-pin connector) (supplied with counterpart)

Nominal supply voltage

12	12 V DC
24	24 V DC

Nominal flow rate at Δp = 10 bar

4	4 L/min
8	8 L/min
12	12 L/min

***** Model for cylinders with asymmetric piston rod, piston area ratio 1:2

Technical Data

Nominal size	mm	04
Maximum operating pressure at ports P, A, B	bar	320
Maximum operating pressure at port T	bar	160
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP - RP 91H in viscosity classes ISO VG 32, 46 and 68
Fluid temperature range (NBR/Viton)	°C	-30 ... +80 / -20 ... +80
Ambient temperature, max.	°C	up to +50
Viscosity range	mm^2/s	20 ... 400
Maximum degree of fluid contamination		Class 21/18/15 according to ISO 4406 (1999).
Nominal flow rate Q_n at Δp = 10 bar (ν = 35 $mm^2 \cdot s^{-1}$)	L/min	4, 8, 12
Hysteresis	%	≤ 6
Weight PRM2-042 PRM2-043	kg	0.9 1.25
Mounting position		any, preferably horizontal
Enclosure type		IP65

Technical Data of the Proportional Solenoid

Nominal supply voltage	V	12 DC	24 DC
Limit current	A	1.7	0.8
Mean resistance value at 20°C	Ω	5	21

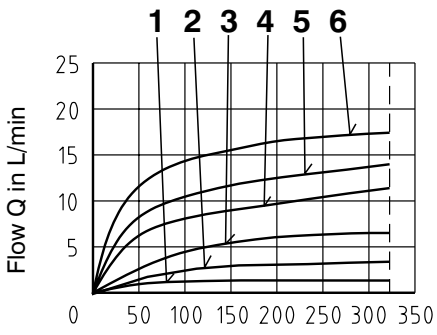
Technical Data of the Electronics

Nominal supply voltage U_{cc}	V	12 DC	24 DC
Supply voltage range	V	11.2... 14.7	20 ... 30 DC
Stabilized voltage for control	V	5 DC (R > 1kΩ)	10 DC (R ≥ 1 kΩ)
Control signal		see table of switches configuration (page 6)	
Maximum output current	A	2.4 for R < 4Ω	1.5 for R < 10Ω
Ramp adjustment range	s	0.05 ... 3	
Dither frequency	Hz	90/60	
Dither amplitude	%	0 ... 30	

Limit Power

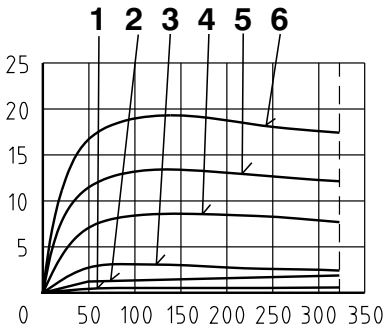
Measured at ν = 35 mm^2/s P → A / B → T or P → B / A → T

Nominal flow 4 L/min



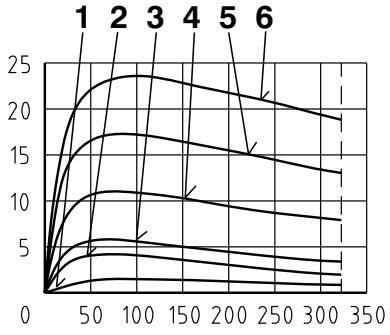
Input pressure p_o in bar

Nominal flow 8 L/min



Input pressure p_o in bar

Nominal flow 12 L/min

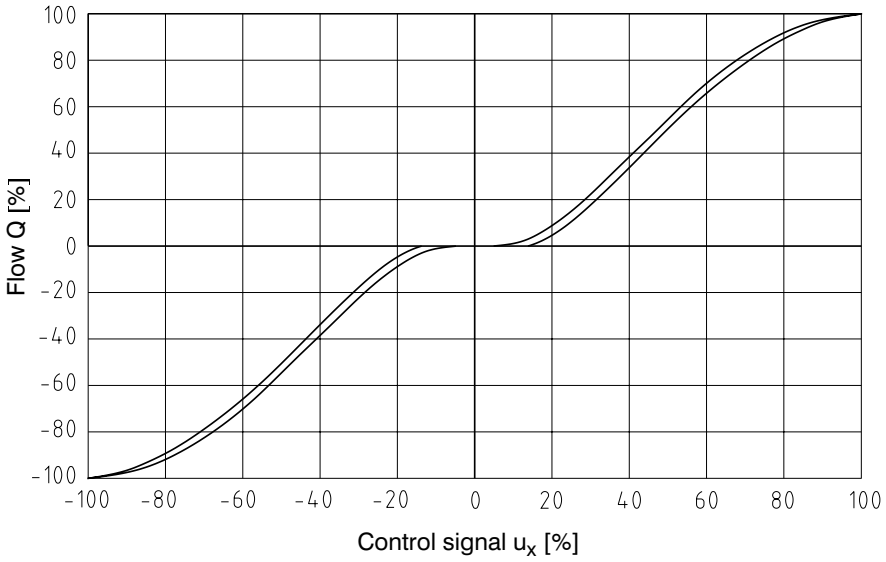


Input pressure p_o in bar

Solenoid current:
1 = 50%
2 = 60%
3 = 70%
4 = 80%
5 = 90%
6 =100%

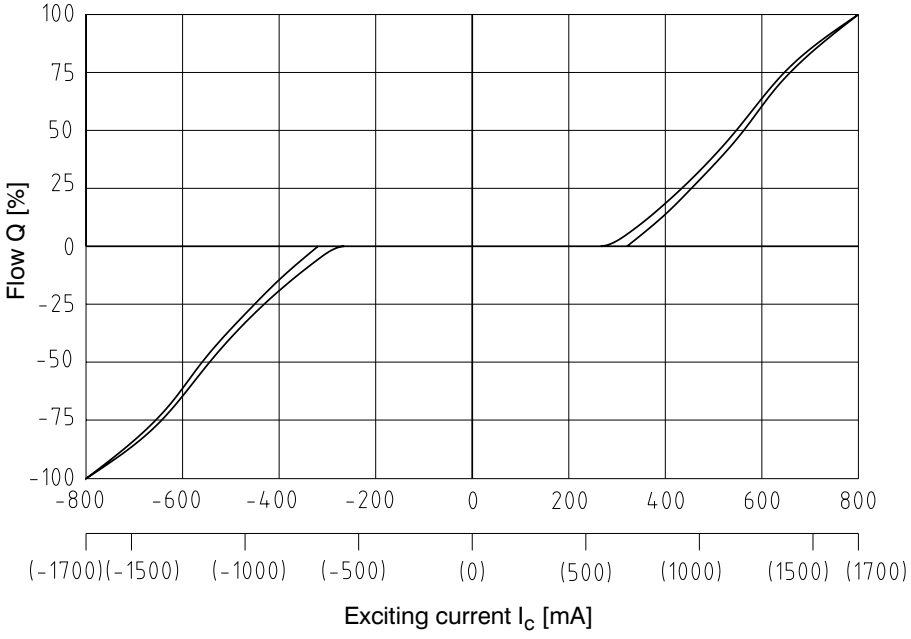
Flow characteristic with integrated electronics

Measured at $\Delta p = 10$ bar, $\nu = 35$ mm^2/s



Flow characteristic without integrated electronics

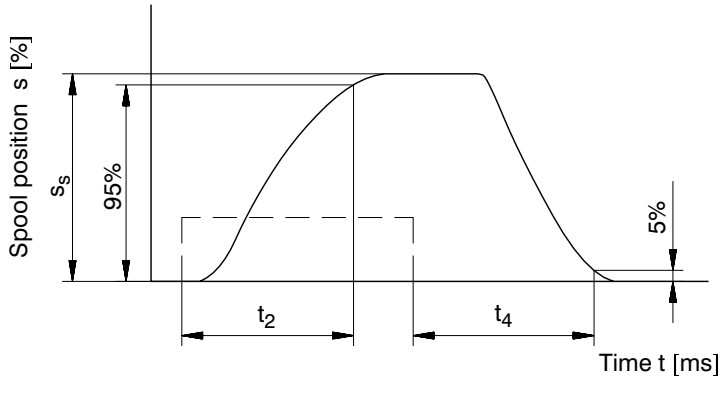
Measured at $\Delta p = 10$ bar, $\nu = 35$ mm^2/s, values in parenthesis are valid for the supply voltage 12 V



The coil current which initializes the flow through the proportional directional valve can differ due to the production tolerances about in a range of ± 6% of the limit current.

Transient characteristic

Measured at $\Delta p = 10$ bar, $\nu = 35$ mm^2/s; $Q = 80\ \%Q_n$

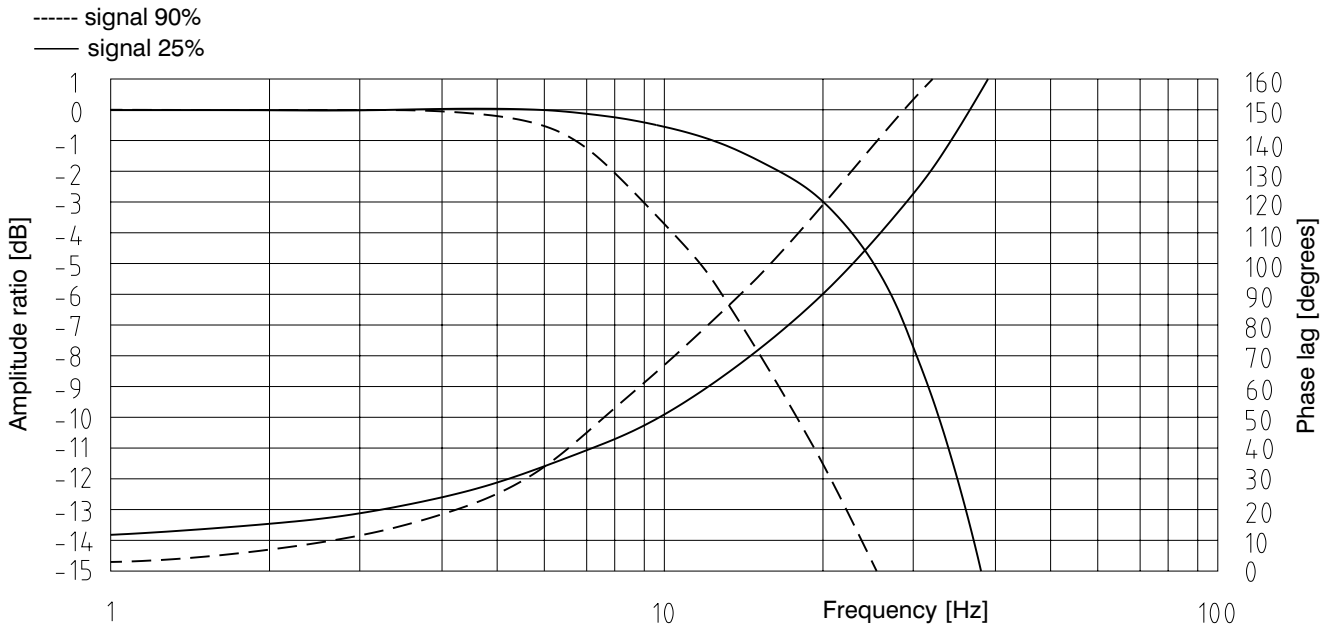


— — — the control signal course of the integrated electronics

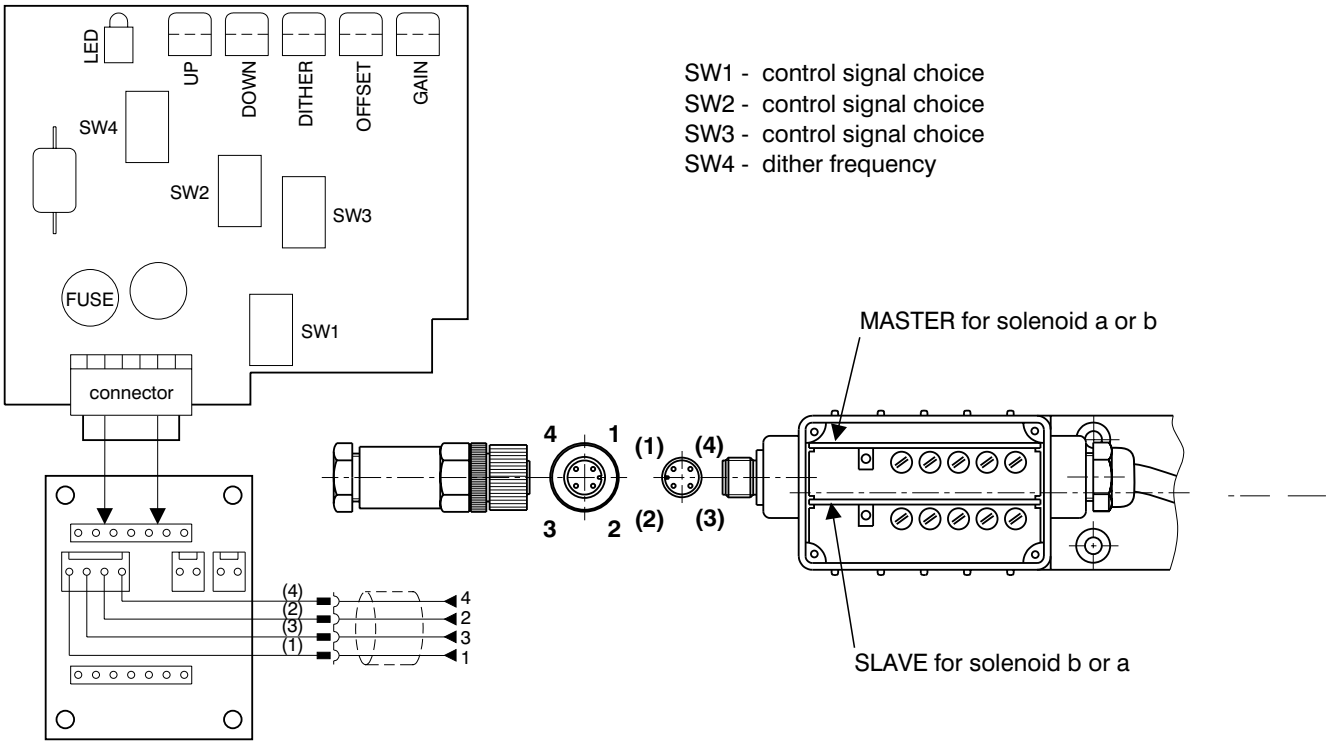
Steady spool position s_s [%]	t_2 [ms]	t_4 [ms]
100	75	70
75	70	55
50	50	40
25	35	25

The values in table have only an informative character.
The times of the transient characteristics at pressure or flow control will be in a particular hydraulic circuit always longer.

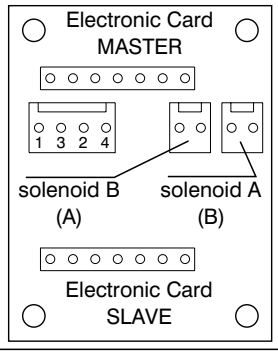
Frequency Reponse



Component Arrangement on the Electronic Card



Description basic subplatte



PIN	Description
1	+24 V (U_{cc}) (+12 V)
2	control
3	0 V
4	+10 V (+5 V)

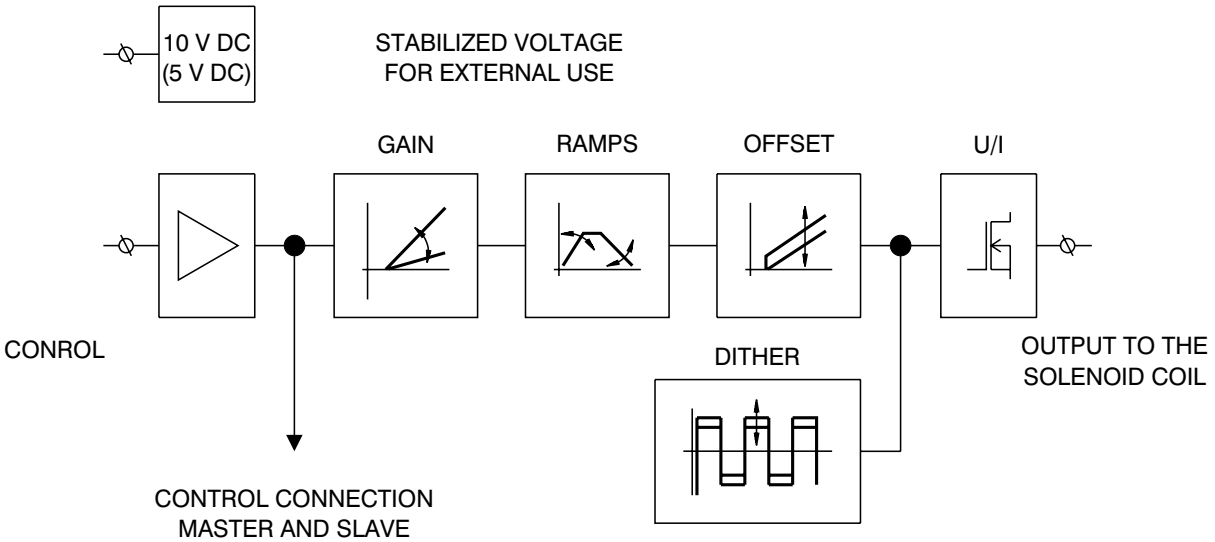
Table of the Switch Configuration for the Control Signal Choices

		PRM2-042				PRM2-043	
		0 ... 5 V	0 ... 10 V (0 ... 5 V)*	0 ... 20 mA	4 ... 20 mA	$U_{cc}/2$ ± 10 V (± 5 V)*	± 10 V (± 5 V)*
MASTER M	SW1	ON 1 2	ON 1 2	ON 1 2	ON 1 2	ON 1 2	ON 1 2
	SW2	ON 1 2	ON 1 2	ON 1 2	ON 1 2	ON 1 2	ON 1 2
	SW3	ON 1 2	ON 1 2	ON 1 2	ON 1 2	ON 1 2	ON 1 2
	SW4	90 Hz ON 1 2			60 Hz ON 1 2		
SLAVE S	SW1					ON 1 2	ON 1 2
	SW2					ON 1 2	ON 1 2
	SW3					ON 1 2	ON 1 2
	SW4					90 Hz ON 1 2	60 Hz ON 1 2

Designation of the basic manufacture setting.
The ramp functions are adjusted on their minimum values, the dither is set to the optimal value with respect to hysteresis. Offset and Gain are adjusted according to the characteristic on page 3 and 4. The manufacturer does not recommend these adjusted values to be changed.

* Input signal level for the 12 V electronic unit.

Block Diagram



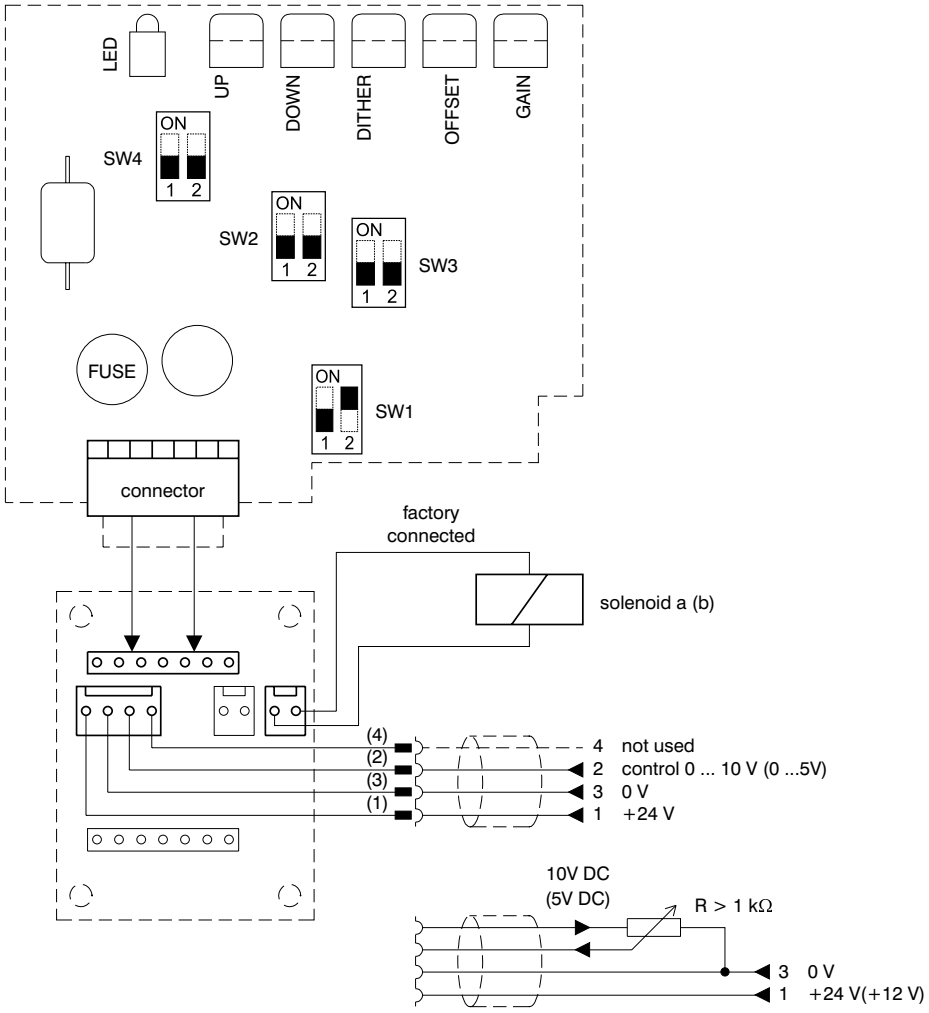
Valve PRM2-042 (with one solenoid)

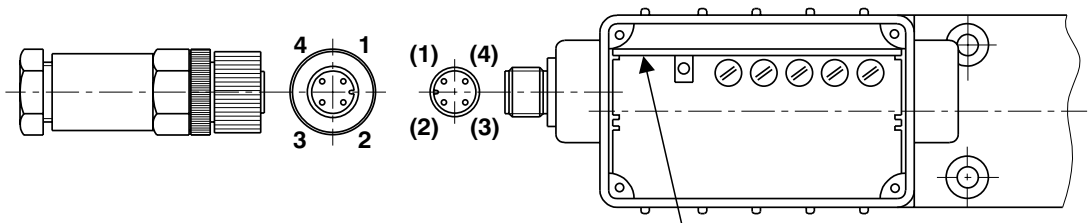
1 Factory setting

1.1 Control with external voltage source 0 ... 10 V (0 ... 5 V) or with external potentiometer R >1 kΩ

Notice:
The control signal must have the same ground potential as the supply source.

Master card for solenoid a (b)





MASTER for solenoid a (b)

Wire colours (connection connector - electronics):
(1) - brown
(2) - white
(3) - blue
(4) - black

Factory set values:
Control signal: 0 - 10 V (0 - 5V)
Dither: frequency 90Hz
amplitude - optimum
Ramps: 0.05 s
Offset, Gain: according to the characteristics on page 3, 4

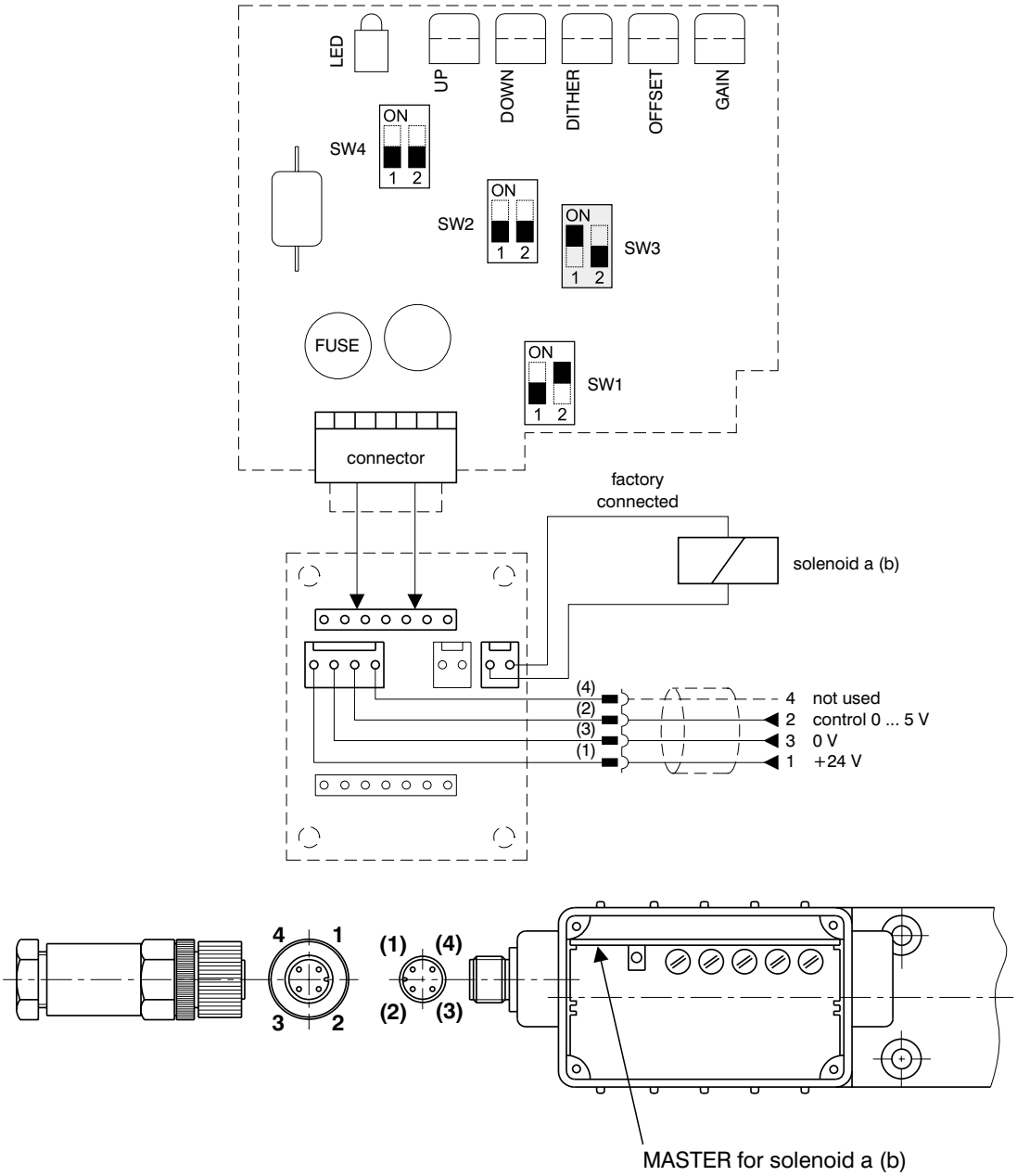
Valve PRM2-042 (with one solenoid)

2 Other control possibilities

2.1 Control with external source 0 ... 5 V

Notice:
The control signal must have the same ground potential as the supply source.

Master card for solenoid a (b)



For the factory setting modification for this case of application, the following steps are required:

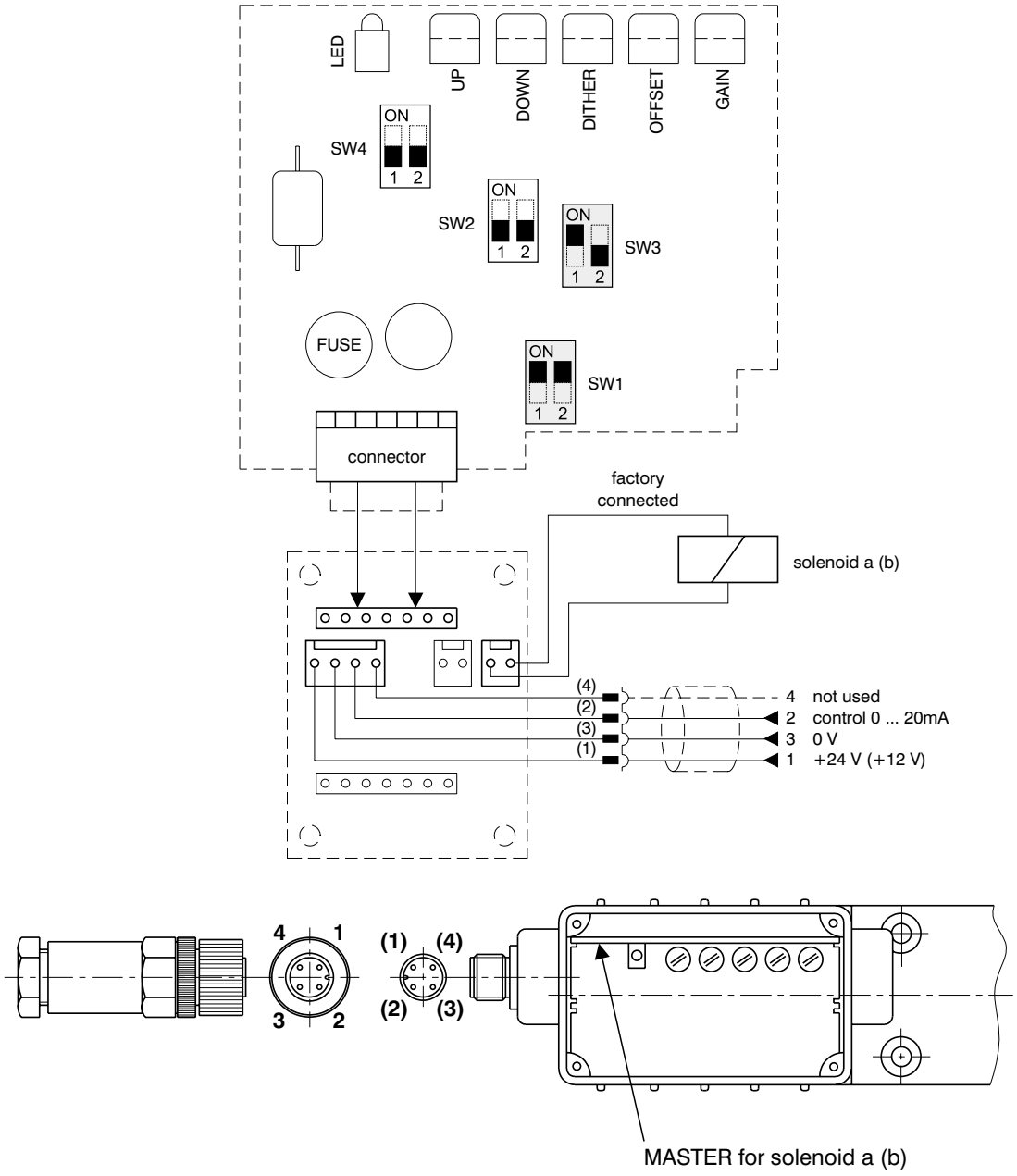
1. Unscrew the electronics cover
2. Carefully remove the Master card
3. Flip the switch SW3 in position shown in the picture
4. Put in the Master card and fix the electronics cover
5. Connect the voltage +24 V from an external supply source to terminals 1 and 3 of the connector
6. Connect the control voltage 0 … 5 V from an external source to terminals 2 and 3 of the connector

Valve PRM2-042 (with one solenoid)

2.2 Control with external source 0 ... 20 mA

Notice:
The control signal must have the same ground potential as the supply source.

Master card for solenoid a (b)



For the factory setting modification for this case of application, the following steps are required:

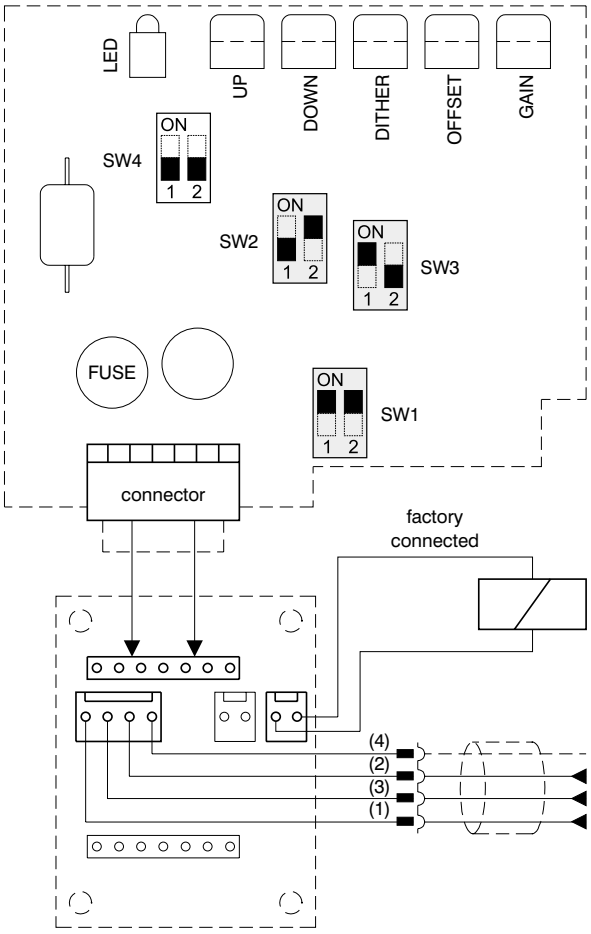
1. Unscrew the electronics cover
2. Carefully remove the Master card
3. Flip the switch SW1 and SW3 in position shown in the picture
4. Put in the Master card and fix the electronics cover
5. Connect the voltage +24 V (+12 V) from an external supply source to terminals 1 and 3 of the connector
6. Bring the control current 0 … 20 mA from an external source to terminals 2 and 3 of the connector

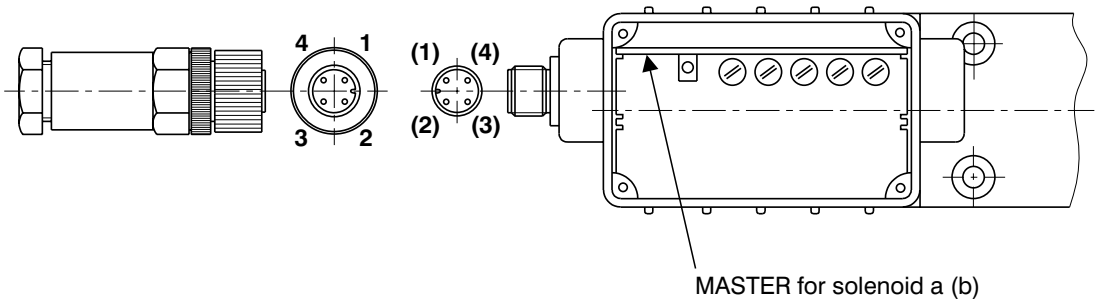
Valve PRM2-042 (with one solenoid)

2.3 Control with external source 4 ... 20 mA

Notice:
The control signal must have the same ground potential as the supply source.

Master card for solenoid a (b)





For the factory setting modification for this case of application, the following steps are required:

1. Unscrew the electronics cover
2. Carefully remove the Master card
3. Flip the switch SW1, SW2 and SW3 in position shown in the picture
4. Put in the Master card and fix the electronics cover
5. Connect the voltage +24 V (+12 V) from an external supply source to terminals 1 and 3 of the connector
6. Bring the control current 4 … 20 mA from an external source to terminals 2 and 3 of the connector

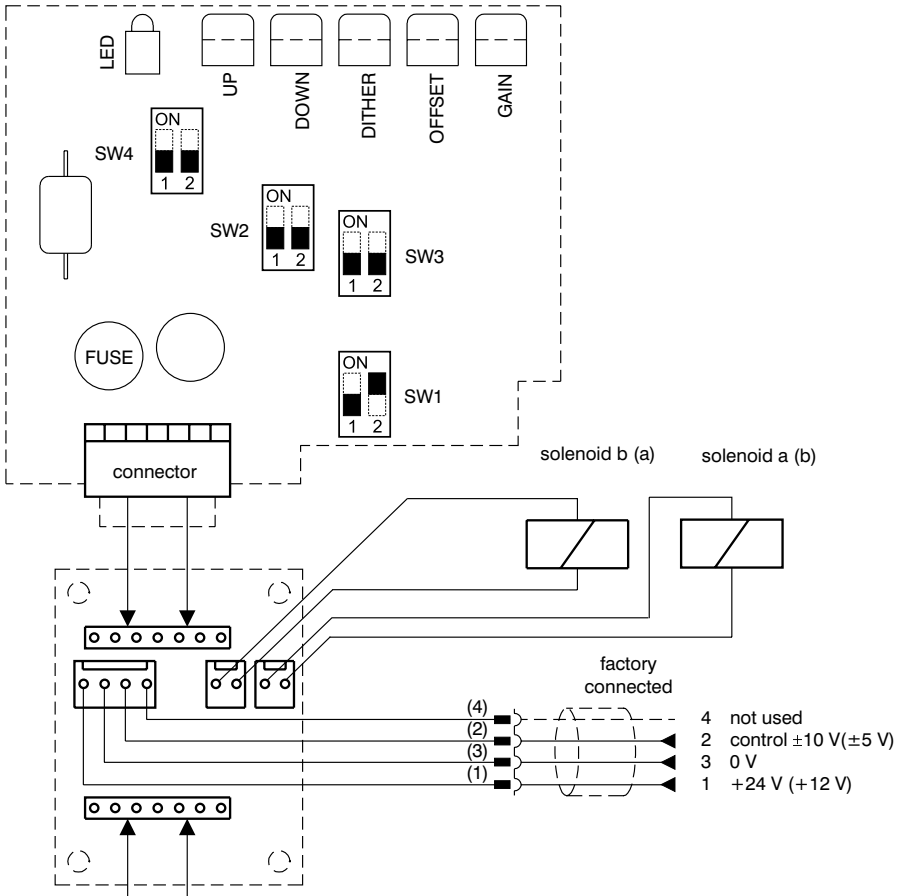
Valve PRM2-043 (with two solenoids)

3 Factory setting

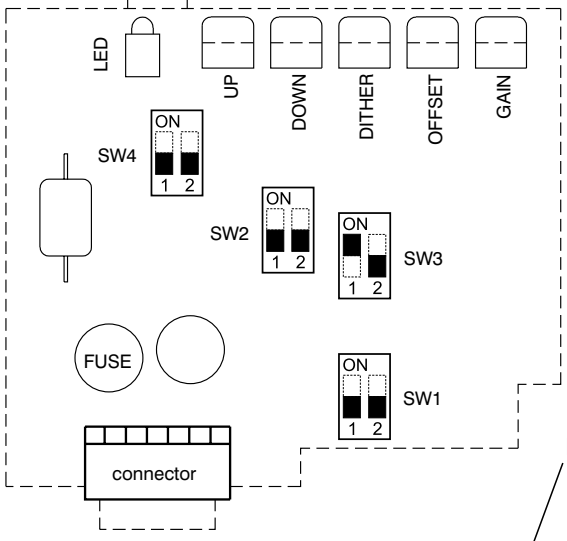
3.1 Control with external source 0 ± 10 V (0 ± 5 V)

Notice:
The control signal must have the same ground potential as the supply source.

Master card for solenoid a (b)

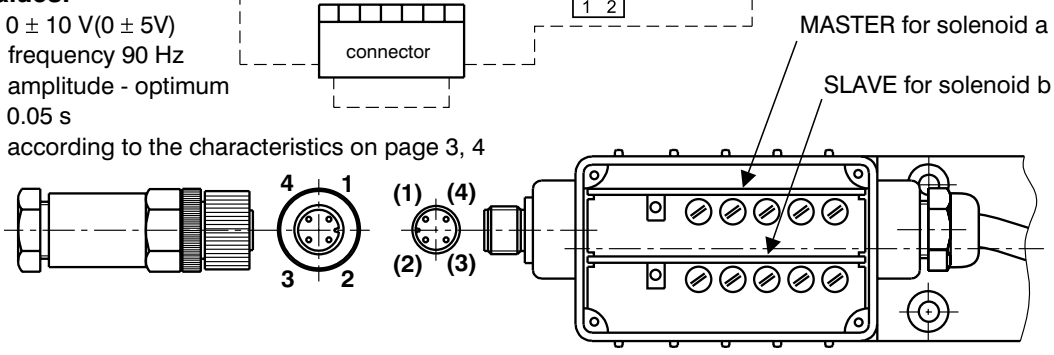


Slave card for solenoid b (a)



Factory set values:

Control signal: 0 ± 10 V(0 ± 5V)
Dither: frequency 90 Hz
amplitude - optimum
Ramps: 0.05 s
Offset, Gain: according to the characteristics on page 3, 4

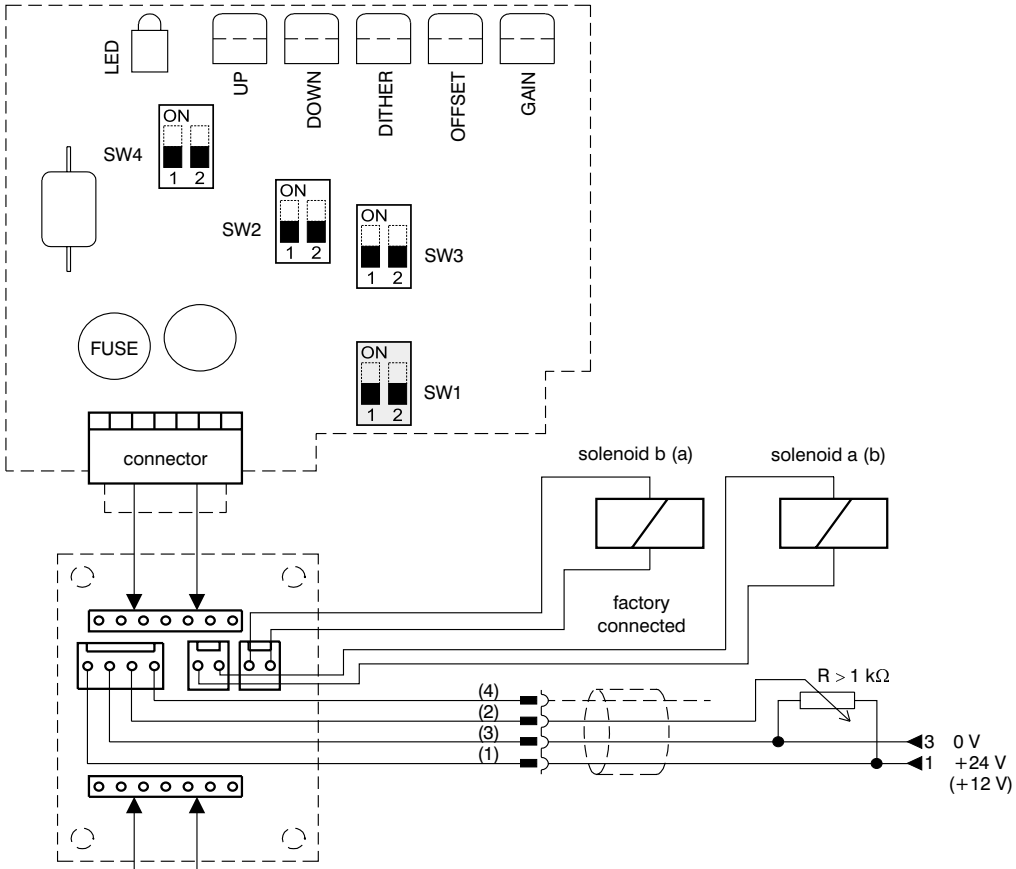


Valve PRM2-043 (with two solenoids)

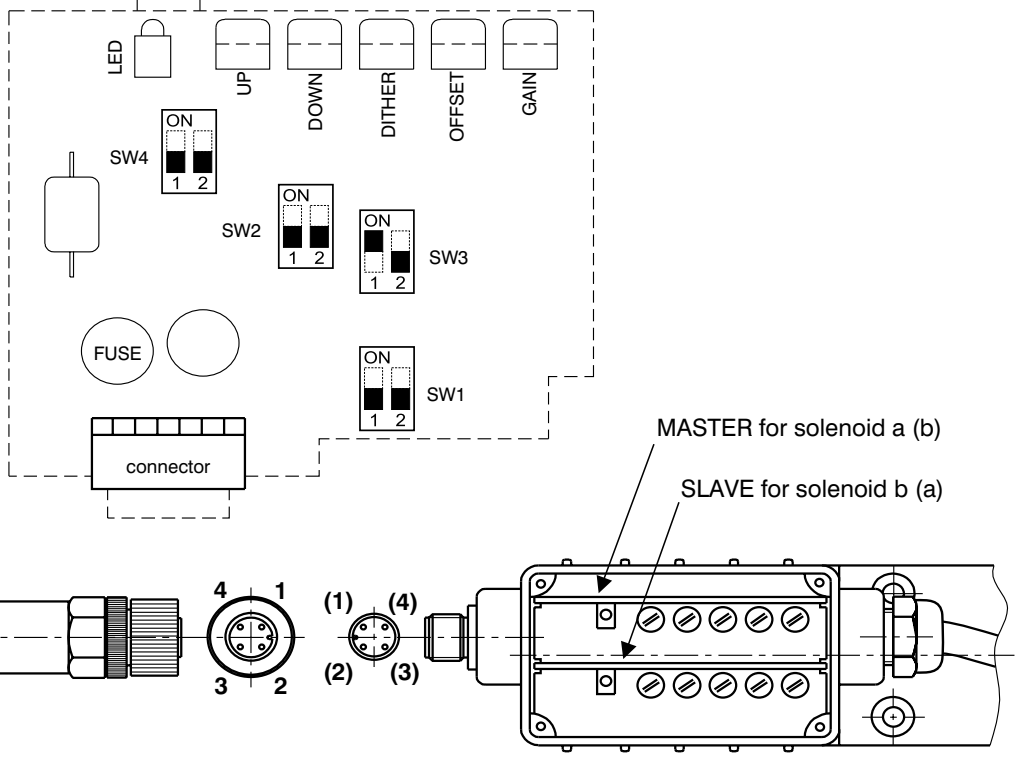
3.2 Other control possibilities

Control $U_{cc}/2 \pm 10$ V($U_{cc}/2 \pm 5$V) external potentiometer R > 1 kΩ

Master card for solenoid a (b)



Slave card for solenoid b (a)

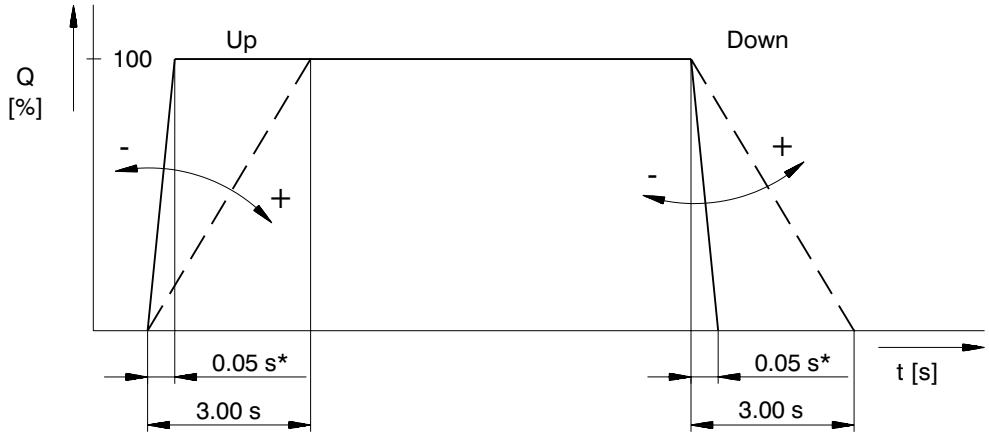


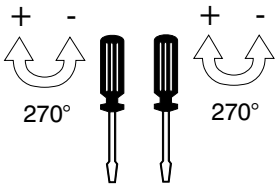
For the factory setting modification for this case of application, the following steps are required:

1. Unscrew the electronics cover
2. Carefully remove the Master card
3. Flip the switch SW1 in position shown in the picture
4. Put in the Master card and fix the electronics cover
5. Connect the voltage +24 V (+12 V) from an external supply source to terminals 1 and 3 of the connector

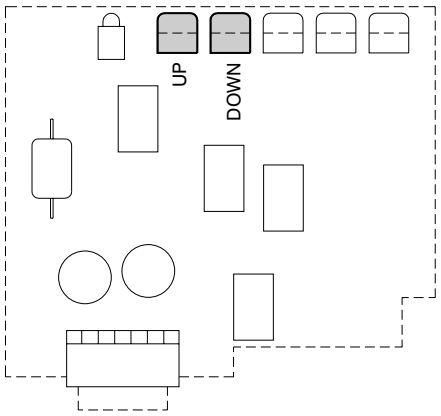
Ramp Adjustment (Up, Down)

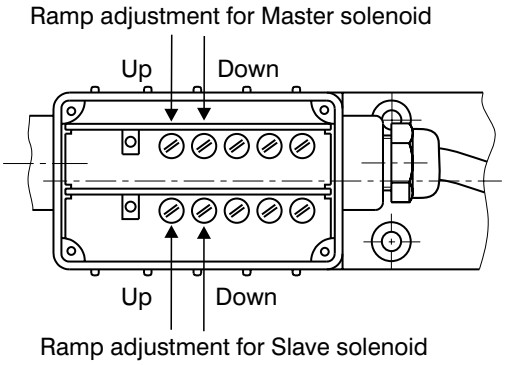
Notice: The factory setting of the ramp functions is to the minimum values.





*The value has only an informative character with respect to the particular type of the proportional directional valve (see page 4)

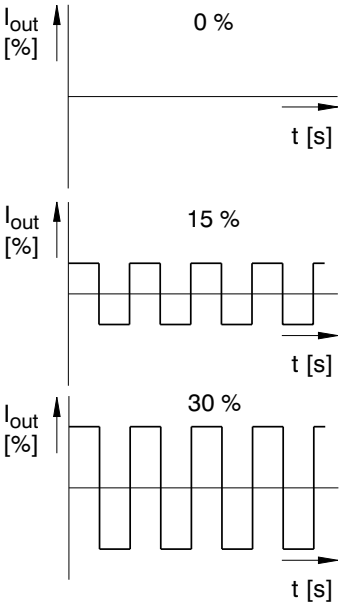


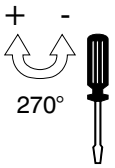


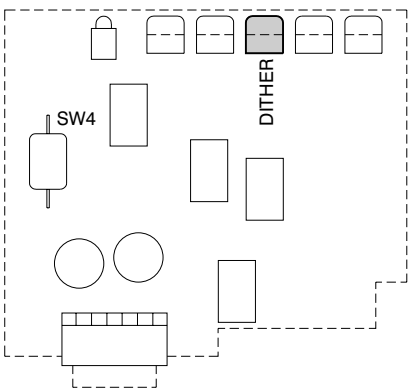
Dither Adjustment

Notice: The dither is adjusted with regard to the minimum hysteresis.

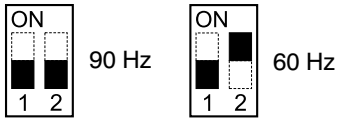
Amplitude - potentiometer (dither) (0 - 30 %)

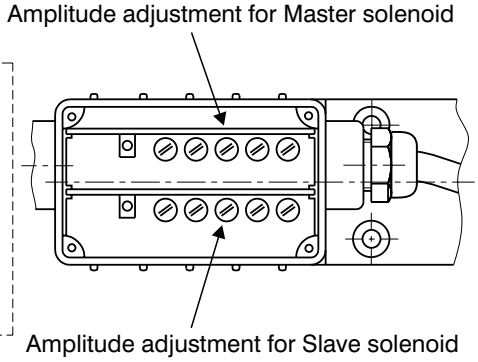






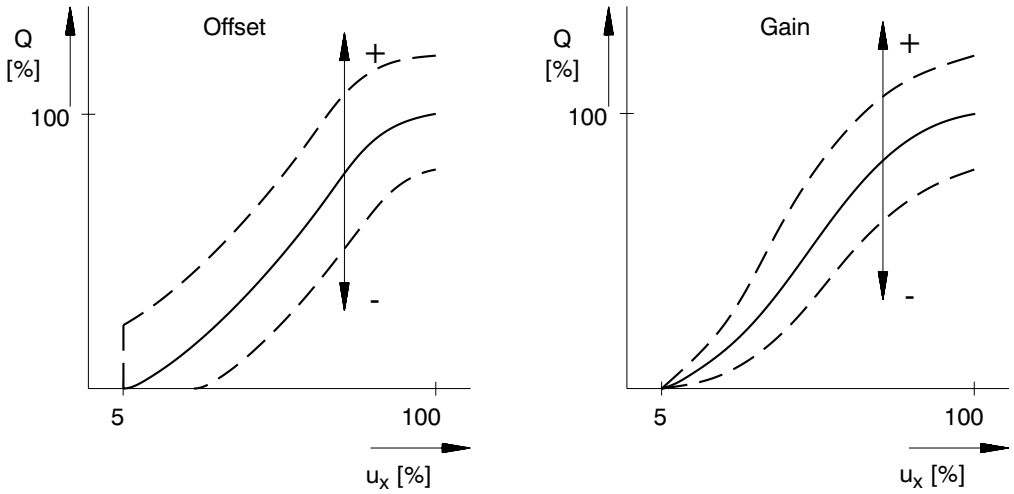
Frequency - switch SW4

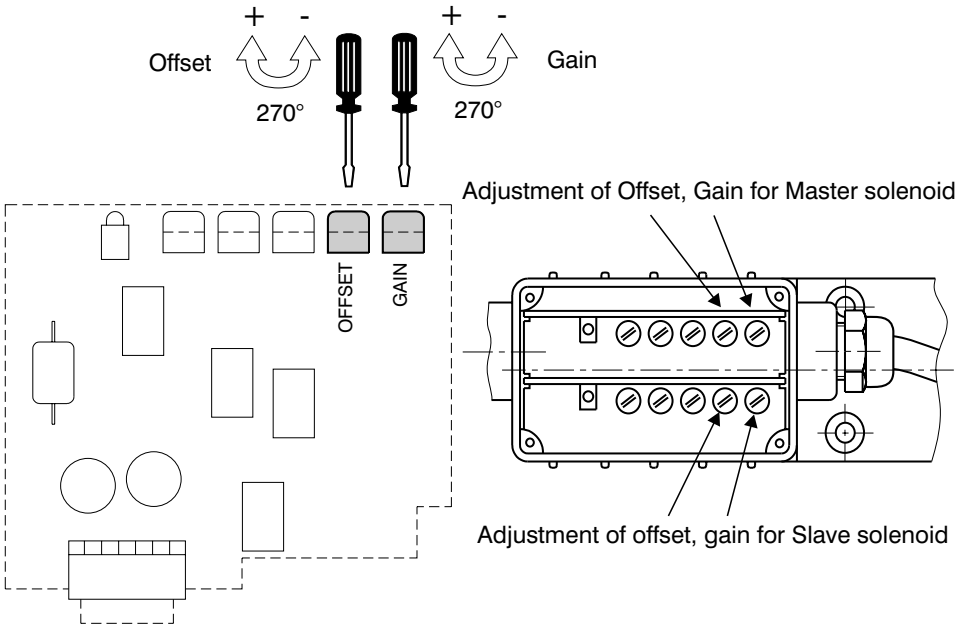




Adjustment of Offset, Gain Parameters

Notice: The factory setting of the Offset and Gain parameters is specific for the solenoids used.
The manufacturer does not recommend this setting to be changed.

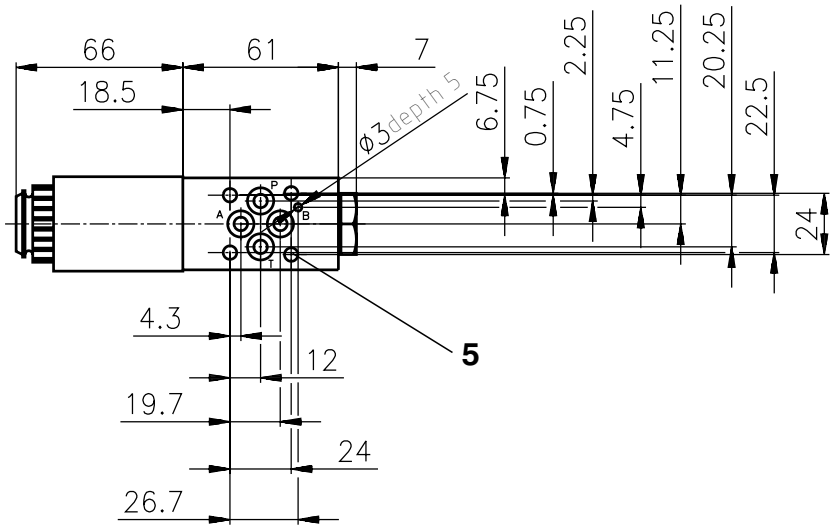




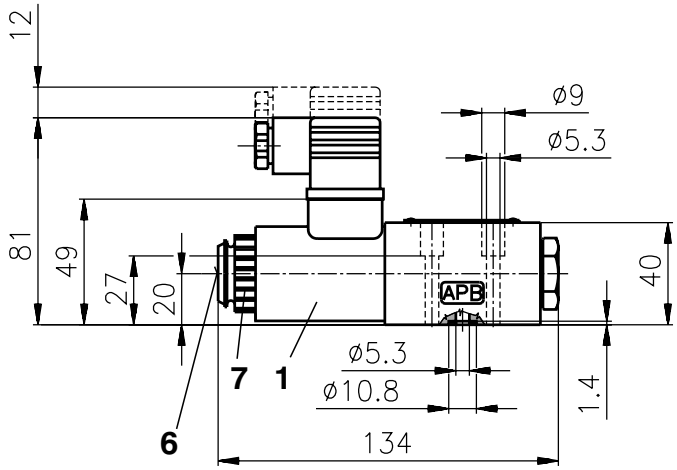
Valve Dimensions

Dimensions in millimetres

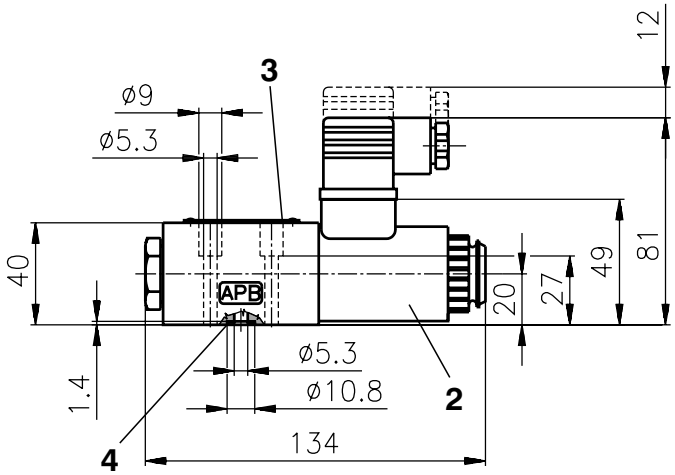
PRM2-042..../..-...



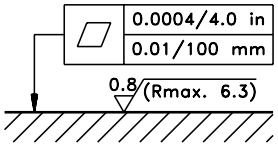
Functional symbols
2Z51, 2Y51



Functional symbols
2Z11, 2Y11



1 Solenoid a
2 Solenoid b
3 Name plate
4 Square ring 7.65 x 1.68 (4 pcs.) supplied in delivery packet
5 4 mounting holes
6 Manual override
7 Solenoid fixing nut (Nut torque 3 Nm)

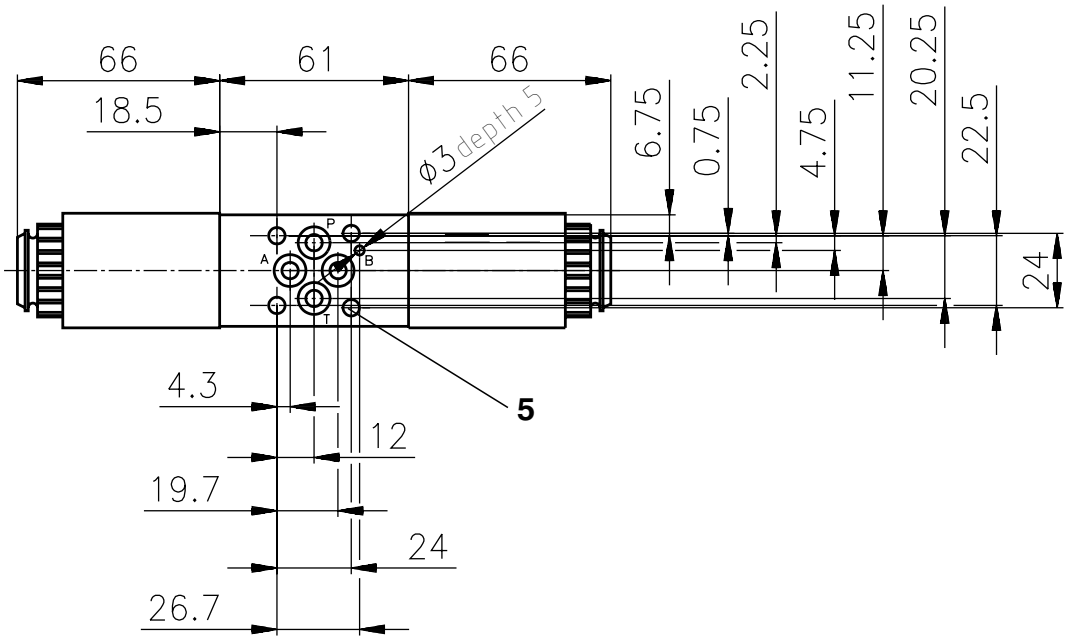


Required surface finish of interface.

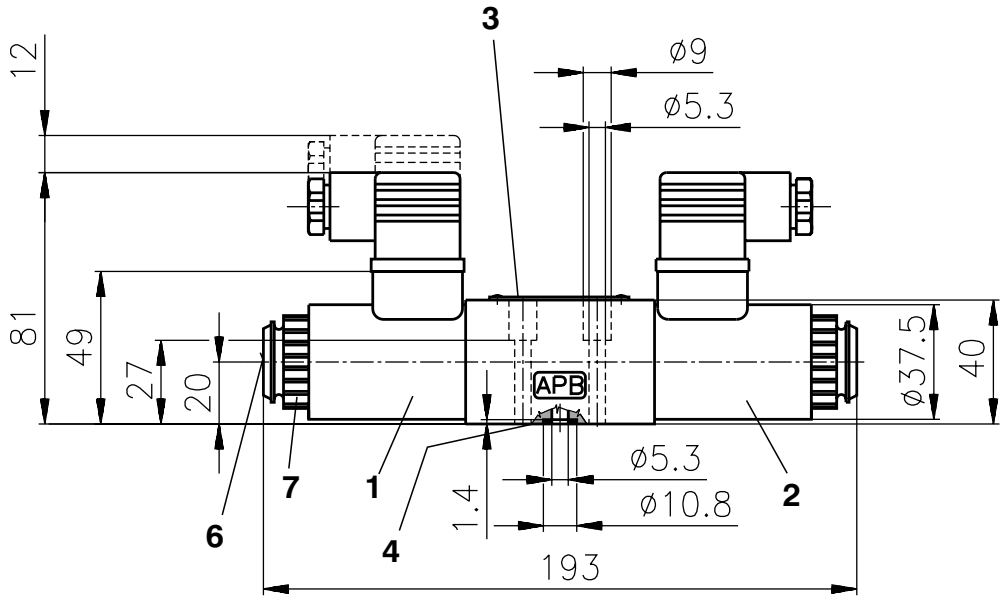
Valve Dimensions

Dimensions in millimetres

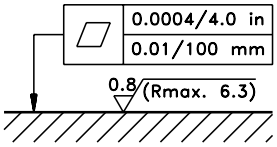
PRM2-043..../..-...



Functional symbols
3Z11, 3Z12, 3Y11, 3Y12



1 Solenoid a
2 Solenoid b
3 Name plate
4 Square ring 7.65 x 1.68 (4 pcs.) supplied in delivery packet
5 4 mounting holes
6 Manual override
7 Solenoid fixing nut (Nut torque 3 Nm)

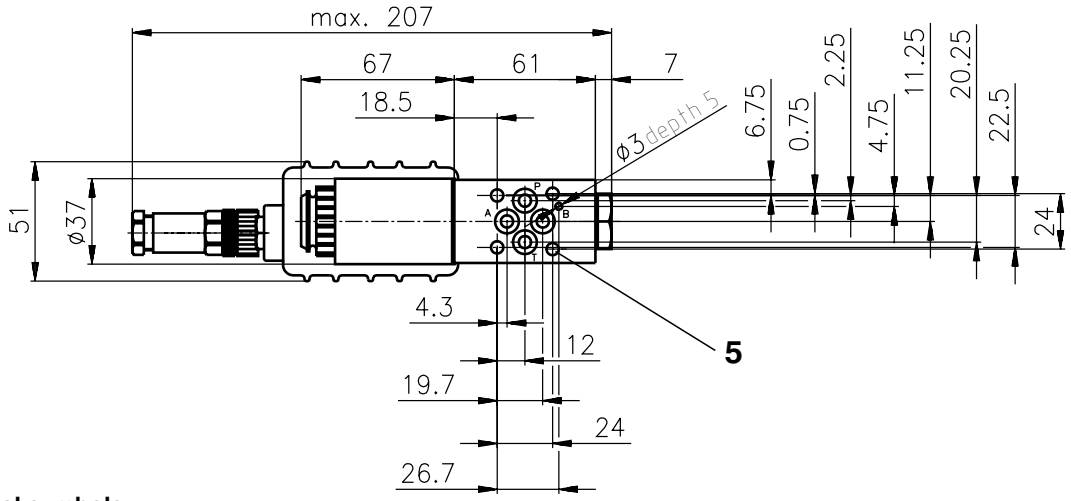


Required surface finish of interface.

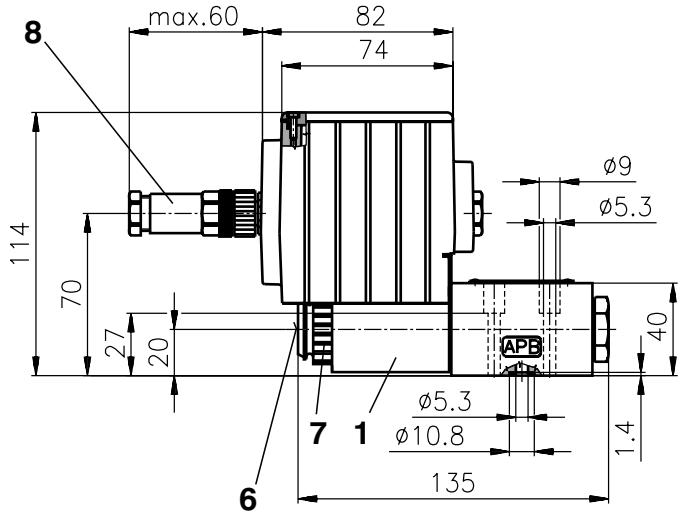
Valve Dimensions

Dimensions in millimetres

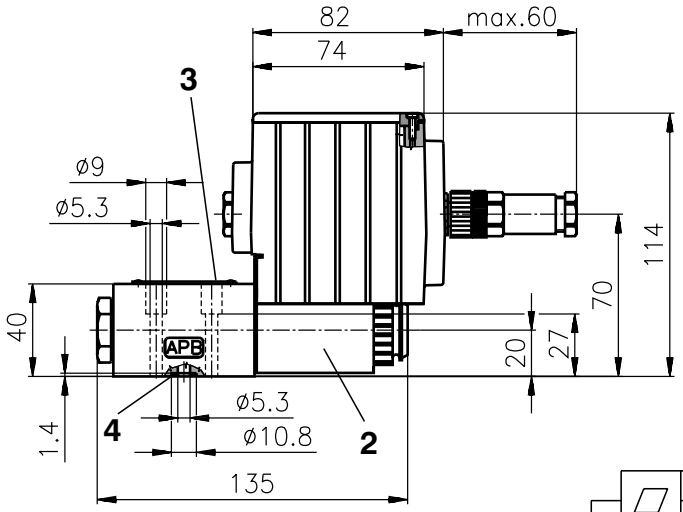
PRM2-042..../..-..EK.



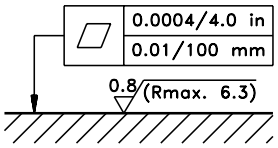
Functional symbols
2Z51, 2Y51



Functional symbols
2Z11, 2Y11



1 Solenoid a
2 Solenoid b
3 Name plate
4 Square ring 7.65 x 1.68 (4 pcs.) supplied in delivery packet
5 4 mounting holes
6 Manual override
7 Solenoid fixing nut (Nut torque 3 Nm)
8 4-pin connector M12 x 1 for external supply voltage

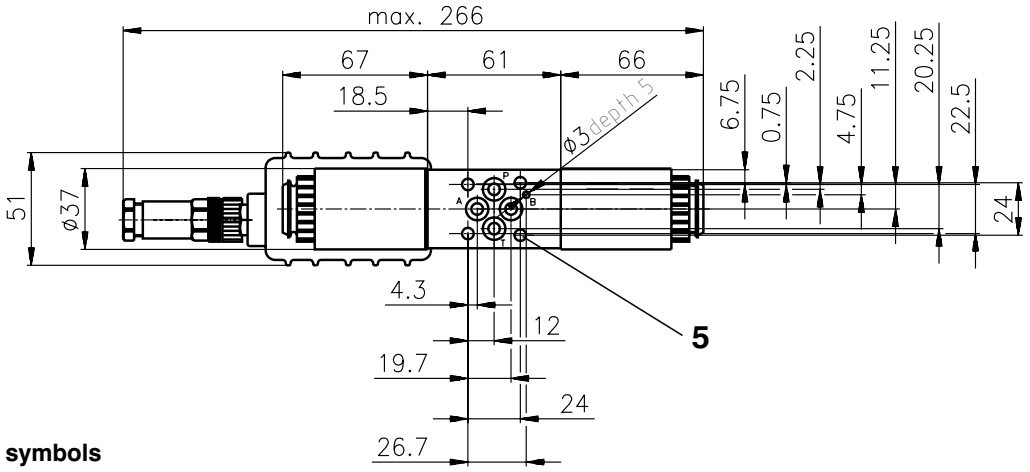


Required surface finish of interface.

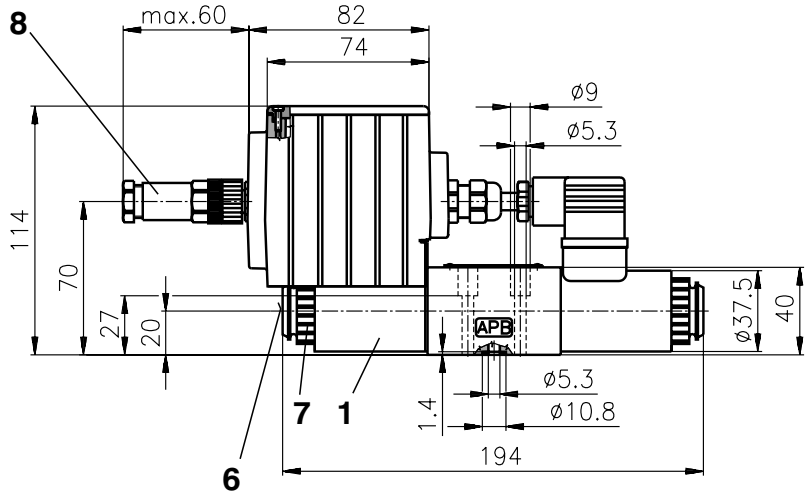
Valve Dimensions

Dimensions in millimetres

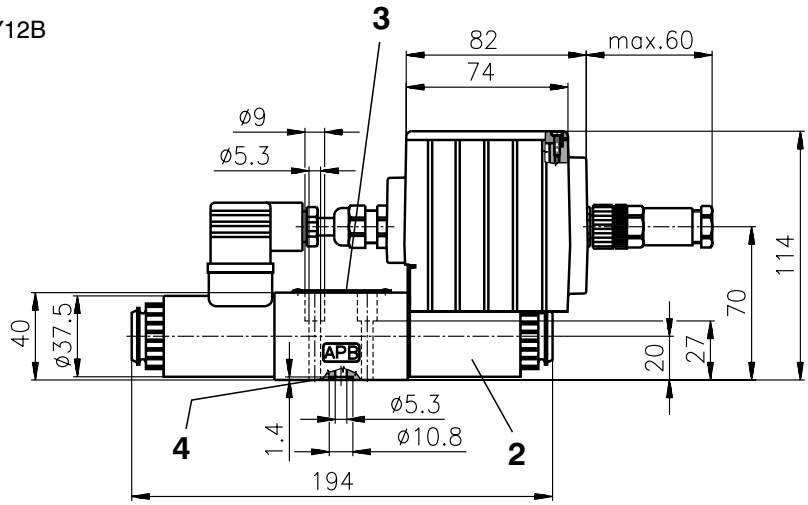
PRM2-043..../..-..EK.



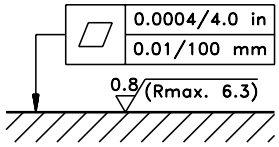
Functional symbols
3Z11, 3Z12, 3Y11, 3Y12



Functional symbols
3Z11B, 3Z12B, 3Y11B, 3Y12B



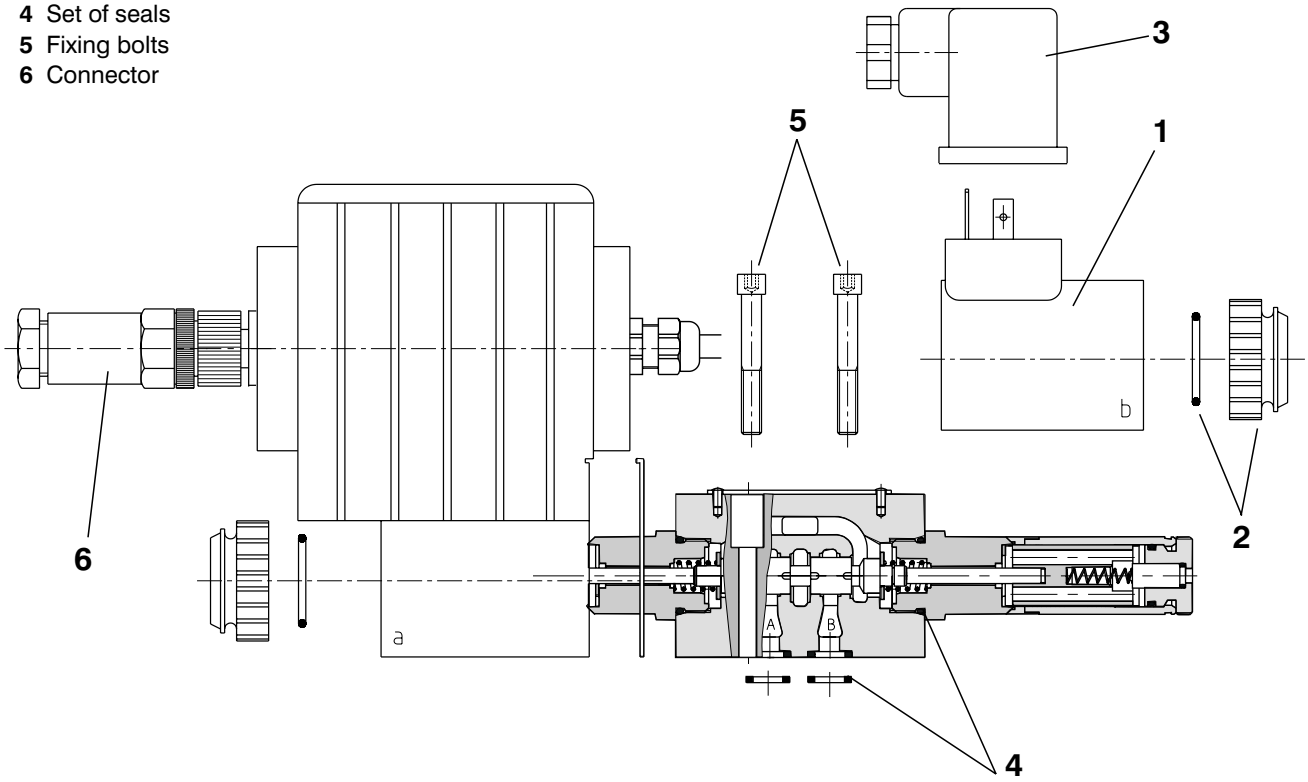
1 Solenoid a
2 Solenoid b
3 Name plate
4 Square ring 7.65 x 1.68 (4 pcs.) supplied in delivery packet
5 4 mounting holes
6 Manual override
7 Solenoid fixing nut (Nut torque 3 Nm)
8 4- pin connector M12 x 1 for external supply voltage



Required surface finish of interface.

Spare Parts

1 Solenoid coil
2 Nut + sealing ring
3 Connector plug
4 Set of seals
5 Fixing bolts
6 Connector



1. Solenoid coil

Nominal supply voltage [V]	Ordering number
12	936-0033
24	936-0034

2. Solenoid fixing nut + sealing ring

Model of the nut	Sealing ring	Ordering number
Standard nut	18 x 1,5	486-9010

3. Connector plug to DIN 43 650

Type designation	Type	Maximum input voltage	Connector plug A gray	Connector plug B black
			Ordering number	
K5	without rectifier - M16x1.5, (bushing bore ∅ 4-6 mm)	230 V DC	936-9906	936-9905

4. Set of seals

Type	Dimensions, number		Ordering number
Standard - NBR 70	7.65 x 1.68 (4 pcs)	16 x 1.8 (2 pcs)	486-9002
Viton	7.65 x 1.68 (4 pcs)	16 x 2 (2 pcs)	486-9009

5. Fixing bolts - set

Dimensions, number	Tightening torque	Ordering number
M5 x 35 DIN 912-10.9 (4 pcs)	5 Nm	486-9011

6. Connector	Ordering number
M12 x 1 (4-pin connector)	358358904012

Caution!

- The packing foil is recyclable.
- The protective plate can be returned to manufacturer.
- Mounting bolts M5 x 35 DIN 912-10.9 or studs must be ordered separately.
  Tightening torque of the bolts is 5 Nm.
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of law.

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E-mail: sales.cz@argo-hytos.com
www.argo-hytos.com

Proportional directional control valve

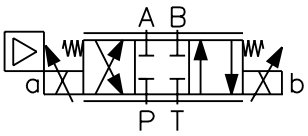
PRM2-10

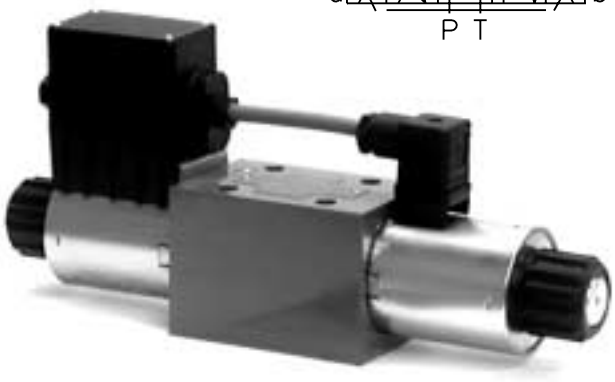
Size 10 • p_{max} up to 320 bar • Q_{max} up to 80 L/min

HA 5106
1/2005

Replaces
HA 5106 9/2003

- ❑ **Compact design with integrated electronics**
- ❑ **High reliability**
- ❑ **Simple replacement of the exciting coils including electronics without opening the hydraulic circuits**
- ❑ **Continuous flow control in both directions**
- ❑ **Installation dimensions to DIN 24 340-A10 and ISO 4401:1994**

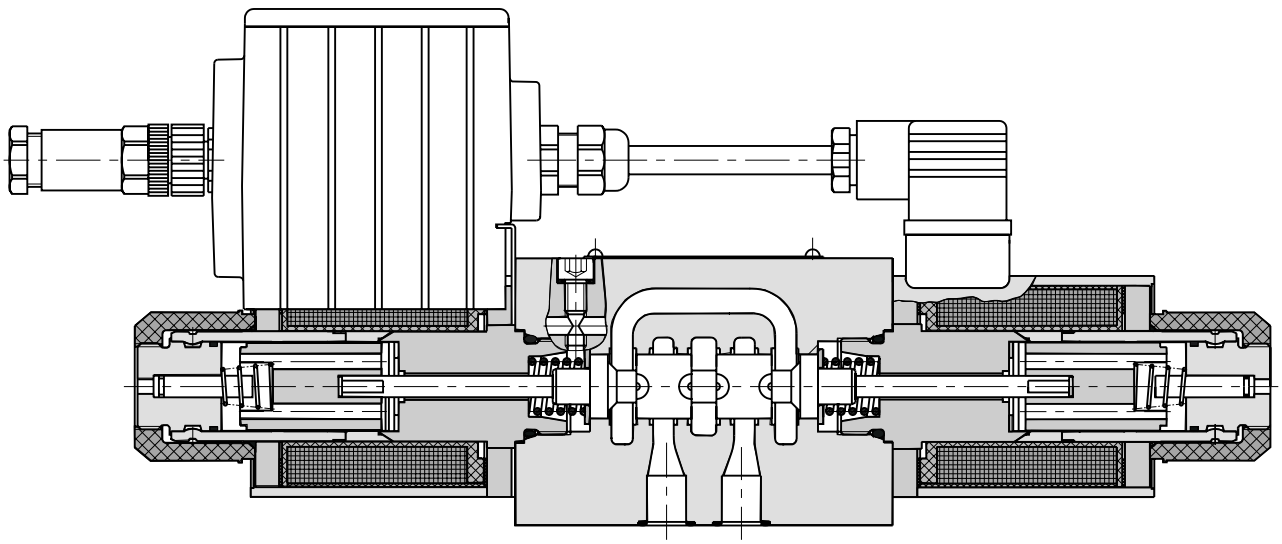




Functional Description

The proportional directional valve consists of a cast-iron housing, a special control spool, two centering springs with supporting washers and one or two proportional solenoids. A control box, which comprises one or two electronic control cards, depending on the number of the controlled solenoids, can be mounted onto either solenoid. With the model with two solenoids, the solenoid mounted apposite the control box is connected with the box by means of a DIN connector, a two-cored cable and a bushing. The connection of the control box with the supply source and with the control signal is realized by means of a 4-pin connector, type M12 x 1. The solenoid coils, including the control box, can be turned in the range of ± 90°.
The electric control unit supplies the solenoid with current, which varies with the control signal. The solenoid shifts the control spool to the required position, proportional to the control current.

The electronic control unit provides the following adjustment possibilities: Offset, Gain, rise and drop-out time of the ramp generator, frequency (2 frequencies) and amplitude of the dither signal generator. The correct function of the control unit is signaled by LED-diodes.
Stabilized voltage +10V (+5V for 12V voltage) is also available for the user. By the use of this voltage, a voltage control signal can be made by means of a potentiometer ≥ 1 kΩ.
The electronic control card enables voltage or current control to be used, according to the positions of the switches SW1 to SW3 (see table on page 6).
The basic surface treatment of the valve housing is phosphate coated, the operating solenoids are zinc coated.

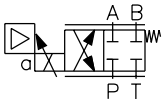
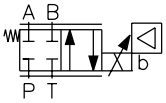
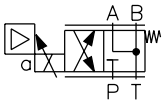
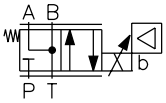
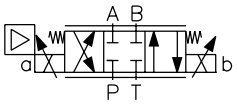
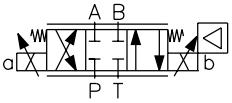
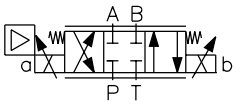
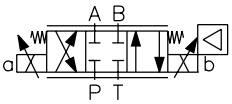
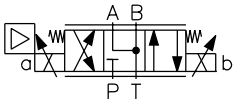
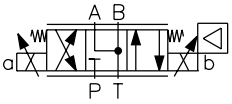
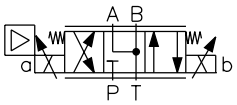
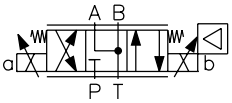


Ordering Code

PRM2-10 □ / □ - □ □ □

Proportional directional valve

Nominal size **10**

	**2Z51**
	**2Z11**
	**2Y51**
	**2Y11**
	**3Z11**
	**3Z11B**
 $\frac{q_A}{q_B} = \frac{1}{2}$*	**3Z12**
 $\frac{q_A}{q_B} = \frac{1}{2}$*	**3Z12B**
	**3Y11**
	**3Y11B**
 $\frac{q_A}{q_B} = \frac{1}{2}$*	**3Y12**
 $\frac{q_A}{q_B} = \frac{1}{2}$*	**3Y12B**

Seals

without designation	NBR
V	FPM (Viton)

Electronics

without designation	without electronics
EK	connection by connector M12 x 1 (4-pin connector) (supplied with counterpart)

Nominal supply voltage

12	12 V DC
24	24 V DC

Nominal flow rate at Δp = 10 bar

30	30 L/min
60	60 L/min

***** Model for cylinders with asymmetric piston rod, piston area ratio 1:2

Technical Data

Nominal size	mm	10	
Maximum operating pressure at ports P, A, B	bar	320	
Maximum operating pressure at port T	bar	160	
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP - RP 91H in viscosity classes ISO VG 32, 46 and 68	
Fluid temperature range (NBR/Viton)	°C	-30 ... +80	-20 ... +80
Ambient temperature, max.	°C	up to +50	
Viscosity range	mm^2/s	98 ... 1840 (20 ... 400)	
Maximum degree of fluid contamination		Class 21/18/15 according to ISO 4406 (1999).	
Nominal flow rate Q_n at $\Delta p = 10$ bar ($\nu = 35\ mm^2 \cdot s^{-1}$)	L/min	30	60
Hysteresis	%	≤ 6	
Weight PRM2-102 PRM2-103	kg	5.1 6.6	
Mounting position		any, preferably horizontal	
Enclosure type		IP65	

Technical Data of the Proportional Solenoid

Type of solenoid	V	12 DC	24 DC
Limit current	A	1.9	1.1
Mean resistance value at 20°C	Ω	4.7	13.9

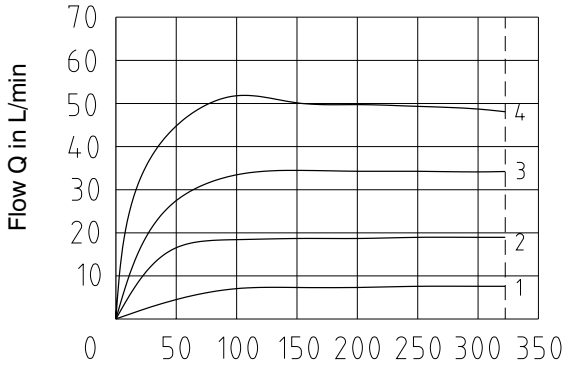
Technical Data of the Electronics

Nominal supply voltage U_{cc}	V	12 DC	24 DC
Supply voltage range	V	11.2 ... 14.7 DC	20 ... 30 DC
Stabilized voltage for control	V	5 DC (R > 1 kΩ)	10 DC (R ≥ 1 kΩ)
Control signal		see table of switches configuration (page 6)	
Maximum output current	A	2.4 for R < 4Ω	1.5 for R < 10Ω
Ramp adjustment range	s	0.05 ... 3	
Dither frequency	Hz	90 / 60	
Dither amplitude	%	0 ... 30	

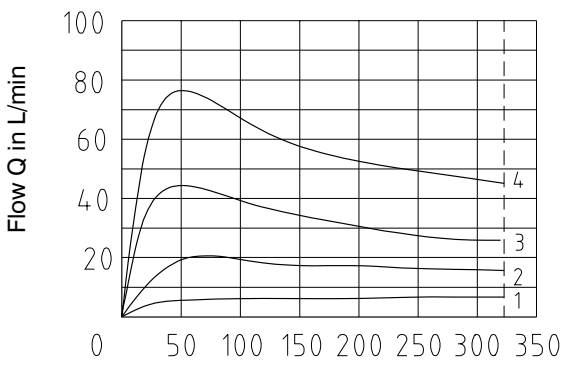
Limit Power

Measured at $\nu = 35\ mm^2/s$ P → A / B → T or P → B / A → T

Nominal flow 30 L/min



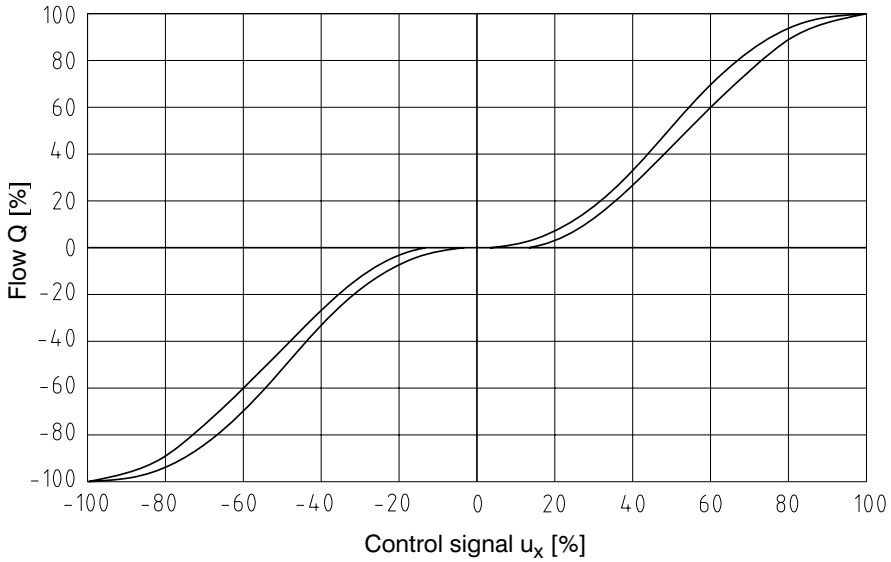
Nominal flow 60 L/min



Solenoid current:
(24 V DC)
1 = 40%
2 = 60%
3 = 80%
4 = 100%

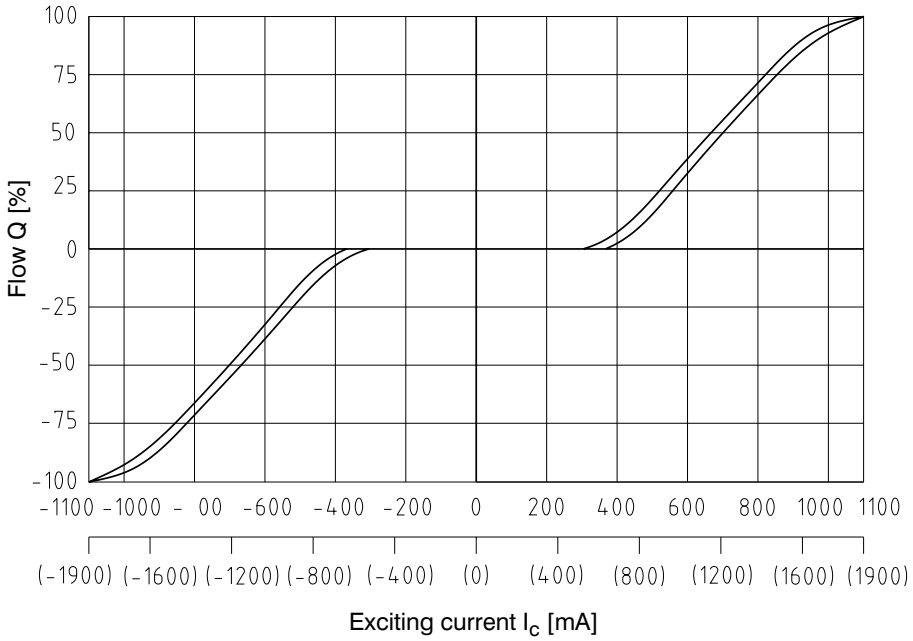
Flow characteristic with integrated electronics

Measured at Δp = 10 bar, ν = 35 mm^2/s



Flow characteristic without integrated electronics

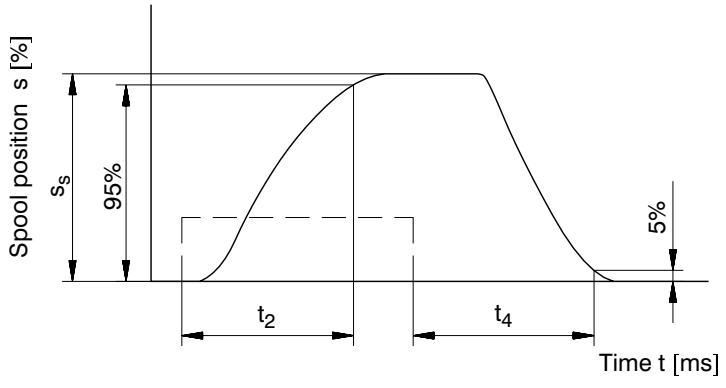
Measured at Δp = 10 bar, ν = 35 mm^2/s, values in parenthesis are valid for the supply voltage 12 V



The coil current which initializes the flow through the proportional directional valve can differ due to the production tolerances about in a range of ± 6% of the limit current.

Transient characteristic

Measured at Δp = 10 bar, ν = 35 mm^2/s; Q = 80 %Q_n

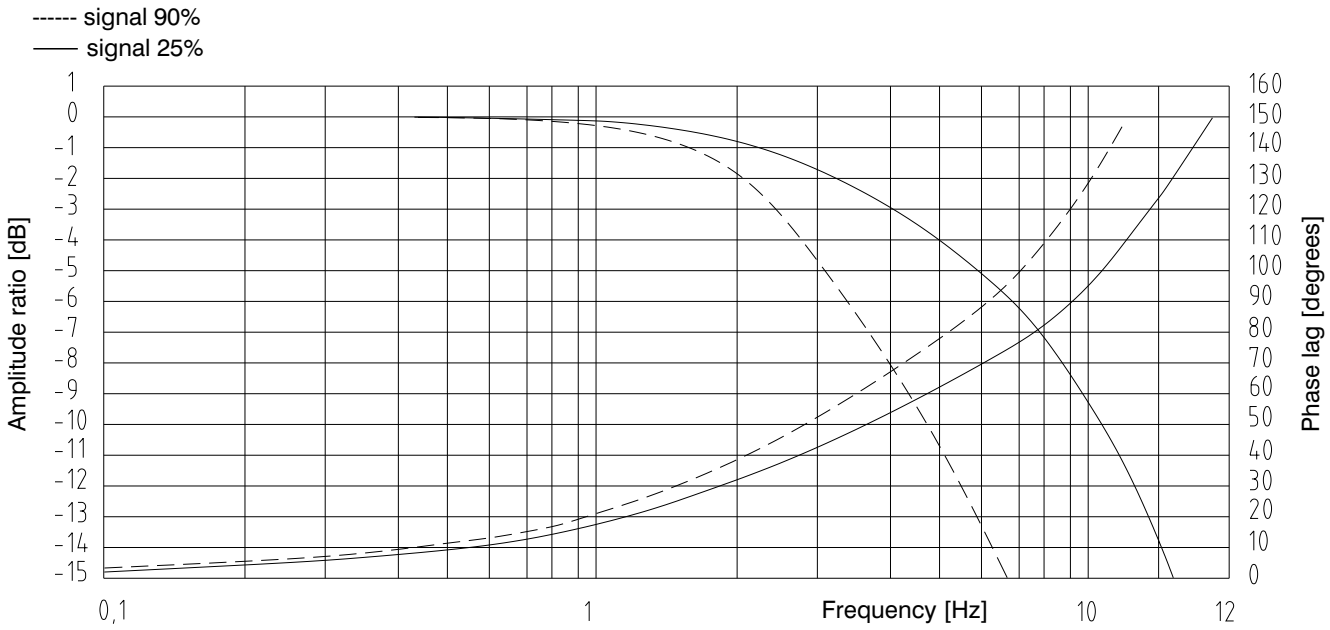


— — — the control signal course of the integrated electronics

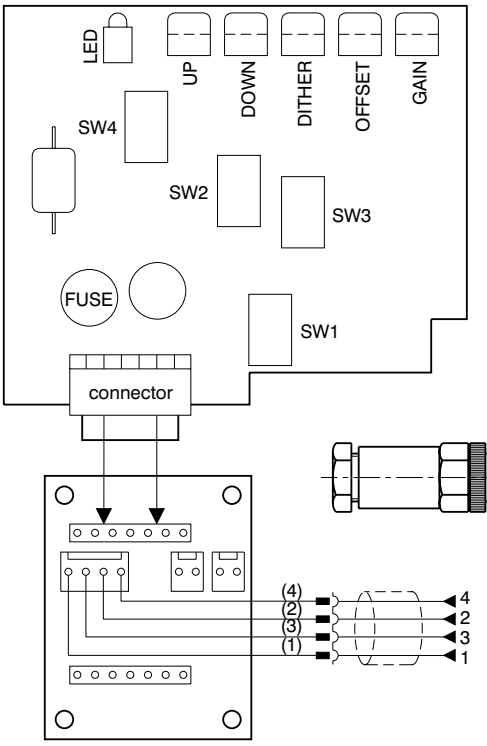
Steady spool position s_s [%]	t_2 [ms]	t_4 [ms]
100	160	145
75	135	130
50	85	105
25	50	70

The values in table have only an informative character.
The times of the transient characteristics at pressure or flow control will be in a particular hydraulic circuit always longer.

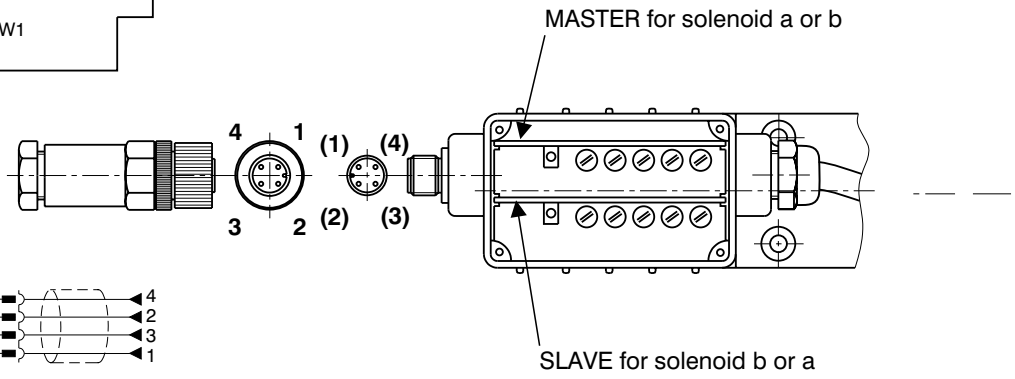
Frequency Reponse



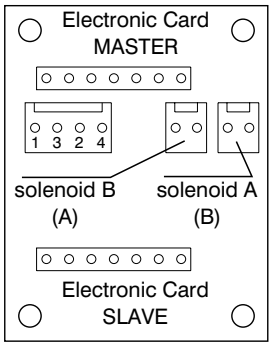
Component Arrangement on the Electronic Card



SW1 - control signal choice
SW2 - control signal choice
SW3 - control signal choice
SW4 - dither frequency



Description basic subplatte



PIN	Description
1	+24 V (U_{cc}) (+12 V)
2	control
3	0 V
4	+10 V (+5 V)

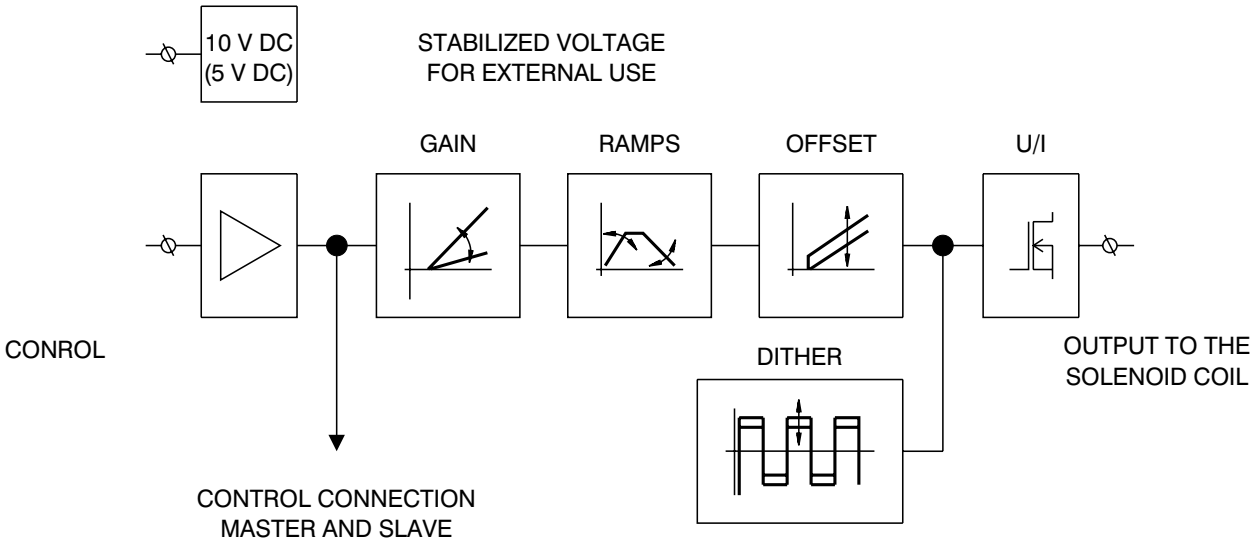
Table of the Switch Configuration for the Control Signal Choices

		PRM2-042				PRM2-043	
		0 ... 5 V	0 ... 10 V (0 ... 5 V)*	0 ... 20 mA	4 ... 20 mA	$U_{cc}/2$ ± 10 V (± 5 V)*	± 10 V (± 5 V)*
MASTER M	SW1	ON 1 2	ON 1 2	ON 1 2	ON 1 2	ON 1 2	ON 1 2
	SW2	ON 1 2	ON 1 2	ON 1 2	ON 1 2	ON 1 2	ON 1 2
	SW3	ON 1 2	ON 1 2	ON 1 2	ON 1 2	ON 1 2	ON 1 2
	SW4	90 Hz ON 1 2			60 Hz	ON 1 2	
SLAVE S	SW1					ON 1 2	ON 1 2
	SW2					ON 1 2	ON 1 2
	SW3					ON 1 2	ON 1 2
	SW4					90 Hz ON 1 2	60 Hz ON 1 2

Designation of the basic manufacture setting.
The ramp functions are adjusted on their minimum values, the dither is set to the optimal value with respect to hysteresis. Offset and Gain are adjusted according to the characteristic on page 3 and 4. The manufacturer does not recommend these adjusted values to be changed.

* Input signal level for the 12 V electronic unit.

Block Diagram



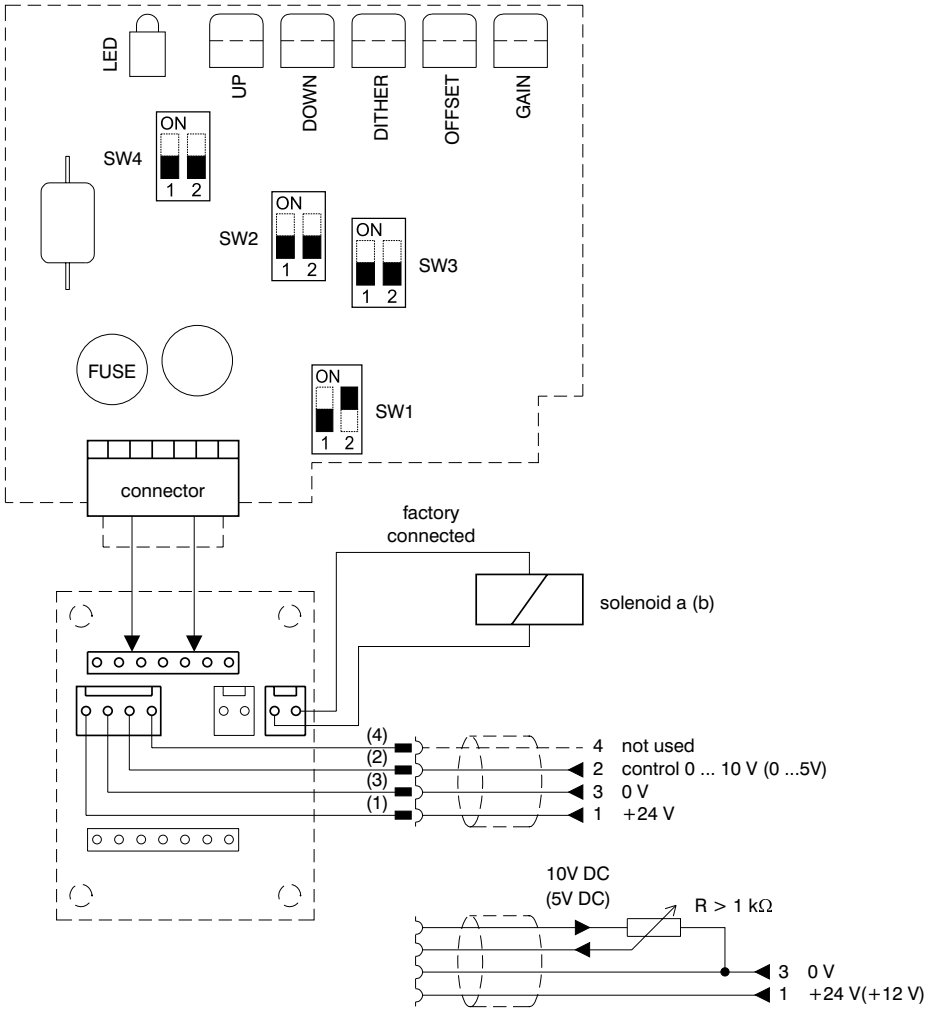
Valve PRM2-102 (with one solenoid)

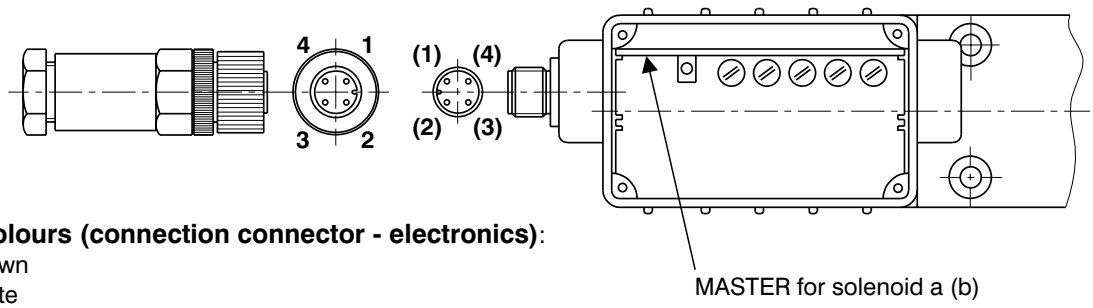
1 Factory setting

1.1 Control with external voltage source 0 ... 10 V (0 ... 5 V) or with external potentiometer R >1 kΩ

Notice:
The control signal must have the same ground potential as the supply source.

Master card for solenoid a (b)





Wire colours (connection connector - electronics):
(1) - brown
(2) - white
(3) - blue
(4) - black

Factory set values:
Control signal: 0 - 10 V (0 - 5V)
Dither: frequency 90Hz
amplitude - optimum
Ramps: 0.05 s
Offset, Gain: according to the characteristics on page 3, 4

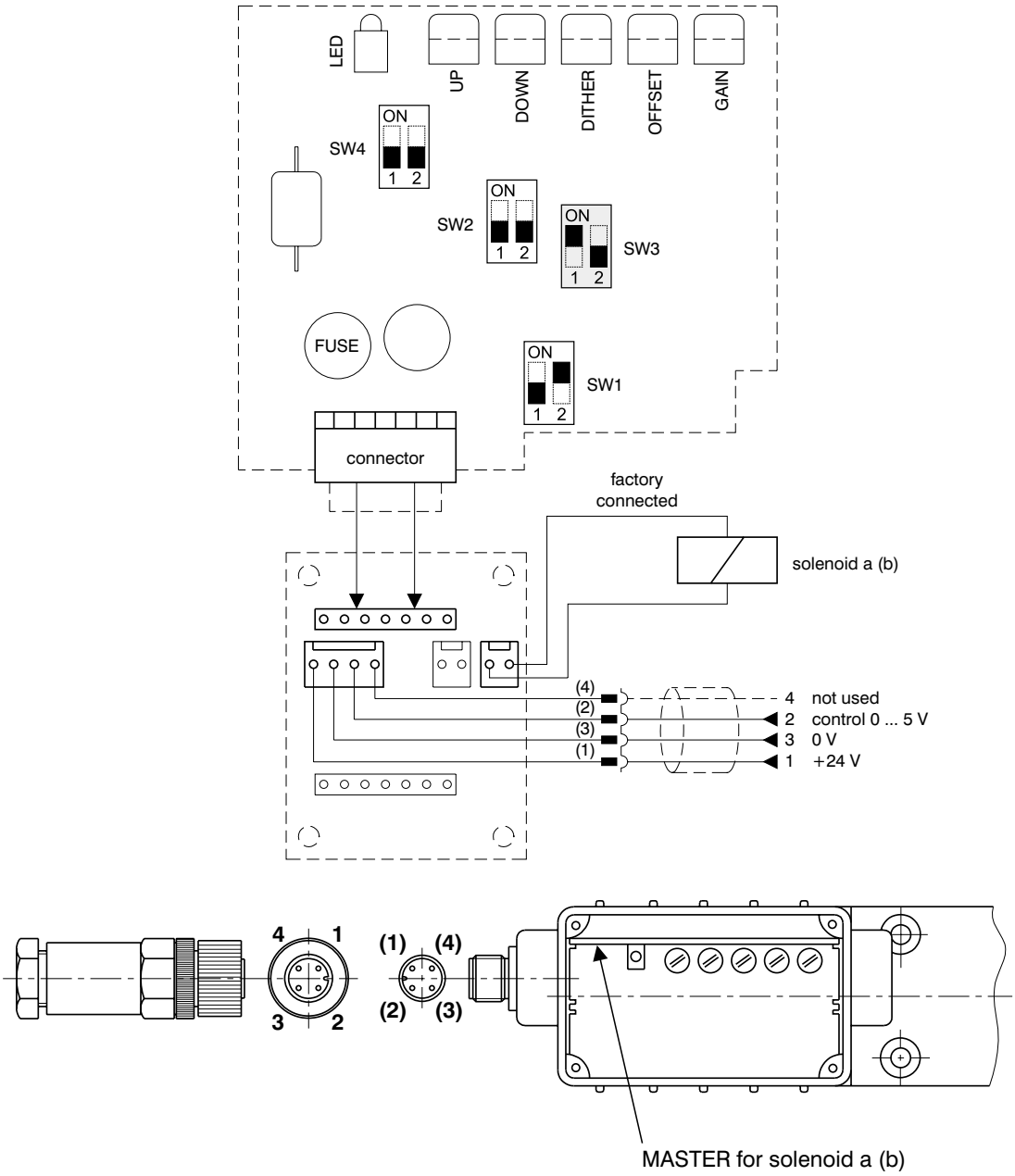
Valve PRM2-102 (with one solenoid)

2 Other control possibilities

2.1 Control with external source 0 ... 5 V

Notice:
The control signal must have the same ground potential as the supply source.

Master card for solenoid a (b)



For the factory setting modification for this case of application, the following steps are required:

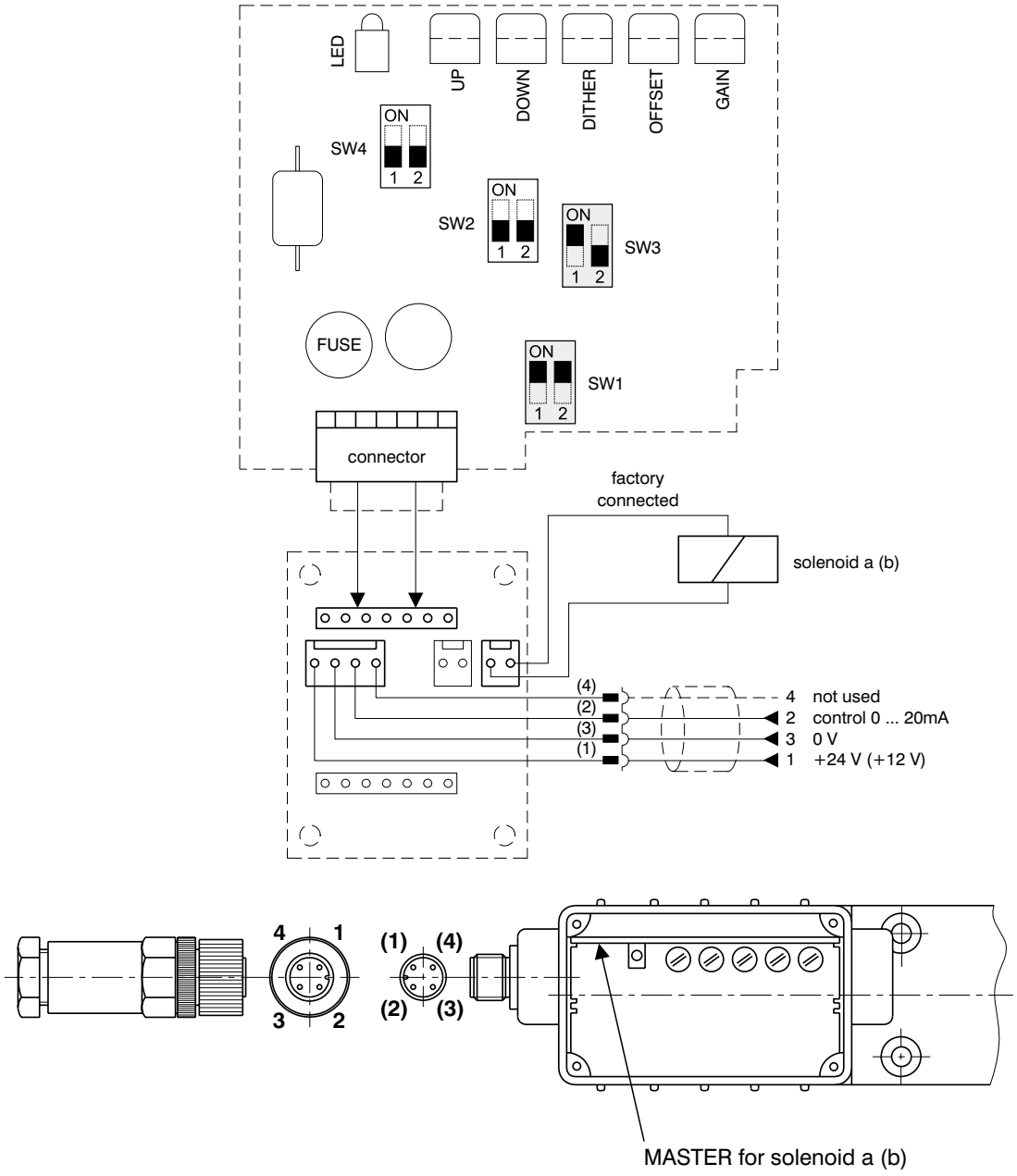
1. Unscrew the electronics cover
2. Carefully remove the Master card
3. Flip the switch SW3 in position shown in the picture
4. Put in the Master card and fix the electronics cover
5. Connect the voltage +24 V from an external supply source to terminals 1 and 3 of the connector
6. Connect the control voltage 0 … 5 V from an external source to terminals 2 and 3 of the connector

Valve PRM2-102 (with one solenoid)

2.2 Control with external source 0 ... 20 mA

Notice:
The control signal must have the same ground potential as the supply source.

Master card for solenoid a (b)



For the factory setting modification for this case of application, the following steps are required:

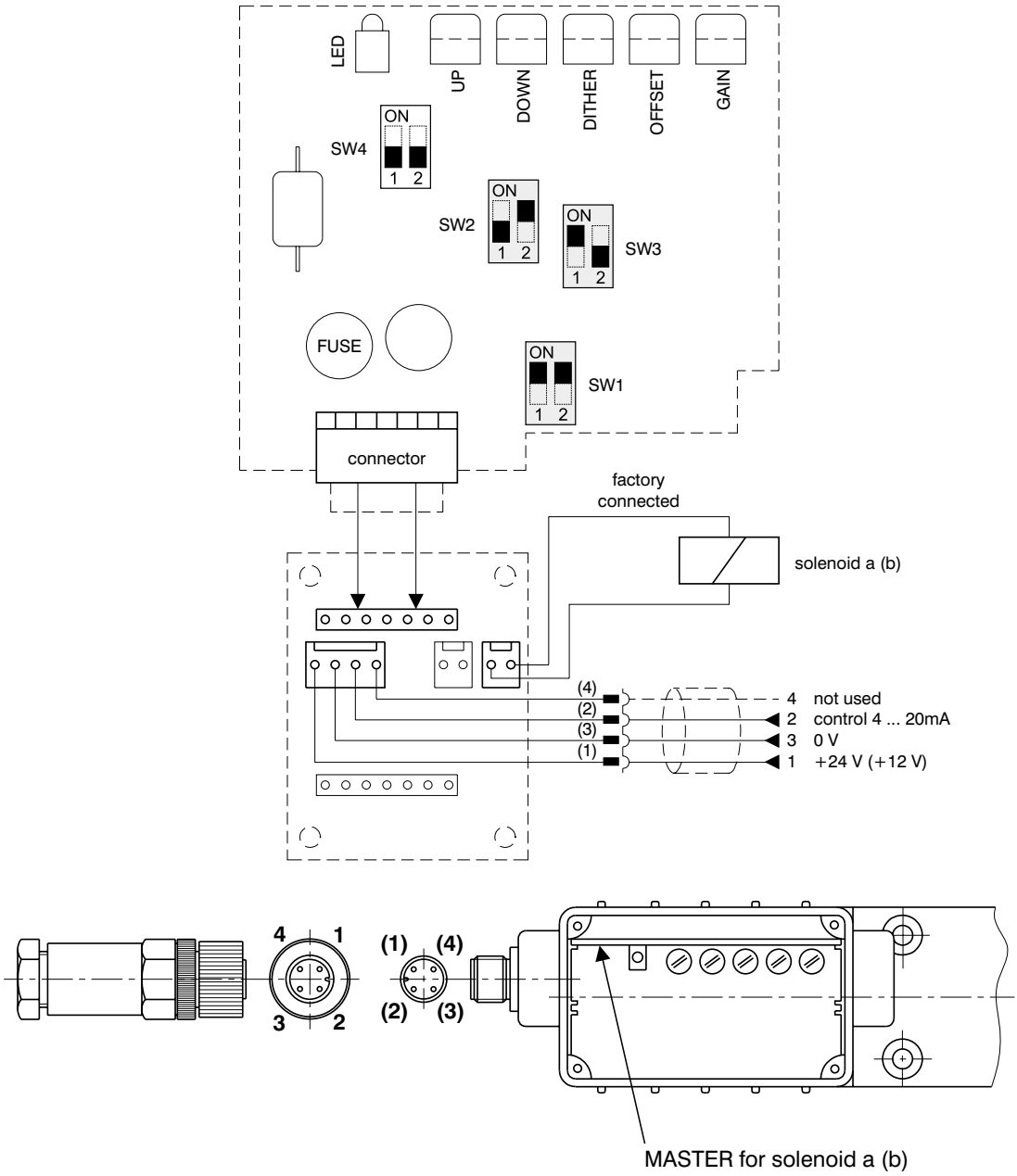
1. Unscrew the electronics cover
2. Carefully remove the Master card
3. Flip the switch SW1 and SW3 in position shown in the picture
4. Put in the Master card and fix the electronics cover
5. Connect the voltage +24 V (+12 V) from an external supply source to terminals 1 and 3 of the connector
6. Bring the control current 0 … 20 mA from an external source to terminals 2 and 3 of the connector

Valve PRM2-102 (with one solenoid)

2.3 Control with external source 4 ... 20 mA

Notice:
The control signal must have the same ground potential as the supply source.

Master card for solenoid a (b)



For the factory setting modification for this case of application, the following steps are required:

1. Unscrew the electronics cover
2. Carefully remove the Master card
3. Flip the switch SW1, SW2 and SW3 in position shown in the picture
4. Put in the Master card and fix the electronics cover
5. Connect the voltage +24 V (+12 V) from an external supply source to terminals 1 and 3 of the connector
6. Bring the control current 4 … 20 mA from an external source to terminals 2 and 3 of the connector

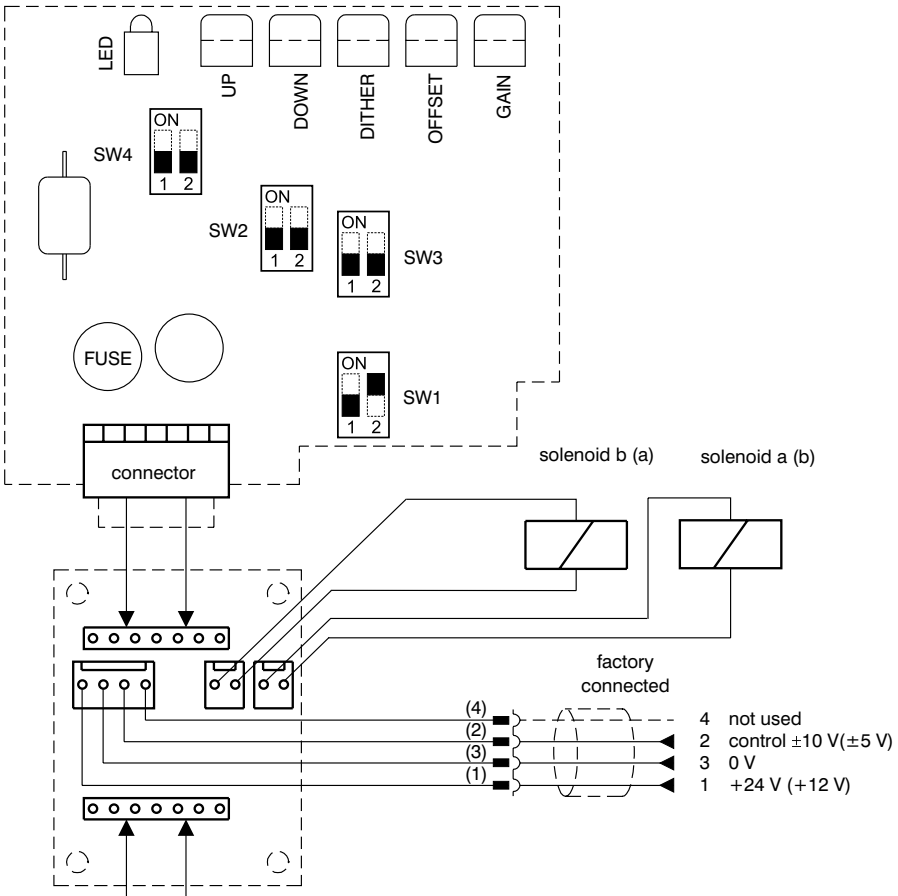
Valve PRM2-103 (with two solenoids)

3 Factory setting

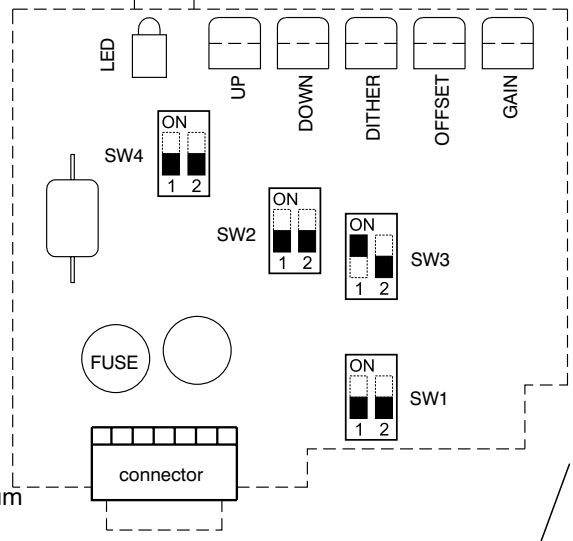
3.1 Control with external source 0 ± 10 V (0 ± 5 V)

Notice:
The control signal must have the same ground potential as the supply source.

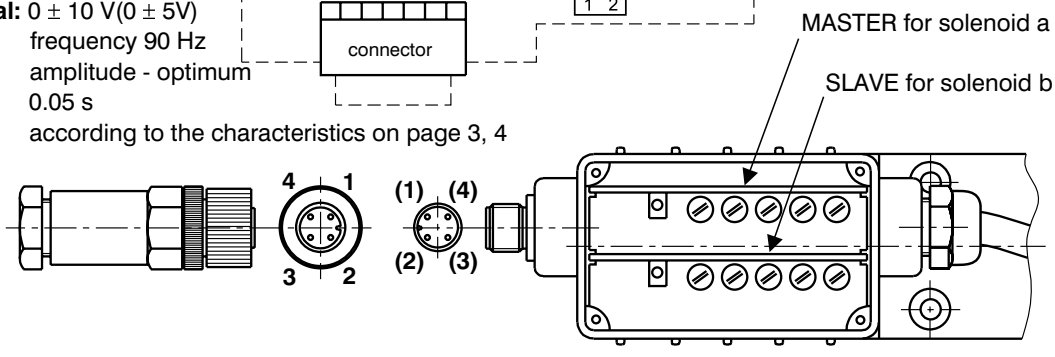
Master card for solenoid a (b)



Slave card for solenoid b (a)



Factory set values:
Control signal: 0 ± 10 V(0 ± 5V)
Dither: frequency 90 Hz
amplitude - optimum
Ramps: 0.05 s
Offset, Gain: according to the characteristics on page 3, 4

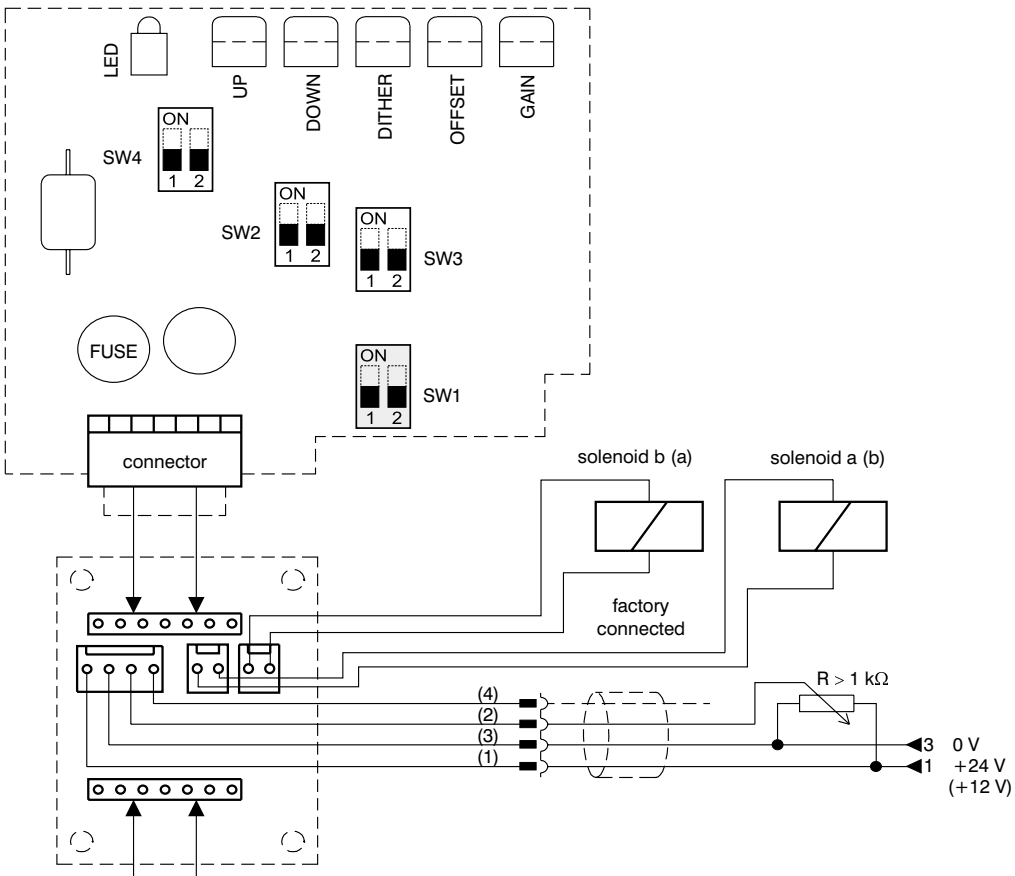


Valve PRM2-103 (with two solenoids)

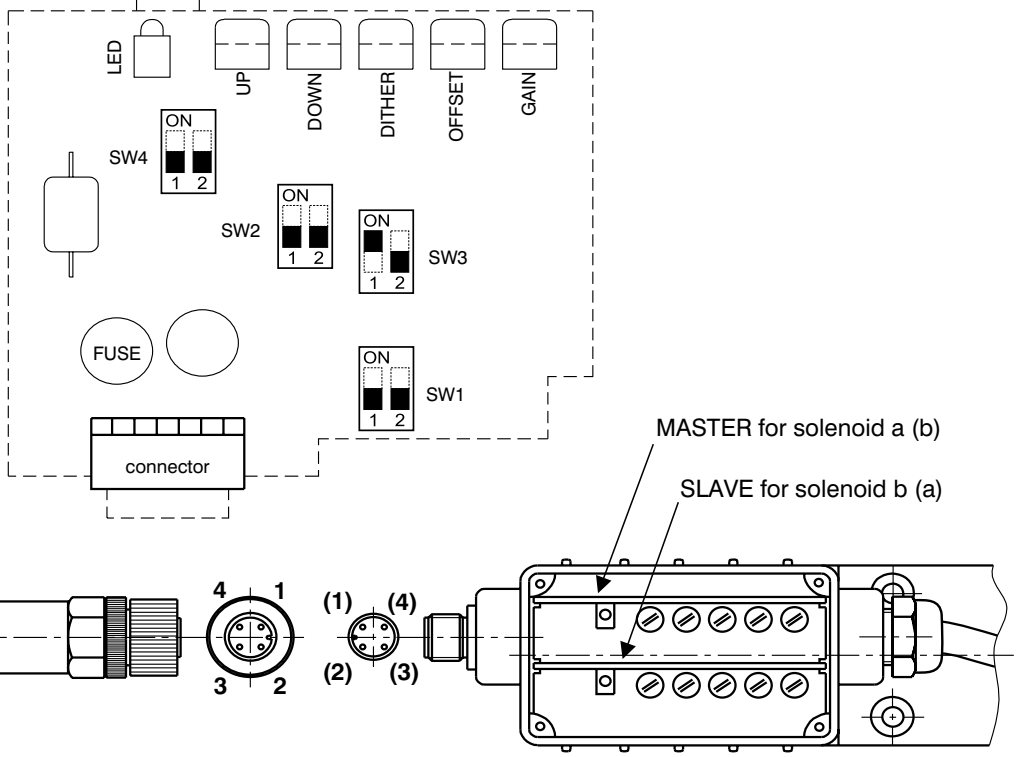
3.2 Other control possibilities

Control $U_{cc}/2 \pm 10$ V($U_{cc}/2 \pm 5$V) external potentiometer R > 1 kΩ

Master card for solenoid a (b)



Slave card for solenoid b (a)

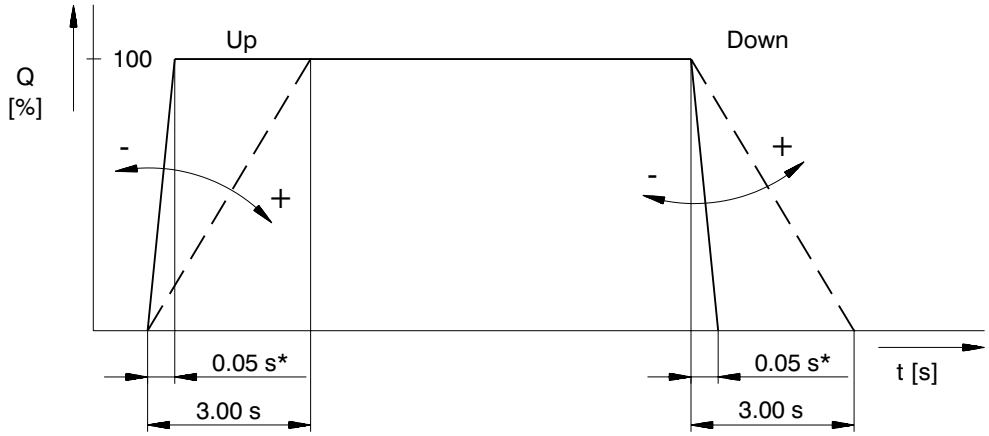


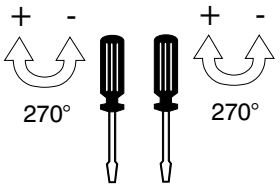
For the factory setting modification for this case of application, the following steps are required:

1. Unscrew the electronics cover
2. Carefully remove the Master card
3. Flip the switch SW1 in position shown in the picture
4. Put in the Master card and fix the electronics cover
5. Connect the voltage +24 V (+12 V) from an external supply source to terminals 1 and 3 of the connector

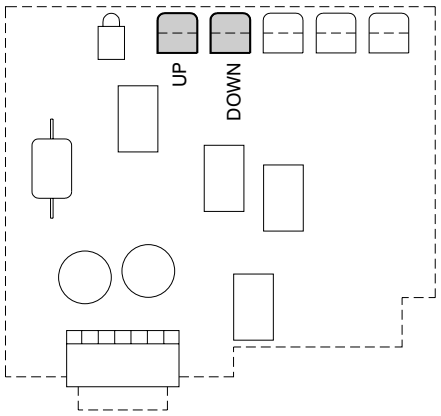
Ramp Adjustment (Up, Down)

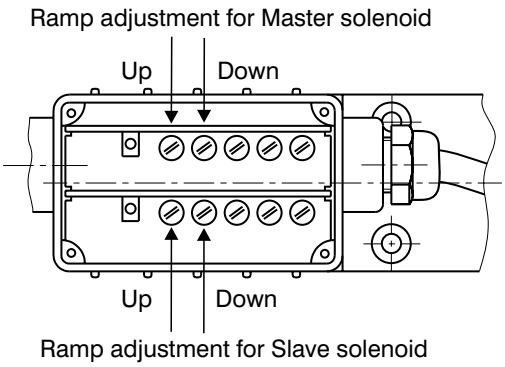
Notice: The factory setting of the ramp functions is to the minimum values.





*The value has only an informative character with respect to the particular type of the proportional directional valve (see page 4)

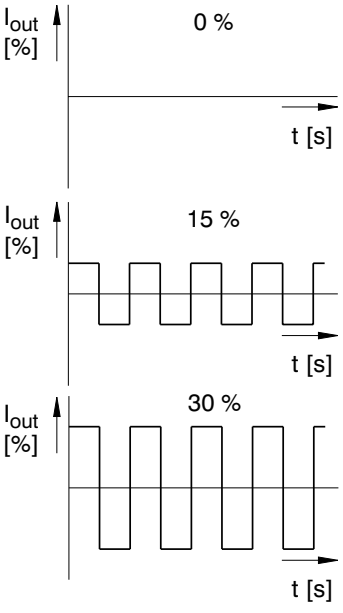


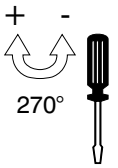


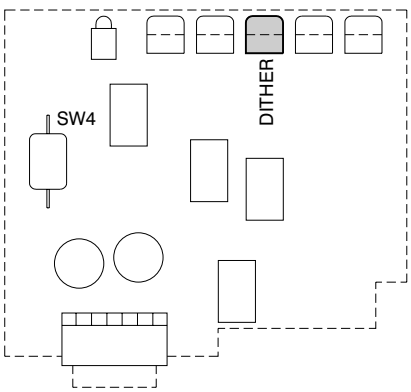
Dither Adjustment

Notice: The dither is adjusted with regard to the minimum hysteresis.

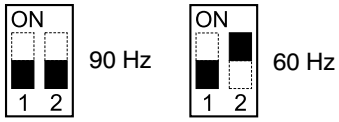
Amplitude - potentiometer (dither) (0 - 30 %)

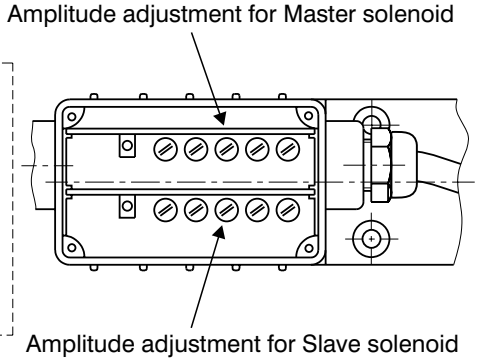






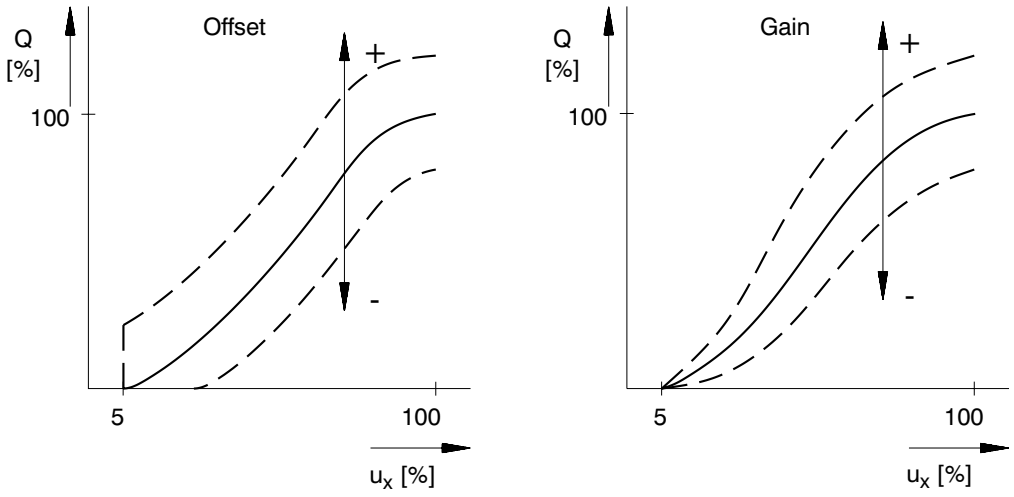
Frequency - switch SW4

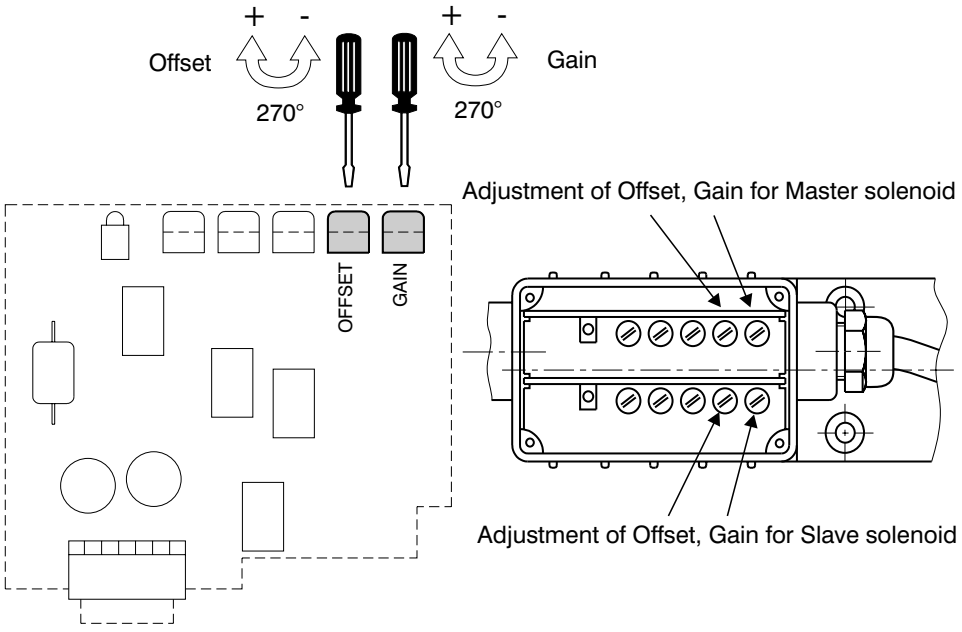




Adjustment of Offset, Gain Parameters

Notice: The factory setting of the Offset and Gain parameters is specific for the solenoids used.
The manufacturer does not recommend this setting to be changed.

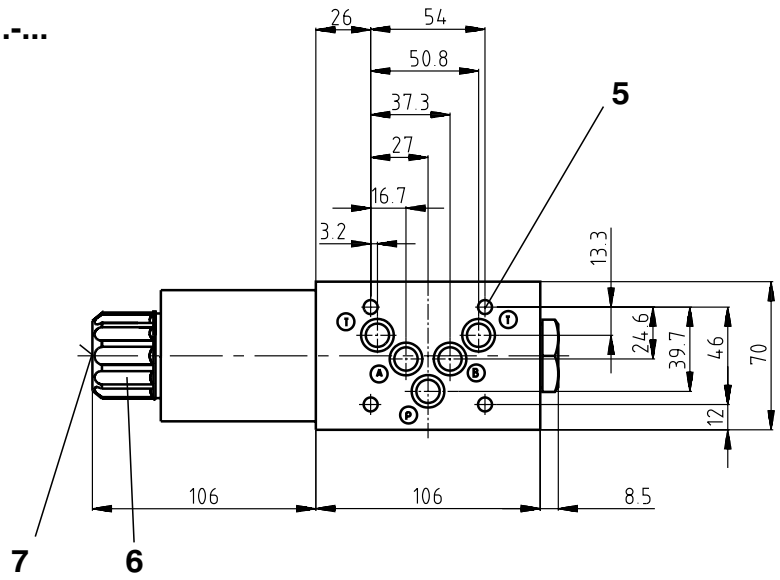




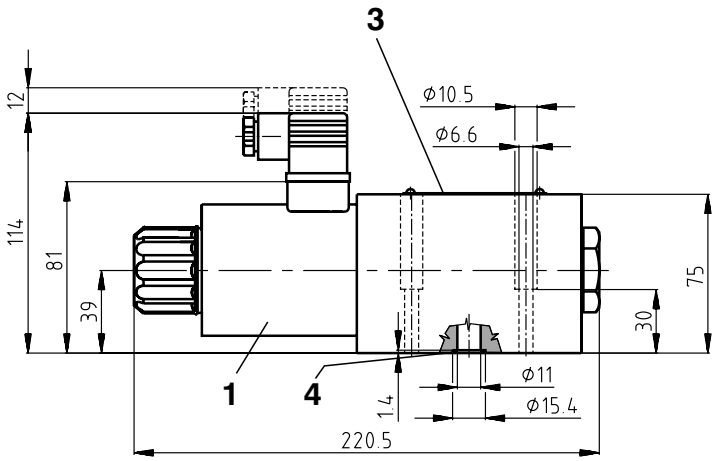
Valve Dimensions

Dimensions in millimetres

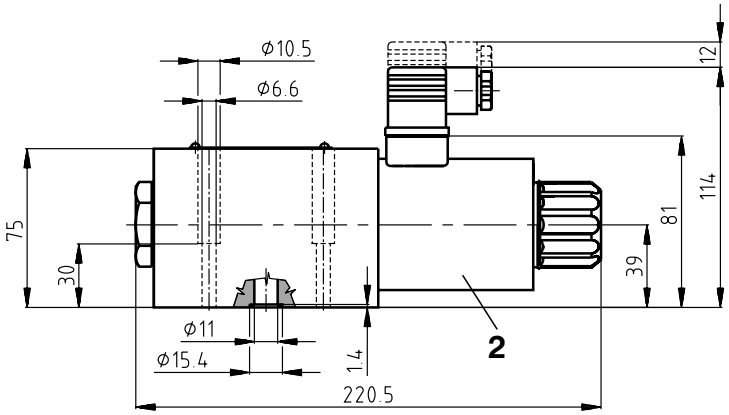
PRM2-102..../..-...



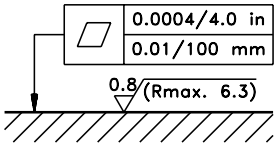
Functional symbols
2Z51, 2Y51



Functional symbols
2Z11, 2Y11



1 Solenoid a
2 Solenoid b
3 Name plate
4 Square ring 12.42 x 1.68 (5 pcs.) supplied in delivery packet
5 4 through mounting holes
6 Solenoid fixing nut (Nut torque 6 Nm)
7 Manual override

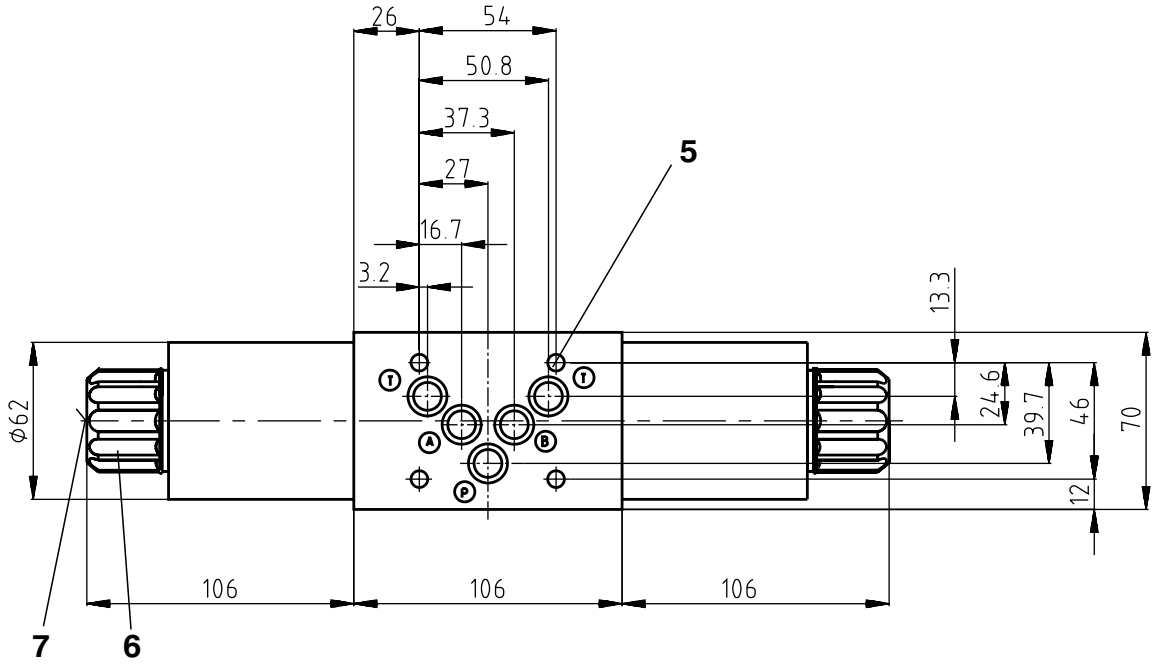


Required surface finish of interface.

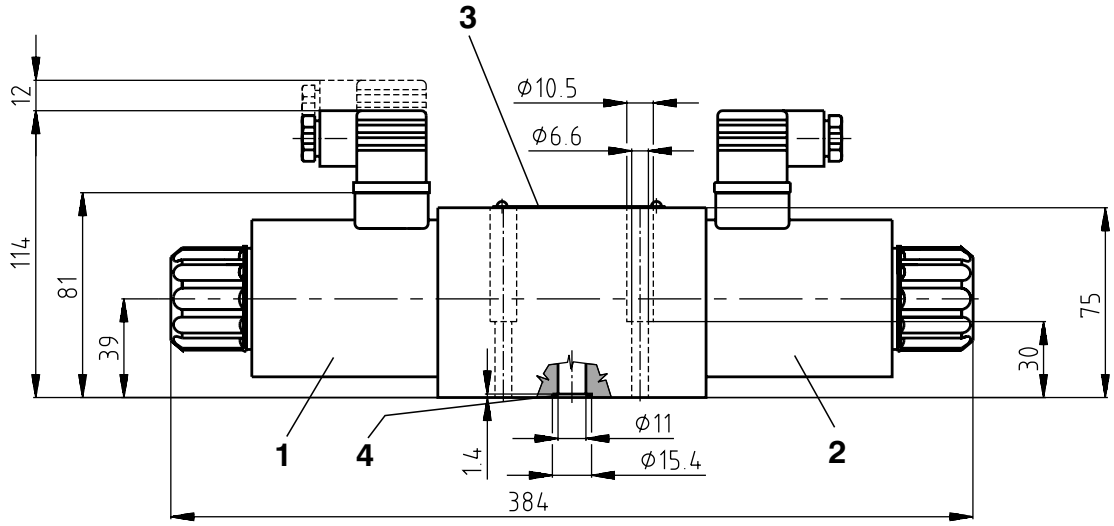
Valve Dimensions

Dimensions in millimetres

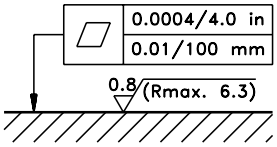
PRM2-103..../..-...



Functional symbols
3Z11, 3Z12, 3Y11, 3Y12



1 Solenoid a
2 Solenoid b
3 Name plate
4 Square ring 12.42 x 1.68 (5 pcs.) supplied in delivery packet
5 4 through mounting holes
6 Solenoid fixing nut (Nut torque 6 Nm)
7 Manual override

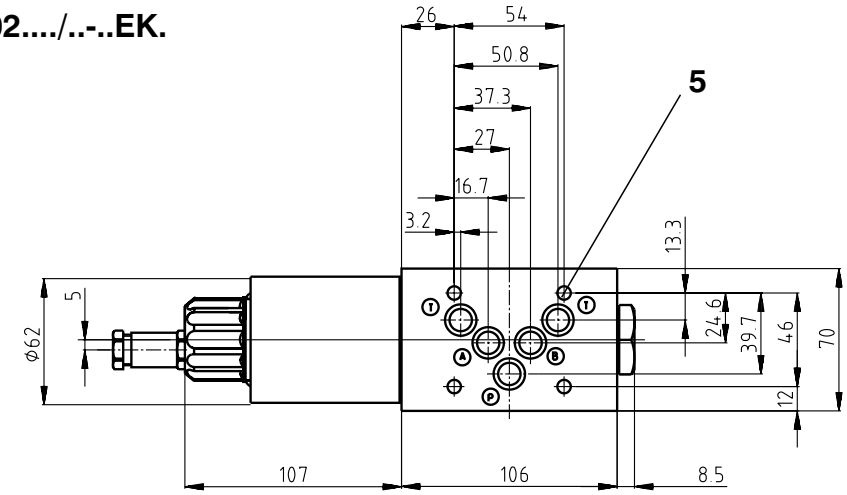


Required surface finish of interface.

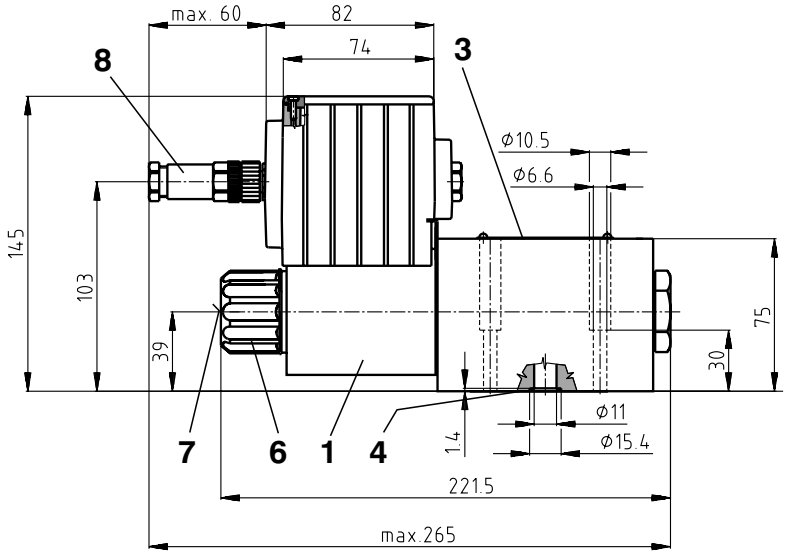
Valve Dimensions

Dimensions in millimetres

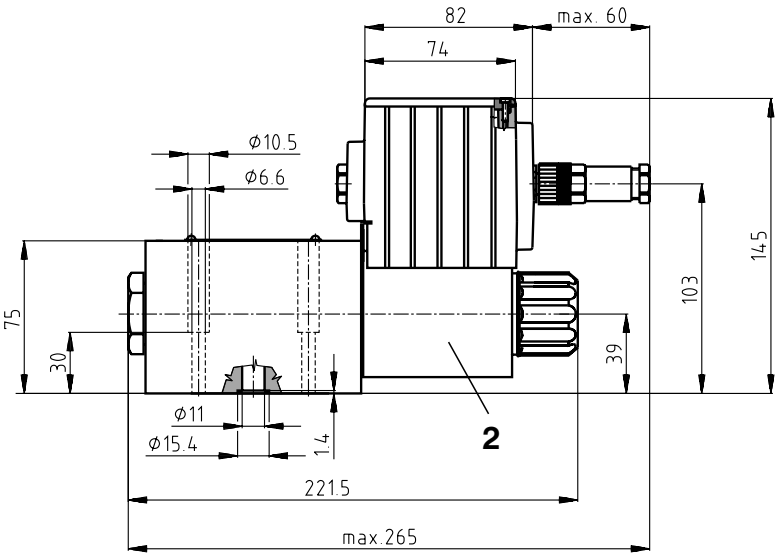
PRM2-102..../..-..EK.



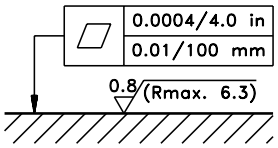
Functional symbols
2Z51, 2Y51



Functional symbols
2Z11, 2Y11



1 Solenoid a
2 Solenoid b
3 Name plate
4 Square ring 12.42 x 1.68 (5 pcs.) supplied in delivery packet
5 4 through mounting holes
6 Solenoid fixing nut (Nut torque 6 Nm)
7 Manual override
8 4- pin connector M12 x 1 for external supply voltage

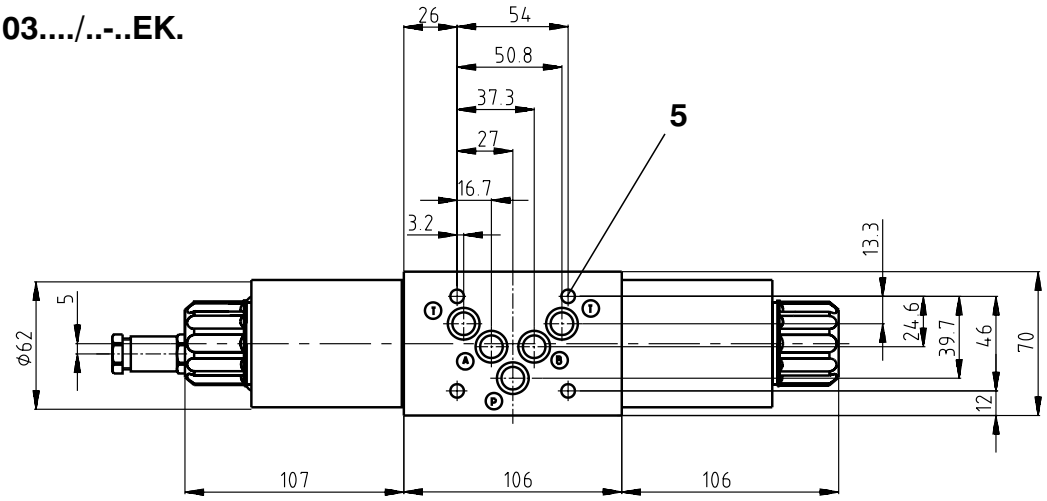


Required surface finish of interface.

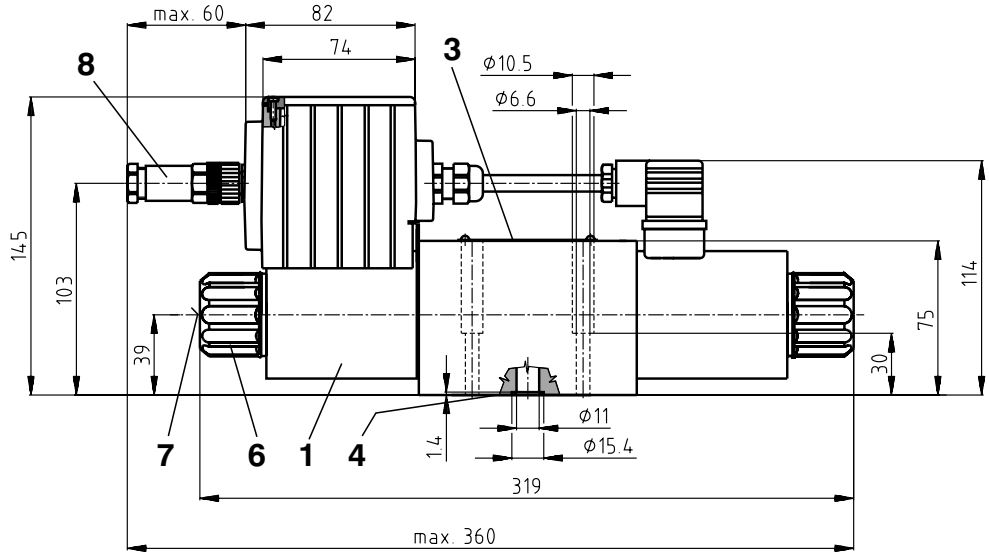
Valve Dimensions

Dimensions in millimetres

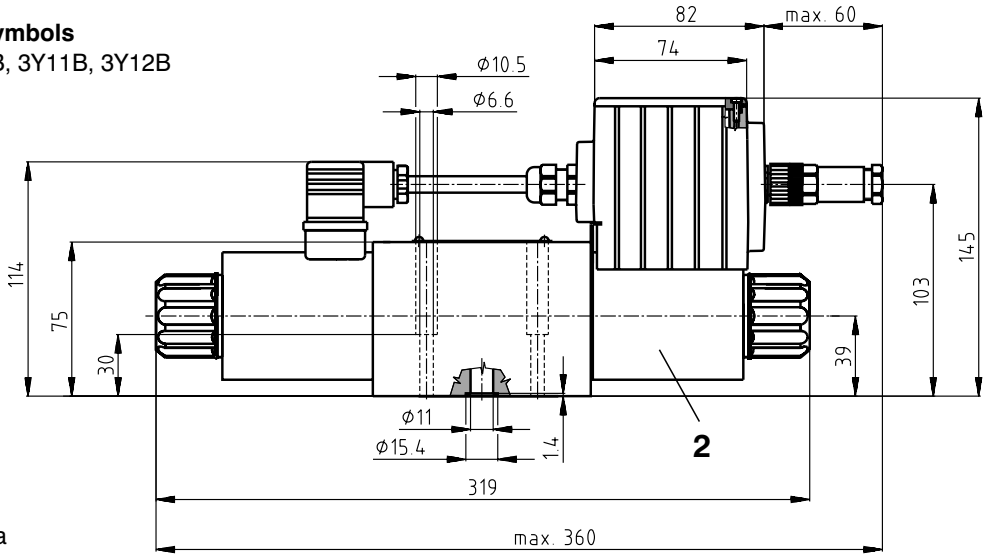
PRM2-103..../..-..EK.



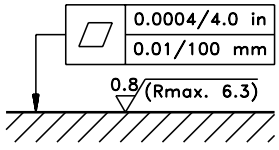
Functional symbols
3Z11, 3Z12, 3Y11, 3Y12



Functional symbols
3Z11B, 3Z12B, 3Y11B, 3Y12B



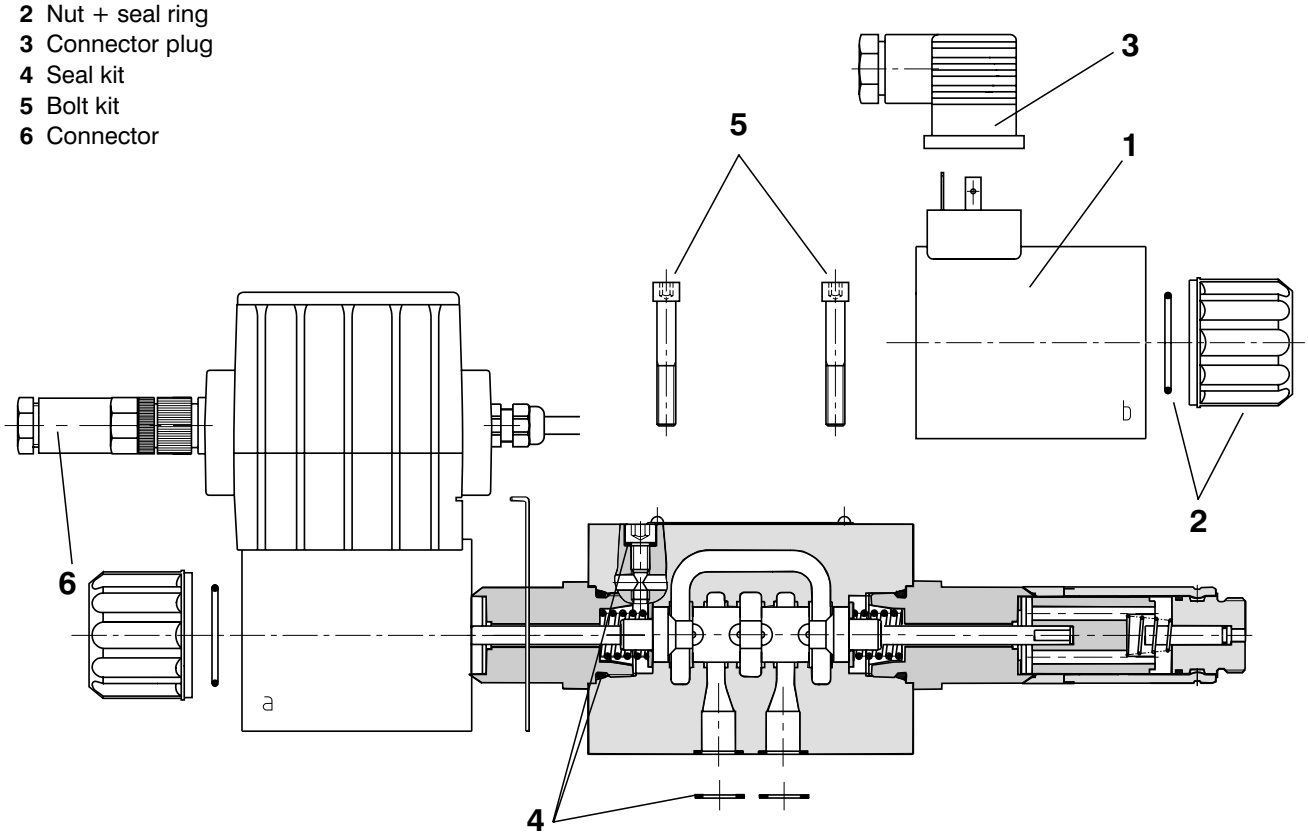
1 Solenoid a
2 Solenoid b
3 Name plate
4 Square ring 12.42 x 1.68 (5 pcs.) supplied in delivery packet
5 4 through mounting holes
6 Solenoid fixing nut (Nut torque 6 Nm)
7 Manual override
8 4- pin connector M12 x 1 for external supply voltage



Required surface finish of interface.

Spare Parts

1 Solenoid coil
2 Nut + seal ring
3 Connector plug
4 Seal kit
5 Bolt kit
6 Connector



1. Solenoid coil

Nominal supply voltage [V]	Ordering number
12	936-4614
24	936-4629

2. Solenoid retaining nut + seal ring

Model of the nut	Seal ring	Ordering number
Standard nut	30 x 2	485-9963

3. Connector plug to DIN 43 650

Type designation	Type	Maximum input voltage	Connector plug A gray	Connector plug B black
			Ordering number	
K5	without rectifier - M16x1.5 (bushing bore ∅ 4-6 mm)	230 V DC	936-9906	936-9905

4. Seal kit

Type	Dimensions, number			Ordering number
Standard - NBR 70	12.42 x 1.68 (5 pcs.)	23.81 x 2.62 (2 pcs.)	6.7 x 10 x 1(1 pc.)	485-9960
Viton	12.42 x 1.68 (5 pcs.)	23.81 x 2.62 (2 pcs.)	6.7 x 10 x 1(1 pc.)	485-9965

5. Bolt kit

Dimensions, number	Tightening torque	Ordering number
M6 x 40 DIN 912-10.9 (4 pcs.)	14 Nm	485-9964

6. Connector	Ordering number
M12 x 1 (4-pin connector)	358358904012

Caution!

- The packing foil is recyclable.
- The protective plate can be returned to manufacturer.
- Mounting bolts M6 x 40 DIN 912-10.9 or studs must be ordered separately.
  Tightening torque of the bolts is 14 Nm.

ARGO-HYTOS a. s. CZ - 543 15 Vrchlabí
Tel.: +420-499-403111, Fax: +420-499-403421
E-mail: sales.cz@argo-hytos.com
www.argo-hytos.com

Proportional directional control valves with position sensor

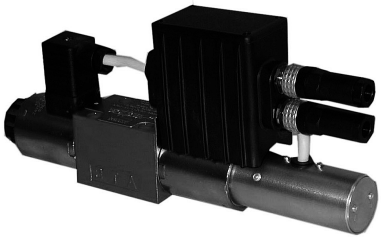
PRM4-06

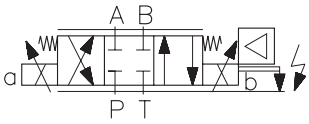
Size 06 • p_{max} up to 320 bar • Q_{max} up to 40 L/min

HA 5107
1/2002

Replaces
HA 5107 6/2001

- ❑ **Compact design**
- ❑ **Operated by proportional solenoids**
- ❑ **High sensitivity and slight hysteresis**
- ❑ **Installation dimensions to DIN 24 340-A6, ISO 4401 and CETOP - RP 121H**



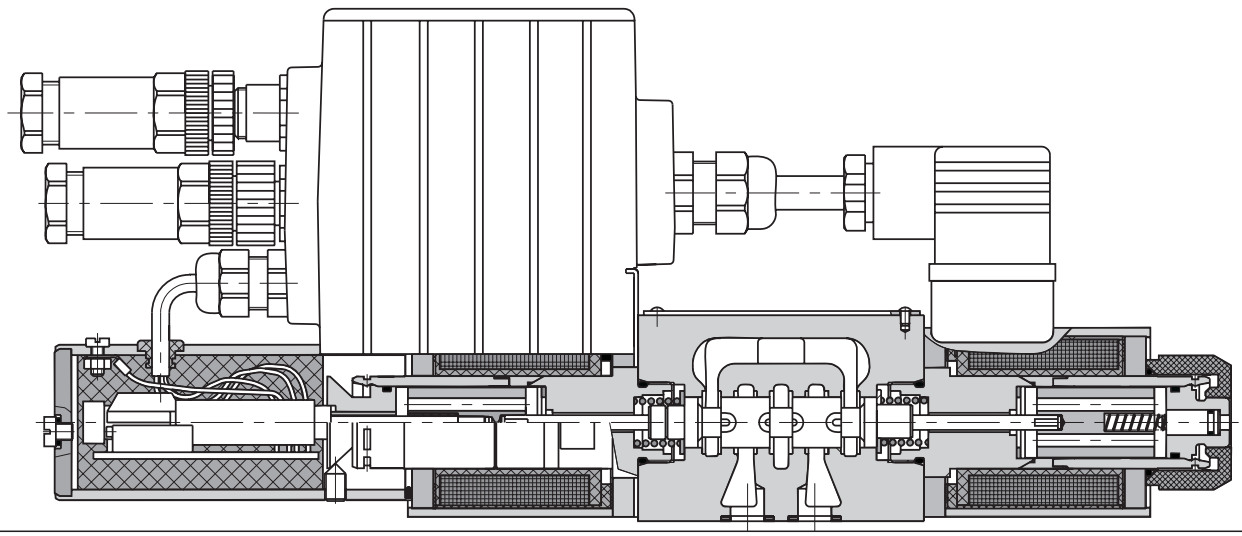


Functional Description

The proportional directional valve PRM4 consists of a cast iron housing, a special control spool, two centering springs with supporting washers, one or two proportional solenoids, a position sensor or, if need be, of a control box with digital electronics.
The measuring system of the position sensor consists of a differential transformer with core and from the evaluating electronic unit realized in hybrid technique.
With the model without integrated electronic unit, the electric connection of the solenoids is realized by the connector plug to DIN 43 650, with the position sensor output being connected by the G4W1F connector plug. Both connectors are supplied.
The proportional valve with the integrated electronic unit comprises an electronic control box that is mounted, together with the position sensor, on either of the solenoids. The connection of the position sensor with the control box is provided by a cable. With the model with two solenoids, the solenoid mounted opposite the control box is connected with the control box by means of a DIN 43 650 connector. The connection of the supply voltage, control signal, program input and external output of the position sensor is realized by a 5-pin connector (ELKA 5012). The connection of the external feedback is provided by a 5-pin connector, which also has three supply voltages +24 V, +10V and -5V for an external sensor available. The solenoid coils, including the control box, can be turned in a range of ± 90°.

The digital control unit enables the proportional valve to be controlled on the basis of data required from two feedback circuits. In this case the proportional valve can be used as follows:
1. Proportional directional valve
2. Only with the internal feedback from the spool position sensor.
3. Only with the external feedback (pressure sensor, position sensor, etc.).
4. With internal and external feedback.

The digital control unit utilizes the pulse-with-modulation (PWM) and supplies the solenoids with current proportional to the control signal. The supply current is additionally modulated with a dither frequency. The individual functional parameters are adjusted through software by means of a special programmer, or by means of a computer through the RS 232 interface. The correct function of the digital control unit is signaled by a green LED. The incorrect function (failure) is indicated by a red LED.
As a standard, the proportional valve is delivered with factory setting.
The model including also an external feedback shall be consulted with the manufacturer.
With the basic surface treatment, the valve housing is phosphate coated, whereas the surfaces of the solenoids are zinc coated.

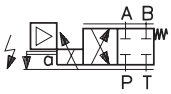
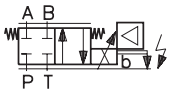
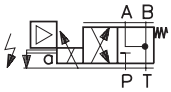
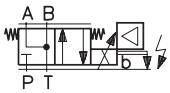
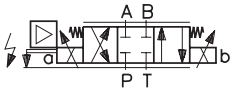
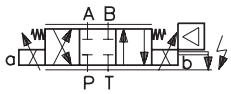
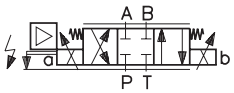
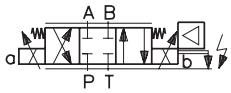
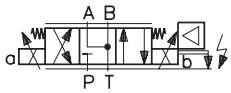
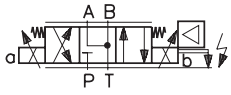


Ordering Code

PRM4-06 □ / □ - □ □ □

Proportional directional control valve with position sensor

Nominal size **06**

	**2Z51**
	**2Z11**
	**2Y51**
	**2Y11**
	**3Z11**
	**3Z11B**
	**3Z12** $\frac{q_A}{q_B} = \frac{1}{2}$*
	**3Z12B** $\frac{q_A}{q_B} = \frac{1}{2}$*
	**3Y11**
	**3Y11B**
	**3Y12** $\frac{q_A}{q_B} = \frac{1}{2}$*
	**3Y12B** $\frac{q_A}{q_B} = \frac{1}{2}$*

Seals

without designation	NBR
V	FPM (Viton)

Model

S01	position sensor with voltage outlet
S02	position sensor with current outlet
E01	proportional directional valve without feedback
E02S01	proportional directional valve with position feedback
E03	proportional directional valve with external feedback
E04S01	proportional directional valve with position and external feedback

On model E, the position sensor without connector is always at the control box side. The model without the el. box is equipped with connector.

Nominal solenoid supply voltage

12	supply voltage 12V DC (valid without integrated electronic unit with position sensor with voltage outlet)
24	supply voltage 24 V DC

Nominal flow rate at Δp = 10 bar

15	flow 15 L/min
30	flow 30 L/min

***** Model for cylinders with asymmetric piston rod, piston area ratio 1:2

Technical Data

Nominal size	mm	06
Max. operating pressure at ports P, A, B	bar	320
Max. operating pressure at port T	bar	210
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP - RP 91H in viscosity classes ISO VG 32, 46 a 68.
Fluid temperature range (NBR/Viton)	°C	-30 ... +80 / -20 ... +80
Ambient temperature max.	°C	up to +50
Viscosity range	mm^2/s	20 ... 400
Maximum degree of fluid contamination		Class 21/18/15 to ISO 4406 (1999).
Nominal flow at Δp = 10 bar	L/min	15 30
Hysteresis - open loop	%	< 6
Hysteresis - closed position loop	%	< 0.5
Weight - PRM4-062 - PRM4-063	kg	2.2 2.7
Mounting position		optional
Enclosure type		IP65
Vibrations		Oscillation, sinusoidal to IEC 68-2-6 Impact test to IEC 68-2-27
Interference immunity		Burst on leads to EN 61000-4-4 HF radiation received to EN 61000-4-3 HF feeding on leads to EN 61000-4-6 ESD to EN 61000-4-2
Radiated interference		Lead related emission to EN 55011 Radiated emission to EN 55011

Technical Data of Position Sensor - voltage outlet

Operating pressure	bar	max. 320, static
Electric connection		electrical connector G4W1F Hirschmann *
Contact assignment		1 - operating voltage 2 - output signal 3 - ground 4 - not used
Enclosure type to DIN 40050		IP 65
Measured distance	mm	8
Operating voltage	V	9.6 ...30 DC
Linearity error	%	< 1
Current consumption at load current of 2 mA	mA	< 15
Output voltage	V	0 ... 5
Output signal range used: 0 Position 1 solenoid - displacement 2,8 mm 2 solenoids - displacement ±2,8 mm	V	 2.5 0.75 - 2.5 0.75 - 4.25
Max. load current	mA	2
Noise voltage - at load current 0 - at load current of 2 mA	mV_{p-p}	 < 20 < 15
Additional output signal error at: Temperature change between 0 ... 80 °C Between 0 ... -25 °C		 typical < 0.2% / 10K max. 0.5% / 10K max. 0.5% / 10K
Load change from 0 to 2 mA	%	0.1
Input voltage change from 9.6 V to 14.4 V from 14.4 V to 30 V	%	 < 0.1 < 0.25
Long-term drift (30 days)	%	< 0.25
Cut-off frequency 3 dB fall in amplitude Frequency 90°	Hz	 > 600 > 600

* Only for S01 and S02 model.

Technical Data of Position Sensor - current outlet

Linearity	%	< 1
Operating pressure	bar	to 320, static
Electrical connection		electrical connector G4W1F Hirschmann *
Contact assigment		1 - operating voltage 2 - output signal 3 - ground 4 - not used
Enclosure type to DIN 40050		IP 65
Operatin voltage	V	20 ... 30 DC
Current	mA	< 35
Output signal range	mA	5 ... 19
Output signal range used: 0 position 1 solenoid - stroke (Hub 2,8 mm) 2 solenoid - stroke (Hub ±2,8 mm)	mA	 12 6.6 ... 12 6.6 ... 17.6
Additional output signal error: - at temperature change from +10 ... 55 °C - at imjpedance change from 50% - at input voltage change in the range of operating voltage		 0.2% / 10K ≤ 0.1% ≤ 0.05%
Impedance	Ω	≤ 500
Output signal ripple	mA R.M.S.	≤ 0,02
Limit frequency at 3 dB amplitude decrease	Hz	≥ 800

* Only for S01 and S02 model.

Technical Data of Proportional Solenoid

Type of coil	V	12 DC	24 DC
Limiting current	A	2.4	1.0
Resistance at 20 °C	Ω	2.3	13.4

Electronics data

Supply voltage with polarity inversion protection	V	24 DC ±20% (residual ripple < 5%)
Input: control point		±10V, 0 ... 10V, ±10mA, 4 ...20mA, 0 ... 20mA
Input: actual value (valve spool position)		0 ... 5V
Input: actual value (external feedback)		0 ... 10V, 2 ... 10V, 4 ... 20mA, 0 ... 20mA
Output: solenoids		2 PWM output stages up to max. 2.5 A
PWM frequency	kHz	13
Controller cycle time	ms	1.3
Adjustment of parameters		By means of a manual programmer or a PC - Company software (RS232)

Accessories

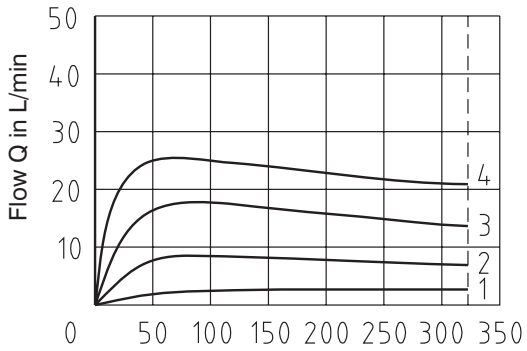
Order number	Content
566-9510	Connecting cable to PC, CD-ROM with software and guidebook
566-9525	Hand programmer, connecting cable to programmer, CD-ROM with software and guidebook
566-9540	Hand programmer
566-9550	Connecting cable to PC
566-9555	Connecting cable to hand programmer

Limit Power

Measured at $\nu = 35\ mm^2/s$ $P \rightarrow A / B \rightarrow T$ or $P \rightarrow B / A \rightarrow T$

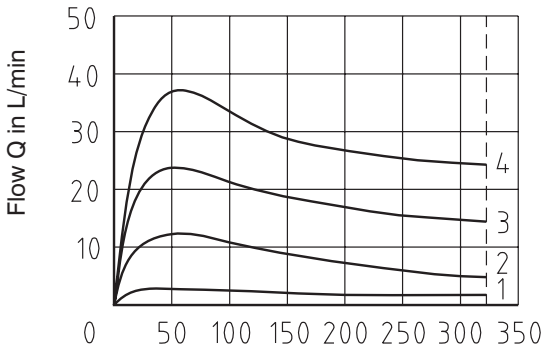
Only for E01 model

Nominal flow 15 L/min



Input pressure p_o in bar

Nominal flow 30 L/min



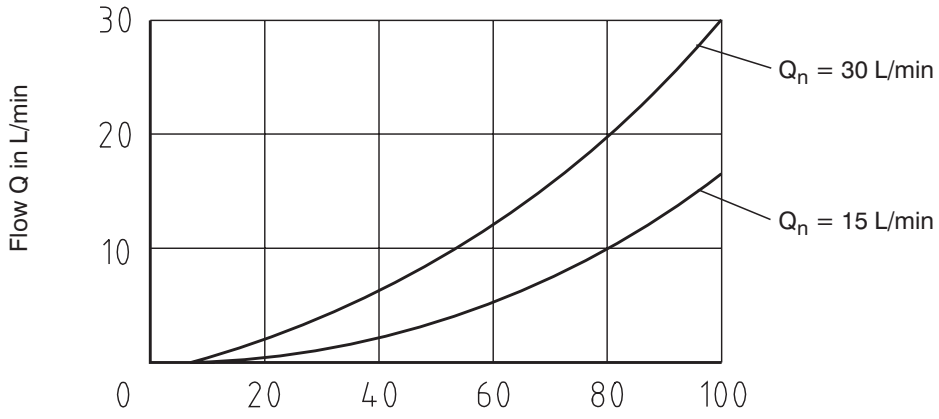
Input pressure p_o in bar

Solenoid current:
1 = 40 %
2 = 60 %
3 = 80 %
4 = 100 %

Flow Characteristics

Measured at input pressure $p_o = 10$ bar, $\nu = 35\ mm^2/s$

Only for E01 model



Control voltage u_x [%]

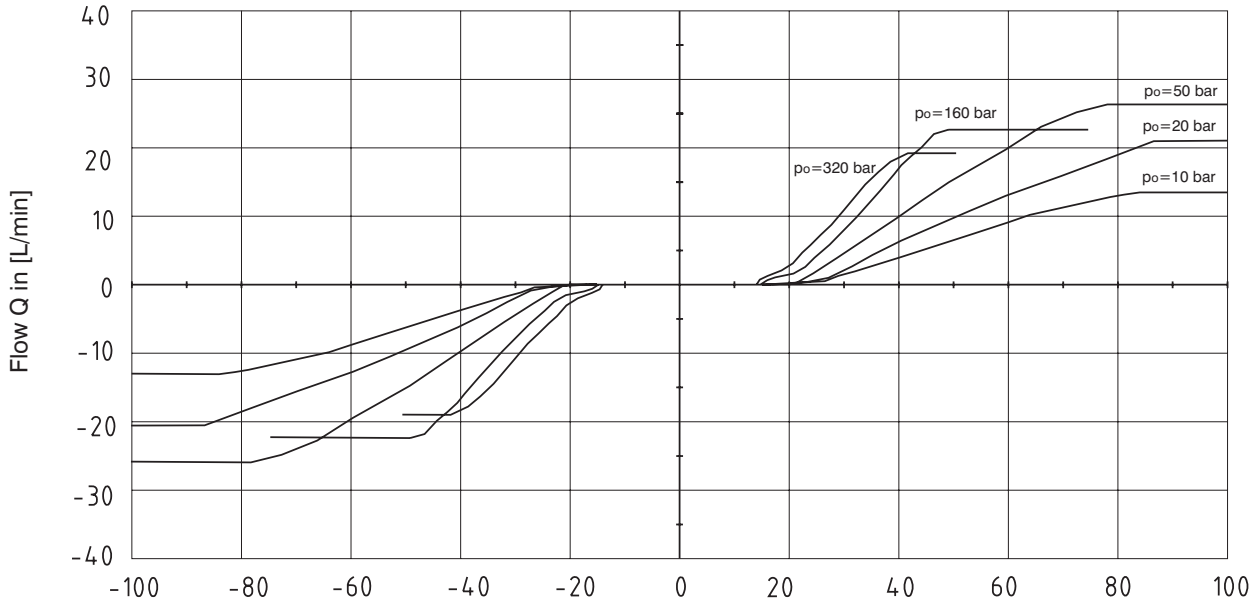
Flow Characteristics

Measured at $\nu = 35\ mm^2/s$ P → A / B → T or P → B / A → T

p_o - input pressure

Only for E02S01 model

Q_n = 15 L/min



Control voltage u_x [%]

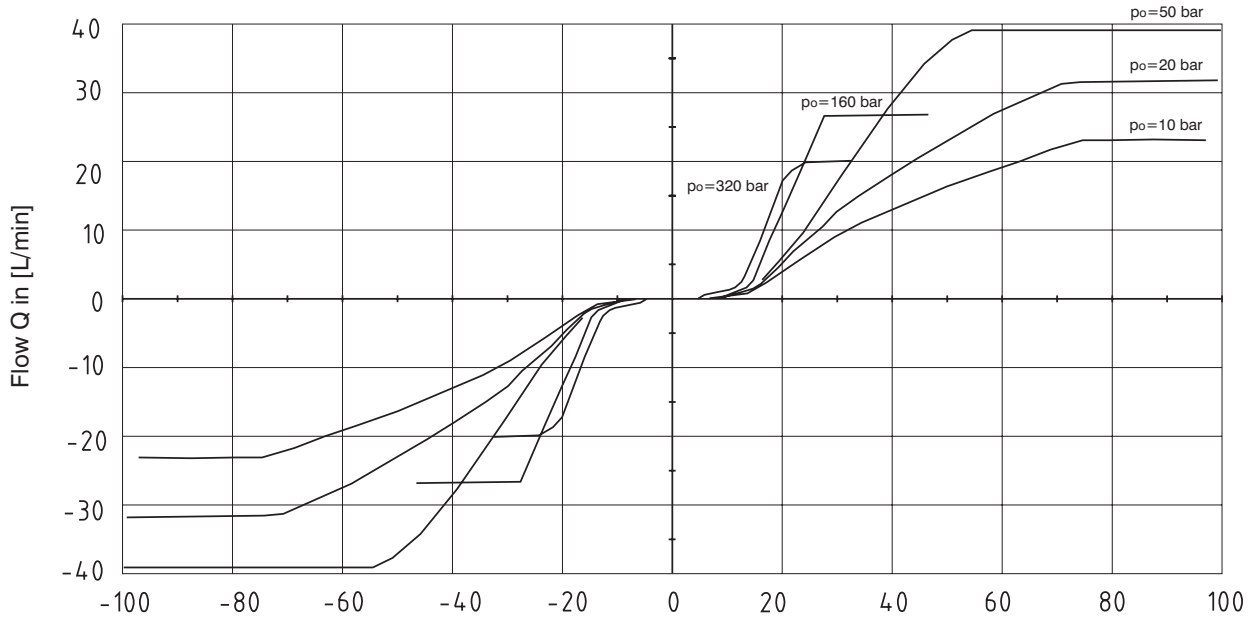
Flow Characteristics

Measured at $\nu = 35\ mm^2/s$ P → A / B → T or P → B / A → T

Only for E02S01 model

p_o - input pressure

Q_n = 30 L/min

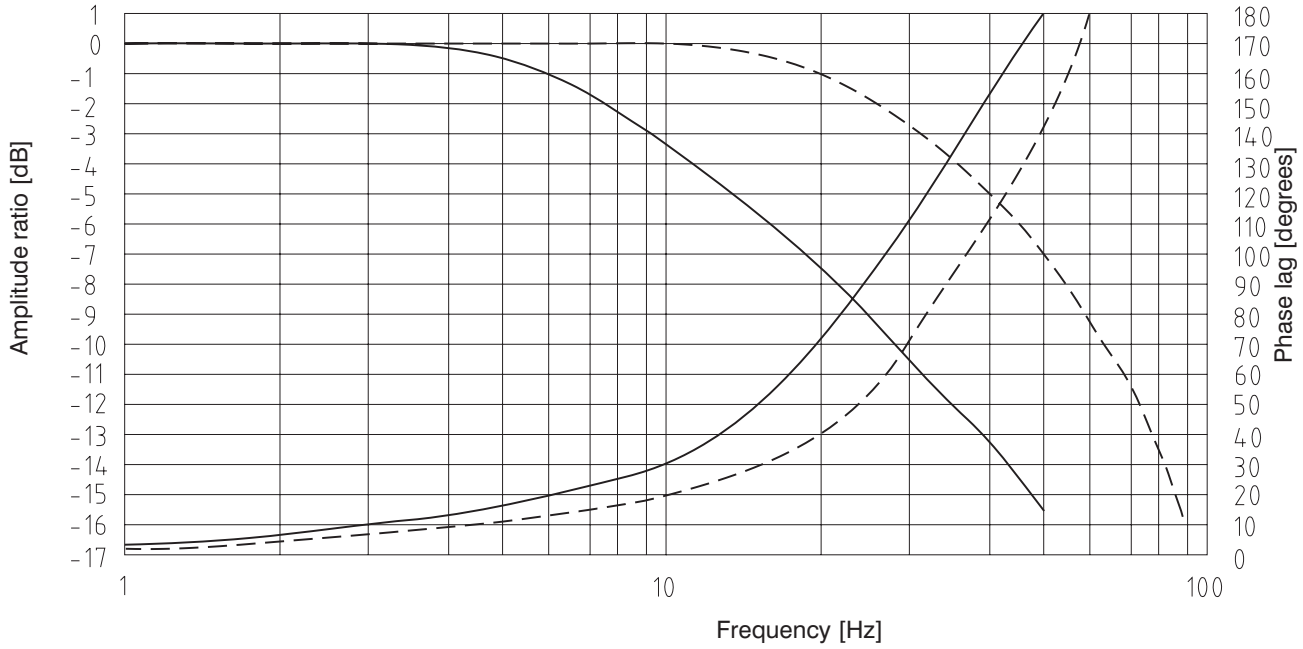


Control voltage u_x [%]

Frequency Reponse

closed position loop

------- signal 25%
—— signal 90%



Connector connection

Connector K1*

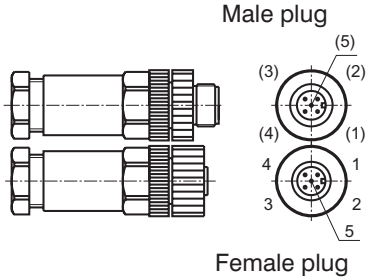
PIN	Technical data	Description
1	Power supply input	+24 V DC
2	Control	according to configuration
3	Ground	0 V
4	Programming	-
5	Output position sensor	0 ... 5 V

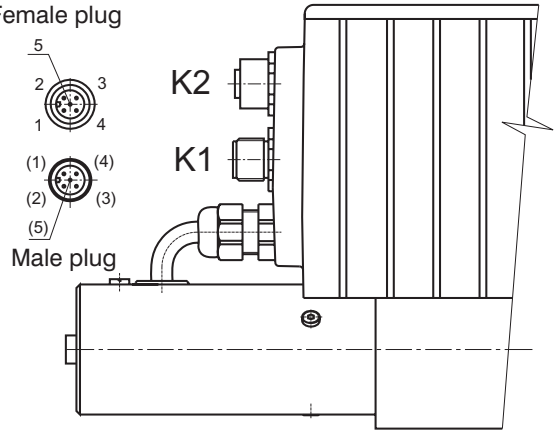
Connector K2 (Model E03 and E04S01)

PIN	Technical data	Description
1	Power supply output	+ 24 V DC/max.100mA
2	Input signal of external feedback	according to configuration
3	Ground	0 V
4	Power supply output	-5 V DC / max.15mA
5	Power supply output	+10 V DC / max.10mA

Manufactory valve configuration

Item	Model							
	E01		E02S01		E03		E04S01	
	1 Magnet	2 Magnet	1 Magnet	2 Magnet	1 Magnet	2 Magnet	1 Magnet	2 Magnet
Control signal	0...10 V	± 10 V	0...10 V	± 10 V	0...10 V	± 10 V	0...10V	± 10 V
Signal external feedback	-	-	-	-	0...10 V			
Output position sensor spool	-	-	0...5 V		-		0...5 V	



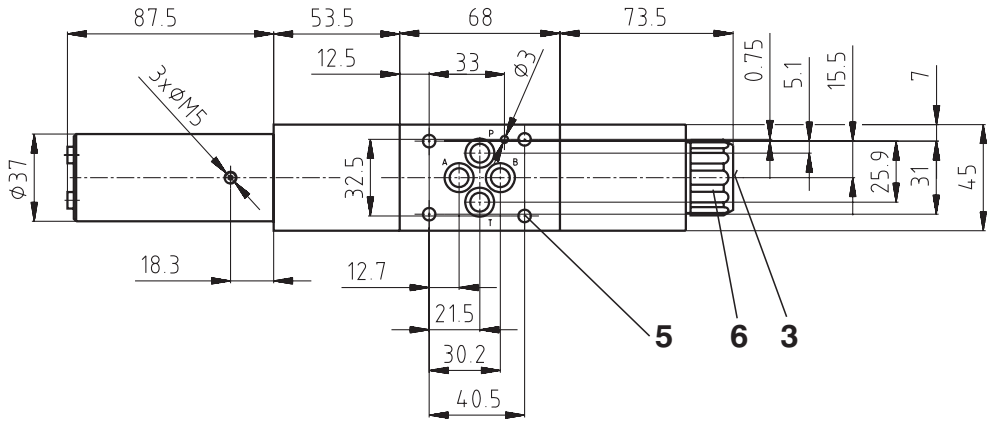


* For models E01 and E03 - 4 pole connector only (without pin No. 5 - outlet of position sensor)

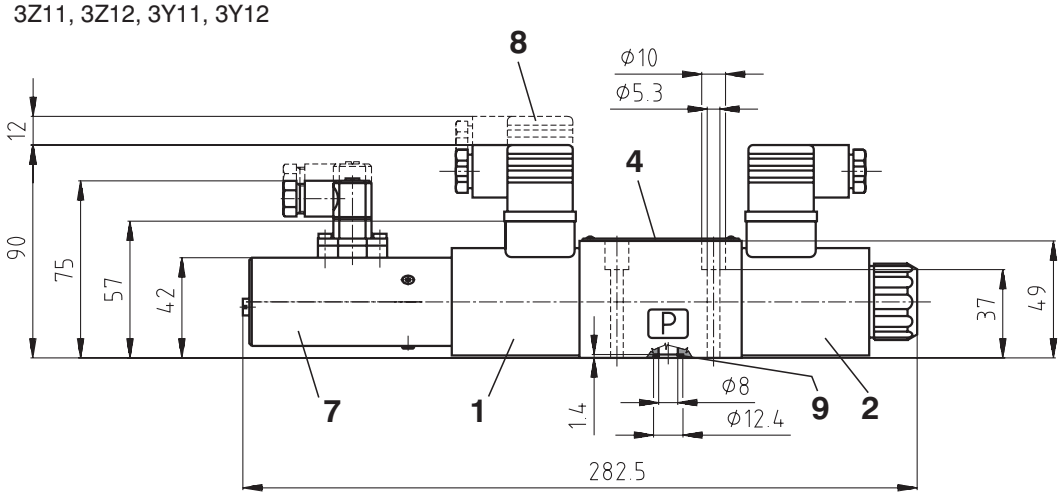
Valve Dimensions

Dimensions in millimetres

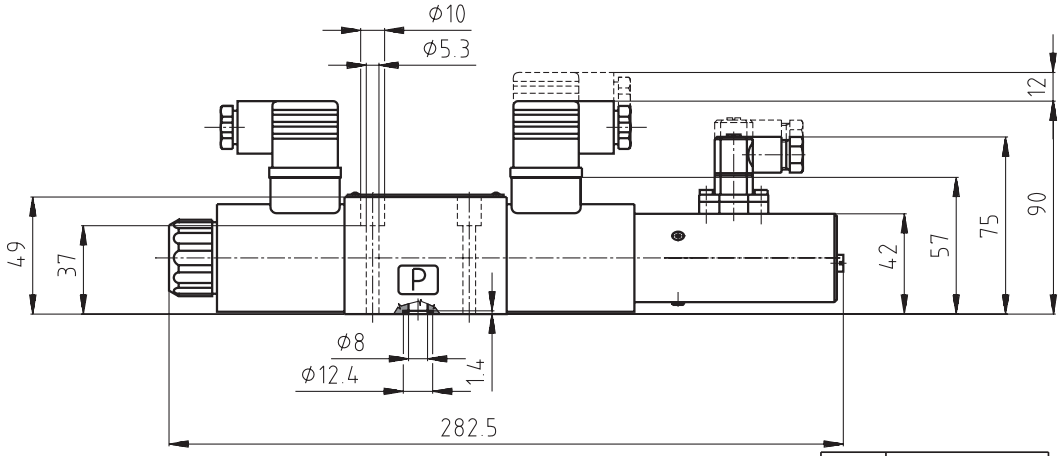
PRM4-063..../..-..S01
PRM4-063..../..-24S02



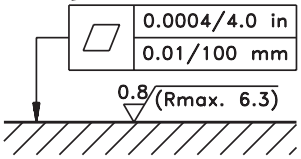
Functional symbols
3Z11, 3Z12, 3Y11, 3Y12



Functional symbols
3Z11B, 3Z12B, 3Y11B, 3Y12B



1 Solenoid a
2 Solenoid b
3 Manual overide
4 Name plate
5 4 mounting holes
6 Solenoid fixing nut
7 Position sensor
8 Space required to remove connector
9 Square ring 9.25 x 1.68 (4 pcs.), supplied in delivery packet

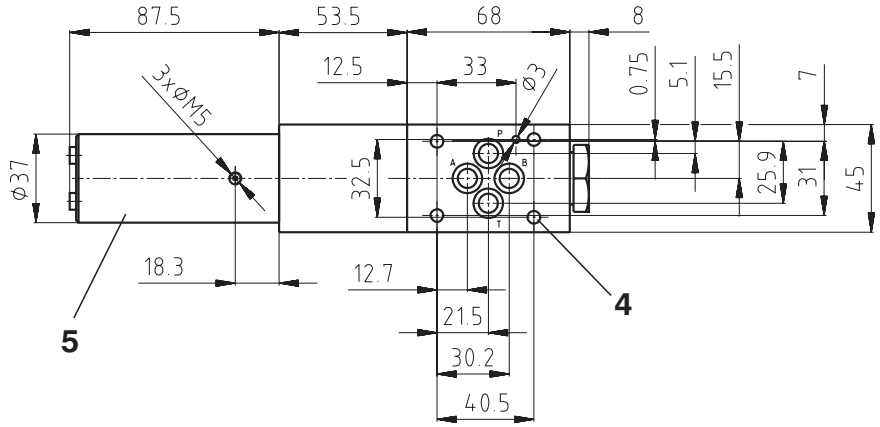


Required surface finish of interface

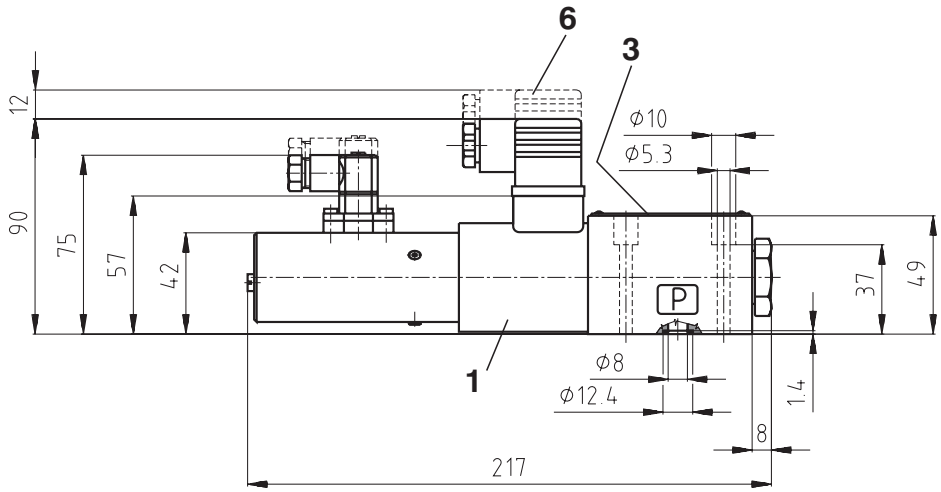
Valve Dimensions

Dimensions in millimetres

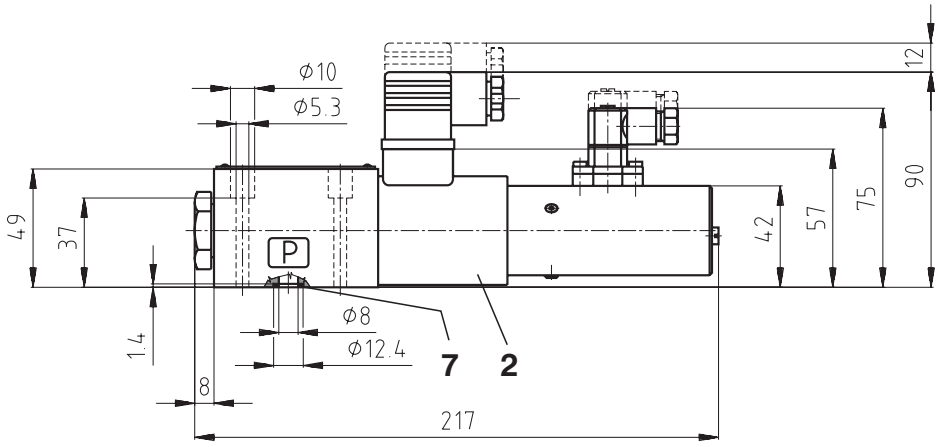
PRM4-062..../..-..S01
PRM4-062..../..-24S02



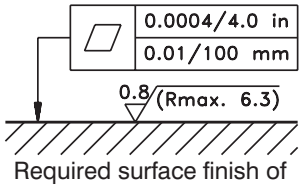
Functional symbols
2Z51, 2Y51



Functional symbols
2Z11, 2Y11



1 Solenoid a
2 Solenoid b
3 Name plate
4 4 mounting holes
5 Position sensor
6 Space required to remove connector
7 Square ring 9.25 x 1.68 (4 pcs.), supplied in delivery packet

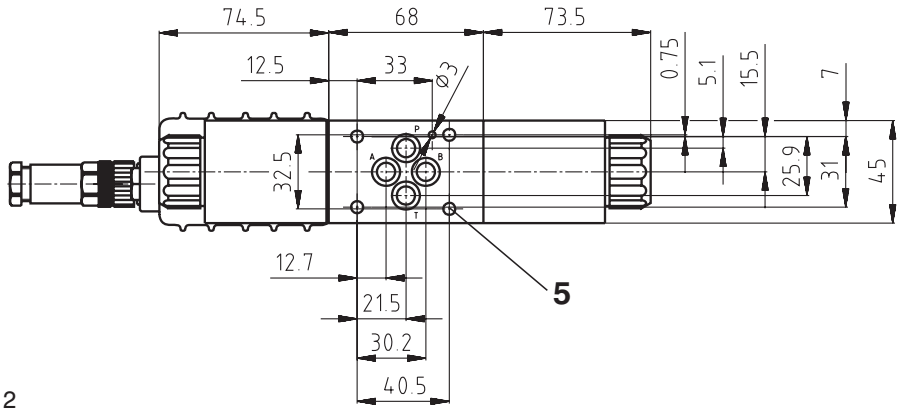


Required surface finish of interface

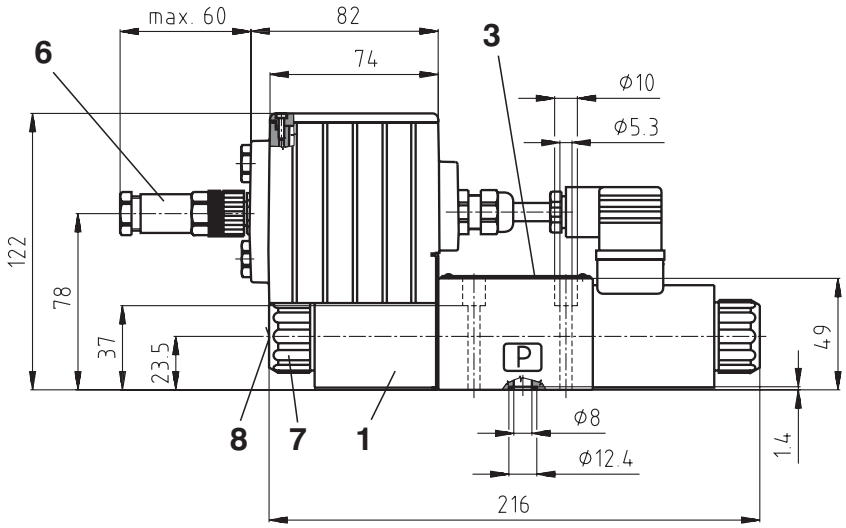
Valve Dimensions

Dimensions in millimetres

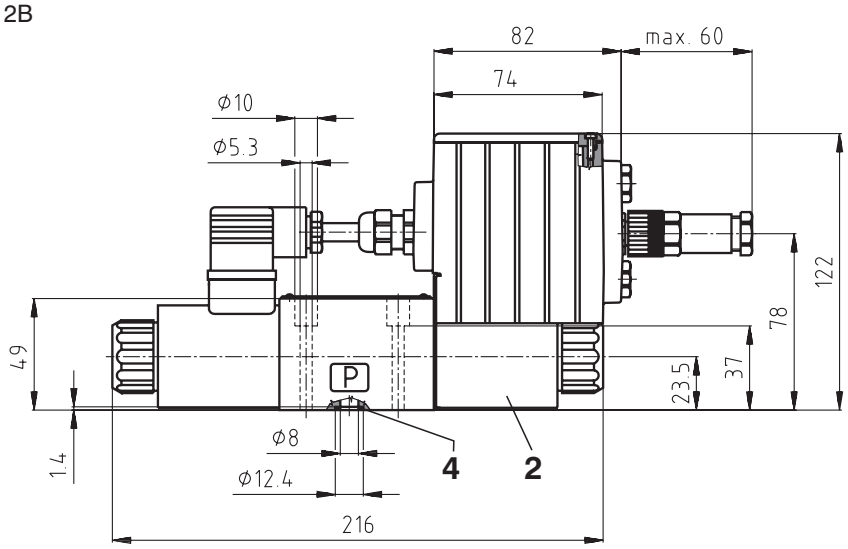
PRM4-063..../..-24E01



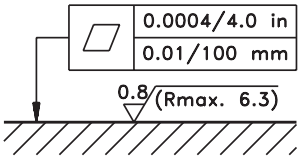
Functional symbols
3Z11, 3Z12, 3Y11, 3Y12



Functional symbols
3Z11B, 3Z12B, 3Y11B, 3Y12B



1 Solenoid a
2 Solenoid b
3 Name plate
4 Square ring 9.25 x 1.68 (4 pcs.), supplied in delivery packet
5 4 mounting holes
6 4-pin connector for supply voltage and control
7 Solenoid fixing nut
8 Manual override

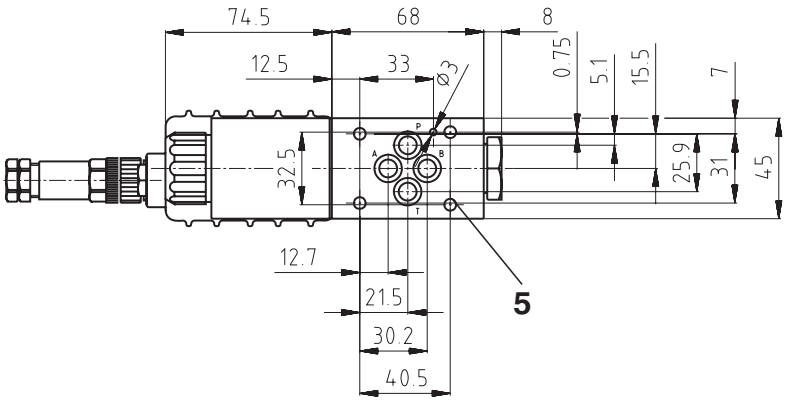


Required surface finish of interface

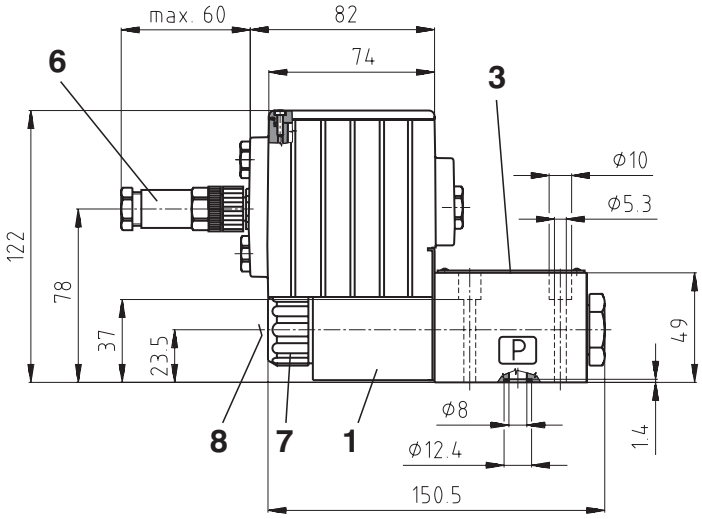
Valve Dimensions

Dimensions in millimetres

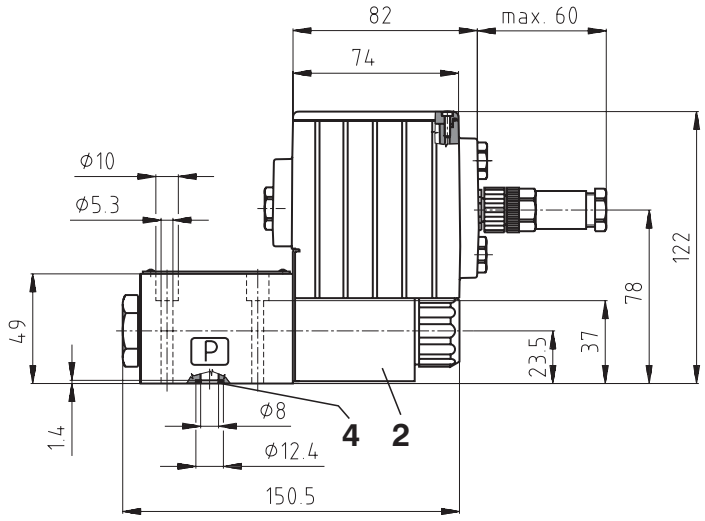
PRM4-062..../..-24E01



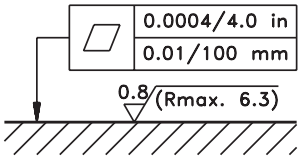
Functional symbols
2Z51, 2Y51



Functional symbols
2Z11, 2Y11



1 Solenoid a
2 Solenoid b
3 Name plate
4 Square ring 9.25 x 1.68 (4 pcs.), supplied in delivery packet
5 4 mounting holes
6 4-pin connector for supply voltage and control
7 Solenoid fixing nut
8 Manual override

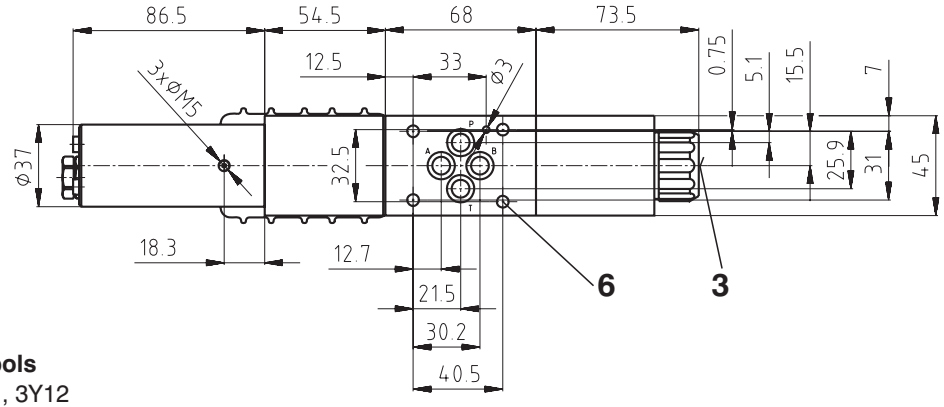


Required surface finish of interface

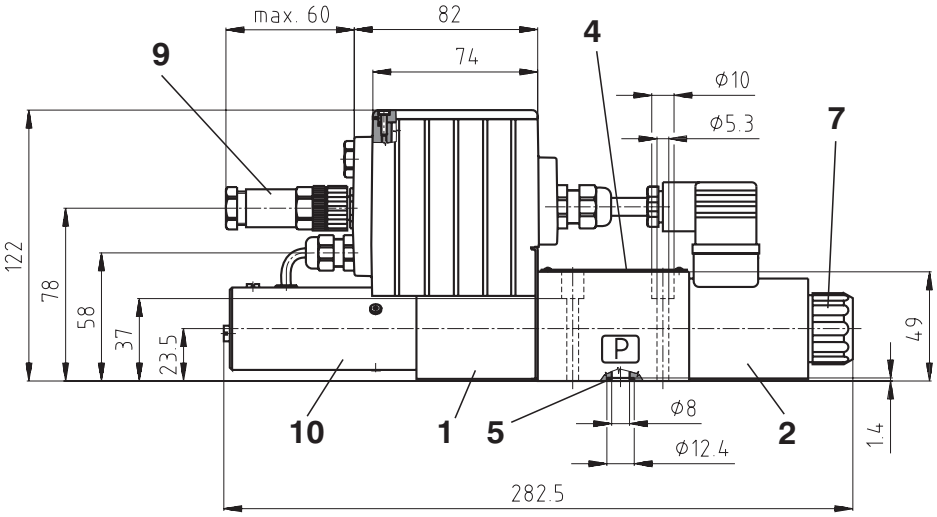
Valve Dimensions

Dimensions in millimetres

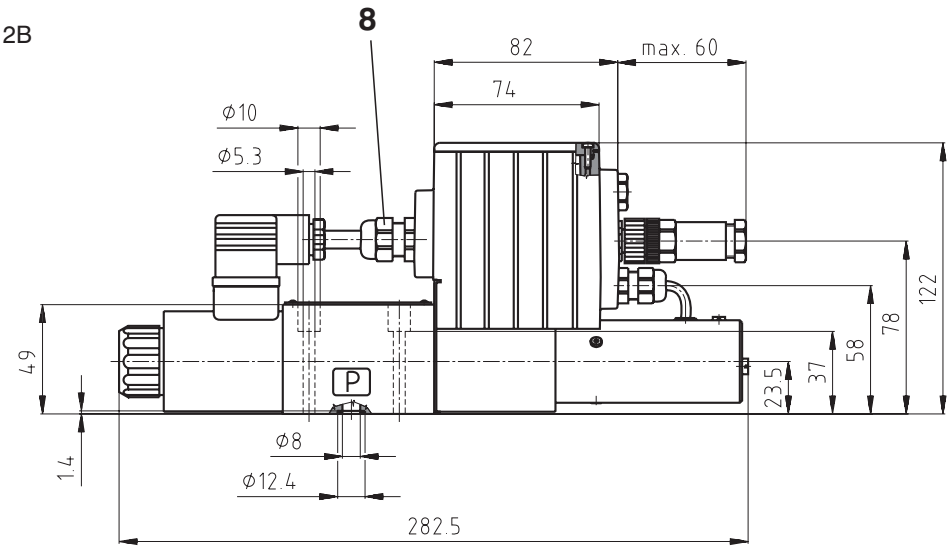
PRM4-063..../..-24E02S01



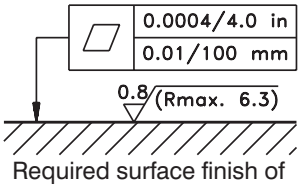
Functional symbols
3Z11, 3Z12, 3Y11, 3Y12



Functional symbols
3Z11B, 3Z12B, 3Y11B, 3Y12B



1 Solenoid a
2 Solenoid b
3 Manual override
4 Name plate
5 Square ring 9.25 x 1.68 (4 pcs.), supplied in delivery packet
6 4 mounting holes
7 Solenoid fixing nut
8 Pg9 bushing
9 5-pin connector for supply voltage and control
10 Position sensor

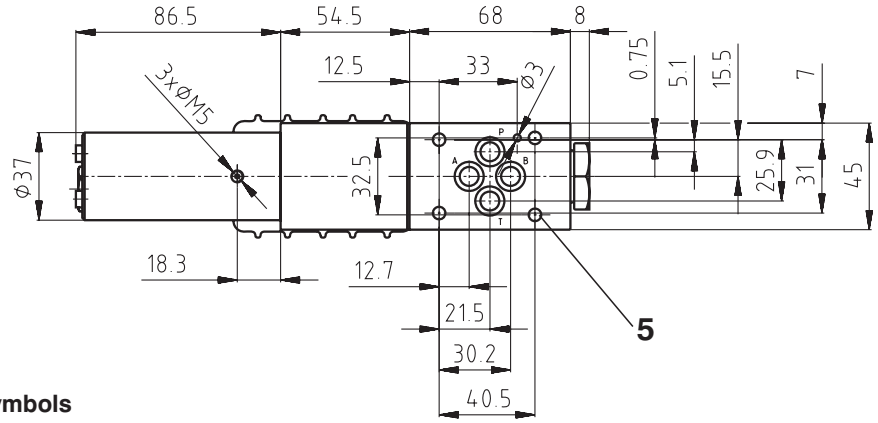


Required surface finish of interface

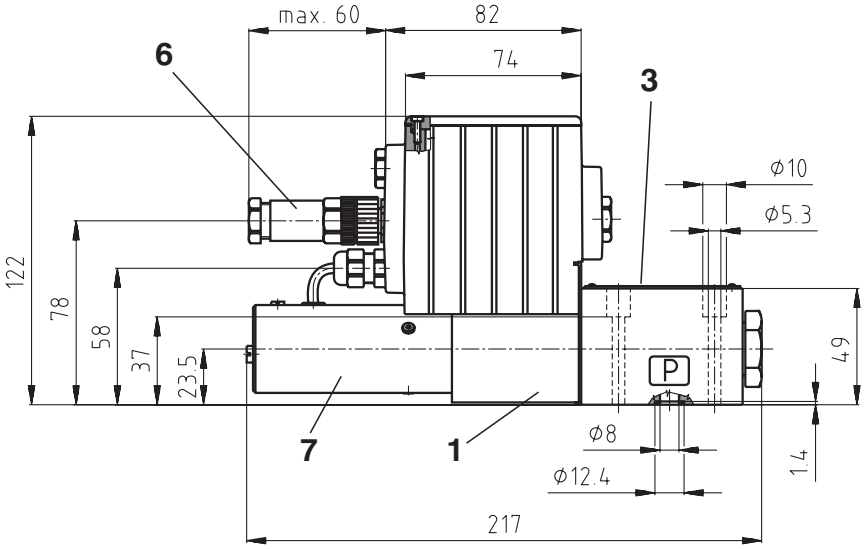
Valve Dimensions

Dimensions in millimetres

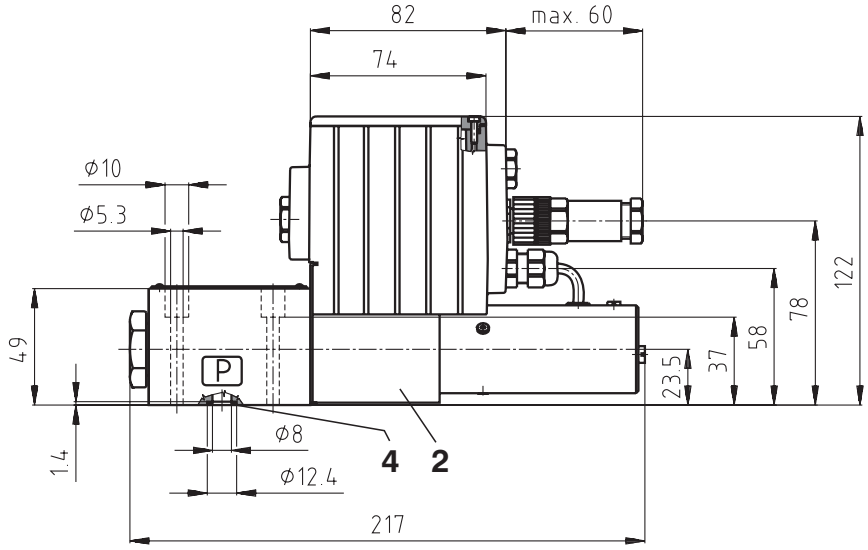
PRM4-062..../..-24E02S01



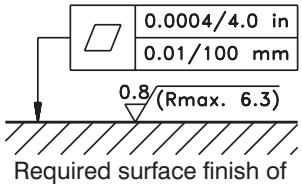
Functional symbols
2Z51, 2Y51



Functional symbols
2Z11, 2Y11



1 Solenoid a
2 Solenoid b
3 Name plate
4 Square ring 9.25 x 1.68 (4 pcs.), supplied in delivery packet
5 4 mounting holes
6 5-pin connector for supply voltage and control
7 Position sensor

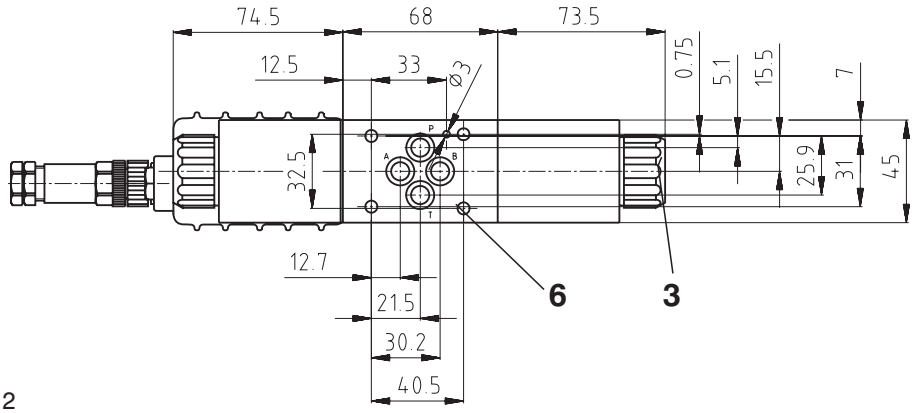


Required surface finish of interface

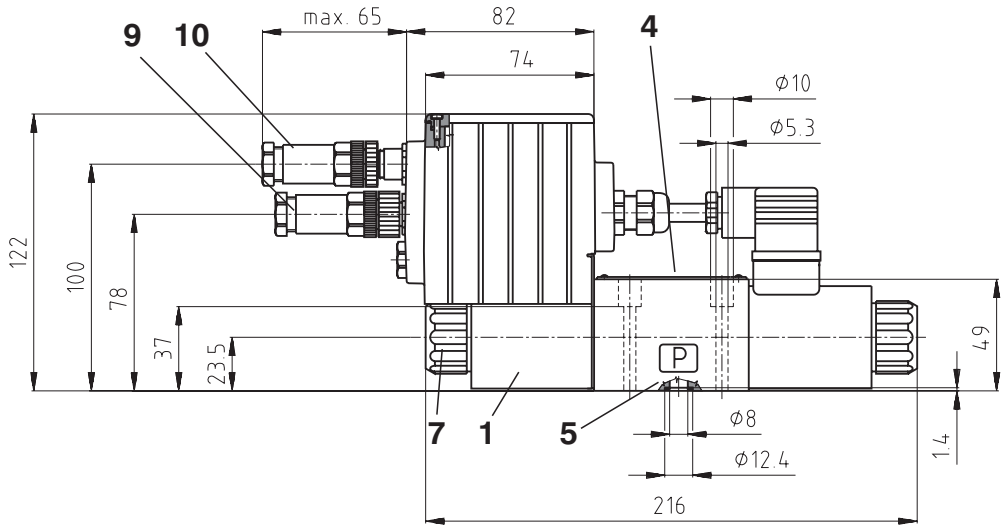
Valve Dimensions

Dimensions in millimetres

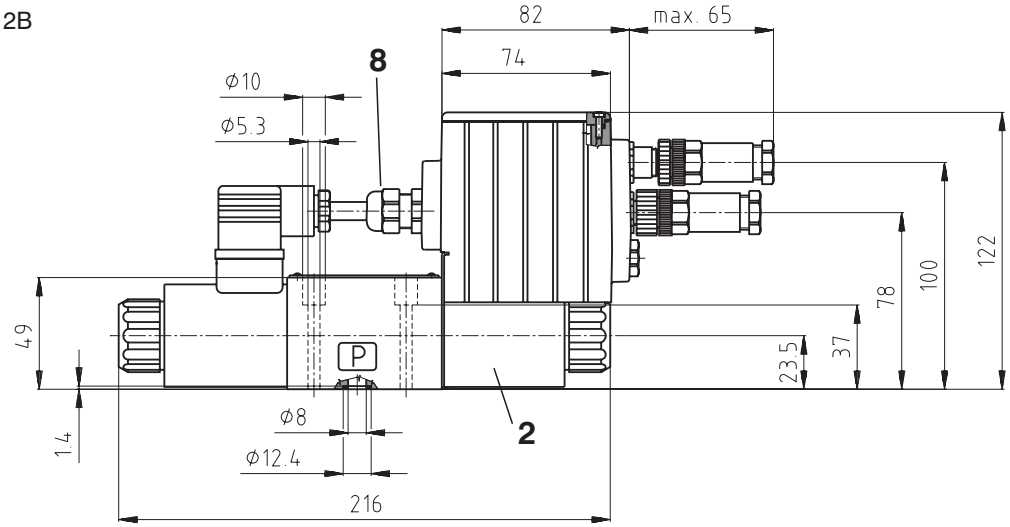
PRM4-063..../..-24E03



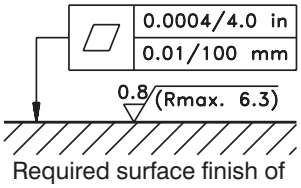
Functional symbols
3Z11, 3Z12, 3Y11, 3Y12



Functional symbols
3Z11B, 3Z12B, 3Y11B, 3Y12B



1 Solenoid a
2 Solenoid b
3 Manual override
4 Name plate
5 Square ring 9.25 x 1.68 (4 pcs.), supplied in delivery packet
6 4 mounting holes
7 Solenoid fixing nut
8 Pg9 bushing
9 4-pin connector for supply voltage and control
10 5-pin connector for input of external feedback

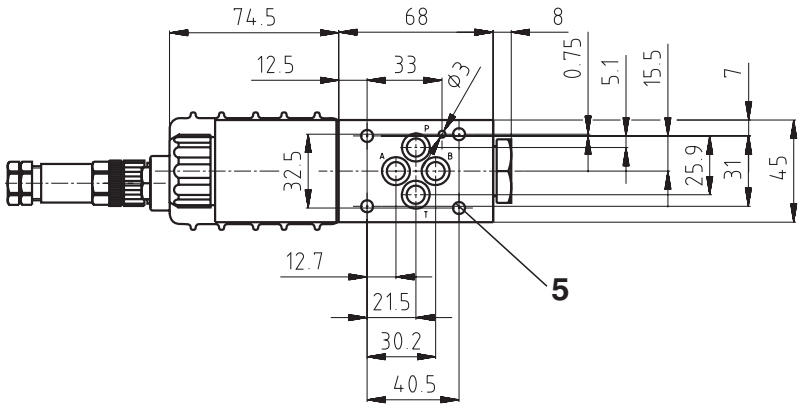


Required surface finish of interface

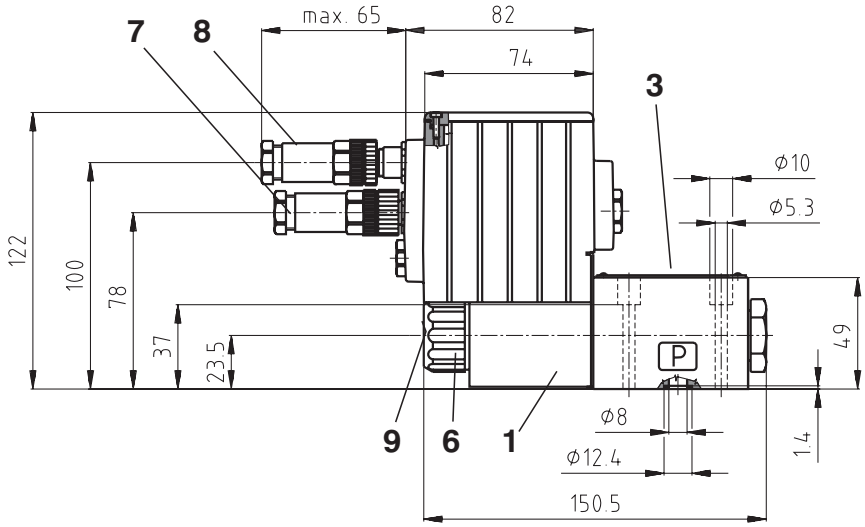
Valve Dimensions

Dimensions in millimetres

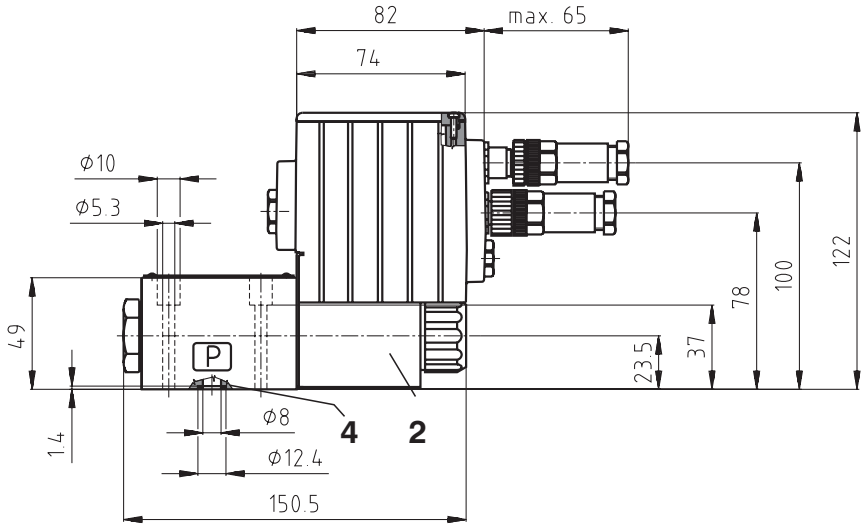
PRM4-062..../..-24E03



Functional symbols
2Z51, 2Y51



Functional symbols
2Z11, 2Y11



1 Solenoid a
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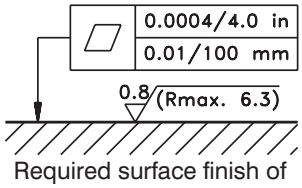
6 Solenoid fixing nut
7 4-pin connector for supply voltage and control
8 5-pin connector for input of external feedback
9 Manual override

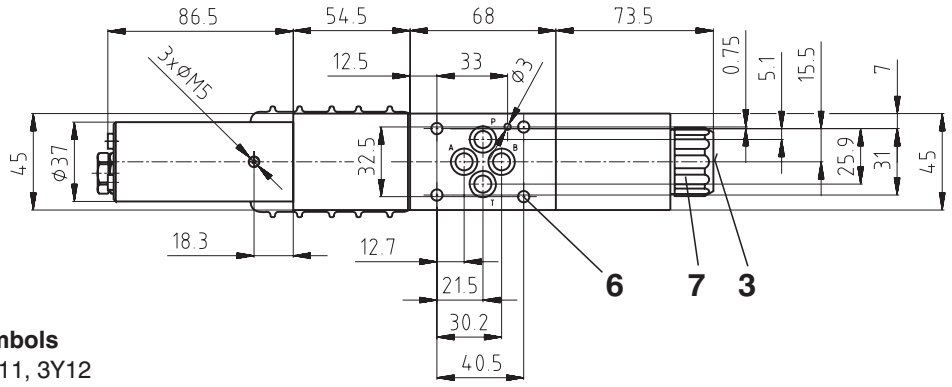


Required surface finish of interface

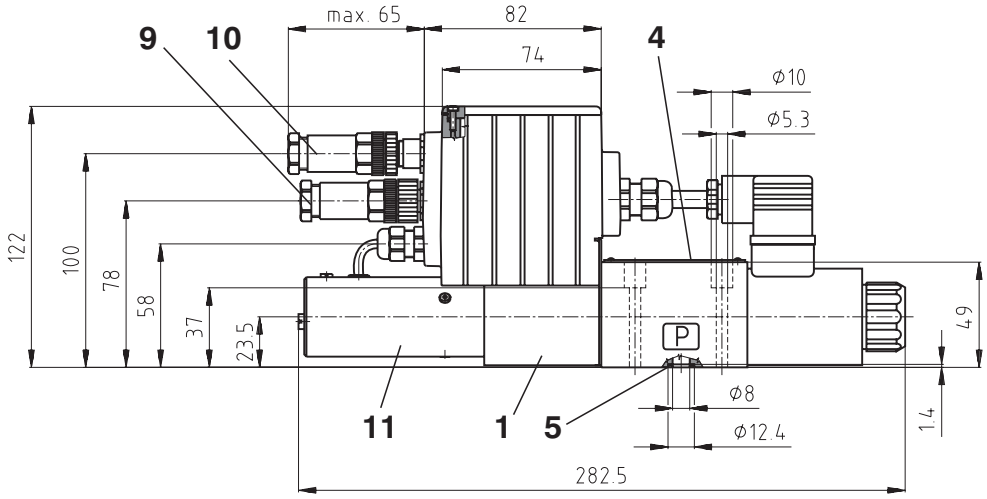
Valve Dimensions

Dimensions in millimetres

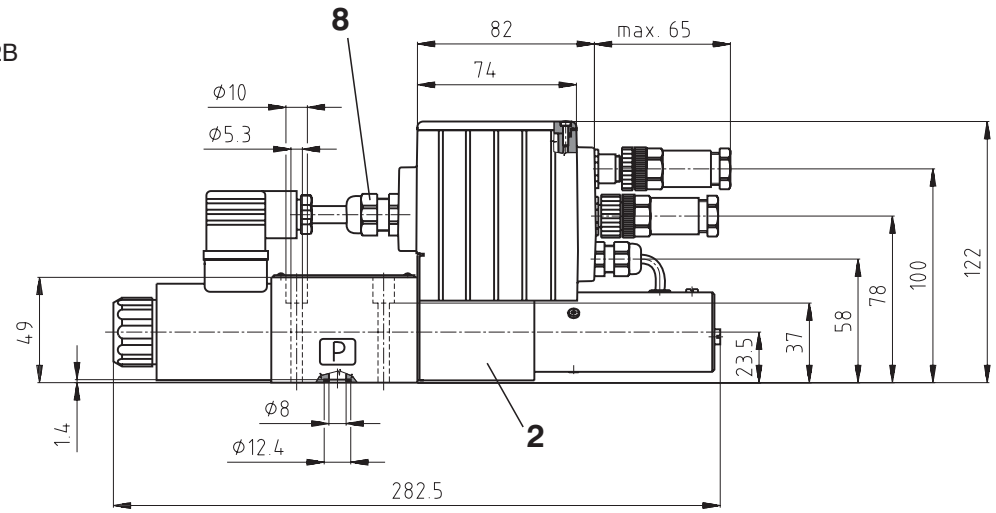
PRM4-063..../..-24E04S01



Functional symbols
3Z11, 3Z12, 3Y11, 3Y12



Functional symbols
3Z11B, 3Z12B, 3Y11B, 3Y12B



1 Solenoid a
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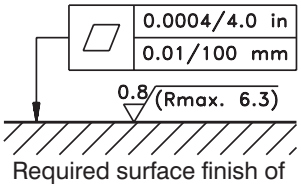
6 4 mounting holes
7 Solenoid fixing nut
8 Pg9 bushing
9 5-pin connector for supply voltage and control
10 5-pin connector for input of external feedback
11 Position sensor

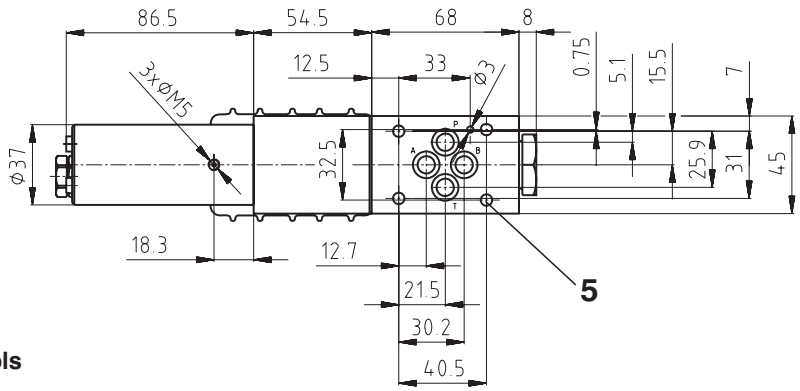


Required surface finish of interface

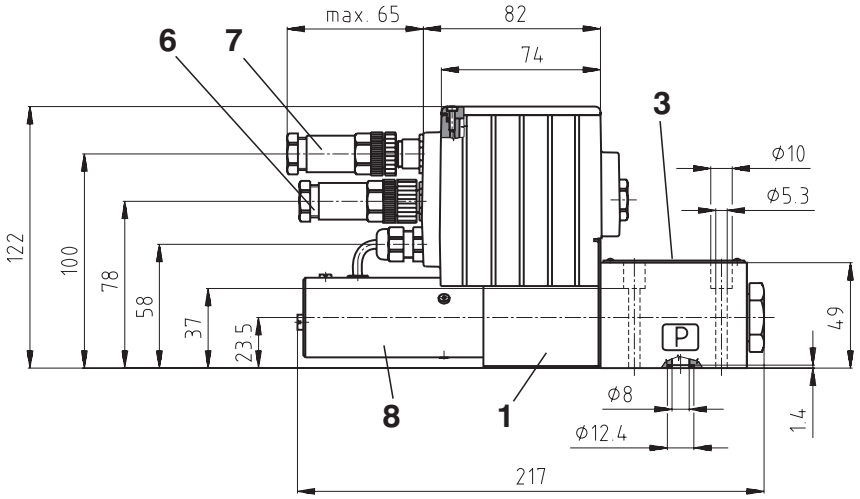
Valve Dimensions

Dimensions in millimetres

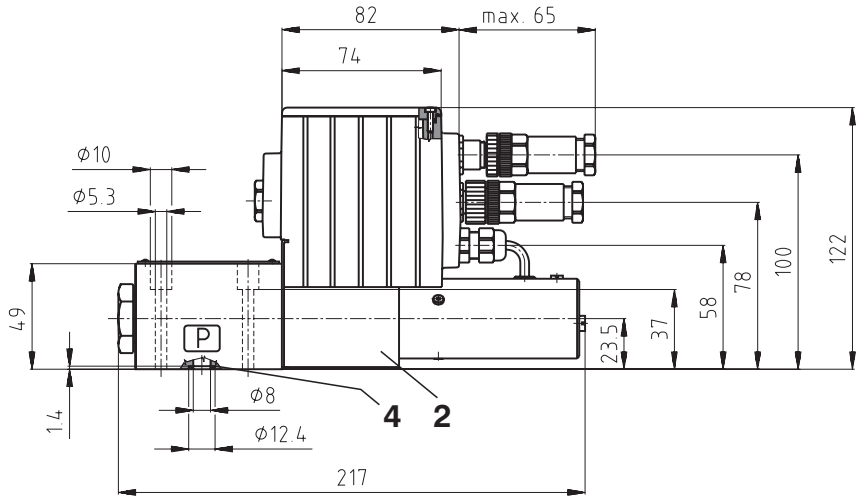
PRM4-062..../..-24E04S01



Functional symbols
2Z51, 2Y51



Functional symbols
2Z11, 2Y11



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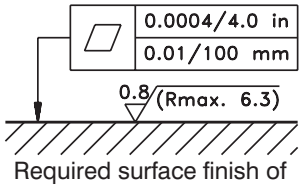
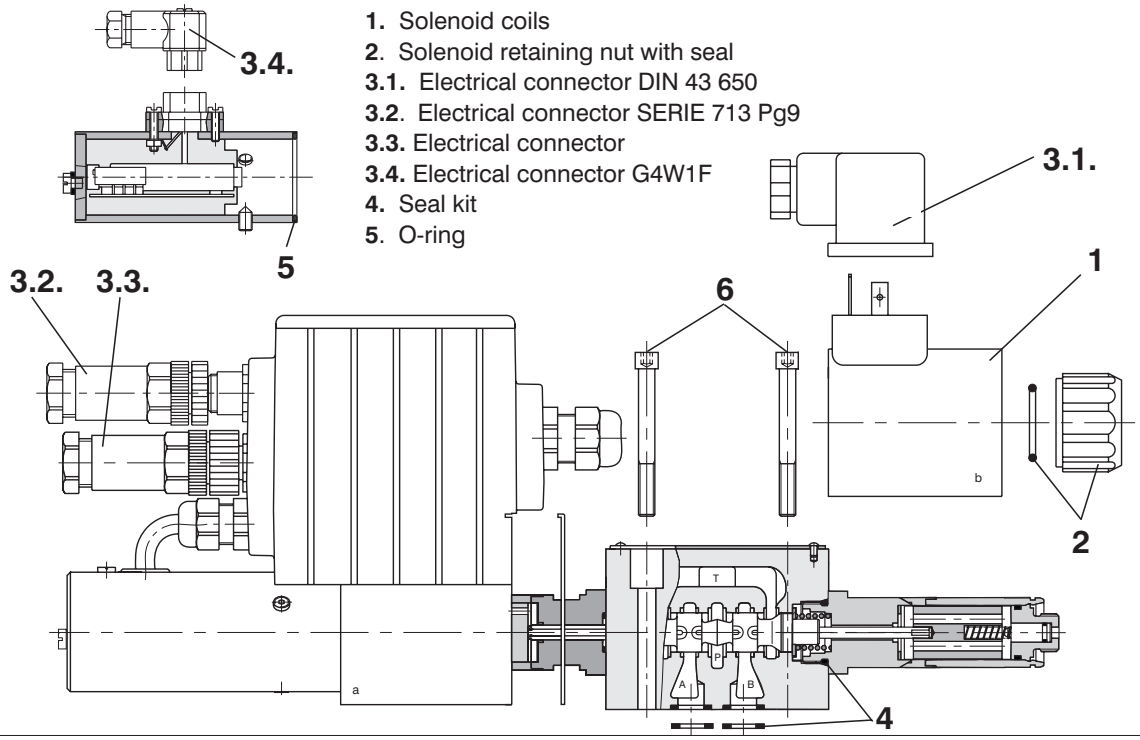
5 4 mounting holes
6 5-pin connector for supply voltage and control
7 5-pin connector for input of external feedback
8 Position sensor



Required surface finish of interface

Spare Parts



1. Solenoid coils
2. Solenoid retaining nut with seal
3.1. Electrical connector DIN 43 650
3.2. Electrical connector SERIE 713 Pg9
3.3. Electrical connector
3.4. Electrical connector G4W1F
4. Seal kit
5. O-ring

1. Solenoid coil

Solenoid type	Ordering number
01200	936-0061
02400	936-0067

2. Solenoid retaining nut with seal

Type of the nut	Seal ring	Ordering number
Standard nut	22 x 2	484-9951

3.1. Electrical connector DIN 43 650

Type designation	Type	Maximum input voltage	Connector A grey	Connector B black
			Ordering number	
K5	without rectifier - M16x1.5, (bushing bore ∅ 4-6 mm)	230 V DC	936-9906	936-9905

3.2. Electrical connector SERIE 713 Pg9

Ordering number	358359000002

3.3. Electrical connector

Valve model	Type of connector	Ordering number
E01, E03	ELKA 4012 Pg9	358358904012
E02S01, E04S01	ELKA 5012 Pg9	358358905012

3.4. Electrical connector G4W1F

Ordering number	358358932157

4. Seal kit

Type	Dimensions, number		Ordering number
Standard - NBR70	9.25 x 1.68 (4 pcs.)	17 x 1.8 (2 pcs.)	484-9961
Viton	9.25 x 1.78 (4 pcs.)	17.17 x 1.78 (2 pcs.)	484-9971

5. O-ring

Standard - NBR70	32 x 2 (1 pc.)	273111014140

6. Mounting bolts

Dimensions, number	Tightening torque	Ordering number
M5 x 45 DIN 912-10.9 (4 pcs.)	8.9 Nm	484-9958

Caution!

- The packing foil is recyclable.
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law.

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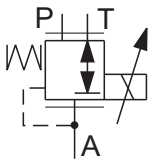
www.argo-hytos.com

Proportional Reducing Valves PVRM1-063/S

Size to (06) 1/4 · ... 50 bar (725 PSI) · ...20 L/min (5.29 US GPM)

HA 5108
01/2006

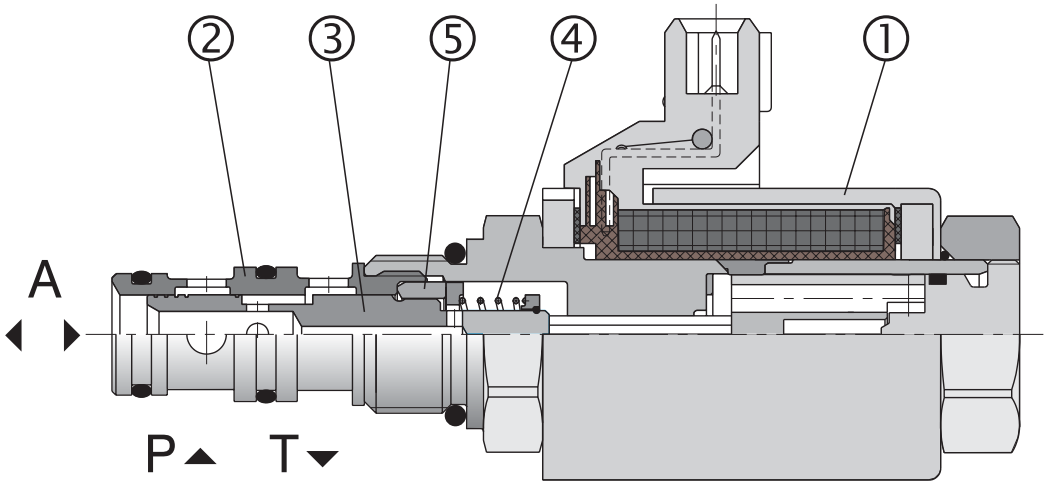
Replaces
HA 5108 4/99



- **Reducing valves suitable for mobile applications**
- **Compact design**
- **Installation dimensions to ISO 7789**

Functional Description

The reducing valve PVRM1 is a directly operated 3-way valve controlled by proportional solenoid (1). In the de-energized state, the spring (4) holds the control spool (3) in relation to the housing in such a position that the input pressure in port P is blocked, whereas the port A is connected with tank. The electric current through the solenoid shifts the spool and closes gradually the return port and opens the inlet to the output port A. The reduced pressure in port A brought to the solenoid room acts on the differential area of the spool, this being created by adapter (5). The solenoid pushes on the spool with a force, which is proportional to the current. Acting against this force is the force created by the reduced pressure acting on the differential area. In a balanced state, both the forces are equal. This arrangement ensures the proportional relation between the reduced pressure in port A and the control current. The basic surface treatment of the solenoid is blackened, other parts are zinc coated.



General Data

Design		spool valve
Mounting mode		screw-in cartridge M20 x 1.5
Mounting position		optional
Flow direction		see the symbol
Ambient temperature, max.	°C (°F)	-30 ...90 (-22 ...194), +100 °C (212 °F for a short term)

Solenoid Technical Data

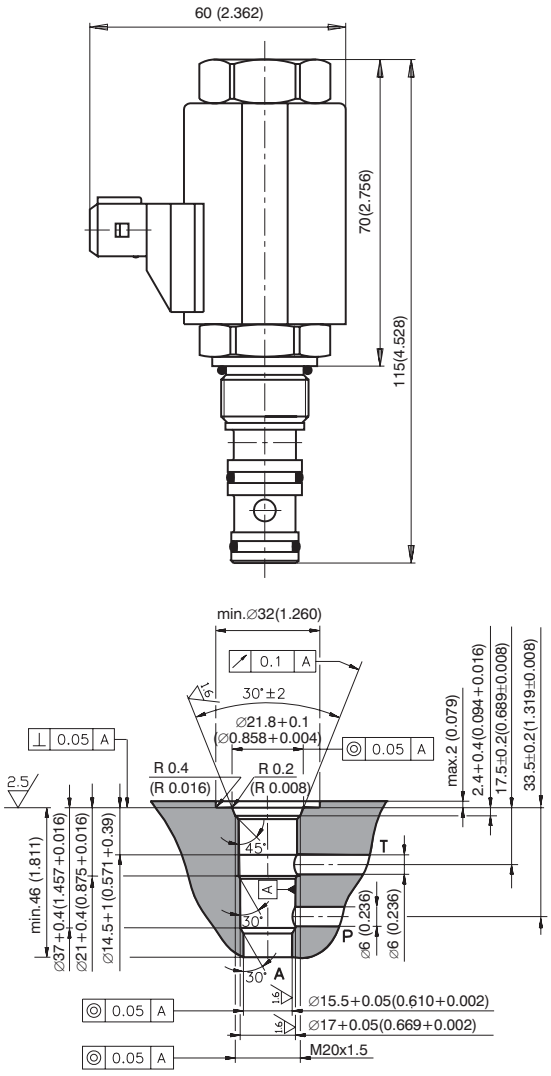
Supply voltage	V	12
Rated current	A	1
Rated resistance at 20 °C (68 °F)	Ω	7,1 ± 6. 5 %
Rated power	W	22
Duty cycle	%	100
Pressure tightness (dynamic)	bar (PSI)	50 (725.19)
Wire insulation class		200 from DIN IEC 60 085
Electric connection		2- poles AMP Junior-Timer
Enclosure type to DIN 40050		IP 65 EN 60 529
Control		PWM-signal 100 Hz
Quenching		BZW 06 P28B

Valve Technical Data

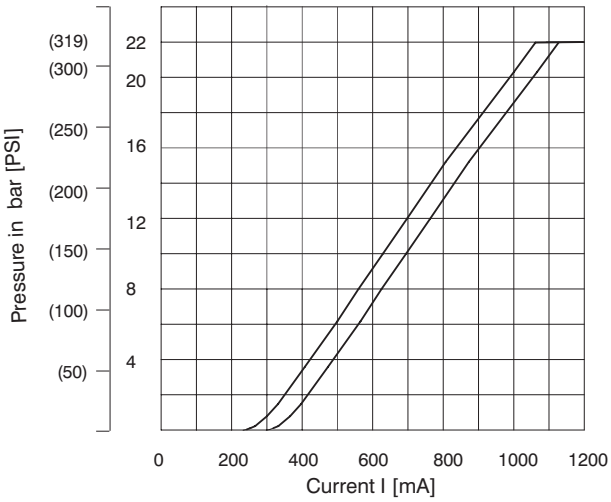
Max. input pressure	bar (PSI)	50 (725.19)
Operating pressure	bar (PSI)	20 (289.86)
Max. flow rate	L/min (US GPM)	20 (5.29)
Hydraulic fluid		Mineral oil (HM, HV) to CETOP-RP 91H and ISO VG 32,46, 68
Viscosity range	mm^2/s (SUS)	10 … 800 (61.45 … 3680)
Fluid temperature range	°C (°F)	-30 ...90 (-22 ...194), +100 °C (212 °F for a short term)
Maximum degree of fluid contamination		Class 21/18/15 to ISO 4406 (1999)
Response time at 100 % signal	ms	< 50

Valve Dimensions

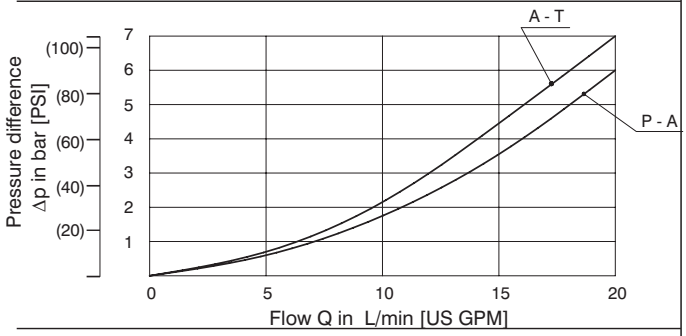
Dimensions in mm (inches)



p-I Characteristics



p-Q Characteristics



Caution!

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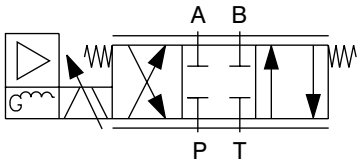
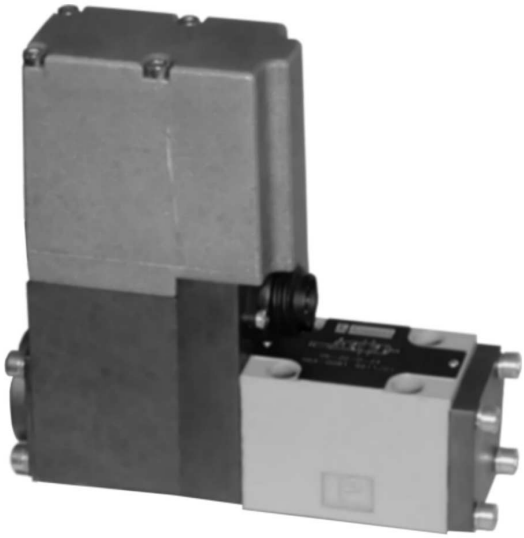
www.argo-hytos.com

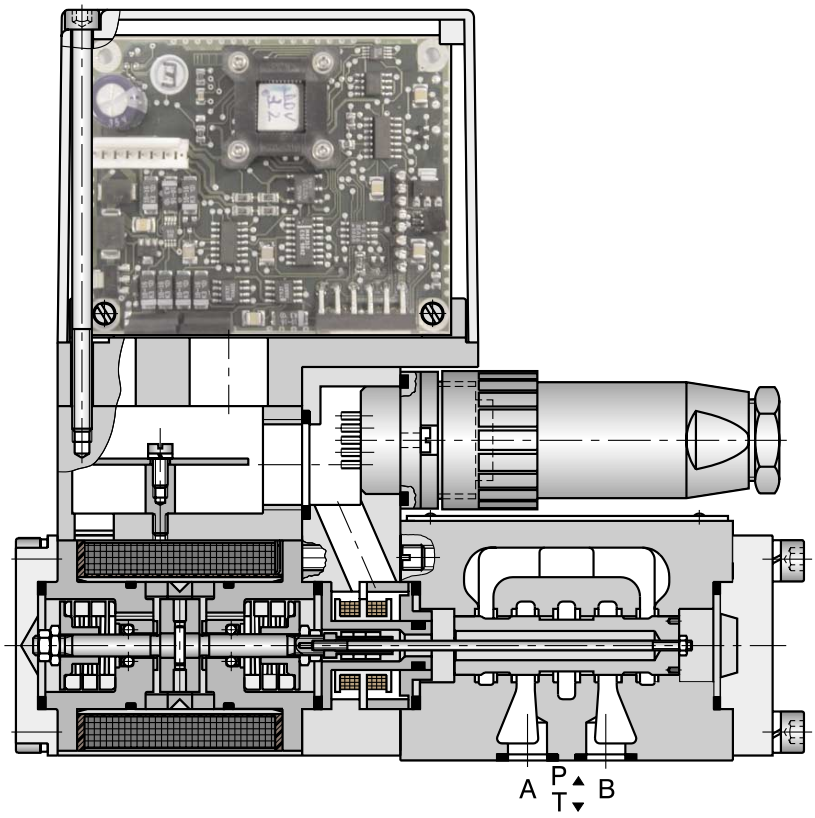
HYTOS	*PROPORTIONAL CONTROL VALVES* **PRL3-06**		**HA 5109 2/2002**
	Size 06	$p_{max.}$ = 350 bar	$Q_{max.}$ = 32 L/min	Replaces HA 5109 6/2001



- **4-way control valve for control of hydraulic actuators and motors**
- **Single-stage control of the spool by linear motor**
- **Electronic spool-position feedback**
- **Integrated digital control electronics**
- **Robust design**
- **Additional input for external controlled value**
- **Installation dimensions to DIN 24 340-A6 and ISO 4401-AB-03-4-A**



The Profil



Ordering code

PRL3 - 06 - □ - □ / □ □ □ □

Control valve

Nominal size

Flow rate L/min at pressure difference per control edge

35 bar	**(5 bar)**	
5 L/min	(2 L/min)	**05**
10 L/min	(4 L/min)	**10**
20 L/min	(8 L/min)	**20**
32 L/min	(13 L/min)	**40**

Spool type
Zero overlap **0**

Set point signals
A ± 10 V
B ± 10 mA
C 4-20 mA

Controller for external controlled value
A not integrated
B P-I controller

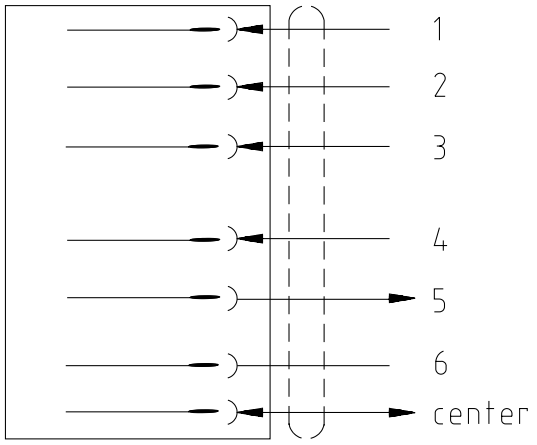
Supply voltage
1 + 24 V DC

BUS-interface
A CAN-BUS (by request)

Technical Data

Nominal size	mm	06			
Nominal pressure	bar	350			
Flow rate at pressure difference per control edge 35 bar	L/min	5	10	20	32
Flow rate at pressure difference per control edge 5 bar	L/min	2	4	8	13
Hysteresis	%	< 0.5			
Threshold	%	< 0.2			
Hydraulic fluid		Hydraulic oils to ISO 6074 MH and VH			
Fluid temperature range	°C	-40 ... +80			
Viscosity range	mm^2/s	10 ... 400			
Maximum degree of fluid contamination		Class 16/13 according to ISO 4406 or better			
Weight	kg	2.5			

Electric Connection



24 V Supply voltage

0 V Supply voltage

Signal input	± 10 V	4-20mA	± 10mA
Input resistance	100 kΩ		
Burden		200 Ω	200 Ω

0 V Signal input

4-20 mA spool position output,
Burden 500 Ω

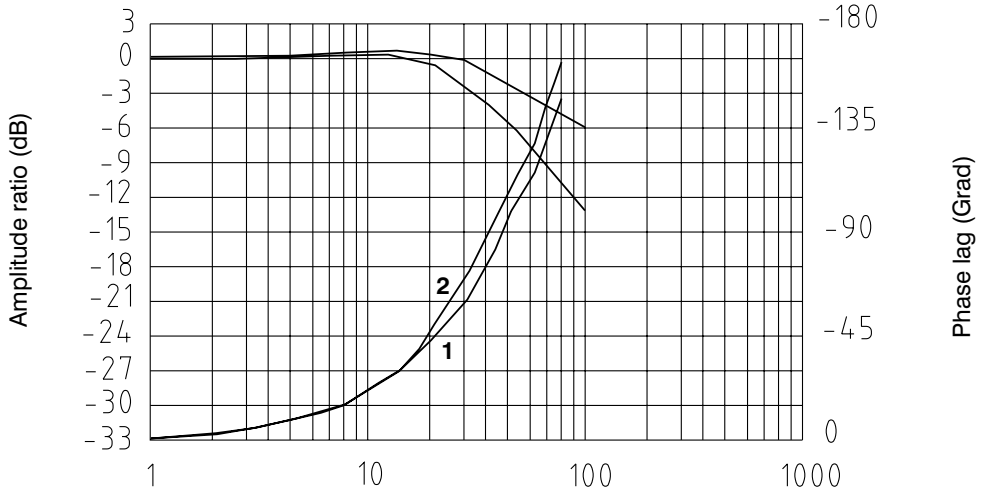
4-20 mA, 250 Ω input for external actual value sensor (optional)

digital data exchange

Characteristics

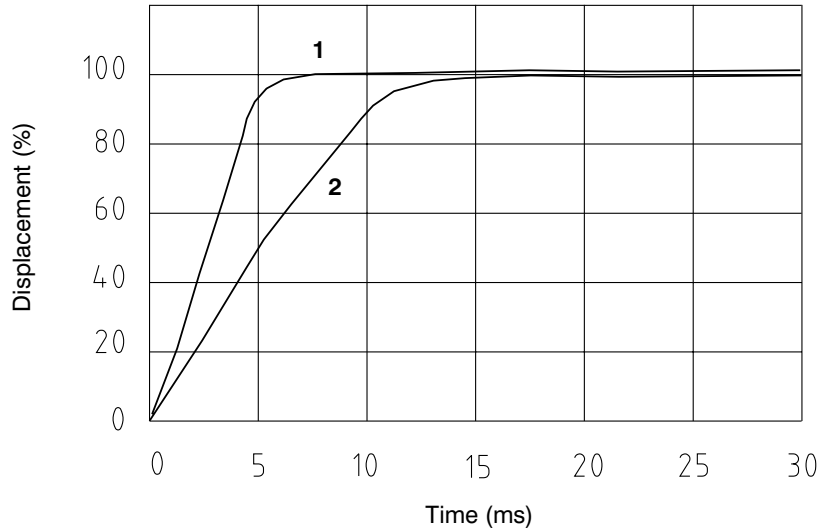
for valves with flow rates 5 L/min and 20 L/min at pressure difference 70 bar

Frequency response (input signal ± 90 %)



1 5 L/min
2 20 L/min

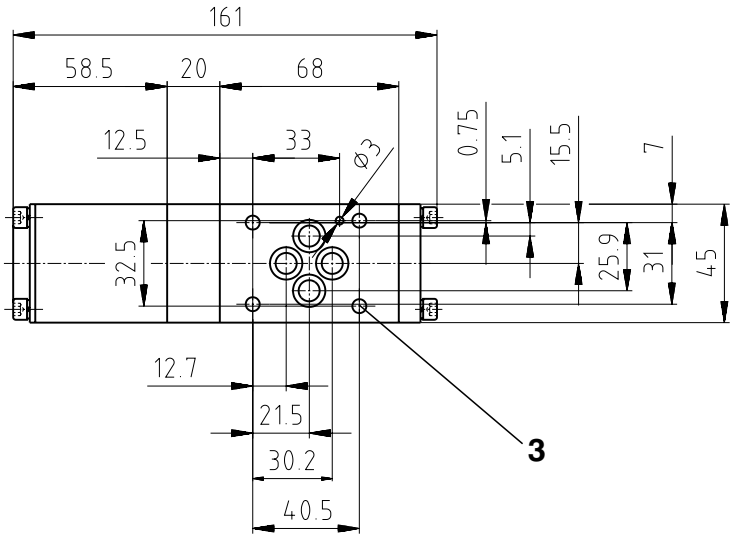
Step response

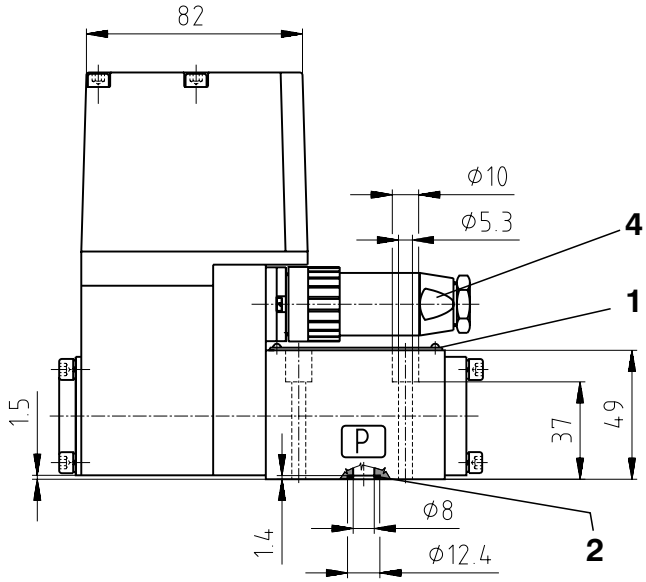


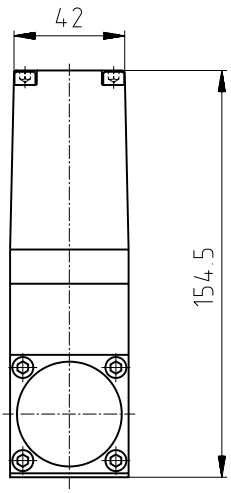
1 5 L/min
2 20 L/min

Valve Dimensions

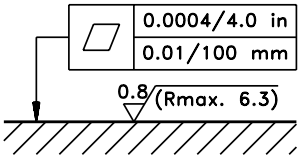
Dimensions in millimetres







1 Name plate
2 O-ring 9.25 x 1.68 (4 pcs.), supplied with valve
3 4 mounting holes
4 Connector AMPHENOL T 3105 101



Required surface finish of interface

Caution!

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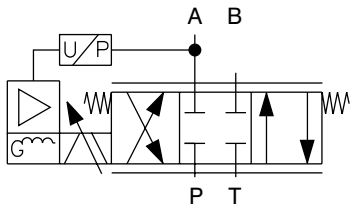
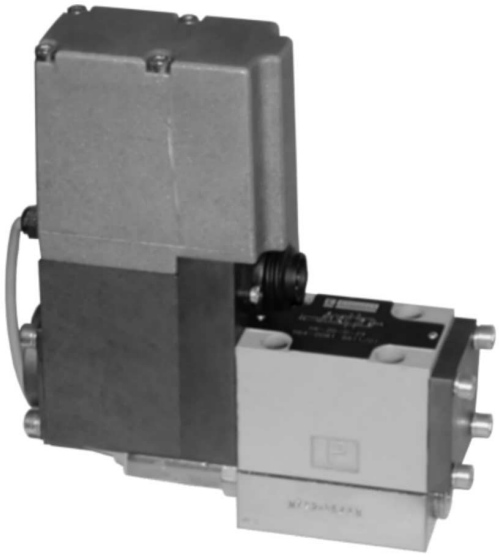
HYTOS a.s. CZ - 543 15 Vrchlabí

Tel.: +420-499-403111, Fax: +420-499-403421, e-mail: sales@hytos.cz

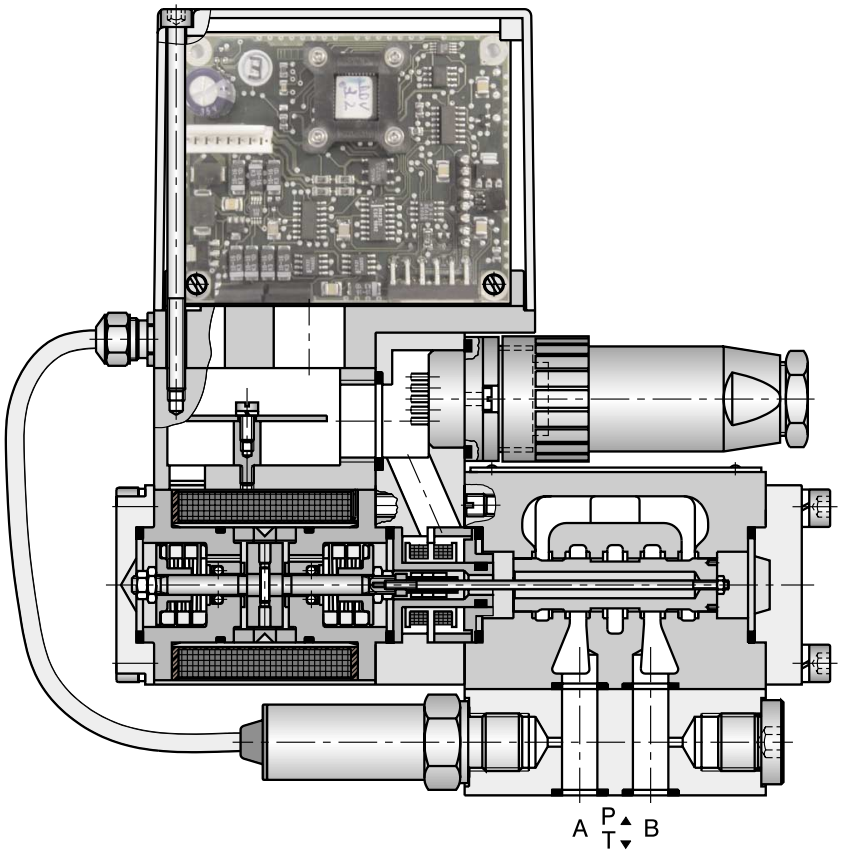
HYTOS	*PROPORTIONAL PRESSURE CONTROL VALVES*	***PVPL3-06***	**HA 5110 2/2002**
	Size 06	$p_{max.}$ = 350 bar	$Q_{max.}$ = 32 L/min	Replaces HA 5110 6/2001



- **3-way control valve for pressure control**
- **Single-stage control of the spool by linear motor**
- **Electronic spool-position feedback**
- **Electronic pressure feedback in port A**
- **Integrated digital electronics**
- **Robust design**
- **Installation dimensions to DIN 24 340-A6 and ISO 4401-AB-03-4-A**



The Profil



Ordering code

PVPL3 - 06 - □ - □ / □ □ □ □

Pressure control valve

Nominal size

Flow rate L/min at pressure difference per control edge

35 bar	**(5 bar)**	
5 L/min	(2 L/min)	**05**
10 L/min	(4 L/min)	**10**
20 L/min	(8 L/min)	**20**
32 L/min	(13 L/min)	**40**

Spool type

Zero overlap	**0**
25 % overlap	**1**

BUS-interface

A	CAN-BUS (by request)

Supply voltage

1	+ 24 V DC

Pressure sensor

	Pressure range	Permissible pressure peak
A	350 bar	500 bar
B*	200 bar	300 bar
C	140 bar	300 bar
D	100 bar	200 bar

Set point signals

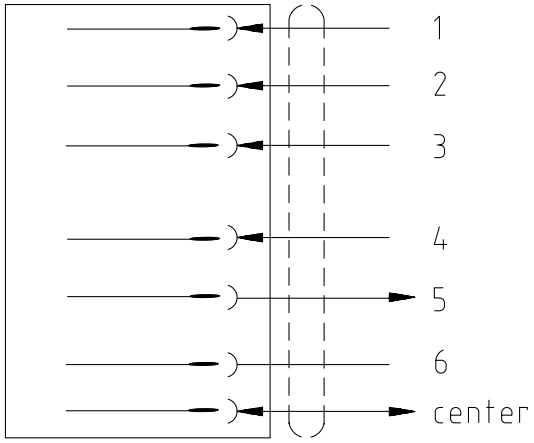
A	± 10 V
B	± 10 mA
C*	4-20 mA

***** Standard

Technical Data

Nominal size	mm	06			
Nominal pressure	bar	350			
Flow rate at pressure difference per control edge 35 bar	L/min	5	10	20	32
Flow rate at pressure difference per control edge 5 bar	L/min	2	4	8	13
Hysteresis	%	< 0.5			
Threshold	%	< 0.2			
Linearity of pressure sensor	%	< 0.5			
Hydraulic fluid		Hydraulic oils to ISO 6074 MH and VH			
Fluid temperature range	°C	-40 ... +80			
Viscosity range	mm^2/s	10 ... 400			
Maximum degree of fluid contamination		Class 16/13 according to ISO 4406 or better			
Weight	kg	2.8			

Electric Connection



24 V Supply voltage

0 V Supply voltage

Signal input	± 10 V	4-20mA	± 10mA
Input resistance	100 kΩ		
Burden		200 Ω	200 Ω

0 V Signal input

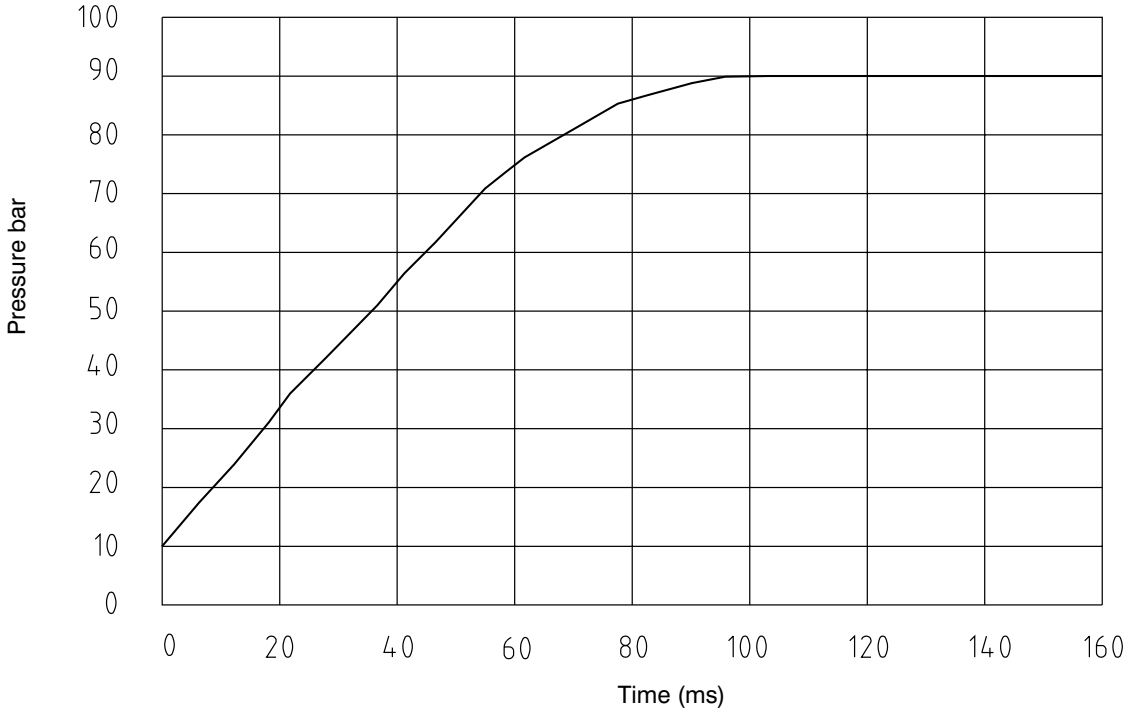
4-20 mA spool position output,
Burden 500 Ω

4-20 mA, 250 Ω input for external actual value sensor (optional)

digital data exchange

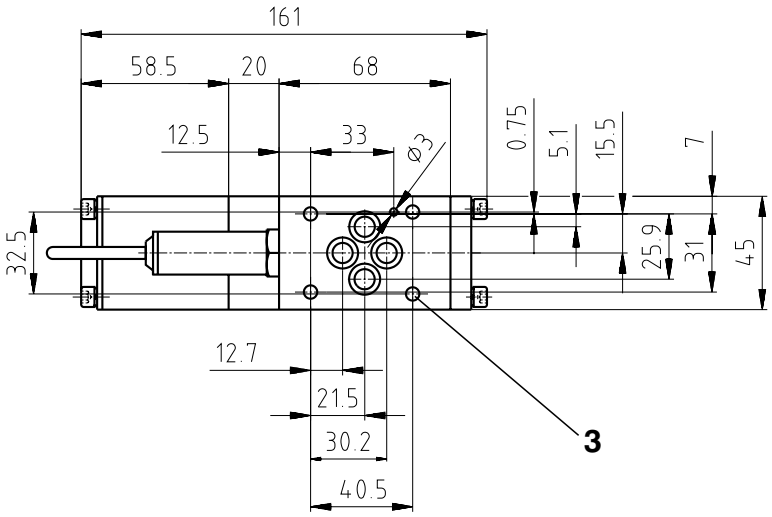
Typical step response of a pressure control valve with 20 L/min flow rate

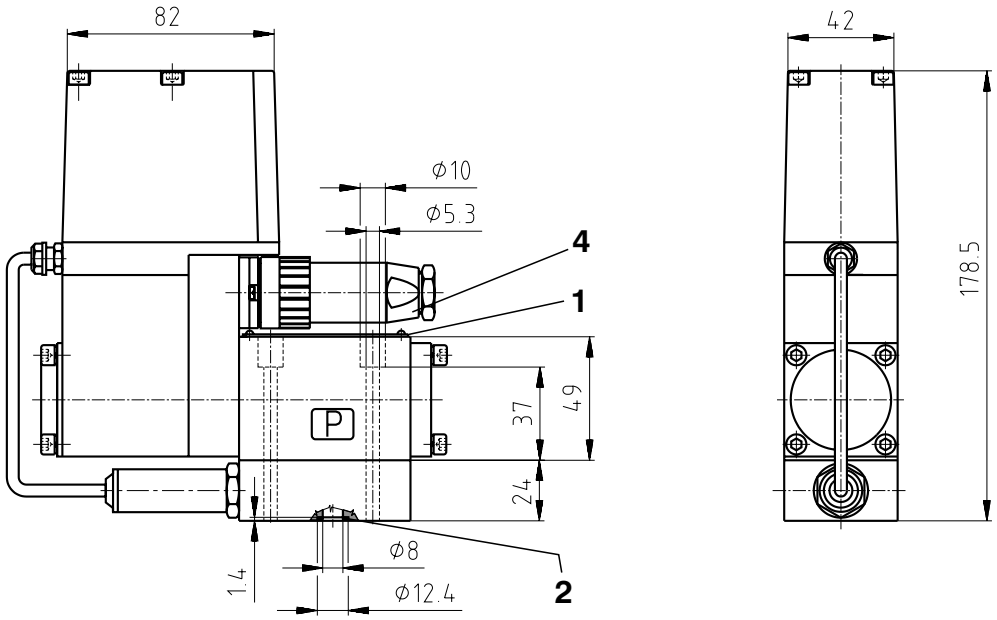
[Enclosed oil volume 1.2 L]



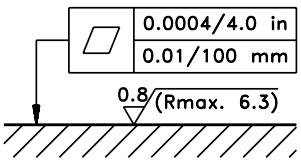
Valve Dimensions

Dimensions in millimetres





1 Name plate
2 O-ring 9.25 x 1.68 (4 pcs.), supplied with valve
3 4 mounting holes
4 Connector AMPHENOL T 3105 101



Required surface finish of interface

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HYTOS a.s. CZ - 543 15 Vrchlabí

Tel.: +420-499-403111, Fax: +420-499-403421, e-mail: sales@hytos.cz

Pilot operated cartridge check valves

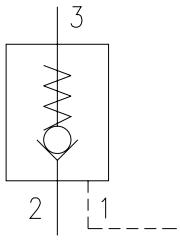
RJV1-05

Size 05 • p_{max} up to 250 bar • Q_{max} up to 20 L/min

HA 5111
1/2000

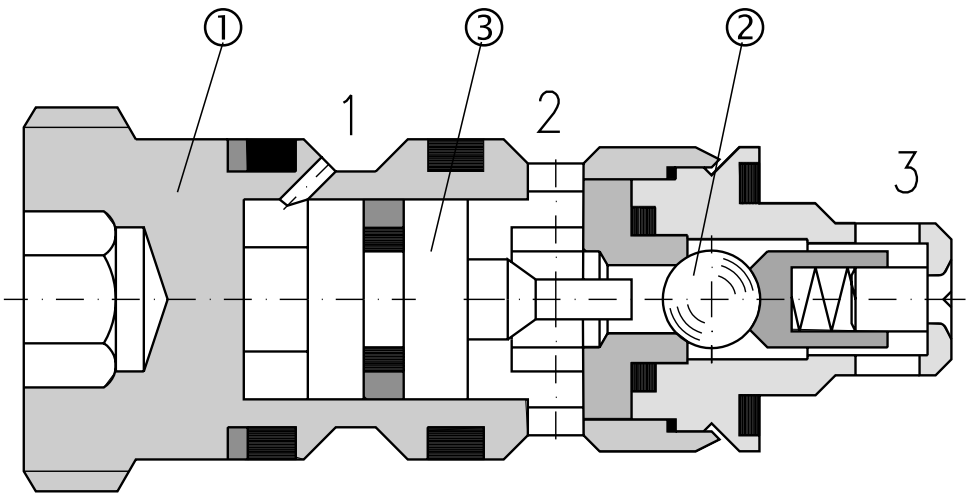
Replaces
HA 5111 11/98

- **Cartridge valve for manifold mounting**
- **Model with subplate - enables direct moutingon the hydraulic actuator by means of a hollow bolt**
- **The use of a hollow bolt with a build-in throttle valve possible**



Functional Description

Model RJV1-05 are pilot operated check valves in cartridge design used to give leakfree closure of a hydraulic actuator port under pressure, even during long idle periods.
They basically consist of housing (1), check valve (2), and pilot piston (3). The cartridge is avaliable alredy assembled into a subplate for direct mounting onto the actuator (page 4 of this data sheet).
When fluid flows from port 2 to 3, it opens the check valve automatically. When the pressure in port 2 drops (e.g. after shifting the directional valve into its middle position), the spring pushes the ball (2) onto the seat and the circuit between the check valve and the actuator is closed. The control pressure (port 1) acting on the pilot piston (3) moves the ball (2) from the seat and makes the flow passage 3 ® 2 free. An additional port 4 is available for use in double acting applications using two pilot operated check valves-see typical circuits (page 2) and drawings (page 4).
The valve body and the hollow bolt (model with subplate) are blackened, whereas the surface of the subplate is phosphate coated.



Ordering Code

RJV1-05- ☐ ☐ / ☐ ☐ ☐

Pilot operated cartridge check valve

Nominal size

Model
With pilot piston seal — without designation
Without pilot piston seal — **O**

Model
Cartridge valve — without designation
With subplate (connecting threads 3xM12x1,5 und 1xM18x1,5) — **M**

Seals
without designation — NBR
V — Viton

Hollow bolt
without designation — without throttle valve
S — with throttle valve VSV1-06
(fill in just with the model with subplate)

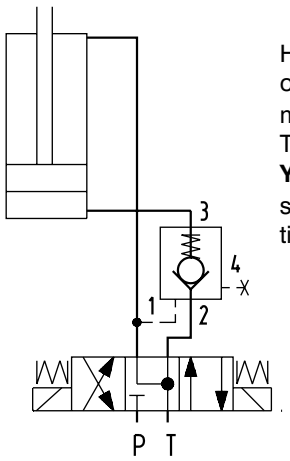
Threads of hollow bolt
B — M 18x1,5
C — M 22x1,5
D — G1/2
E — G3/8
(fill in just with the model with subplate)

Technical Data

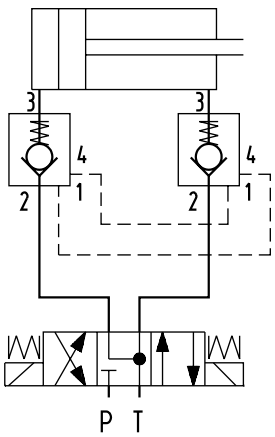
Nominal size	mm	05
Maximum flow	L/min	20
Maximum operating pressure	bar	250
Cracking pressure	bar	see Δp-Q characteristics
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP RP 91H viscosity classes ISO VG 32, 46 and 68
Fluid temperature range for standard sealing (NBR)	°C	-30 ... +80
Fluid temperature range for Viton seals (FPM)	°C	-20 ... +80
Viscosity range	mm^2/s	20 ... 400
Maximum degree of fluid contamination		Class 21/18/15 to ISO 4406 (1999)
Area ration (pilot piston / seat)		5.76
Weight of the cartridge valve	kg	0.08
Mounting position		optional

Hydraulic circuits

Use of the pilot operated check valve for one direction only (lowering). Port **4** is pluged

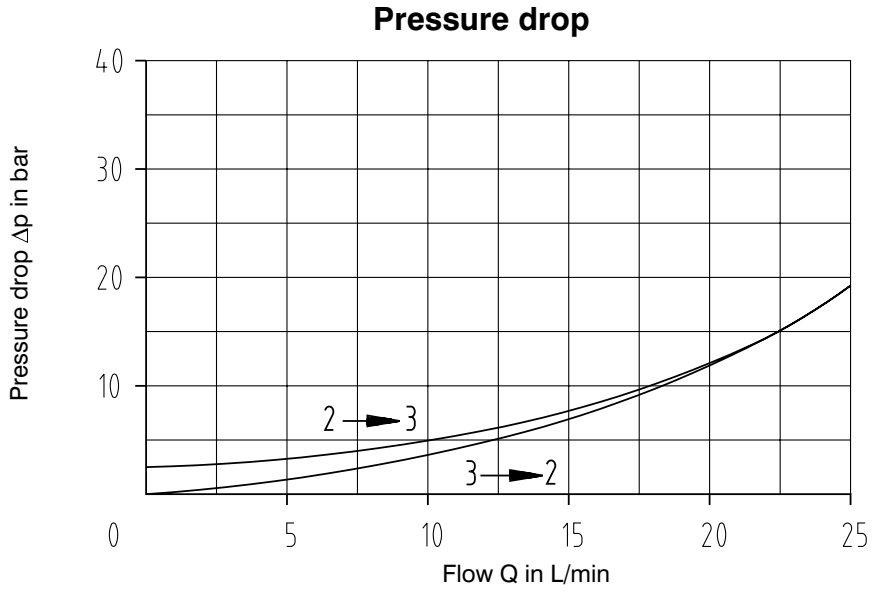


Hydraulic circuit with two pilot operated check valves enabling movement in both directions.
The use of a directional valve with **Y**-functional symbol ensures perfect seating of the ball, thus ensuring tight closure of the actuator.



Δp-Q Characteristics

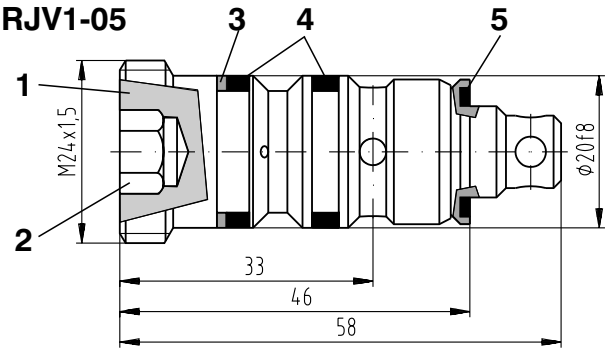
Measured at ν = 35 mm^2/s and t = 40 °C



Valve Dimensions

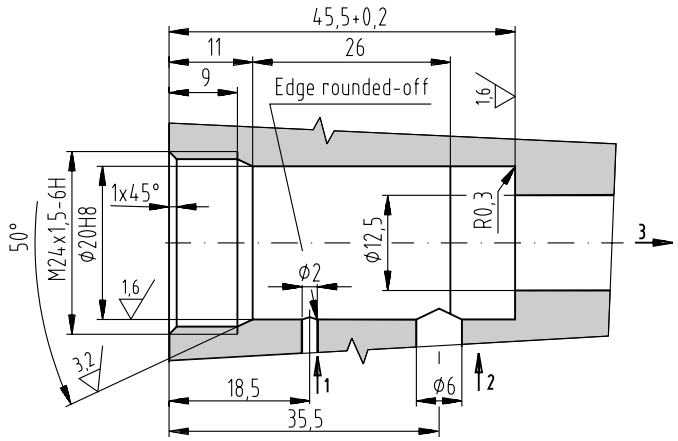
Dimensions in millimeters

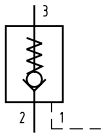
Cartridge valve RJV1-05



1 Type code stamped on the face (RJV1-05)
2 Inside hex. 10 mm (Tightening torque is 10+2 Nm)
3 OPKR - BBP80B 113-N9 SHAMBAN (14.66 x 19.02 x 1.14)
4 O -ring 15.08 x 2.62
5 O -ring 12.42 x 1.78

Valve Cavity





Spare Parts

Seal kit

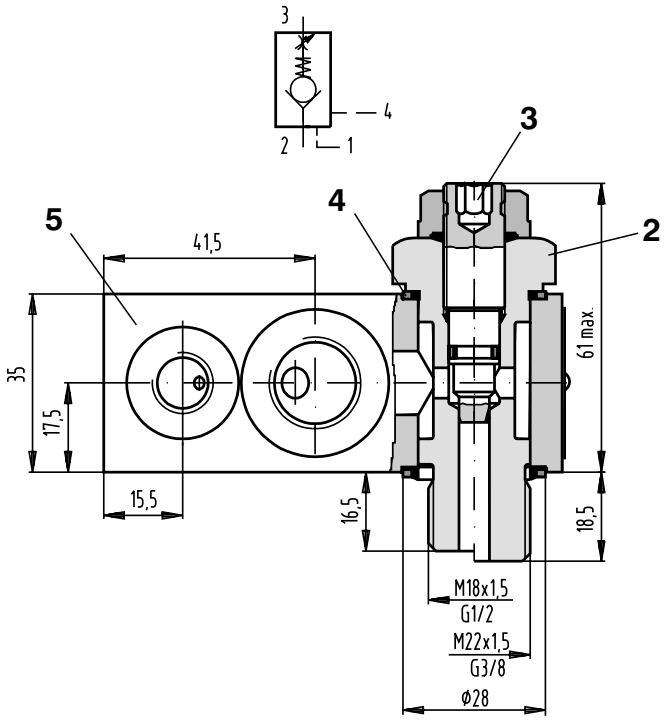
Type	Dimensions, quantity		Ordering number
	O-ring	Back-up ring	
Standard NBR70	9 x 1.8 (1 pc.)	14.66 x 19.02 x 1.14 (1 pc.)	535-0125
	6.07 x 1.78 (1 pc.)	-	
	12.42 x 1.78 (1 pc.)	-	
	15.08 x 2.62 (2 pcs.)	-	
Viton	9.25 x 1.78 (1 pc.)	14.66 x 19.02 x 1.14 (1 pc.)	535-0126
	6.07 x 1.78 (1 pc.)	-	
	12.42 x 1.78 (1 pc.)	-	
	15.08 x 2.62 (2 pcs.)	-	

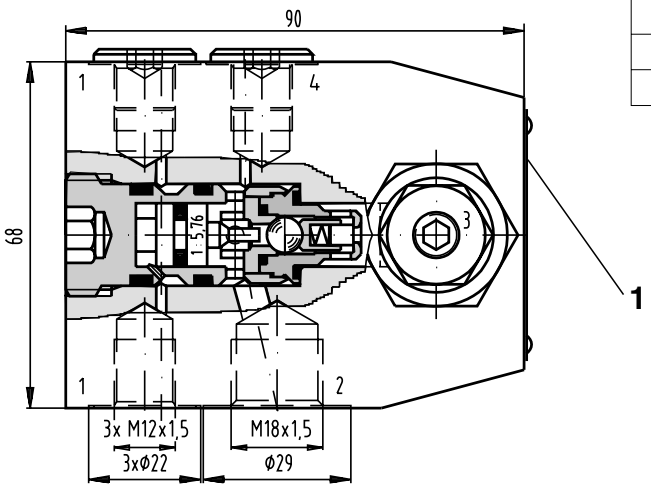
Valve Dimensions

Dimensions in millimeters

Model with subplate RJV1-05-M/BS, RJV1-05-M/CS

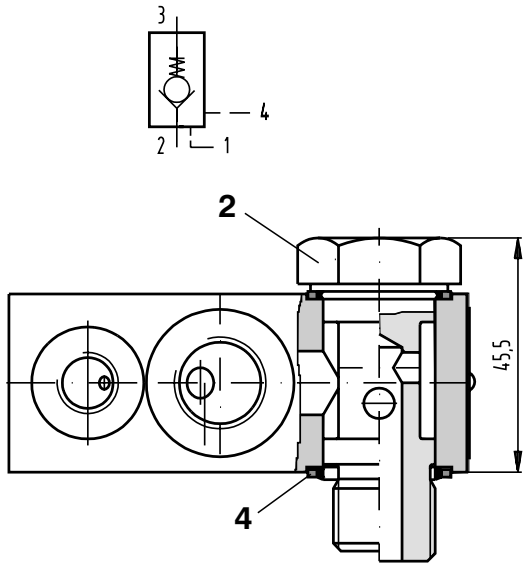
(hollow bolt with throttle valve VSV-06)





Model with subplate RJV1-05-M/B, RJV1-05-M/C

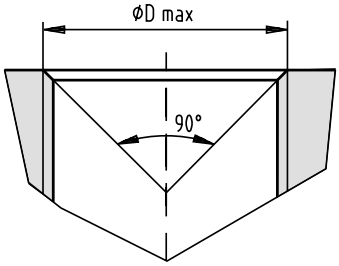
(hollow bolt without throttle valve)



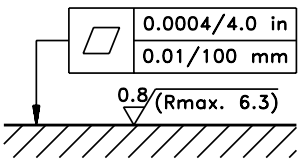
D max is the diameter of the chamfering for the inner connecting thread (hollow bolt)

Connecting thread	∅ D max	Tightening torque (Nm)
M18 x 1.5	$18^{+0.2}$	30+3
M22 x 1.5	$22^{+0.2}$	70+5
G 1/2	$21^{+0.2}$	70+5
G 3/8	$16.6^{+0.2}$	25+3

M 2:1



1 Type plate
2 Hollow bolt (hex. 27 mm)
3 Throttle valve VSV-06 (inside hex. 6 mm)
4 Seal D22.5 x 28 x 1.5 - NSA
5 For optimum positioning the subplate can be turned be 180°C (around the check valve axis)



Required surface finish of interface

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ARGO-HYTOS a. s. CZ - 543 15 Vrchlabí
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E-mail: sales.cz@argo-hytos.com
www.argo-hytos.com

ARGO HYTOS

Proportional directional control valves with position sensor

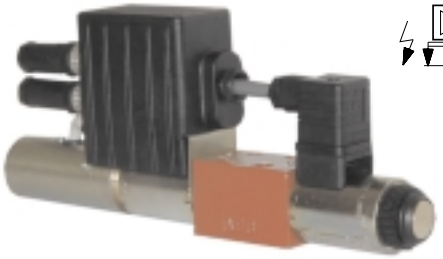
PRM4-04

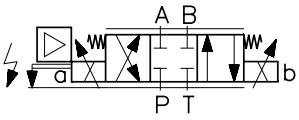
Size 04 • p_{max} up to 320 bar • Q_{max} up to 20 L/min

HA 5112 1/2002

Replaces HA 5112 6/2001

- ❑ **Compact design**
- ❑ **Operated by proportional solenoids**
- ❑ **High sensitivity and slight hysteresis**
- ❑ **Installation dimensions to ISO 4401 CETOP - RP 121H**



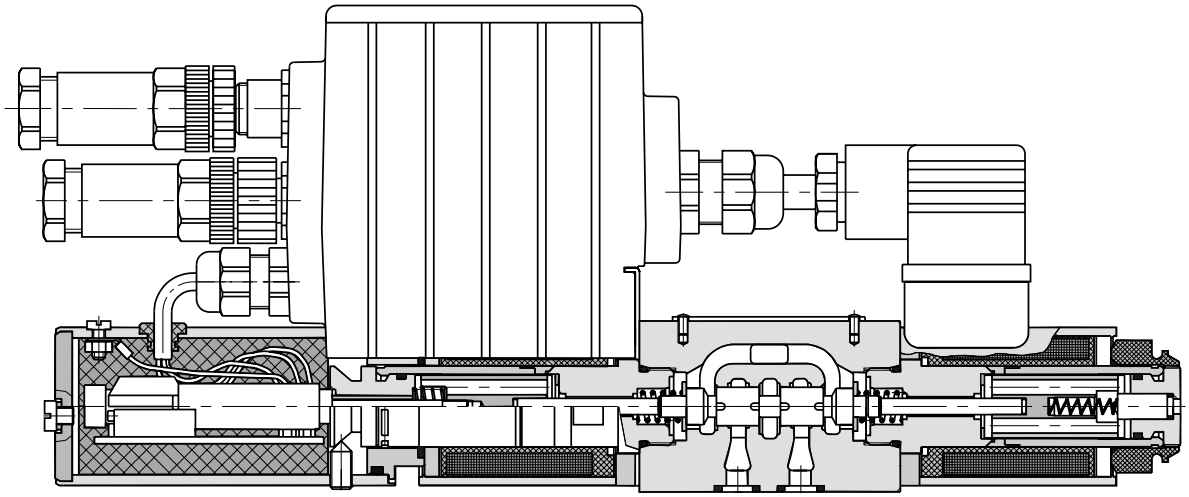


Functional Description

The proportional directional valve PRM4 consists of a cast iron housing, a special control spool, two centering springs with supporting washers, one or two proportional solenoids, a position sensor or, if need be, of a control box with digital electronics.
The measuring system of the position sensor consists of a differential transformer with core and from the evaluating electronic unit realized in hybrid technique.
With the model without integrated electronic unit, the electric connection of the solenoids is realized by the connector plug to DIN 43 650, with the position sensor output being connected by the G4W1F connector plug. Both connectors are supplied.
The proportional valve with the integrated electronic unit comprises an electronic control box that is mounted, together with the position sensor, on either of the solenoids. The connection of the position sensor with the control box is provided by a cable. With the model with two solenoids, the solenoid mounted opposite the control box is connected with the control box by means of a DIN 43 650 connector. The connection of the supply voltage, control signal, program input and external output of the position sensor is realized by a 5-pin connector (ELKA 5012). The connection of the external feedback is provided by a 5-pin connector, which also has three supply voltages +24 V, +10V and -5V for an external sensor available. The solenoid coils, including the control box, can be turned in a range of ± 90°.

The digital control unit enables the proportional valve to be controlled on the basis of data required from two feedback circuits. In this case the proportional valve can be used as follows:
1. Proportional directional valve
2. Only with the internal feedback from the spool position sensor.
3. Only with the external feedback (pressure sensor, position sensor, etc.).
4. With internal and external feedback.

The digital control unit utilizes the pulse-with-modulation (PWM) and supplies the solenoids with current proportional to the control signal. The supply current is additionally modulated with a dither frequency. The individual functional parameters are adjusted through software by means of a special programmer, or by means of a computer through the RS 232 interface. The correct function of the digital control unit is signaled by a green LED. The incorrect function (failure) is indicated by a red LED.
As a standard, the proportional valve is delivered with factory setting.
The model including also an external feedback shall be consulted with the manufacturer.
With the basic surface treatment, the valve housing is phosphate coated, whereas the surfaces of the solenoids are zinc coated.

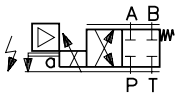
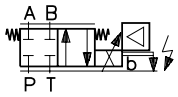
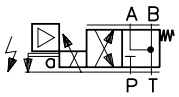
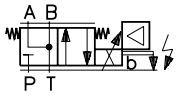
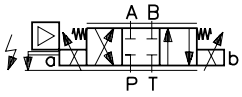
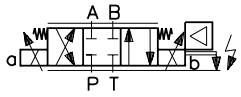
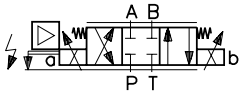
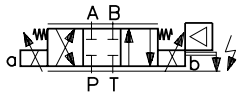
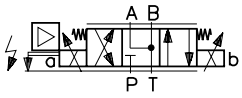
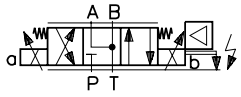
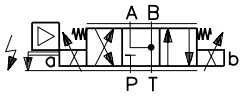
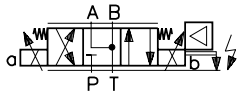


Ordering Code

PRM4-04 □ / □ - □ □ □

Proportional directional control valve with position sensor

Nominal size **04**

	**2Z51**
	**2Z11**
	**2Y51**
	**2Y11**
	**3Z11**
	**3Z11B**
	$\frac{q_A}{q_B} = \frac{1}{2}^*$ **3Z12**
	$\frac{q_A}{q_B} = \frac{1}{2}^*$ **3Z12B**
	**3Y11**
	**3Y11B**
	$\frac{q_A}{q_B} = \frac{1}{2}^*$ **3Y12**
	$\frac{q_A}{q_B} = \frac{1}{2}^*$ **3Y12B**

Seals

without designation NBR
V FPM (Viton)

Model

S01 position sensor with voltage outlet

S02 position sensor with current outlet

E01 proportional directional valve

E02S01 proportional directional valve with position feedback

E03 proportional directional valve with external feedback

E04S01 proportional directional valve with position and external feedback

On model E, the position sensor without connector is always at the control box side. The model without the el. box is equipped with connector.

Nominal solenoid supply voltage

12 supply voltage 12V DC (valid without integrated electronic unit with position sensor with voltage outlet)

24 supply voltage 24 V DC

Nominal flow rate at Δp = 10 bar

4 flow 4 L/min
8 flow 8 L/min
12 flow 12 L/min

***** Model for cylinders with asymmetric piston rod, piston area ratio 1:2

Technical Data

Nominal size	mm	04
Max. operating pressure at ports P, A, B	bar	320
Max. operating pressure at port T	bar	100
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP -RP 91H in viscosity classes ISO VG 32, 46 and 68
Fluid temperature range (NBR / Viton)	°C	-30 ... +80 / -20 ... +80
Ambient temperature max.	°C	up to +50
Viscosity range	mm^2/s	20 ... 400
Maximum degree of fluid contamination		Class 21/18/15 to ISO 4406 (1999).
Nominal flow at Δp = 10 bar	L/min	4 8 12
Hysteresis - open loop	%	< 6
Hysteresis - closed position loop	%	< 0.5
Masse - PRM4-042 PRM4-043	kg	1.4 1.75
Mounting position		optional
Enclosure type		IP65
Vibrations		Oscillation, sinusoidal to IEC 68-2-6 Impact test to IEC 68-2-27
Interference immunity		Burst on leads to EN 61000-4-4 HF radiation received to EN 61000-4-3 HF feeding on leads to EN 61000-4-6 ESD to EN 61000-4-2
Radiated interference		Lead related emission to EN 55011 Radiated emission to EN 55011

Technical Data of position sensor - voltage outlet

Operating pressure	bar	max. 320, static
Electrical connection		electrical connector G4W1F Hirschmann *
Contact assignment		1 - operating voltage 2 - output signal 3 - ground 4 - not used
Enclosure type to DIN 40050		IP 65
Measured distance	mm	8
Operating voltage	V	9.6 ... 30 DC
Linearity error	%	< 1
Current consumption at load current of 2 mA	mA	< 15
Output voltage	V	0 ... 5
Output signal range used: 0 position 1 solenoid - displacement 1.8mm 2 solenoid - displacement ±1.8mm	V	 2.5 1.375 - 2.5 1.375 - 3.625
Max. load current	mA	2
Noise voltage - at load current 0 - at load current of 2 mA	mV_{p-p}	 < 20 < 15
Additional output signal error at: Temperature change between 0 ... 80 °C Between 0 ... -25 °C		 typical < 0.2% / 10K max. 0.5% / 10K max. 0.5% / 10K
Load change from 0 to 2 mA	%	0.1
Input voltage change from 9.6 V to 14.4 V from 14.4 V to 30 V	%	 < 0.1 < 0.25
Long-term drift (30 days)	%	< 0.25
Cut-off frequency 3 dB fall in amplitude Frequency 90°	Hz	 > 600 > 600

* Only for S01 and S02 model.

Technical data of position sensor - current outlet

Linearity	%	< 1
Operating pressure	bar	to 320, static
Electrical connection		electrical connector G4W1F Hirschmann *
Contact assigment		1 - operating voltage 2 - output signal 3 - ground 4 - not used
Enclosure type to DIN 40050		IP 65
Operatin voltage	V	20 ... 30 DC
Current	mA	< 35
Output signal range	mA	5 ... 19
Output signal range used: 0 position 1 solenoid - stroke (Hub 1,8 mm) 2 solenoid - stroke (Hub ±1,8 mm)	mA	 12 8.4 ... 12 8.4 ... 15.6
Additional output signal error: - at temperature change from +10 ... 55 °C - at imjpedance change from 50% - at input voltage change in the range of operating voltage		 0.2% / 10K ≤ 0.1% ≤ 0.05%
Impedance	Ω	≤ 500
Output signal ripple	mA R.M.S.	≤ 0,02
Limit frequency at 3 dB amplitude decrease	Hz	≥ 800

* Only for S01 and S02 model.

Technical Data of Proportional Solenoid

Type of coil	V	12 DC (only for S01 model)	24 DC
Limiting current	A	1.7	0.8
Resistance at 20 °C	Ω	4.9	21

Electronics data

Supply voltage with polarity inversion protection	V	24 DC ±20% (residual ripple < 5%)
Input: control point		±10V, 0 ... 10V, ±10mA, 4 ... 20mA, 0 ... 20mA
Input: actual value (valve spool position)		0 ... 5V
Input: actual value (external feedback)		0 ... 10V, 2 ... 10V, 4 ... 20mA, 0 ... 20mA
Output: solenoids		2 PWM output stages up to max 2.5 A
PWM frequency	kHz	13
Controller cycle time	ms	1.3
Adjustment of parameters		By means of a manual programmer or a PC - Company software (RS232)

Accessories

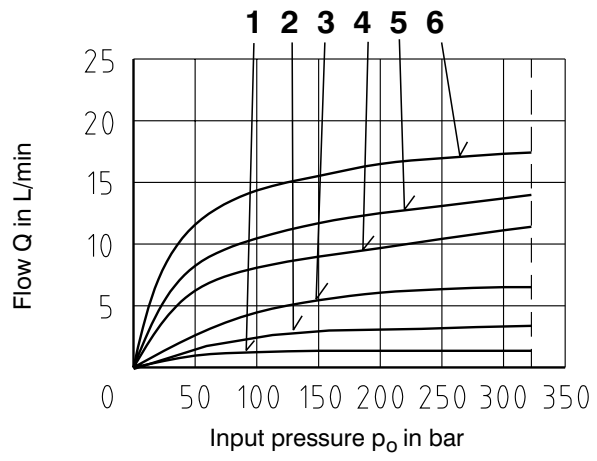
Ordering number	Contens
566-9505	Cable for connection with PC, CD-ROM with Software and manual (hc, hd, ha version)
566-9540	Manual programmer
566-9550	Cable for connection with PC
566-9555	Cable for connection with the manual programmer
566-9525	Manual programmer, Cable for connection with PC, CD-ROM with Software and manual (hc, hd, ha version)

Limit Power

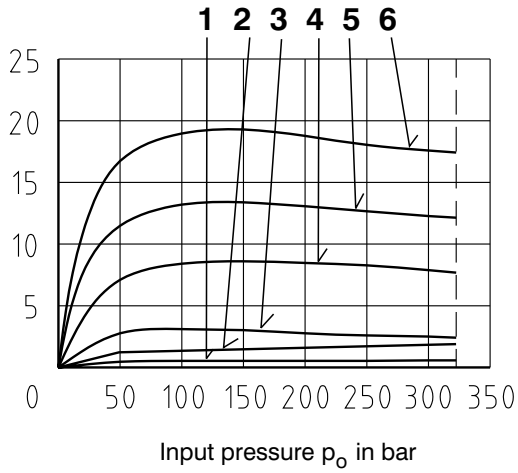
Measured at $\nu = 35\ mm^2/s$ $P \rightarrow A / B \rightarrow T$ or $P \rightarrow B / A \rightarrow T$

Only for E01 model

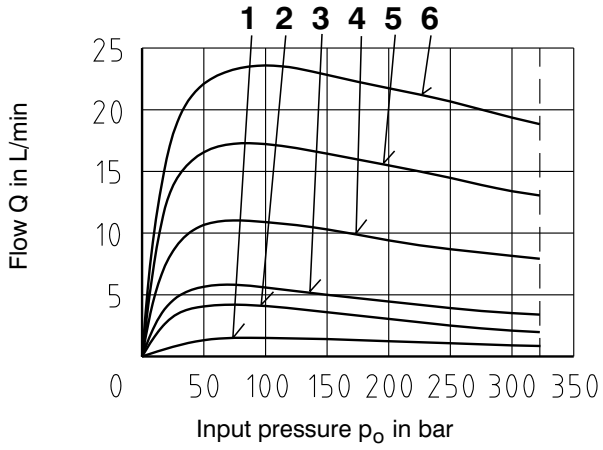
Nominal flow 4 L/min



Nominal flow 8 L/min



Nominal flow 12 L/min

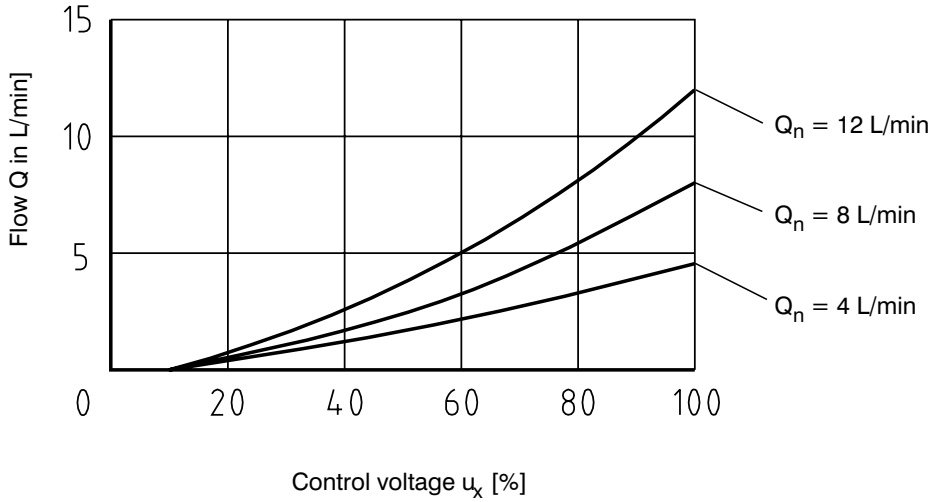


Solenoid current:
1 = 50%
2 = 60%
3 = 70%
4 = 80%
5 = 90%
6 = 100%

Flow Characteristics

Measured at input pressure $p_o = 10$ bar, $\nu = 35\ mm^2/s$

Only for E01 model



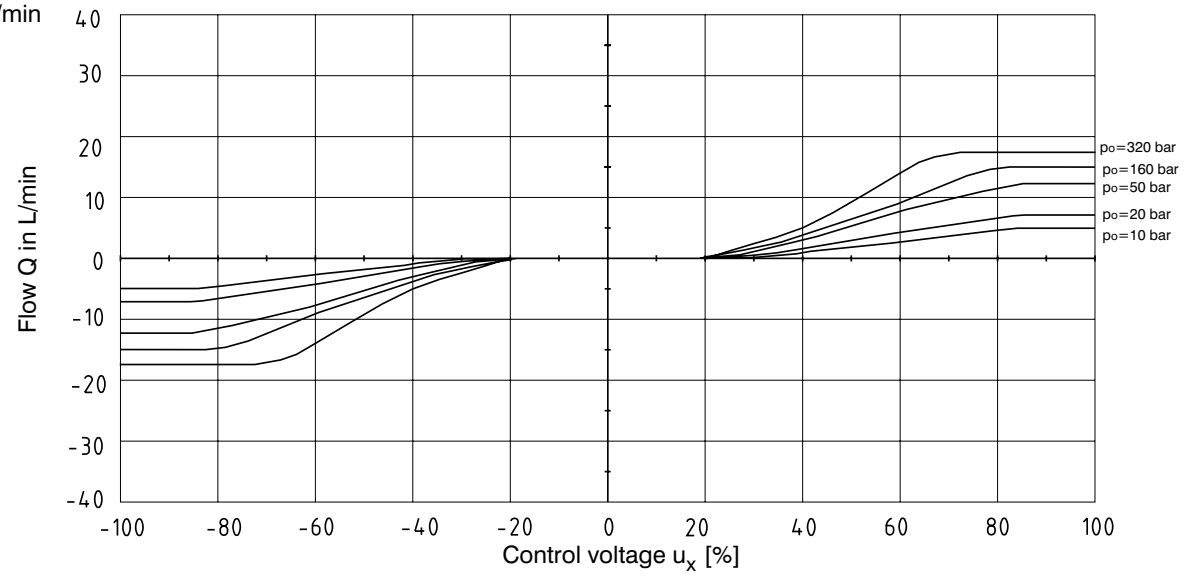
Flow Characteristics

Measured at $\nu = 35\ mm^2/s$ $P \rightarrow A / B \rightarrow T$ or $P \rightarrow B / A \rightarrow T$

Only for E02S01 model

p_o - input pressure

$Q_n = 4$ L/min



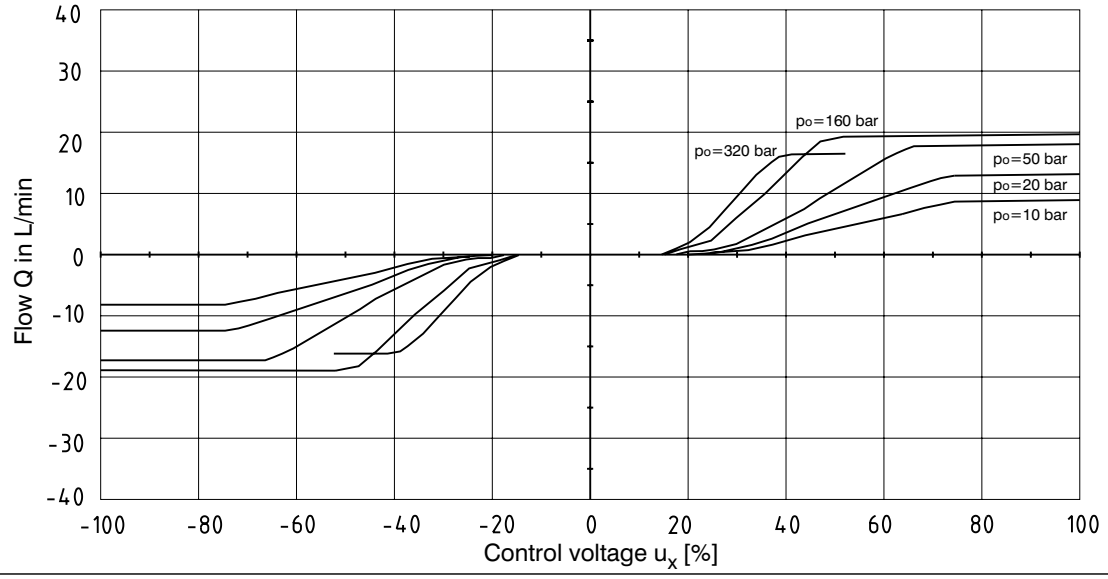
Flow Characteristics

Measured at $\nu = 35\ mm^2/s$ $P \rightarrow A / B \rightarrow T$ or $P \rightarrow B / A \rightarrow T$

Only for E02S01 model

p_o - input pressure

$Q_n = 8$ L/min



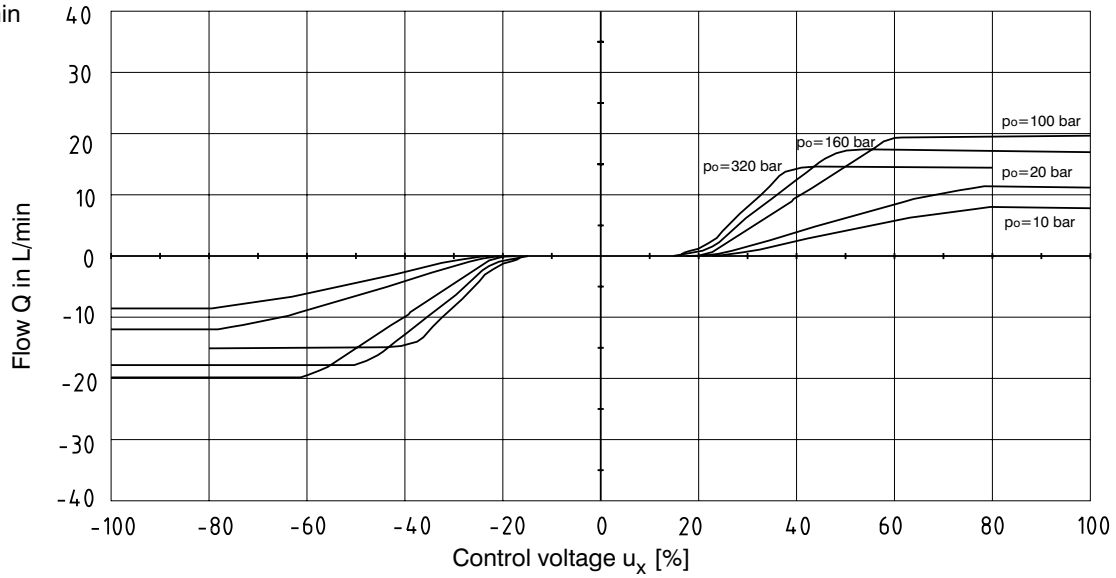
Flow Characteristics

Measured at $\nu = 35\ mm^2/s$ $P \rightarrow A / B \rightarrow T$ or $P \rightarrow B / A \rightarrow T$

Only for E02S01 model

p_o - input pressure

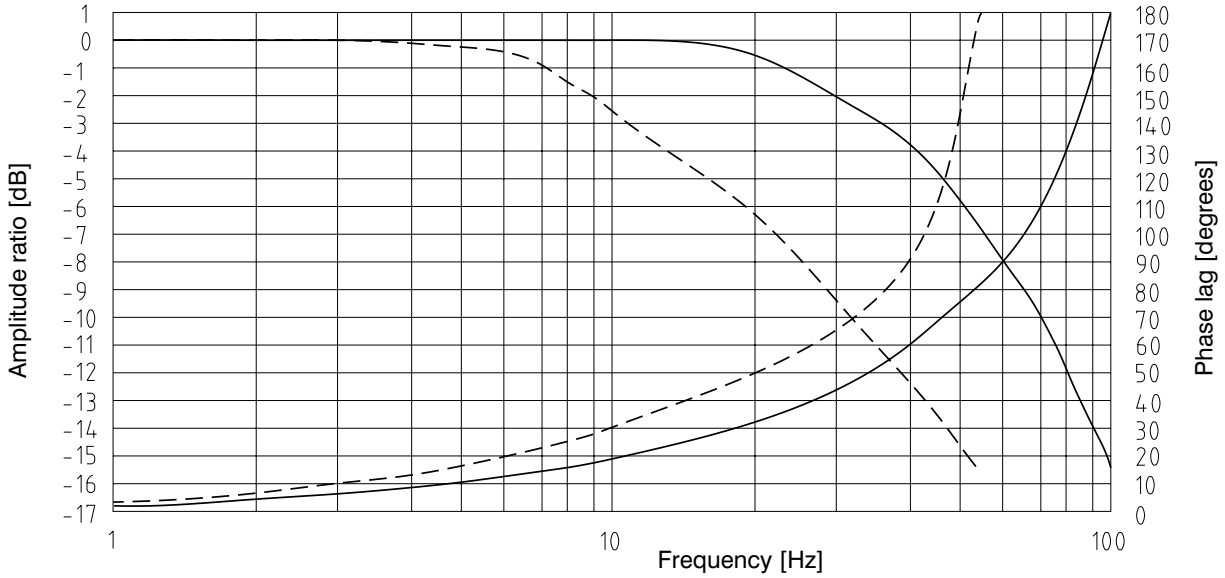
$Q_n = 12$ L/min



Frequency Reponse

closed position loop

------ signal 90%
—— signal 25%



Connector connection

Connector K1*

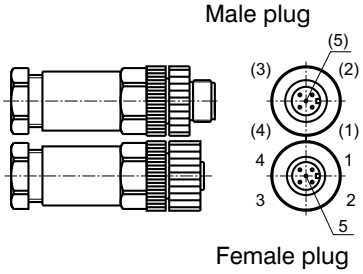
PIN	Technical data	Description
1	Power supply input	+24 V DC
2	Control	according to configuration
3	Ground	0 V
4	Programming	-
5	Output position sensor	0 ... 5 V

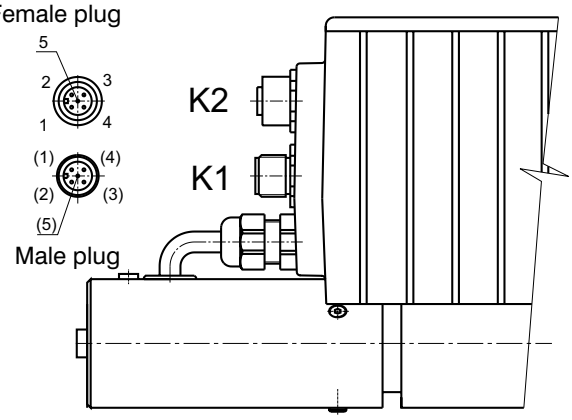
Connector K2 (Model E03 and E04S01)

PIN	Technical data	Description
1	Power supply output	+ 24 V DC/max.100mA
2	Input signal of external feedback	according to configuration
3	Ground	0 V
4	Power supply output	-5 V DC/max.15mA
5	Power supply output	+10 V DC/max.10mA

Manufactory valve configuration

Item	Model							
	E01		E02S01		E03		E04S01	
	1 Magnet	2 Magnet	1 Magnet	2 Magnet	1 Magnet	2 Magnet	1 Magnet	2 Magnet
Control signal	0...10 V	± 10 V	0...10 V	± 10 V	0...10 V	± 10 V	0...10V	± 10 V
Signal external feedback	-	-	-	-	0...10 V			
Output position sensor spool	-	-	0...5 V		-		0...5 V	



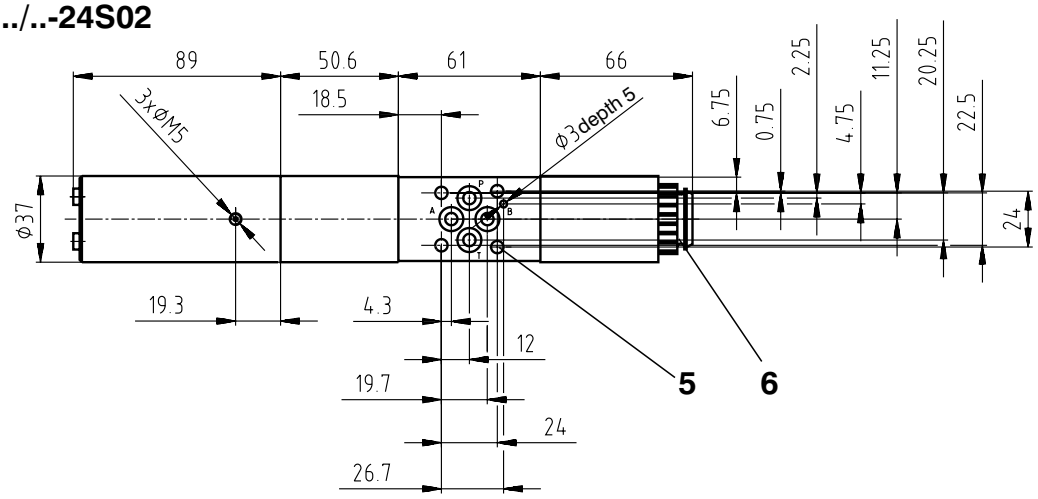


* For models E01 and E03 - 4 pole connector only
(without pin No. 5 - outlet of position sensor)

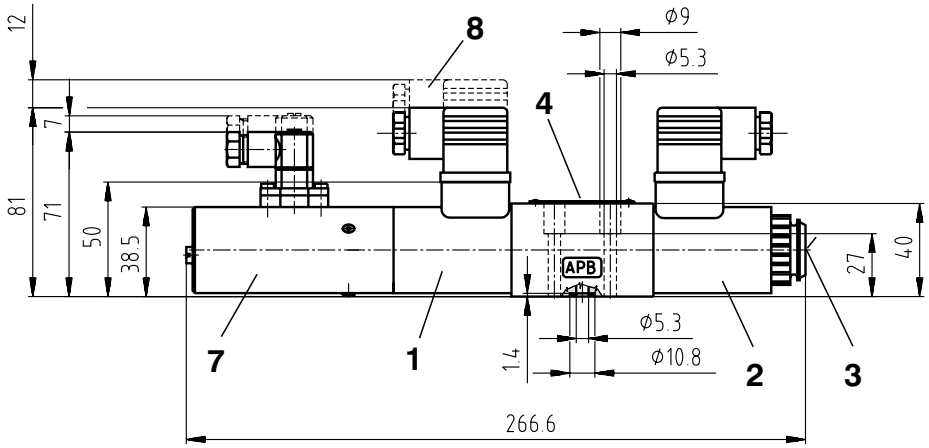
Valve Dimensions

Dimensions in millimetres

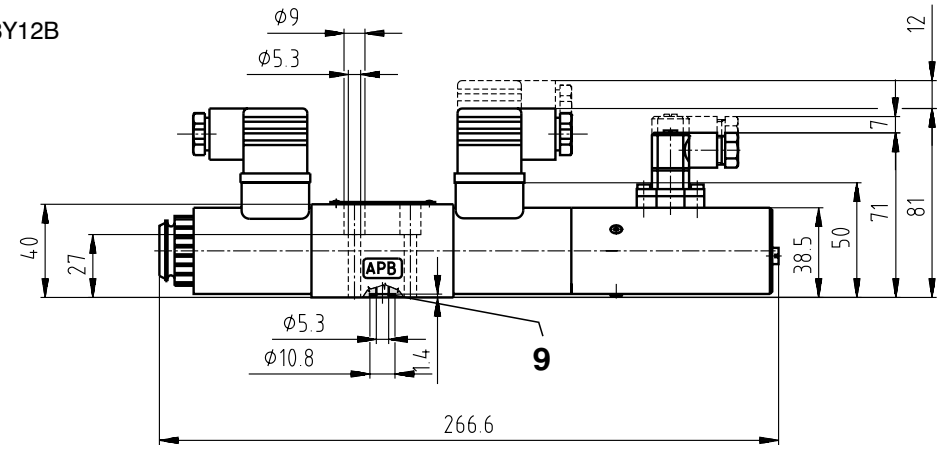
PRM4-043..../..-..S01
PRM4-043..../..-24S02



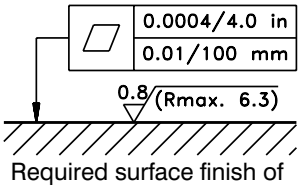
Functional symbols
3Z11, 3Z12, 3Y11, 3Y12



Functional symbols
3Z11B, 3Z12B, 3Y11B, 3Y12B



1 Solenoid a
2 Solenoid b
3 Manual overide
4 Name plate
5 4 mounting holes
6 Solenoid fixing nut
7 Position sensor
8 Space required to remove connector
9 Square ring 7.65 x 1.68 (4 pcs.), supplied in delivery packet

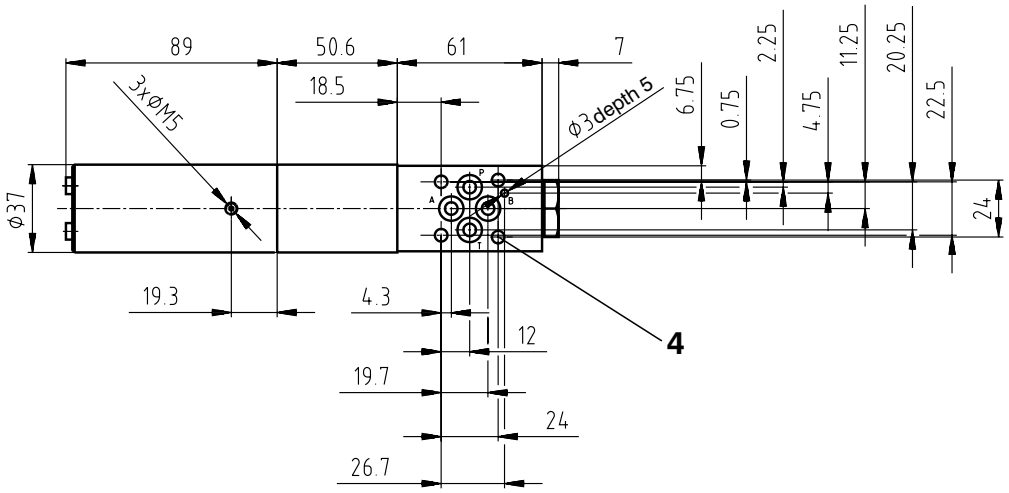


Required surface finish of interface

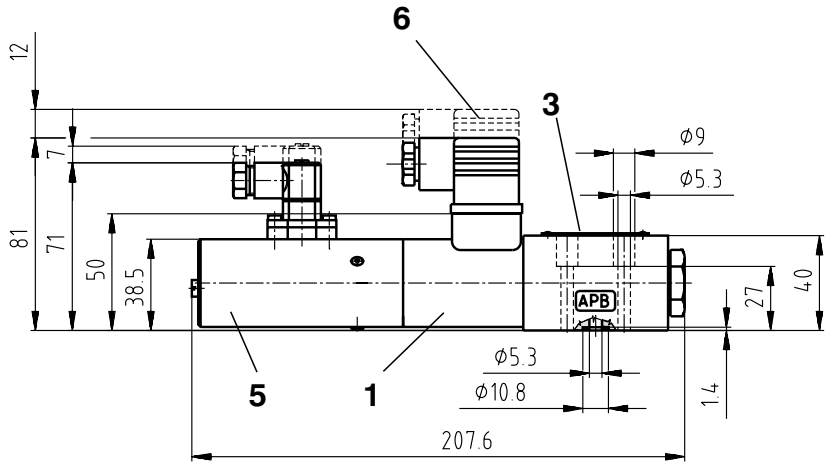
Valve Dimensions

Dimensions in millimetres

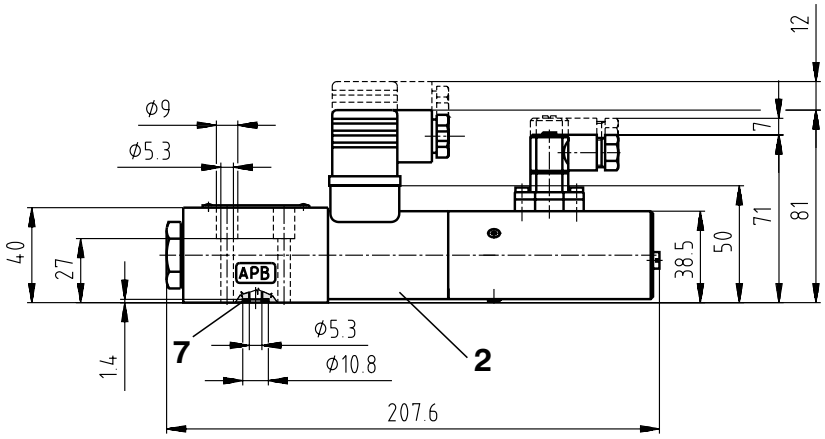
PRM4-042..../..-..S01
PRM4-042..../..-24S02



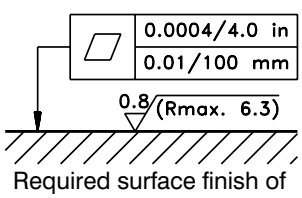
Functional symbols
2Z51, 2Y51



Functional symbols
2Z11, 2Y11



1 Solenoid a
2 Solenoid b
3 Name plate
4 4 mounting holes
5 Position sensor
6 Space required to remove connector
7 Square ring 7.65 x 1.68 (4 pcs.), supplied in delivery packet

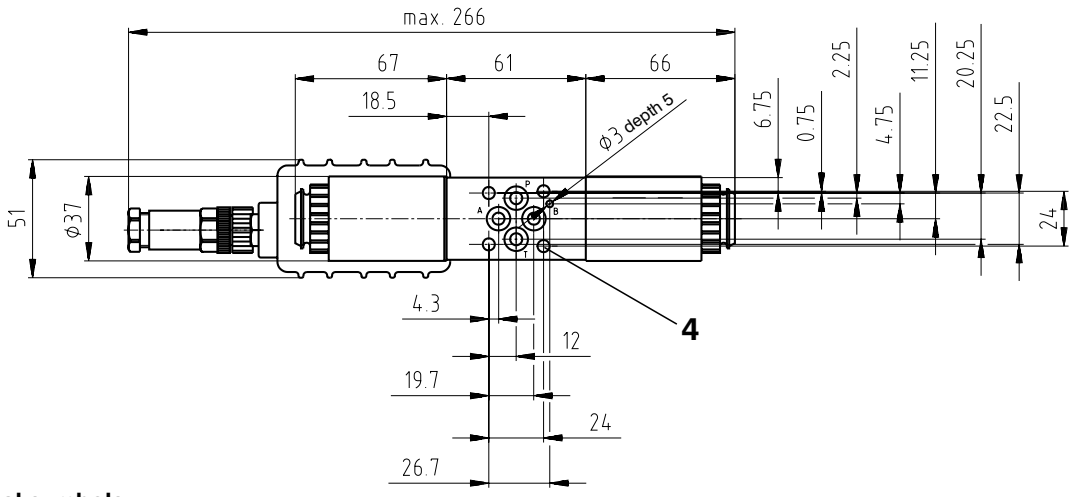


Required surface finish of interface

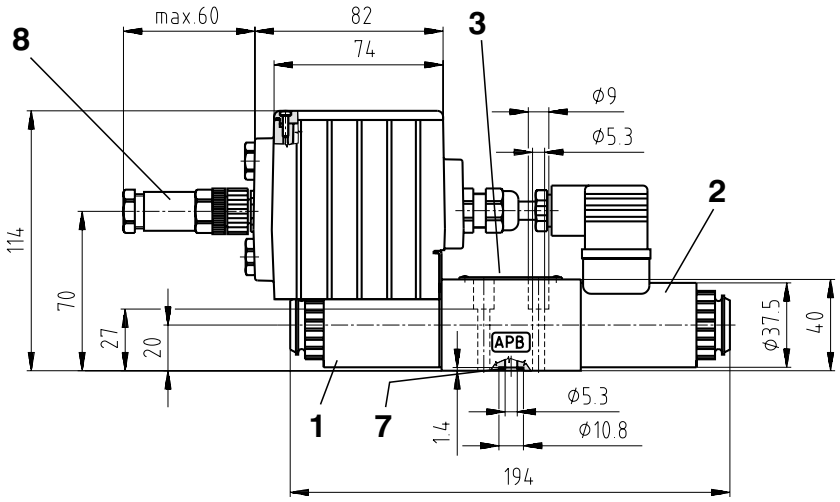
Valve Dimensions

Dimensions in millimetres

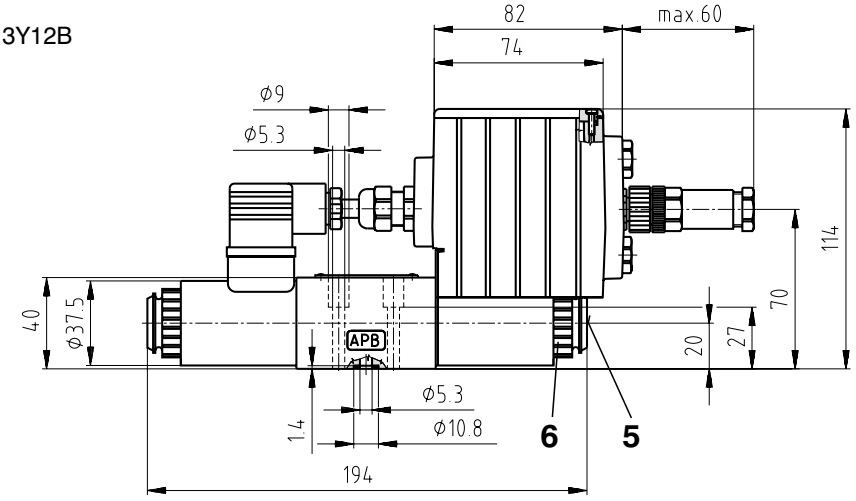
PRM4-043..../..-24E01



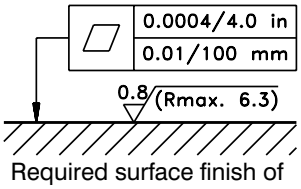
Functional symbols
3Z11, 3Z12, 3Y11, 3Y12



Functional symbols
3Z11B, 3Z12B, 3Y11B, 3Y12B



1 Solenoid a
2 Solenoid b
3 Name plate
4 4 mounting holes
5 Manual override
6 Solenoid fixing nut
7 Square ring 7.65 x 1.68 (4 pcs.), supplied in delivery packet
8 4-pin connector for supply voltage and control

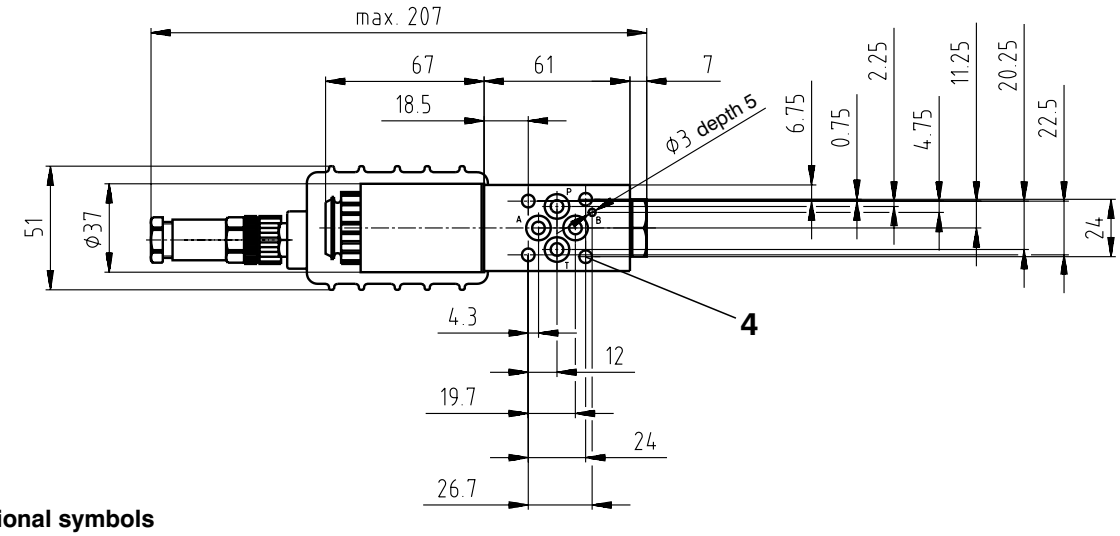


Required surface finish of interface

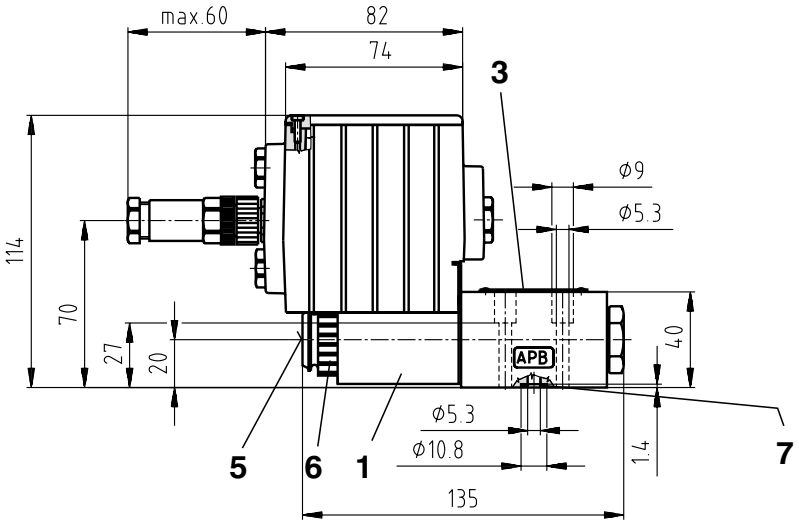
Valve Dimensions

Dimensions in millimetres

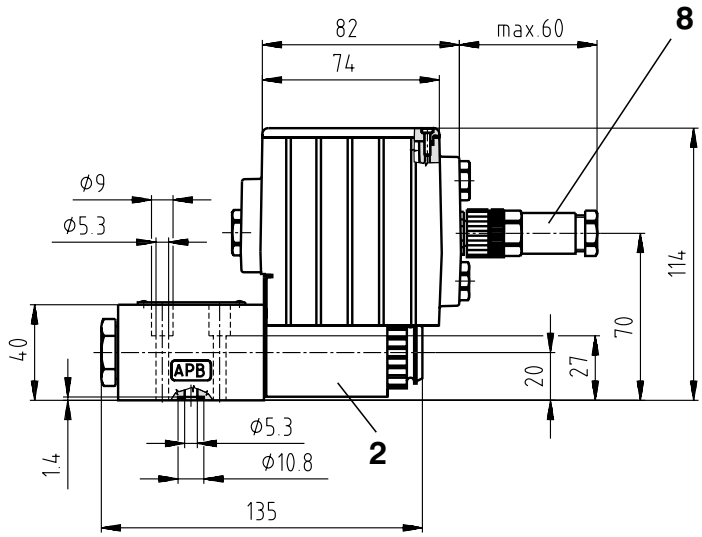
PRM4-042..../..-24E01



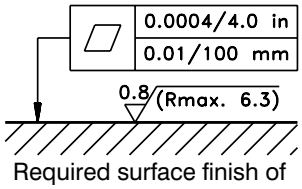
Functional symbols
2Z51, 2Y51



Functional symbols
2Z11, 2Y11



1 Solenoid a
2 Solenoid b
3 Name plate
4 4 mounting holes
5 Manual override
6 Solenoid fixing nut
7 Square ring 7.65 x 1.68 (4 pcs.), supplied in delivery packet
8 4-pin connector for supply voltage and control

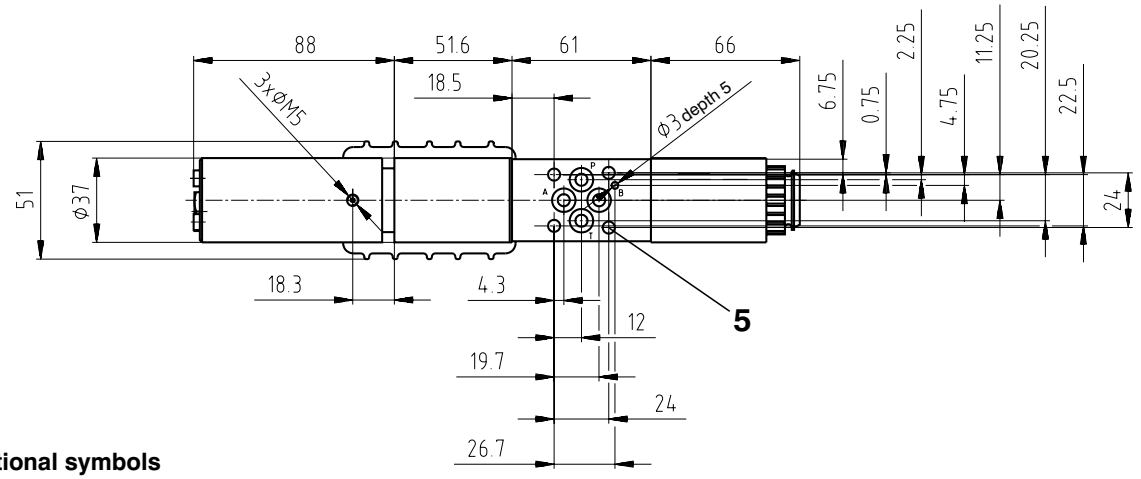


Required surface finish of interface

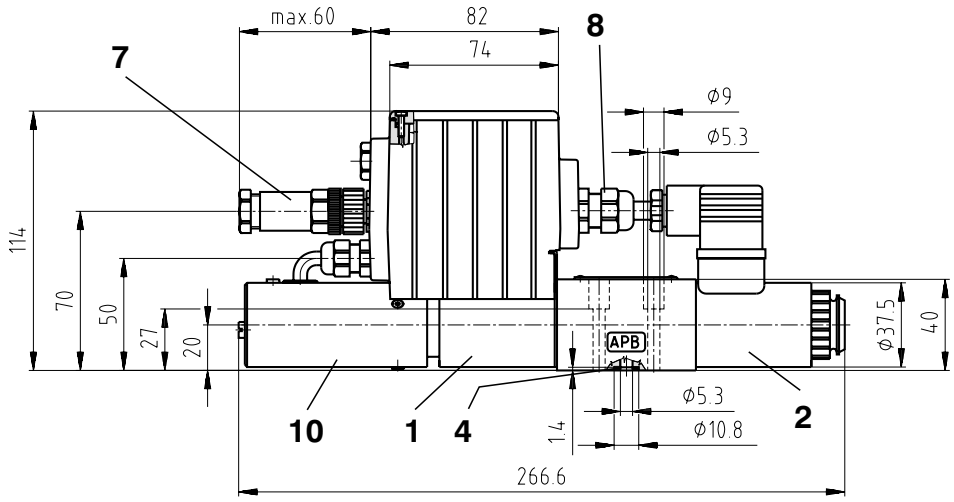
Valve Dimensions

Dimensions in millimetres

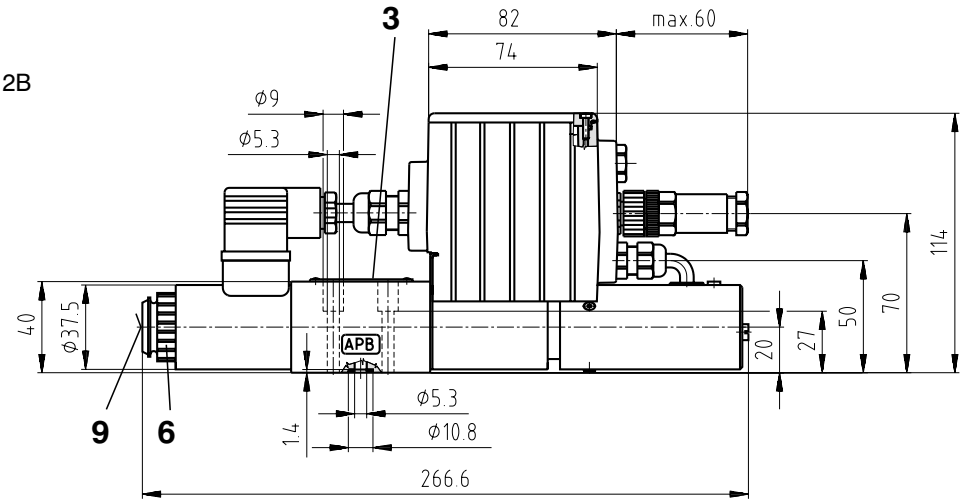
PRM4-043..../..-24E02S01



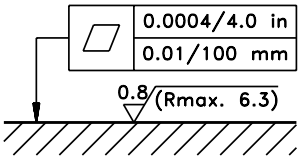
Functional symbols
3Z11, 3Z12, 3Y11, 3Y12



Functional symbols
3Z11B, 3Z12B, 3Y11B, 3Y12B



1 Solenoid a
2 Solenoid b
3 Name plate
4 Square ring 7.65 x 1.68 (4 pcs.), supplied in delivery packet
5 4 mounting holes
6 Solenoid fixing nut
7 5-pin connector for supply voltage and control
8 Pg9 bushing
9 Manual override
10 Position sensor

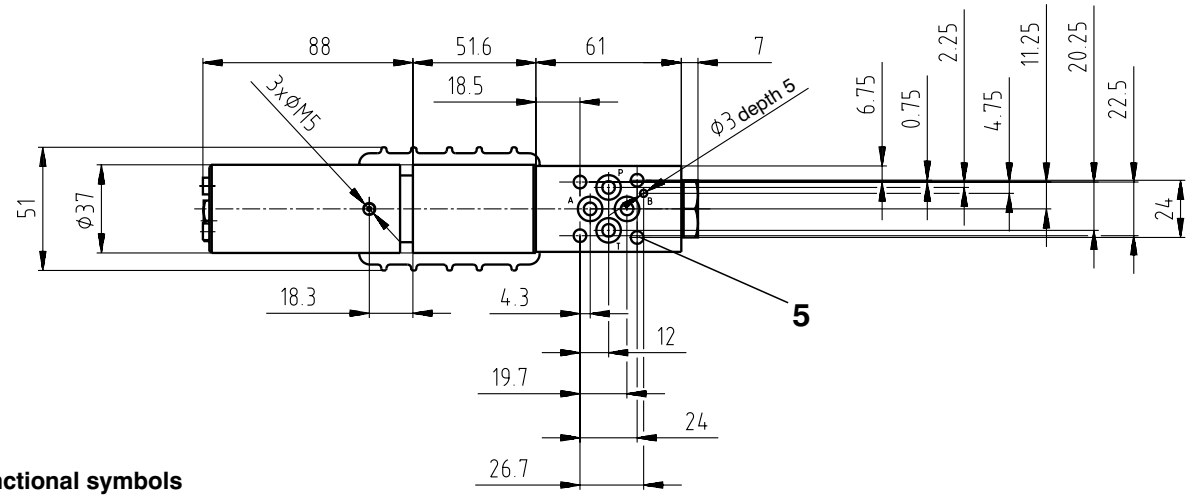


Required surface finish of interface

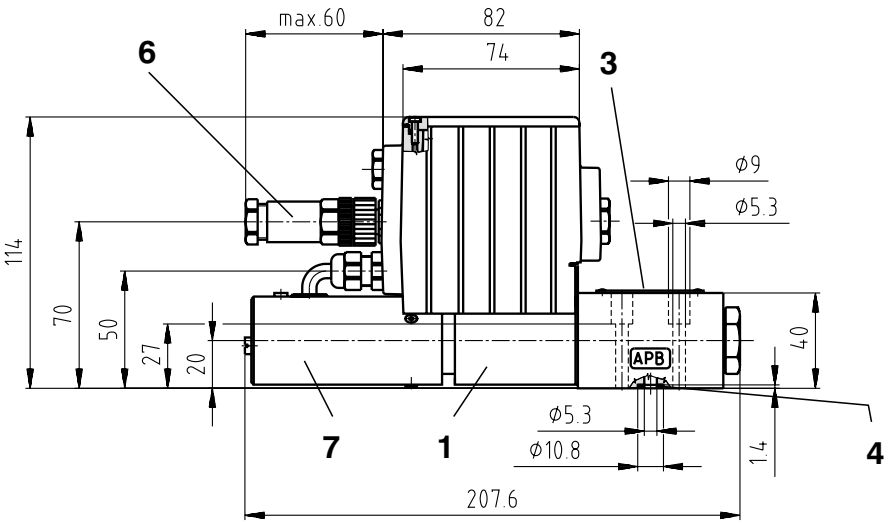
Valve Dimensions

Dimensions in millimetres

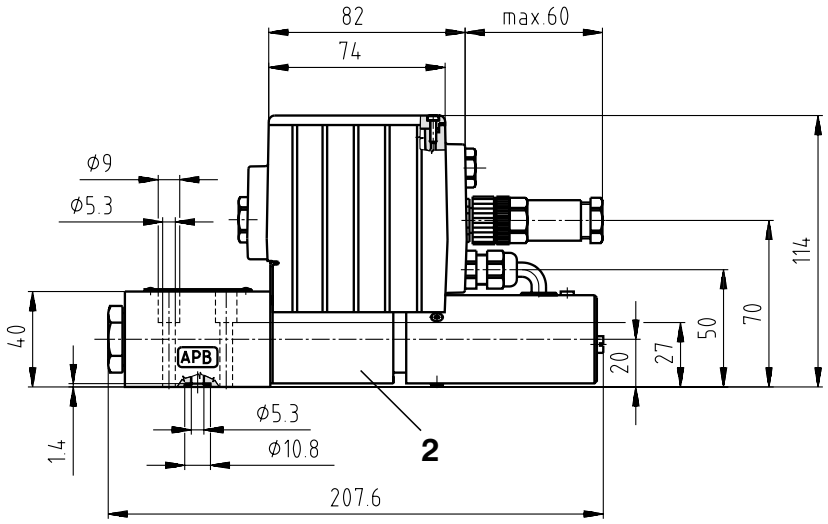
PRM4-042..../..-24E02S01



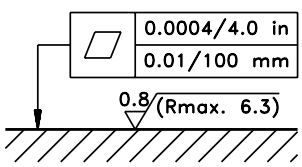
Functional symbols
2Z11, 2Y11



Functional symbols
2Z51, 2Y51



1 Solenoid a
2 Solenoid b
3 Name plate
4 Square ring 7.65 x 1.68 (4 pcs.), supplied in delivery packet
5 4 mounting holes
6 5-pin connector for supply voltage and control
7 Position sensor

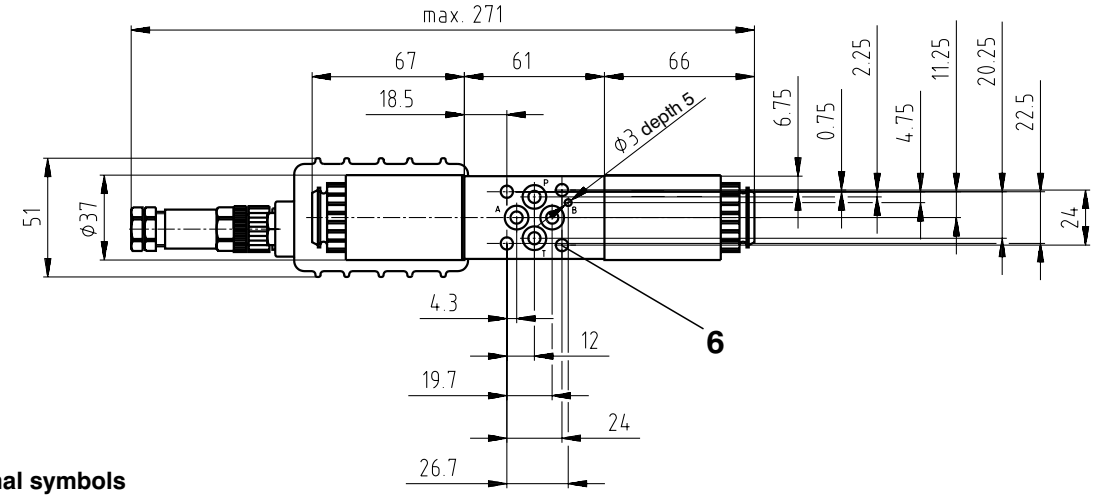


Required surface finish of interface

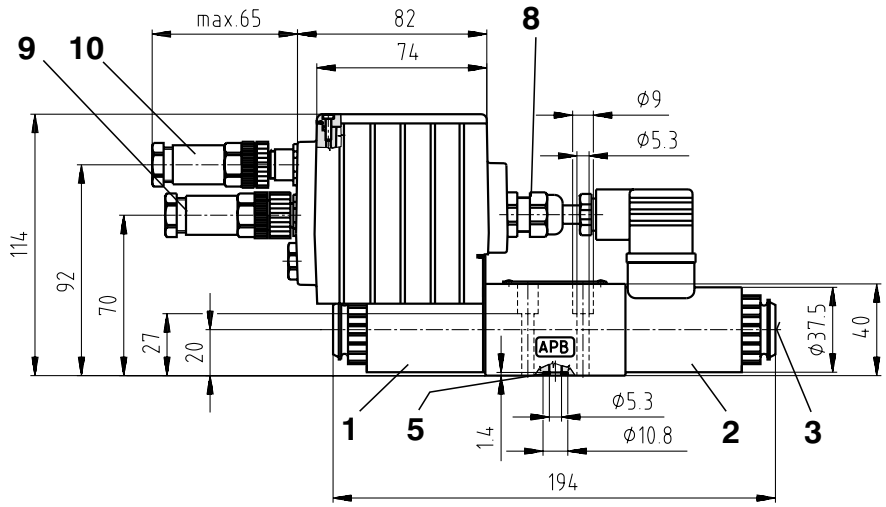
Valve Dimensions

Dimensions in millimetres

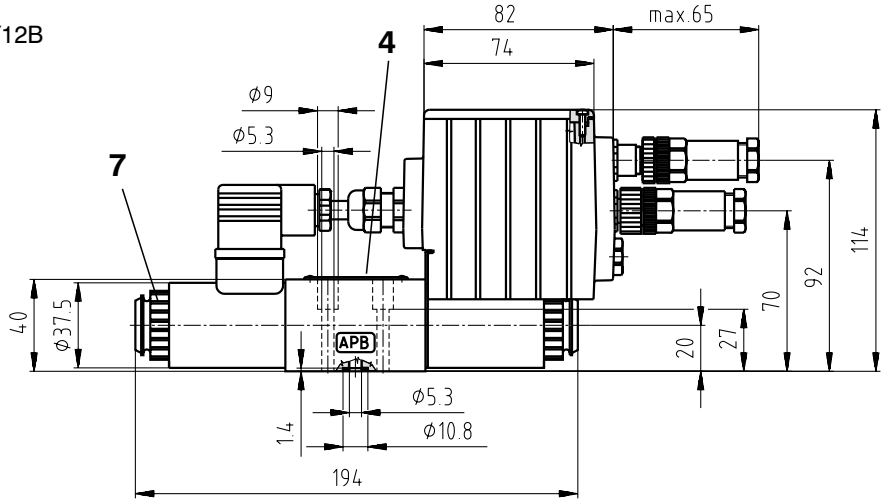
PRM4-043..../..-24E03



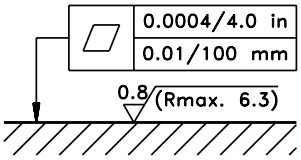
Functional symbols
3Z11, 3Z12, 3Y11, 3Y12



Functional symbols
3Z11B, 3Z12B, 3Y11B, 3Y12B



1 Solenoid a
2 Solenoid b
3 Manual override
4 Name plate
5 Square ring 7.65 x 1.68 (4 pcs.), supplied in delivery packet
6 4 mounting holes
7 Solenoid fixing nut
8 Pg9 bushing
9 4-pin connector for supply voltage and control
10 5-pin connector for input of external feedback

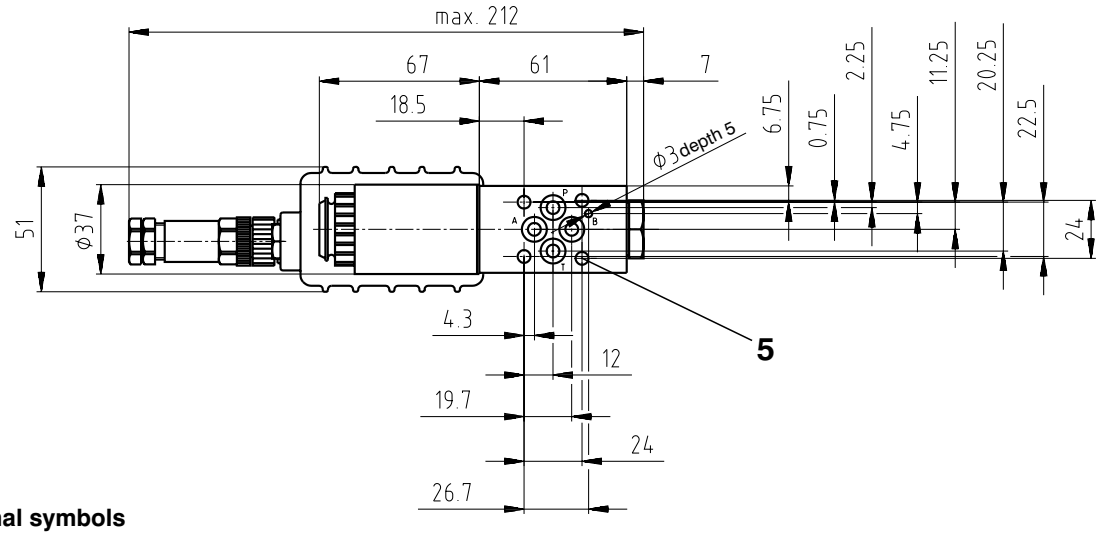


Required surface finish of interface

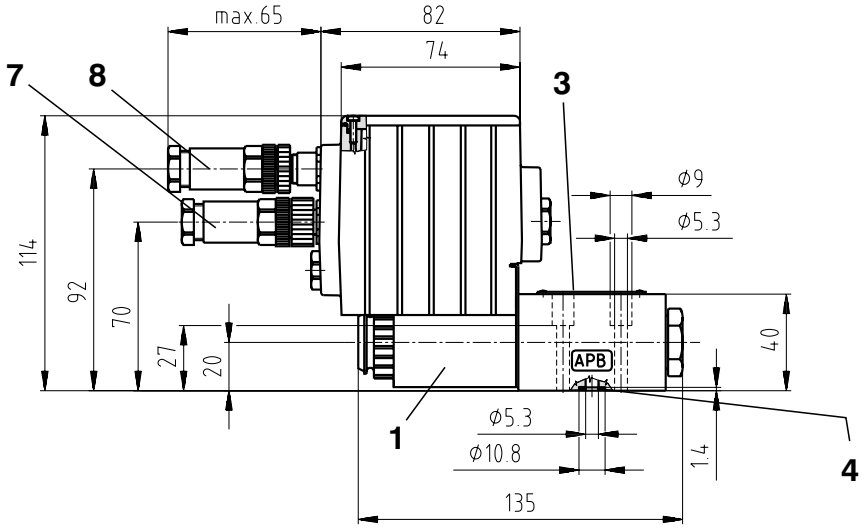
Valve Dimensions

Dimensions in millimetres

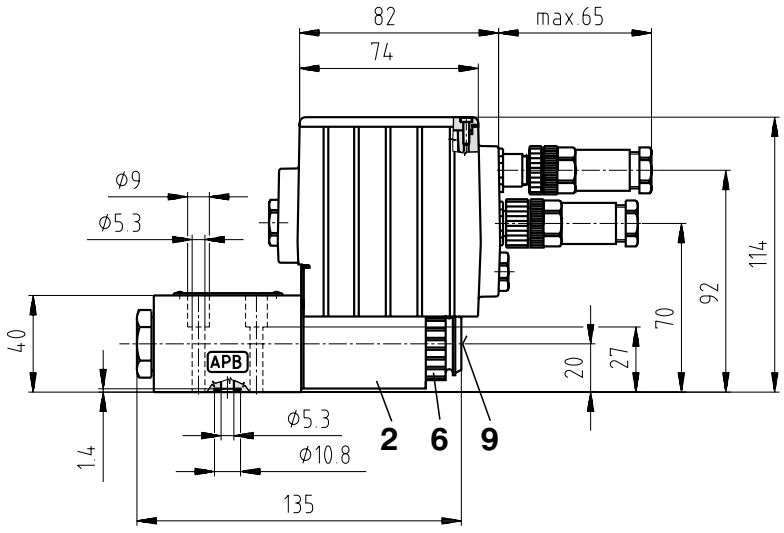
PRM4-042..../..-24E03



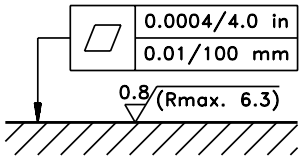
Functional symbols
2Z11, 2Y11



Functional symbols
2Z51, 2Y51



1 Solenoid a
2 Solenoid b
3 Name plate
4 Square ring 7.65 x 1.68 (4 pcs.), supplied in delivery packet
5 4 mounting holes
6 Solenoid fixing nut
7 4-pin connector for supply voltage and control
8 5-pin connector for input of external feedback
9 Manual override

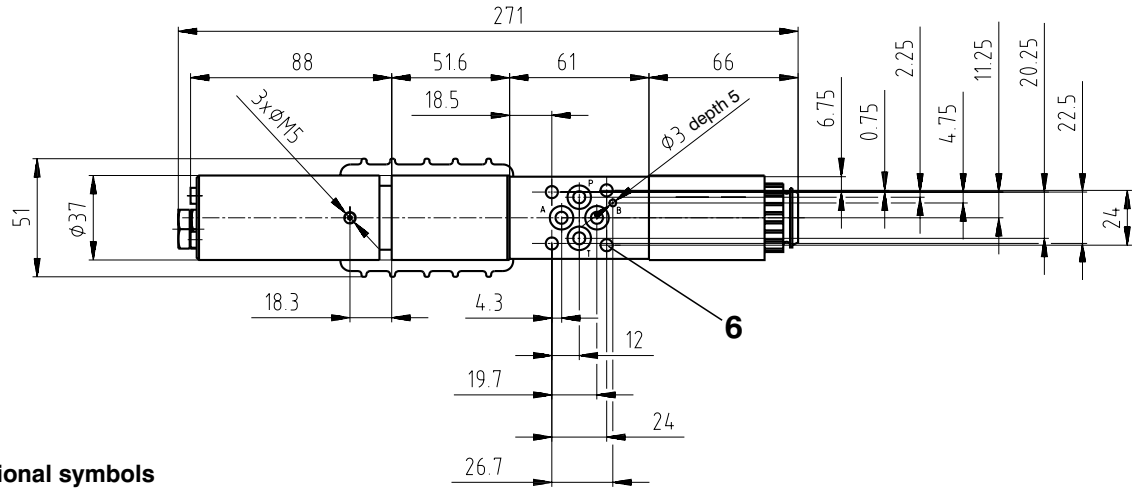


Required surface finish of interface

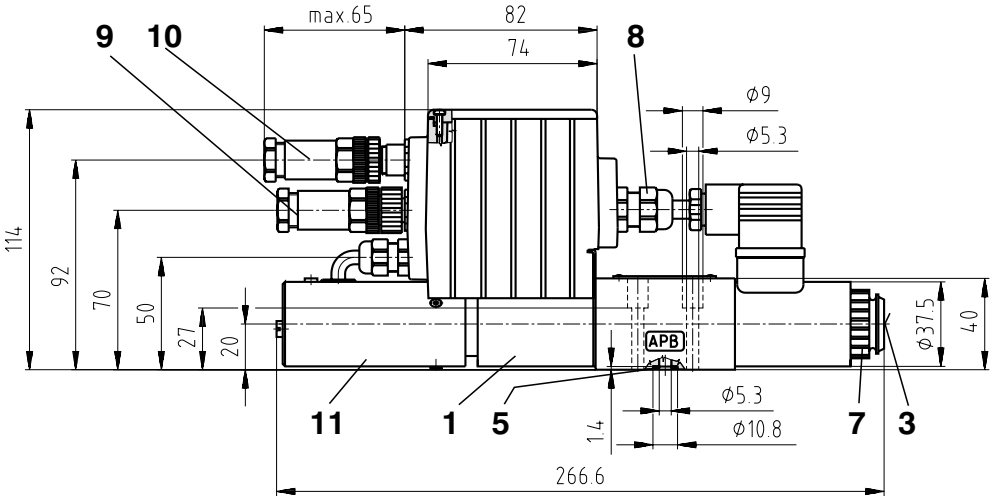
Valve Dimensions

Dimensions in millimetres

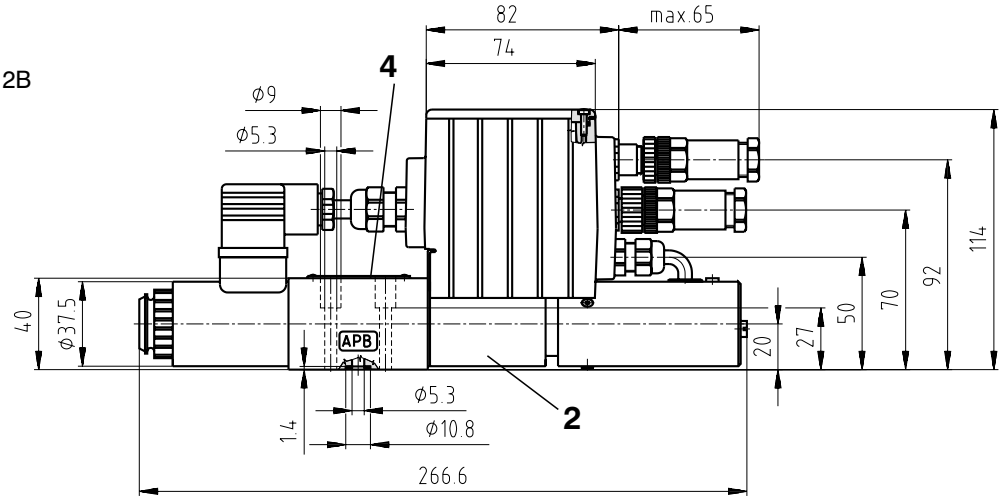
PRM4-043..../..-24E04S01



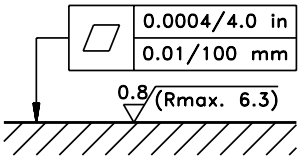
Functional symbols
3Z11, 3Z12, 3Y11, 3Y12



Functional symbols
3Z11B, 3Z12B, 3Y11B, 3Y12B



1 Solenoid a
2 Solenoid b
3 Manual override
4 Name plate
5 Square ring 7.65 x 1.68 (4 pcs.), supplied in delivery packet
6 4 mounting holes
7 Solenoid fixing nut
8 Pg9 bushing
9 5-pin connector for supply voltage and control
10 5-pin connector for input of external feedback
11 Position sensor

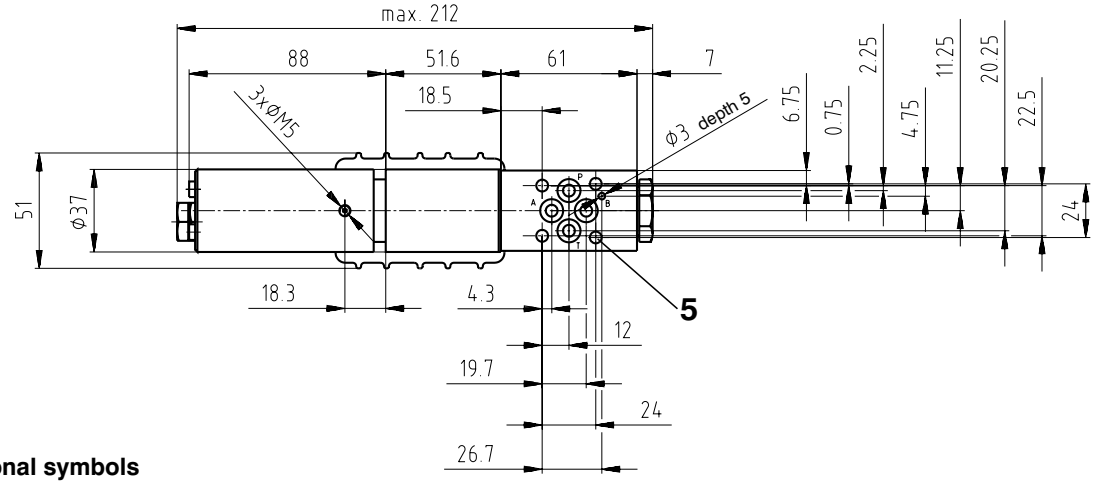


Required surface finish of interface

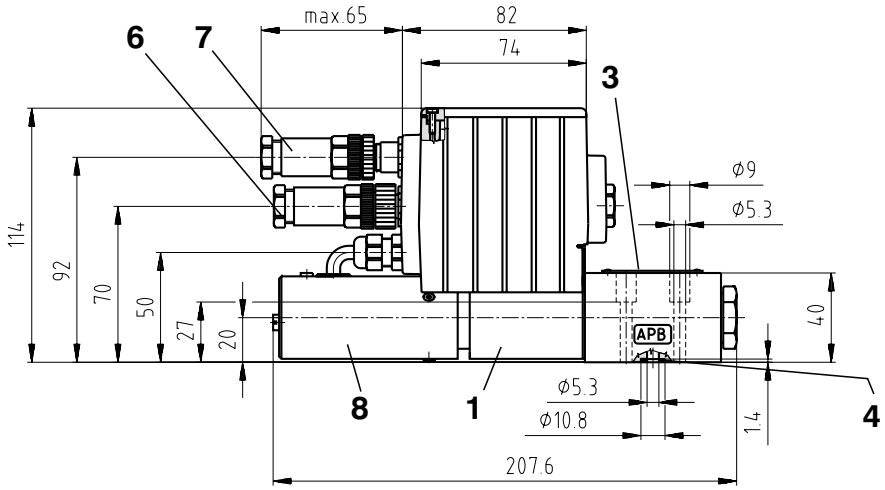
Valve Dimensions

Dimensions in millimetres

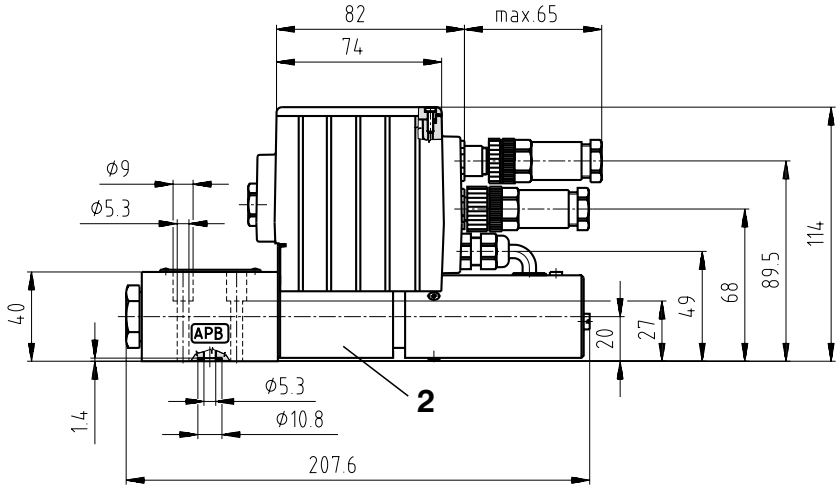
PRM4-042..../..-24E04S01



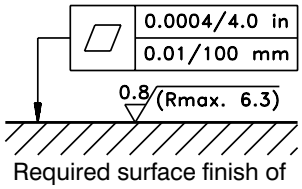
Functional symbols
2Z11, 2Y11



Functional symbols
2Z51, 2Y51

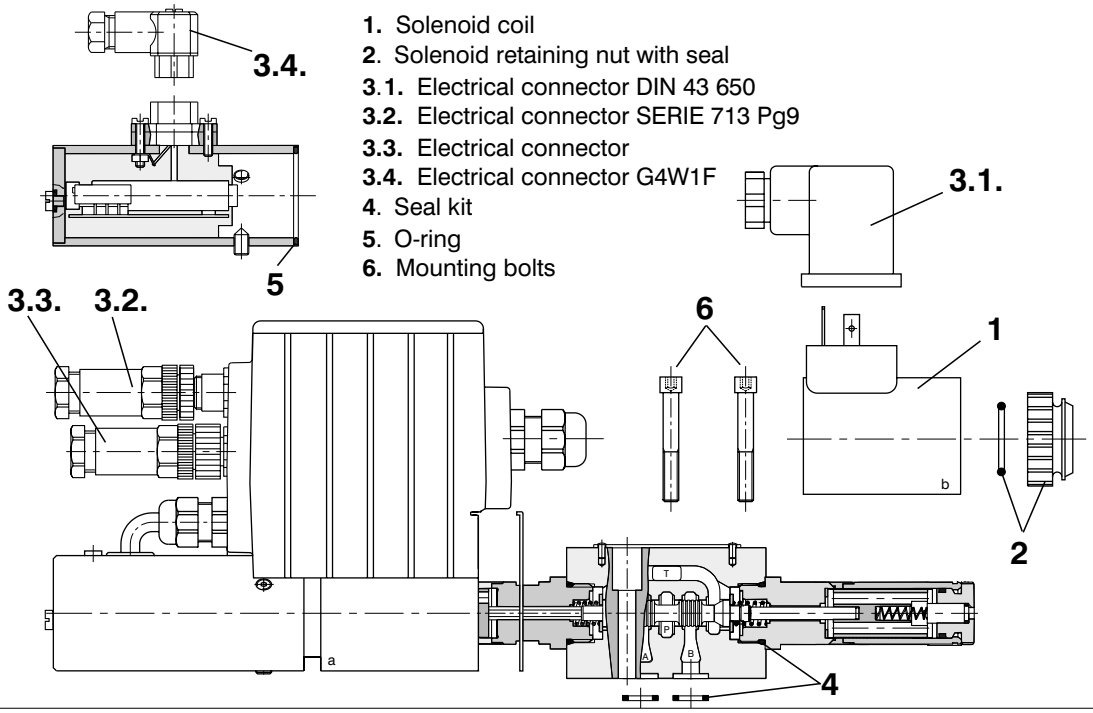


1 Solenoid a
2 Solenoid b
3 Name plate
4 Square ring 7.65 x 1.68 (4 pcs.), supplied in delivery packet
5 4 mounting holes
6 5-pin connector for supply voltage and control
7 5-pin connector for input of external feedback
8 Position sensor



Required surface finish of interface

Spare Parts



1. Solenoid coil
2. Solenoid retaining nut with seal
3.1. Electrical connector DIN 43 650
3.2. Electrical connector SERIE 713 Pg9
3.3. Electrical connector
3.4. Electrical connector G4W1F
4. Seal kit
5. O-ring
6. Mounting bolts

1. Solenoid coil

Solenoid Type	Ordering number
01200	936-0033
02400	936-0034

2. Solenoid retaining nut with seal

Type of the nut	Seal ring	Ordering number
Standard nut	18 x 1.5	486-9010

3.1. Electrical connector DIN 43 650

Type designation	Type	Maximum input voltage	Connector A grey	Connector B black
			Ordering number	
K5	without rectifiert - M16x1.5 (bushing bore ∅ 4-6 mm)	230 V DC	936-9906	936-9905

3.2. Electrical connector SERIE 713 Pg9

Ordering number	358359000002

3.3. Electrical connector

Valve model	Type of connector	Ordering number
E01, E03	ELKA 4012 Pg9	358358904012
E02S01, E04S01	ELKA 5012 Pg9	358358905012

3.4. Electrical connector G4W1F

Ordering number	358358932157

4. Seal kit

Type	Dimensions, number		Ordering number
Standard - NBR70	7.65 x 1.68 (4 pcs.)	16 x 1.8 (2 pcs.)	486-9002
Viton	7.65 x 1.68 (4 pcs.)	16 x 2 (2 pcs.)	486-9009

5. O-ring

Standard - NBR70	32 x 2 (1 pcs.)	273111014140

6. Mounting bolts

Dimensions, number	Tightening torque	Ordering number
M5 x 35 DIN 912-10.9 (4 pcs.)	5 Nm	486-9011

Caution!

- The packing foil is recyclable.
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law.

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www.argo-hytos.com

Proportional directional control valves with position sensor

PRM4-10

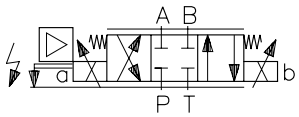
Size 10 • p_{max} up to 320 bar • Q_{max} up to 80 L/min

HA 5113
11/2001

Replaces
HA 5113 10/2001

Preliminary technical information

- ❑ **Compact design**
- ❑ **Operated by proportional solenoids**
- ❑ **High sensitivity and slight hysteresis**
- ❑ **Installation dimensions to ISO 4401 and DIN 24 340-A10**

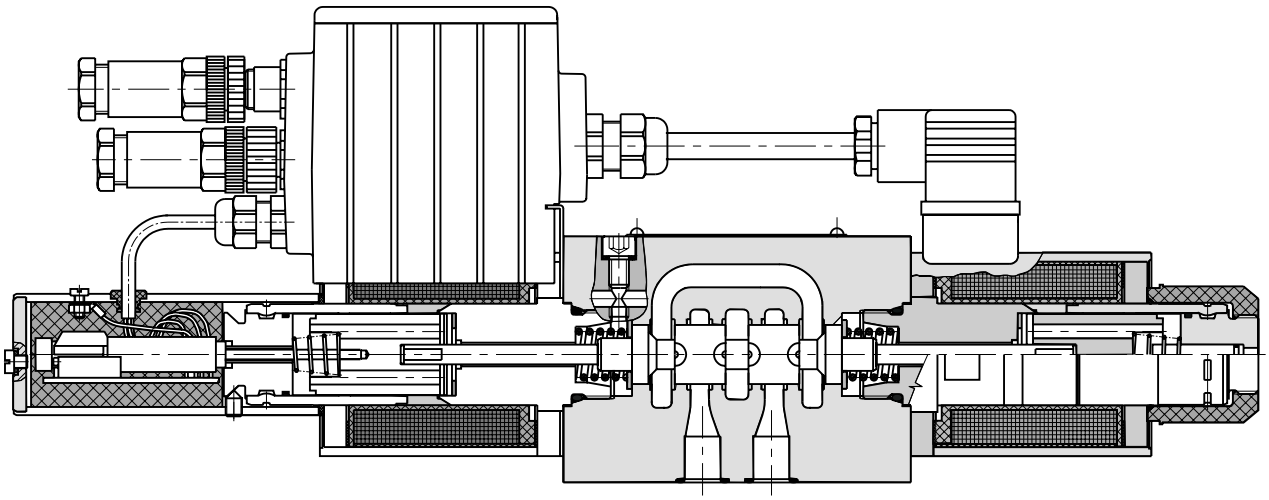


Functional Description

The proportional directional valve PRM4 consists of a cast iron housing, a special control spool, two centering springs with supporting washers, one or two proportional solenoids, a position sensor or, if need be, of a control box with digital electronics.
The measuring system of the position sensor consists of a differential transformer with core and from the evaluating electronic unit realized in hybrid technique.
With the model without integrated electronic unit, the electric connection of the solenoids is realized by the connector plug to DIN 43 650, with the position sensor output being connected by the G4W1F connector plug. Bought connectors belong to delivery.
The proportional valve with the integrated electronic unit comprises an electronic control box that is mounted, together with the position sensor, on either of the solenoids. The connection of the position sensor with the control box is provided by a cable. With the model with two solenoids, the solenoid mounted opposite the control box is connected with the control box by means of a DIN 43 650 connector. The connection of the supply voltage, control signal, program input and external output of the position sensor is realized by a 5-pin connector (ELKA 5012). The connection of the external feedback is provided by a 5-pin connector, which also has three supply voltages +24 V, +10V and -5V for an external sensor available. The solenoid coils, including the control box, can be turned in a range of ± 90°.

The digital control unit enables the proportional valve to be controlled on the basis of data required from two feedback circuits. In this case the proportional valve can be used as follows:
1. Proportional directional valve
2. Only with the internal feedback from the spool position sensor.
3. Only with the external feedback (pressure sensor, position sensor, etc.).
4. With internal and external feedback.

The digital control unit utilizes the pulse-with-modulation (PWM) and supplies the solenoids with current proportional to the control signal. The supply current is additionally modulated with a dither frequency. The individual functional parameters are adjusted through software by means of a special programmer, or by means of a computer through the RS 232 interface. The correct function of the digital control unit is signaled by a green LED. The incorrect function (failure) is indicated by a red LED.
As a standard, the proportional valve is delivered with factory setting. The model including also an external feedback shall be consulted with the manufacturer.
With the basic surface treatment, the valve housing is phosphate coated, whereas the surfaces of the solenoids are zinc coated.

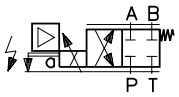
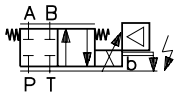
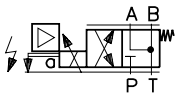
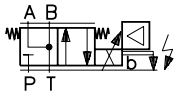
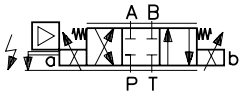
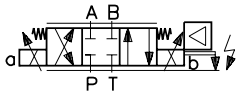
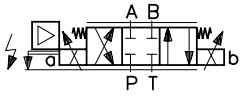
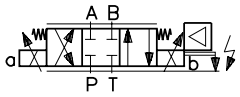
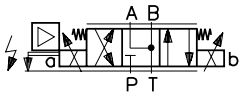
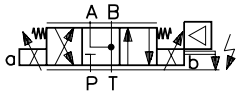
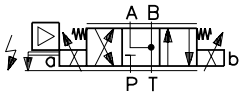
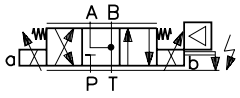


Ordering Code

PRM4-10 □ / □ - □ □ □

Proportional directional control valve with position sensor

Nominal size **10**

	**2Z51**
	**2Z11**
	**2Y51**
	**2Y11**
	**3Z11**
	**3Z11B**
 $\frac{q_A}{q_B} = \frac{1}{2}^*$	**3Z12**
 $\frac{q_A}{q_B} = \frac{1}{2}^*$	**3Z12B**
	**3Y11**
	**3Y11B**
 $\frac{q_A}{q_B} = \frac{1}{2}^*$	**3Y12**
 $\frac{q_A}{q_B} = \frac{1}{2}^*$	**3Y12B**

Seals

without designation	NBR
V	FPM (Viton)

Model

S01	position sensor with voltage outlet
S02	position sensor with current outlet
E01	proportional directional valve
E02S01	proportional directional valve with position feedback
E03	proportional directional valve with external feedback
E04S01	proportional directional valve with position and external feedback

On model E, the position sensor without connector is always at the control box side. The model without the el. box is equipped with connector.

Nominal solenoid supply voltage

12	supply voltage 12V DC (valid without integrated electronic unit with position sensor with voltage outlet)
24	supply voltage 24 V DC

Nominal flow rate at Δp = 10 bar

30	flow 30 L/min
60	flow 60 L/min

***** Model for cylinders with asymmetric piston rod, piston area ratio 1:2

Technical Data

Nominal size	mm	10
Max. operating pressure at ports P, A, B	bar	320
Max. operating pressure at port T	bar	210
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP - RP 91H in viscosity classes ISO VG 32, 46 a 68.
Fluid temperature range (NBR/Viton)	°C	-30 ... +80 / -20 ... +80
Ambient temperature max.	°C	up to +50
Viscosity range	mm^2/s	20 ... 400
Maximum degree of fluid contamination		Class 21/18/15 to ISO 4406 (1999).
Nominal flow at Δp = 10 bar	L/min	30 60
Hysteresis - open loop	%	< 6
Hysteresis - closed position loop	%	< 0.5
Weight - PRM4-102 - PRM4-103	kg	5.6 7.1
Mounting position		optional
Enclosure type		IP65
Vibrations		Oscillation, sinusoidal to IEC 68-2-6 Impact test to IEC 68-2-27
Interference immunity		Burst on leads to EN 61000-4-4 HF radiation received to EN 61000-4-3 HF feeding on leads to EN 61000-4-6 ESD to EN 61000-4-2
Radiated interference		Lead related emission to EN 55011 Radiated emission to EN 55011

Technical data of position sensor - voltage outlet

Operating pressure	bar	max. 320, static
Electric connection		electrical connector G4W1F Hirschmann *
Contact assignment		1 - operating voltage 2 - output signal 3 - ground 4 - not used
Enclosure type to DIN 40050		IP 65
Measured distance	mm	8
Operating voltage	V	9.6 ...30 DC
Linearity error	%	< 1
Current consumption at load current of 2 mA	mA	< 15
Output voltage	V	0 ... 5
Output signal range used: 0 Position 1 solenoid - displacement 3.8 mm 2 solenoids - displacement ±3.8 mm	V	 2.5 0.125 - 2.5 0.125 - 4.875
Max. load current	mA	2
Noise voltage - at load current 0 - at load current of 2 mA	mV_{p-p}	 < 20 < 15
Additional output signal error at: Temperature change between 0 ... 80 °C Between 0 ... -25 °C		 typical < 0.2% / 10K max. 0.5% / 10K max. 0.5% / 10K
Load change from 0 to 2 mA	%	0.1
Input voltage change from 9.6 V to 14.4 V from 14.4 V to 30 V	%	 < 0.1 < 0.25
Long-term drift (30 days)	%	< 0.25
Cut-off frequency 3 dB fall in amplitude Frequency 90°	Hz	 > 600 > 600

* Only for S01 and S02 model.

Technical data of position sensor - current outlet

Linearity	%	< 1
Operating pressure	bar	to 320, static
Electrical connection		electrical connector G4W1F Hirschmann *
Contact assigment		1 - operating voltage 2 - output signal 3 - ground 4 - not used
Enclosure type to DIN 40050		IP 65
Operatin voltage	V	20 ... 30 DC
Current	mA	< 35
Output signal range	mA	5 ... 19
Output signal range used: 0 position 1 solenoid - stroke (Hub 3.8 mm) 2 solenoid - stroke (Hub ±3.8 mm)	mA	 12 4.4 ... 12 4.4 ... 19.6
Additional output signal error: - at temperature change from +10 ... 55 °C - at imjpedance change from 50% - at input voltage change in the range of operating voltage		 0.2% / 10K ≤ 0.1% ≤ 0.05%
Impedance	Ω	≤ 500
Output signal ripple	mA R.M.S.	≤ 0,02
Limit frequency at 3 dB amplitude decrease	Hz	≥ 800

* Only for S01 and S02 model.

Technical Data of Proportional Solenoid

Type of coil	V	12 DC	24 DC
Limiting current	A	1.9	1.1
Resistance at 20°C	Ω	4.73	13.9

Electronics data

Supply voltage with polarity inversion protection	V	24 DC ±20% (residual ripple < 5%)
Input: control point		±10V, 0 ... 10V, ±10mA, 4 ...20mA, 0 ... 20mA
Input: actual value (valve spool position)		0 ... 5V
Input: actual value (external feedback)		0 ... 10V, 2 ... 10V, 4 ... 20mA, 0 ... 20mA
Output: solenoids		2 PWM output stages up to max. 2.5 A
PWM frequency	kHz	13
Controller cycle time	ms	1.3
Adjustment of parameters		By means of a manual programmer or a PC - Company software (RS232)

Accessories

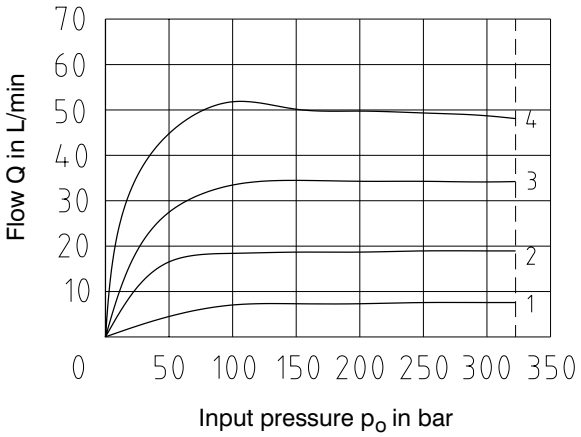
Order number	Content
566-9510	Connecting cable to PC, CD-ROM with software and guidebook
566-9525	Hand programmer, connecting cable to programmer, CD-ROM with software and guidebook
566-9540	Hand programmer
566-9550	Connecting cable to PC
566-9555	Connecting cable to hand programmer

Limit Power

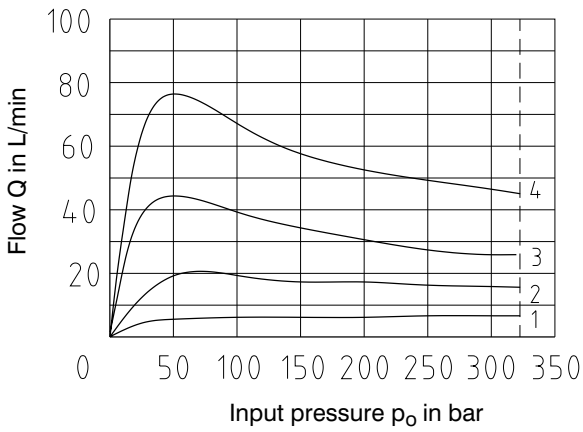
Measured at ν = 35 mm^2/s P → A / B → T or P → B / A → T

Only for E01 model

Nominal flow 30 L/min



Nominal flow 60 L/min

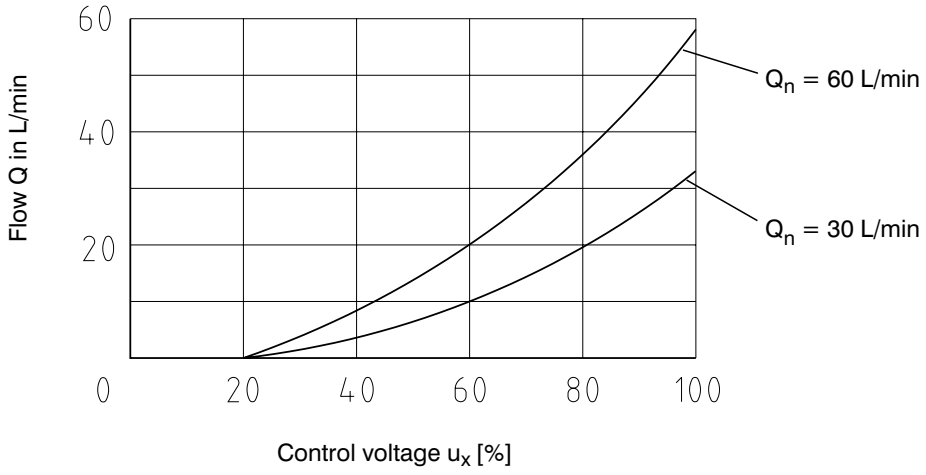


Solenoid current:
1 = 40 %
2 = 60 %
3 = 80 %
4 = 100 %

Flow Characteristics

Measured at input pressure p_o = 10 bar, ν = 35 mm^2/s

Only for E01 model



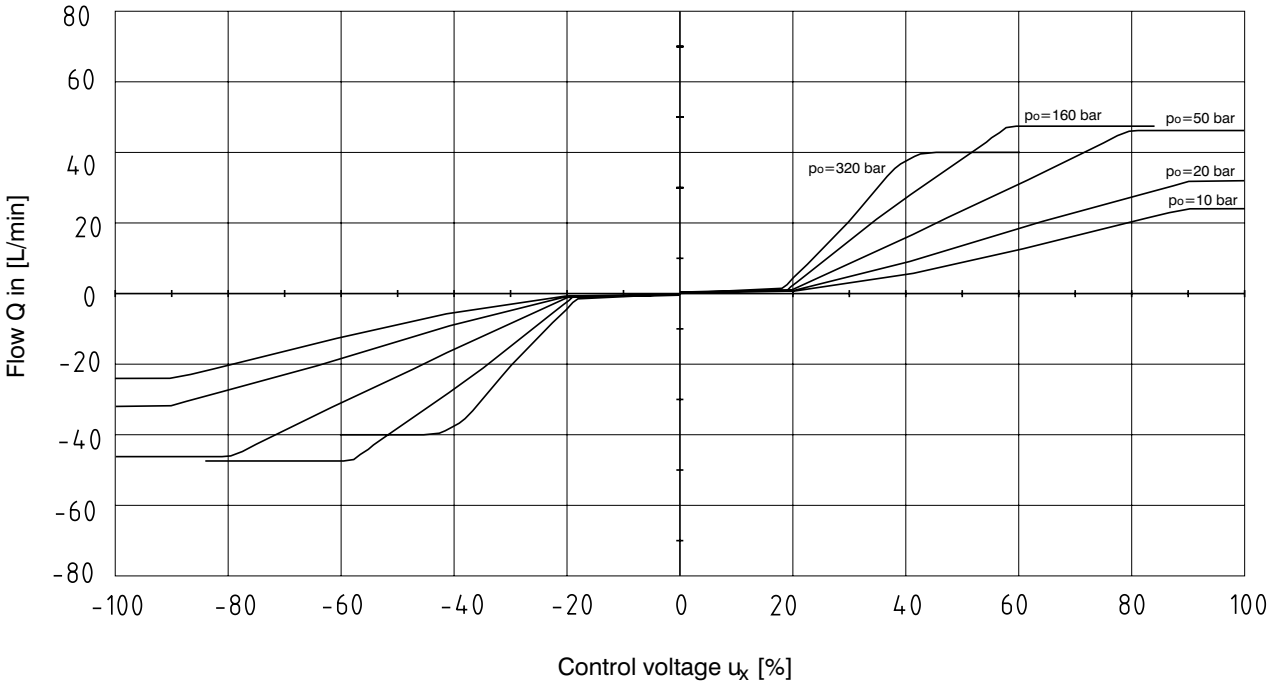
Flow Characteristics

Measured at $\nu = 35\ mm^2/s$ P → A / B → T or P → B / A → T

p_o - input pressure

Only for E02S01 model

Q_n = 30 L/min



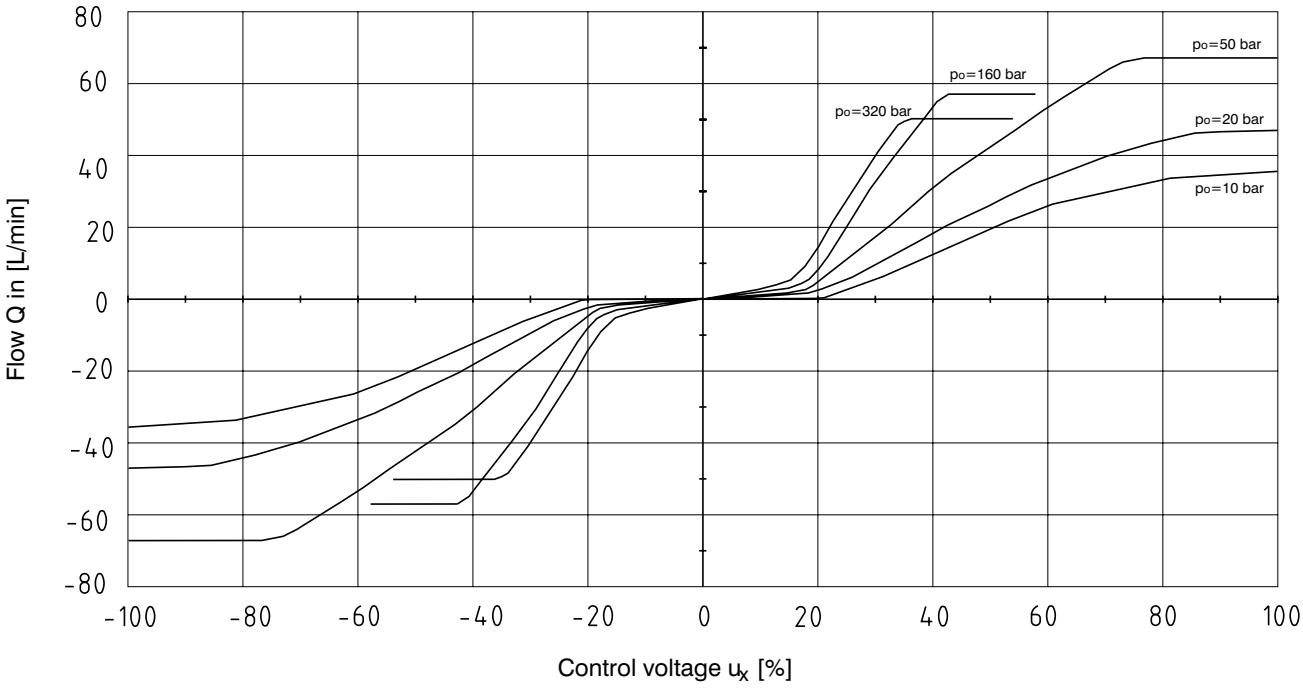
Flow Characteristics

Measured at $\nu = 35\ mm^2/s$ P → A / B → T or P → B / A → T

p_o - input pressure

Only for E02S01 model

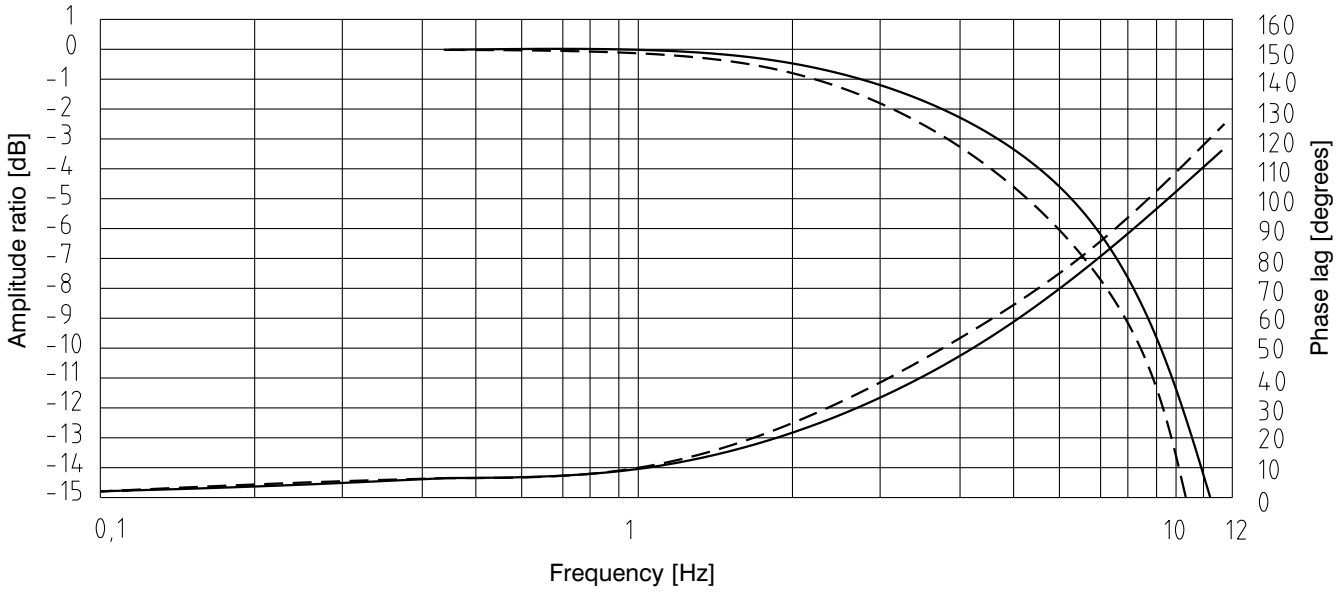
Q_n = 60 L/min



Frequency Reponse

closed position loop

------- signal 25%
——— signal 90%



Connector connection

Connector K1 *

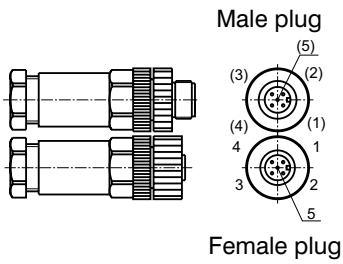
PIN	Technical data	Description
1	Power supply input	+24 V DC
2	Control	according to configuration
3	Ground	0 V
4	Programming	-
5	Output position sensor	0 ... 5 V

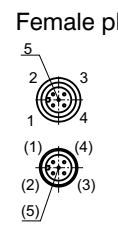
Connector K2 (Model E03 and E04S01)

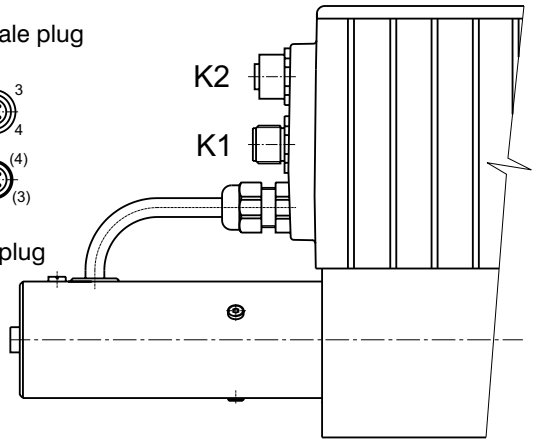
PIN	Technical data	Description
1	Power supply output	+ 24 V DC / max.100 mA
2	Input signal of external feedback	according to configuration
3	Ground	0 V
4	Power supply output	-5 V DC / max.15 mA
5	Power supply output	+10 V DC / max.10 mA

Manufactory valve configuration

Item	Model							
	E01		E02S01		E03		E04S01	
	1 Magnet	2 Magnet	1 Magnet	2 Magnet	1 Magnet	2 Magnet	1 Magnet	2 Magnet
Control signal	0...10 V	± 10 V	0...10 V	± 10 V	0...10 V	± 10 V	0...10V	± 10 V
Signal external feedback	-	-	-	-	0...10 V			
Output position sensor spool	-	-	0...5 V		-		0...5 V	





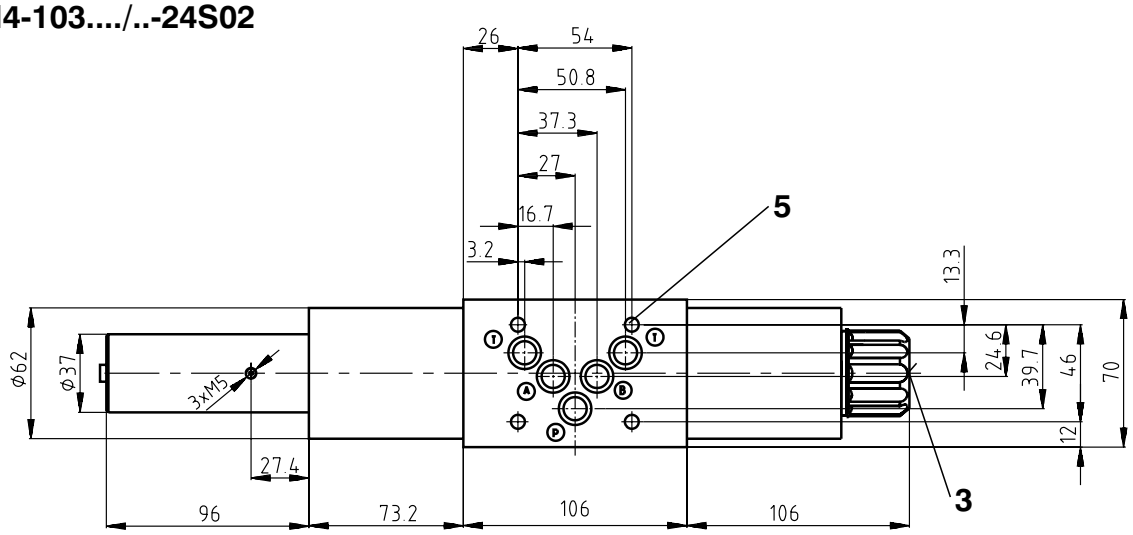


* For models E01 and E03 - 4 pole connector only (without pin No. 5 - outlet of position sensor)

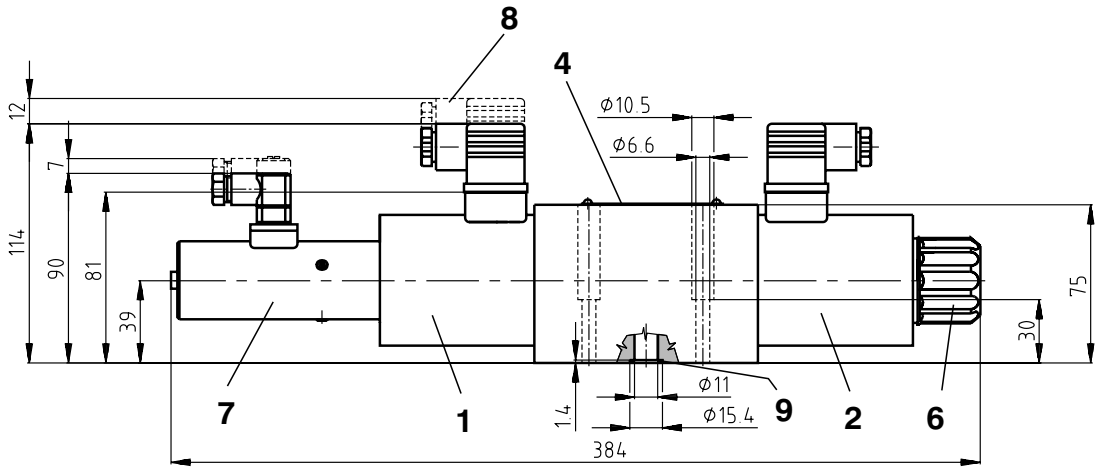
Valve Dimensions

Dimensions in millimeters

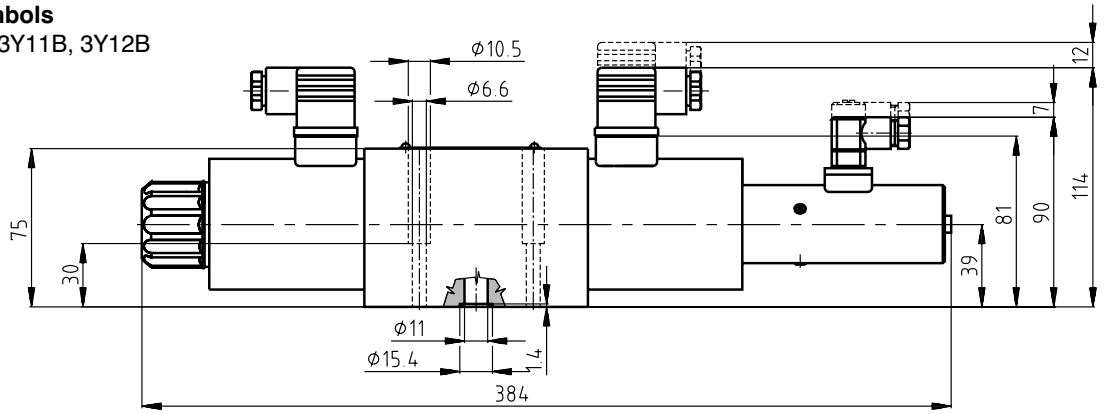
PRM4-103..../..-..S01
PRM4-103..../..-24S02



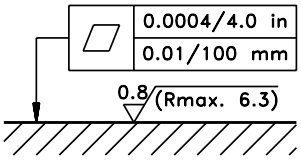
Functional symbols
3Z11, 3Z12, 3Y11, 3Y12



Functional symbols
3Z11B, 3Z12B, 3Y11B, 3Y12B



1 Solenoid a
2 Solenoid b
3 Manual overide
4 Name plate
5 4 mounting holes
6 Solenoid fixing nut
7 Position sensor
8 Space required to remove connector
9 Square ring 12.42 x 1.68 (5 pcs.), supplied in delivery packet

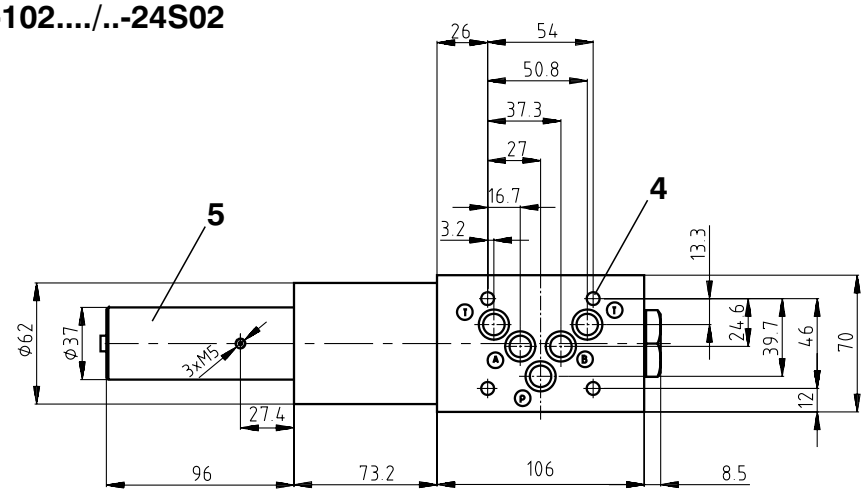


Required surface finish of interface

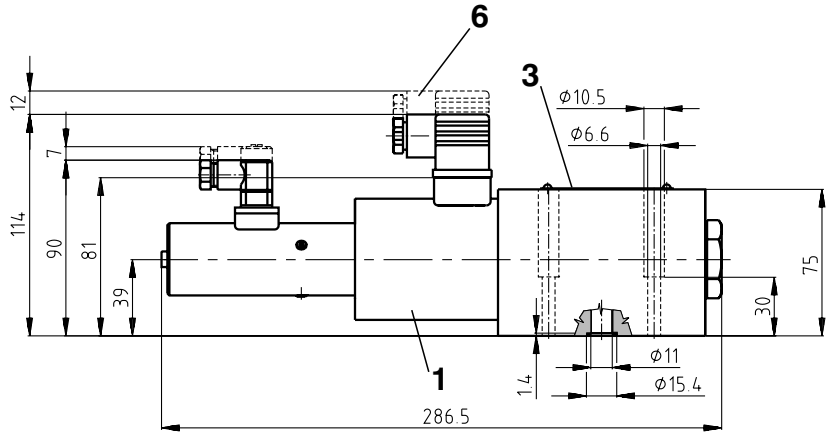
Valve Dimensions

Dimensions in millimeters

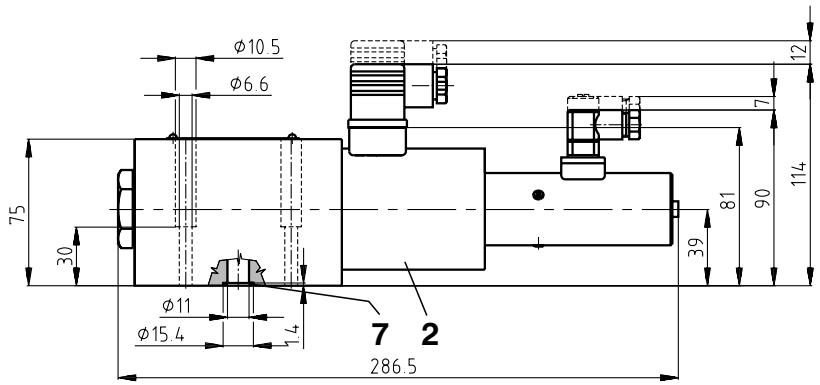
PRM4-102..../..-..S01
PRM4-102..../..-24S02



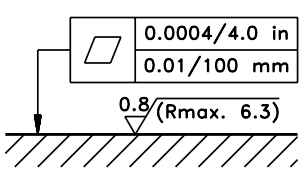
Functional symbols
2Z51, 2Y51



Functional symbols
2Z11, 2Y11



1 Solenoid a
2 Solenoid b
3 Name plate
4 4 mounting holes
5 Position sensor
6 Space required to remove connector
7 Square ring 12.42 x 1.68 (5 pcs.), supplied in delivery packet

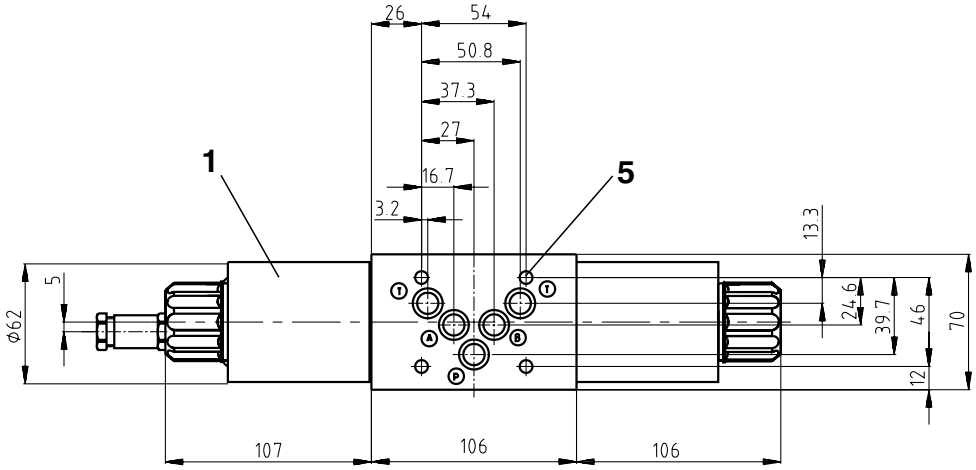


Required surface finish of interface

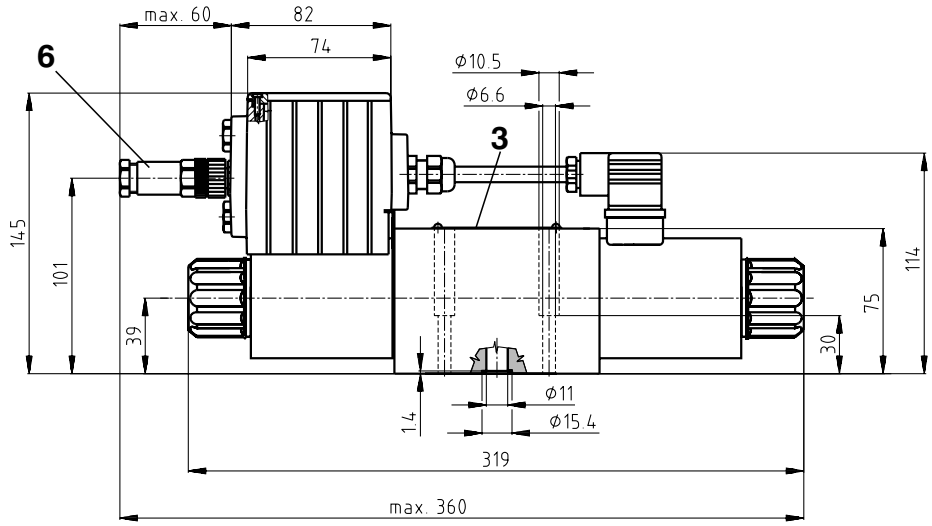
Valve Dimensions

Dimensions in millimeters

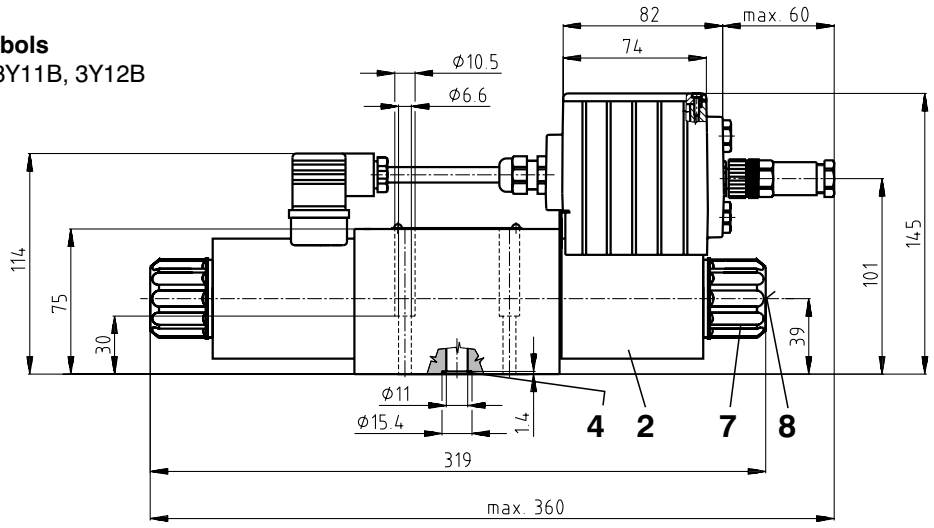
PRM4-103..../..-24E01



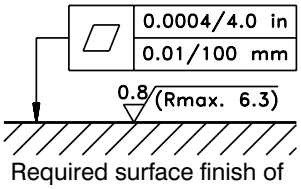
Functional symbols
3Z11, 3Z12, 3Y11, 3Y12



Functional symbols
3Z11B, 3Z12B, 3Y11B, 3Y12B



1 Solenoid a
2 Solenoid b
3 Name plate
4 Square ring 12.42 x 1.68 (5 pcs.), supplied in delivery packet
5 4 mounting holes
6 4-pin connector for supply voltage and control
7 Solenoid fixing nut
8 Manual override

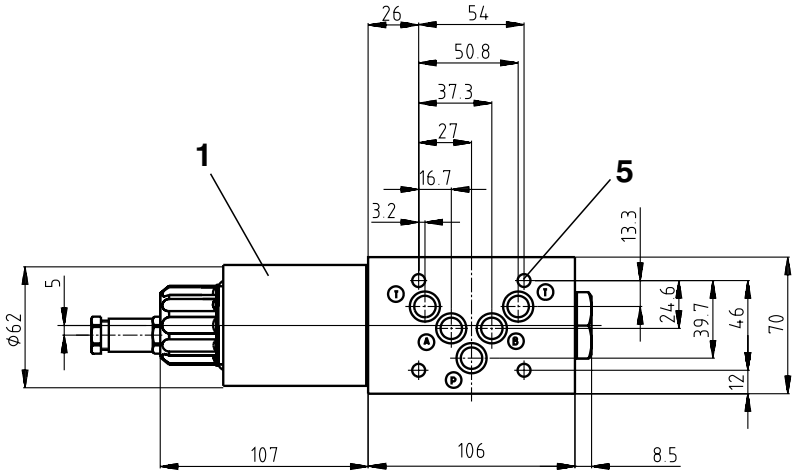


Required surface finish of interface

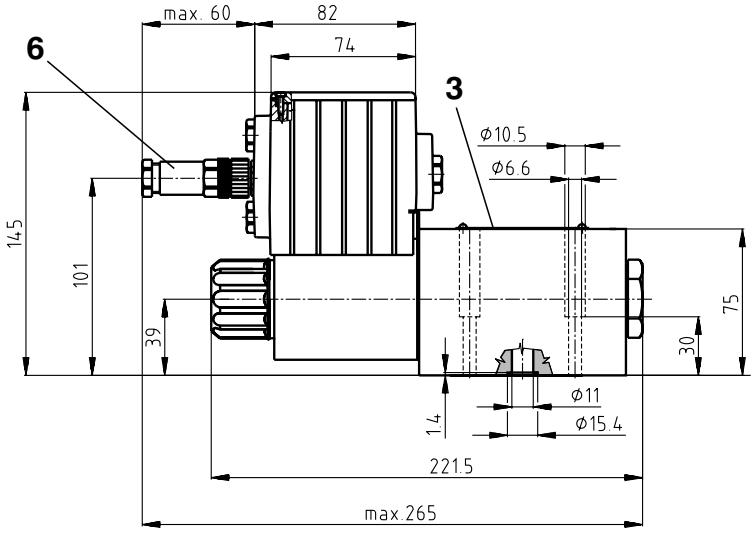
Valve Dimensions

Dimensions in millimeters

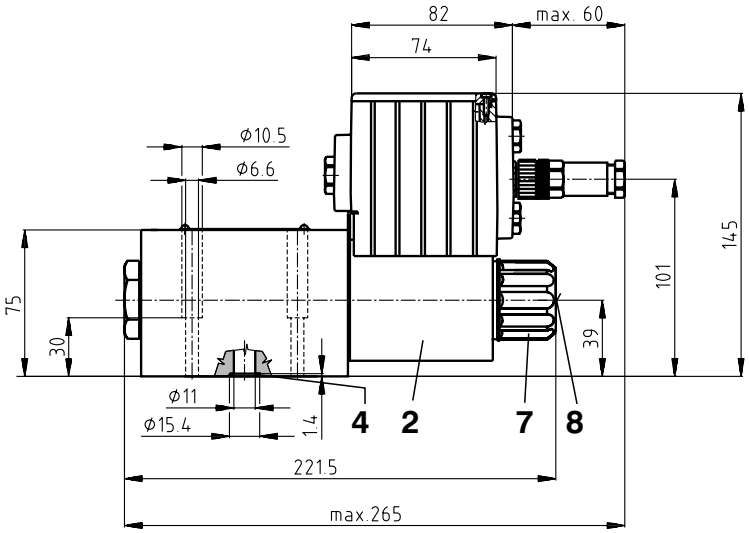
PRM4-102..../..-24E01



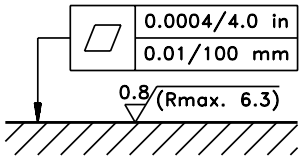
Functional symbols
2Z51, 2Y51



Functional symbols
2Z11, 2Y11



1 Solenoid a
2 Solenoid b
3 Name plate
4 Square ring 12.42 x 1.68 (5 pcs.), supplied in delivery packet
5 4 mounting holes
6 4-pin connector for supply voltage and control
7 Solenoid fixing nut
8 Manual override

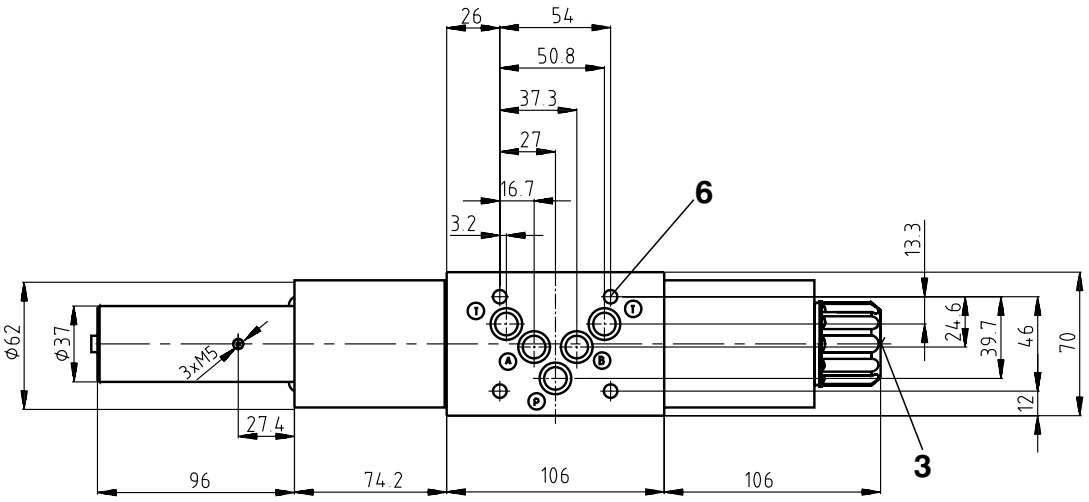


Required surface finish of interface

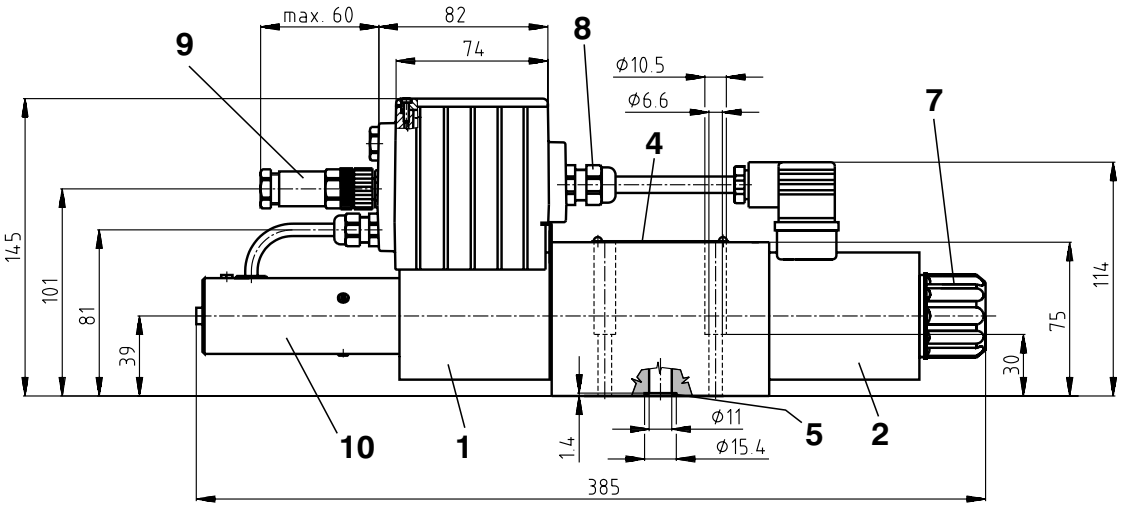
Valve Dimensions

Dimensions in millimeters

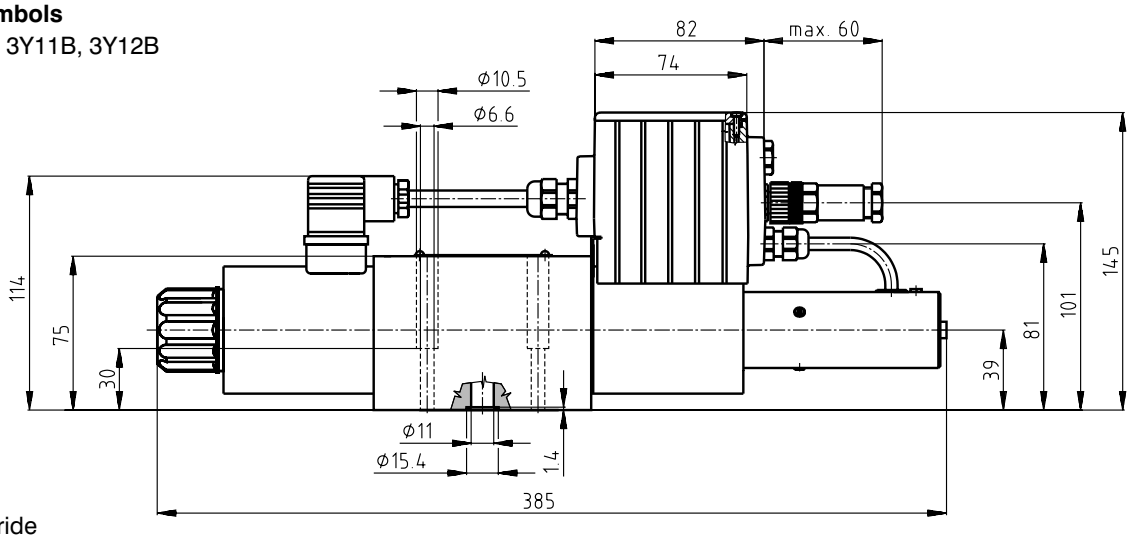
PRM4-103..../..-24E02S01



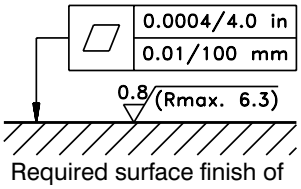
Functional symbols
3Z11, 3Z12, 3Y11, 3Y12



Functional symbols
3Z11B, 3Z12B, 3Y11B, 3Y12B



1 Solenoid a
2 Solenoid b
3 Manual override
4 Name plate
5 Square ring 12.42 x 1.68 (5 pcs.), supplied in delivery packet
6 4 mounting holes
7 Solenoid fixing nut
8 Pg9 bushing
9 5-pin connector for supply voltage and control
10 Position sensor

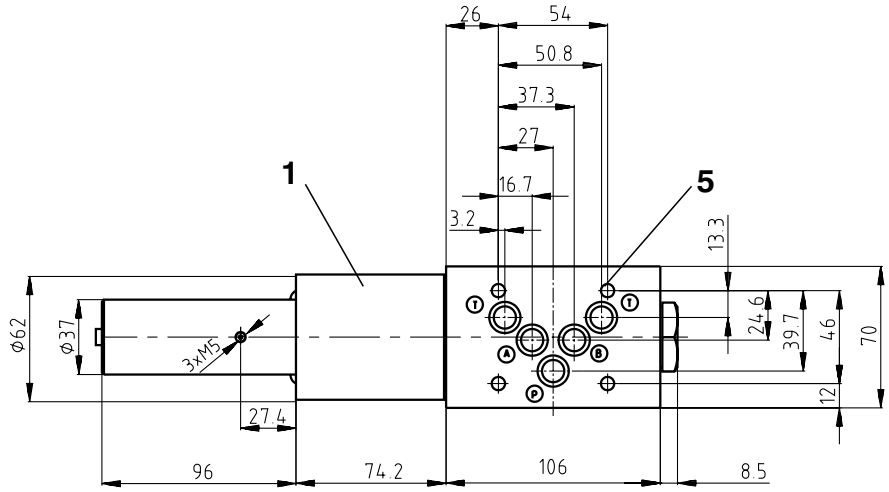


Required surface finish of interface

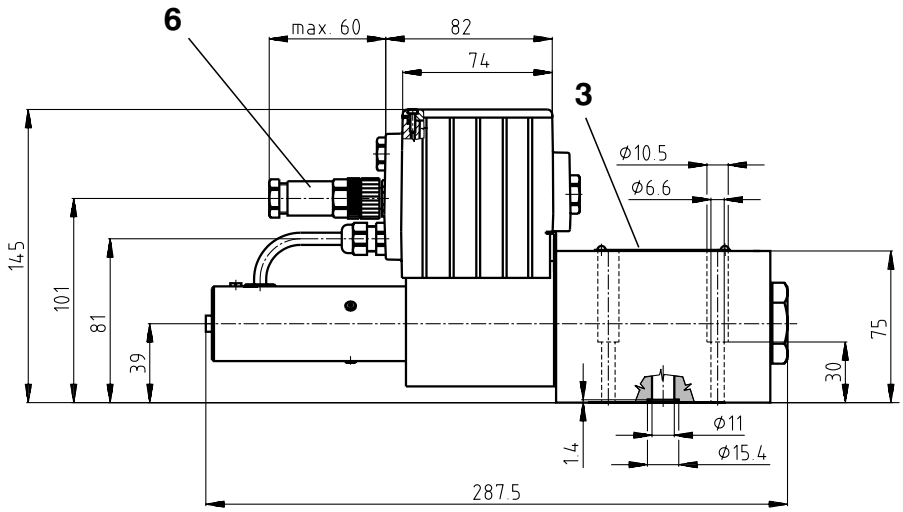
Valve Dimensions

Dimensions in millimeters

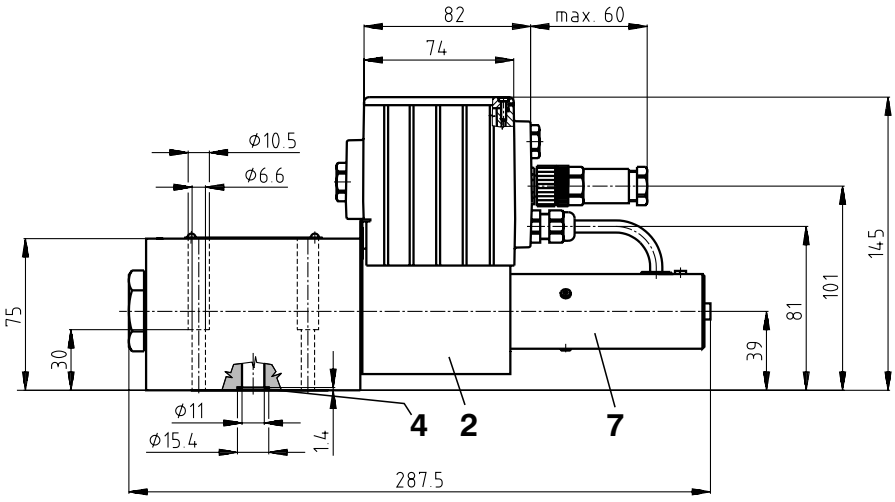
PRM4-102..../..-24E02S01



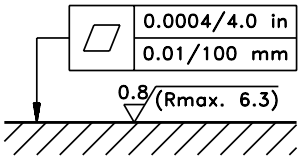
Functional symbols
2Z51, 2Y51



Functional symbols
2Z11, 2Y11



1 Solenoid a
2 Solenoid b
3 Name plate
4 Square ring 12.42 x 1.68 (5 pcs.), supplied in delivery packet
5 4 mounting holes
6 5-pin connector for supply voltage and control
7 Position sensor

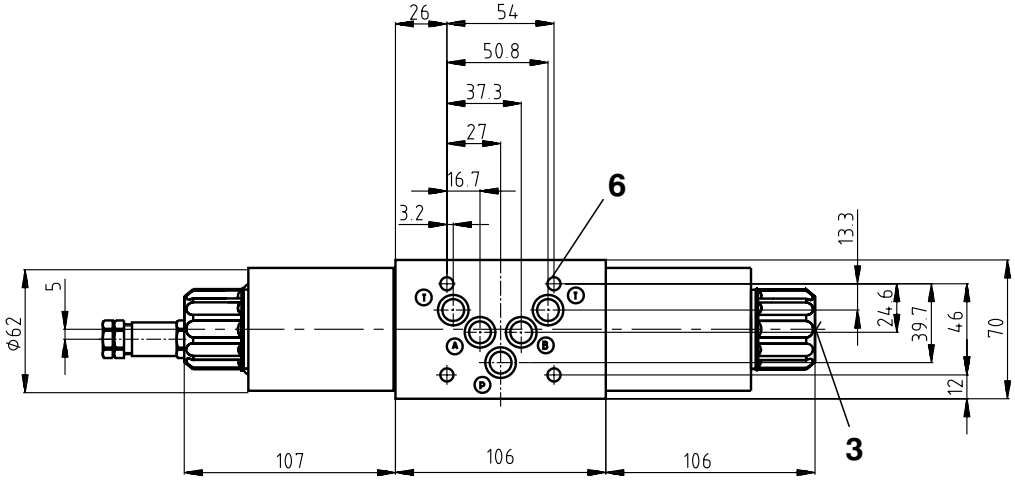


Required surface finish of interface

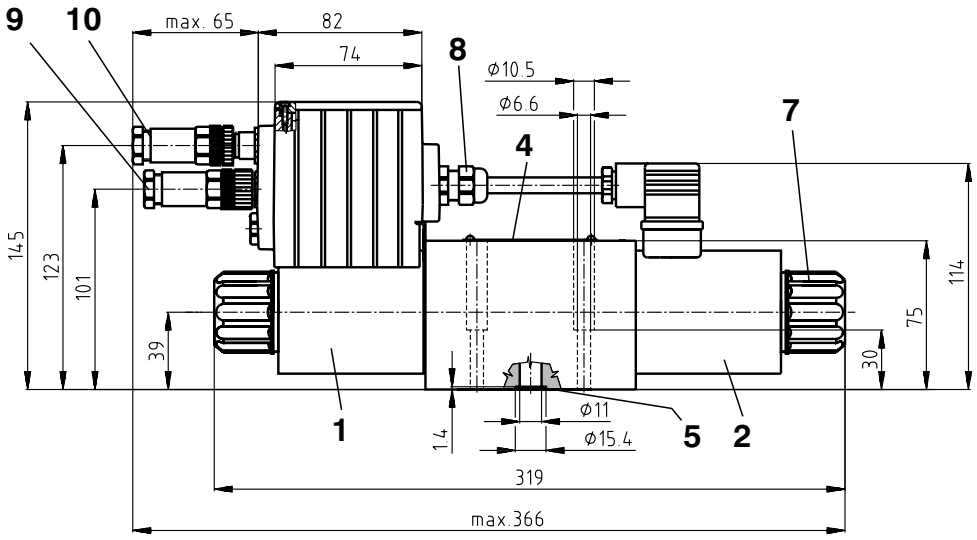
Valve Dimensions

Dimensions in millimeters

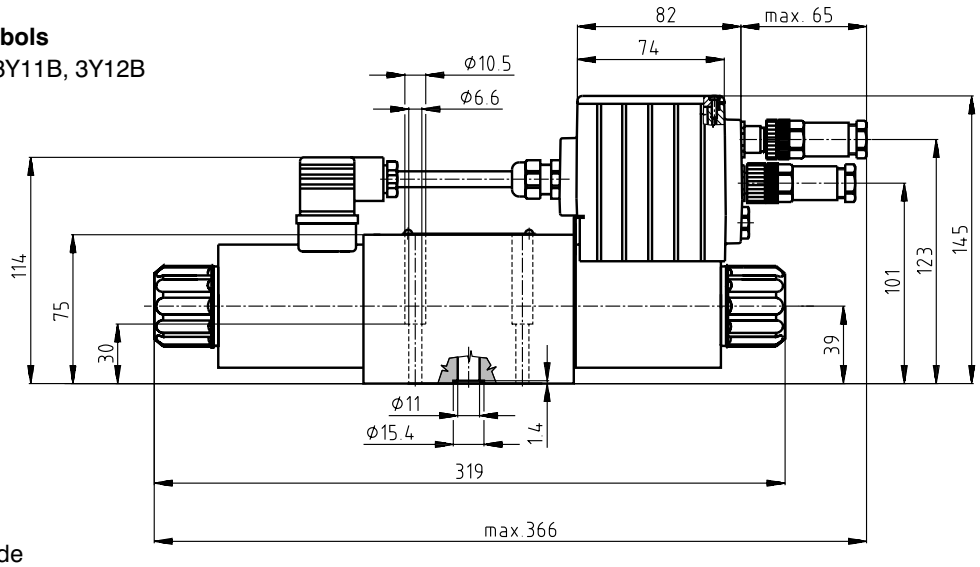
PRM4-103..../..-24E03



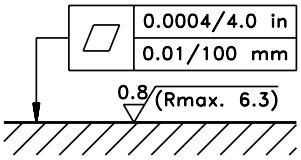
Functional symbols
3Z11, 3Z12, 3Y11, 3Y12



Functional symbols
3Z11B, 3Z12B, 3Y11B, 3Y12B



1 Solenoid a
2 Solenoid b
3 Manual override
4 Name plate
5 Square ring 12.42 x 1.68 (5 pcs.), supplied in delivery packet
6 4 mounting holes
7 Solenoid fixing nut
8 Pg9 bushing
9 4-pin connector for supply voltage and control
10 5-pin connector for input of external feedback

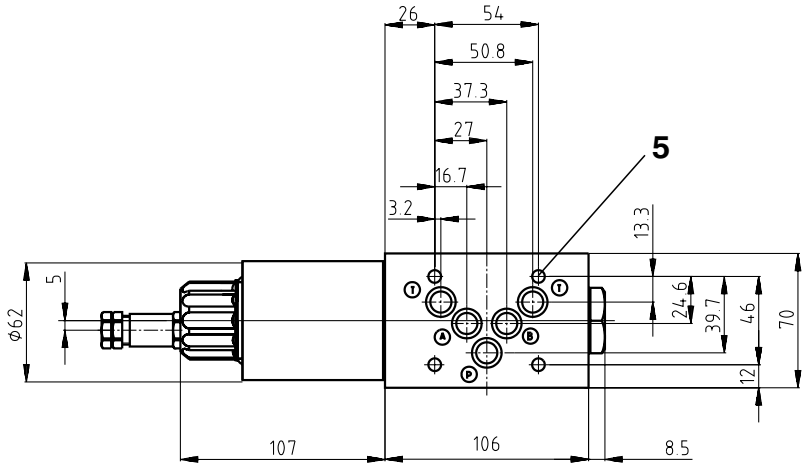


Required surface finish of interface

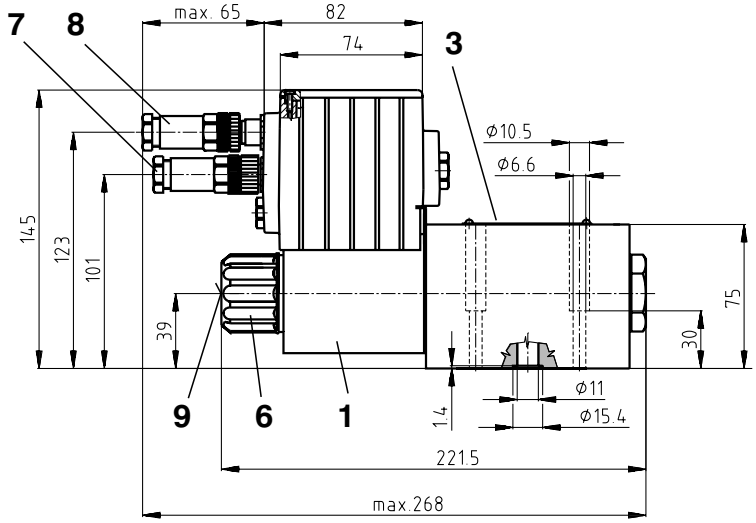
Valve Dimensions

Dimensions in millimeters

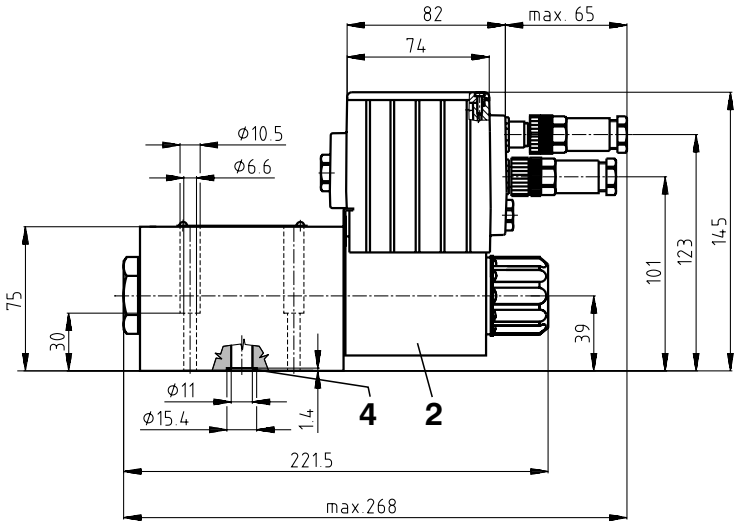
PRM4-102..../..-24E03



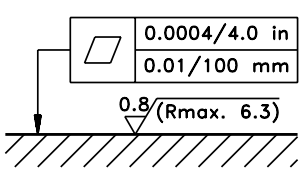
Functional symbols
2Z51, 2Y51



Functional symbols
2Z11, 2Y11



1 Solenoid a
2 Solenoid b
3 Name plate
4 Square ring 12.42 x 1.68 (5 pcs.), supplied in delivery packet
5 4 mounting holes
6 Solenoid fixing nut
7 4-pin connector for supply voltage and control
8 5-pin connector for input of external feedback
9 Manual override

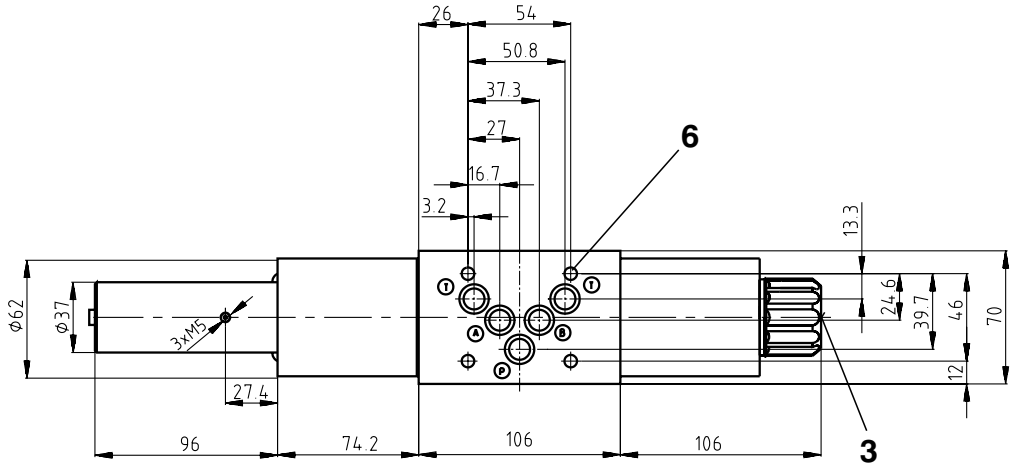


Required surface finish of interface

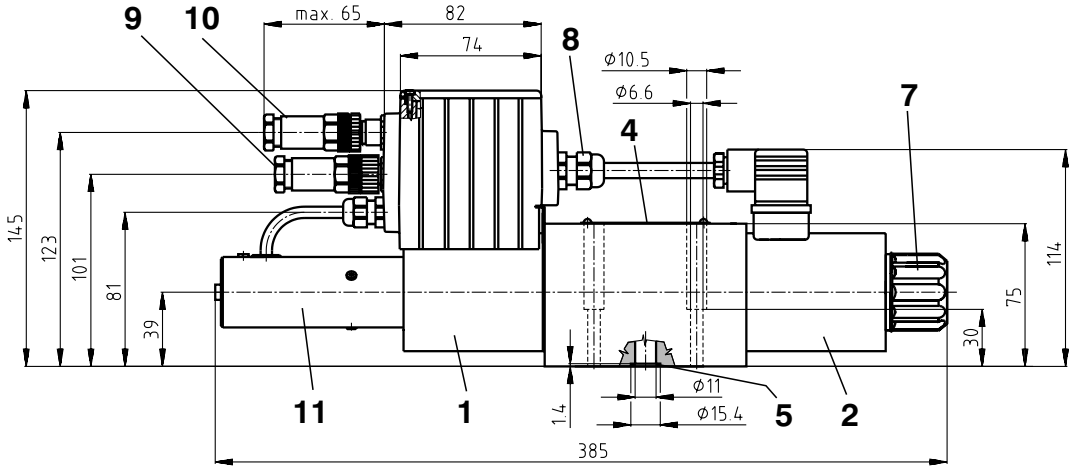
Valve Dimensions

Dimensions in millimeters

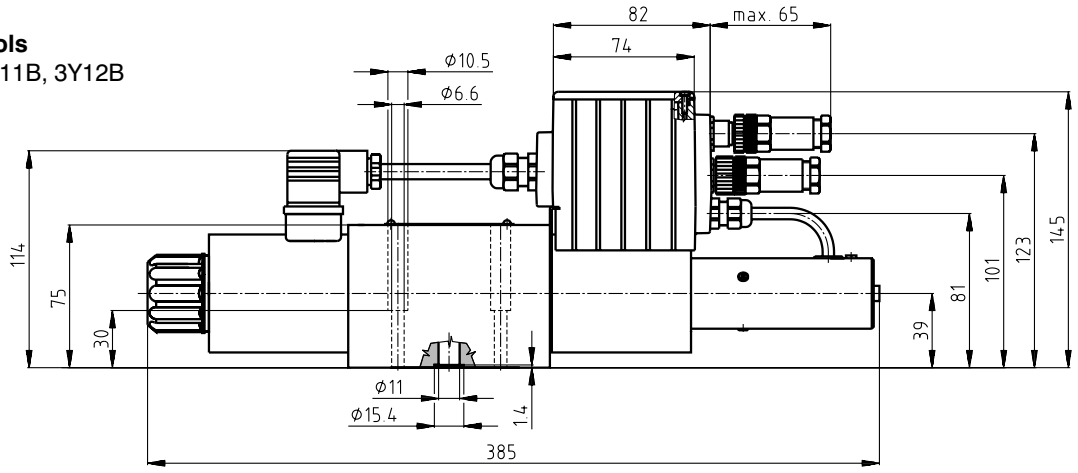
PRM4-103..../..-24E04S01



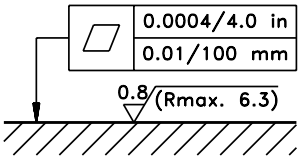
Functional symbols
3Z11, 3Z12, 3Y11, 3Y12



Functional symbols
3Z11B, 3Z12B, 3Y11B, 3Y12B



1 Solenoid a
2 Solenoid b
3 Manual override
4 Name plate
5 Square ring 12.42 x 1.68 (5 pcs.), supplied in delivery packet
6 4 mounting holes
7 Solenoid fixing nut
8 Pg9 bushing
9 5-pin connector for supply voltage and control
10 5-pin connector for input of external feedback
11 Position sensor

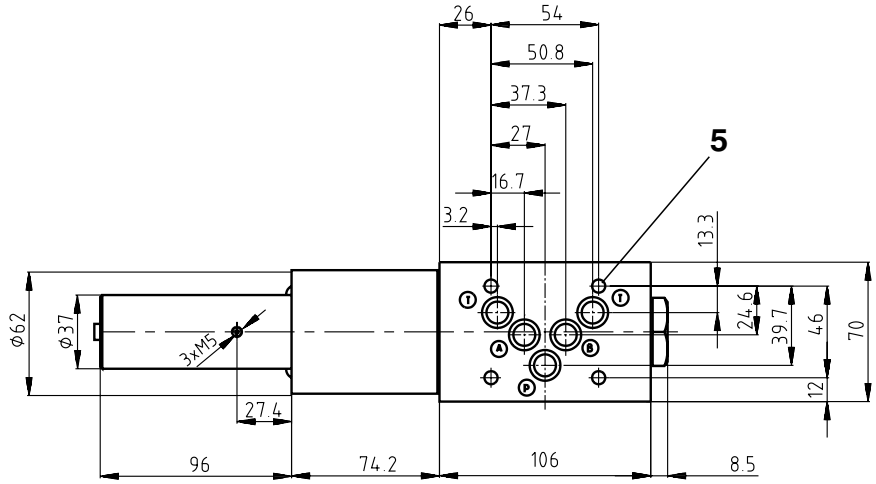


Required surface finish of interface

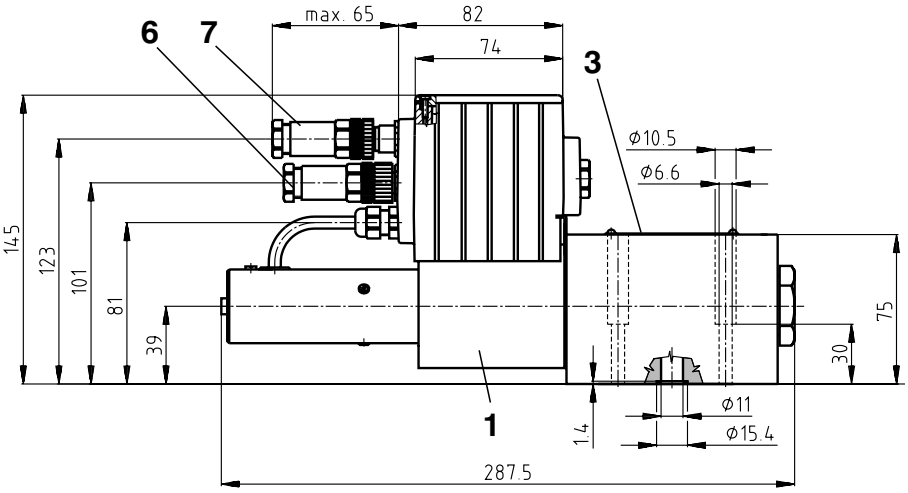
Valve Dimensions

Dimensions in millimeters

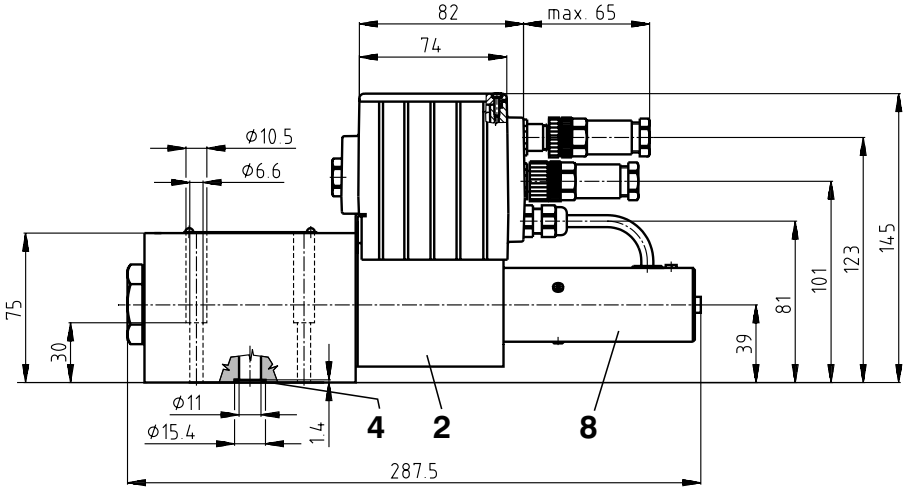
PRM4-102..../..-24E04S01



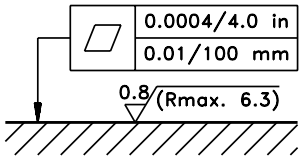
Functional symbols
2Z51, 2Y51



Functional symbols
2Z11, 2Y11

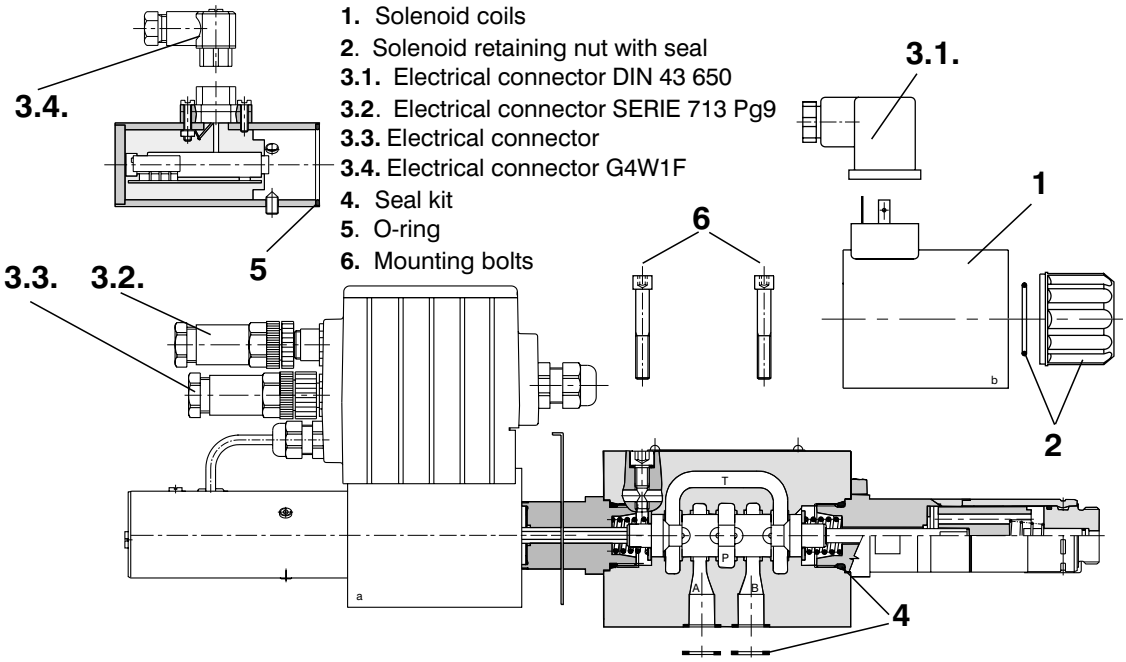


1 Solenoid a
2 Solenoid b
3 Name plate
4 Square ring 12.42 x 1.68 (5 pcs.), supplied in delivery packet
5 4 mounting holes
6 5-pin connector for supply voltage and control
7 5-pin connector for input of external feedback
8 Position sensor



Required surface finish of interface

Spare Parts



1. Solenoid coils
2. Solenoid retaining nut with seal
3.1. Electrical connector DIN 43 650
3.2. Electrical connector SERIE 713 Pg9
3.3. Electrical connector
3.4. Electrical connector G4W1F
4. Seal kit
5. O-ring
6. Mounting bolts

1. Solenoid coil

Solenoid type	Ordering number
01200	936-4614
02400	936-4629

2. Solenoid retaining nut with seal

Type of the nut	Seal ring	Ordering number
Standard nut	30 x 2	485-9963

3.1. Electrical connector DIN 43 650

Type designation	Type	Maximum input voltage	Connector A grey	Connector B black
			Ordering number	
K5	without rectifier - M16x1.5 (bushing bore ∅ 4-6 mm)	230 V DC	936-9906	936-9905

3.2. Electrical connector SERIE 713 Pg9

Ordering number	358359000002

3.3. Electrical connector

Valve model	Type of connector	Ordering number
E01, E03	ELKA 4012 Pg9	358358904012
E02S01, E04S01	ELKA 5012 Pg9	358358905012

3.4. Electrical connector G4W1F

Ordering number	358358932157

4. Seal kit

Type	Dimensions, number			Order number
	Square ring	O-ring	U-seal	
Standard - NBR70	12.42 x 1.68 (5 pcs.)	23.81 x 2.62 (2 pcs.)	6.7 x 10 x 1 (1 pc.)	485-9960
Viton	12.42 x 1.68 (5 pcs.)	23.47 x 2.62 (2 pcs.)	6.7 x 10 x 1 (1 pc.)	485-9965

5. O-ring

Standard - NBR70	32 x 2 (1 pc.)	273111014140

6. Mounting bolts

Dimensions, number	Tightening torque	Ordering number
M6 x 40 DIN 912-10.9 (4 pcs.)	14 Nm	485-9964

Caution!

- The packing foil is recyclable.
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law.

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www.argo-hytos.com

Proportional directional control valve

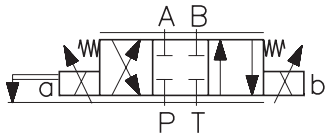
PRM5-06

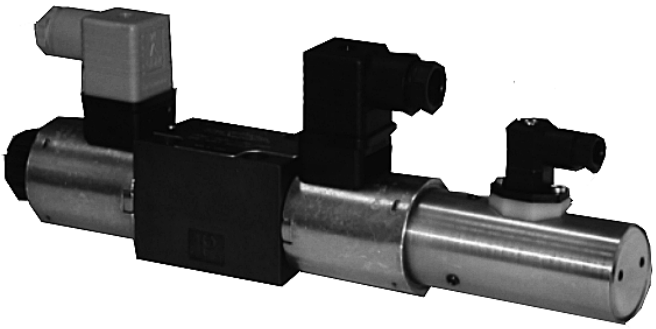
Size 06 • p_{max} up to 320 bar • Q_{max} up to 35 L/min

HA 5114
3/2002

Replaces
HA 5114 8/2001

- **High reliability**
- **Simple replacement of the exciting coils including electronics without opening the hydraulic circuits**
- **Continuous flow control in both directions**
- **Installation dimensions to DIN 24 340-A6 and ISO 4401-AB-03-4-A**

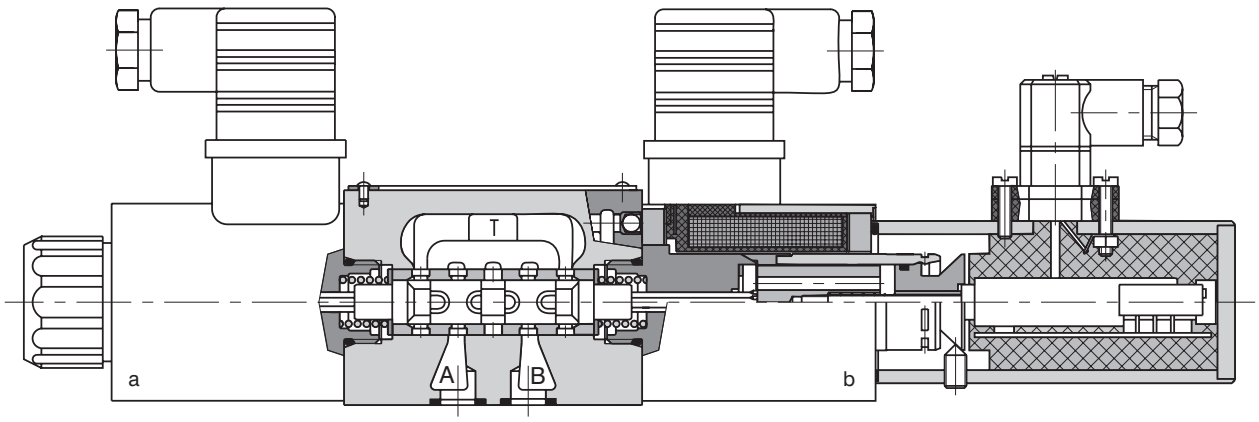




Functional Description

The proportional directional valve PRM5 consists of a cast iron housing, a special control spool situated in a sleeve, two centering springs with supporting washers, one or two proportional solenoids or a position sensor. The measuring system of the position sensor consists of a differential transformer with core and from the evaluating electronic unit realized in hybrid technique.

The electric connection of the solenoids is realized by the connector plug to DIN 43 650, with the position sensor output being connected by the G4W1F connector plug. Bought connectors belong to delivery.
With the basic surface treatment, the valve housing is phosphate coated, whereas the surfaces of the solenoids and position sensor are zinc coated.

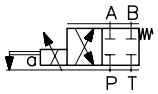
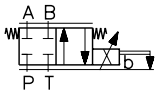
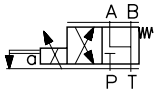
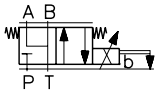
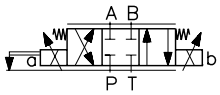
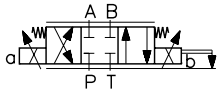
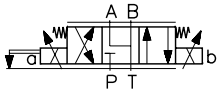
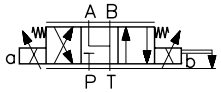


Ordering Code

PRM5-06 □ / □ - □ □ □

Proportional directional control valve with sleeve

Nominal size **06**

	**2Z51**
	**2Z11**
	**2Y51**
	**2Y11**
	**3Z11**
	**3Z11B**
	**3Y11**
	**3Y11B**

Seals

without designation	NBR
V	FPM (Viton)

Model

without designation	without position sensor
S01	position sensor with voltage outlet
S02	position sensor with current outlet

Nominal solenoid supply voltage

12	supply voltage 12V DC (position sensor with voltage outlet)
24	supply voltage 24 V DC

Nominal flow rate at Δp = 10 bar

20	flow 20 L/min

Technical Data

Nominal size	mm	06	
Max. operating pressure at ports P, A, B	bar	320	
Max. operating pressure at port T	bar	160	
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP - RP 91H in viscosity classes ISO VG 32, 46 a 68.	
Fluid temperature range (NBR / Viton)	°C	-30 ... +80	-20 ... +80
Ambient temperature max.	°C	up to +50	
Viscosity range	mm^2/s	20 ... 400	
Maximum degree of fluid contamination		Class 21/18/15 to ISO 4406 (1999).	
Nominal flow at $\Delta p = 10$ bar	L/min	20	
Hysteresis - open loop	%	< 6	
Hysteresis - closed position loop	%	< 0.5	
Weight - PRM5-062 - PRM5-063	kg	2.2 2.7	
Mounting position		optional	

Technical Data of Proportional Solenoid

Type of coil	V	12 DC	24 DC
Nominal current	A	2.4	1.0
Resistance at 20 °C	Ω	2.3	13.4

Technical data

Ambient temperature	°C	-20 ... +50
Enclosure type		IP65
Vibrations		Oscillation, sinusoidal to IEC 68-2-6 Impact test to IEC 68-2-27
Interference immunity		Burst on leads to EN 61000-4-4 HF radiation received to EN 61000-4-3 HF feeding on leads to EN 61000-4-6 ESD to EN 61000-4-2
Radiated interference		Lead related emission to EN 55011 Radiated emission to EN 55011

Technical data of position sensor - voltage outlet (supply voltage 12V and 24V)

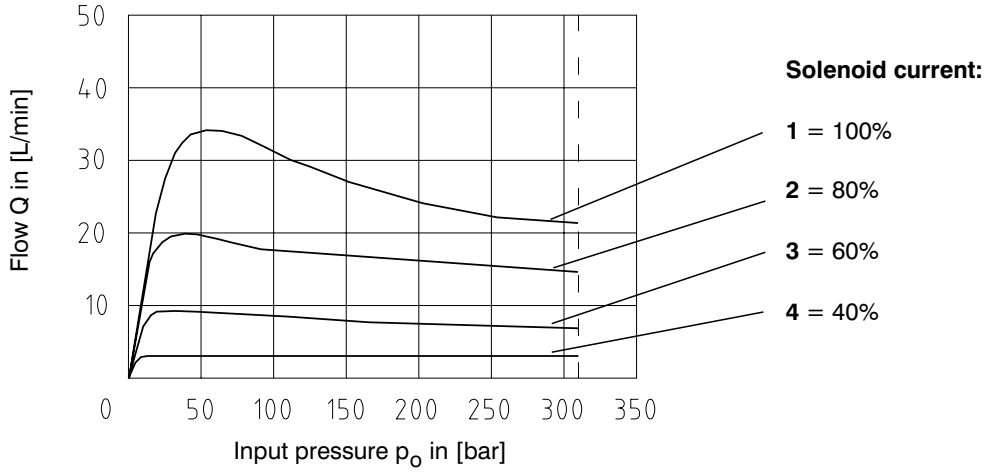
Operating pressure	bar	max. 320, static
Electric connection		electrical connector G4W1F Hirschmann
Contact assignment		1 - operating voltage 2 - output signal 3 - ground 4 - not used
Enclosure type to DIN 40050		IP 65
Measured distance	mm	8
Operating voltage	V	9.6 ...30 DC
Linearity error	%	< 1
Current consumption at load current of 2 mA	mA	< 15
Output voltage	V	0 ... 5
Output signal range used: 0 Position 1 solenoid - displacement 2.8 mm 2 solenoids - displacement ±2.8 mm	V	 2.5 0.75 - 2.5 0.75 - 4.25
Max. load current	mA	2
Noise voltage - at load current 0 - at load current of 2 mA	mV_{p-p}	 < 20 < 15
Additional output signal error at: Temperature change between 0 ... 80 °C Between 0 ... -25 °C		 typical < 0.2% / 10K max. 0.5% / 10K max. 0.5% / 10K
Load change from 0 to 2 mA	%	0.1
Input voltage change from 9.6 V to 14.4 V from 14.4 V to 30 V	%	 < 0.1 < 0.25
Long-term drift (30 days)	%	< 0.25
Cut-off frequency 3 dB fall in amplitude Frequency 90°	Hz	 > 600 > 600

Technical data of position sensor - current outlet (supply voltage 24V)

Linearity	%	< 1
Operating pressure	bar	to 320, static
Electrical connection		electrical connector G4W1F Hirschmann
Contact assigment		1 - operating voltage 2 - output signal 3 - ground 4 - not used
Enclosure type to DIN 40050		IP 65
Operatin voltage	V	20 ... 30 DC
Current	mA	< 35
Output signal range	mA	5 ... 19
Output signal range used: 0 position 1 solenoid - stroke (Hub 2.8 mm) 2 solenoid - stroke (Hub ±2.8 mm)	mA	 12 6.6 ... 12 6.6 ... 17.6
Additional output signal error: - at temperature change from +10 ... 55 °C - at imjpedance change from 50% - at input voltage change in the range of operating voltage		 0.2% / 10K ≤ 0.1% ≤ 0.05%
Impedance	Ω	≤ 500
Output signal ripple	mA R.M.S.	≤ 0,02
Limit frequency at 3 dB amplitude decrease	Hz	≥ 800

Limit power

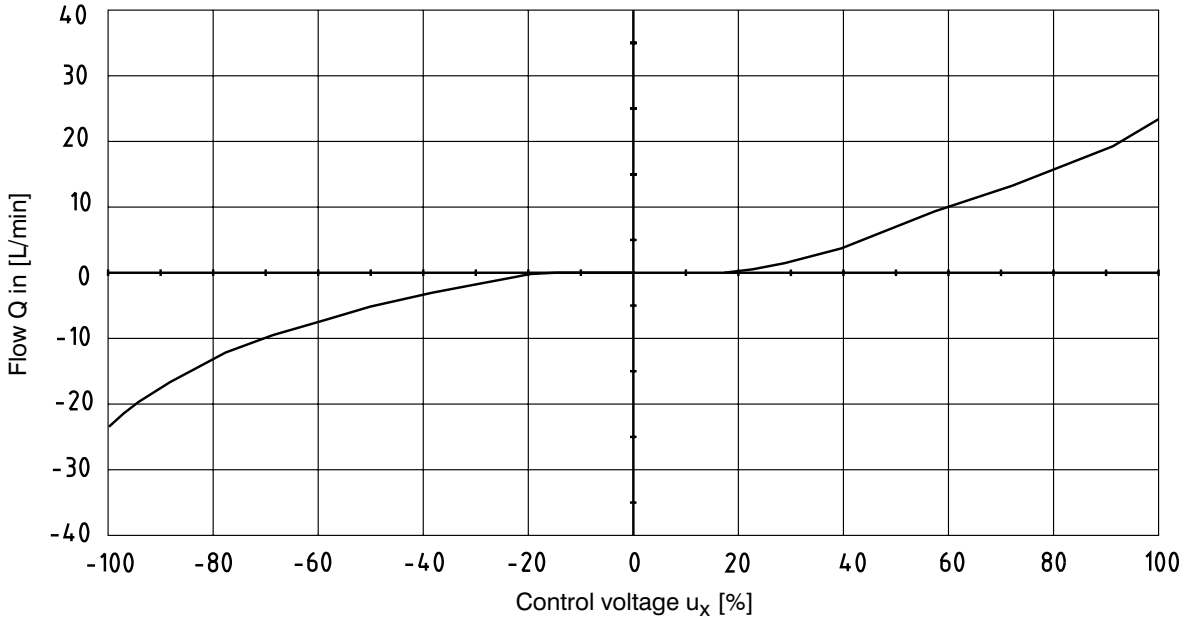
Measured at $\nu = 35\ mm^2/s$ P → A / B → T or P → B / A → T



Flow Characteristics

Measured at $\Delta p = 10$ bar, $\nu = 35\ mm^2/s$

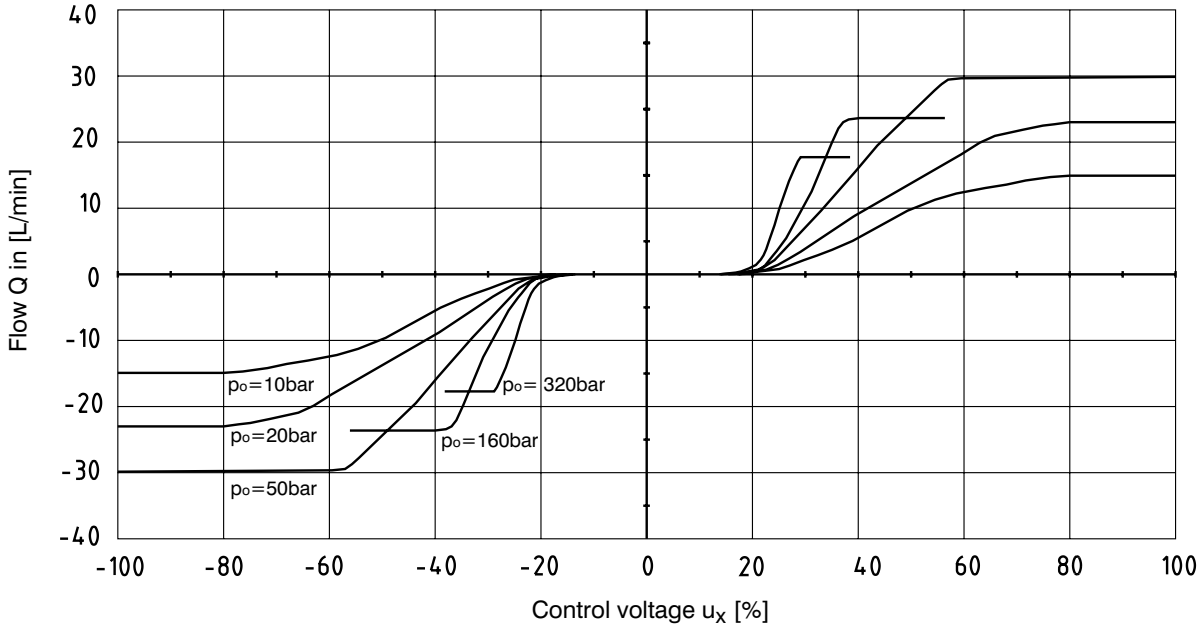
Only for valve without position feedback



Flow Characteristics

Measured at $\nu = 35\ mm^2/s$, p_o - input pressure

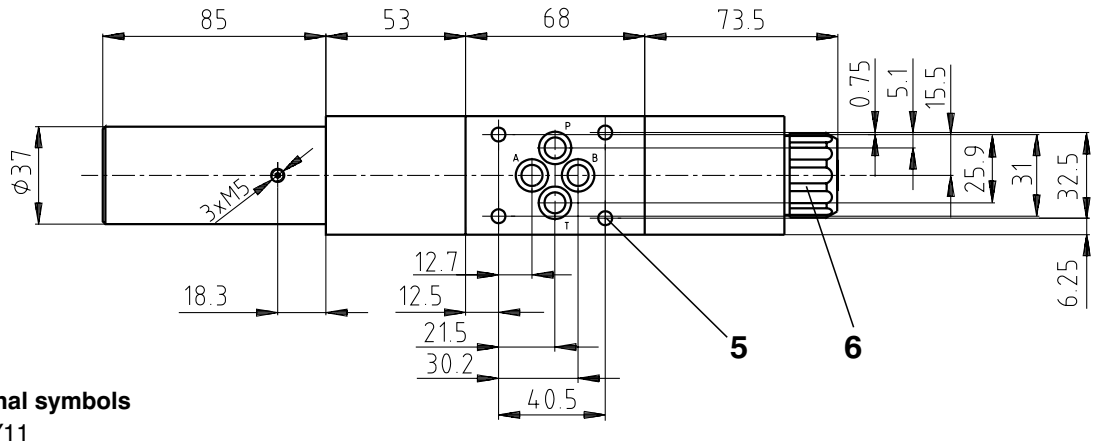
Only for valve with position feedback (S01, S02)



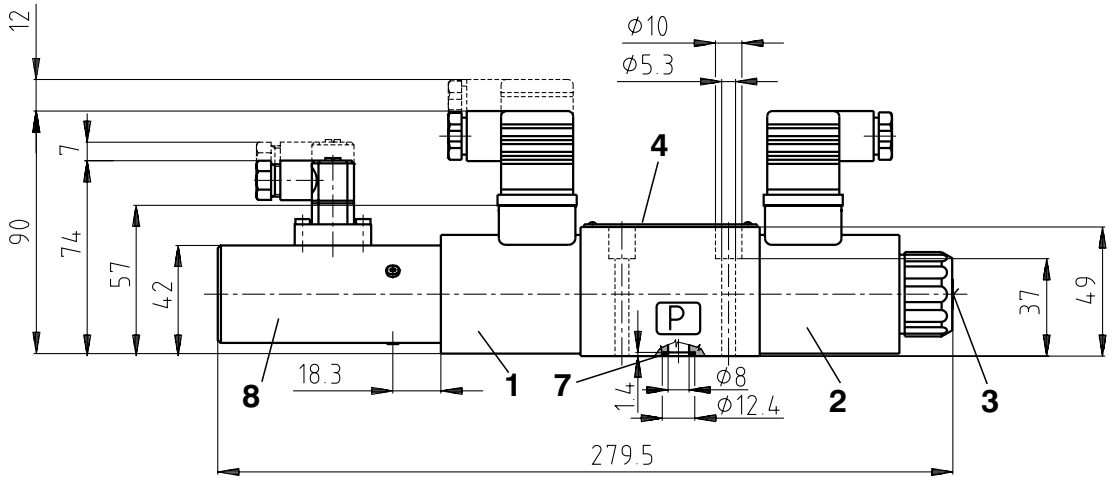
Valve Dimensions

Dimensions in millimetres

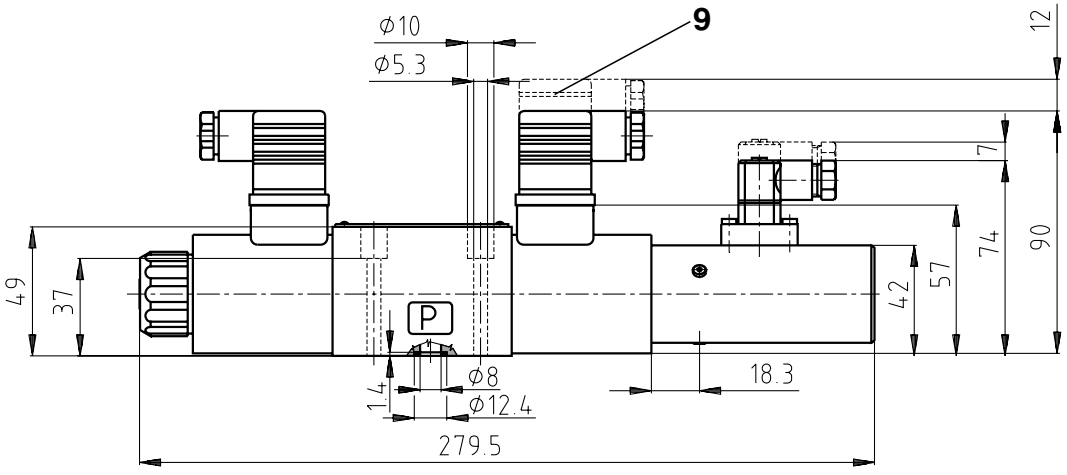
PRM5-063..../..-..S01
PRM5-063..../..-..S02



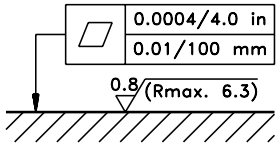
Functional symbols
3Z11, 3Y11



Functional symbols
3Z11B, 3Y11B



1 Solenoid a
2 Solenoid b
3 Manual overide
4 Name plate
5 4 mounting holes
6 Solenoid fixing nut
7 Square ring 9.25 x 1.68 (4 pcs.), supplied in delivery packet
8 Position sensor
9 Space required to remove connector

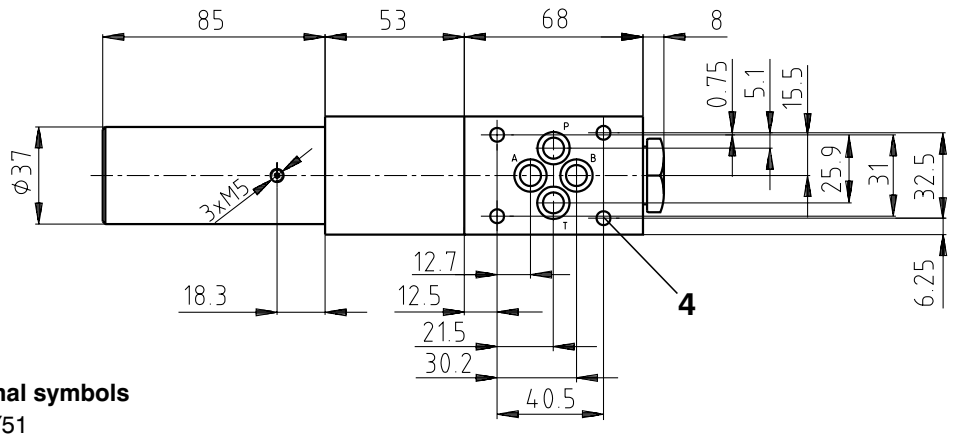


Required surface finish of interface.

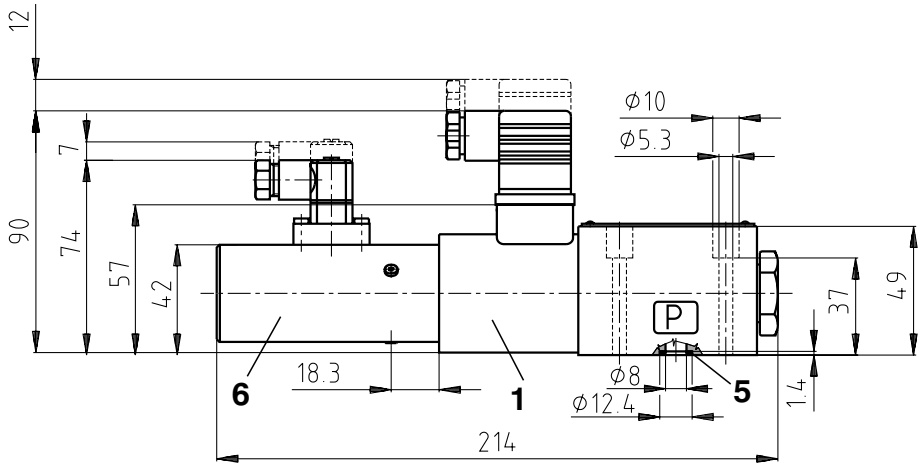
Valve Dimensions

Dimensions in millimetres

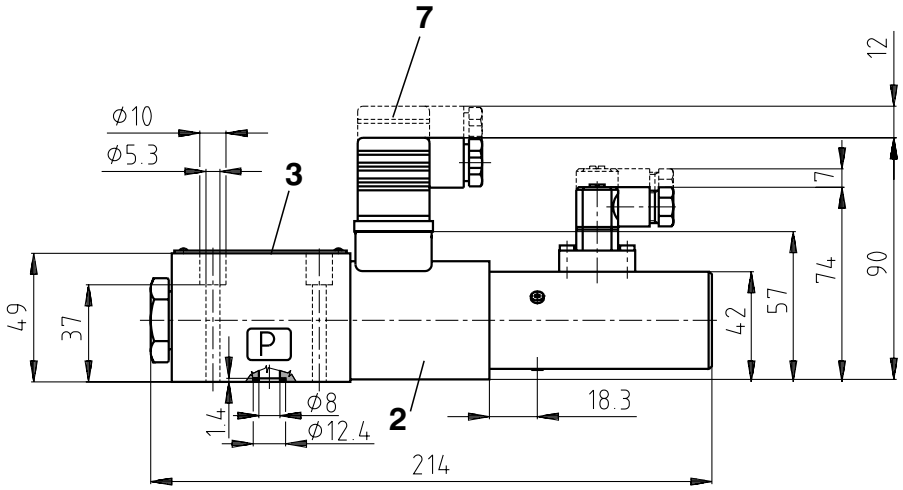
PRM5-062..../..-..S01
PRM5-062..../..-..S02



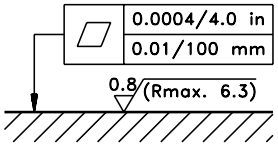
Functional symbols
2Z51, 2Y51



Functional symbols
2Z11, 2Y11



1 Solenoid a
2 Solenoid b
3 Name plate
4 4 mounting holes
5 Square ring 9.25 x 1.68 (4 pcs.), supplied in delivery packet
6 Position sensor
7 Space required to remove connector

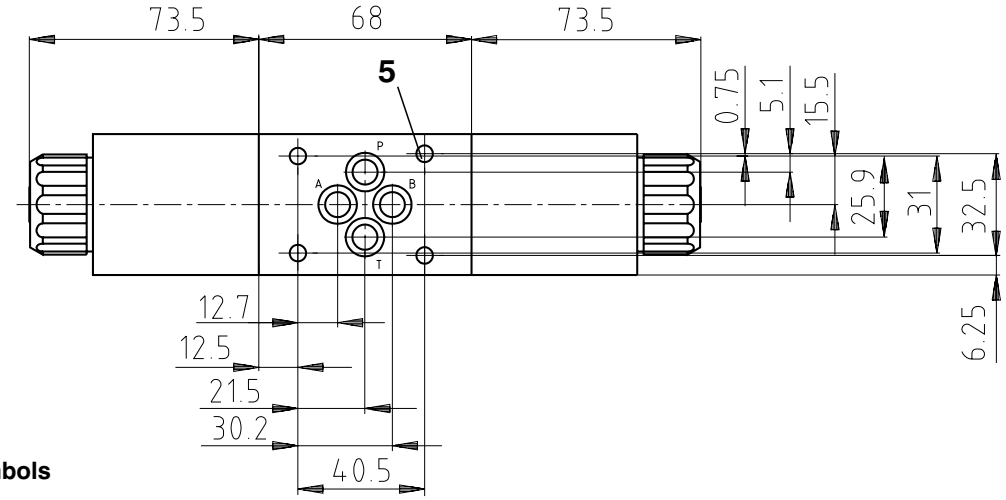


Required surface finish of interface.

Valve Dimensions

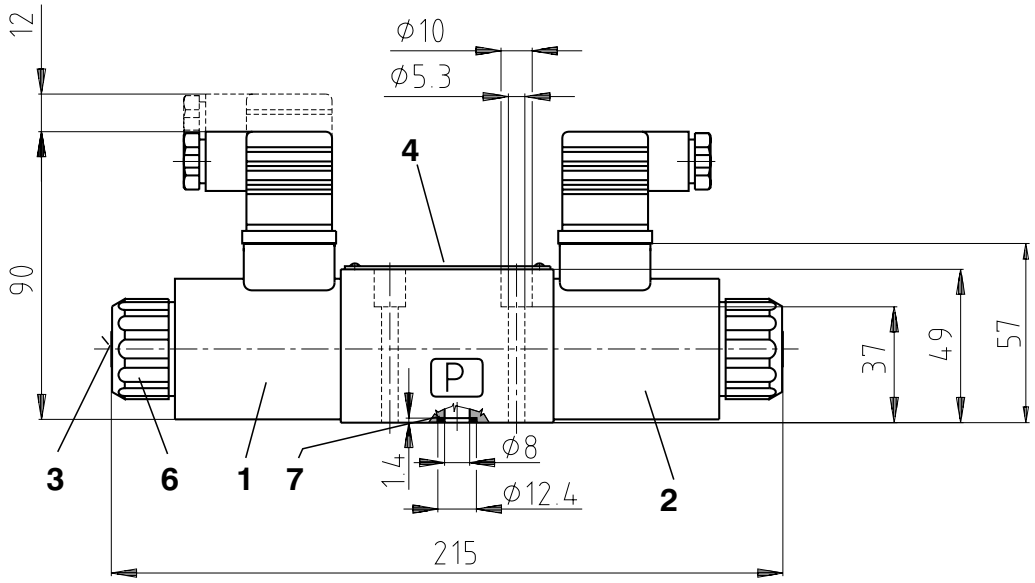
Dimensions in millimetres

PRM5-063..../..-....

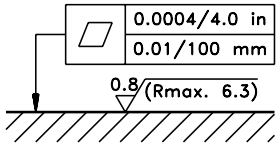


Functional symbols

3Z11, 3Y11



1 Solenoid a
2 Solenoid b
3 Manual overide
4 Name plate
5 4 mounting holes
6 Solenoid fixing nut
7 Square ring 9.25 x 1.68 (4 pcs.), supplied in delivery packet

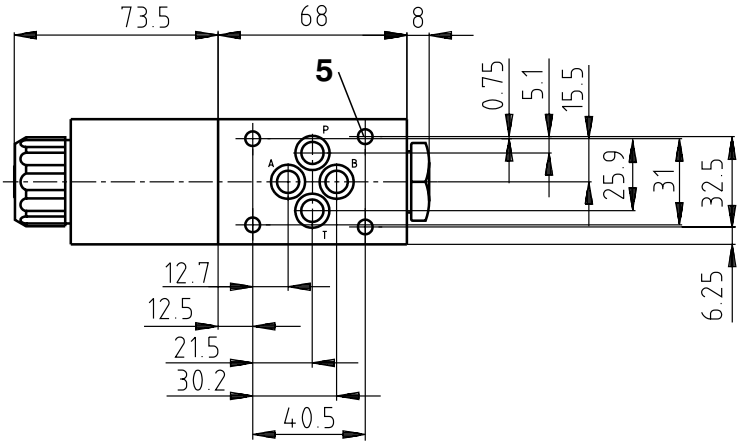


Required surface finish of interface.

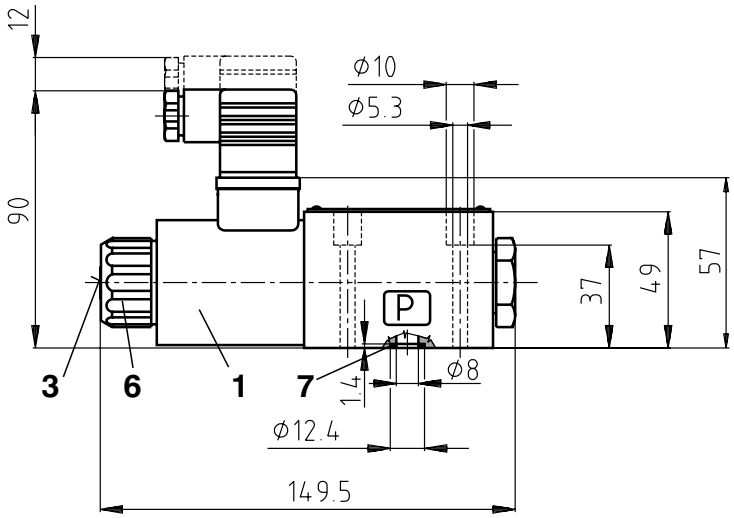
Valve Dimensions

Dimensions in millimetres

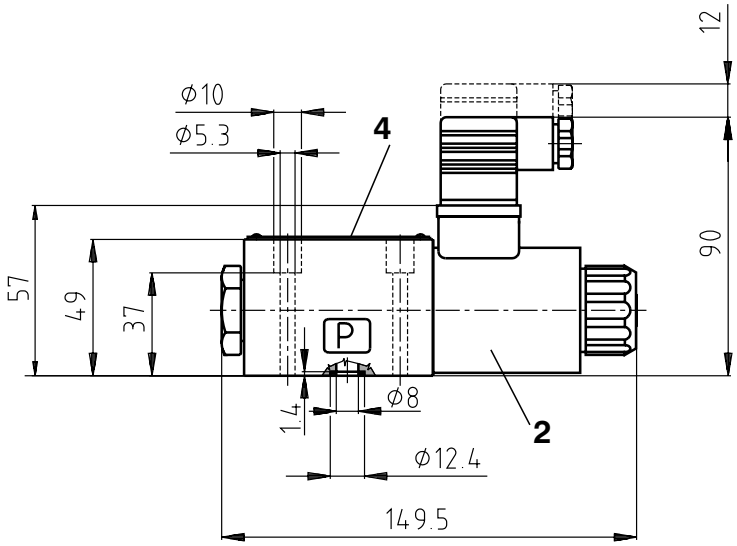
PRM5-062..../..-....



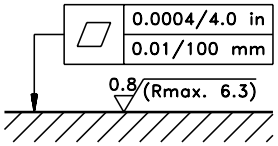
Functional symbols
2Z51, 2Y51



Functional symbols
2Z11, 2Y11



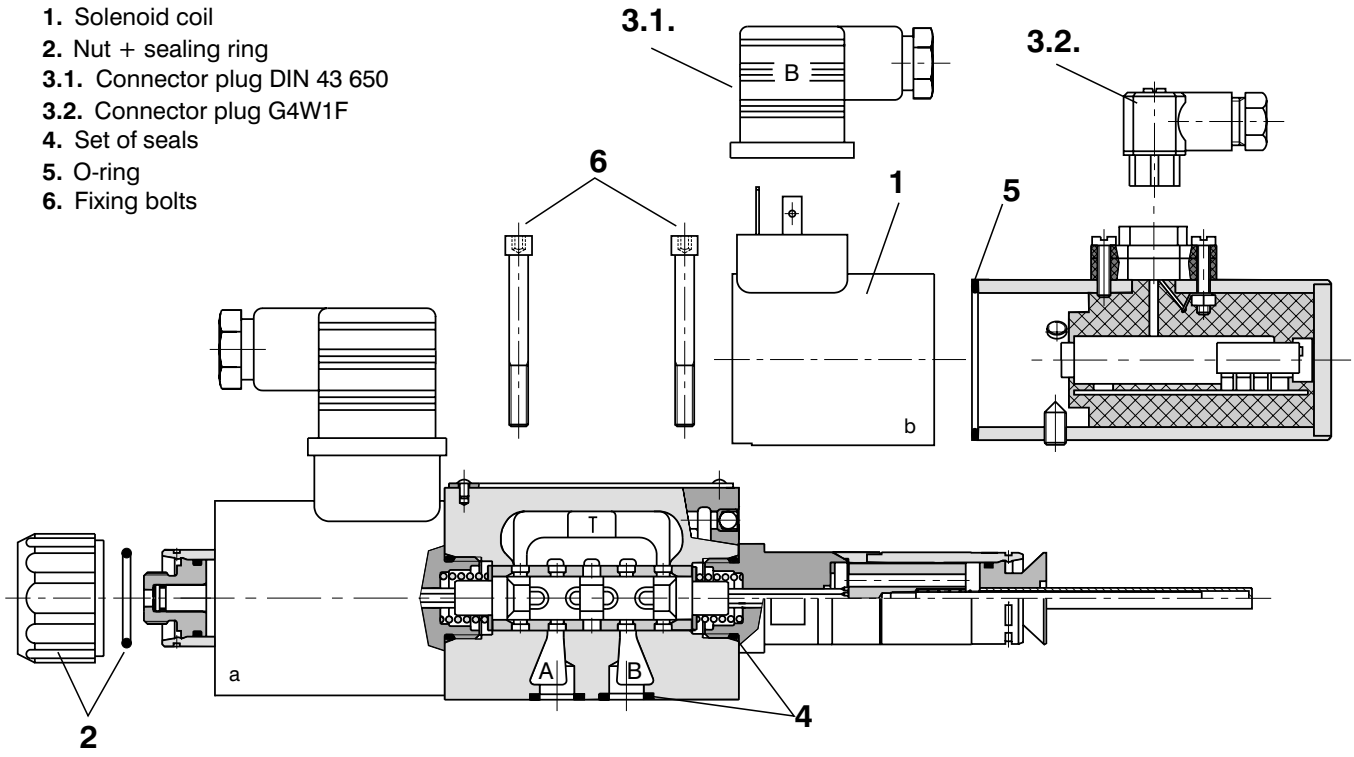
1 Solenoid a
2 Solenoid b
3 Manual overide
4 Name plate
5 4 mounting holes
6 Solenoid fixing nut
7 Square ring 9.25 x 1.68 (4 pcs.), supplied in delivery packet



Required surface finish of interface.

Spare Parts

1. Solenoid coil
2. Nut + sealing ring
3.1. Connector plug DIN 43 650
3.2. Connector plug G4W1F
4. Set of seals
5. O-ring
6. Fixing bolts



1. Solenoid coil

Type designation of the solenoid coil	Ordering number
01200	936-0061 (2.4 A)
02400	936-0067

2. Solenoid fixing nut + sealing ring

Model of the nut	Sealing ring	Ordering number
Standard nut	22 x 2	484-9951

3.1. Connector plug to DIN 43 650

Type designation	Type	Maximum input voltage	Connector plug A gray	Connector plug B black
			Ordering number	
K5	without rectifier - M16x1.5 (bushing bore ∅ 4-6 mm)	230 V DC	936-9906	936-9905

3.2. Connector plug G4W1F

Ordering number	358358932157

4. Set of seals

Type	Dimensions, number		Ordering number
Standard - NBR 70	9.25 x 1.68 x 1.68 (4 pcs.)	17 x 1.8 (2 pcs.)	484-9961
Viton	9.25 x 1.78 (4 pcs.)	17.17 x 1.78 (2 pcs.)	484-9971

5. O-ring

Standard - NBR70	32 x 2 (1 pc.)	273111014140

6. Fixing bolts - set

Dimensions, number	Tightening torque	Ordering number
M5 x 45 DIN 912-10.9 (4 pcs.)	8.9 Nm	484-9958

Caution!

- The packing foil is recyclable.
- The protective plate can be returned to manufacturer.
- Mounting bolts M5 x 45 DIN 912-10.9 or studs must be ordered separately. Tightening torque of the bolts is 8.9 Nm.
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of law.

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ARGO HYTOS

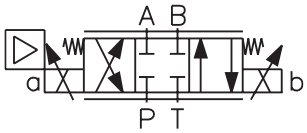
Proportional Directional Control Valves

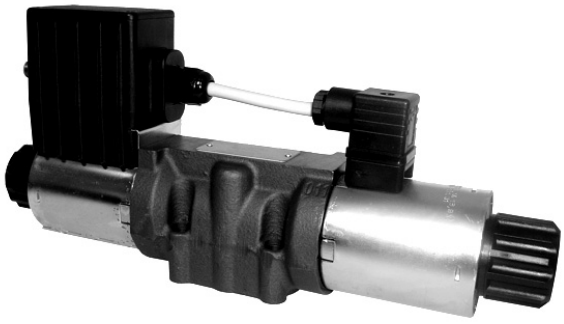
PRM6-10

Size 10 (D 05) · ... 320 bar (4600 PSI) · ...80 L/min (21 GPM)

HA 5115
8/2005

- **Compact design with integrated electronics**
- **High reliability**
- **Simple replacement of the exciting coils including electronics without opening the hydraulic circuits**
- **Continuous flow control in both directions**
- **Installation dimensions to DIN 24 340-A10 and ISO 4401:1994**

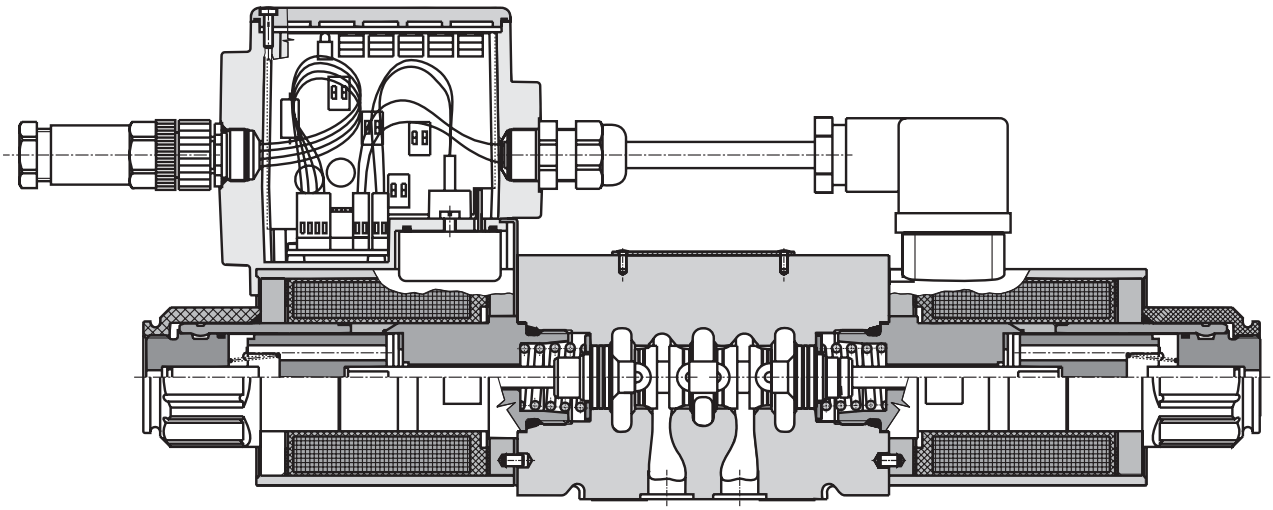




Functional Description

The proportional directional valve consists of a cast-iron housing, a special control spool, two centering springs with supporting washers and one or two proportional solenoids. A control box, which comprises one or two electronic control cards, depending on the number of the controlled solenoids, can be mounted onto either solenoid. With the model with two solenoids, the solenoid mounted apposite the control box is connected with the box by means of a DIN connector, a two-cored cable and a bushing. The connection of the control box with the supply source and with the control signal is realized by means of a 4-pin connector, type M12 x 1. The solenoid coils, including the control box, can be turned in the range of $\pm 90^{o}$.
The electric control unit supplies the solenoid with current, which varies with the control signal. The solenoid shifts the control spool to the required position, proportional to the control current.

The electronic control unit provides the following adjustment possibilities: Offset, Gain, rise and drop-out time of the ramp generator, frequency (2 frequencies) and amplitude of the dither signal generator. The correct function of the control unit is signaled by LED-diodes.
Stabilized voltage +10V (+5V for 12V voltage) is also available for the user. By the use of this voltage, a voltage control signal can be made by means of a potentiometer $\geq 1\ k\Omega$.
The electronic control card enables voltage or current control to be used, according to the positions of the switches SW1 to SW3 (see table on page 6).
The basic surface treatment of the valve housing is phosphate coated, the operating solenoids are zinc coated.

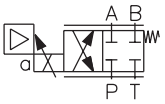
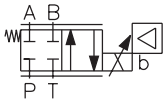
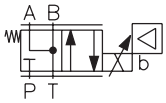
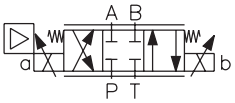
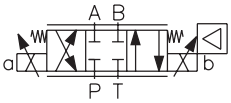
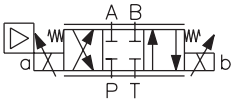
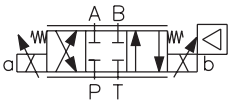
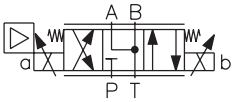
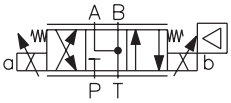
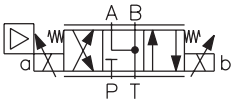
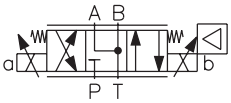


Ordering Code

PRM6-10 □ / □ - □ □ □

Proportional directional valve

Nominal size **10 (D 05)**

	**2Z51**
	**2Z11**
	**2Y51**
	**2Y11**
	**3Z11**
	**3Z11B**
 $\frac{q_A}{q_B} = \frac{1}{2}$*	**3Z12**
 $\frac{q_A}{q_B} = \frac{1}{2}$*	**3Z12B**
	**3Y11**
	**3Y11B**
 $\frac{q_A}{q_B} = \frac{1}{2}$*	**3Y12**
 $\frac{q_A}{q_B} = \frac{1}{2}$*	**3Y12B**

Seals

without designation	NBR
V	FPM (Viton)

Electronics

without designation	without electronics
EK	connection by connector M12 x 1 (4-pin connector) (supplied with counterpart)

Nominal supply voltage

12	12 V DC
24	24 V DC

Nominal flow rate at Δp = 10 bar (145 PSI)

30	30 L/min (7.93 GPM)
60	60 L/min (15.85 GPM)

***** Model for cylinders with asymmetric piston rod, piston area ratio 1:2

Technical Data

Valve size	mm (US)	10 (D 05)	
Maximum operating pressure at ports P, A, B	bar (PSI)	320 (4600)	
Maximum operating pressure at port T	bar (PSI)	160 (2300)	
Hydraulic fluid		Petroleum oils (HM, HL, HLP) Phosphate ester fluids (HFD-R)	
Fluid temperature range NBR/Viton	°C (°F)	-30 ... +80 (-22 ... +176) /-20 ... +80 (-4 ... +176)	
Ambient temperature, max.	°C (°F)	up to +50 (+122)	
Viscosity range	mm^2/s (SUS)	20 ... 400 (98 ... 1840)	
Maximum degree of fluid contamination		Class 21/18/15 to ISO 4406 (1999).	
Nominal flow rate Q_n at Δp = 145 PSI (10 bar) ν = 166 SUS (ν = 35 $mm^2 \cdot s^{-1}$)	L/min (GPM)	30 (7.93)	60 (15.85)
Hysteresis	%	≤ 6	
Weight PRM2-102 PRM2-103	kg (lbs)	4.3 (9.48) 5.8 (12.78)	
Mounting position		any, preferably horizontal	
Enclosure type		IP65	

Technical Data of the Proportional Solenoid

Nominal supply voltage	V	12 DC ±10 %	24 DC ±10 %
Limit current	A	1.9	1.1
Mean resistance value at 20°C	Ω	4.7	13.9

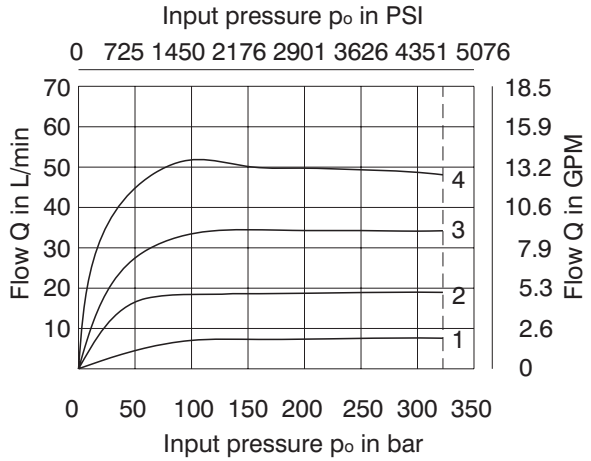
Technical Data of the Electronics

Nominal supply voltage U_{cc}	V	12 DC	24 DC
Supply voltage range	V	11.2 ... 14.7 DC	20 ... 30 DC
Stabilized voltage for control	V	5 DC (R > 1 kΩ)	10 DC (R ≥ 1 kΩ)
Control signal		see table of switches configuration (page 6)	
Maximum output current	A	2.4 for R < 4Ω	1.5 for R < 10Ω
Ramp adjustment range	s	0.05 ... 3	
Dither frequency	Hz	90 / 60	
Dither amplitude	%	0 ... 30	

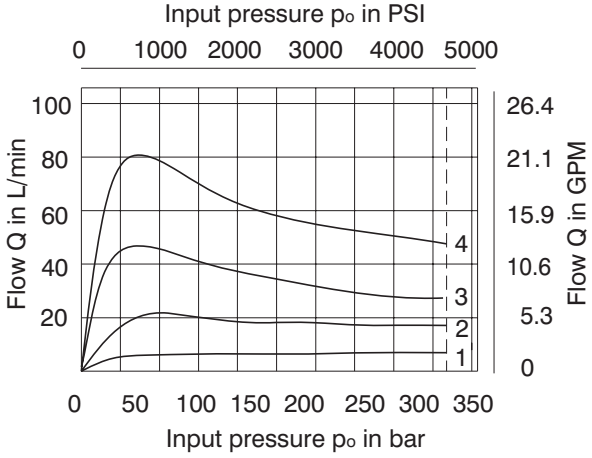
Limit Power

Measured at ν = 35 mm^2/s (166 SUS) P → A / B → T or P → B / A → T

Nominal flow 30 L/min (7.93 GPM)



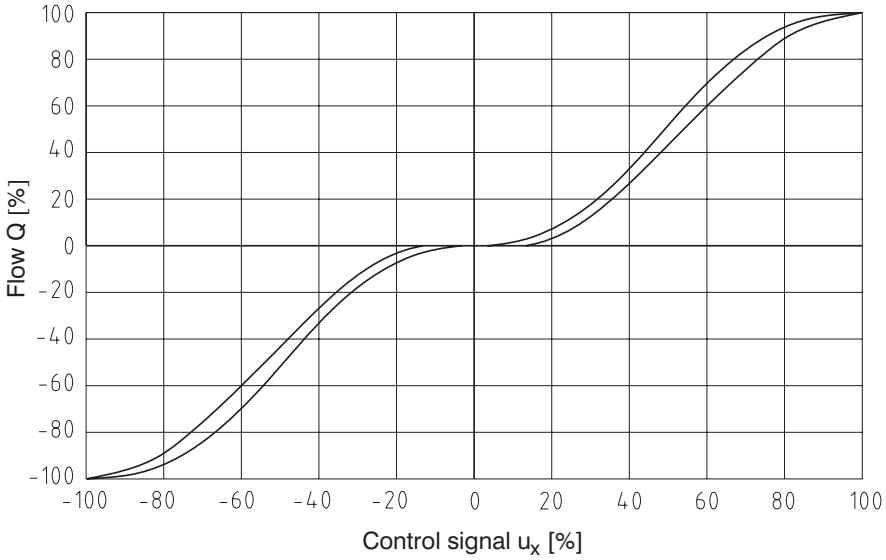
Nominal flow 60 L/min (15.85 GPM)



Solenoid curren t:(24 V DC)
1 = 40%
2 = 60%
3 = 80%
4 = 100%

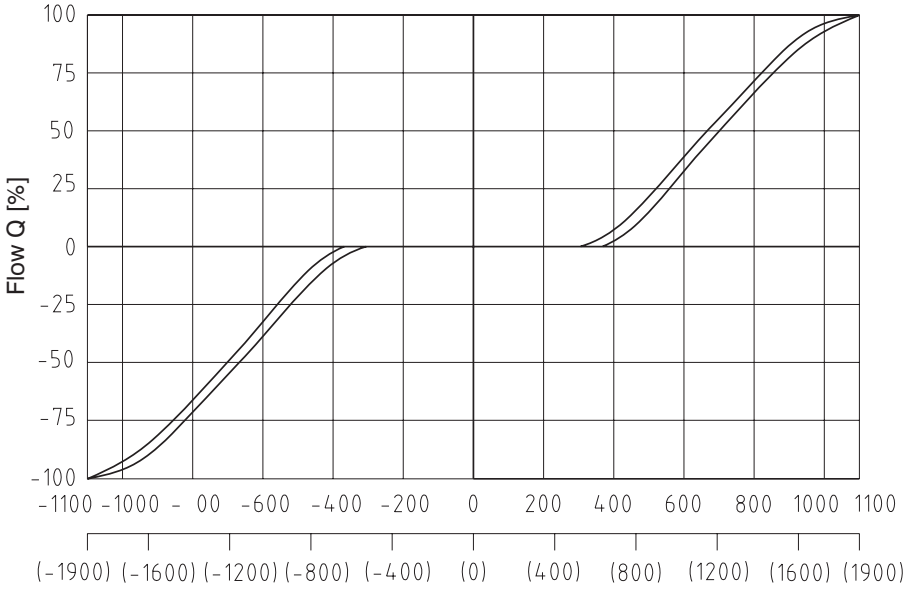
Flow Characteristic with Integrated Electronics

Measured at Δp = 145 PSI (10 bar), ν = 166 SUS (35 mm^2/s)



Flow Characteristic without Integrated Electronics

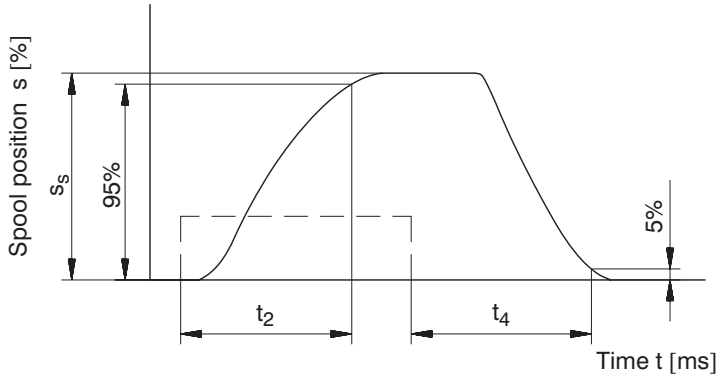
Measured at Δp = 145 PSI (10 bar), ν = 166 SUS (35 mm^2/s), values in parenthesis are valid for the supply voltage 12 V



The coil current which initializes the flow through the proportional directional valve can differ due to the production tolerances about in a range of ± 6% of the limit current.

Transient Characteristic

Measured at Δp = 145 PSI (10 bar), ν = 166 SUS (35 mm^2/s); Q = 80 %Q_n

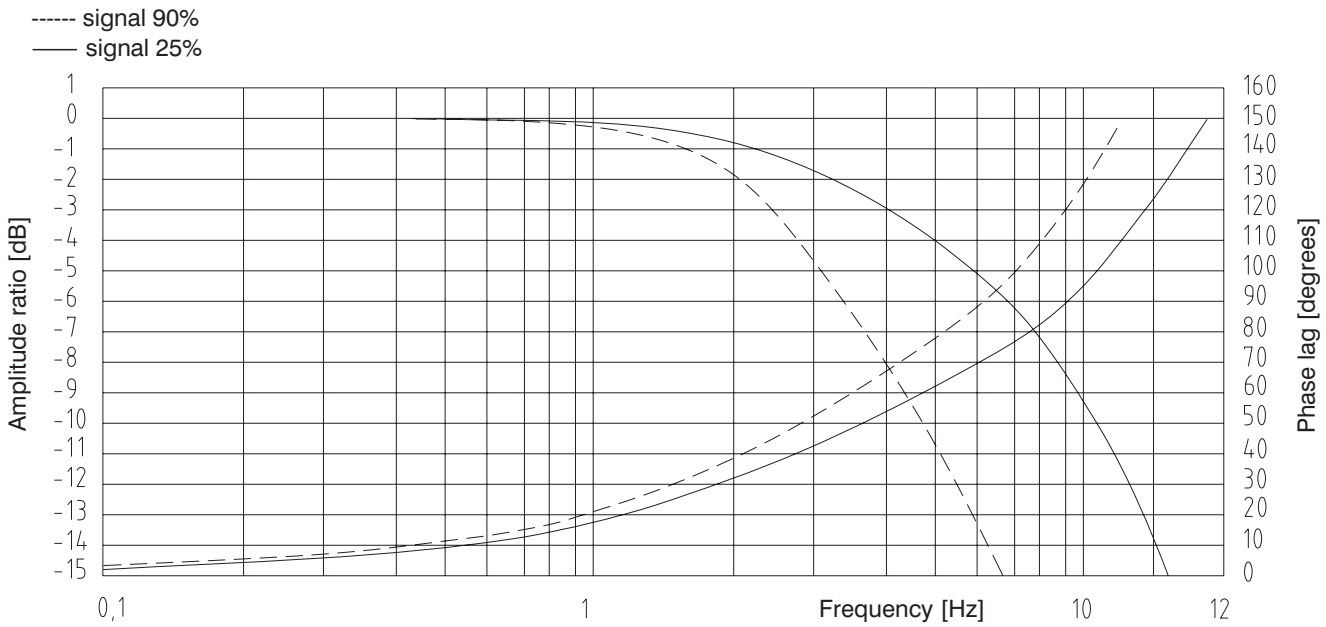


— — — the control signal course of the integrated electronics

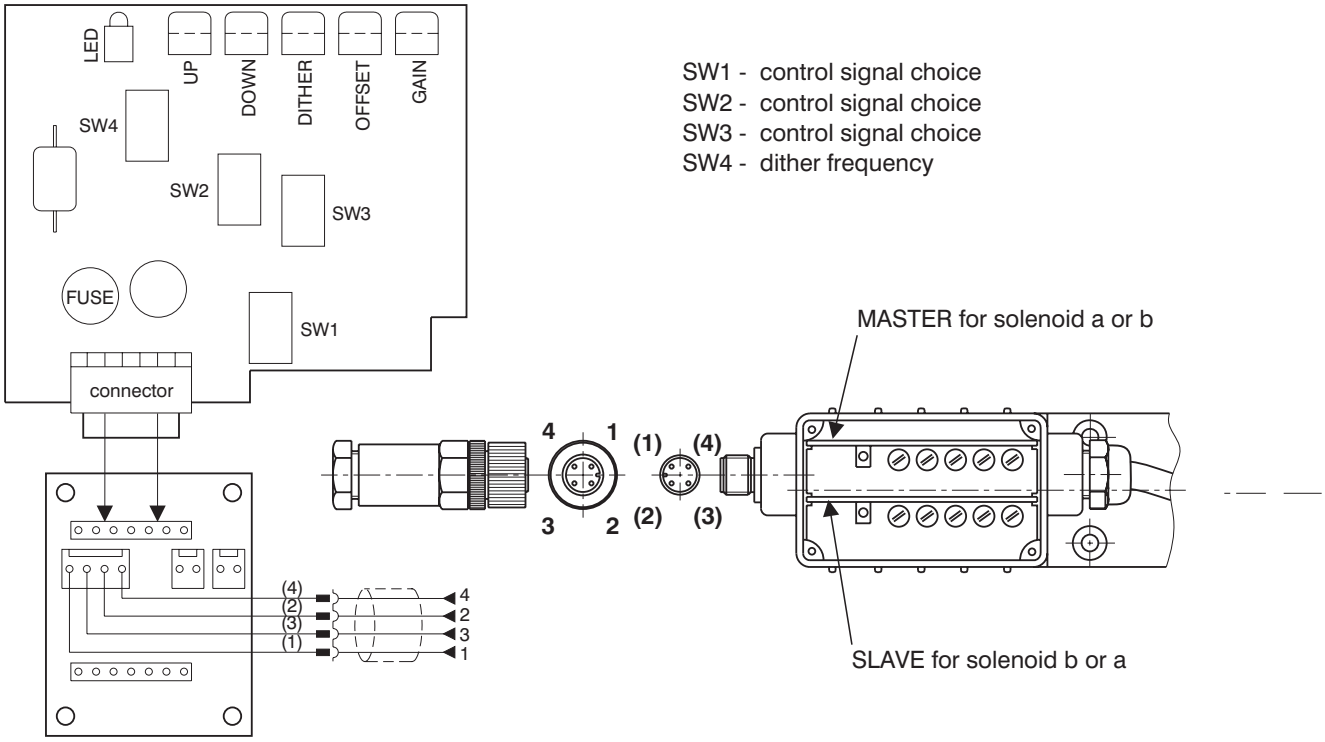
Steady spool position s_s [%]	t_2 [ms]	t_4 [ms]
100	160	145
75	135	130
50	85	105
25	50	70

The values in table have only an informative character.
The times of the transient characteristics at pressure or flow control will be in a particular hydraulic circuit always longer.

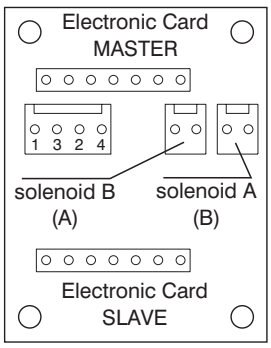
Frequency Reponse



Component Arrangement on the Electronic Card



Description basic subplatte



PIN	Description
1	+24 V (U_{CC}) (+12 V)
2	control
3	0 V
4	+10 V (+5 V)

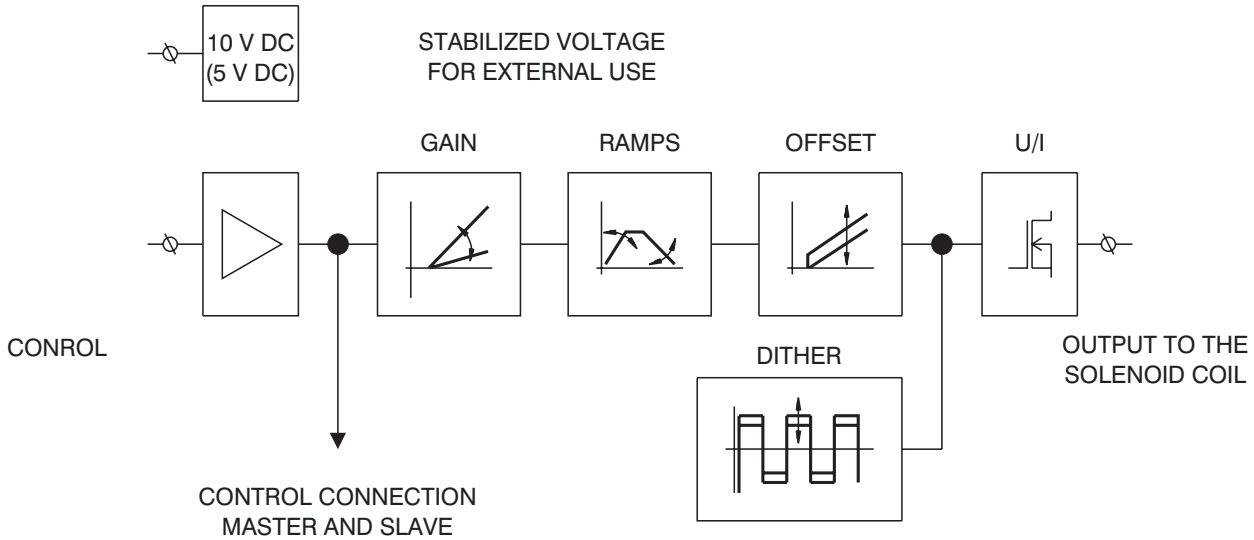
Table of the Switch Configuration for the Control Signal Choices

		PRM6-102				PRM6-103	
		0 ... 5 V	0 ... 10 V (0 ... 5 V)*	0 ... 20 mA	4 ... 20 mA	$U_{cc}/2$ ± 10 V (± 5 V)*	± 10 V (± 5 V)*
MASTER M	SW1	ON 1 2	ON 1 2	ON 1 2	ON 1 2	ON 1 2	ON 1 2
	SW2	ON 1 2	ON 1 2	ON 1 2	ON 1 2	ON 1 2	ON 1 2
	SW3	ON 1 2	ON 1 2	ON 1 2	ON 1 2	ON 1 2	ON 1 2
	SW4	90 Hz ON 1 2			60 Hz	ON 1 2	
SLAVE S	SW1					ON 1 2	ON 1 2
	SW2					ON 1 2	ON 1 2
	SW3					ON 1 2	ON 1 2
	SW4					90 Hz ON 1 2	60 Hz ON 1 2

Designation of the basic manufacture setting.
The ramp functions are adjusted on their minimum values, the dither is set to the optimal value with respect to hysteresis. Offset and Gain are adjusted according to the characteristic on page 3 and 4. The manufacturer does not recommend these adjusted values to be changed.

* Input signal level for the 12 V electronic unit.

Block Diagram



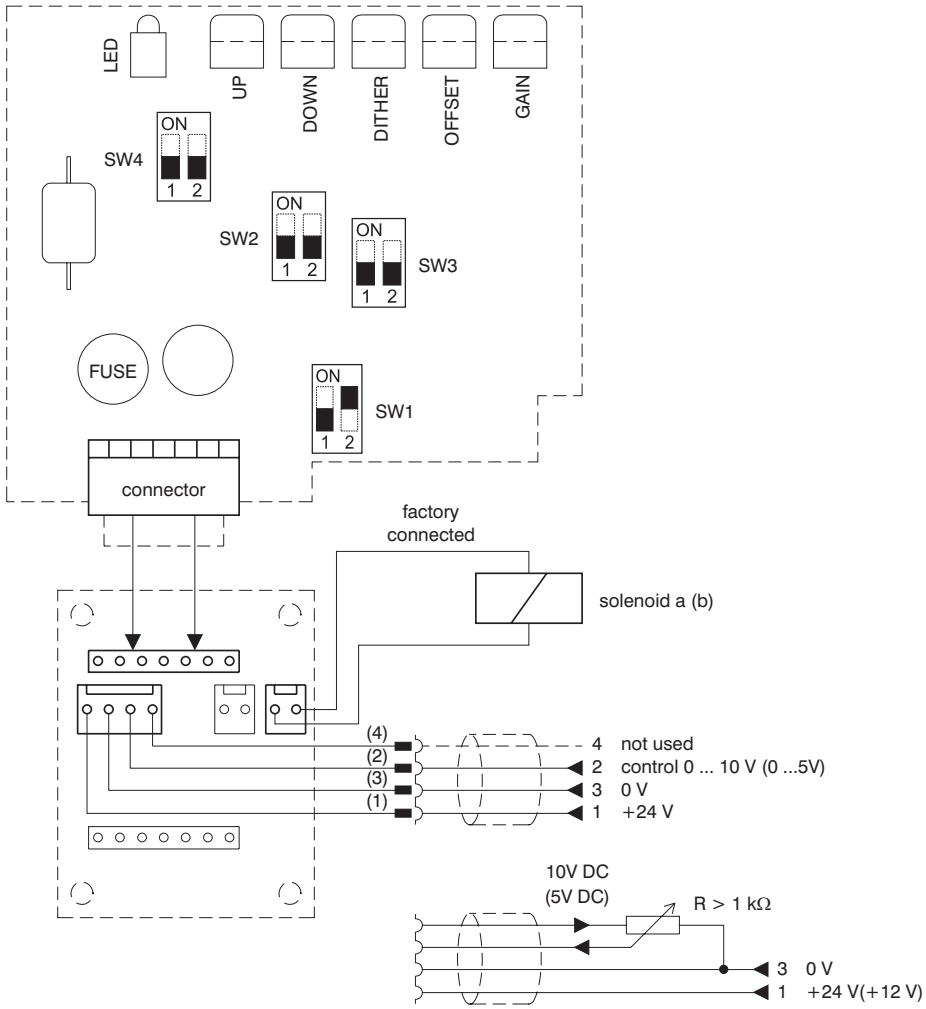
Valve PRM6-102 (with One Solenoid)

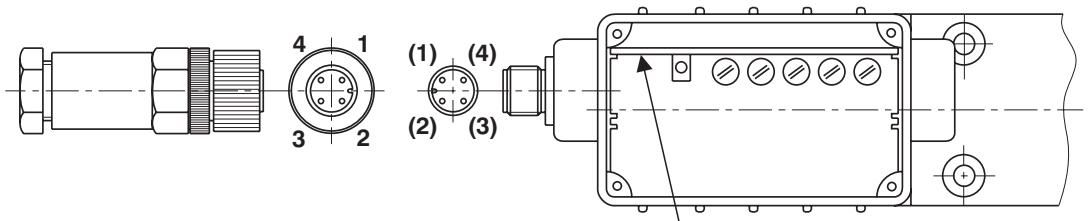
1 Factory setting

1.1 Control with external voltage source 0 ... 10 V (0 ... 5 V) or with external potentiometer R >1 kΩ

Notice:
The control signal must have the same ground potential as the supply source.

Master card for solenoid a (b)





MASTER for solenoid a (b)

Wire colours (connection connector - electronics):
(1) - brown
(2) - white
(3) - blue
(4) - black

Factory set values:
Control signal: 0 - 10 V (0 - 5V)
Dither: frequency 90Hz
amplitude - optimum
Ramps: 0.05 s
Offset, Gain: according to the characteristics on page 3, 4

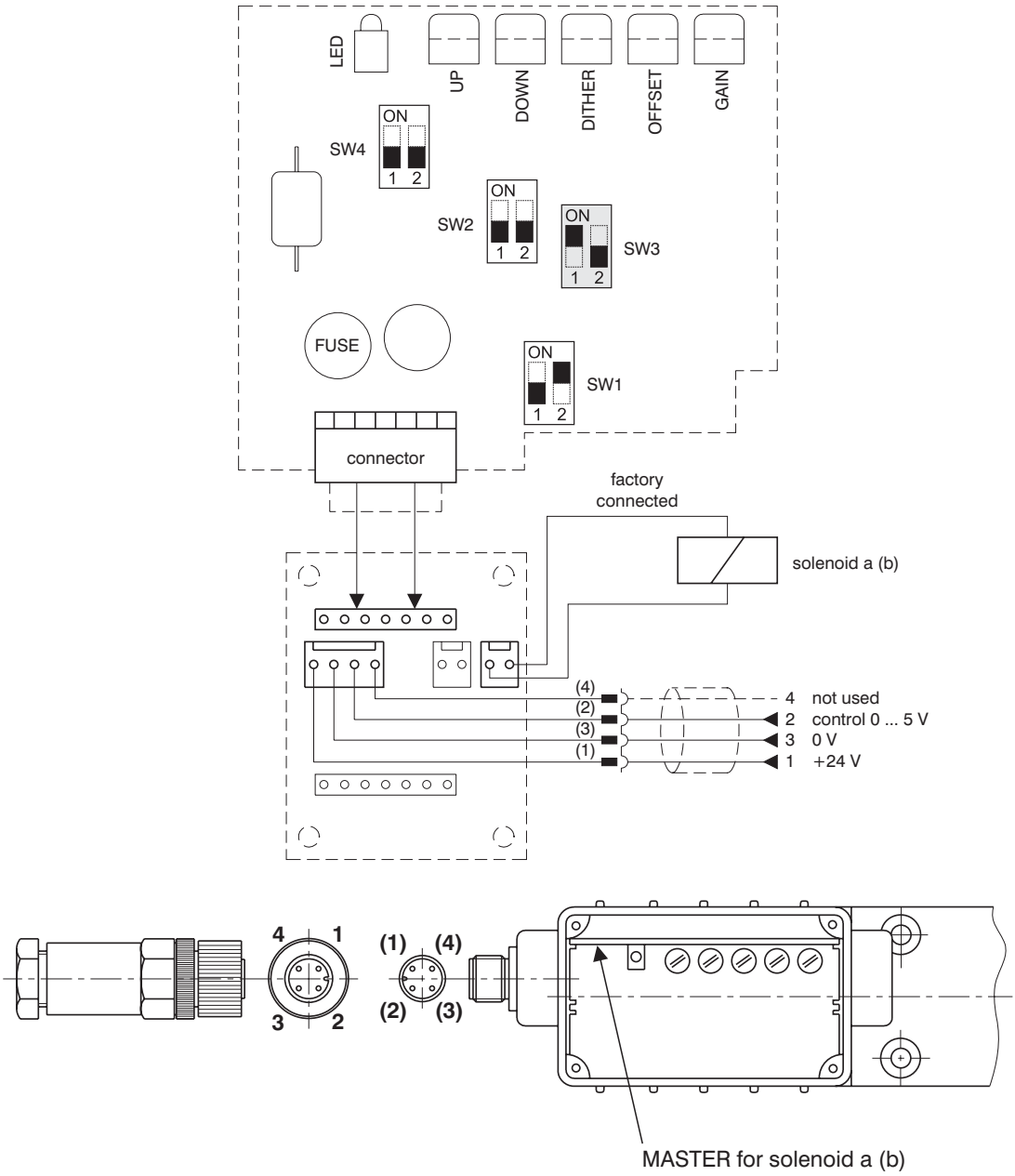
Valve PRM6-102 (with One Solenoid)

2 Other control possibilities

2.1 Control with external source 0 ... 5 V

Notice:
The control signal must have the same ground potential as the supply source.

Master card for solenoid a (b)



For the factory setting modification for this case of application, the following steps are required:

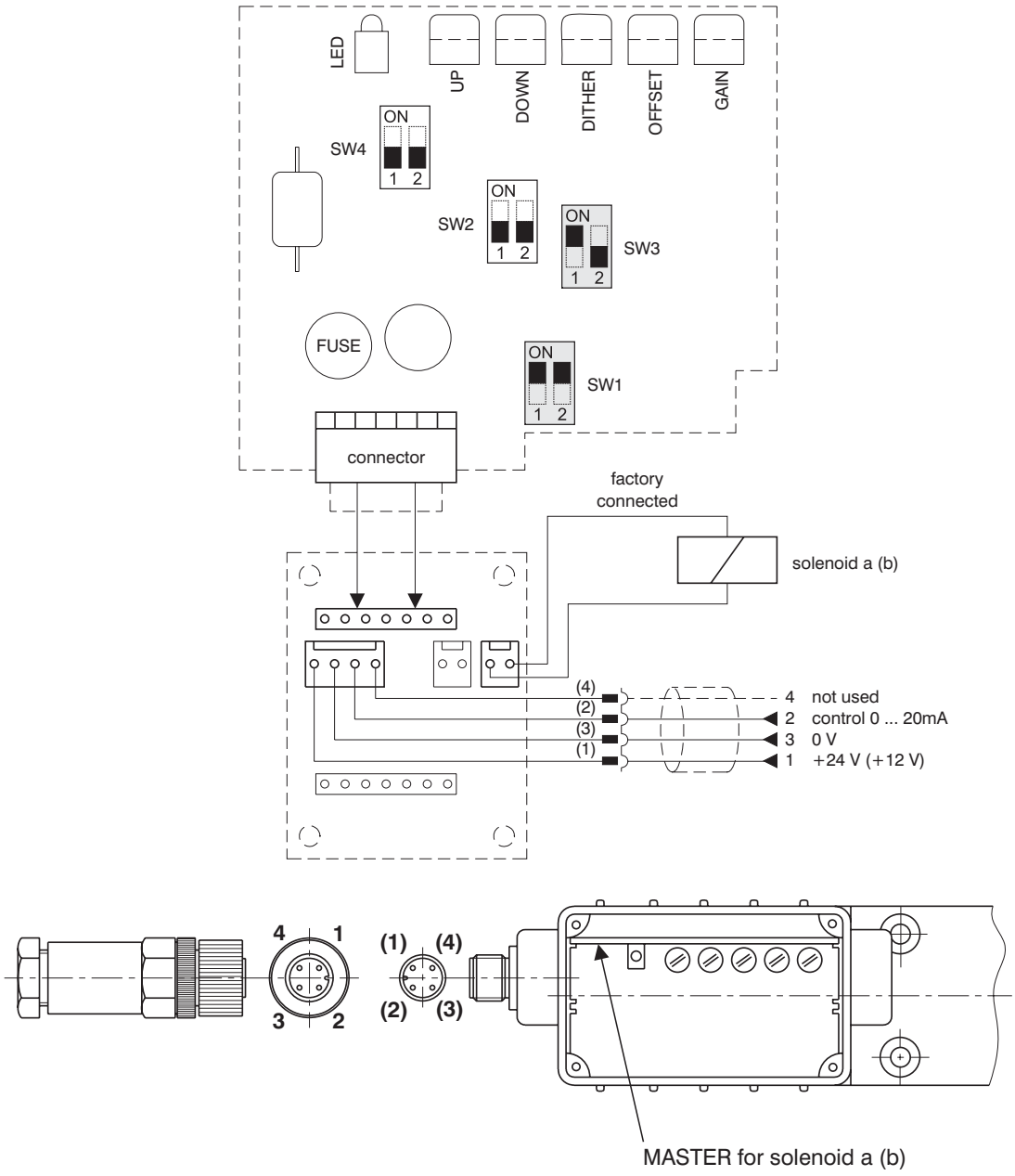
1. Unscrew the electronics cover
2. Carefully remove the Master card
3. Flip the switch SW3 in position shown in the picture
4. Put in the Master card and fix the electronics cover
5. Connect the voltage +24 V from an external supply source to terminals 1 and 3 of the connector
6. Connect the control voltage 0 … 5 V from an external source to terminals 2 and 3 of the connector

Valve PRM6-102 (with One Solenoid)

2.2 Control with external source 0 ... 20 mA

Notice:
The control signal must have the same ground potential as the supply source.

Master card for solenoid a (b)



For the factory setting modification for this case of application, the following steps are required:

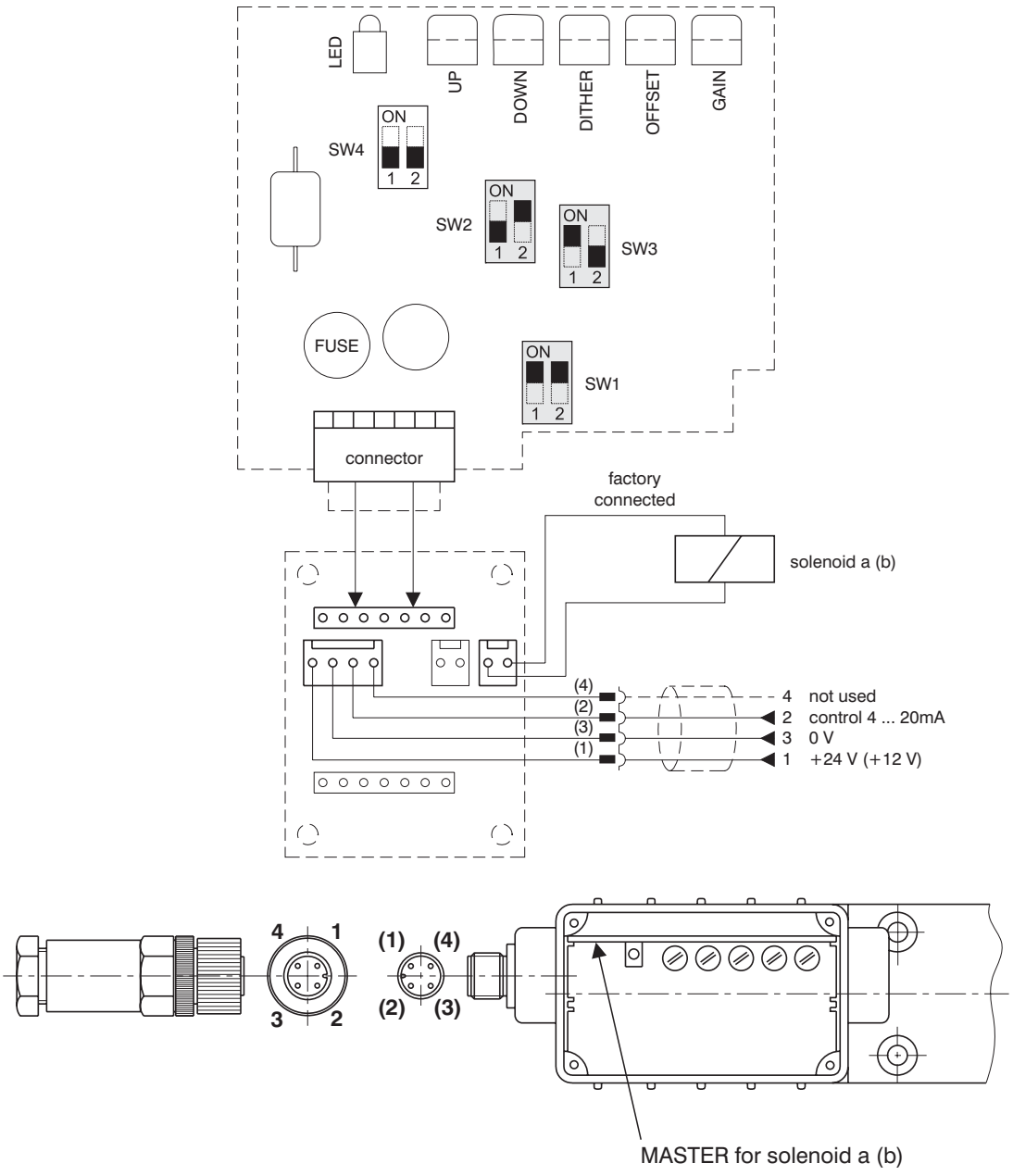
1. Unscrew the electronics cover
2. Carefully remove the Master card
3. Flip the switch SW1 and SW3 in position shown in the picture
4. Put in the Master card and fix the electronics cover
5. Connect the voltage +24 V (+12 V) from an external supply source to terminals 1 and 3 of the connector
6. Bring the control current 0 … 20 mA from an external source to terminals 2 and 3 of the connector

Valve PRM6-102 (with One Solenoid)

2.3 Control with external source 4 ... 20 mA

Notice:
The control signal must have the same ground potential as the supply source.

Master card for solenoid a (b)



For the factory setting modification for this case of application, the following steps are required:

1. Unscrew the electronics cover
2. Carefully remove the Master card
3. Flip the switch SW1, SW2 and SW3 in position shown in the picture
4. Put in the Master card and fix the electronics cover
5. Connect the voltage +24 V (+12 V) from an external supply source to terminals 1 and 3 of the connector
6. Bring the control current 4 … 20 mA from an external source to terminals 2 and 3 of the connector

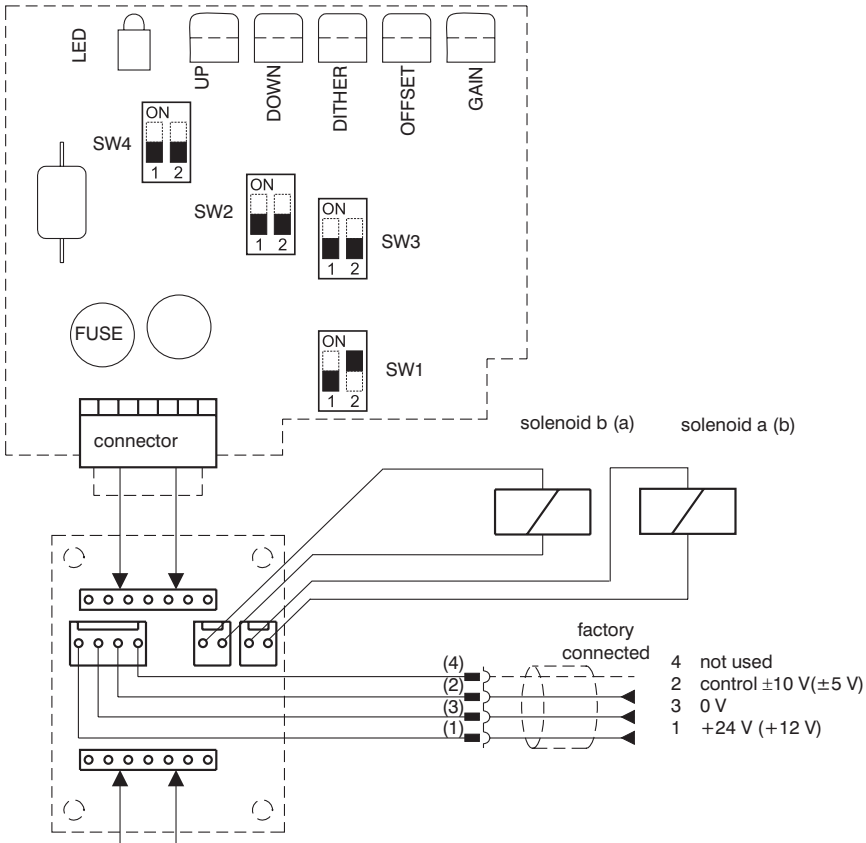
Valve PRM6-103 (with Two Solenoids)

3 Factory setting

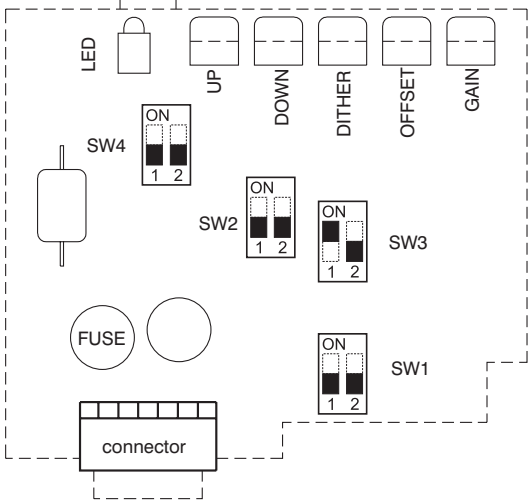
3.1 Control with external source 0 ± 10 V (0 ± 5 V)

Notice:
The control signal must have the same ground potential as the supply source.

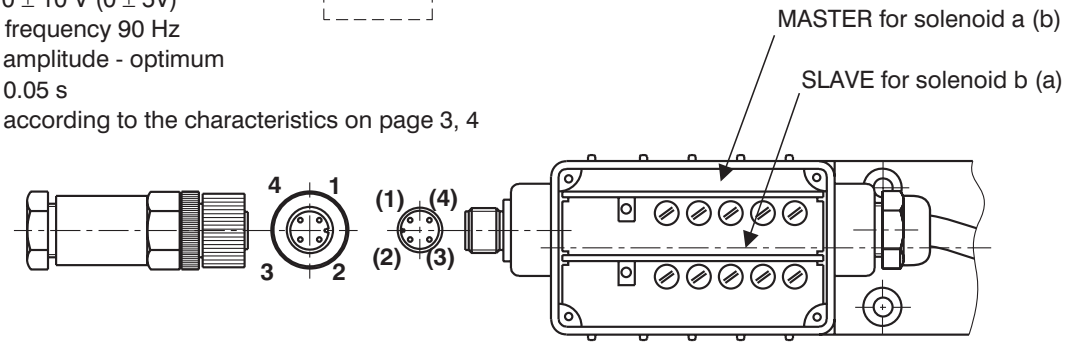
Master card for solenoid a (b)



Slave card for solenoid b (a)



Factory set values:
Control signal: 0 ± 10 V (0 ± 5V)
Dither: frequency 90 Hz
amplitude - optimum
Ramps: 0.05 s
Offset, Gain: according to the characteristics on page 3, 4

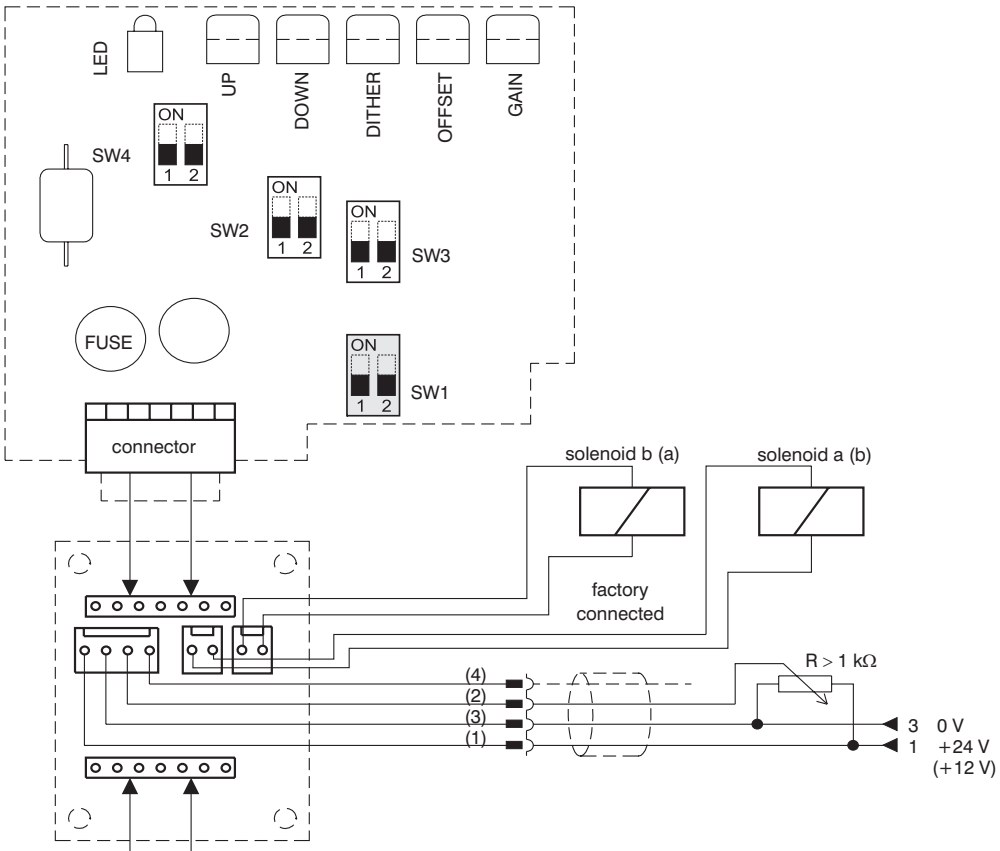


Valve PRM6-103 (with Two Solenoids)

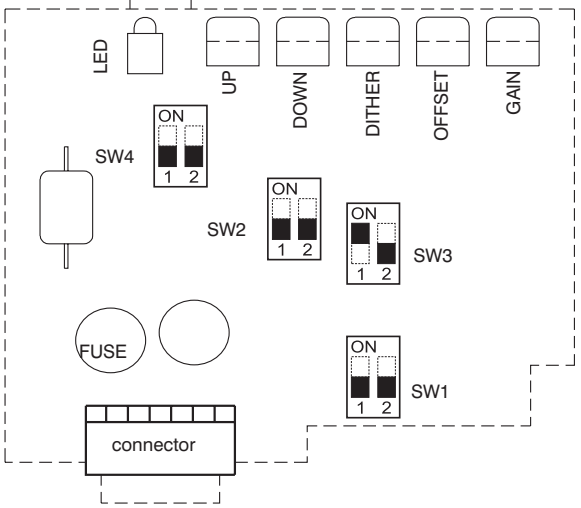
3.2 Other control possibilities

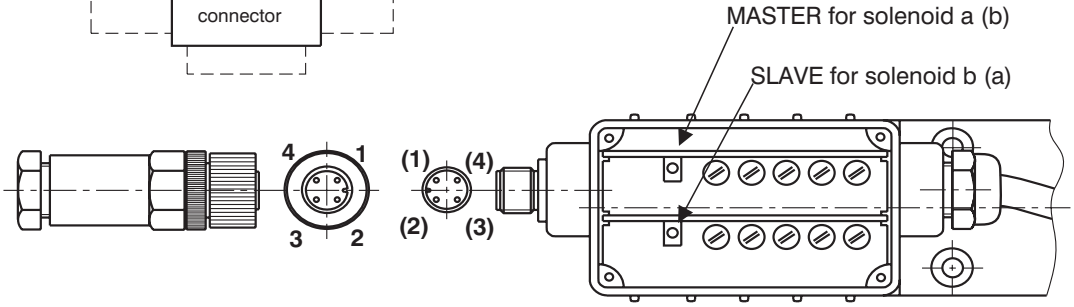
Control $U_{cc}/2 \pm 10$ V($U_{cc}/2 \pm 5$V) external potentiometer R > 1 kΩ

Master card for solenoid a (b)



Slave card for solenoid b (a)



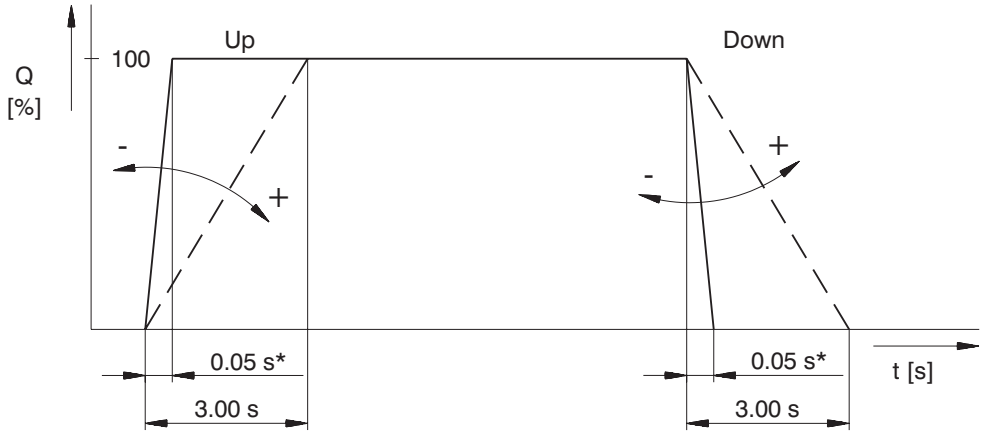


For the factory setting modification for this case of application, the following steps are required:

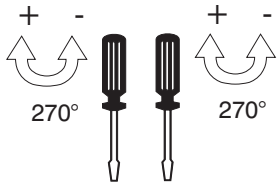
1. Unscrew the electronics cover
2. Carefully remove the Master card
3. Flip the switch SW1 in position shown in the picture
4. Put in the Master card and fix the electronics cover
5. Connect the voltage +24 V (+12 V) from an external supply source to terminals 1 and 3 of the connector

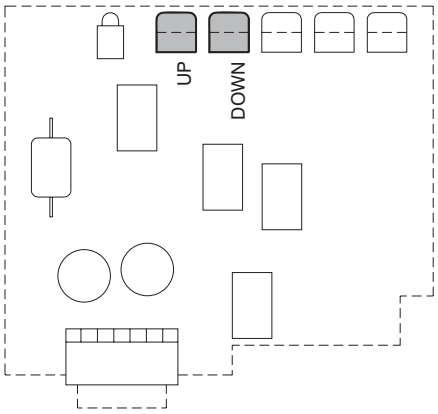
Ramp Adjustment (Up, Down)

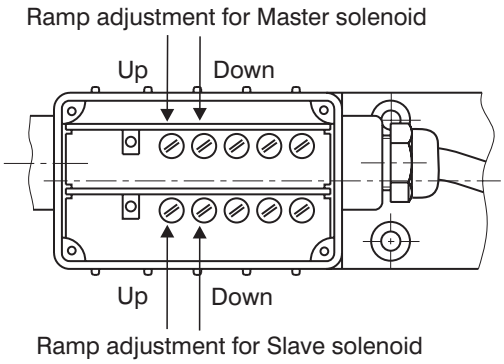
Notice: The factory setting of the ramp functions is to the minimum values.



*The value has only an informative character with respect to the particular type of the proportional directional valve (see page 4)



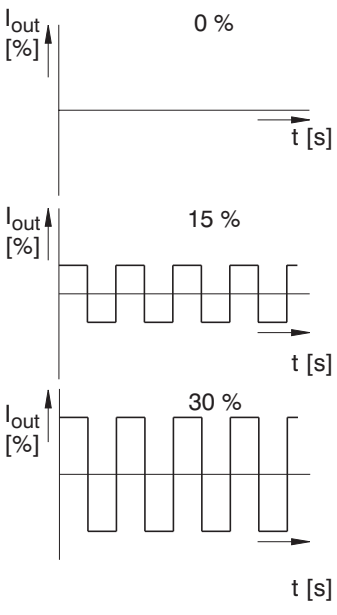


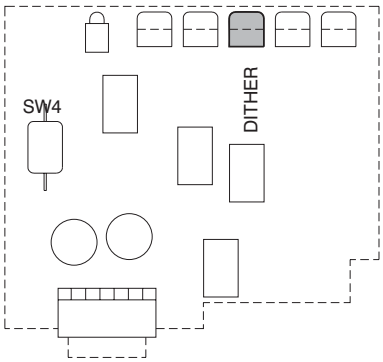


Dither Adjustment

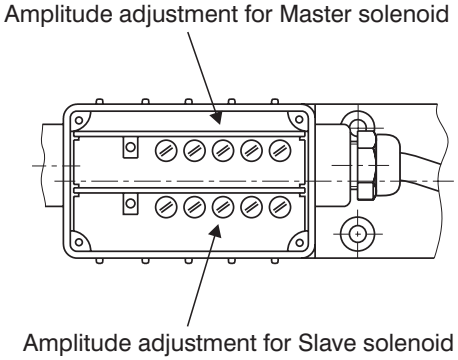
Notice: The dither is adjusted with regard to the minimum hysteresis.

Amplitude - potentiometer (dither) (0 - 30 %)



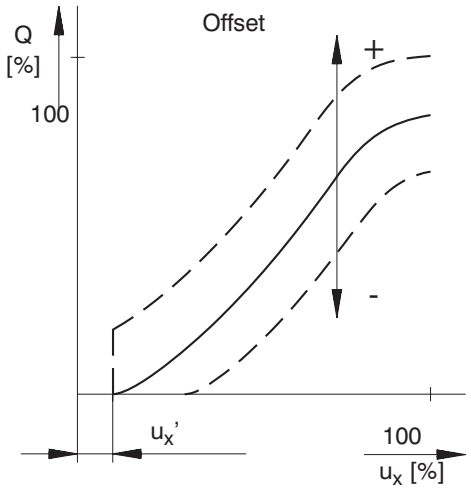


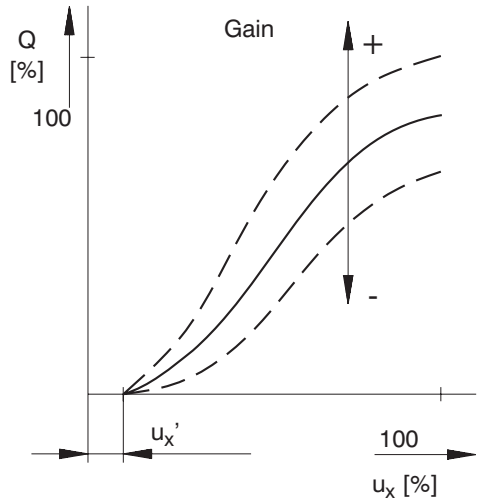
Frequency - switch SW4

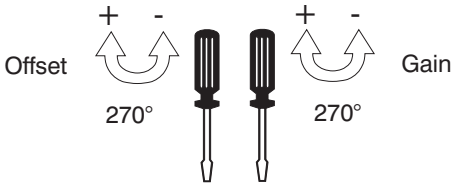


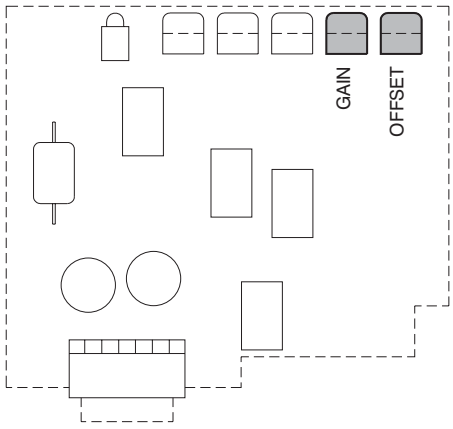
Adjustment of Offset, Gain Parameters

Notice: The factory setting of the Offset and Gain parameters is specific for the solenoids used.
The manufacturer does not recommend this setting to be changed.

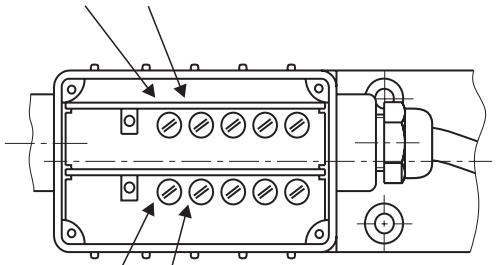








Adjustment of Offset, Gain for Master solenoid



Adjustment of Offset, Gain for Slave solenoid

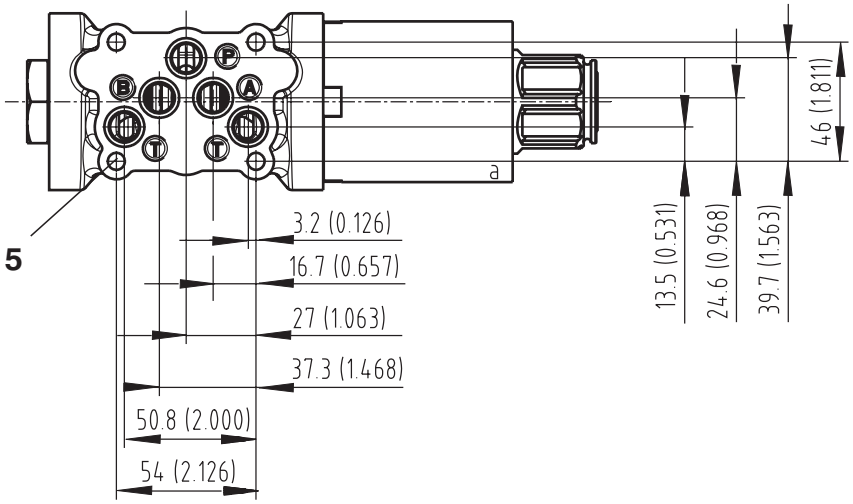
Nominal supply voltage of electronics [V]	Area insensible to control signal u_x' [%]
12	1 ... 3
24	0.5 ... 2

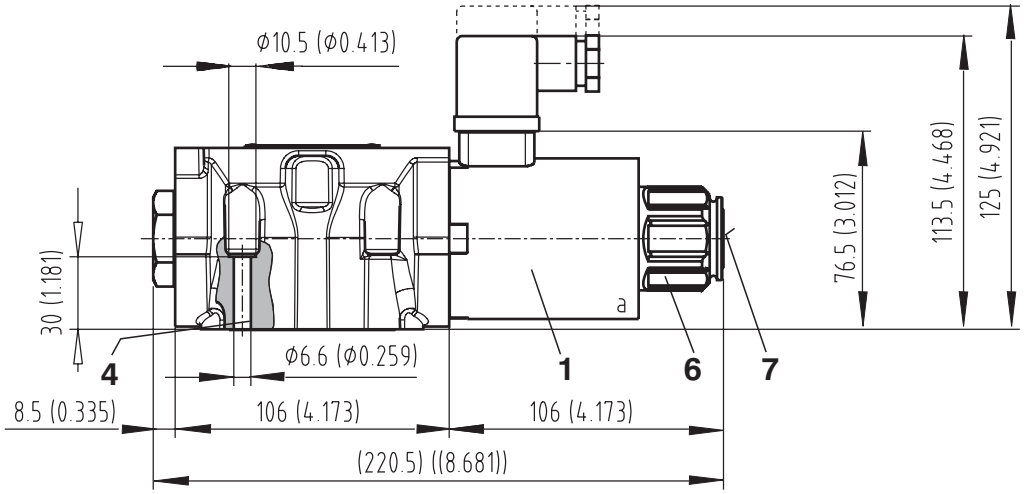
Valve Dimensions

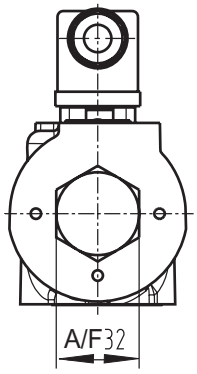
Dimensions in millimetres (in inches)

PRM2-102..../..-...

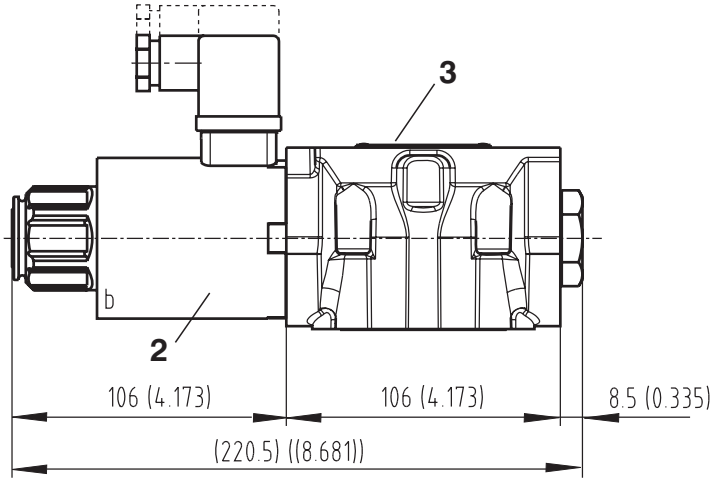
Functional symbols
2Z51, 2Y51



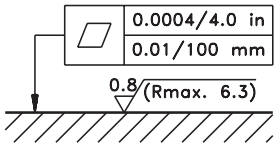




Functional symbols
2Z11, 2Y11



1 Solenoid a
2 Solenoid b
3 Name plate
4 Square ring 12.42 x 1.68 (5 pcs.) supplied in delivery packet
5 4 through mounting holes
6 Solenoid fixing nut [Nut torque 6 Nm (4.43 lbf.ft)]
7 Manual override



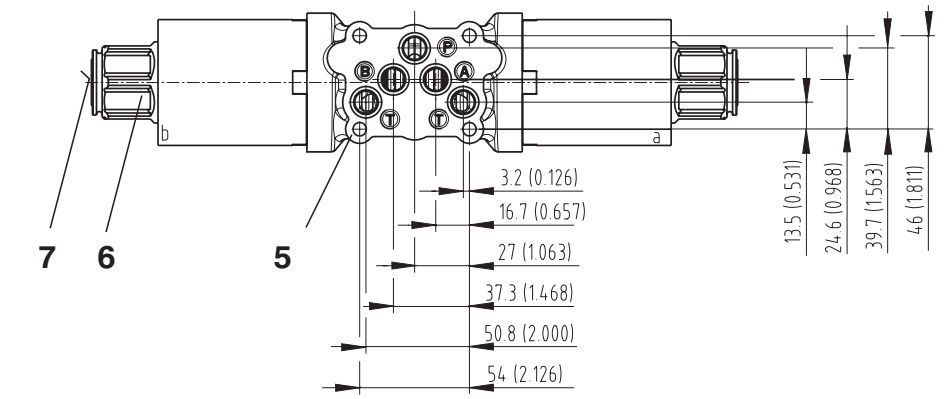
Required surface finish of interface.

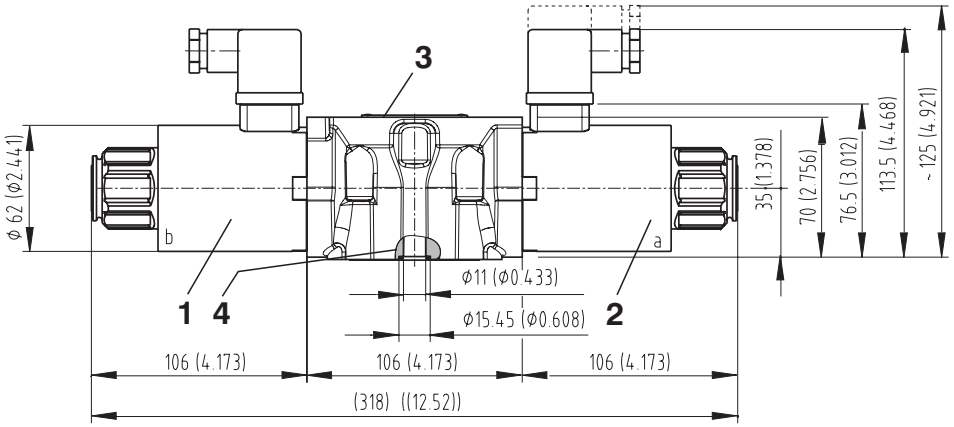
Valve Dimensions

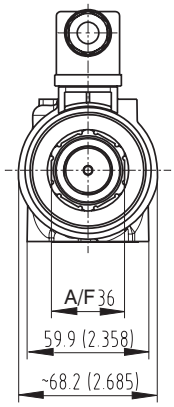
Dimensions in millimetres (in inches)

PRM6-103..../..-...

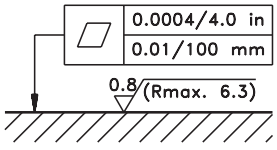
Functional symbols
3Z11, 3Z12, 3Y11, 3Y12







1 Solenoid a
2 Solenoid b
3 Name plate
4 Square ring 12.42 x 1.68 (5 pcs.)
supplied in delivery packet
5 4 through mounting holes
6 Solenoid fixing nut [Nut torque 6 Nm (4.43 lbf.ft)]
7 Manual override



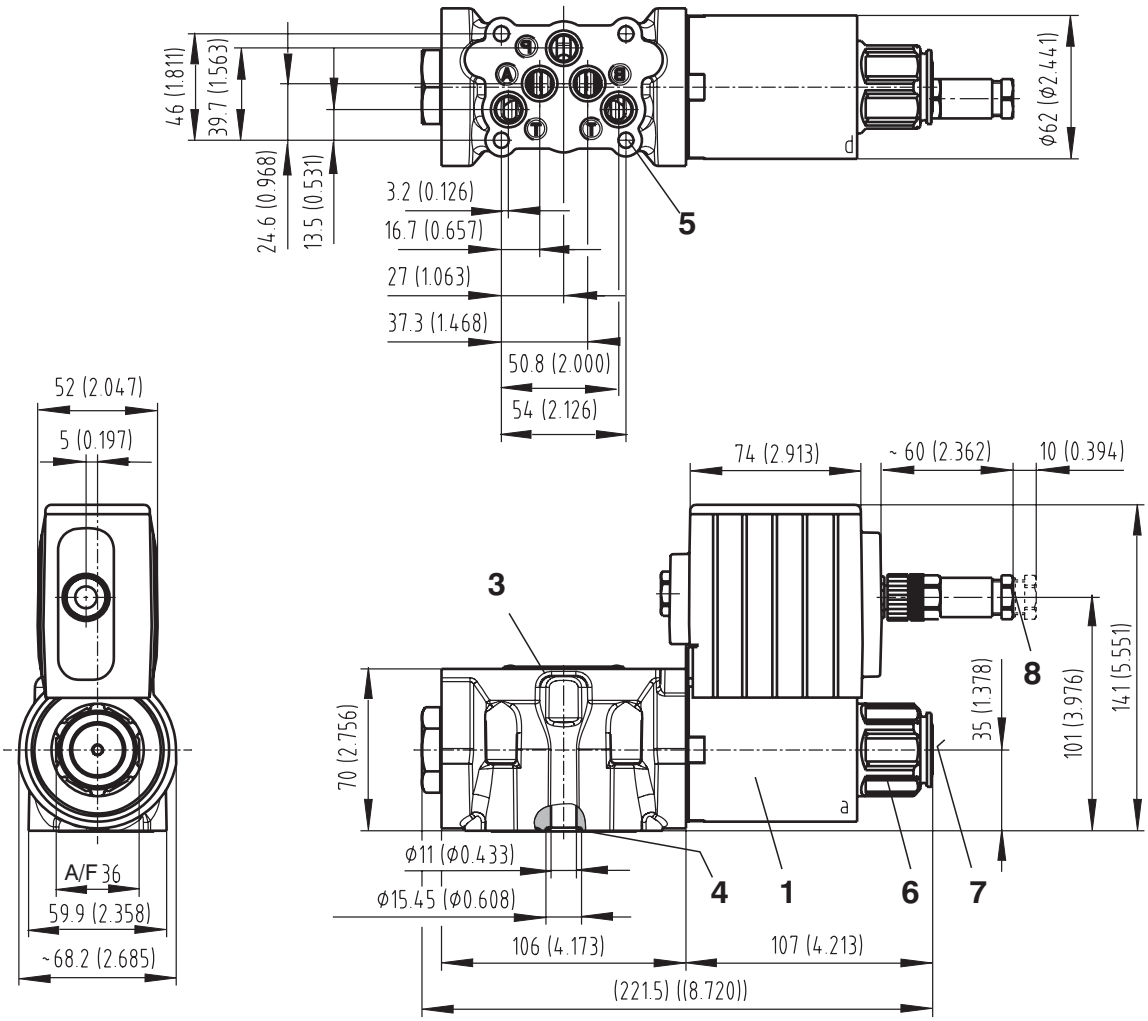
Required surface finish of interface.

Valve Dimensions

Dimensions in millimetres (in inches)

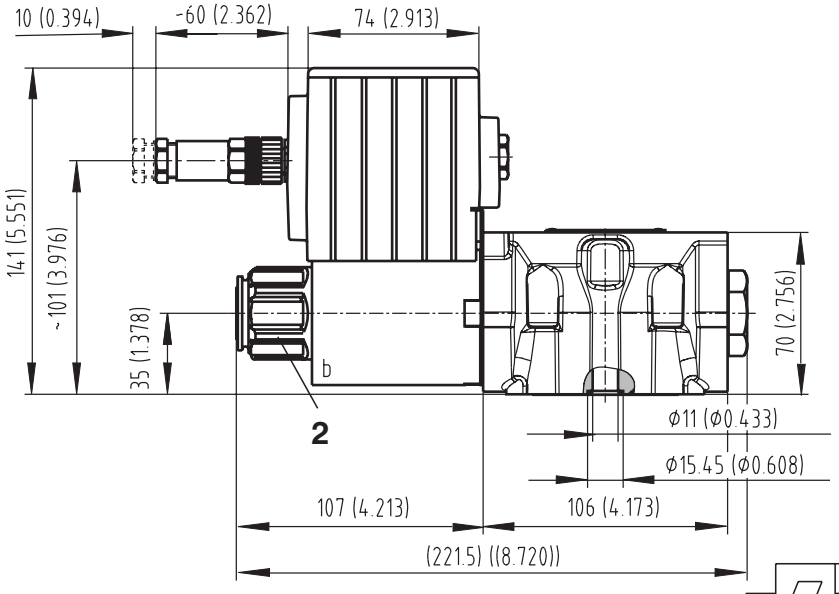
PRM6-102..../..-..EK..

Functional symbols
2Z51, 2Y51

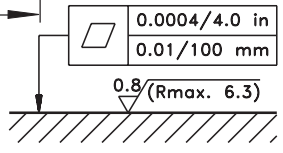


PRM6-102...B/..-..EK..

Functional symbols
2Z11, 2Y11



1 Solenoid a
2 Solenoid b
3 Name plate
4 Square ring 12.42 x 1.68 (5 pcs.) supplied in delivery packet
5 4 through mounting holes
6 Solenoid fixing nut [Nut torque 6 Nm (4.43 lbf.ft)]
7 Manual override
8 4- pin connector M12 x 1 for external supply voltage



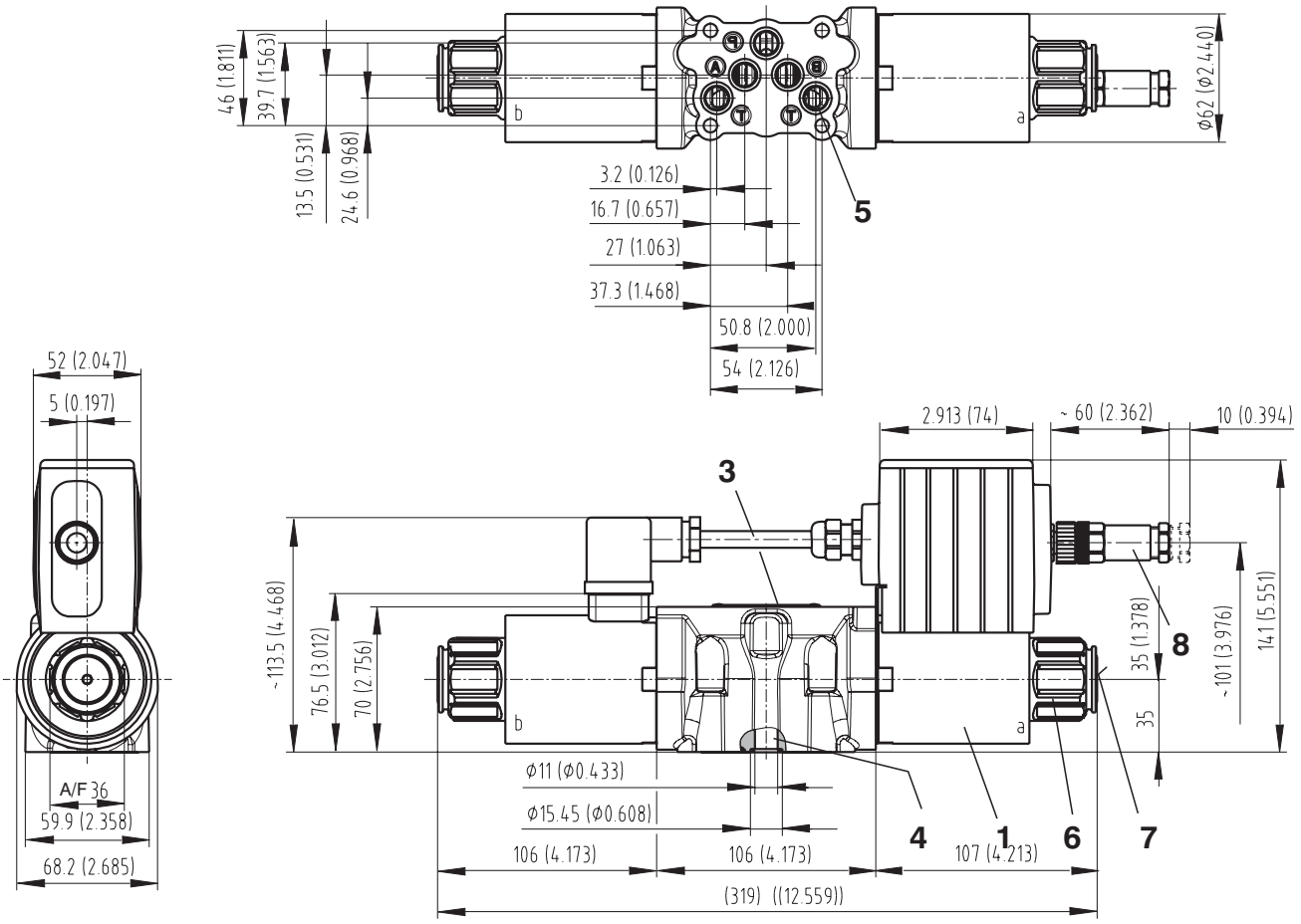
Required surface finish of interface.

Valve Dimensions

Dimensions in millimetres (in inches)

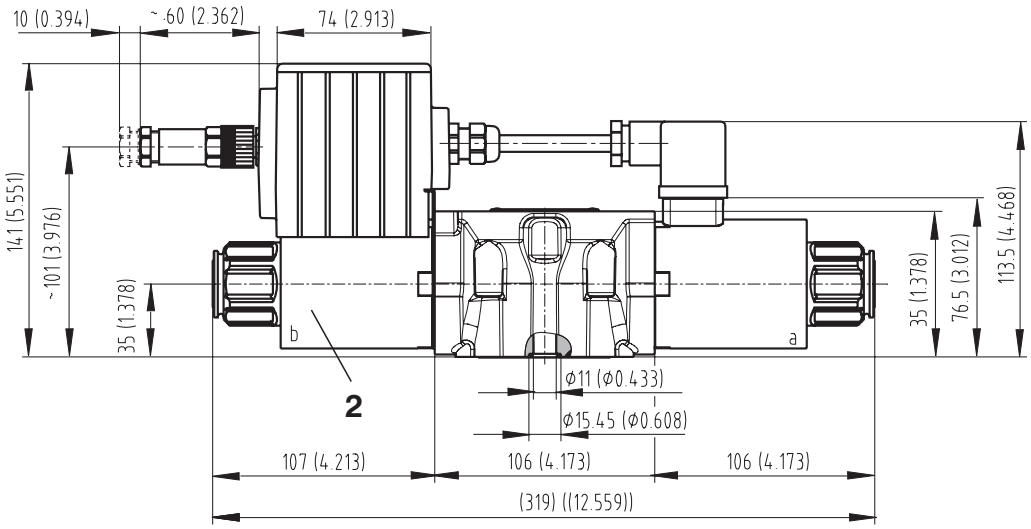
PRM6-103..../..-..EK..

Functional symbols
3Z11, 3Z12, 3Y11, 3Y12

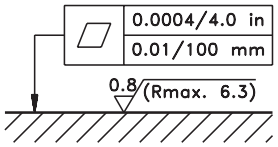


PRM6-103...B/..-..EK..

Functional symbols
3Z11B, 3Z12B, 3Y11B, 3Y12B



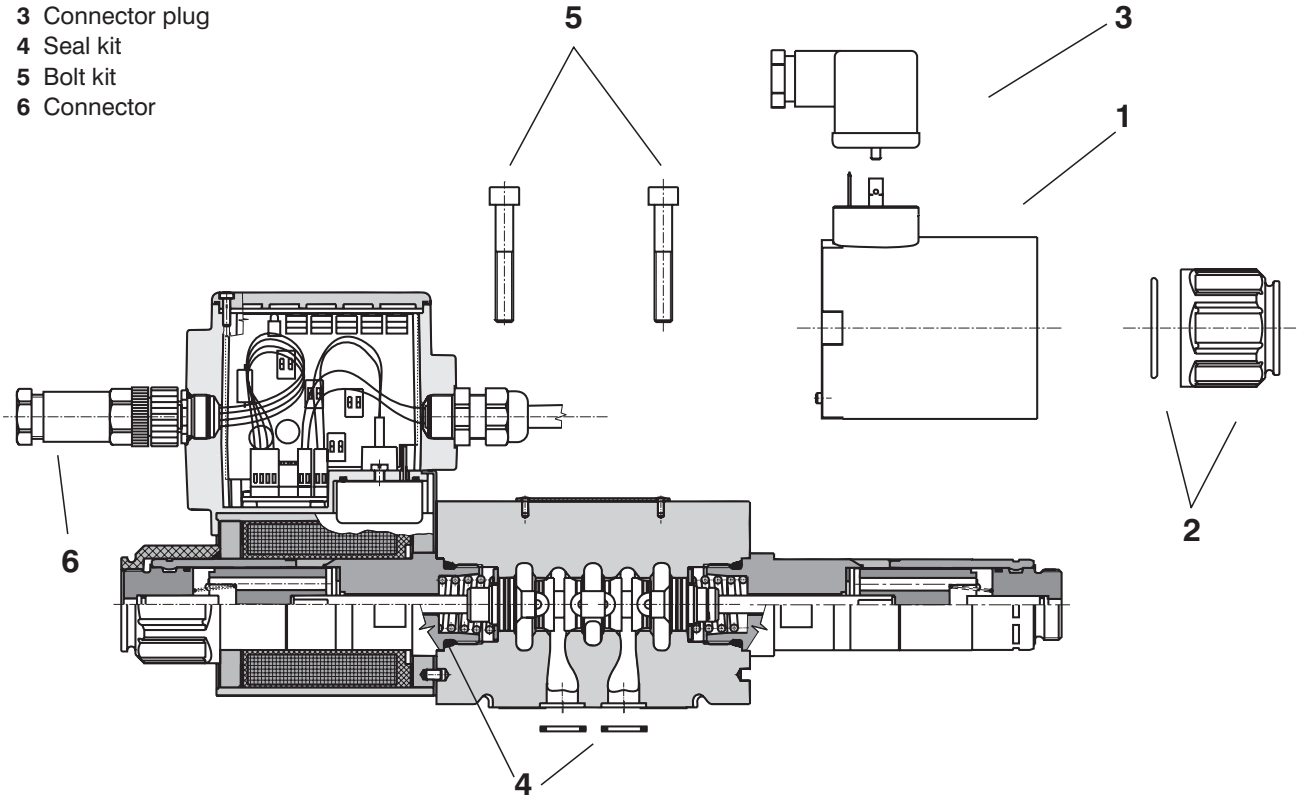
1 Solenoid a
2 Solenoid b
3 Name plate
4 Square ring 12.42 x 1.68 (5 pcs.) supplied in delivery packet
5 4 through mounting holes
6 Solenoid fixing nut [Nut torque 6 Nm (4.43 lbf.ft)]
7 Manual override
8 4- pin connector M12 x 1 for external supply voltage



Required surface finish of interface.

Spare Parts

1 Solenoid coil
2 Nut + seal ring
3 Connector plug
4 Seal kit
5 Bolt kit
6 Connector



1. Solenoid coil

Nominal supply voltage [V]	Ordering number
12	936-4614
24	936-4629

2. Solenoid retaining nut + seal ring

Model of the nut	Seal ring	Ordering number
Standard nut	30 x 2	489-9900

3. Connector plug to DIN 43 650

Type designation	Type	Maximum input voltage	Connector plug A gray	Connector plug B black
			Ordering number	
K5	without rectifier - M16x1.5 bushing bore ∅ 4-6 mm (∅ 0.16-0.24 in)	230 V DC	936-9906	936-9905

4. Seal kit

Type	Dimensions, number		Ordering number
Standard - NBR 70	12.42 x 1.68 (5 pcs.)	23.81 x 2.62 (2 pcs.)	489-9902
Viton	12.42 x 1.68 (5 pcs.)	23.81 x 2.62 (2 pcs.)	489-9903

5. Bolt kit

Dimensions, number	Tightening torque	Ordering number
M6 x 40 DIN 912-10.9 (4 pcs.)	14 Nm (10.33 lbf.ft)	485-9964

6. Connector	Ordering number
M12 x 1 (4-pin connector)	358358904012

Caution!

- The packing foil is recyclable.
- Mounting bolts M6 x 40 DIN 912-10.9 or studs must be ordered separately.
  Tightening torque of the bolts is 14 Nm (10.33 lbf.ft).
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of law.

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www.argo-hytos.com

ARGO HYTOS

Proportional Directional Control Valves with Position Sensor

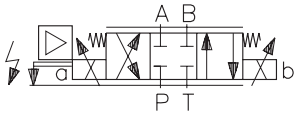
PRM7-10

Size 10 (D 05) • ... 320 bar (4600 PSI) • ...80 L/min (21 GPM)

HA 5116
11/2006

Replaces
HA 5116 5/2005

- ❑ **Digital control**
- ❑ **Compact design**
- ❑ **Operated by proportional solenoids**
- ❑ **High sensitivity and slight hysteresis**
- ❑ **Installation dimensions to ISO 4401 and DIN 24 340-A10**



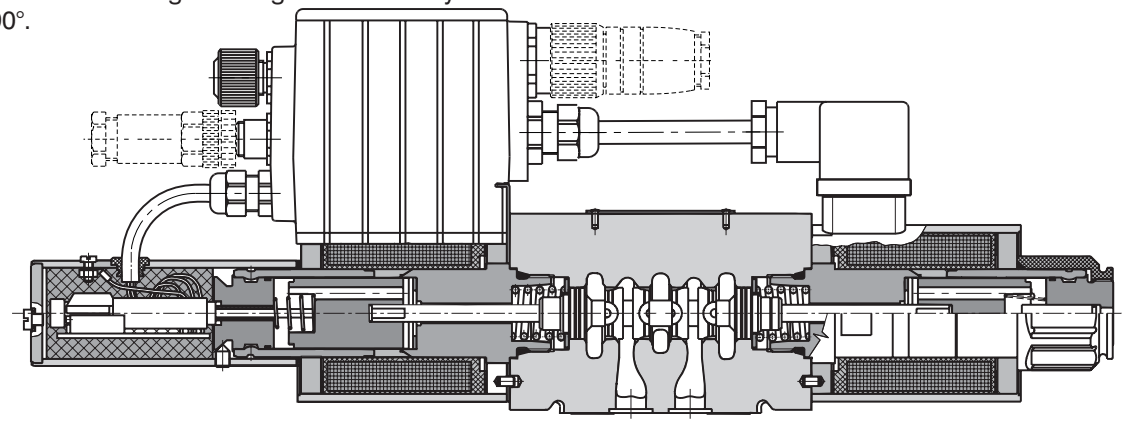
Functional Description

The proportional switchboard PRM7 consists of an iron casting body, a special cylindrical gate calve, two centering thrust washers, one or two proportional electromagnets, a position primary element or an electronics system box with digital electronics if need be. The measuring system of the position primary element consists of a differential transformer with a core and of evaluating electronic system in hybrid execution.
In case of the execution without the integrated electronic system the electrical connection of the electromagnets is realized with the use of a connector skewer plug DIN 43 650 and the outlet of the position primary element is realized with the use of a connector skewer plug G4W1F.
In case of the execution with the integrated electronic system the proportional switchboard is fitted with an electronics box. This box is fixed to an arbitrary electromagnet together with the position primary element. The outlet of the electromagnet is connected with the box directly with the use of a cable. In the execution of the switchboard fitted with two electromagnets the opposite electromagnet is interconnected with the appropriate electronic system box with the use of a cable terminated with a connector skewer plug DIN 43 650. The connection of the feeding voltage, control signal, control outlet of the position primary element of the gate valve (if installed) and outlet voltage +10 V DC (direct-current voltage) is carried out with the help of seven-poles connector M23. The connection of the external feedback is carried out with the help of a fife-pole connector M12x1 where in addition to an inlet from the external feedback it is also at disposal a feeding voltage of +24V for an external primary element.
Coils including the electronic system box can be turned a slight amount along the longitudinal axis by a value of ± 90°.

The digital electronic system makes it possible to control the proportional valve on the basis of data obtained from two feedback circuits. The proportional switchboard can be utilized using the following four ways:
1.Controlled valve without any feedback – E01.
2.Internal feedback only on the basis of a signal from the gate valve position – E02S01 primary element.
3.External feedback only (pressure sensing unit, position sensing unit etc.) – E03.
4.Both the internal and external feedback – E04S01.

The outlet current to the electromagnet coils is controlled with the help of PWM. The electronic system is equipped with an internal current feedback. The outlet current in case of need may be modulated with the use of a signal of dynamic lubrication. Single function parameters are set up with the use of appropriate software with the help of a computer connected to the proportional switchboard through a serial interface RS 232.
It is necessary to order a cable in accordance with appropriate ordering number as mentioned on page 4.
The right function of the digital electronic system is indicated with a green light emitting LED diode. The incorrect function (a failure) is indicated with the help of a red light emitting LED diode.
The factory configuration of the valve is dependent on its execution. The configuration with an external feedback should be consulted with the manufacturer.

As for the basic surface treatment the switchboard body is phosphate coated, the surface of the control electromagnets and the position sensing elements are zinc coated.



Ordering Code

PRM7-10 □ / □ - □ □ □

Proportional directional control valve with position sensor

Nominal size **10 (D 05)**

Seals

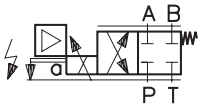
without designation	NBR
V	FPM (Viton)

Model

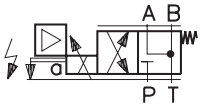
S01	position sensor with voltage outlet
S02	position sensor with current outlet
E01	proportional directional valve without feedback
E02S01	proportional directional valve with position feedback
E03	proportional directional valve with external feedback
E04S01	proportional directional valve with position and external feedback

On model E, the position sensor without connector is always at the control box side. The model without the el. box is equipped with connector

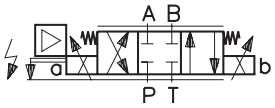
Spool Symbols



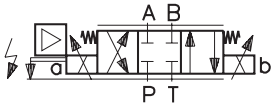
2Z51



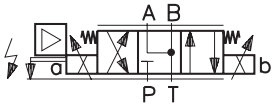
2Y51



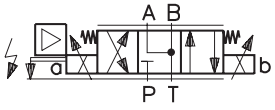
3Z11



$\frac{q_A}{q_B} = \frac{1}{2}^*$ **3Z12**



3Y11



$\frac{q_A}{q_B} = \frac{1}{2}^*$ **3Y12**

Nominal solenoid supply voltage

12	**supply voltage 12V DC
24	supply voltage 24 V DC

** Cannot be supplied as Variant S2

Nominal flow rate at Δp =10 bar (145 PSI)

30	flow 30 L/min (7.925 GPM)
60	flow 60 L/min (15.850 GPM)

***** Model for cylinders with asymmetric piston rod, piston area ratio 1:2

Connectors are to be ordered separately, see pages 10

Technical Data

Nominal size	mm (US)	10 (D 05)
Max. operating pressure at ports P, A, B	bar (PSI)	320 (4600)
Max. operating pressure at port T	bar (PSI)	210 (3046)
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP - RP 91H in viscosity classes ISO VG 32, 46 a 68.
Fluid temperature range (NBR/Viton)	°C (°F)	-30 ... +80 (-22 ... +176) / -20 ... +80 (-4 ... +176)
Ambient temperature max.	°C (°F)	up to +50 (+122)
Viscosity range	mm^2/s (SUS)	20 ... 400 (98 ... 1840)
Maximum degree of fluid contamination		Class 21/18/15 to ISO 4406 (1999).
Nominal flow at $\Delta p = 10$ bar	L/min (GPM)	30 (7.93) / 60 (15.85)
Hysteresis - open loop	%	< 6
Hysteresis - closed position loop	%	< 0.5
Weight - PRM7-102 - PRM7-103	kg (lbs)	4.4 (9.70) 5.9 (13.01)
Mounting position		optional
Enclosure type		IP65

Technical Data of Position Sensor - Voltage Outlet

Operating pressure	bar (PSI)	max. 320 (4600), static
Electric connection		electrical connector G4W1F Hirschmann *
Contact assignment		1 - operating voltage 2 - output signal 3 - ground 4 - not used
Enclosure type to DIN 40050		IP 65
Measured distance	mm (in)	8 (0.315)
Operating voltage	V	9.6 ...30 DC
Linearity error	%	< 1
Current consumption at load current of 2 mA	mA	< 15
Output voltage	V	0 ... 5
Output signal range used: 0 Position 1 solenoid - displacement 3.8 mm 2 solenoids - displacement ±3.8 mm	V	 2.5 0.125 - 2.5 0.125 - 4.875
Max. load current	mA	2
Noise voltage - at load current 0 - at load current of 2 mA	mV_{p-p}	 < 20 < 15
Additional output signal error at: Temperature change between 0 ... 80 °C Between 0 ... -25 °C Load change from 0 to 2 mA		 typical < 0.2% / 10K max. 0.5% / 10K max. 0.5% / 10K 0.1%
Input voltage change from 9.6 V to 14.4 V from 14.4 V to 30 V	%	 < 0.1 < 0.25
Long-term drift (30 days)	%	< 0.25
Cut-off frequency 3 dB fall in amplitude Frequency 90°	Hz	 > 600 > 600

* Only for S01 and S02 model.

Technical Data of Position Sensor - Current Outlet

Linearity	%	< 1
Operating pressure	bar (PSI)	to 320 (4600), static
Electrical connection		electrical connector G4W1F Hirschmann *
Contact assigment		1 - operating voltage 2 - output signal 3 - ground 4 - not used
Enclosure type to DIN 40050		IP 65
Operatin voltage	V	20 ... 30 DC
Current	mA	< 35
Output signal range	mA	4 20
Output signal range used: 0 position 1 solenoid - stroke (Hub 3.8 mm) 2 solenoid - stroke (Hub ±3.8 mm)	mA	 12 4.4 ... 12 4.4 ... 19.6
Additional output signal error: - at temperature change from +10 ... 55 °C - at imjpedance change from 50% - at input voltage change in the range of operating voltage		 0.2% / 10K ≤ 0.1% ≤ 0.05%
Impedance	Ω	≤ 500
Output signal ripple	mA R.M.S.	≤ 0.02
Limit frequency at 3 dB amplitude decrease	Hz	≥ 800

* Only for S01 and S02 model.

Technical Data of Proportional Solenoid

Type of coil	V	12 DC	24 DC
Limiting current	A	1.9	1.1
Resistance at 20°C	Ω	4.7	13.9

Electronics Data

Supply voltage with polarity inversion protection		V	11.2 ... 28 VDC (residual ripple < 10%)
Input: control point			±10V, 0 ... 10V, ±10mA, 4...20mA, 0...20mA,12mA ± 8mA
Input: sensor signal of spool position			0...5V
Input: external feedback signal			0...10V, 4...20mA, 0...20mA,
Resolution of the A/D converter			12 bit
Output: solenoids			2 PWM output stages up to max. 3.5 A
PWM frequency		kHz	18
Adjustment of parameters		µs	170
EMC	Interference resistance		61000 - 6 - 2 : 2005
	Radiation resistance		55011 : 1998 Třída A
Parameter setting	Serial port RS 232 (zero modem). 19200 bauds, 8 data bits, 1 stop bit, no parity. Special software PRM7Conf,		

Accessories

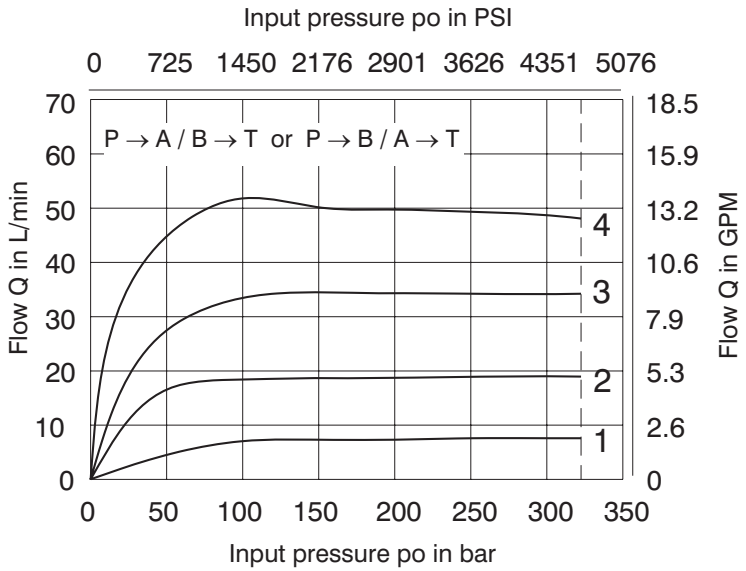
Order number	Content
566-9500	Connecting cable to PC. size 2m , CD-ROM with software and guidebook
566-9501	Connecting cable to PC. size 5m , CD-ROM with software and guidebook
566-9502	Connecting cable to PC. size 2m
566-9503	Connecting cable to PC. size 5m

Limit Power

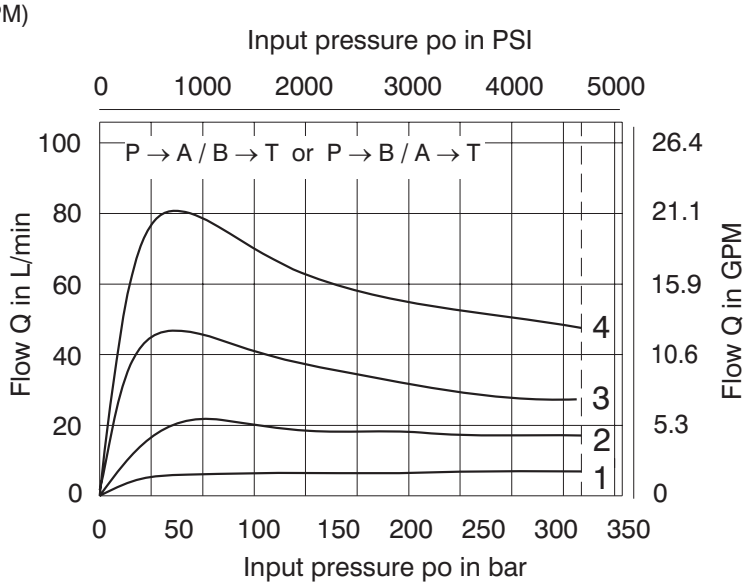
Measured at ν = 35 mm^2/s (166 SUS)

Only for E01 model

Nominal flow 30 L/min (7.93 GPM)



Nominal flow 60 L/min (15.85 GPM)

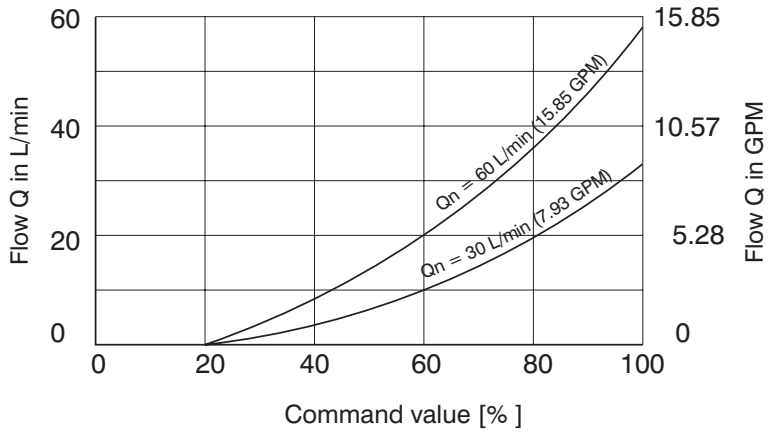


Solenoid current:
1 = 40 %
2 = 60 %
3 = 80 %
4 = 100 %

Flow Characteristics

Measured at input pressure p_o = 10 bar (1450 PSI) , ν = 35 mm^2/s (166 SUS)

Only for E01 model

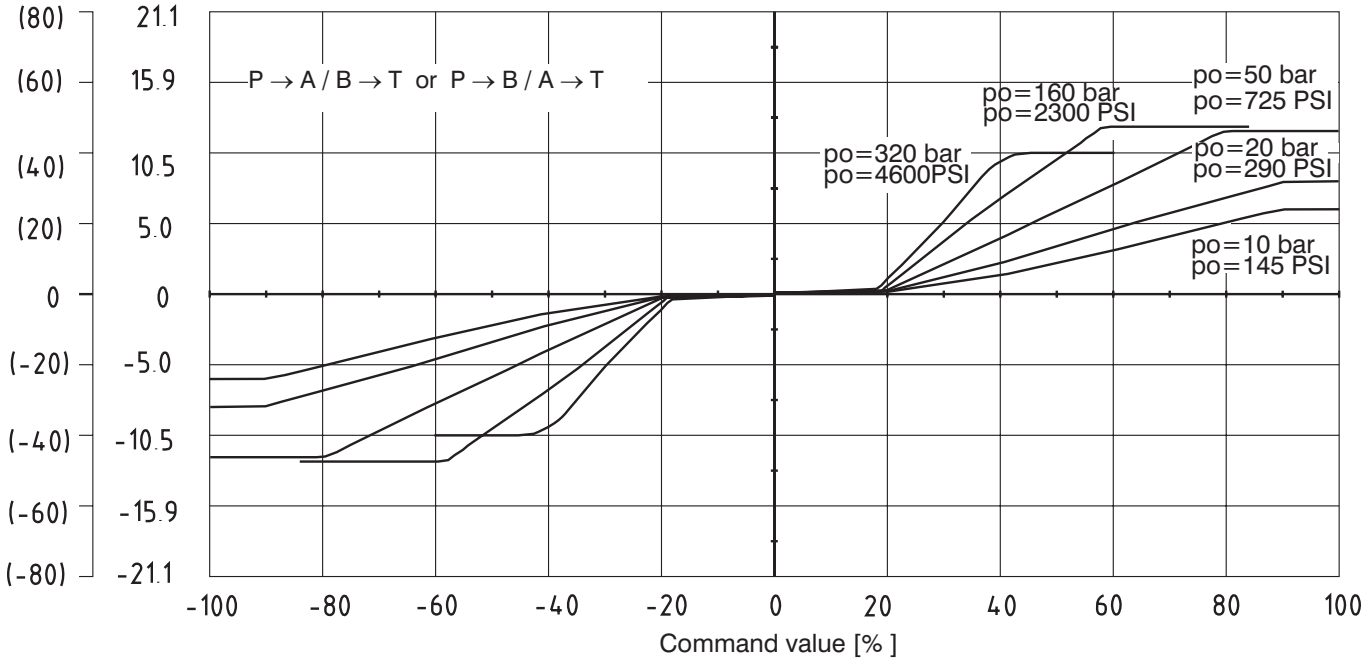


Flow Characteristics

Measured at ν = 35 mm^2/s (166 SUS), p_o - input pressure

Only for E02S01 model

Q_n = 30 L/min (7.92 GPM)

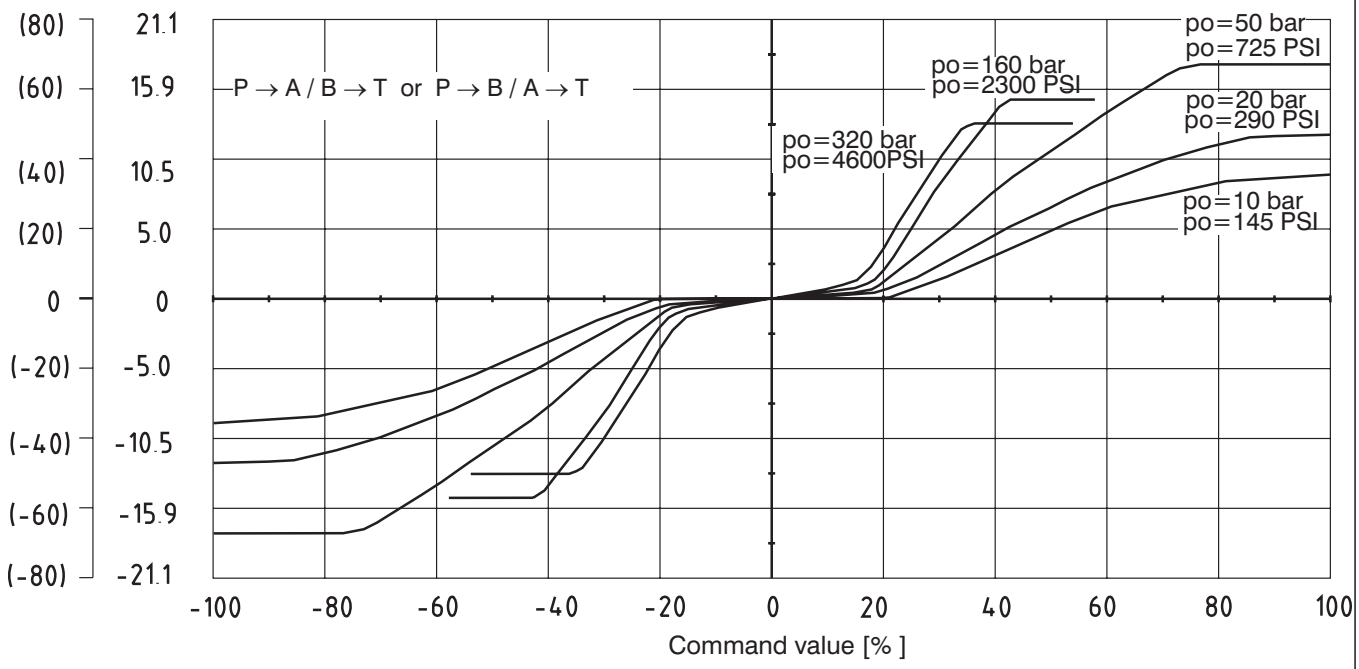


Flow Characteristics

Measured at ν = 35 mm^2/s (166 SUS), p_o - input pressure

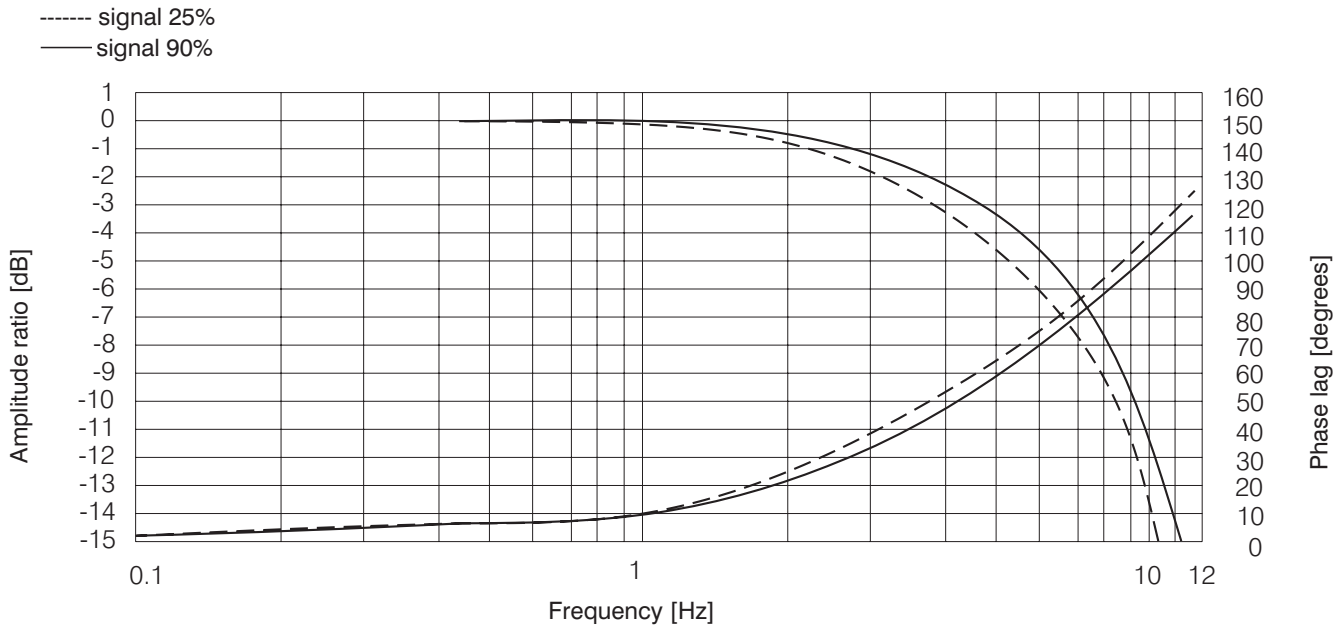
Only for E02S01 model

Q_n = 60 L/min (15.85 GPM)



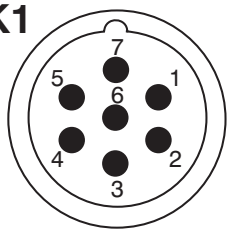
Frequency Reponse

closed position loop



Connector Connection

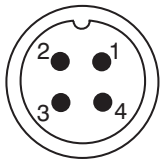
K1



Connector K1- type M23 (male)		
PIN	**Technical data**	**Description**
1	* Power supply input	11.2 .... 28V DC
2	* Ground (power supply)	0V
3	Control signal	according to configuration
4	Ground (signal)	0V
5	Power reference signal	+10V DC/max.10mA
6	Control signal of position sensor spool	0 ....5V
7	* Protection earth lead (PE)	---

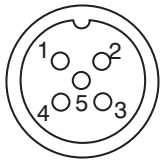
* Recommended min. lead cross section 0.75mm^2

K2



Connector K2 - type M12x1 (male)		
PIN	**Technical data**	**Description**
1	TxD	standard
2	RxD	RS 232
3	Ground (signal)	0V
4	Not used	

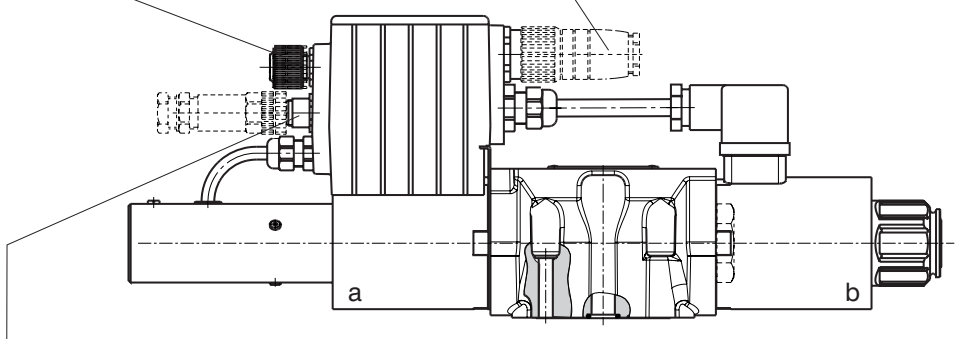
K3



Connector K3 - type M12x1 (femele)		
PIN	**Technical data**	**Description**
1	Power supply output	11.2 .... 28V DC/max.100mA
2	Signal of external feedback	according to configuration
3	Ground	0V
4	Not used	
5	Not used	

K2 - Connection RS232 M12x1 (4 PIN)
For programing the electronics.

K1 - Main inplut connector M23 (7PIN)
Whole cable diameter 8 ...12mm.



K3 - Conektor M12x1 (5PIN)
External feedback signal (it presented only for E03 and E04S01configurations).

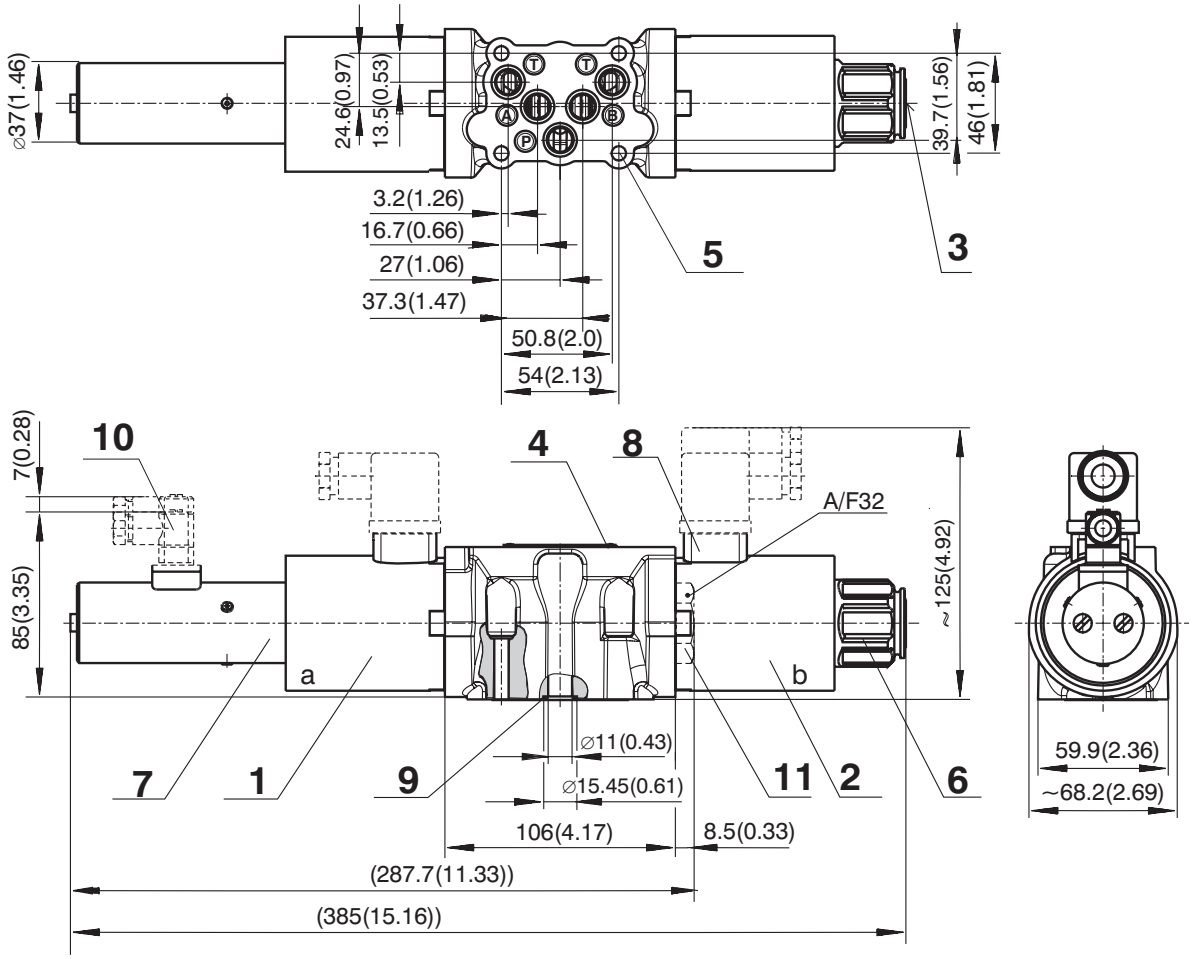
Manufactory valve configuration

Item	Model							
	E01		E02S01		E03		E04S01	
	1 Magnet	2 Magnet	1 Magnet	2 Magnet	1 Magnet	2 Magnet	1 Magnet	2 Magnet
Control signal	0...10 V	± 10 V	0...10 V	± 10 V	0...10 V	± 10 V	0...10V	± 10 V
Signal external feedback	-	-	-	-	0...10 V			
Output position sensor spool	-	-	0...5 V		-		0...5 V	

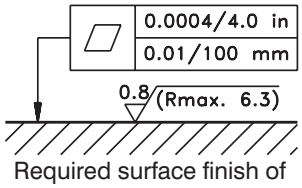
Valve Dimensions

Dimensions in millimeters and inches (in brackets)

102, 103 ... S01
102, 103 ... S02



1 Solenoid a
2 Solenoid b
3 Manual overid
4 Name plate
5 4 mounting holes
6 Solenoid fixing nut
7 Position sensor
8 Solenoid supply connector
9 Square ring 12.42 x 1.68 (5 pcs.), supplied in delivery packet
10 Position sensor connector
11 Plug screw for valve with one solenoid, A/F 32, configurations 2Z51, 2Z11

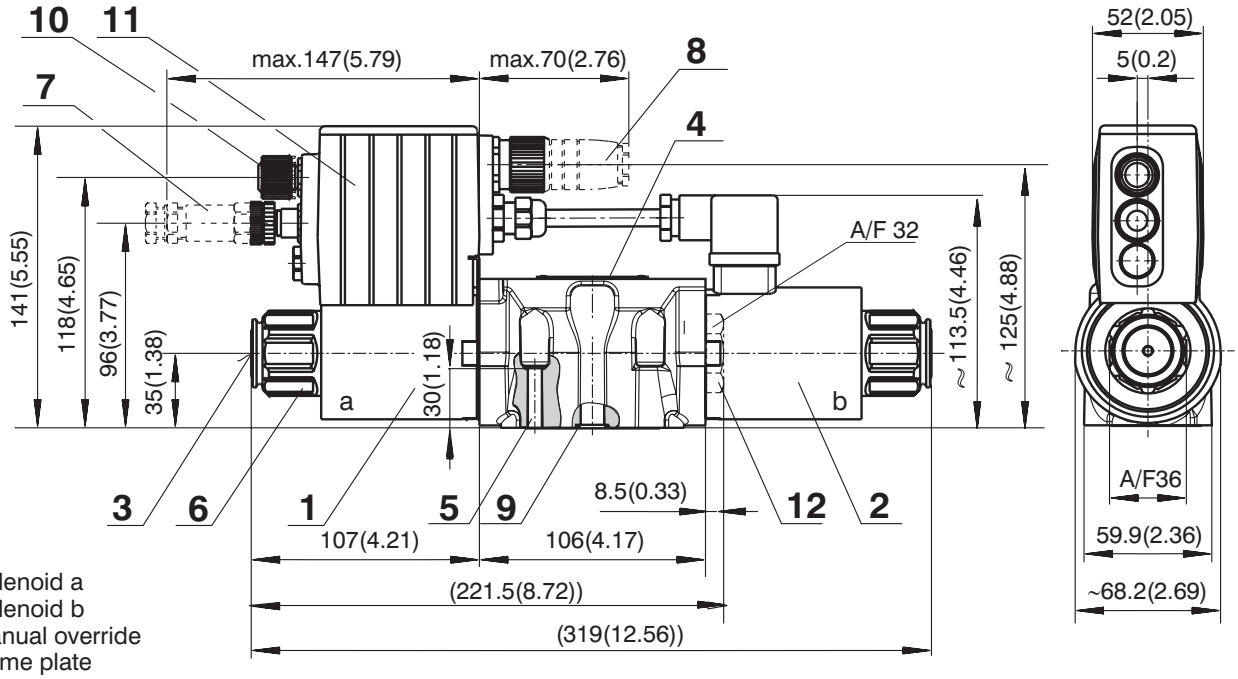


Required surface finish of interface

Valve Dimensions

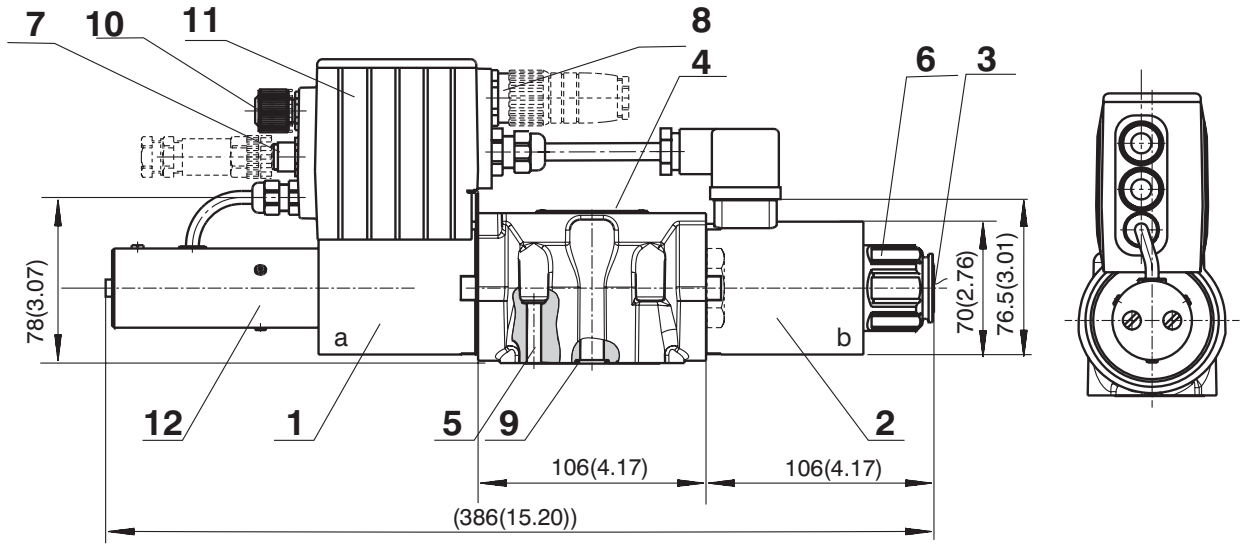
Dimensions in millimeters and inches (in brackets)

102, 103 ... E01 - without connector plug for spool possition feedback
102, 103 ... E03

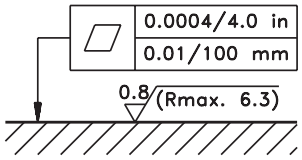


1 Solenoid a
2 Solenoid b
3 Manual override
4 Name plate
5 4 mounting holes
6 Solenoid fixing nut
7 Connector M12x1 for connection of external feedback
8 Main supply connector M23
9 Square ring 12.42 x 1.68 (5 pcs.), supplied in delivery packet
10 Cover of connector M12x1 for programming
11 Plastic box with integrated electronics
12 Plug screw for valve with one solenoid, A/F 32, configurations 2Z51, 2Z11

102, 103 ... E02S01 - without connector plug for spool possition feedback
102, 103 ... E04S01

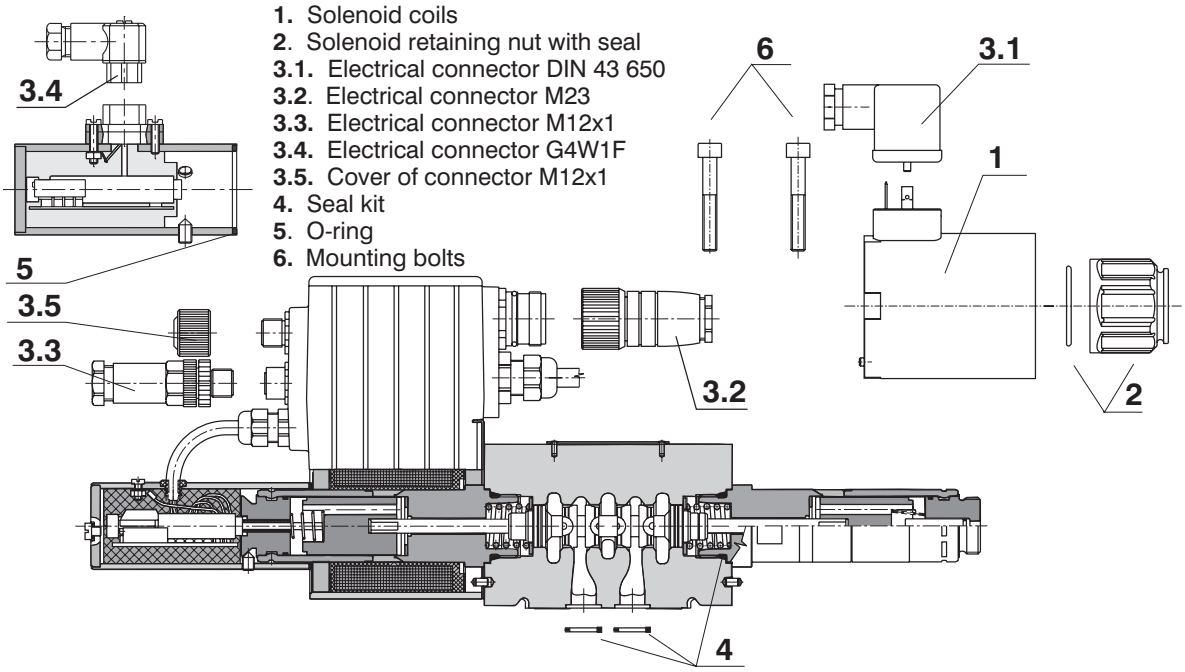


1 Solenoid a
2 Solenoid b
3 Manual overrideí
4 Name plate
5 4 mounting holes
6 Solenoid fixing nut
7 Connector M12x1 for connection of external feedback
8 Main supply connector M23
9 Square ring 12.42 x 1.68 (5 pcs.), supplied in delivery packet
10 Cover of connector M12x1 for programming
11 Plastic box with integrated electronics
12 Position sensor



Required surface finish of interface

Spare Parts



1. Solenoid coil

Solenoid type	Ordering number
01200	936-4614
02400	936-4629

2. Solenoid retaining nut with seal

Type of the nut	Seal ring	Ordering number
Standard nut	30 x 2	489-9900

3.1. Electrical connector DIN 43 650

Type designation	Type	Maximum input voltage	Connector A grey	Connector B black
			Ordering number	
K5	without rectifier - M16x1.5 (bushing bore ⌀ 4-6 mm)	230 V DC	936-9906	936-9905

3.2. Electrical connector M23 - 7PIN (female)

Ordering number	345579500001

3.3. Electrical connector M12x1- 5PIN (male), it presented only for E03 and E04S01 configurations

Ordering number	358359000002

3.4. Electrical connector G4W1F

Ordering number	358358932157

3.5. Cover of connector M12x1

Ordering number	566-7400

4. Seal kit

Type	Dimensions, number		Order number
	Square ring	O-ring	
Standard - NBR70	12.42 x 1.68 (5 pcs.)	23.81 x 2.62 (2 pcs.)	489-9902
Viton	12.42 x 1.68 (5 pcs.)	23.47 x 2.62 (2 pcs.)	489-9903

5. O-ring

Standard - NBR70	32 x 2 (1 pc.)	273111014140

6. Mounting bolts

Dimensions, number	Tightening torque	Ordering number
M6 x 40 DIN 912-10.9 (4 pcs.)	14 Nm (10.33 lbf.ft)	485-9964

Caution!

- The packing foil is recyclable.
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law.

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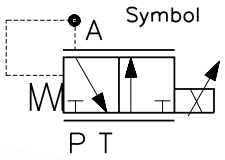
Proportional Reducing Valves **PVRM3-10**

Size to 10 (05) • ... 50 bar (725 PSI) • ...40 L/min (10.57 US GPM)

HA 5118
08/2006

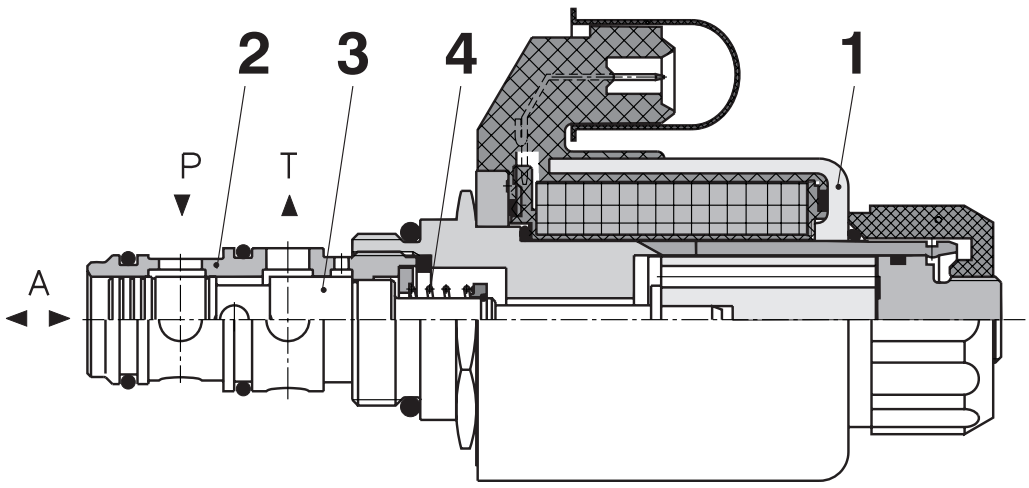
Preliminary technical information



- **Reducing valves suitable for mobile applications**
- **Compact design**
- **Installation dimensions to ISO 7789**

Functional Description

The valve PVRM3 is the directly controlled 3-way [2] reducing valve controlled by a proportional solenoid. In basic position (zero coil current) the channel A is connected to tank via channel T, whereas the channel P is closed. In this state the reduced pressure in channel A equals zero. With increasing the coil current the solenoid force gradually increases [1] and shifts, after overcoming the spring pretension [4], the spool [3] to position gradually decreasing the opened way A-T until the pressure in channel A increases due to opening the way P-A. The reduced pressure is led through the spool boring into the space of the actuating system, where it acts on the smaller spool are. With increasing the reduced pressure in channel A, the created force acting in direction of the solenoid force increases and assist in overcoming the hydrodynamic forces acting on spool. For every value of the coil exciting current, there is a state of equilibrium of forces between the solenoid force, spring force, force acting on the smaller spool area and hydrodynamic forces. The reduced pressure is exactly defined by coil current, as shown on the static pressure characteristic. In basic variant a part of the valve is exhibited to influence of the environmental atmosphere and the coil zinc plated.



General Data

Design		spool valve
Mounting mode		screw-in cartridge M24 x 1.5
Mounting position		optional
Flow direction		see the symbol
Ambient temperature, max.	°C (°F)	-20 ...90 (-4 ...194), +100 °C (212 °F for a short term)

Solenoid Technical Data

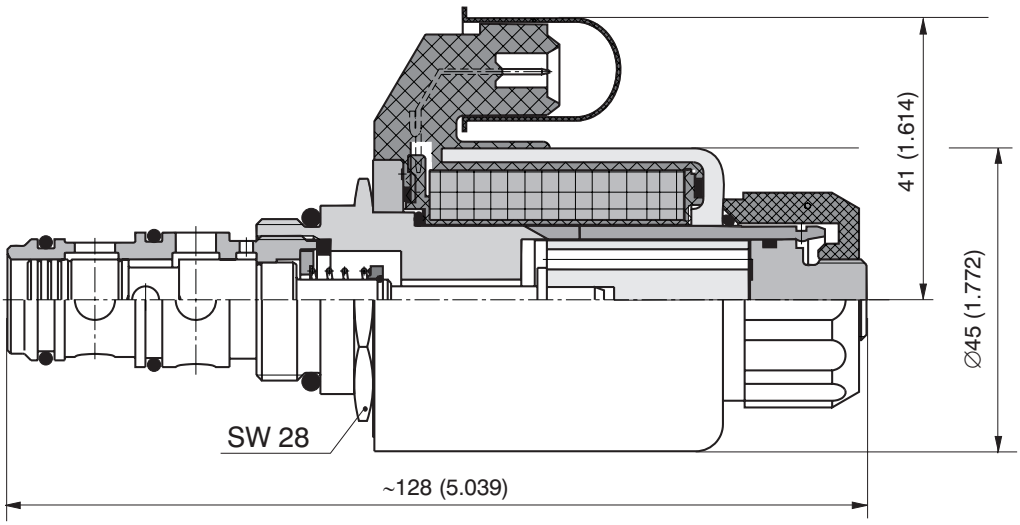
Supply voltage	V	9 ..15
Rated current	A	1,5
Rated resistance at 20 °C (68 °F)	Ω	5 ± 0,25
Duty cycle	%	100
Wire insulation class		200 from IEC 085
Electric connection		2- poles AMP Junior-Timer AXIAL
Enclosure type to DIN 40050		IP 65
Control		PWM-signal 150 Hz

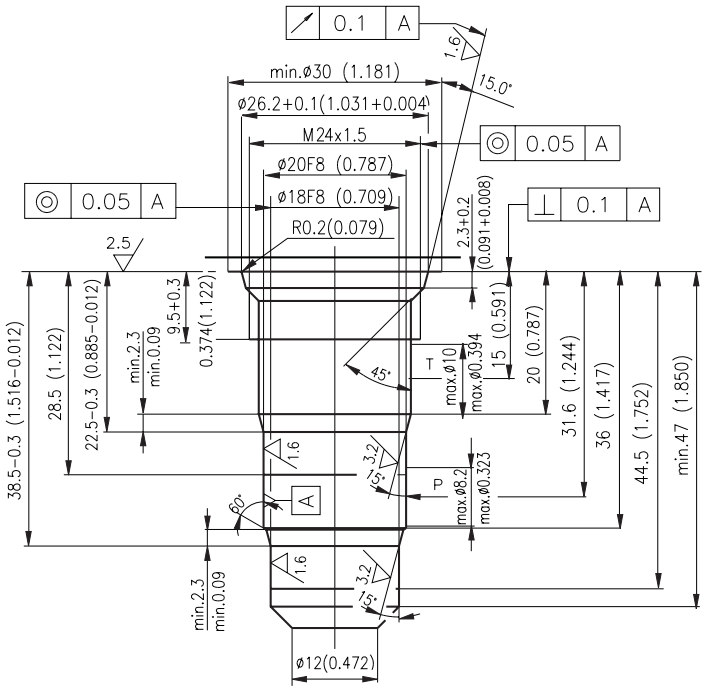
Valve Technical Data

Max. input pressure	bar (PSI)	50 (725.19)
Operating pressure	bar (PSI)	18,5 (268.32)
Max. flow rate	L/min (US GPM)	40 (10.57)
Hydraulic fluid		Mineral oil (HM, HV) to CETOP-RP 91H and ISO VG 32,46, 68
Viscosity range	mm^2/s (SUS)	10 … 400 (61.45 … 1840)
Fluid temperature range	°C (°F)	-20 ...90 (-4 ...194), +100 °C (212 °F for a short term)
Maximum degree of fluid contamination		Class 23/20/12 to ISO 4406

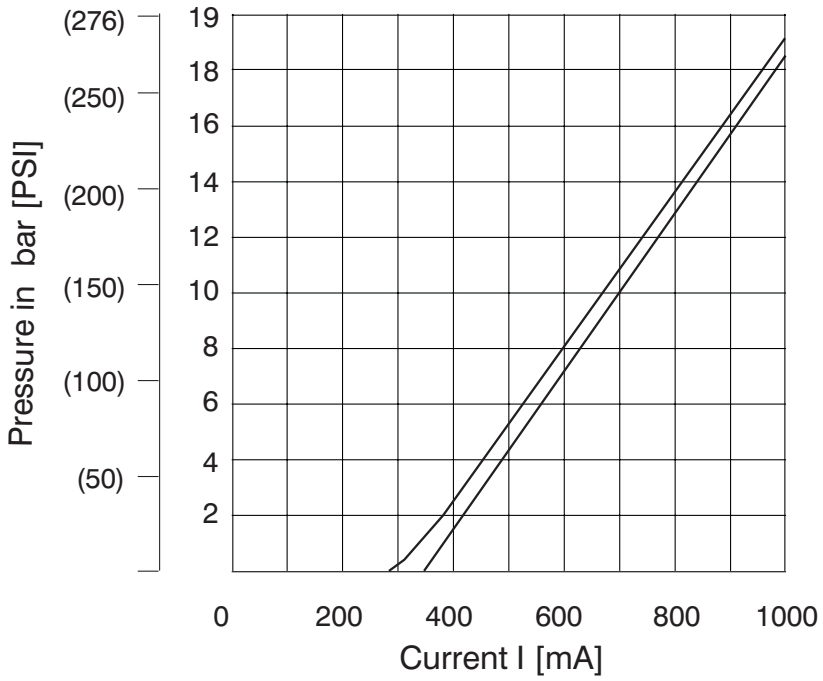
Valve Dimensions

Dimensions in mm (inches)

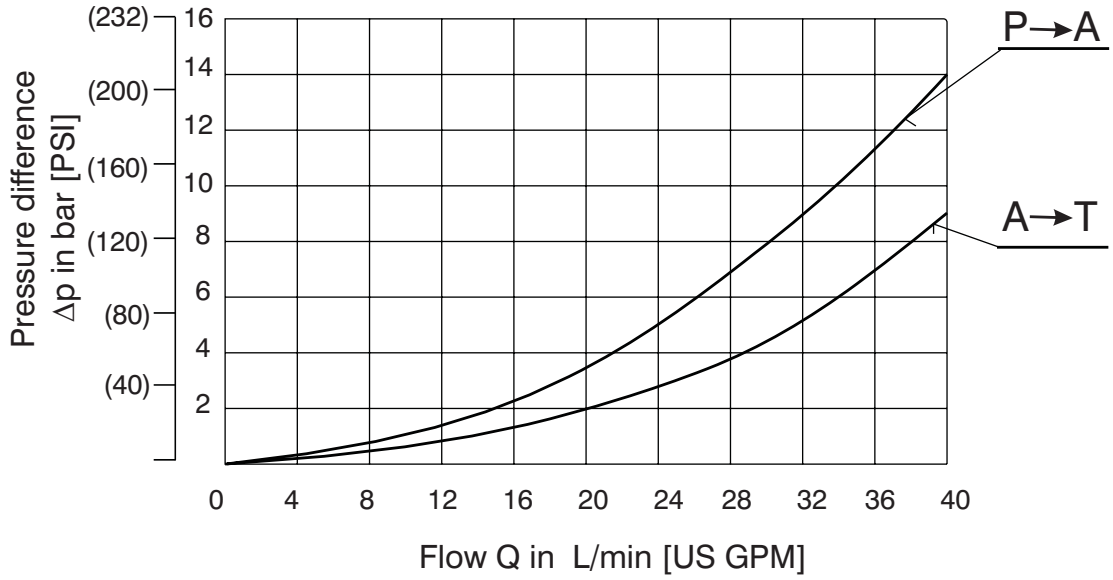




p-I Characteristics



p-Q Characteristics



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ARGO HYTOS

Proportional Directional Control Valves with Position Sensor

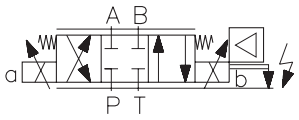
PRM7-06

Size D 03 (06) • ...4600 PSI (320 bar) • ...10.6 GPM (40 L/min)

HA 5119
11/2006

Replaces
HA 5107 2/2002

- ❑ **Digital control**
- ❑ **Compact design**
- ❑ **Operated by proportional solenoids**
- ❑ **High sensitivity and slight hysteresis**
- ❑ **Installation dimensions to ISO 4401 and DIN 24 340-A10**



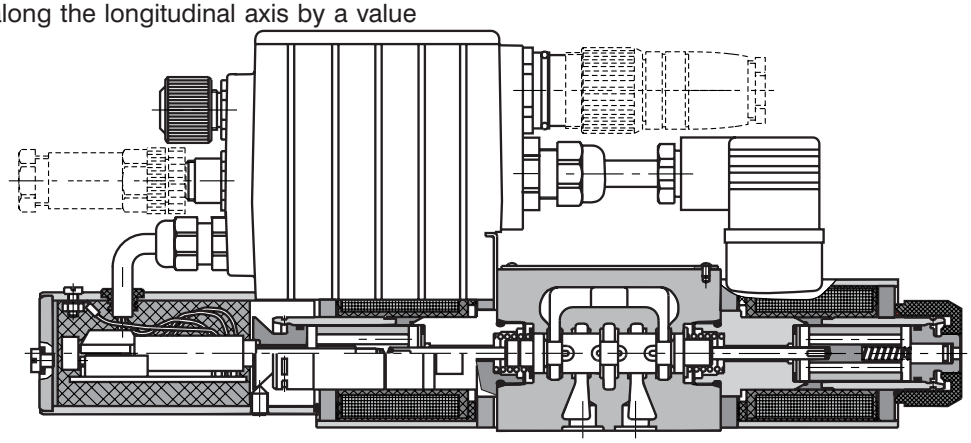
Functional Description

The proportional switchboard PRM7 consists of an iron casting body, a special cylindrical gate calve, two centering thrust washers, one or two proportional electromagnets, a position primary element or an electronics system box with digital electronics if need be. The measuring system of the position primary element consists of a differential transformer with a core and of evaluating electronic system in hybrid execution.
In case of the execution without the integrated electronic system the electrical connection of the electromagnets is realized with the use of a connector skewer plug DIN 43 650 and the outlet of the position primary element is realized with the use of a connector skewer plug G4W1F.
In case of the execution with the integrated electronic system the proportional switchboard is fitted with an electronics box. This box is fixed to an arbitrary electromagnet together with the position primary element. The outlet of the electromagnet is connected with the box directly with the use of a cable. In the execution of the switchboard fitted with two electromagnets the opposite electromagnet is interconnected with the appropriate electronic system box with the use of a cable terminated with a connector skewer plug DIN 43 650. The connection of the feeding voltage, control signal, control outlet of the position primary element of the gate valve (if installed) and outlet voltage +10 V DC (direct-current voltage) is carried out with the help of seven-poles connector M23. The connection of the external feedback is carried out with the help of a fife-pole connector M12x1 where in addition to an inlet from the external feedback it is also at disposal a feeding voltage of +24V for an external primary element.
Coils including the electronic system box can be turned a slight amount along the longitudinal axis by a value of ± 90°.

The digital electronic system makes it possible to control the proportional valve on the basis of data obtained from two feedback circuits. The proportional switchboard can be utilized using the following four ways:
1.Controlled valve without any feedback – E01.
2.Internal feedback only on the basis of a signal from the gate valve position – E02S01 primary element.
3.External feedback only (pressure sensing unit, position sensing unit etc.) – E03.
4.Both the internal and external feedback – E04S01.

The outlet current to the electromagnet coils is controlled with the help of PWM. The electronic system is equipped with an internal current feedback. The outlet current in case of need may be modulated with the use of a signal of dynamic lubrication. Single function parameters are set up with the use of appropriate software with the help of a computer connected to the proportional switchboard through a serial interface RS 232.
It is necessary to order a cable in accordance with appropriate ordering number as mentioned on page 4.
The right function of the digital electronic system is indicated with a green light emitting LED diode. The incorrect function (a failure) is indicated with the help of a red light emitting LED diode.
The factory configuration of the valve is dependent on its execution. The configuration with an external feedback should be consulted with the manufacturer.

As for the basic surface treatment the switchboard body is phosphate coated, the surface of the control electromagnets and the position sensing elements are zinc coated.



Ordering Code

PRM7-06 □ / □ - □ □ □

Proportional directional control valve with position sensor

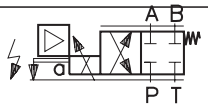
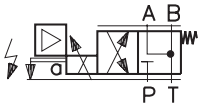
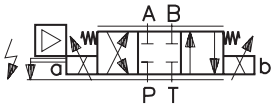
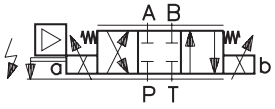
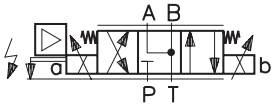
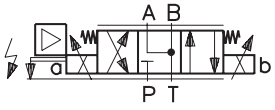
Nominal size **06 (D 03)**

Seals

without designation	NBR
V	FPM (Viton)

Model

S01	position sensor with voltage outlet
S02	position sensor with current outlet
E01	proportional directional valve without feedback
E02S01	proportional directional valve with position feedback
E03	proportional directional valve with external feedback
E04S01	proportional directional valve with position and external feedback

		**2Z51**
		**2Y51**
		**3Z11**
	$\frac{q_A}{q_B} = \frac{1}{2}$ *	**3Z12**
		**3Y11**
	$\frac{q_A}{q_B} = \frac{1}{2}$ *	**3Y12**

Nominal solenoid supply voltage

12	**supply voltage 12V DC
24	supply voltage 24 V DC

** Cannot be supplied as Variant S2

Nominal flow rate at Δp =10 bar (145 PSI)

15	flow 15 L/min (3.96 GPM)
30	flow 30 L/min (7.93 GPM)

* Model for cylinders with asymmetric piston rod, piston area ratio 1:2

Connectors are to be ordered separately, see pages 10

Technical Data

Nominal size	mm (US)	06 (D 03)
Max. operating pressure at ports P, A, B	bar (PSI)	320 (4600)
Max. operating pressure at port T	bar (PSI)	210 (3046)
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP - RP 91H in viscosity classes ISO VG 32, 46 a 68.
Fluid temperature range (NBR/Viton)	°C (°F)	-30 ... +80 (-22 ... +176) / -20 ... +80 (-4 ... +176)
Ambient temperature max.	°C (°F)	up to +50 (+122)
Viscosity range	mm^2/s (SUS)	20 ... 400 (98 ... 1840)
Maximum degree of fluid contamination		Class 21/18/15 to ISO 4406 (1999).
Nominal flow at Δp = 10 bar	L/min (GPM)	15 (3.96) / 30 (7.93)
Hysteresis - open loop	%	< 6
Hysteresis - closed position loop	%	< 0.5
Weight - PRM7-062 - PRM7-063	kg (lbs)	2.3 (5.07) 2.8 (6.17)
Mounting position		optional
Enclosure type		IP65

Technical Data of Position Sensor - Voltage Outlet

Operating pressure	bar (PSI)	max. 320 (4600), static
Electric connection		electrical connector G4W1F Hirschmann *
Contact assignment		1 - operating voltage 2 - output signal 3 - ground 4 - not used
Enclosure type to DIN 40050		IP 65
Measured distance	mm (in)	8 (0.315)
Operating voltage	V	9.6 ...30 DC
Linearity error	%	< 1
Current consumption at load current of 2 mA	mA	< 15
Output voltage	V	0 ... 5
Output signal range used: 0 Position 1 solenoid - displacement 3.8 mm 2 solenoids - displacement ±3.8 mm	V	 2.5 0.125 - 2.5 0.125 - 4.875
Max. load current	mA	2
Noise voltage - at load current 0 - at load current of 2 mA	mV_{p-p}	 < 20 < 15
Additional output signal error at: Temperature change between 0 ... 80 °C Between 0 ... -25 °C Load change from 0 to 2 mA		 typical < 0.2% / 10K max. 0.5% / 10K max. 0.5% / 10K 0.1%
Input voltage change from 9.6 V to 14.4 V from 14.4 V to 30 V	%	 < 0.1 < 0.25
Long-term drift (30 days)	%	< 0.25
Cut-off frequency 3 dB fall in amplitude Frequency 90°	Hz	 > 600 > 600

* Only for S01 and S02 model.

Technical Data of Position Sensor - Current Outlet

Linearity	%	< 1
Operating pressure	bar (PSI)	to 320 (4600), static
Electrical connection		electrical connector G4W1F Hirschmann *
Contact assigment		1 - operating voltage 2 - output signal 3 - ground 4 - not used
Enclosure type to DIN 40050		IP 65
Operatin voltage	V	20 ... 30 DC
Current	mA	< 35
Output signal range	mA	4 20
Output signal range used: 0 position 1 solenoid - stroke (Hub 3.8 mm) 2 solenoid - stroke (Hub ±3.8 mm)	mA	 12 4.4 ... 12 4.4 ... 19.6
Additional output signal error: - at temperature change from +10 ... 55 °C - at imjpedance change from 50% - at input voltage change in the range of operating voltage		 0.2% / 10K ≤ 0.1% ≤ 0.05%
Impedance	Ω	≤ 500
Output signal ripple	mA R.M.S.	≤ 0.02
Limit frequency at 3 dB amplitude decrease	Hz	≥ 800

* Only for S01 and S02 model.

Technical Data of Proportional Solenoid

Type of coil	V	12 DC	24 DC
Limiting current	A	2.4	1.0
Resistance at 20°C	Ω	2.3	13.4

Electronics Data

Supply voltage with polarity inversion protection	V	11.2 ... 28 VDC (residual ripple < 10%)
Input: control point		±10V, 0 ... 10V, ±10mA, 4...20mA, 0...20mA,12mA ± 8mA
Input: sensor signal of spool position		0...5V
Input: external feedback signal		0...10V, 4...20mA, 0...20mA,
Resolution of the A/D converter		12 bit
Output: solenoids		2 PWM output stages up to max. 3.5 A
PWM frequency	kHz	18
Adjustment of parameters	µs	170
EMC — Interference resistance		61000 - 6 - 2 : 2005
EMC — Radiation resistance		55011 : 1998 Třída A
Parameter setting		Serial port RS 232 (zero modem). 19200 bauds, 8 data bits, 1 stop bit, no parity. Special software PRM7Conf,

Accessories

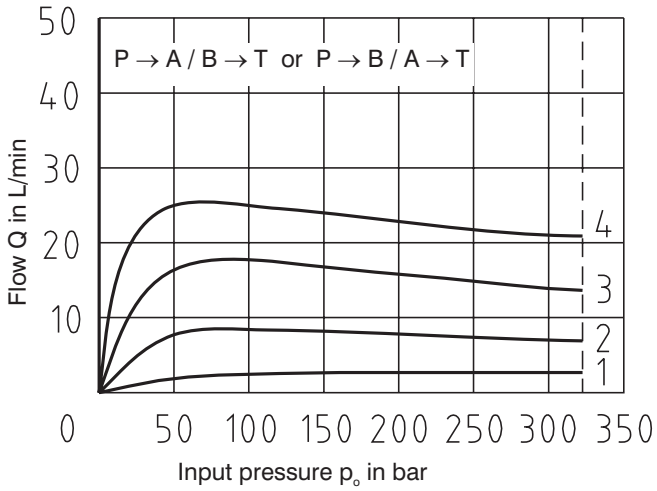
Order number	Content
566-9500	Connecting cable to PC. size 2m , CD-ROM with software and guidebook
566-9501	Connecting cable to PC. size 5m , CD-ROM with software and guidebook
566-9502	Connecting cable to PC. size 2m
566-9503	Connecting cable to PC. size 5m

Limit Power

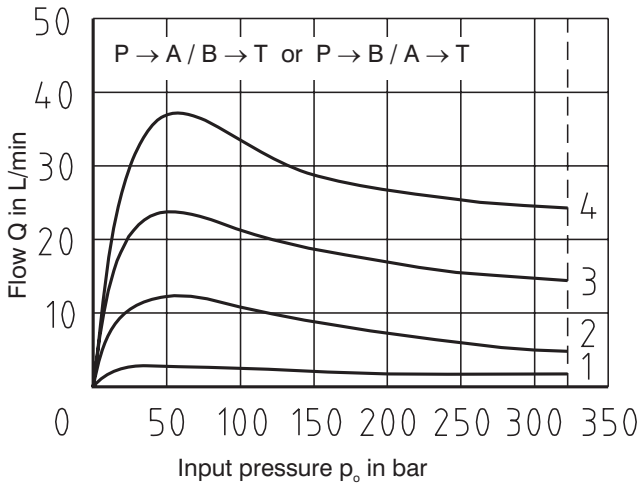
Measured at ν = 35 mm^2/s

Only for E01 model

Nominal flow 15 L/min



Nominal flow 30 L/min)

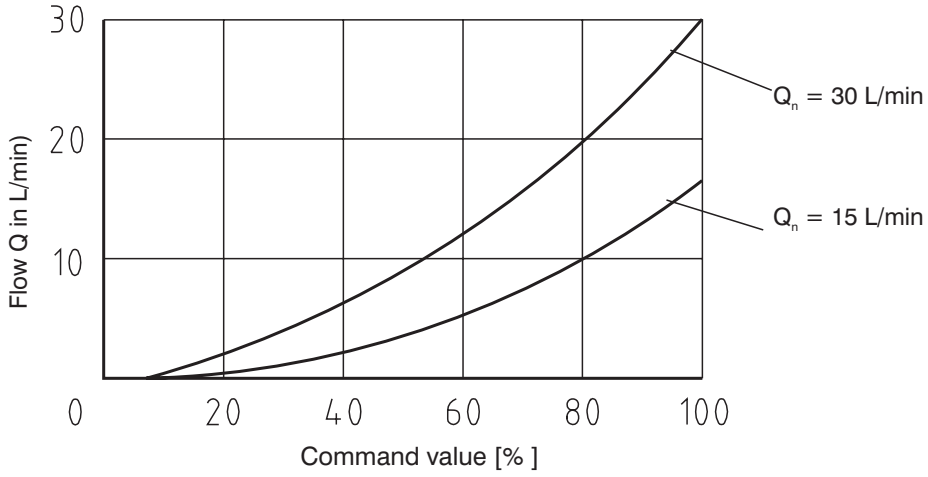


Solenoid current:
1 = 40 %
2 = 60 %
3 = 80 %
4 = 100 %

Flow Characteristics

Measured at input pressure p_o = 10 bar , ν = 35 mm^2/s

Only for E01 model

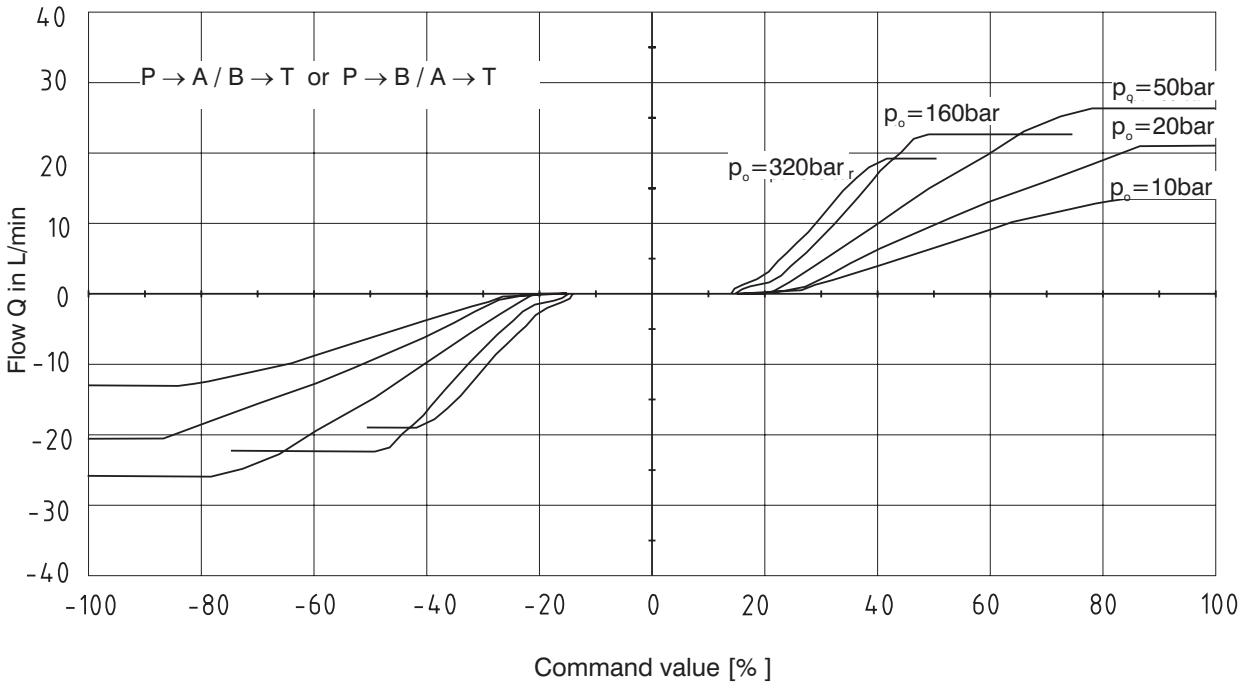


Flow Characteristics

Measured at ν = 35 mm^2/s (, p_o - input pressure

Only for E02S01 model

Q_n = 15 L/min

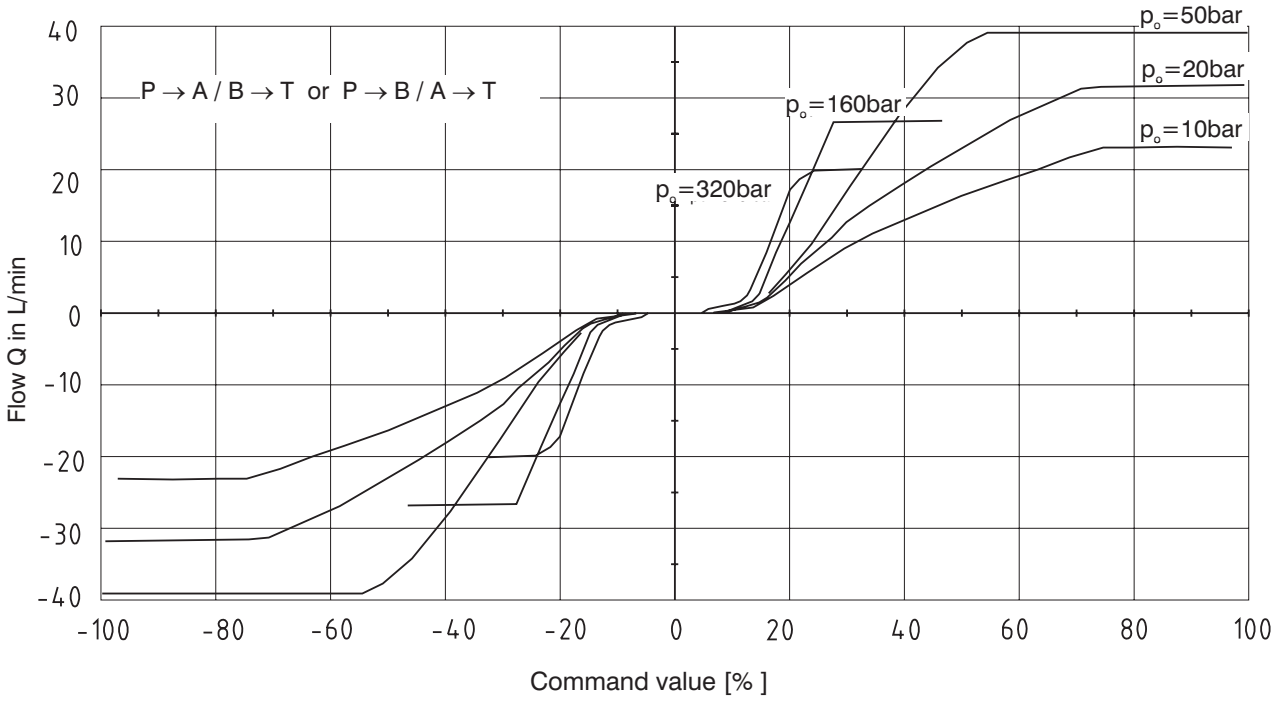


Flow Characteristics

Measured at ν = 35 mm^2/s , p_o - input pressure

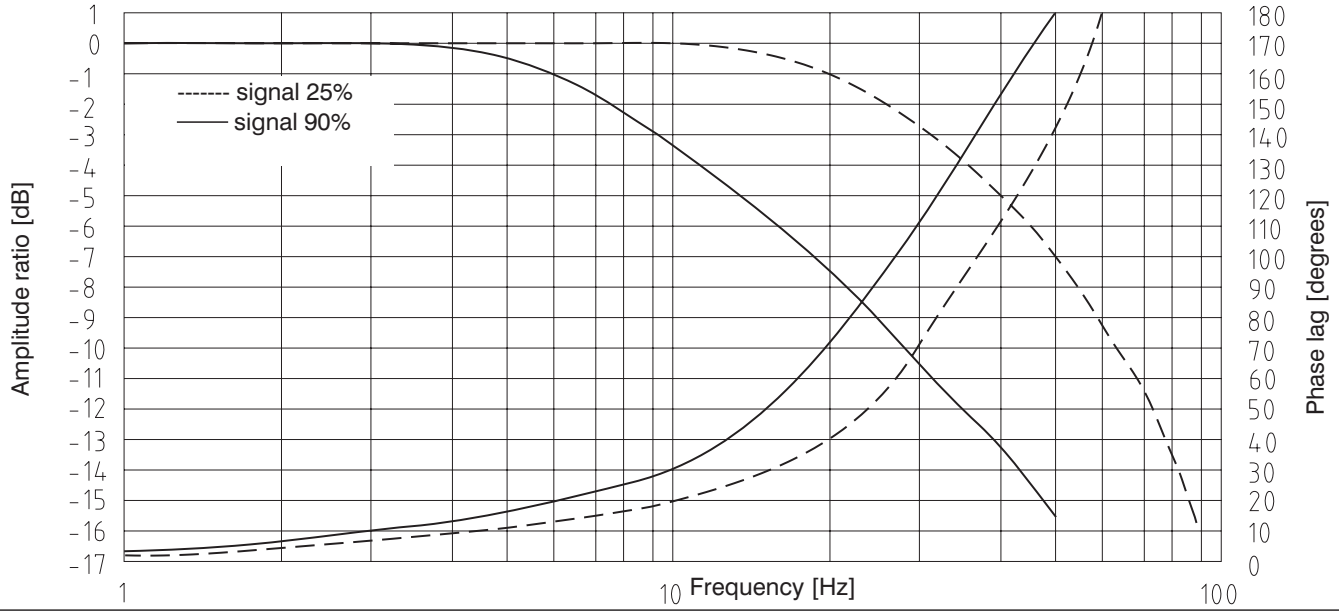
Only for E02S01 model

Q_n = 30 L/min



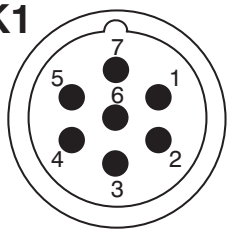
Frequency Reponse

closed position loop



Connector Connection

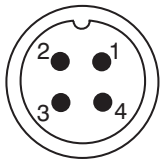
K1



Connector K1- type M23		(male)
PIN	**Technical data**	**Description**
1	* Power supply input	11.2 .... 28V DC
2	* Ground (power supply)	0V
3	Control signal	according to configuration
4	Ground (signal)	0V
5	Power reference signal	+10V DC/max.10mA
6	Control signal of position sensor spool	0 ....5V
7	* Protection earth lead (PE)	---

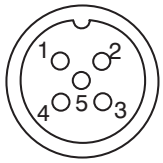
* Recommended min. lead cross section 0.75mm^2

K2



Connector K2 - type M12x1		(male)
PIN	**Technical data**	**Description**
1	TxD	standard
2	RxD	RS 232
3	Ground (signal)	0V
4	Not used	

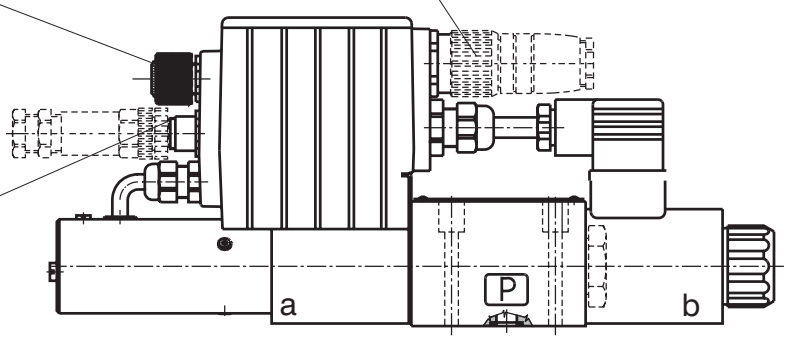
K3



Connector K3 - type M12x1		(femele)
PIN	**Technical data**	**Description**
1	Power supply output	11.2 .... 28V DC/max.100mA
2	Signal of external feedback	according to configuration
3	Ground	0V
4	Not used	
5	Not used	

K2 - Connection RS232 M12x1 (4 PIN)
For programing the electronics.

K1 - Main inplut connector M23 (7PIN)
Whole cable diameter 8 ...12mm.



K3 - Conektor M12x1 (5PIN)
External feedback signal (it presented only for E03 and E04S01configurations).

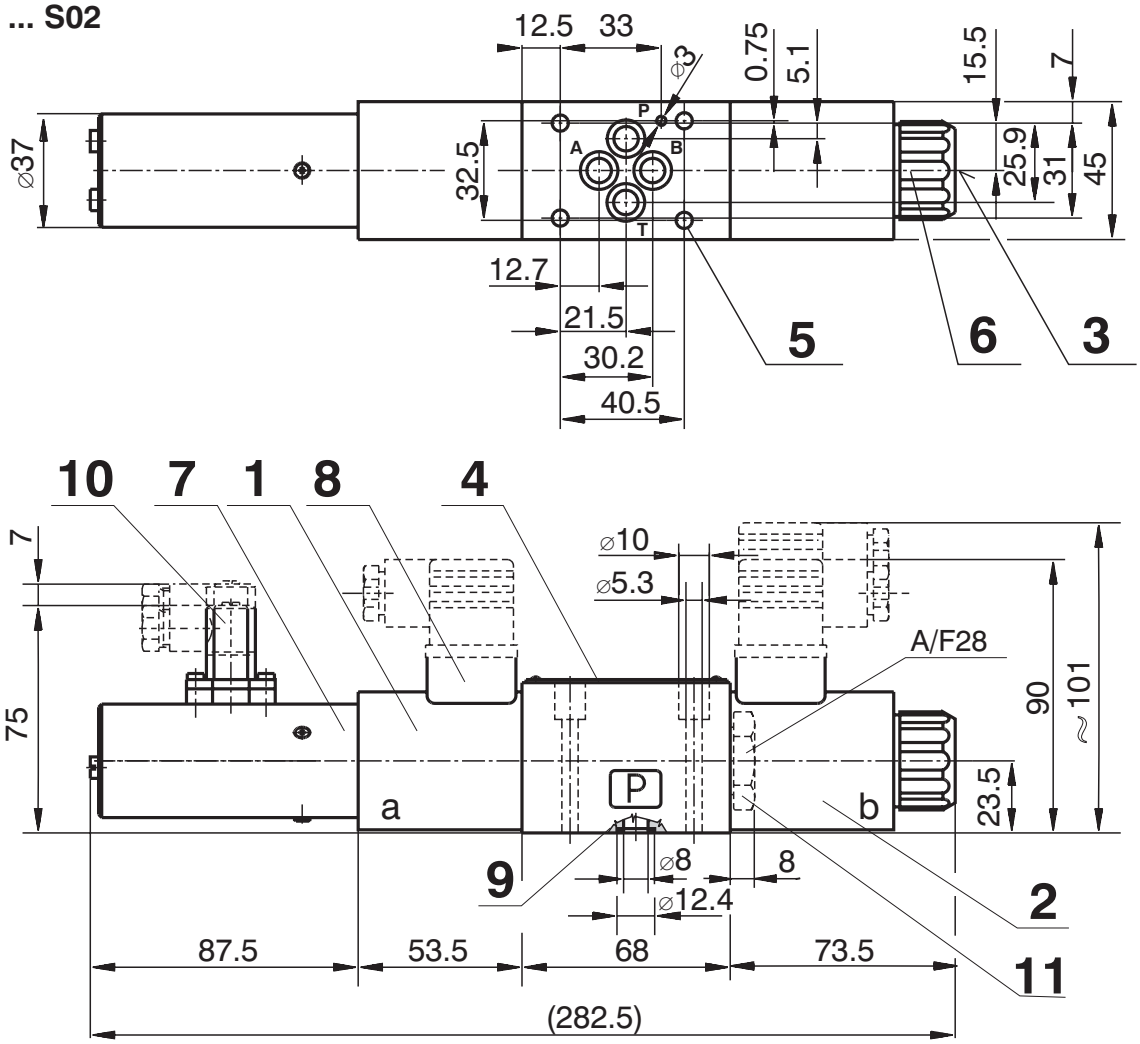
Manufactory valve configuration

Item	Model							
	E01		E02S01		E03		E04S01	
	1 Magnet	2 Magnet	1 Magnet	2 Magnet	1 Magnet	2 Magnet	1 Magnet	2 Magnet
Control signal	0...10 V	± 10 V	0...10 V	± 10 V	0...10 V	± 10 V	0...10V	± 10 V
Signal external feedback	-	-	-	-	0...10 V			
Output position sensor spool	-	-	0...5 V		-		0...5 V	

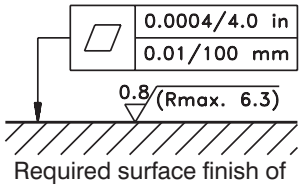
Valve Dimensions

Dimensions in millimeters

063 ... S01
063 ... S02



1 Solenoid a
2 Solenoid b
3 Manual overid
4 Name plate
5 4 mounting holes
6 Solenoid fixing nut
7 Position sensor
8 Solenoid supply connector
9 Square ring 9.25 x 1.68 (4 pcs.), supplied in delivery packet
10 Position sensor connector
11 Plug screw for valve with one solenoid, A/F 28, configurations 2Z51, 2Z11

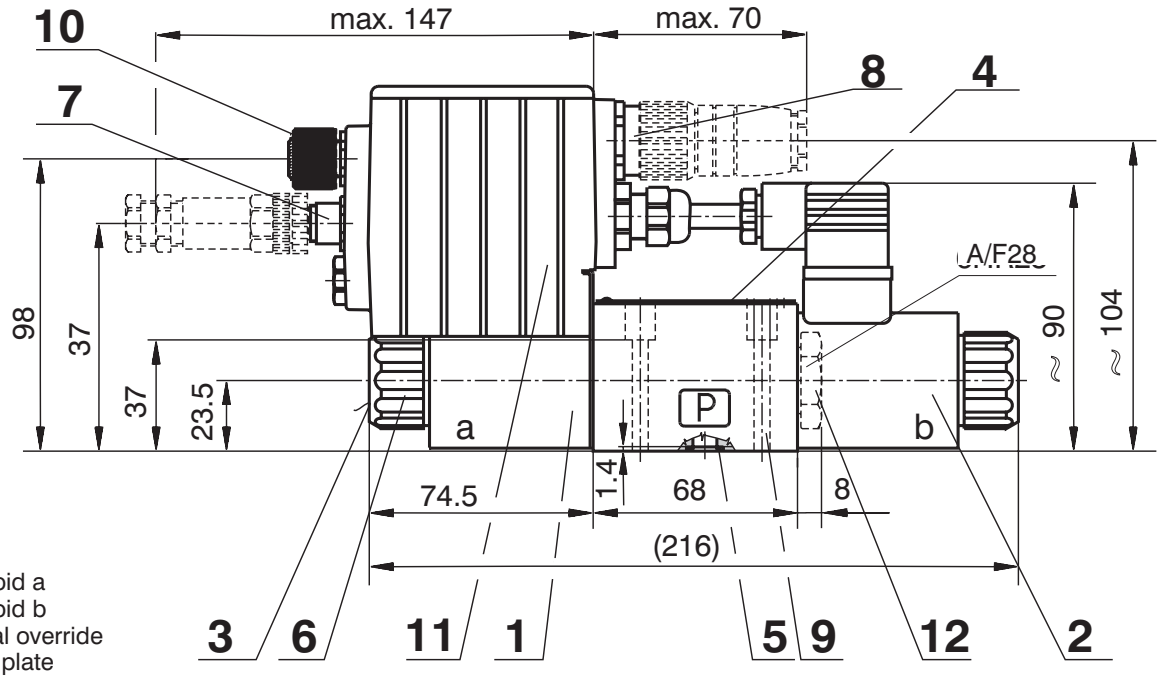


Required surface finish of interface

Valve Dimensions

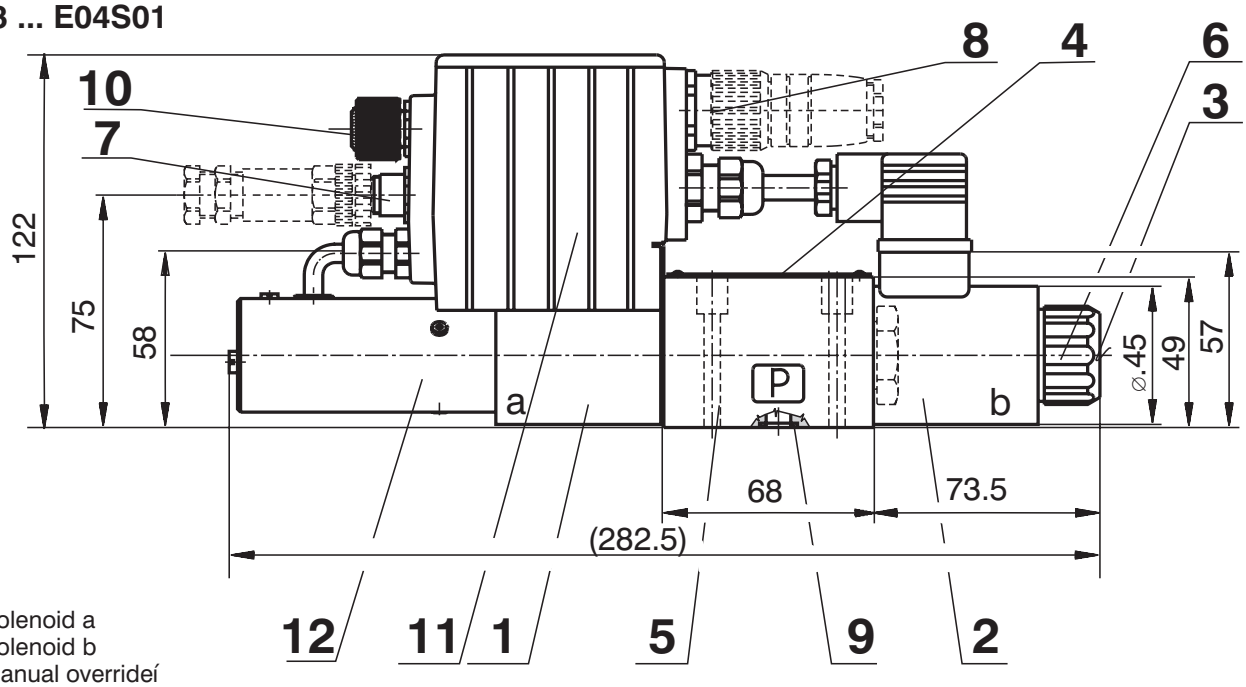
Dimensions in millimeters

063 ... E01 - without connector plug for spool possition feedback
063 ... E03

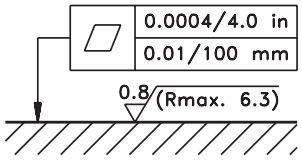


1 Solenoid a
2 Solenoid b
3 Manual override
4 Name plate
5 4 mounting holes
6 Solenoid fixing nut
7 Connector M12x1 for connection of external feedback
8 Main supply connector M23
9 Square ring 9.25 x 1.68 (4 pcs.), supplied in delivery packet
10 Cover of connector M12x1 for programming
11 Plastic box with integrated electronics
12 Plug screw for valve with one solenoid, A/F 28, configurations 2Z51, 2Z11

063 ... E02S01 - without connector plug for spool possition feedback
063 ... E04S01

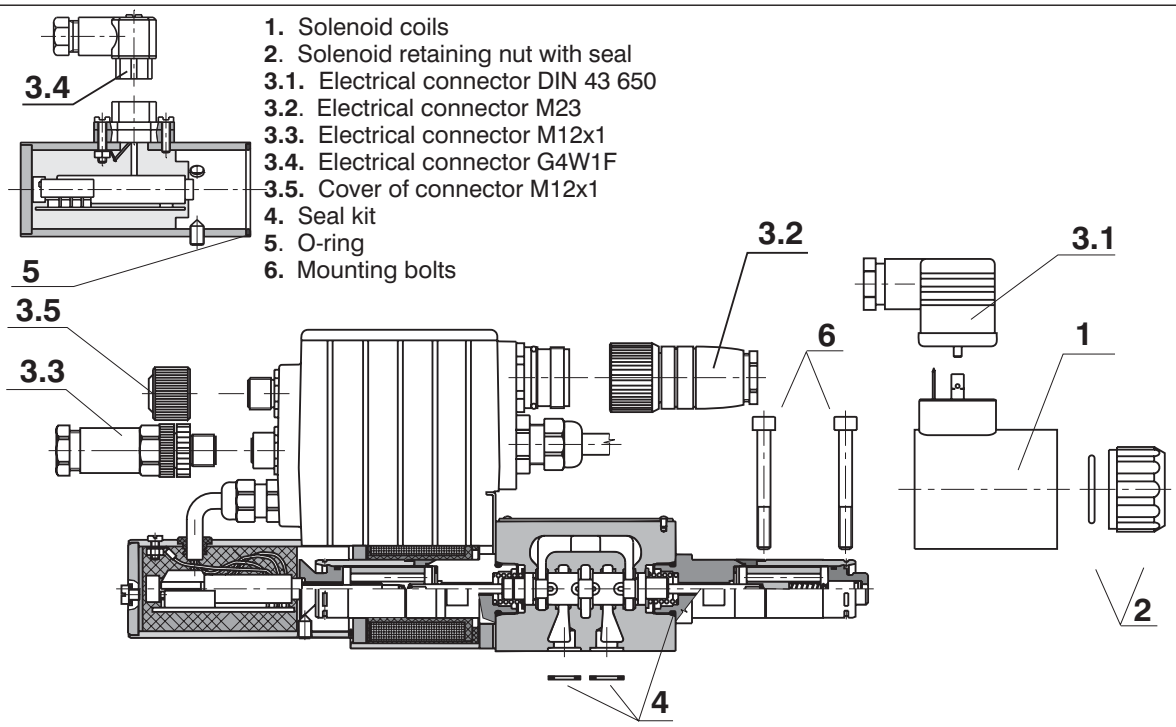


1 Solenoid a
2 Solenoid b
3 Manual overrideí
4 Name plate
5 4 mounting holes
6 Solenoid fixing nut
7 Connector M12x1 for connection of external feedback
8 Main supply connector M23
9 Square ring 9.25 x 1.68 (4 pcs.), supplied in delivery packet
10 Cover of connector M12x1 for programming
11 Plastic box with integrated electronics
12 Position sensor



Required surface finish of interface

Spare Parts



1. Solenoid coils
2. Solenoid retaining nut with seal
3.1. Electrical connector DIN 43 650
3.2. Electrical connector M23
3.3. Electrical connector M12x1
3.4. Electrical connector G4W1F
3.5. Cover of connector M12x1
4. Seal kit
5. O-ring
6. Mounting bolts

1. Solenoid coil

Solenoid type	Ordering number
01200	936-0061
02400	936-0067

2. Solenoid retaining nut with seal

Type of the nut	Seal ring	Ordering number
Standard nut	22 x 2	484-9951

3.1. Electrical connector DIN 43 650

Type designation	Type	Maximum input voltage	Connector A grey	Connector B black
			Ordering number	
K5	without rectifier - M16x1.5 (bushing bore ⌀ 4-6 mm)	230 V DC	936-9906	936-9905

3.2. Electrical connector M23 - 7PIN (female)

Ordering number	345579500001

3.3. Electrical connector M12x1- 5PIN (male), it presented only for E03 and E04S01 configurations

Ordering number	358359000002

3.4. Electrical connector G4W1F

Ordering number	358358932157

3.5. Cover of connector M12x1

Ordering number	566-7400

4. Seal kit

Type	Dimensions, number		Order number
	Square ring	O-ring	
Standard - NBR70	9.25 x 1.68 (4 pcs.)	17 x 1.8 (2 pcs.)	484-9961
Viton	9.25 x 1.78 (4 pcs.)	17.17 x 1.78 (2 pcs.)	484-9971

5. O-ring

Standard - NBR70	32 x 2 (1 pc.)	273111014140

6. Mounting bolts

Dimensions, number	Tightening torque	Ordering number
M5 x 45 DIN 912-10.9 (4 pcs.)	8.9 Nm (6.6 ft-lbs)	484-9958

Caution!

- The packing foil is recyclable.
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law.

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www.argo-hytos.com

ARGO HYTOS

Proportional Directional Control Valves with Position Sensor

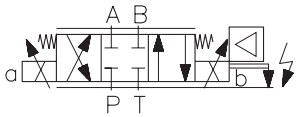
PRM7-04

Size 04 (D 02) • p_{max} up to 320 bar • Q_{max} up to 20 L/min

HA 5120
11/2006

Replaces
HA 5112 2/2002

- ❑ **Digital control**
- ❑ **Compact design**
- ❑ **Operated by proportional solenoids**
- ❑ **High sensitivity and slight hysteresis**
- ❑ **Installation dimensions to ISO 4401 and DIN 24 340-A10**



Functional Description

The proportional switchboard PRM7 consists of an iron casting body, a special cylindrical gate calve, two centering thrust washers, one or two proportional electromagnets, a position primary element or an electronics system box with digital electronics if need be. The measuring system of the position primary element consists of a differential transformer with a core and of evaluating electronic system in hybrid execution.
In case of the execution without the integrated electronic system the electrical connection of the electromagnets is realized with the use of a connector skewer plug DIN 43 650 and the outlet of the position primary element is realized with the use of a connector skewer plug G4W1F.
In case of the execution with the integrated electronic system the proportional switchboard is fitted with an electronics box. This box is fixed to an arbitrary electromagnet together with the position primary element. The outlet of the electromagnet is connected with the box directly with the use of a cable. In the execution of the switchboard fitted with two electromagnets the opposite electromagnet is interconnected with the appropriate electronic system box with the use of a cable terminated with a connector skewer plug DIN 43 650. The connection of the feeding voltage, control signal, control outlet of the position primary element of the gate valve (if installed) and outlet voltage +10 V DC (direct-current voltage) is carried out with the help of seven-poles connector M23. The connection of the external feedback is carried out with the help of a fife-pole connector M12x1 where in addition to an inlet from the external feedback it is also at disposal a feeding voltage of +24V for an external primary element.
Coils including the electronic system box can be turned a slight amount along the longitudinal axis by a value of ± 90°.

The digital electronic system makes it possible to control the proportional valve on the basis of data obtained from two feedback circuits. The proportional switchboard can be utilized using the following four ways:
1.Controlled valve without any feedback – E01.
2.Internal feedback only on the basis of a signal from the gate valve position – E02S01 primary element.
3.External feedback only (pressure sensing unit, position sensing unit etc.) – E03.
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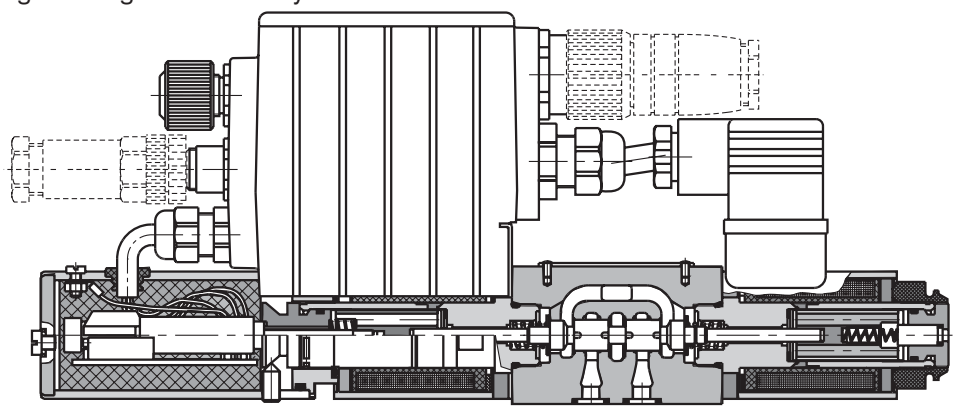
The outlet current to the electromagnet coils is controlled with the help of PWM. The electronic system is equipped with an internal current feedback. The outlet current in case of need may be modulated with the use of a signal of dynamic lubrication. Single function parameters are set up with the use of appropriate software with the help of a computer connected to the proportional switchboard through a serial interface RS 232.
It is necessary to order a cable in accordance with appropriate ordering number as mentioned on page 4.
The right function of the digital electronic system is indicated with a green light emitting LED diode. The incorrect function (a failure) is indicated with the help of a red light emitting LED diode.
The factory configuration of the valve is dependent on its execution. The configuration with an external feedback should be consulted with the manufacturer.

As for the basic surface treatment the switchboard body is phosphate coated, the surface of the control electromagnets and the position sensing elements are zinc coated.



Ordering Code

PRM7-04 ☐ / ☐ - ☐ ☐ ☐

Proportional directional control valve with position sensor

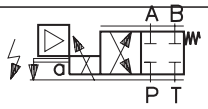
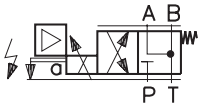
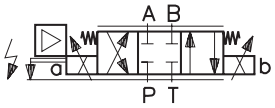
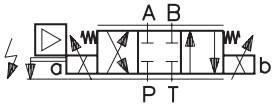
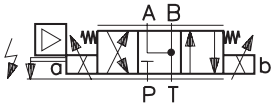
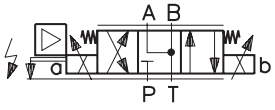
Nominal size **04 (D 02)**

Seals

without designation	NBR
V	FPM (Viton)

Model

S01	position sensor with voltage outlet
S02	position sensor with current outlet
E01	proportional directional valve without feedback
E02S01	proportional directional valve with position feedback
E03	proportional directional valve with external feedback
E04S01	proportional directional valve with position and external feedback

		**2Z51**
		**2Y51**
		**3Z11**
	$\frac{q_A}{q_B} = \frac{1}{2}$*	**3Z12**
		**3Y11**
	$\frac{q_A}{q_B} = \frac{1}{2}$*	**3Y12**

Nominal solenoid supply voltage

12	**supply voltage 12 V DC
24	supply voltage 24 V DC

** Cannot be supplied as Variant S2

Nominal flow rate at Δp = 145 PSI (10 bar)

4	flow 4 L/min (1.1 GPM)
8	flow 8 L/min (2.1 GPM)
12	flow 12 L/min (3.2 GPM)

* Model for cylinders with asymmetric piston rod, piston area ratio 1:2

Connectors are to be ordered separately, see pages 10

Technical Data

Nominal size	mm (US)	04 (D 02)
Max. operating pressure at ports P, A, B	bar (PSI)	320 (4600)
Max. operating pressure at port T	bar (PSI)	210 (3046)
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP - RP 91H in viscosity classes ISO VG 32, 46 a 68.
Fluid temperature range (NBR/Viton)	°C (°F)	-30 ... +80 (-22 ... +176) / -20 ... +80 (-4 ... +176)
Ambient temperature max.	°C (°F)	up to +50 (+122)
Viscosity range	mm^2/s (SUS)	20 ... 400 (98 ... 1840)
Maximum degree of fluid contamination		Class 21/18/15 to ISO 4406 (1999).
Nominal flow at $\Delta p = 10$ bar	L/min (GPM)	4 (1.1) /8 (2.1)/ 12 (3.2)
Hysteresis - open loop	%	< 6
Hysteresis - closed position loop	%	< 0.5
Weight - PRM7-042 - PRM7-043	kg (lbs)	1.5 (3.30) 1.8 (3.96)
Mounting position		optional
Enclosure type		IP65

Technical Data of Position Sensor - Voltage Outlet

Operating pressure	bar (PSI)	max. 320 (4600), static
Electric connection		electrical connector G4W1F Hirschmann *
Contact assignment		1 - operating voltage 2 - output signal 3 - ground 4 - not used
Enclosure type to DIN 40050		IP 65
Measured distance	mm (in)	8 (0.315)
Operating voltage	V	9.6 ...30 DC
Linearity error	%	< 1
Current consumption at load current of 2 mA	mA	< 15
Output voltage	V	0 ... 5
Output signal range used: 0 Position 1 solenoid - displacement 1.8 mm 2 solenoids - displacement ± 1.8 mm	V	 2.5 0.375 - 2.5 0.375 - 3.625
Max. load current	mA	2
Noise voltage - at load current 0 - at load current of 2 mA	mV_{p-p}	 < 20 < 15
Additional output signal error at: Temperature change between 0 ... 80 °C Between 0 ... -25 °C Load change from 0 to 2 mA		 typical < 0.2% / 10K max. 0.5% / 10K max. 0.5% / 10K 0.1%
Input voltage change from 9.6 V to 14.4 V from 14.4 V to 30 V	%	 < 0.1 < 0.25
Long-term drift (30 days)	%	< 0.25
Cut-off frequency 3 dB fall in amplitude Frequency 90°	Hz	 > 600 > 600

* Only for S01 and S02 model.

Technical Data of Position Sensor - Current Outlet

Linearity	%	< 1
Operating pressure	bar (PSI)	to 320 (4600), static
Electrical connection		electrical connector G4W1F Hirschmann *
Contact assigment		1 - operating voltage 2 - output signal 3 - ground 4 - not used
Enclosure type to DIN 40050		IP 65
Operatin voltage	V	20 ... 30 DC
Current	mA	< 35
Output signal range	mA	4 20
Output signal range used: 0 position 1 solenoid - stroke (Hub 1..8 mm) 2 solenoid - stroke (Hub ± 1.8 mm)	mA	 12 8.4 ... 12 8..4 ... 15.6
Additional output signal error: - at temperature change from +10 ... 55 °C - at imjpedance change from 50% - at input voltage change in the range of operating voltage		 0.2% / 10K ≤ 0.1% ≤ 0.05%
Impedance	Ω	≤ 500
Output signal ripple	mA R.M.S.	≤ 0.02
Limit frequency at 3 dB amplitude decrease	Hz	≥ 800

* Only for S01 and S02 model.

Technical Data of Proportional Solenoid

Type of coil	V	12 DC	24 DC
Limiting current	A	1.7	0.8
Resistance at 20°C	Ω	4.9	21

Electronics Data

Supply voltage with polarity inversion protection		V	11.2 ... 28 VDC (residual ripple < 10%)
Input: control point			±10V, 0 ... 10V, ±10mA, 4...20mA, 0...20mA,12mA ± 8mA
Input: sensor signal of spool position			0...5V
Input: external feedback signal			0...10V, 4...20mA, 0...20mA,
Resolution of the A/D converter			12 bit
Output: solenoids			2 PWM output stages up to max. 3.5 A
PWM frequency		kHz	18
Adjustment of parameters		µs	170
EMC	Interference resistance		61000 - 6 - 2 : 2005
	Radiation resistance		55011 : 1998 Třída A
Parameter setting	Serial port RS 232 (zero modem). 19200 bauds, 8 data bits, 1 stop bit, no parity. Special software PRM7Conf,		

Accessories

Order number	Content
566-9500	Connecting cable to PC. size 2m , CD-ROM with software and guidebook
566-9501	Connecting cable to PC. size 5m , CD-ROM with software and guidebook
566-9502	Connecting cable to PC. size 2m
566-9503	Connecting cable to PC. size 5m

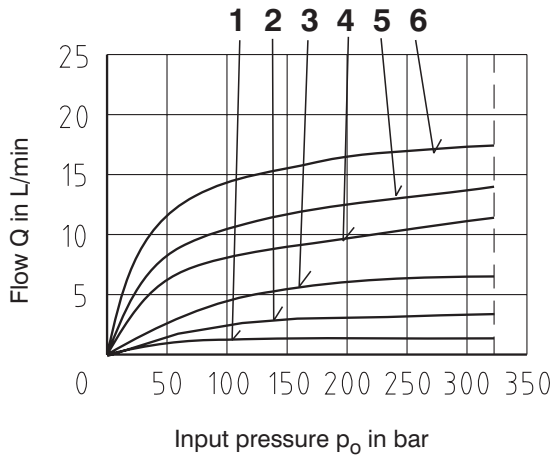
Limit Power

Measured at $\nu = 35\ mm^2/s$

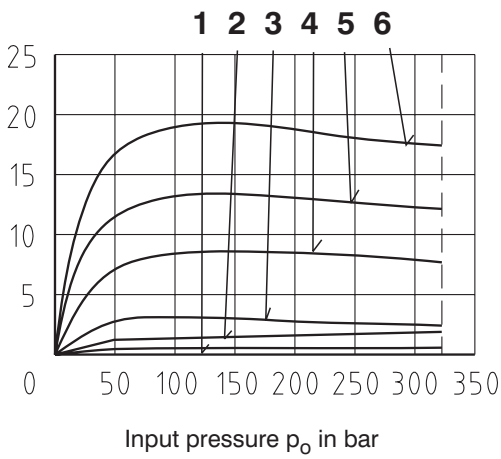
Only for E01 model

$P \rightarrow A / B \rightarrow T$ or $P \rightarrow B / A \rightarrow T$

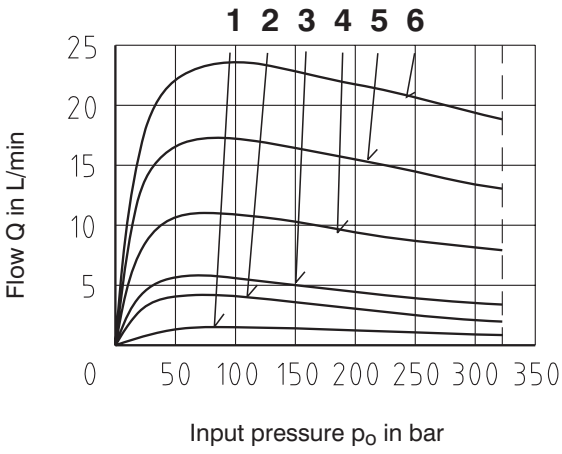
Nominal flow 4 L/min



Nominal flow 8 L/min



Nominal flow 12 L/min

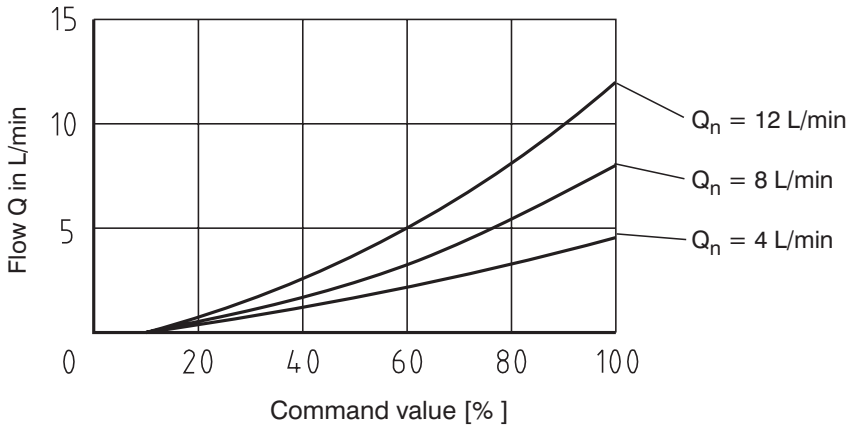


Solenoid current:
1 = 50%
2 = 60%
3 = 70%
4 = 80%
5 = 90%
6 = 100%

Flow Characteristics

Measured at input pressure $p_o = 10$ bar, $\nu = 35\ mm^2/s$

Only for E01 model

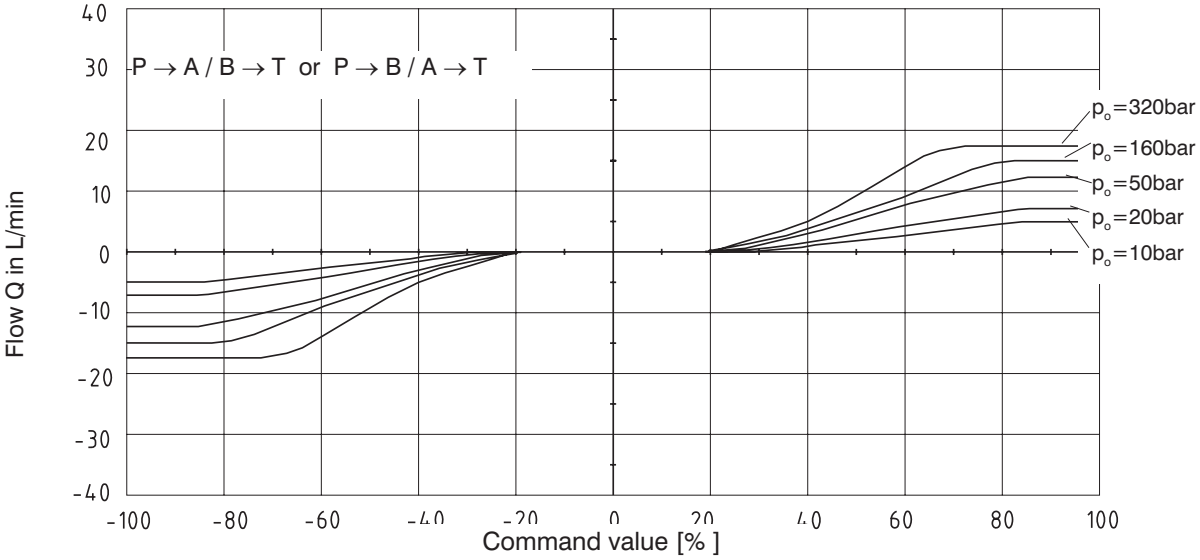


Flow Characteristics

Measured at ν = 35 mm^2/s p_o - input pressure

Only for E02S01 model

Q_n = 4 L/min

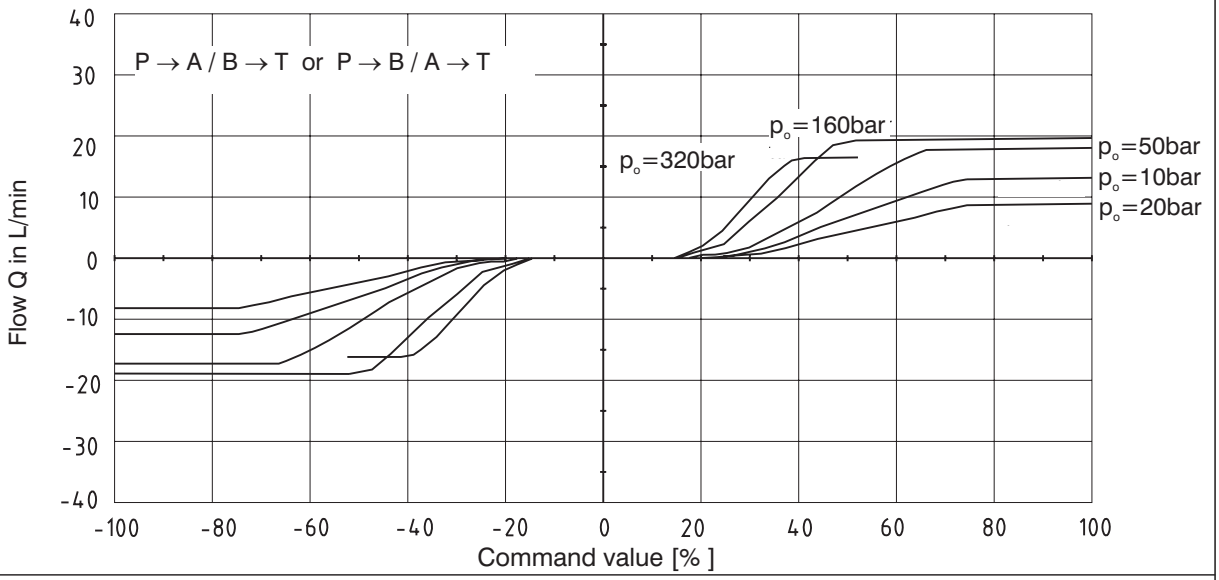


Flow Characteristics

Measured at ν = 35 mm^2 /s p_o - input pressure

Only for E02S01 model

Q_n =8 L/min

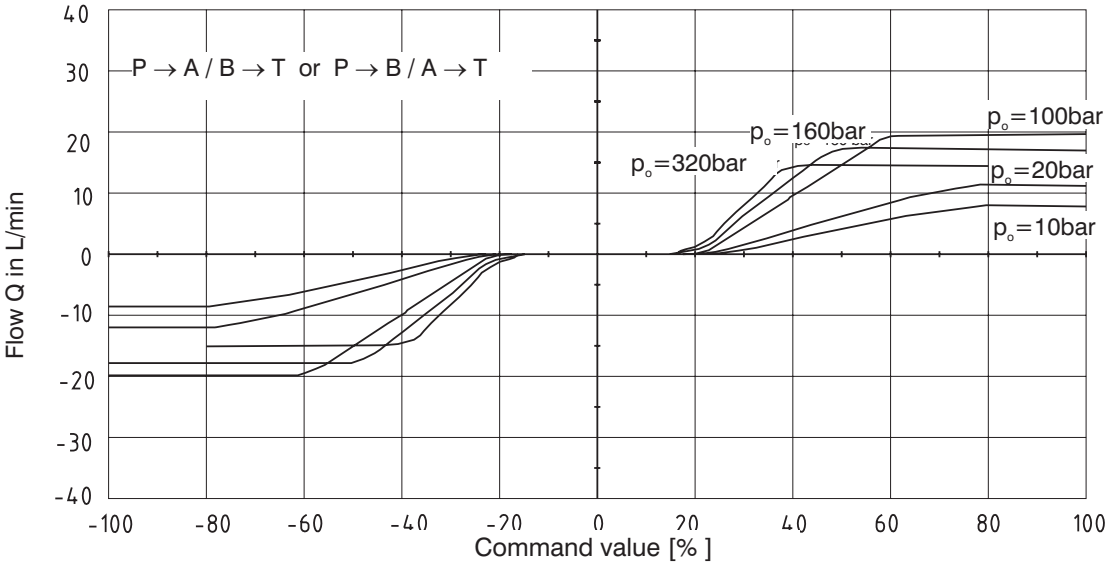


Flow Characteristics

Measured at ν = 35 mm^2 /s p_o - input pressure

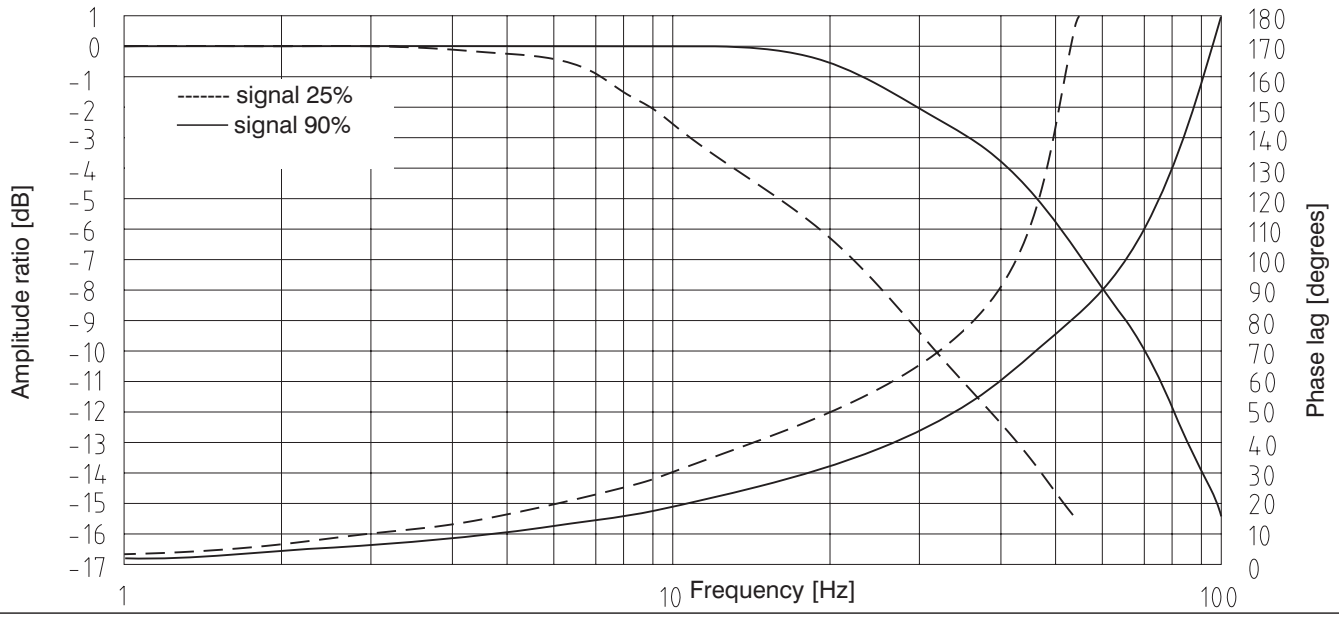
Only for E02S01 model

Q_n = 12 L/min



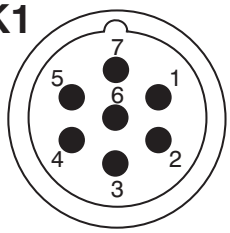
Frequency Reponse

closed position loop



Connector Connection

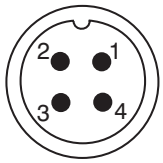
K1



Connector K1- type M23 (male)		
PIN	**Technical data**	**Description**
1	* Power supply input	11.2 .... 28V DC
2	* Ground (power supply)	0V
3	Control signal	according to configuration
4	Ground (signal)	0V
5	Power reference signal	+10V DC/max.10mA
6	Control signal of position sensor spool	0 ....5V
7	* Protection earth lead (PE)	---

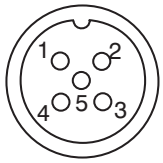
* Recommended min. lead cross section 0.75mm^2

K2



Connector K2 - type M12x1 (male)		
PIN	**Technical data**	**Description**
1	TxD	standard
2	RxD	RS 232
3	Ground (signal)	0V
4	Not used	

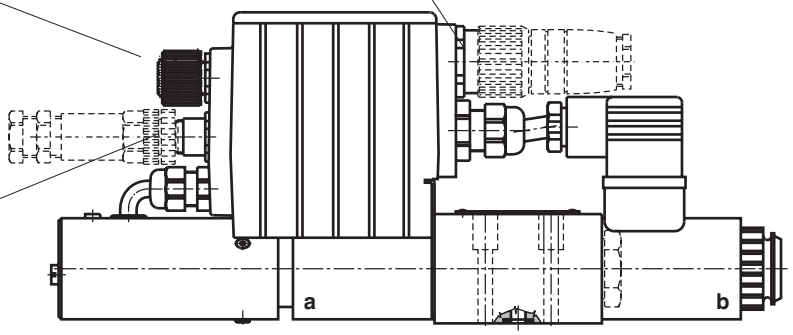
K3



Connector K3 - type M12x1 (femele)		
PIN	**Technical data**	**Description**
1	Power supply output	11.2 .... 28V DC/max.100mA
2	Signal of external feedback	according to configuration
3	Ground	0V
4	Not used	
5	Not used	

K2 - Connection RS232 M12x1 (4 PIN)
For programing the electronics.

K1 - Main inplut connector M23 (7PIN)
Whole cable diameter 8 ...12mm.



K3 - Conektor M12x1 (5PIN)
External feedback signal (it presented only for E03 and E04S01configurations).

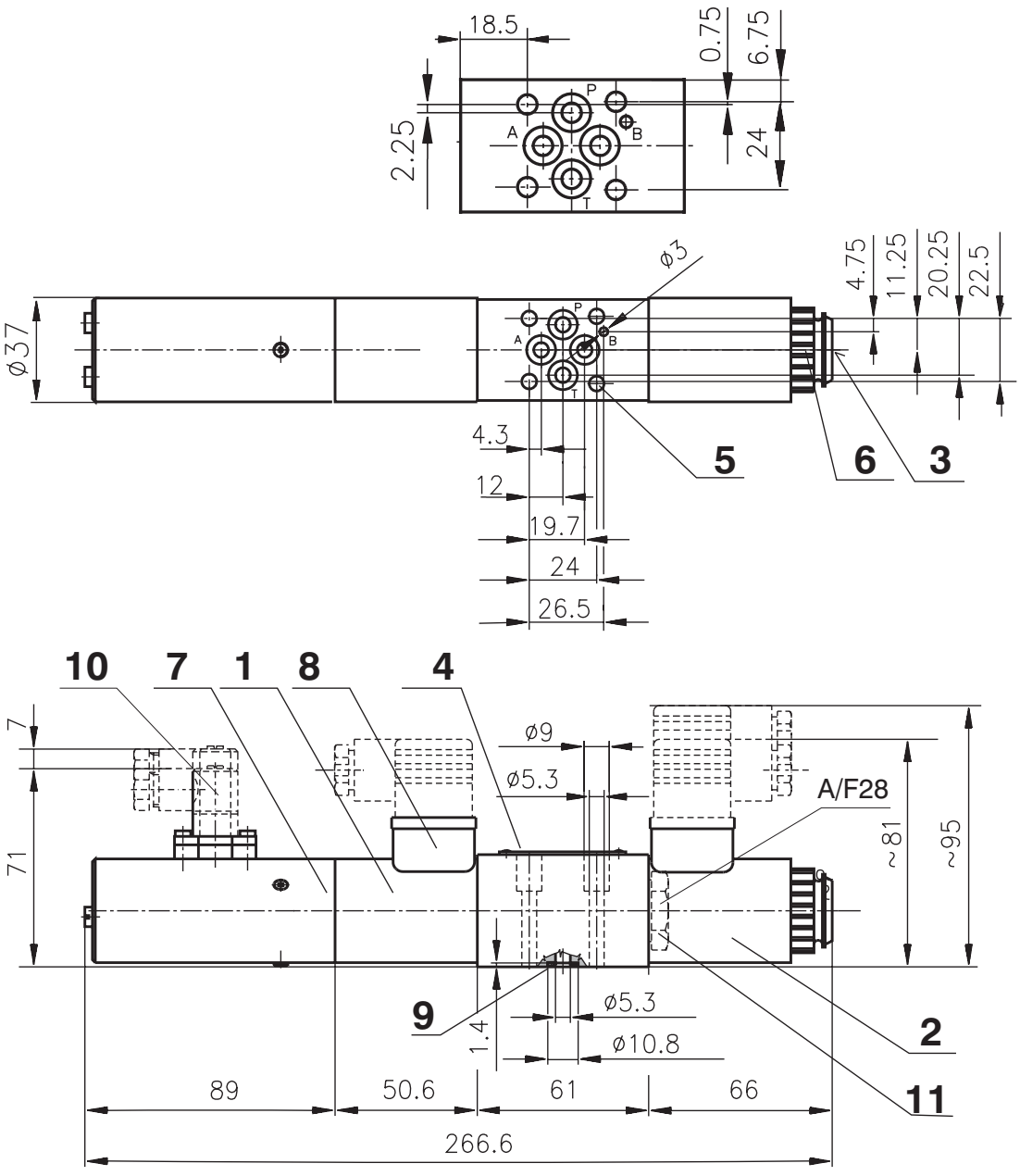
Manufactory valve configuration

Item	Model							
	E01		E02S01		E03		E04S01	
	1 Magnet	2 Magnet	1 Magnet	2 Magnet	1 Magnet	2 Magnet	1 Magnet	2 Magnet
Control signal	0...10 V	± 10 V	0...10 V	± 10 V	0...10 V	± 10 V	0...10V	± 10 V
Signal external feedback	-	-	-	-	0...10 V			
Output position sensor spool	-	-	0...5 V		-		0...5 V	

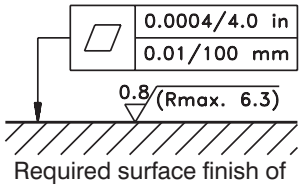
Valve Dimensions

Dimensions in millimeters

043 ... S01
043 ... S02



1 Solenoid a
2 Solenoid b
3 Manual overid
4 Name plate
5 4 mounting holes
6 Solenoid fixing nut
7 Position sensor
8 Solenoid supply connector
9 Square ring 7.65 x 1.68 (4 pcs.), supplied in delivery packet
10 Position sensor connector
11 Plug screw for valve with one solenoid, A/F 24, configurations 2Z51, 2Z11

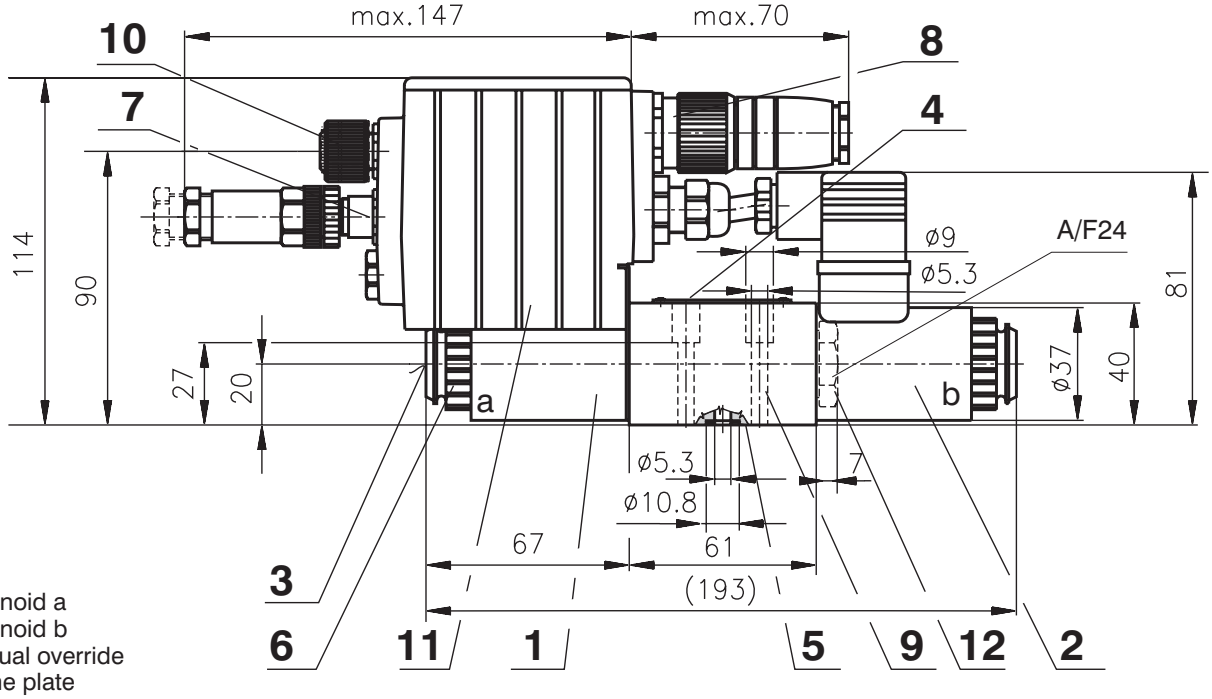


Required surface finish of interface

Valve Dimensions

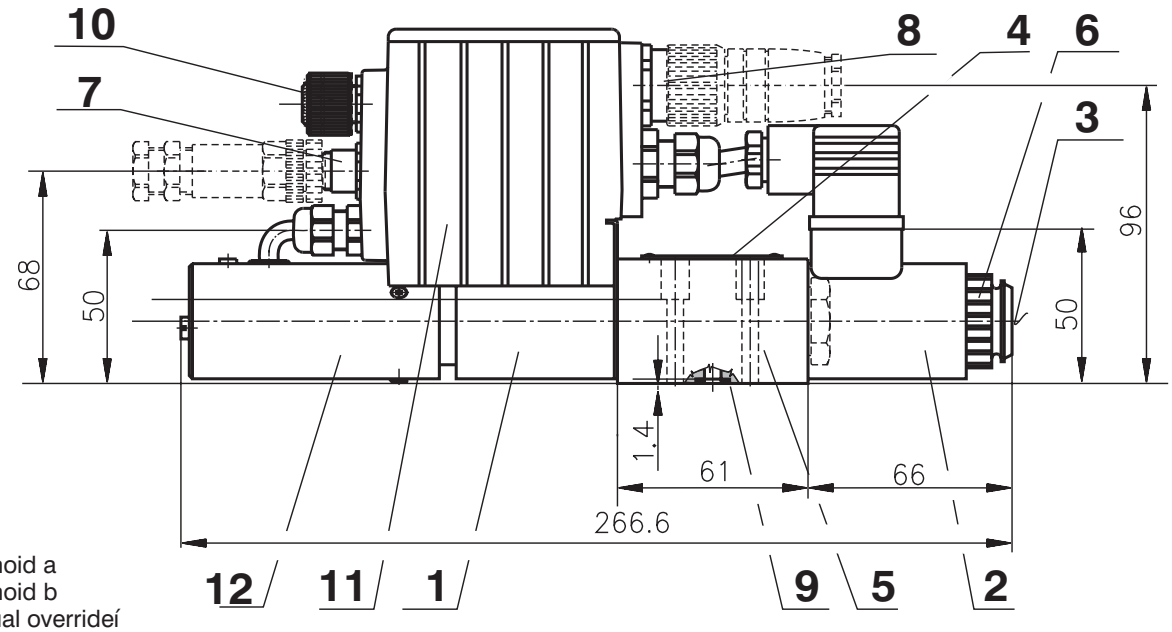
Dimensions in millimeters and inches (in brackets)

043 ... E01 - without connector plug for spool possition feedback
043 ... E03

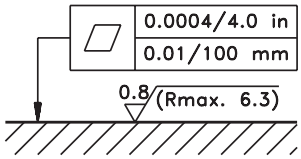


1 Solenoid a
2 Solenoid b
3 Manual override
4 Name plate
5 4 mounting holes
6 Solenoid fixing nut
7 Connector M12x1 for connection of external feedback
8 Main supply connector M23
9 Square ring 7.65 x 1.68 (4 pcs.), supplied in delivery packet
10 Cover of connector M12x1 for programming
11 Plastic box with integrated electronics
12 Plug screw for valve with one solenoid, A/F 24, configurations 2Z51, 2Z11

043 ... E02S01 - without connector plug for spool possition feedback
043 ... E04S01

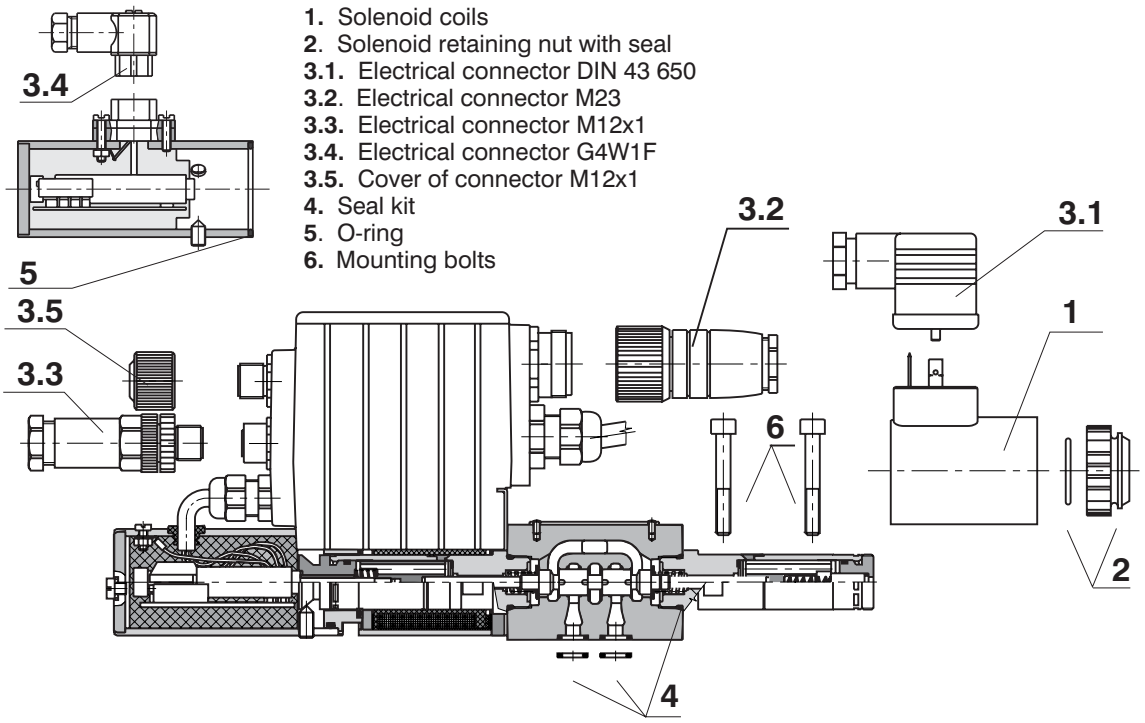


1 Solenoid a
2 Solenoid b
3 Manual overrideí
4 Name plate
5 4 mounting holes
6 Solenoid fixing nut
7 Connector M12x1 for connection of external feedback
8 Main supply connector M23
9 Square ring 7.65 x 1.68 (4 pcs.), supplied in delivery packet
10 Cover of connector M12x1 for programming
11 Plastic box with integrated electronics
12 Position sensor



Required surface finish of interface

Spare Parts



1. Solenoid coils
2. Solenoid retaining nut with seal
3.1. Electrical connector DIN 43 650
3.2. Electrical connector M23
3.3. Electrical connector M12x1
3.4. Electrical connector G4W1F
3.5. Cover of connector M12x1
4. Seal kit
5. O-ring
6. Mounting bolts

1. Solenoid coil

Solenoid type	Ordering number
01200	936-0033
02400	936-0034

2. Solenoid retaining nut with seal

Type of the nut	Seal ring	Ordering number
Standard nut	18 x 1.5	486-9010

3.1. Electrical connector DIN 43 650

Type designation	Type	Maximum input voltage	Connector A grey	Connector B black
			Ordering number	
K5	without rectifier - M16x1.5 (bushing bore ⌀ 4-6 mm)	230 V DC	936-9906	936-9905

3.2. Electrical connector M23 - 7PIN (female)

Ordering number	345579500001

3.3. Electrical connector M12x1- 5PIN (male), it presented only for E03 and E04S01 configurations

Ordering number	358359000002

3.4. Electrical connector G4W1F

Ordering number	358358932157

3.5. Cover of connector M12x1

Ordering number	566-7400

4. Seal kit

Type	Dimensions, number		Order number
	Square ring	O-ring	
Standard - NBR70	7.65 x 1.68 (4 pcs.)	16 x 1.8 (2 pcs.)	486-9002
Viton	7.65 x 1.68 (4 pcs.)	16 x 2.0 (2 pcs.)	486-9009

5. O-ring

Standard - NBR70	28 x 2 (1 pc.)	273111014120

6. Mounting bolts

Dimensions, number	Tightening torque	Ordering number
M5 x 35 DIN 912-10.9 (4 pcs.)	5 Nm (3.7 ft-lbs)	486 -9011

Caution!

- The packing foil is recyclable.
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law.

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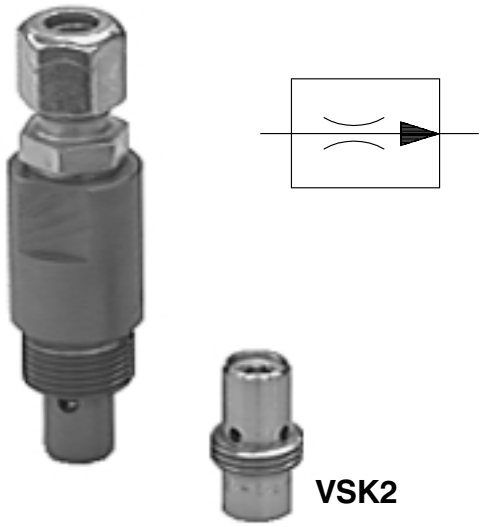
E-mail: sales.cz@argo-hytos.com
www.argo-hytos.com

- **Wide range of throttling oriffices**
- **Two models:**
  - cartridge
  - screw-in cartridge valve

VSK4



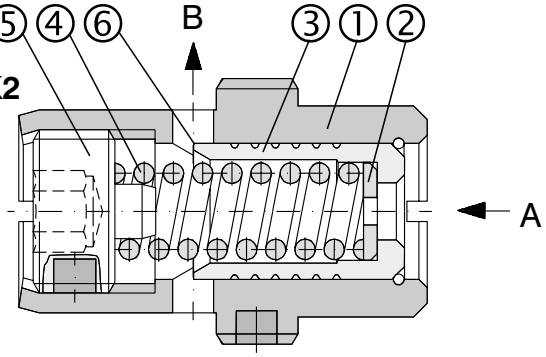
VSK2

Functional Description

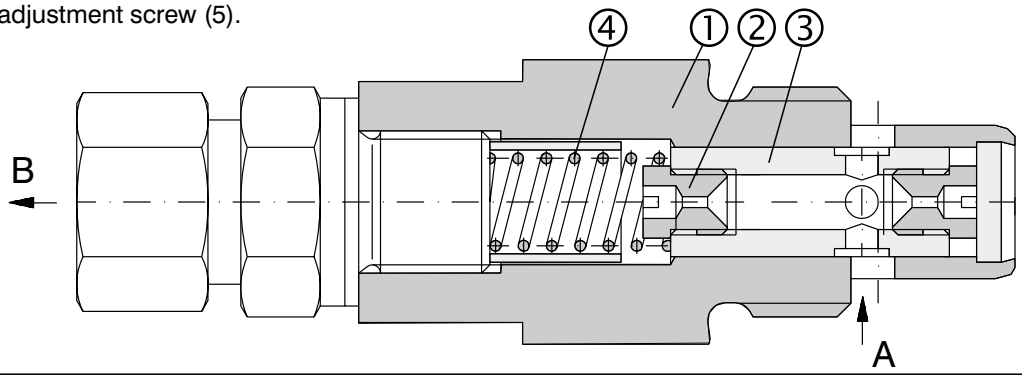
The pressure compensated flow control valves VSK are designed to control flow rates practically independent of pressures and temperatures. The set up flow rate is constant and depends on the orifice area. The 2-way flow control valves can be used in meter-in, meter out or bleed-off applications.
The valve consists of housing (1), throttling orifice (2), pressure compensator (3), spring (4) and adjustment screw (5).
Throttling in the direction A B takes place on the throttling area of the orifice (2). To provide for the independence between flow rate and pressure, a pressure compensator (3) with the metering edge (6) is located behind the throttling orifice. The spring (4) pushes the compensator to its extreme right position. Provided that there is flow passing through the valve, the input pressure acts on the face area of the pressure compensator and shifts it to the left, thus reducing the flow area of the metering edge (6) which results in decreasing the pressure difference at the throttling orifice. The movement of the compensator stops as soon as the equilibrium is reached and the pressure difference returns to its required value. The pressure compensator continuously compares the pressure difference at the orifice area (2) with the value preset by the spring pretension and ensures the necessary control, thus holding the flow rate constant. The flow rate of the VSK2 can be adjusted in a small range by setting the adjustment screw (5).

The flow rate in direction B A is also given by the orifice area (2), but the function of the pressure compensator is excluded.
The function of the VSK4 is similar, but in this case, the pressure compensator (3) is located in front of the throttling orifice (2).
The model VSK4-M-135/S is designed for simple, only with weight loaded hydraulic systems, which often tend, due to the flexibility of the oil enclosed in cylinder and hoses, to oscillation. This model differs from the standard one only by its static characteristic, which embodies slightly positive slope. This characteristic should suppress the oscillation.
The housing of the VSK2 valve does not have any surface treatment, the housing of the VSK4 is phosphate coated. All the other parts are zinc coated.

VSK2



VSK4



Ordering Code

VSK □ - □ - □ / □

Constant flow-control valves

Model
Cartridge **2**
Screw - in cartridge **4**

Connectiong thread
Metric thread (M18x1.5 for VSK2) **M2**
Metric thread (M22x1.5 for VSK4) **M4**
Pipe thread (G 3/8 only for VSK2) **G4**

Type
without designation Standard
S Special type (see characteristic)

Orifice diameter in mm/100																
VSK2	55	80	100	-	120	-	-	-	-	160	180	-	210	230	-	260
VSK4	-	-	100	110	120	130	135	140	150	160	180	200	-	-	250	-

Technical Data

Nominal size	mm	06
Maximum flow	US GPM (L/min)	See table of flow rates
Maximum working pressure	PSI (bar)	4641 (320)
Minimum pressure difference	PSI (bar)	See the performance curves
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP RP 91H in viscosity classes ISO VG 32, 46 and 68
Fluid temperature range	°F (°C)	-22 ... +176 (-30 ... +80)
Viscosity range	SUS (mm^2/s)	98 ... 1840 (20 ... 400)
Maximum degree of fluid contamination		Class 21/18/15 to ISO 4406 (1999).
Weight - VSK2 VSK4 with connector	lbs (kg)	0.055 (0.025) 0.441 (0.2)
Mounting position		optional

Approximate flow rates corresponding with the orifice diameter

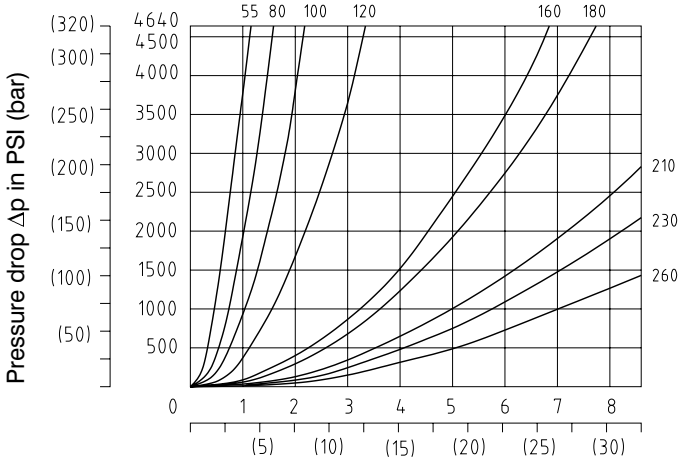
VSK2		**VSK4**	
ID of the orifice [mm/100]	Flow range US GPM (L/min) adjustable through spring pretension at 464.1 PSI (32 bar)	ID of the orifice [mm/100]	Flow range US GPM (L/min) an input presure 464.1 PSI (32 bar)
55	0.08 - 0.16 (0.3 - 0.6)	100	0.56 (2.1)
80	0.37 - 0.45 (1.4 - 1.7)	110	0.63 (2.4)
100	0.48 - 0.63 (1.8 - 2.4)	120	0.79 (3.0)
120	0.82 - 1.06 (3.1 - 4.0)	130	1.01 (3.8)
160	1.46 - 1.72 (5.5 - 6.5)	140	1.14 (4.3)
180	1.48 - 1.88 (5.6 - 7.1)	150	1.30 (4.9)
210	2.25 - 2.86 (8.5 - 10.8)	160	1.67 (6.3)
230	2.83 - 3.52 (10.7 - 13.3)	180	1.75 (6.6)
260	3.17 - 4.34 (12.0 - 16.4)	200	2.30 (8.7)
		250	3.31 (12.5)
		135/S	1.59 (6.0)

Δp-Q Characteristics (B → A)

Measured at ν = 166 SUS (35 mm²/s) and t = 104 °F (40 °C)

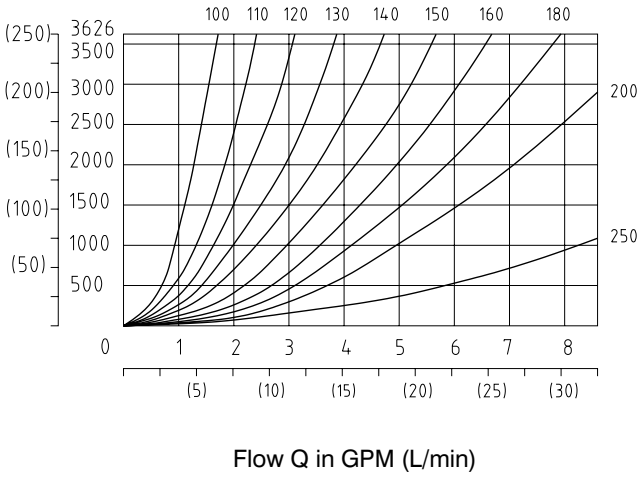
VSK2

Orifice diameter (mm/100)



VSK4

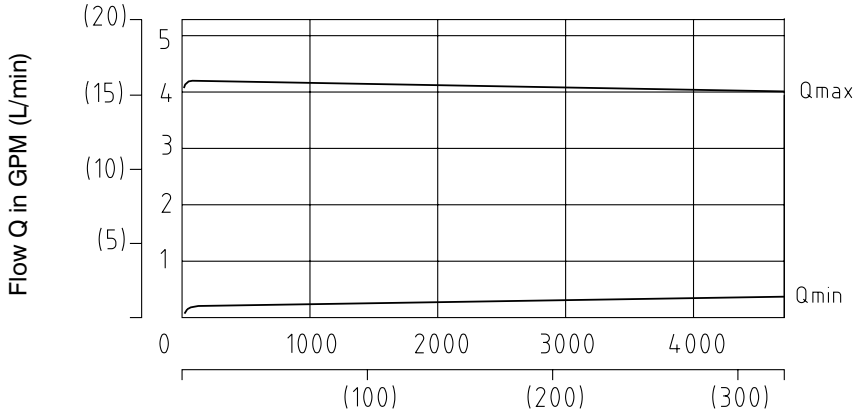
Orifice diameter (mm/100)



Δp-Q Characteristics (A → B)

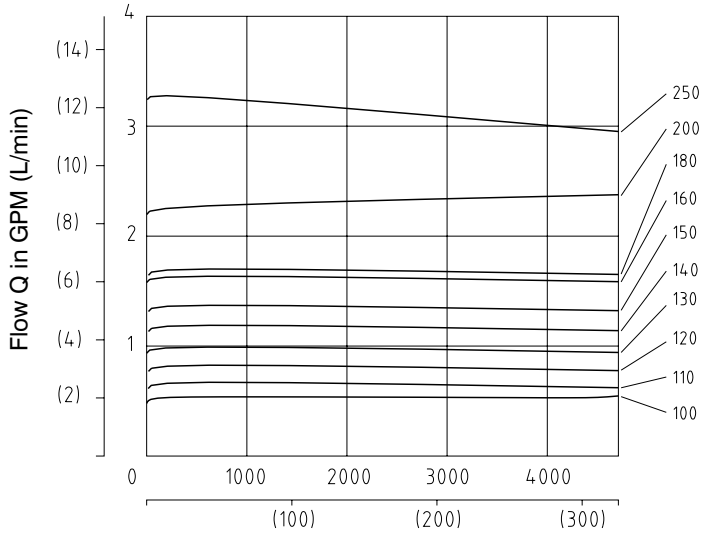
Measured at ν = 166 SUS (35 mm²/s) and t = 104 °F (40 °C)

VSK2

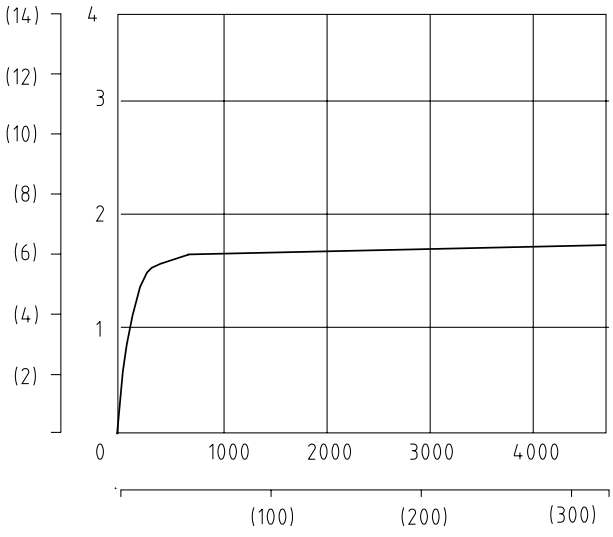


VSK4

Orifice diameter (mm/100)



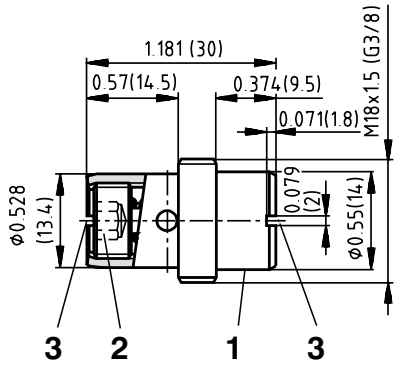
VSK4-M4-135/S



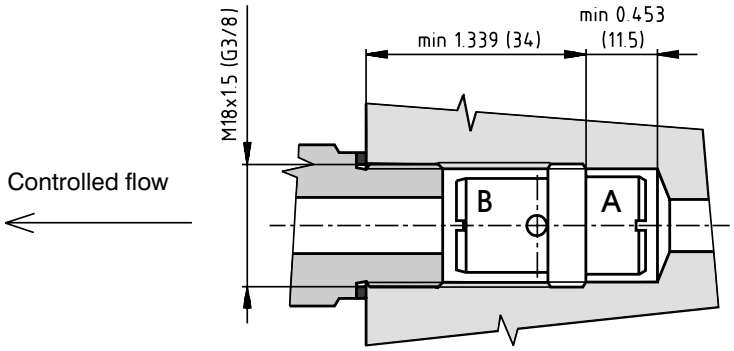
Valve Dimensions

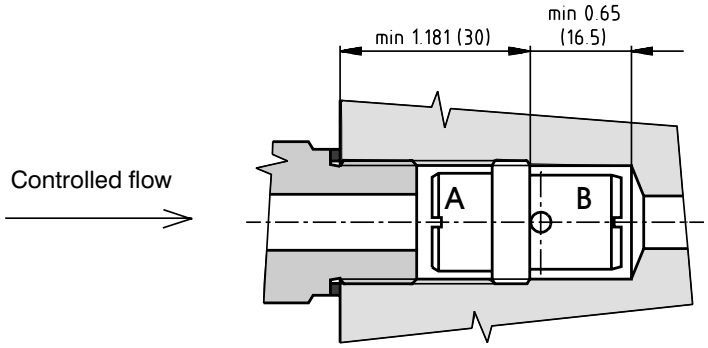
Dimensions in inches and millimeters (in brackets)

VSK2-M4-x



Mounting Cavity

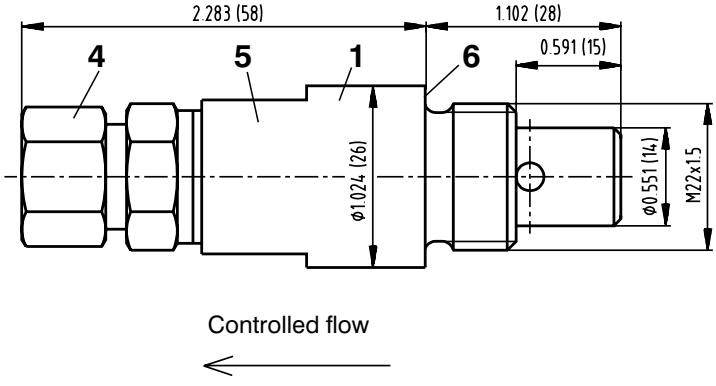




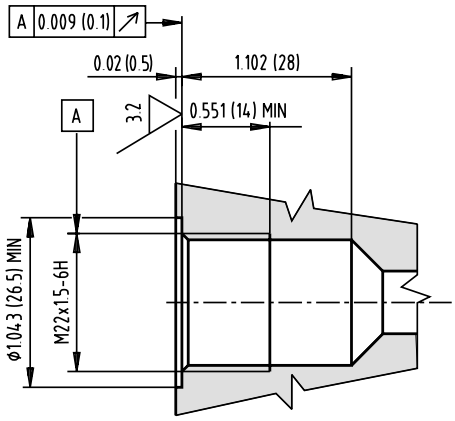
1 Type designation (stamped)
2 Screw for fine flow adjustment (with VSK2 only)
- inside haxagon 5 mm
- anti clockwise rotation = flow decrease
- clockwise rotation = flow increase

3 Slot for screwing-in in mounting cavity of VSK2
4 Straight connector GE10-PRL-ED
for pipe with ⌀D 10 mm
5 Wrench flats size 22 mm,
tightening torque = 22.13 ft-lbs (30 Nm)
6 Sealing edge

VSK4-M4-x



Mounting Cavity



Caution!

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Screw-in cartridge throttle valves VSV1,VSVJ1

p_{max} up to 320 bar • Q_{max} up to 20 l/min

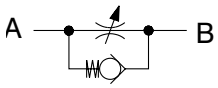
HA 5131
6/2004

Preliminary technical information

- ❑ **Screw-in cartridge design**
- ❑ **Use :**
  - Metering in one direction
  - Metering in both directions
- ❑ **Flow rate set by adjustment screw internal to hexagon lock-nut**

VSV1

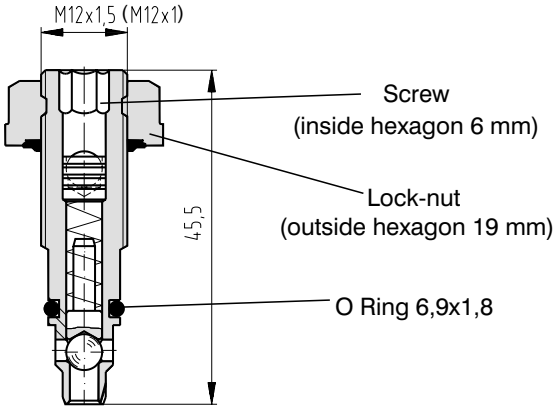
VSVJ1



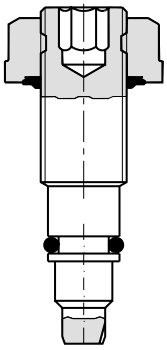
Functional Description

Throttle valve controls flow rate in a hydraulic system in one or both directions.
The adjustment sensitivity depends on model selection with either M12x1 or M12x1,5 threads.
A lock-nut with a special seal prevents external leakage and properly secures valve upon installation.

VSVJ1



VSV1



Ordering Code

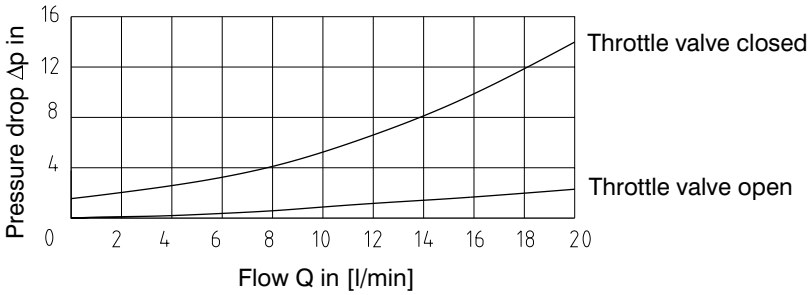
VSV ☐ 1 / ☐

Screw-in cartridge throttle valve		
without designation **J**	**Model** without check valve with check valve	
		M12x1 **M12x1,5** **Thread** Standard - M12x1 M12x1,5
		Design

Check Valve Characteristics Δp = f (Q)

Measured at ν = 35 mm²/s and t = 40 °C

Flow direction B → A
VSVJ1

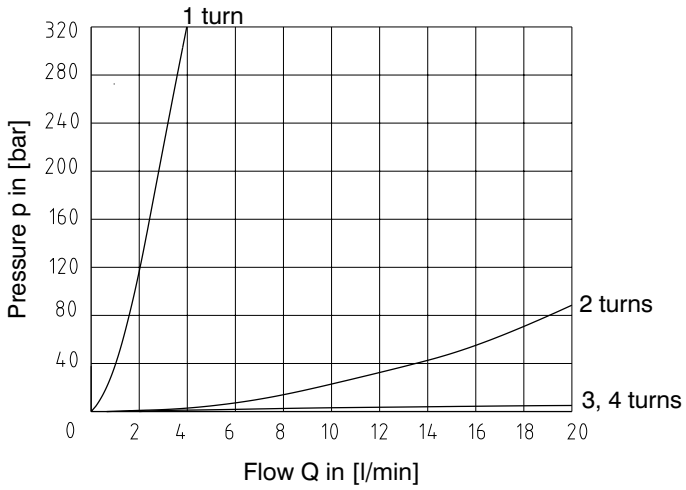


p-Q Characteristics

Measured at $\nu = 35\ mm^2/s$ and $t = 40\ °C$

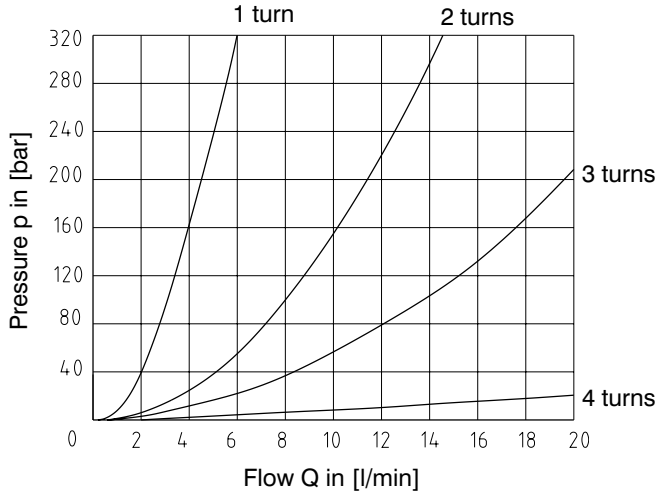
Model M12 x 1,5

Flow direction A → B



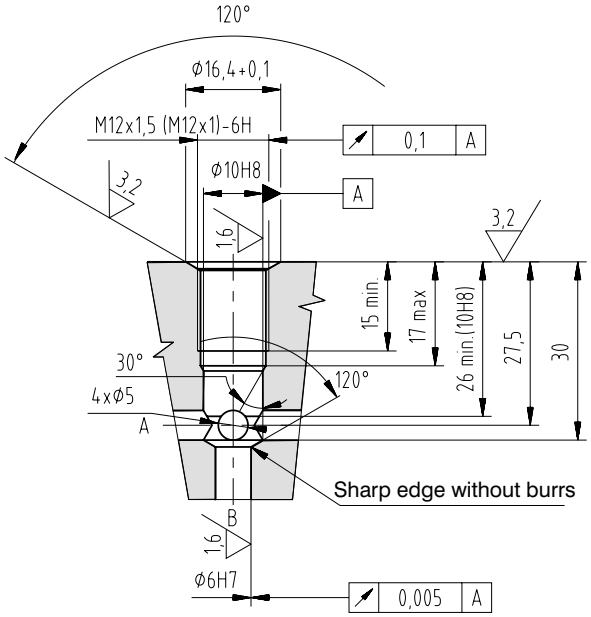
Model M12 x 1

Flow direction A → B



Mounting Cavity

Dimensions in millimeters



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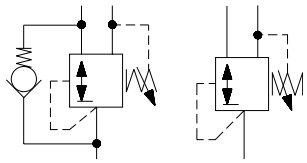
Directly operated pressure reducing valves

VRP2-04

Size 04 ... 4600 PSI (320 bar) ... 5.3 US GPM (20 L/min)

HA 5142
5/2005

Replaces
HA 5142 6/2003



- ❑ **For stacking assemblies**
- ❑ **4 pressure ranges**
- ❑ **Pressure reduction in ports A or P**
- ❑ **Model “A” with check valve**
- ❑ **Installation dimensions to ISO 4401/CETOP-RP 121H**

Functional Description

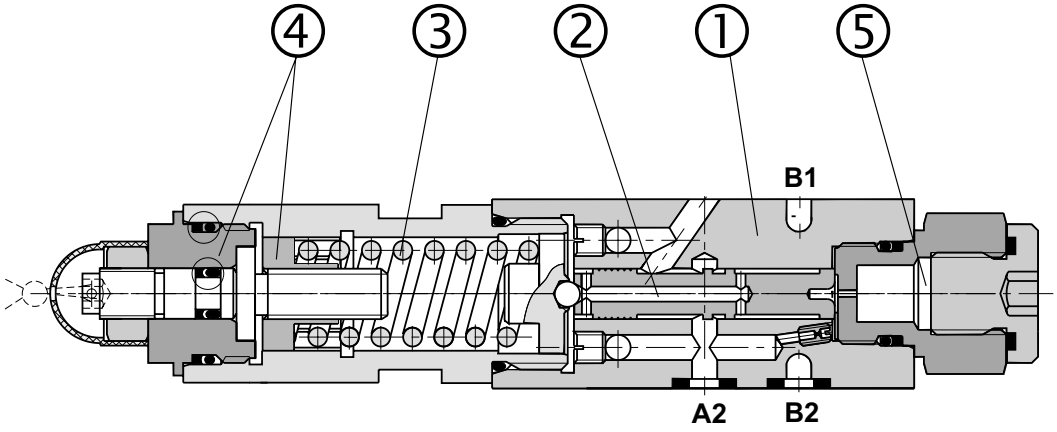
The pressure valves VRP2 are directly operated reducing valves for vertical stacking assemblies designed as 3-way valves, i.e. with pressure protection of the secondary circuit.
The valve consists of the valve body (1), control spool (2), spring (3), adjustment element (4) and the plug G 1/4 (5) for pressure measuring and, if necessary, of a check valve.

Model “A”
With this model, the fluid enters into the valve body from the primary circuit through port A1 and passes through the metering edge, where its pressure is reduced. The reduced pressure corresponds with the setting of the control spring. At the same time, this pressure affects also the surface area of the control spool opposed to the spring (the pressure can be measured at the port G 1/4 which is normally closed by plug 5). Thus the static balance of the spool is ensured. If the reduced pressure changes, a respective control action takes place and the reduced pressure returns to its preset value. The flow from the output port A2 passes then to the user. If pressure behind the valve increases due to the effect of the load acting on the user, the spool shifts further against the spring until the second metering edge opens and the excessive flow drains through port T. The leakage from the spring room is also routed to port T. The reverse free-flow from port A2 to port A1 passes through a check valve which is connected parallel to the metering edge.

Model “B”
With model “B”, the pressure reduction follows from port P2 to port P1, but it takes place only when the flow in port B passes in the direction to the user (not opposite). The protection of the secondary circuit is also ensured for one flow direction only.

Model “P”
With model “P”, the pressure reduction follows from port P2 to port P1, but is effective in both flow directions through the directional valve (as well as the protection of the secondary circuit).

The valves are delivered with basic surface treatment. The valve body is phosphate coated, whereas the surfaces of the other parts are zinc coated.



Ordering Code

VRP2-04- □ □ / □

Reducing valve, directly operated

Nominal size

Pressure range

2	Adjustable up to 363 PSI (25 bar)
6	Adjustable up to 914 PSI (63 bar)
16	Adjustable up to 2321 PSI (160 bar)
21	Adjustable up to 3046 PSI (210 bar)

Pressure reduction	**Pressure control**	
In port A2	from port A2	A
In port P1	from port B1	B
In port P1	from port P1	**P**

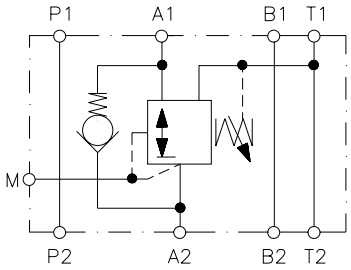
Adjustment element

S Screw with outside hexagon 4 mm

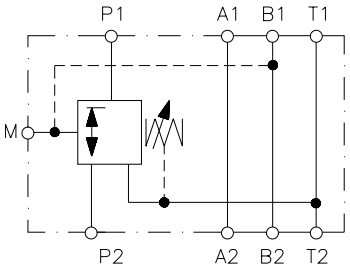
FOR PREFERRED TYPES SEE BOLD TYPING IN ORDERING CODE AND TABLE OF PREFERRED TYPES ON PAGE 3

Functional Symbols

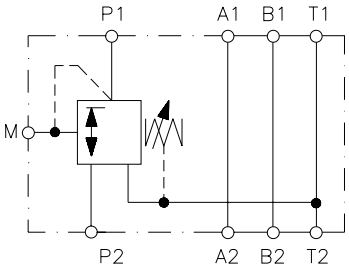
VRP 2-04-A . / . .



VRP 2-04-B . / . .



VRP 2-04-P . / . .

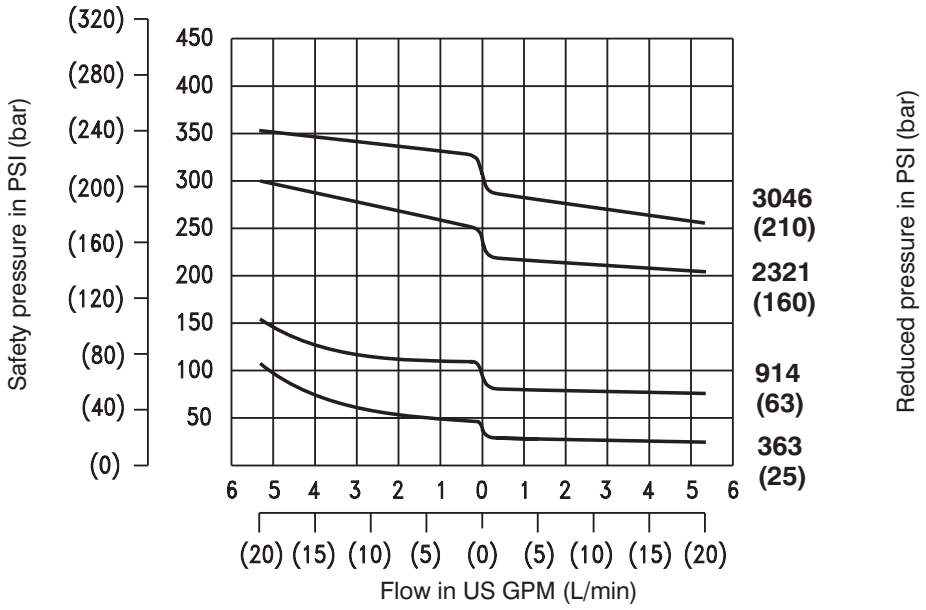


Technical Data

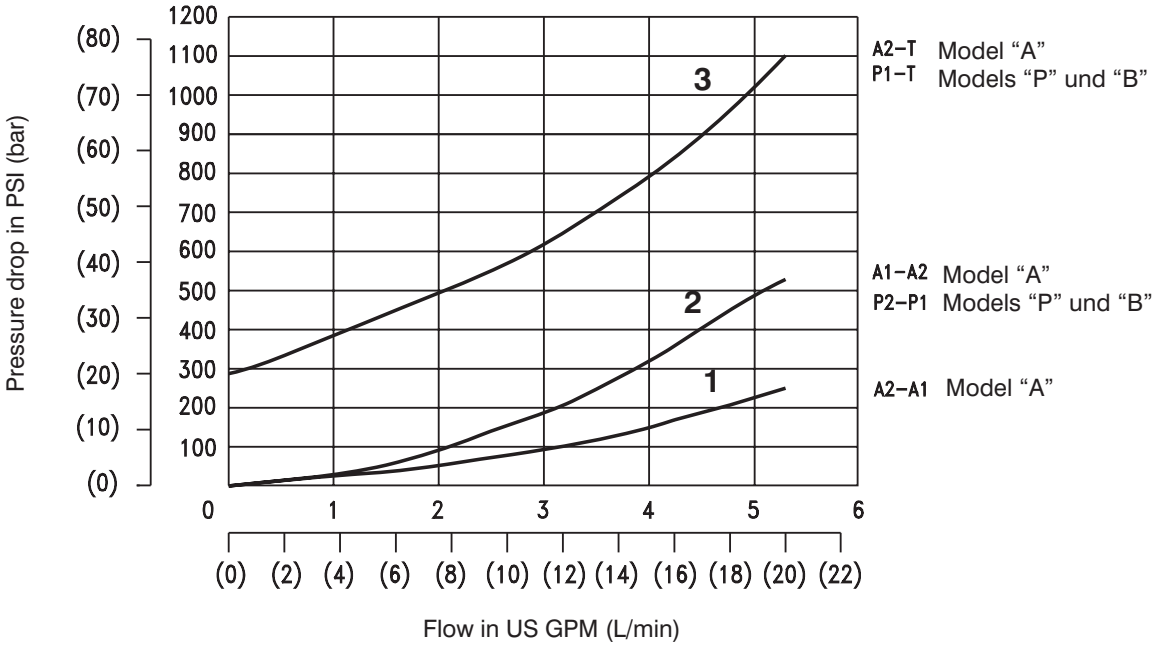
Nominal size	mm	04			
Maximal flow	US GPM (L/min)	5.3 (20)			
Max. imput pressure	PSI (bar)	4641.3 (320)			
Reduced pressure	PSI (bar)	363 (25)	914 (63)	2321 (160)	3046 (210)
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP RP 91 H in viscosity classes ISO VG 32, 46 and 68			
Fluid temperature range	°F (°C)	-22 ... +176 (-30 ... +80)			
Viscosity range	SUS (mm^2/s)	98 ... 1840 (20 .. 400)			
Maximum degree of fluid contamination		Class 21/18/15 to ISO 4406 (1999).			
Weight - model “A” model “B”, “P”	lb (kg)	1.81 (0.82) 1.32 (0.60)			
Mounting position		optional			

p-Q Characteristics

Measured at ν = 166 SUS (35 mm^2/s) and t = 104°F (40°C)



Δp-Q Characteristics



Preferred Types of Valves

Type	Ordering number
VRP2-04-PS/6	517-0068
VRP2-04-PS/16	517-0069
VRP2-04-PS/21	517-0070

Caution!

- The packing foil is recyclable.
- If the valve is used separately without a directional valve, a cover plate DK1-04/32-3 with the same installation dimensions can be ordered. This plate connect port A1 with port P1 - see catalogue Adapter and Blanking Plates HA 0003.
- Mounting bolts M5x50 or studs must be ordered separately. Tightening torque of the screws is 3.7 ft-lbs (5 Nm).
- For applications outside these parameters, please consult the manufacturer.
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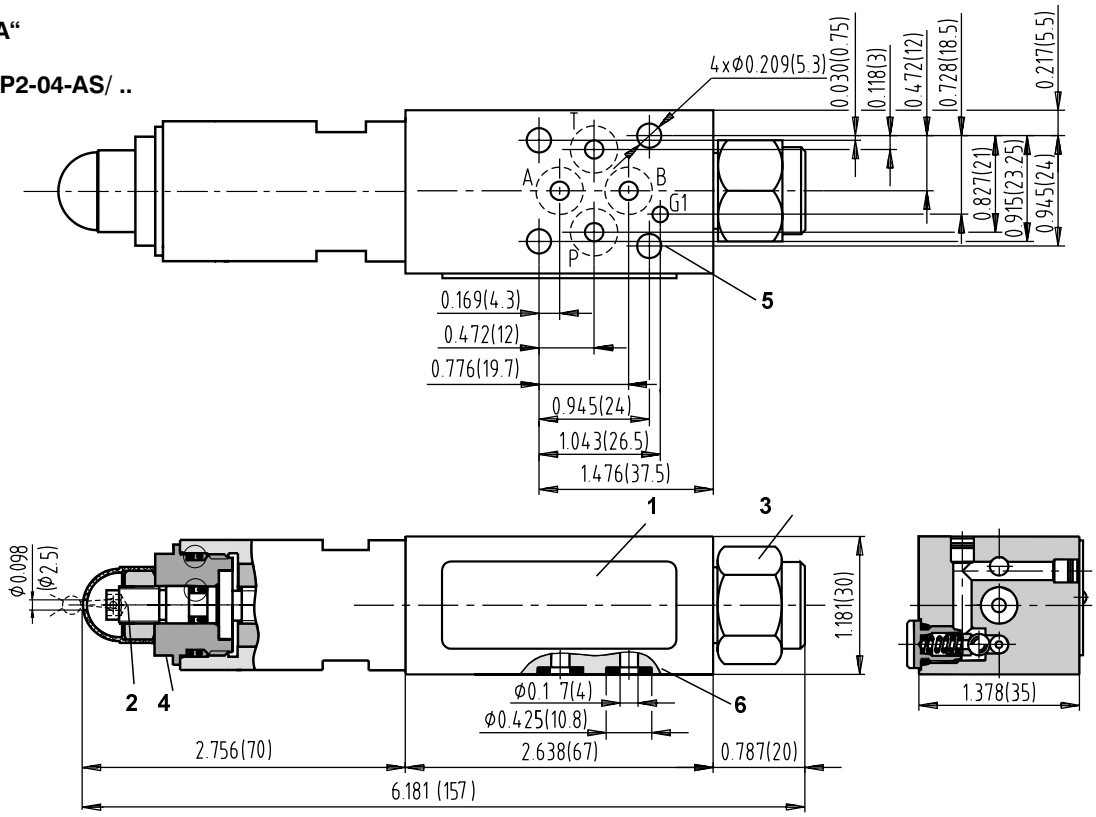
Valve Dimensions

Dimensions in inches and millimetres (in brackets)

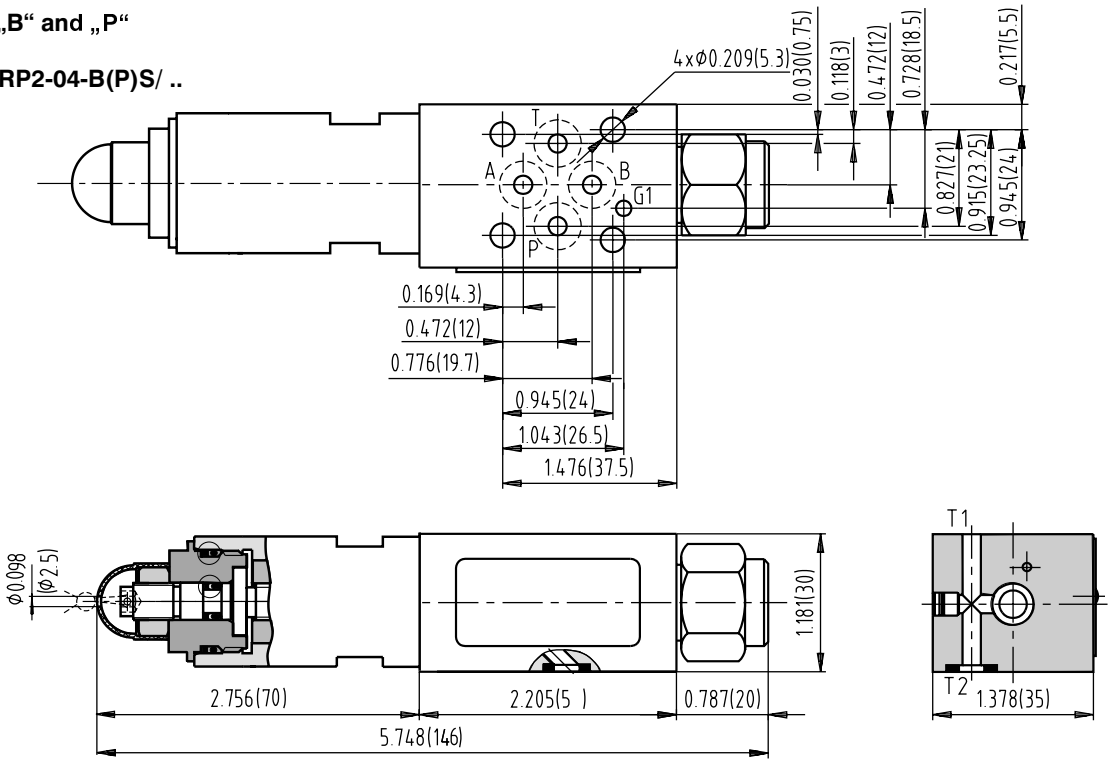
Model „A“

Type VRP2-04-AS/ ..

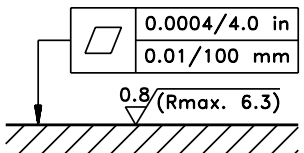


Model „B“ and „P“

Type VRP2-04-B(P)S/ ..



1 Name plate
2 Pressure adjustment element “S”- screw with outside hex. s=4 mm
3 Plug for pressure gauge connection, thread G 1/4
4 Locknut
5 4 through mounting holes
6 SQUARE RING 7.65x1.68 (4 pcs.), supplied with each valve



Required surface finish of interface.

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ARGO HYTOS

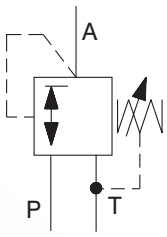
Directly operated pressure relief valves

SP2A-A3

3/4-16 UNF • p_{max} 350 bar (5076 PSI) • Q_{max} 20 L/min (5,3 GPM)

HA 5143
2/2005

- ❑ **Screw-in cartridge design**
- ❑ **3 pressure ranges**
- ❑ **Pressure setting by hexagon socket**

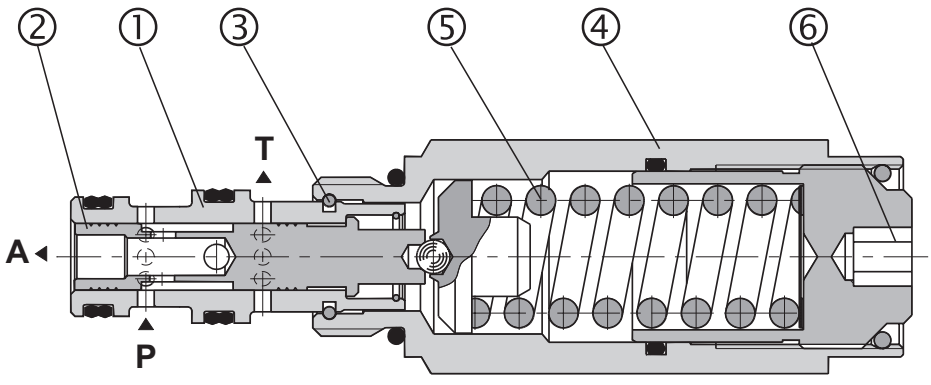


Functional Description

This 3-way direct operated pressure reducing valve is designed to reduce the system pressure. Due to its 3-way design the valve is capable to relief as well the secondary pressure. The pressure can be set by an adjustment screw (6).

In its initial position the valve allows free flow from port P to A. The pressure in port A acts on the front face of the control spool (2) against the spring (5). When the pressure in port A reaches the pressure set at the spring the control spool moves into the regulating position and closes the flow from port P to A until the pressure falls back to the set pressure. This will maintain a constant pressure in line A. A further pressure increase in port A caused by a potential external force on the actuator will cause the spool to shift against the spring until the spool opens port T and allows the oil flow pass to tank.

The valve bush (1) is fixed to the cartridge (4) by a wire ring (3). Decoupling the bush from the cartridge makes a transmission of tensions caused by high tightening torques impossible. In the basic version the valve corpus and the adjustment screw are zinc plated



Ordering Code

SP2A-A3 / S □ □

Polyuretan, Viton **V**
Polyuretan, NBR **Without designation**

Directly operated pressure relief valve

Pressure range
6 up to 63 bar (914 PSI)
16 up to160 bar (2321 PSI)
21 up to 210 bar (3046 PSI)

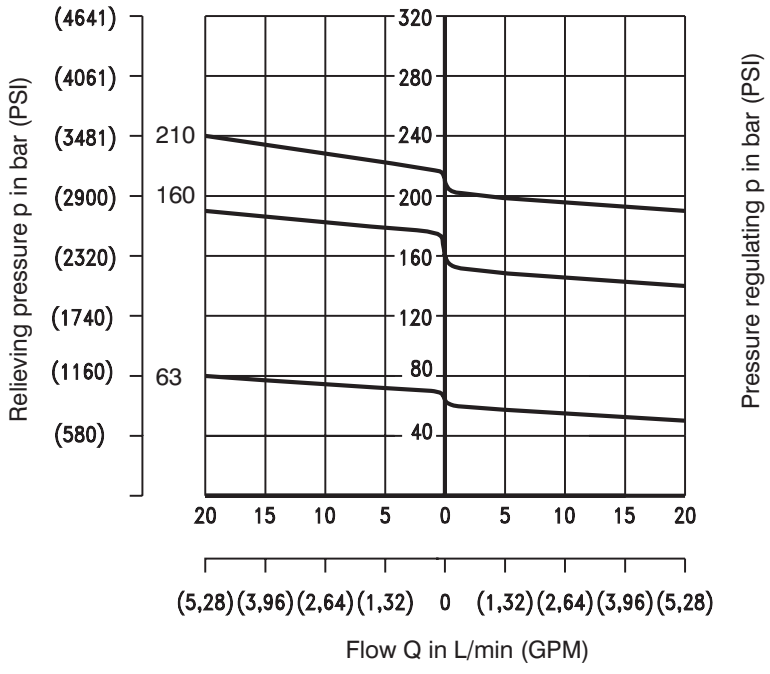
Standard **S**

Technical Data

Cartridge thread		3/4 - 16 UNF - 2B		
Max. flow rate	L/min (GPM)	20 (5,28)		
Max. input pressure (port P)	bar (PSI)	150 (2176) (pressure range 06)	250 (3626) (pressure range 16)	350 (5076) (pressure range 21)
Regulated pressure	to bar (PSI)	63 (914)	160 (2321)	210 (3046)
Working pressure related to flow	bar (PSI)	see p-Q characteristics		
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP - RP 91H in viscosity classes ISO VG 32, 46 and 68.		
Fluid temperature range for standard sealing (NBR)	°C (°F)	-20 ... +80 (-4 ... 176)		
Fluid temperature range for Viton sealing (FPM)	°C (°F)	-20 ... +80 (-4 ... 176)		
Viscosity range	mm^2/s (SUS)	20 ... 500 (98 ... 2300)		
Max. degree of fluid contamination		Class 21/18/15 according to ISO 4406 (1999).		
Weight	kg (lbs)	0,13 (0,286)		
Maximum valve tightening torque		30 $^{+2}$Nm		
Mounting position		optional		

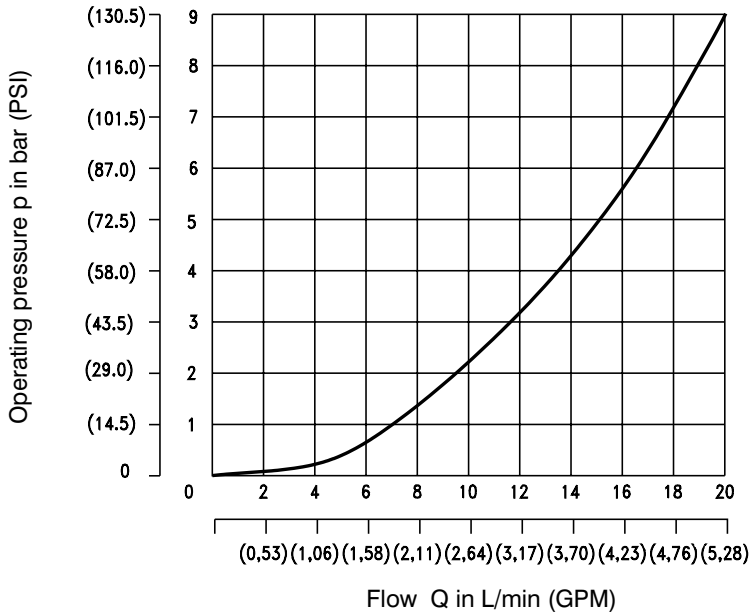
p-Q Characteristics

Measured at ν= 32 mm^2/s (156,8 SUS)



Δp-Q Characteristic

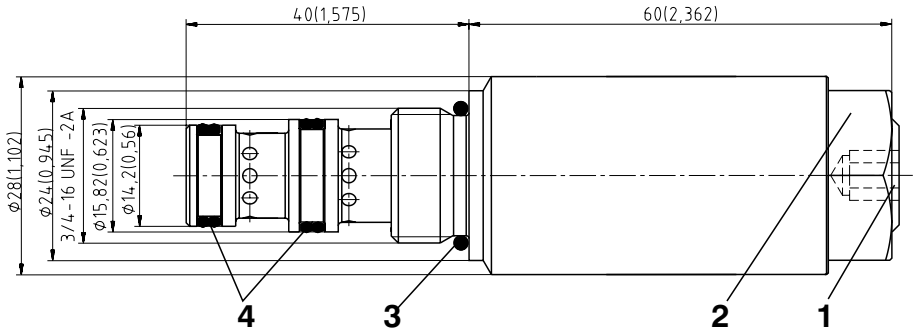
Measured at ν= 32 mm²/s (156,8 SUS)



Valve Dimensions

Dimensions in millimetres (inches)

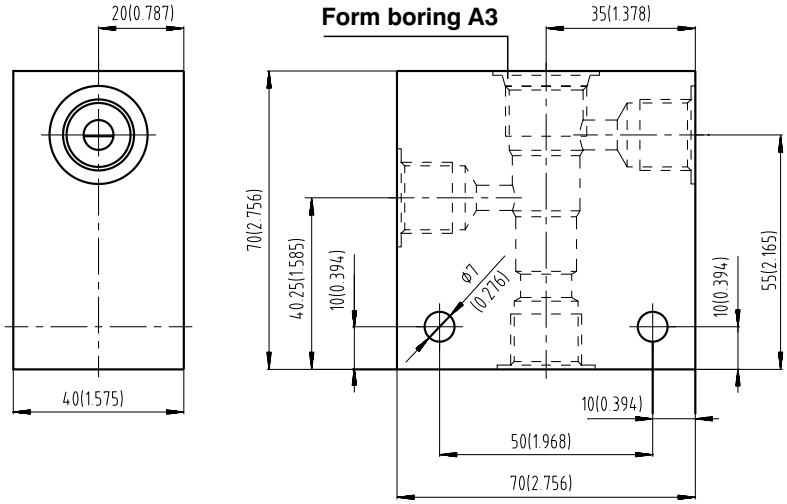
Screw-in Cartridge Design



1 Adjustment element (screw with internal hexagon 6 mm)
Clockwise rotation = pressure increase
Atniclockwise rotation =pressure decrease
2 Wrench flats s = 24 mm - tightening torque 30 Nm
3 O-ring 17 x 1,8 (supplied with valve)
4 Combined sealing:
Dualseal DRYZ000004Z20 11,87 x 14,27 x 3,1
Dualseal DRYZ000002Z20 13,47 x 15,87 x 3,1(supplied with valve)

Valve Body

For short selection see table on page 4. Dimensions in millimeters (inches)

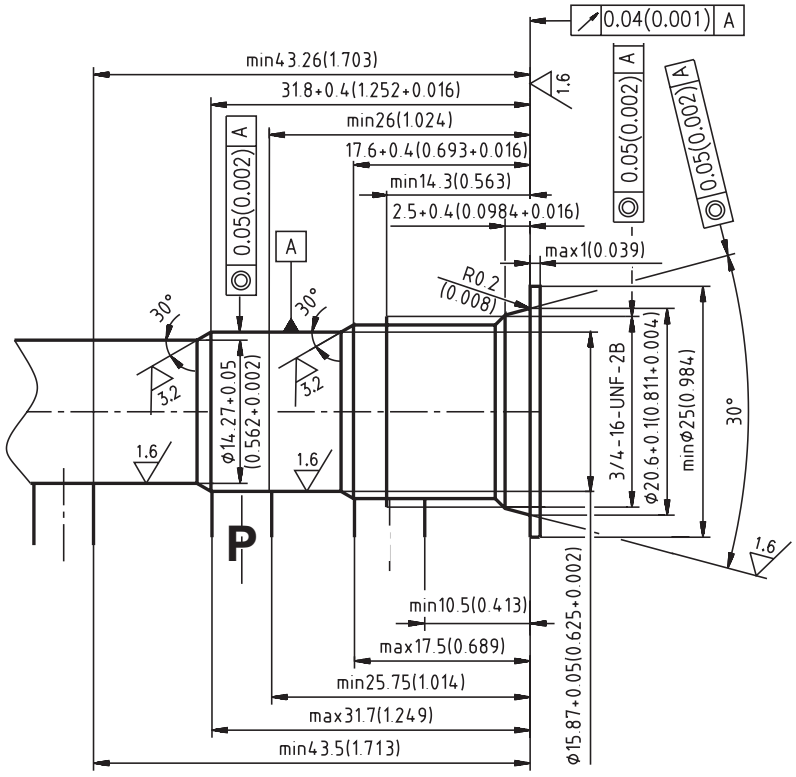


Body material	Connecting size	Type code	Operating pressures
Steel	G3/8	SB-A3-0103ST	420 bar (6091 PSI)
Steel	SAE 6	SB-A3-0102ST	420 bar (6091 PSI)
Aluminium	G3/8	SB-A3-0103AL	250 bar (3626 PSI)
Aluminium	SAE 6	SB-A3-0102AL	250 bar (3626 PSI)

Note:
- For detailed valve body ordering code refer to data sheet HA 0018

Insatallation Cavity

Dimensions in millimeters (inches)



Spare Parts

Seal kit

Dualseal - PU	O-ring - NBR	O-ring - Viton	Order number
11,87 x 14,27 x 3,1 (1pcs.)	17 x 1,8 (1 pcs.)	-	517-0099
13,47 x 15,87 x 3,1 (1pcs.)	20,35 x 1,78 (1 pcs.)	-	
11,87 x 14,27 x 3,1 (1pcs.)	-	17 x 1,8 (1 pcs.)	517-0098
13,47 x 15,87 x 3,1 (1pcs.)	-	20,35 x 1,78 (1 pcs.)	

Caution!

- The packing foil is recyclable.
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law.

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Pilot operated pressure reducing valves

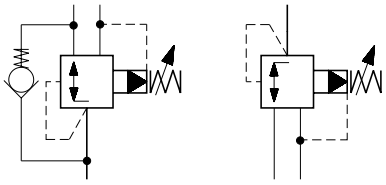
VRN1-06

Size 06 • ... 4600 psi (320 bar) • ... 10.6 US gpm (40 l/min)

HA 5151
6/2003

Replaces
HA 5151 2/99

- **Screw-in cartridge valve for manifold mounting and stacking assemblies**
- **4 pressure ranges**
- **Two pressure adjustment options**
- **Pressure reduction in ports A, B or P**
- **Models “A” and “B” with check valve**
- **Installation dimensions to DIN 24 340-A6 and ISO 4401-AB-03-4-A**



Functional Description

The pressure valves VRN1 are pilot operated screw-in cartridge pressure reducing valves designed as 3-way-valves, i.e. with pressure protection of the secondary circuit. For the use in vertical stacking assemblies, three models of valve bodies are available, with pressure reduction in ports A, B and P. Incorporated into the valve bodies “A” and “B” are the check valves which enable the reverse flow to pass through the valve.

The reducing valve consists of a bush (1) with the attachment thread M22x1.5, control spool (2), spring (3) and the adjustment element (4). With the models for stacking assemblies also the respective valve body (5) and alternatively a check valve (6) complete the valve.

Screw-in cartridge valve

The flow from the primary circuit flows to the first metering edge, where its pressure is reduced. The reduced pressure corresponds with the adjustment of the control spring of the ball pilot valve. The reduced pressure is continuously controlled and compared with the pressure preset. If any control error appears, the respective control action takes place and the reduced pressure returns to its preset value. After the pressure reduction, the fluid flows through the spool bore and is then routed to the output port of the module valve body. If pressure behind the valve increases due to the effect of external load acting on the user, the control spool shifts further against the spring, the reducing metering edge closes and the second metering edge opens. The fluid passes through the „third way“ to port T. The control flow of the pilot valve (from the spring room) is also routed to port T.

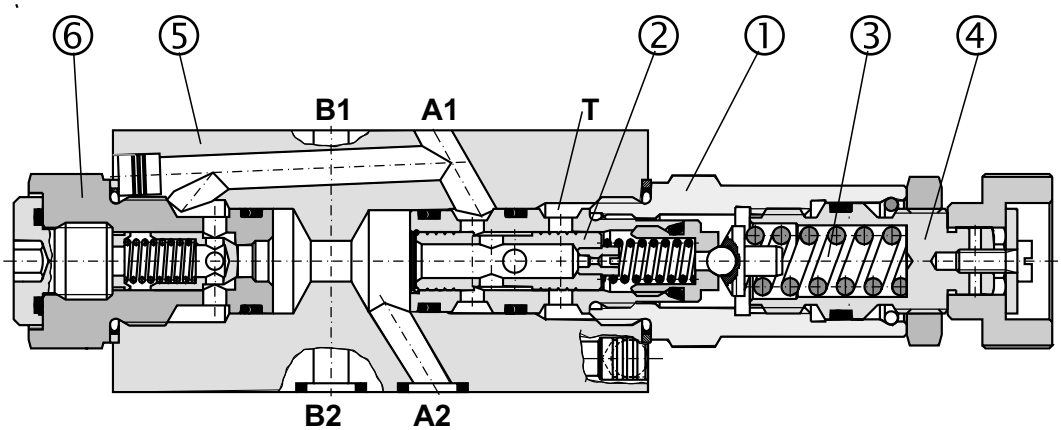
Models “A” and “B”

With this models, the flow enters into the valve body through port A1 (B1). The input pressure is reduced, routed to port A2 (B2) and further to the user. The reverse flow passes through a check valve which is connected parallel to the metering edge.

Model “P”

With the model „P“, the pressure is reduced from port P2 to port P1. With this model, a control pressure gauge can be connected to port G 1/4.

The valves are delivered with basic surface treatment. The valve body is phosphate coated, whereas the



Ordering Code

VRN1-06 / □-□ □

Reducing valve, pilot operated

Nominal size

Adjustment element

Screw with outside hexagon 0.394 in. (10 mm)	**S**
Hand knob	**R**

Pressure range

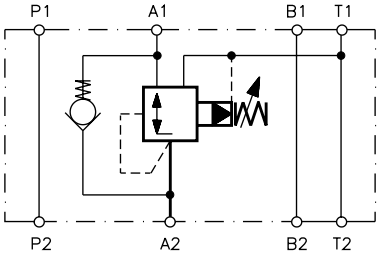
6.3	Pressure adjustable from 145 psi (10 bar) to 913.7 psi (63 bar)
10	1450 psi (100 bar)
16	2320.6 psi (160 bar)
21	to 3045.8 psi (210 bar)

Models

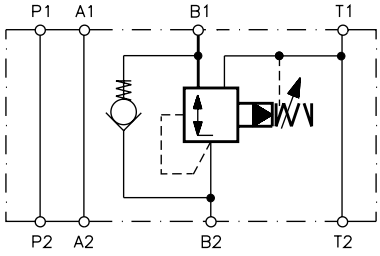
V	Screw-in cartridge valve
A	Module design, pressure reduction in port A
B	Module design, pressure reduction in port B
P	Module design, pressure reduction in port P

Functional Symbols

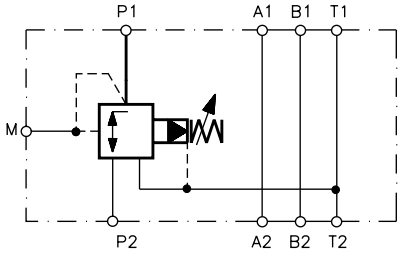
VRN 1-06/x-Ax



VRN 1-06/x-Bx



VRN 1-06/x-Px

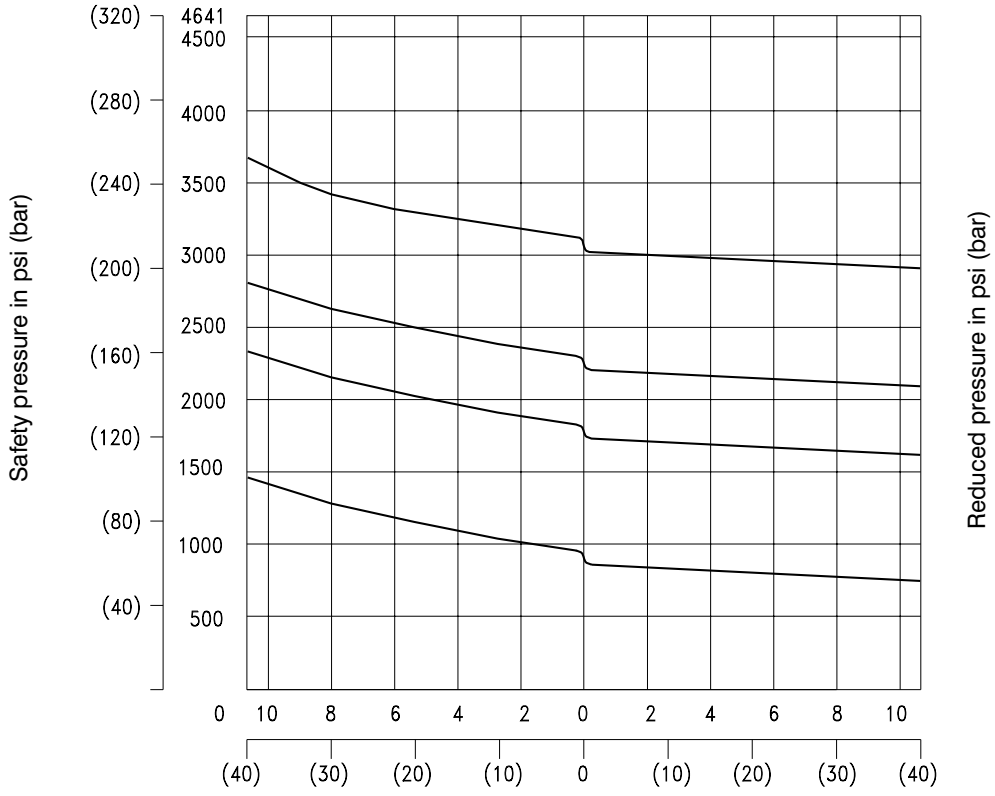


Technical Data

Nominal size	mm	06
Maximal flow rate	US gpm (l/min)	10.6 (40)
Maximum pilot flow	US gpm (l/min)	0.066 (0,25)
Maximum input pressure	psi (bar)	4641 (320)
Reduced pressure	psi (bar)	145 (10) ... 913.7 (63); 1450 (100); 2320.6 (160); 3046 (210)
Maximum pressure in port T	psi (bar)	2320.6 (160)
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP RP 91H in vicosity classes ISO VG 32, 46 and 68
Fluid temperature range	°F (°C)	-22 ... 176 (-30 ... +80)
Viscosity range	SUS (mm^2/s)	98 ... 1840 (20 .. 400)
Maximum degree of fluid contamination		Class 21/18/15 according to ISO 4406 (1999).
Weight of the valve model ''V''	lb (kg)	0.573 (0.26)
model ''A'' and ''B''		3.174 (1.44)
model ''P''		2.337 (1.06)
Mounting position		optional

p-Q Characteristics

Measured at ν = 166 SUS (35 mm²/s) and t = 104°F (40°C)



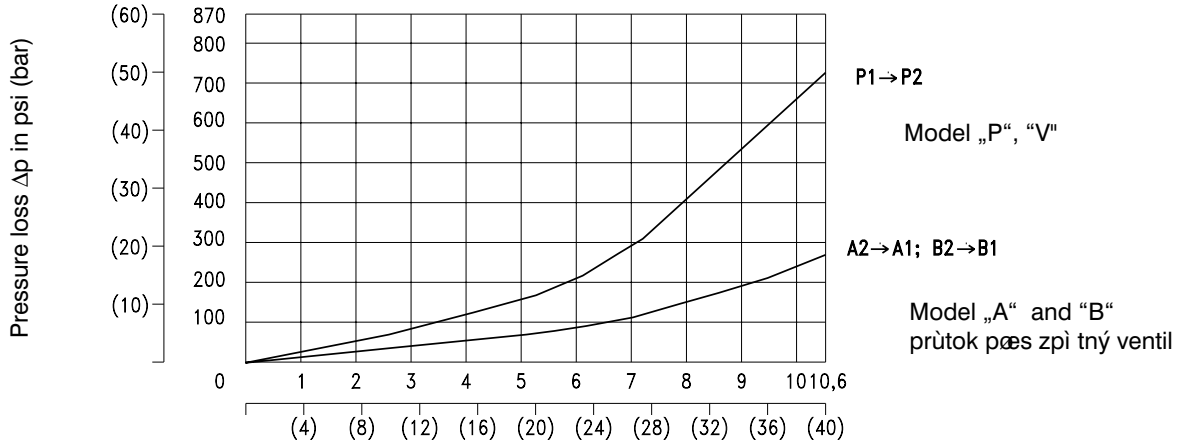
P1 - T, A2 - T, B2 - T

Flow Q in US gpm(l/min)

P2 - P1, A1 - A2, B1 - B2

Δp-Q Characteristics

Measured at ν = 166 SUS (35 mm²/s) and t = 104°F (40°C)



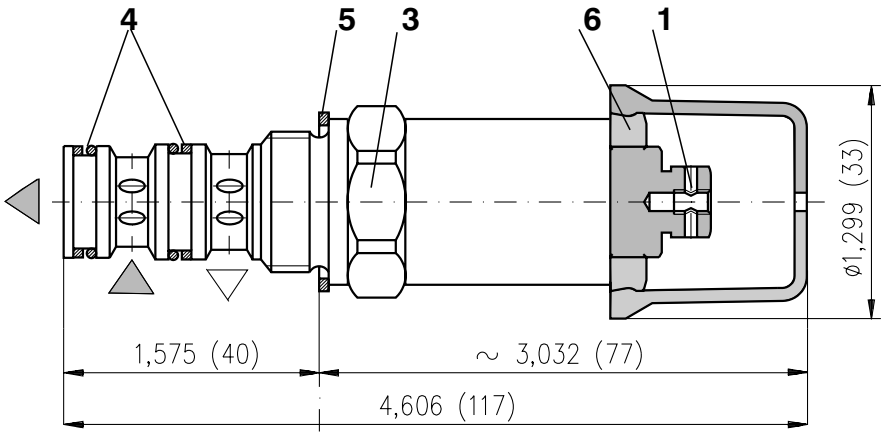
Flow Q in US gpm(l/min)

Valve Dimensions

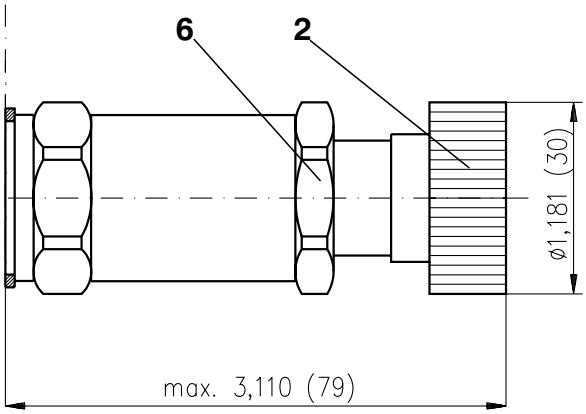
Dimensions in inches and millimetres (in brackets)

Model „V“ - screw-in cartridge valve

Model VRN 1-06-SV

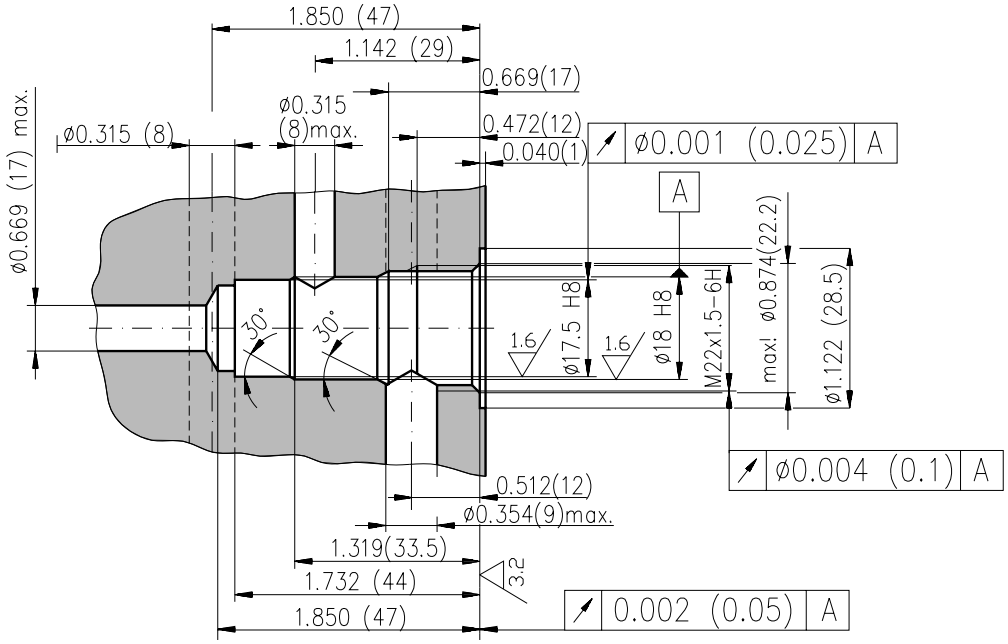


Model VRN 1-06-RV



1 Adjustment element “S” - screw with outside hexagon 0.394 in. (10 mm)
2 Adjustment element “R” - hand knob
3 Outside hexagon 1.063 in. (27 mm), tightening torque 44.52 lb-tf (60 Nm)
4 Sealing: O-ring 14 mm x 1.87 mm
Thrust ring S8-015
supplied with each valve
5 Sealing: U-SEAL 22.5 mm x 28 mm x 1.5 mm
supplied with each valve
6 Locknut (hexagon 1.063 in. (27 mm))

Mounting cavity

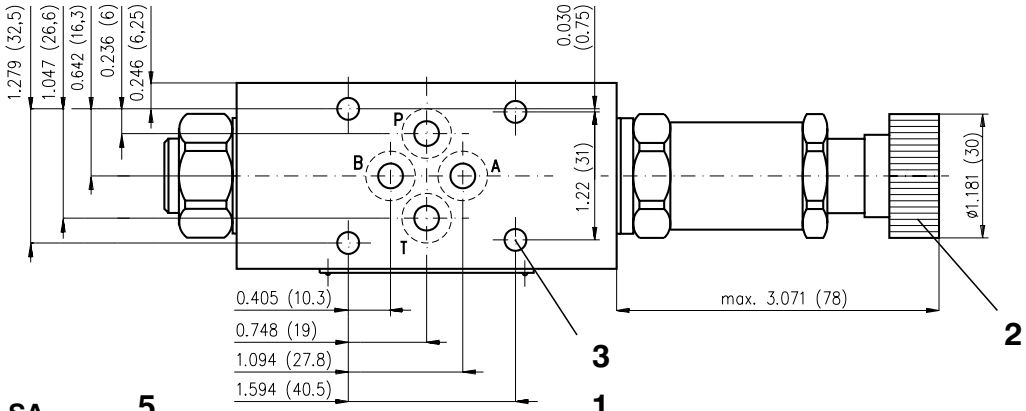


Valve Dimensions

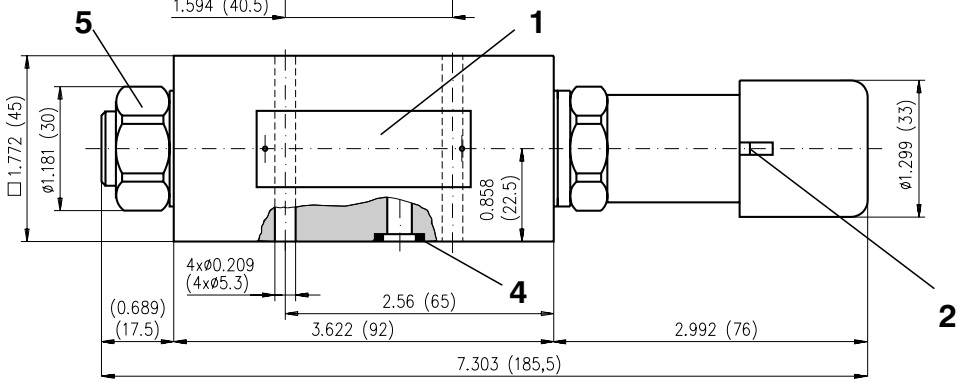
Dimensions in inches and millimetres (in brackets)

Model “A”

Model VRN 1-06-RA



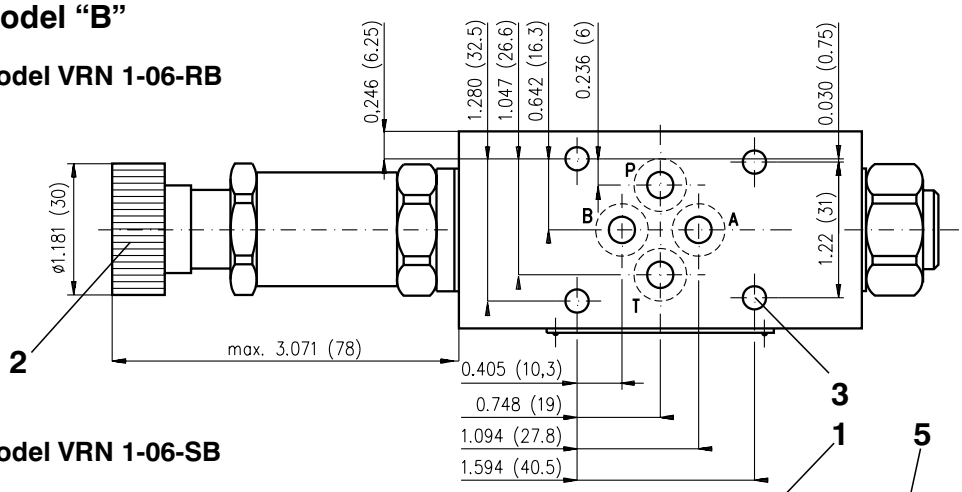
Model VRN 1-06-SA



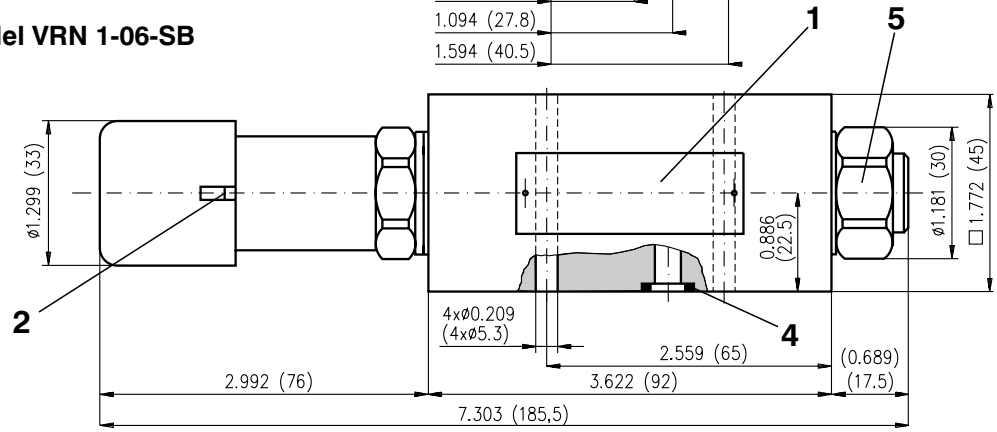
1 Name plate
2 Adjustment element - see page 4
3 4 through mounting holes
4 SQUARE RING - 012 9,25 mm x 1,68 mm (4 pcs) supplied with each valve
5 Check valve

Model “B”

Model VRN 1-06-RB



Model VRN 1-06-SB

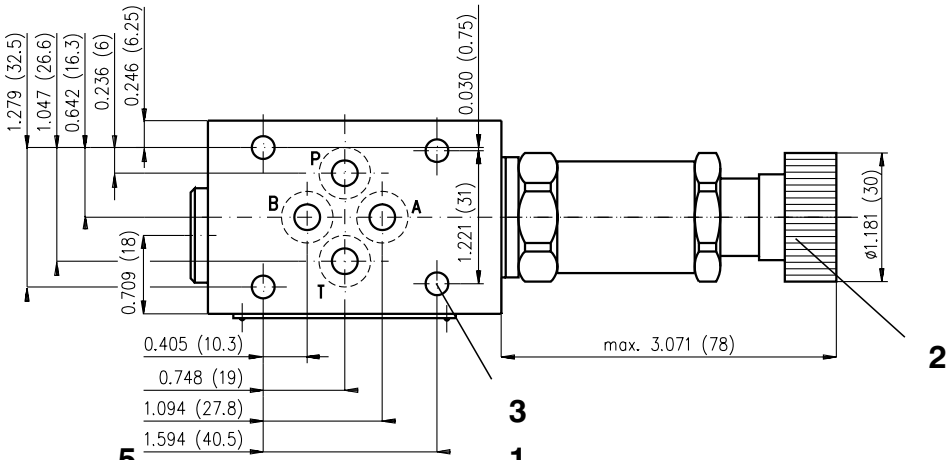


Valve Dimensions

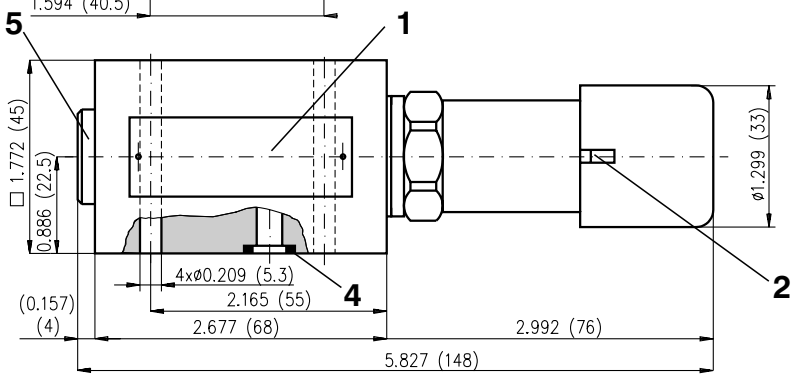
Dimensions in inches and millimetres (in brackets)

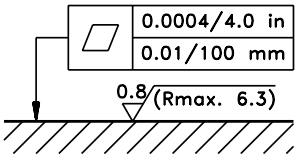
Model “P”

Model VRN 1-06-RP



Model VRN 1-06-SP





Required surface finish of interface.

1 Name plate
2 Adjustment element - see page 4
3 4 through mounting holes
4 SQUARE RING - 012
9,25 mm x 1,68 mm (4 pcs)
supplied with each valve
5 Plug of the measuring port,
thread G 1/4

Caution!

- The packing foil is recyclable.
- The transport plate can be returned to the manufacturer.
- Mounting bolts M5x60 DIN 912-10.9 or studs must be ordered separately. Tightening torque of the screws is 6.60 lb-ft (8.9 Nm).
- If the valve is used separately without a directional valve, a cover plate DK1-06/32-3 with the same installation dimensions can be ordered. This plate connect port A1 with port P1 - see catalogue Adapter and Blanking Plates HA 0003.
- For applications outside these parameters, please consult the manufacturer.
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law.

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HYTOS	*PRESSURE REDUCING VALVES*	***VRN1-10/M***	**HA 5152 9/99**
	Size 10	p_{max} 320 bar	Q_{max} 70 L/min	Replaces HA 5152 4/97

- **Sandwich plate design for use in vertical stacking assemblies**
- **Pressure reduction in ports A, B or P**
- **Installation dimensions to DIN 24 340 A10 and ISO 4401:1994**

Functional Description

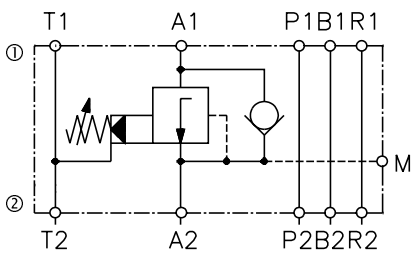
Design
These pressure reducing valves are designed as pilot operated spool valves.

Operation
The pressure is adjustable by means of a hand knob.

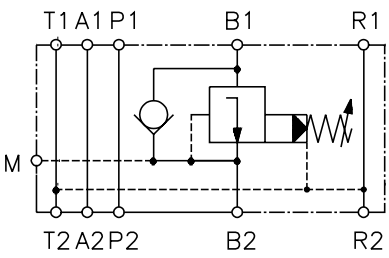
Mounting
The valve is mounted between the directional control valve and the subplate and fixed by bolts. Sealing is provided by O-rings.

Functional Symbols

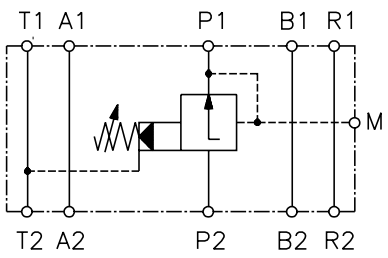
VRN1-10/MAR/xx



VRN1-10/MBR/xx



VRN1-10/MPR/xx



① valve side
② plate side

Ordering Code

VRN 1-10/M □ □ / □

Reducing valve, pilot operated

Nominal size

Modular design

Model

Pressure reducing valve in A	**A**
Pressure reducing valve in B	**B**
Pressure reducing valve in P	**P**

Pressure range

10	up to 100 bar
32	up to 320 bar

Adjustment element

R Hand knob

Technical Data

Nominal size	mm	10	
Flow rate	L/min	see the performance curves	
Pilot flow	L/min	0.5	
Operating pressure p_e max.	bar	320	
Pressure range	bar	100	320
Adjustable pressure p_v	bar	see the performance curves	
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP RP 91 H in viscosity classes ISO VG 32, 46 and 68	
Fluid temperature range	°C	-30 ... +80	
Viscosity range	mm^2/s	12 ... 500	
Maximum degree of fluid contamination		Class 18/15 to ISO 4406. A filter with a retention rate $\beta_{10} \geq 75$ is recommended.	
Weight	kg	4.0	
Mounting position		optional	

Caution!

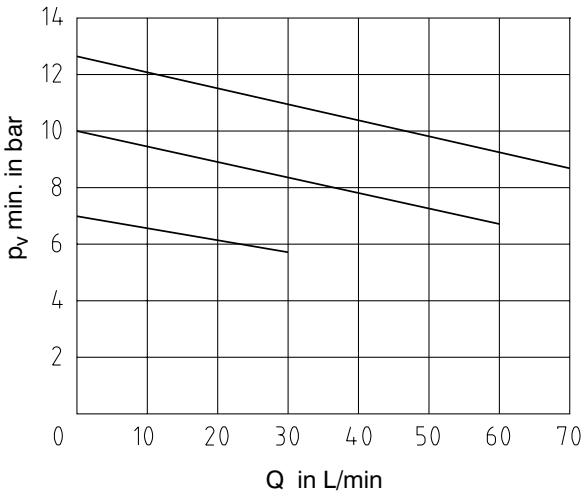
- The packing foil is recyclable.
- The protecting plate can be returned for discarding to the manufacturer.
- Mounting bolts M6 DIN 912-10.9 or studs must be ordered separately. Tightening torque is 14 Nm.
- For applications outside these parameters please consult the manufacturer.
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law.

Performance Curves

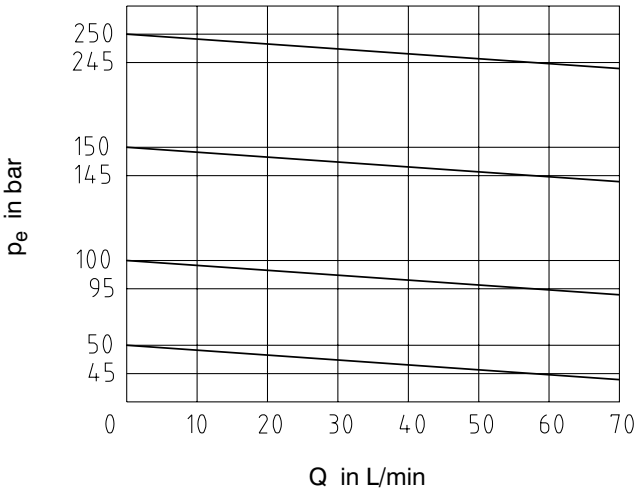
Measured at ν = 33 mm^2/s and t = 50 °C

The values of p_v min. are valid at p_T = 0 bar

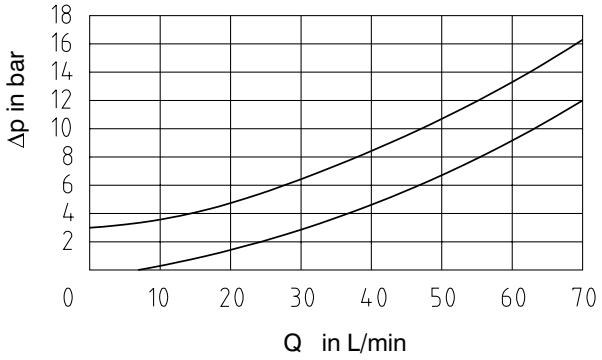
p_v min. = f(Q)



p_e = f(Q)



Δp min. = f(Q)



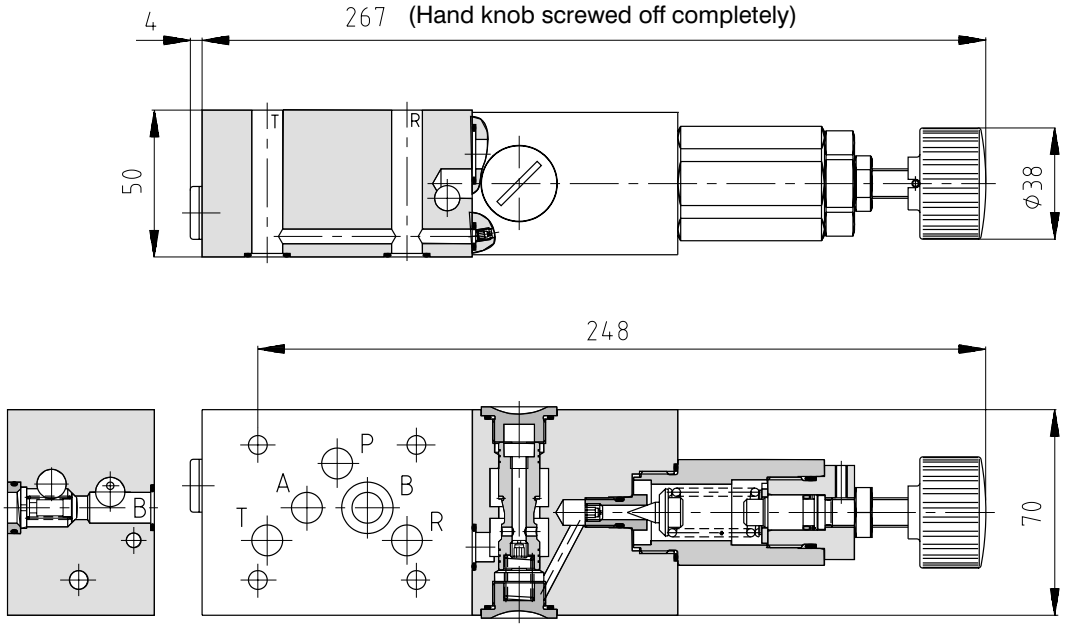
Pressure drop at the check valve
← Control spool closed (p.>p_v)

← Control spool open (p.<p_v)

Valve Dimensions

Dimensions in millimetres

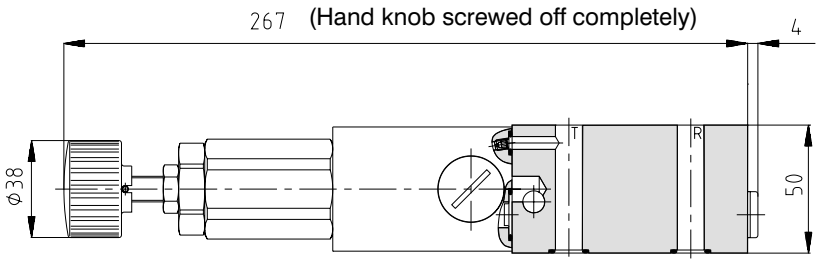
Type VRN1-10/MBR/xx

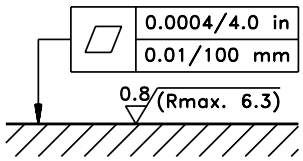


Valve Dimensions

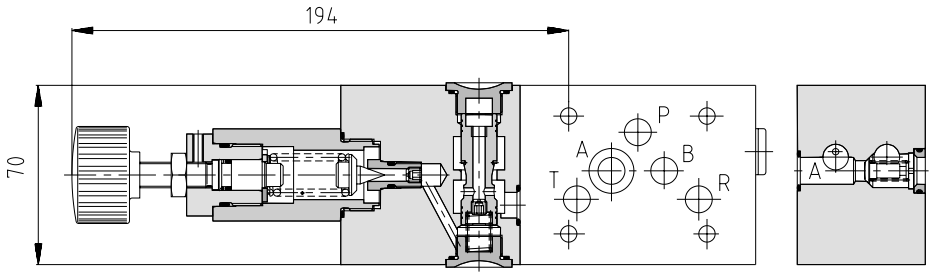
Dimensions in millimetres

Type VRN1-10/MAR/xx

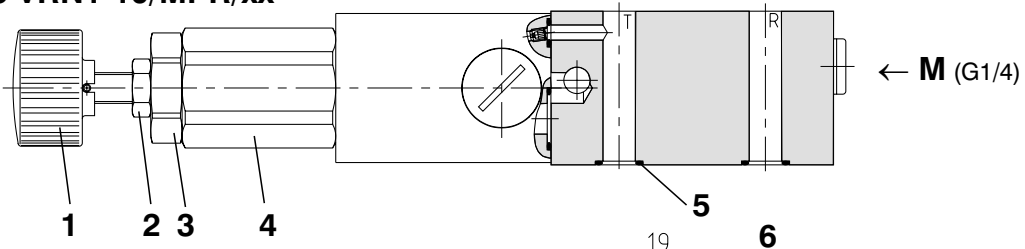


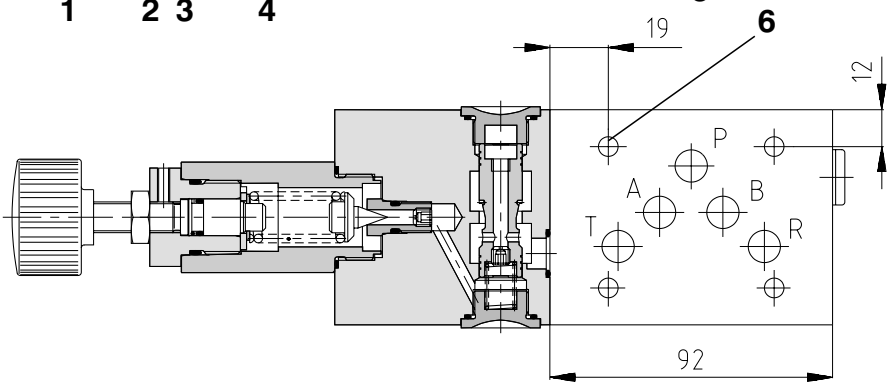


Required surface finish of interface

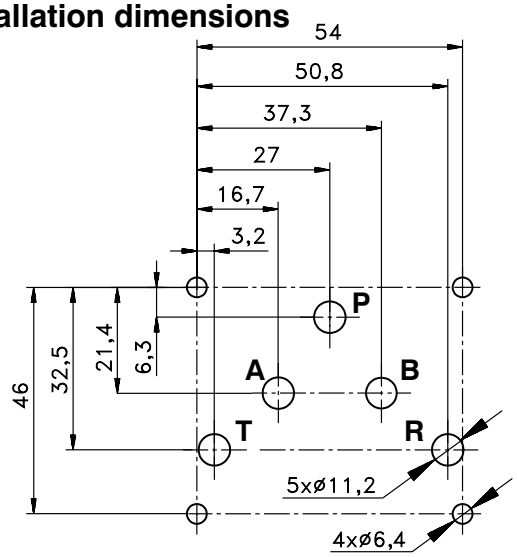


Type VRN1-10/MPR/xx





Installation dimensions



1 Adjustment element
2 Nut - hex. 17
3 Nut - hex. 32
4 Nut - hex. 36
5 O-ring 12.4 x 1.5 (5 pcs, supplied)
6 4 mounting holes

HYTOS a.s. CZ - 543 15 Vrchlabí

Tel.: +420-499-403111, Fax: +420-499-403421, e-mail: sales@hytos.cz

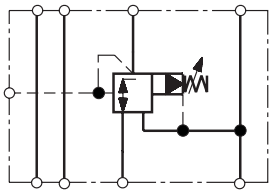
Pilot operated pressure reducing valve

VRN2-06

Size 06 • p_{max} up to 320 bar • Q_{max} up to 40 L/min

HA 5153
6/2003

Replaces
HA 5153 1/2003



- **Screw-in cartridge valve for manifold mounting and stacking assemblies**
- **4 pressure ranges**
- **Two pressure adjustment options**
- **Pressure reduction in ports A or P**
- **Model MA with check valve**
- **Installation dimensions to ISO 4401-AB-03-4-A and DIN 24 340-A6**

Functional Description

The pressure valves VRN2 are pilot operated screw-in cartridge pressure reducing valves designed as 3-way-valves, i.e. with pressure protection of the secondary circuit. For the use in vertical stacking assemblies, two models of valve bodies are available, with pressure reduction in ports A and P. Incorporated into the valve bodies MA are the check valves which enable the reverse flow to pass through the valve.
The reducing valve consists of a cartridge (1) with thread M22x1.5, control spool (2), spring (3) and the adjustment element (4). With the models for stacking assemblies also the respective valve body (5) and alternatively a check valve (6) complete the valve.

Screw-in cartridge valve

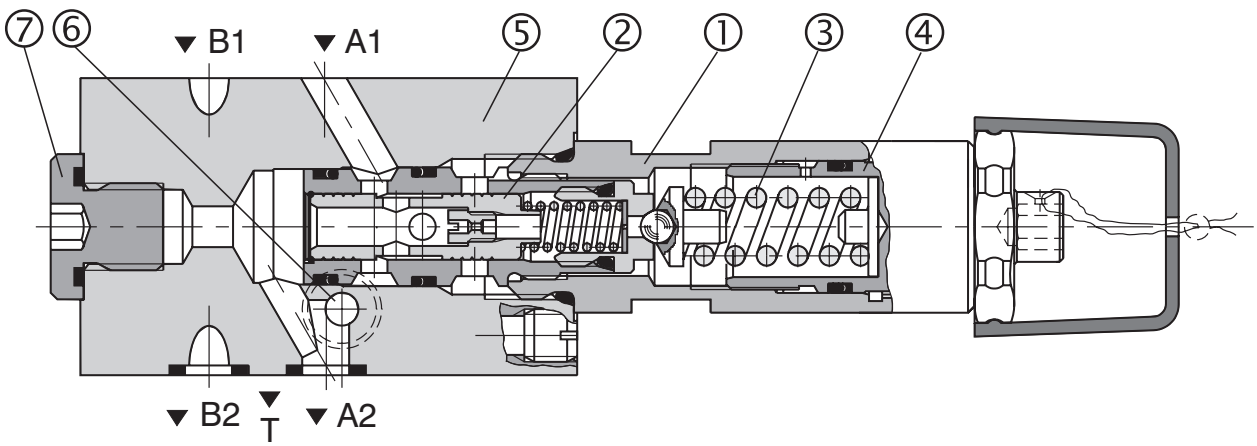
The flow from the primary circuit flows to the first metering edge, where its pressure is reduced. The reduced pressure corresponds with the adjustment of the control spring of the ball pilot valve. The reduced pressure is continuously controlled and compared with the pressure preset. If any control error appears, the respective control action takes place and the reduced pressure returns to its preset value. After the pressure reduction, the fluid flows through the spool bore and is then routed to the output port of the module valve body. If pressure behind the valve increases due to the effect of external load acting on the user, the control spool shifts further against the spring, the reducing metering edge closes and the second metering edge opens. The fluid passes through the „third way“ to port T. The control flow of the pilot valve (from the spring room) is also routed to port T.

Model MA

With this model, the flow enter into the valve body through port A1. The input pressure is reduced, routed to port A2 and further to the user. The reverse flow passes through a check valve which is connected parallel to the metering edge.

Model MP

With the model MP, the pressure is reduced from port P2 to port P1.
With all models, a control pressure gauge can be connected to port G 1/4 (7).
The valve body and the adjustment screw are zinc coated. With model M the valve bodies are phosphate coated.



Ordering Code

VRN2-06/ ☐ **-** ☐ ☐ ☐

Pilot Operated Pressure Reducing Valve

Nominal size

Model

screw in cartridge	**S**
modular valve, pressure reduction in port A	MA
modular valve, pressure reduction in port P	**MP**

Pressure range

6	up to 63 bar
10	up to 100 bar
16	up to 160 bar
21	up to 210 bar

Adjustment element

S	screw with internal hexagon 6 mm
R	hand knob

Sealing

without designation	NBR
V	Viton

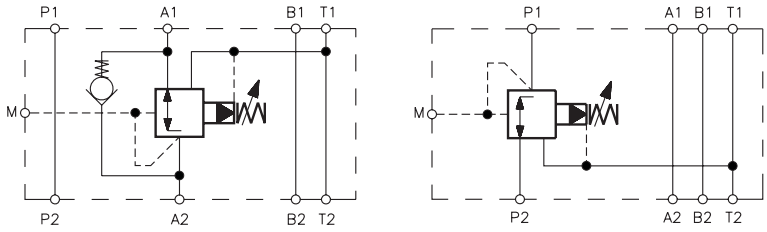
FOR PREFERRED TYPES SEE BOLD TYPING IN ORDERING CODE AND TABLE OF PREFERRED TYPES ON PAGE 6

Functional Symbols

Model MA

Model MP

Valve side



Subplate side

Technical Data

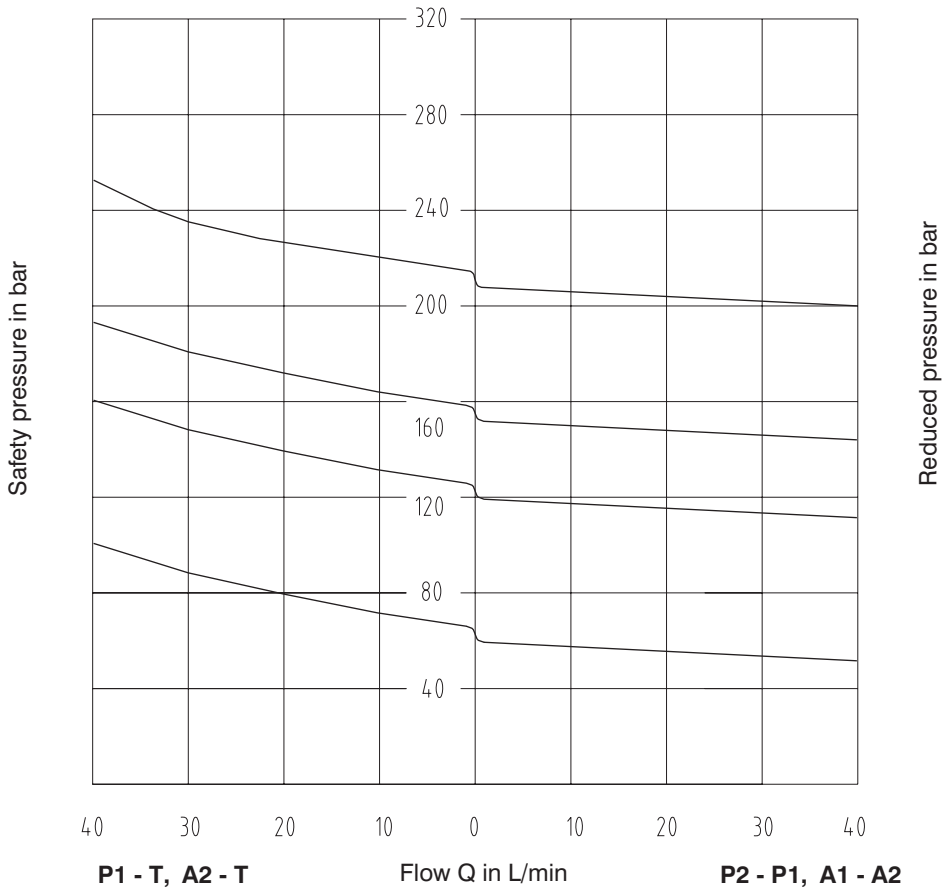
Nominal size	mm	06			
Maximal flow rate	L/min	40			
Maximum pilot flow	L/min	0.25			
Maximum input pressure	bar	320			
Reduced pressure	bar	63	100	160	210
Maximum pressure in port T	bar	160			
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP RP 91H in viscosity classes ISO VG 32, 46 and 68			
Fluid temperature range (NBR / Viton)	°C	-30 ... +80 / -20 ... +80			
Viscosity range	mm^2/s	20 ... 400			
Maximum degree of fluid contamination		Class 21/18/15 according to ISO 4406 (1999).			
Weight: model S model MA model MP	kg	0.22 1.20 1.10			
Mounting position		optional			

Ordering Numbers of Sandwich / Valve Bodies (without screw-in cartridge)

Valve body for modular valve - NBR	Ordering number	Valve body for modular valve - Viton	Ordering number
MA06-VRN2	556-1083	MA06-VRN2/V	556-1084
MP06-VRN2	556-1081	MP06-VRN2/V	556-1082

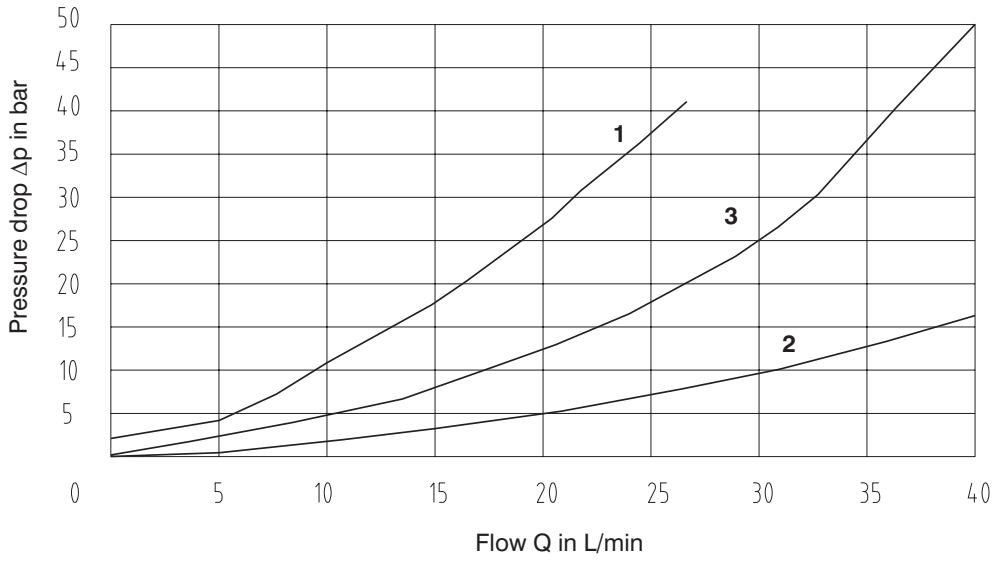
p-Q Characteristics

Measured at $\nu = 35\ mm^2/s$ and $t = 40\ °C$



Δp-Q Characteristics

Measured at $\nu = 35\ mm^2/s$ and $t = 40\ °C$



Model MA

A1 - A2 **1** (Pressure fall of valve = minimum adjustable p)
A2 - A1 **2** (Check valve + Reducing valve open)

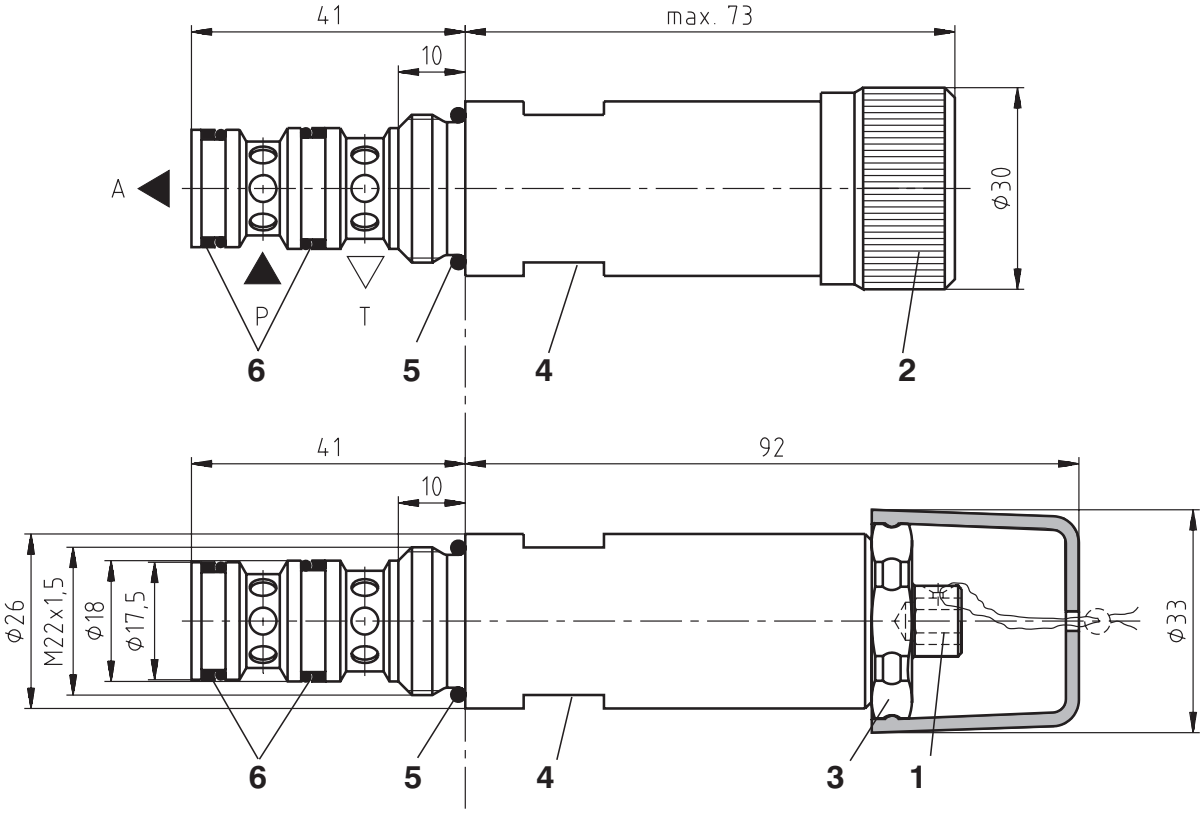
Model S, MP

P2 - P1 **3** (Minimum adjustable p)

Valve Dimensions

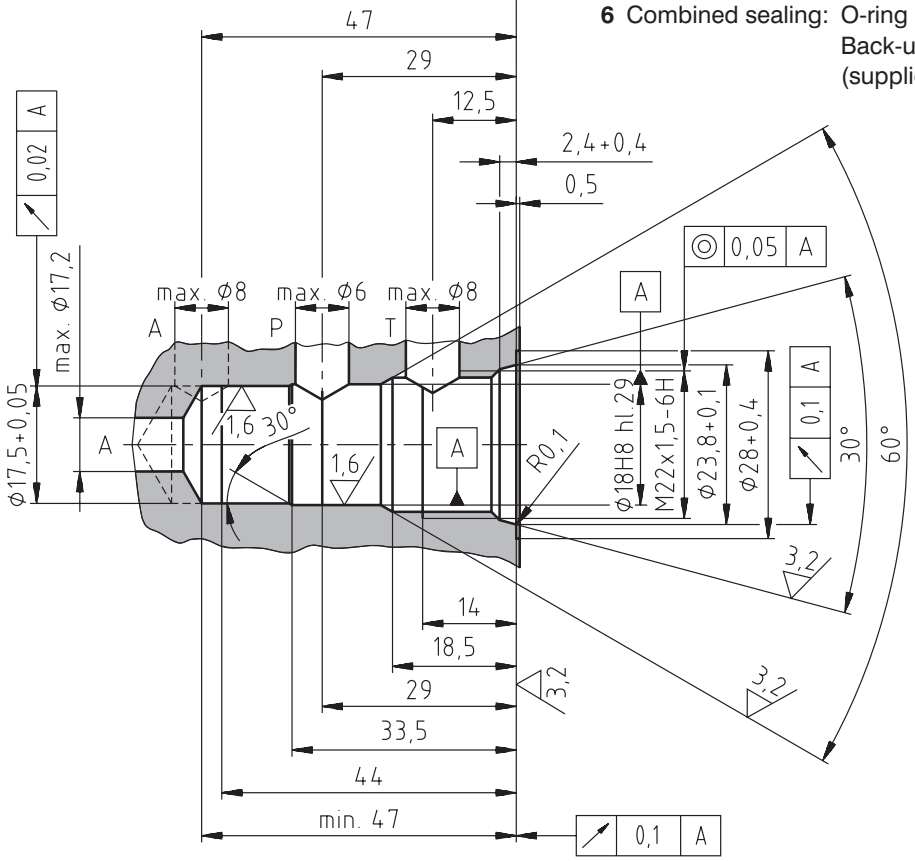
Dimensions in millimeters

Model S



1 Adjustment element S [screw with internal hexagon 6 mm]
2 Adjustment element R (hand knob)
3 Locknut hex. 27 mm
4 Wrench flats s = 24 mm - tightening torque 60 Nm
5 O-ring 19.4 x 2.1 NBR 80 (1 pc.), supplied with valve
6 Combined sealing: O-ring 14 x 1.78 NBR 90 (2 pcs.)
Back-up ring 14.73 x 17.43 x 1.14 (2 pcs.)
(supplied with valve)

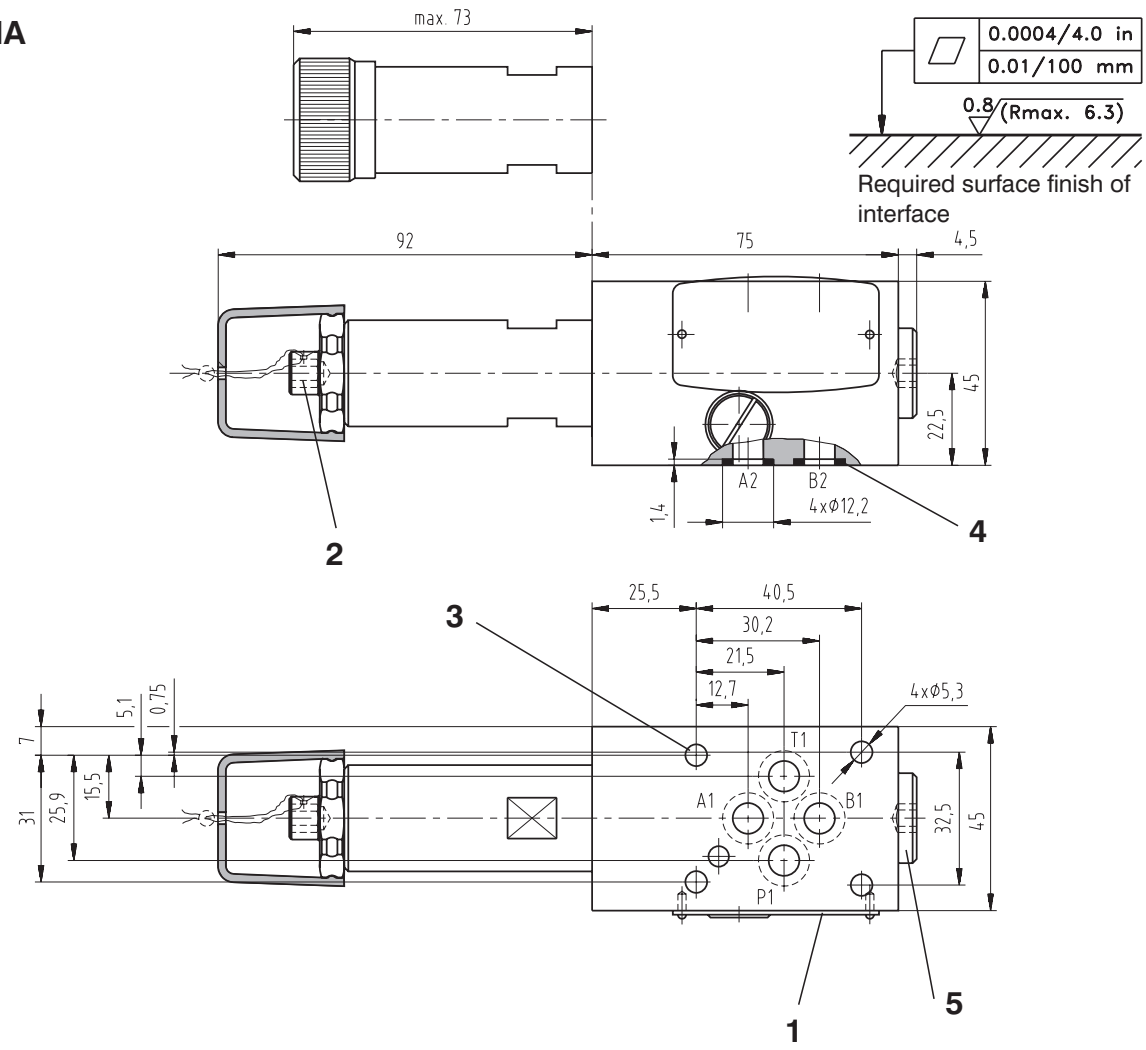
Mounting cavity



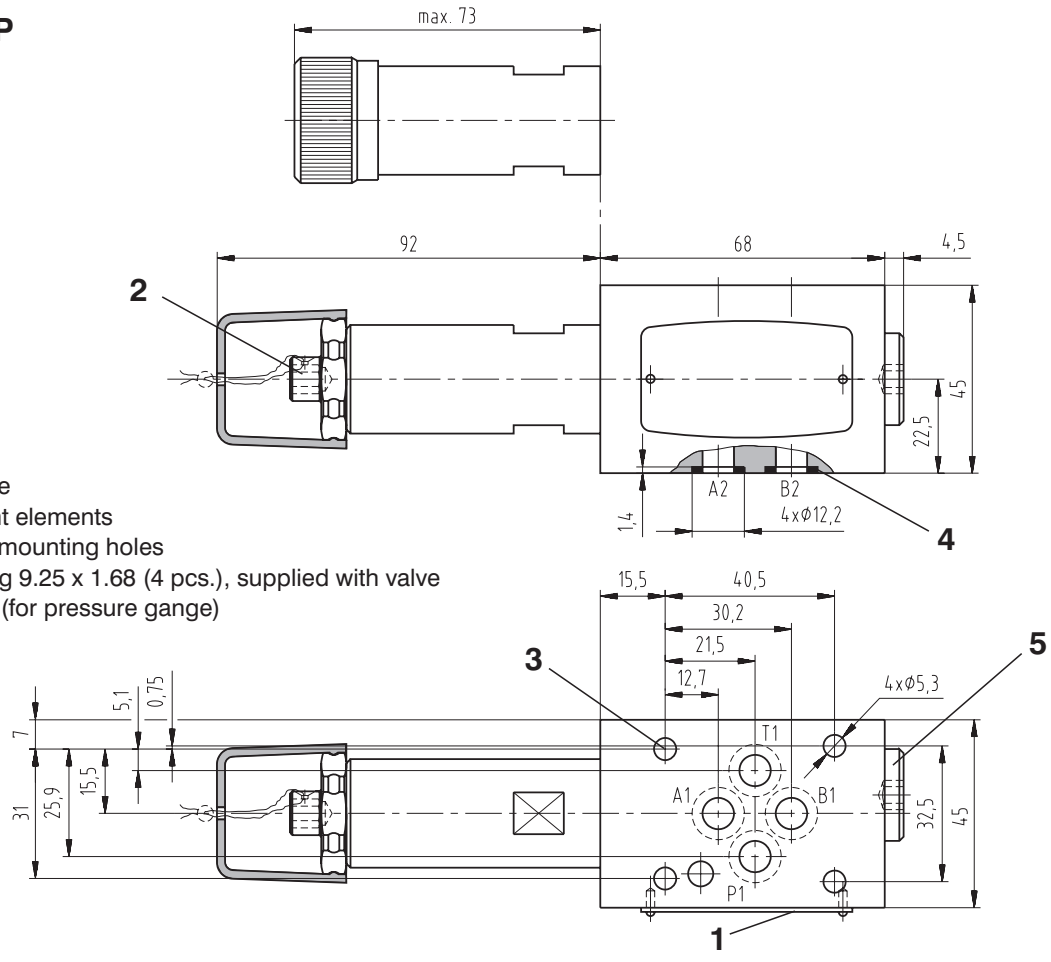
Valve Dimensions

Dimensions in millimeters

Model MA



Model MP



1 Name plate
2 Adjustment elements
3 4 through mounting holes
4 Square ring 9.25 x 1.68 (4 pcs.), supplied with valve
5 Plug G1/4 (for pressure gange)

Spare Parts

Model	Dimensions, quantity	Ordering number
Screw-in cartridge - NBR	O-ring 9 x 1.8 NBR 70 (1 pc.)	556-0234
	O-ring 14 x 1.78 NBR 90 (2 pc.)	
	O-ring 17 x 1.8 NBR 70 (1 pc.)	
	O-ring 19.4 x 2.1 NBR 80 (1 pc.)	
	Back-up ring BBP80B015-N9 14.73 x 17.43 x 1.14 (2 pcs.)	
	Back-up ring BBP80-B-016-N9 16.33 x 19.03 x 1.14 (1 pc.)	
Screw-in cartridge - Viton	O-ring 9.25 x 1.78 (1 pc.)	556-0236
	O-ring 14 x 1.78 (2 pcs.)	
	O-ring 17.17 x 1.78 (1 pc.)	
	O-ring 19.4 x 2.1 (1 pc.)	
	Back-up ring 14.73 x 17.43 x 1.14 (2 pcs.)	
Model	**Dimensions, quantity**	**Ordering number**
Modular valve - NBR	O-ring 9 x 1.8 (1 pc.)	556-0235
	O-ring 14 x 1.78 (2 pcs.)	
	O-ring 17 x 1.8 (1 pc.)	
	O-ring 9.75 x 1.78 (1 pc.)	
	O-ring 19.4 x 2.1 (1 pc.)	
	Back-up ring 14.73 x 17.43 x 1.14 (2 pcs.)	
	Back-up ring 16.33 x 19.03 x 1.14 (1 pc.)	
	Square ring 9.25 x 1.68 (4 pcs.)	
Modular valve - Viton	O-ring 9.25 x 1.78 (5 pcs.)	556-0237
	O-ring 14 x 1.78 (2 pcs.)	
	O-ring 17.17 x 1.78 1 pc.)	
	O-ring 19.4 x 2.1 (1 pc.)	
	Back-up ring 14.73 x 17.43 x 1.14 (2 pcs.)	
	Back-up ring 17.4 x 1.3 (1 pc.)	

Preferred Types of Valves

Type	Ordering Number
VRN2-06/S-10S	556-1002
VRN2-06/S-21S	556-1004
VRN2-06/MP-10S	556-1022
VRN2-06/MP-21S	556-1024

Caution!

- The packing foil is recyclable.
- Mounting studs must be ordered separately. Tightening torque is 8.9 Nm.
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law.

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www.argo-hytos.com

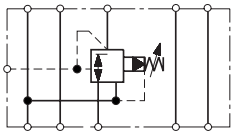
Pilot operated pressure reducing valve

VRN2-10

Size 10 · p_{max} up to 320 bar · Q_{max} up to 150 (80) L/min

HA 5154
2/2003

- **Screw-in cartridge valve for manifold mounting and stacking assemblies**
- **4 pressure ranges**
- **Two pressure adjustment options**
- **Pressure reduction in ports A, B or P**
- **Model MA a MB with check valve**
- **Installation dimensions to ISO 4401 and DIN 24 340-A10**



Functional Description

The pressure valves VRN2 are pilot operated screw-in cartridge pressure reducing valves designed as 3-way-valves. For the use in vertical stacking assemblies, three models of valve bodies are available, with pressure reduction in ports A, B and P. Incorporated into the valve bodies MA, MB are the check valves which enable the reverse flow to pass through the valve.

The reducing valve consists of a cartridge (1) with thread M27x2, control spool (2), spring (3) and the adjustment element (4). With the models for stacking assemblies also the respective valve body (5) and alternatively a check valve (6) complete the valve.

Screw-in cartridge valve

At rest, the valves are open, i.e. oil can flow from input line via the main spool to output line . At the same time there is pressure from output line via the main spool with bore and jets and at the spring-loaded side of the main spool and at the side opposite the spring. If pressure in output line exceeds the value set at the spring the pilot poppet opens. Oil now flows from the spring loaded side of the main spool vis the jet and pilot poppet into the chamber. The main spool moves into control position and holds the value set at the spring in output line constant. If pressure behind the valve increases due to the effect of external load acting on the user, the control spool shifts further against the spring, the input line closes and the flow from output line to port T opens. The control flow of the pilot valve (from the spring room) is also routed to port T.

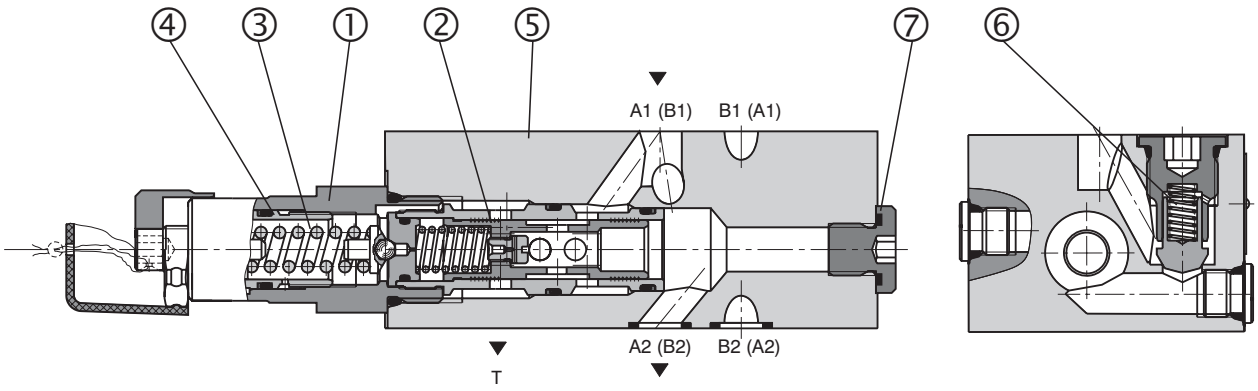
Model MA and MB

With these models, the flow enters into the valve body through port A1 (B1). The input pressure is reduced, routed to port A2 (B2) and further to the user. The reverse flow passes through a check valve which is connected parallel to the metering edge.

Model MP

With the model MP, the pressure is reduced from port P2 to port P1. With all models, a control pressure gauge can be connected to port G 1/4 (7).

The screw-in cartridge valve body and the adjustment screw are zinc coated. With models for stacking assemblies the valve bodies are phosphate coated.



Ordering Code

VRN2-10/ ☐ - ☐ ☐ ☐

Pilot Operated Pressure Reducing Valve

Nominal size

Model

screw in cartridge	**S**
modular valve, pressure reduction in port A	MA
modular valve, pressure reduction in port B	MB
modular valve, pressure reduction in port P	**MP**

Adjustment element

S	screw with internal hexagon 6 mm
R	hand knob

Pressure range

6	up to 63 bar
10	up to 100 bar
16	up to 160 bar
21	up to 210 bar

Sealing

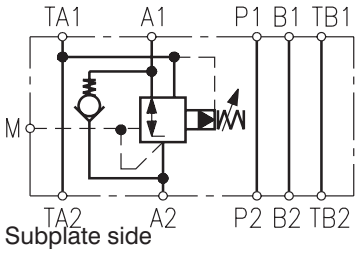
without designation	NBR
V	Viton

FOR PREFERRED TYPES SEE BOLD TYPING IN ORDERING CODE AND TABLE OF PREFERRED TYPES ON PAGE 7

Functional Symbols

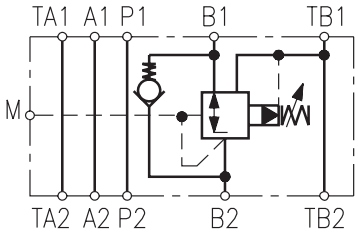
Model MA

Valve side

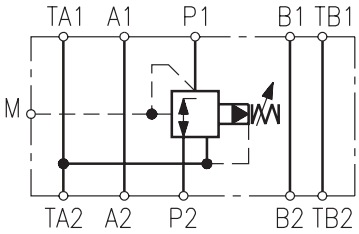


Subplate side

Model MB



Model MP

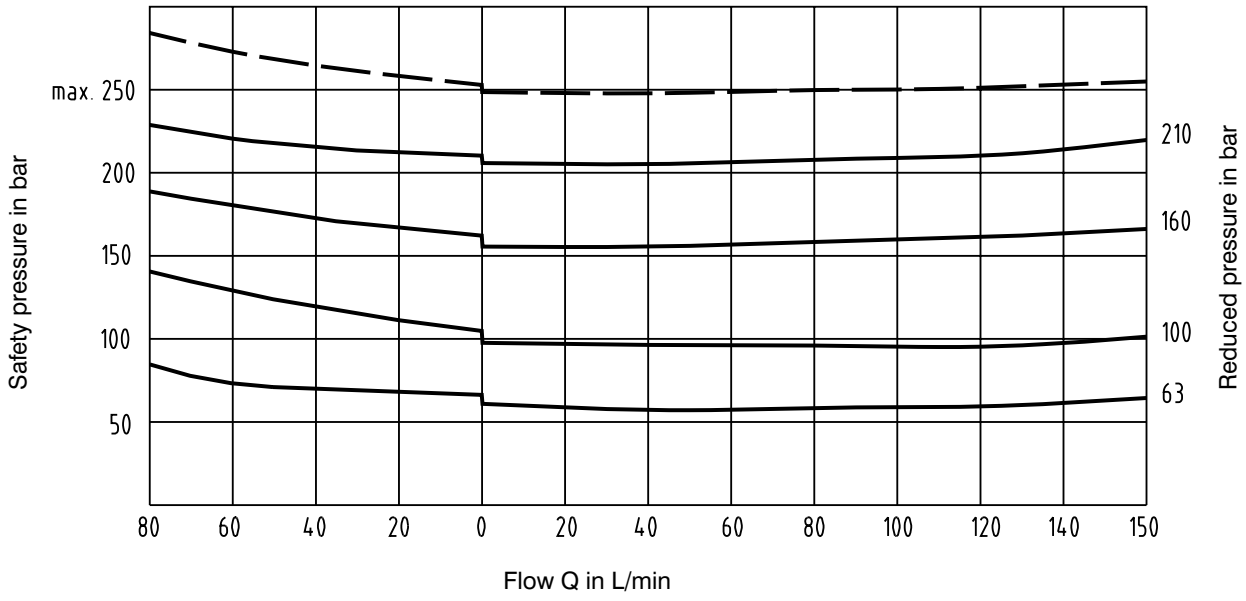


Technical Data

Nominal size	mm	10			
Maximum flow rate - screw in cartridge	L/min	150			
Maximum flow rate - modular valve	L/min	80			
Maximum pilot flow	L/min	0.65			
Maximum input pressure	bar	320			
Reduced pressure	bar	63	100	160	210
Maximum pressure in port T	bar	160			
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP RP 91H in viscosity classes ISO VG 32, 46 and 68			
Fluid temperature range (NBR)	°C	-30 ... +80			
Fluid temperature range (Viton)	°C	-20 ... +80			
Viscosity range	mm^2/s	20 ... 400			
Maximum degree of fluid contamination		Class 21/18/15 according to ISO 4406 (1999)			
Weight: model S model MA, MB model MP	kg	0.35 3.20 2.85			
Mounting position		optional			

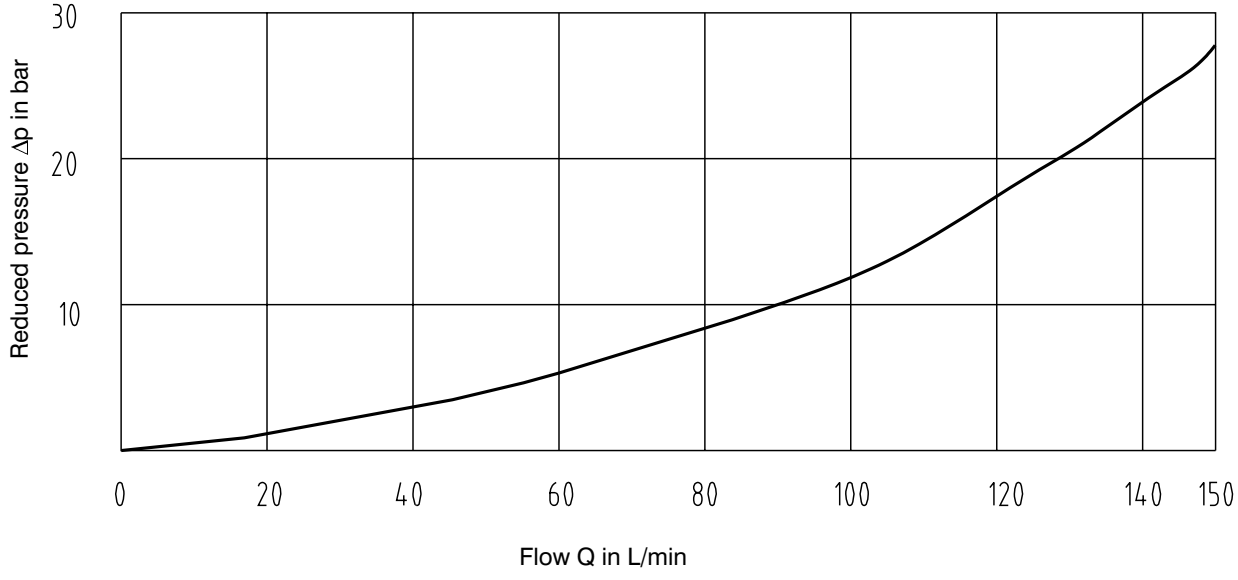
p-Q Cartridge characteristics

Measured at ν = 35 mm^2/s and t = 40 °C



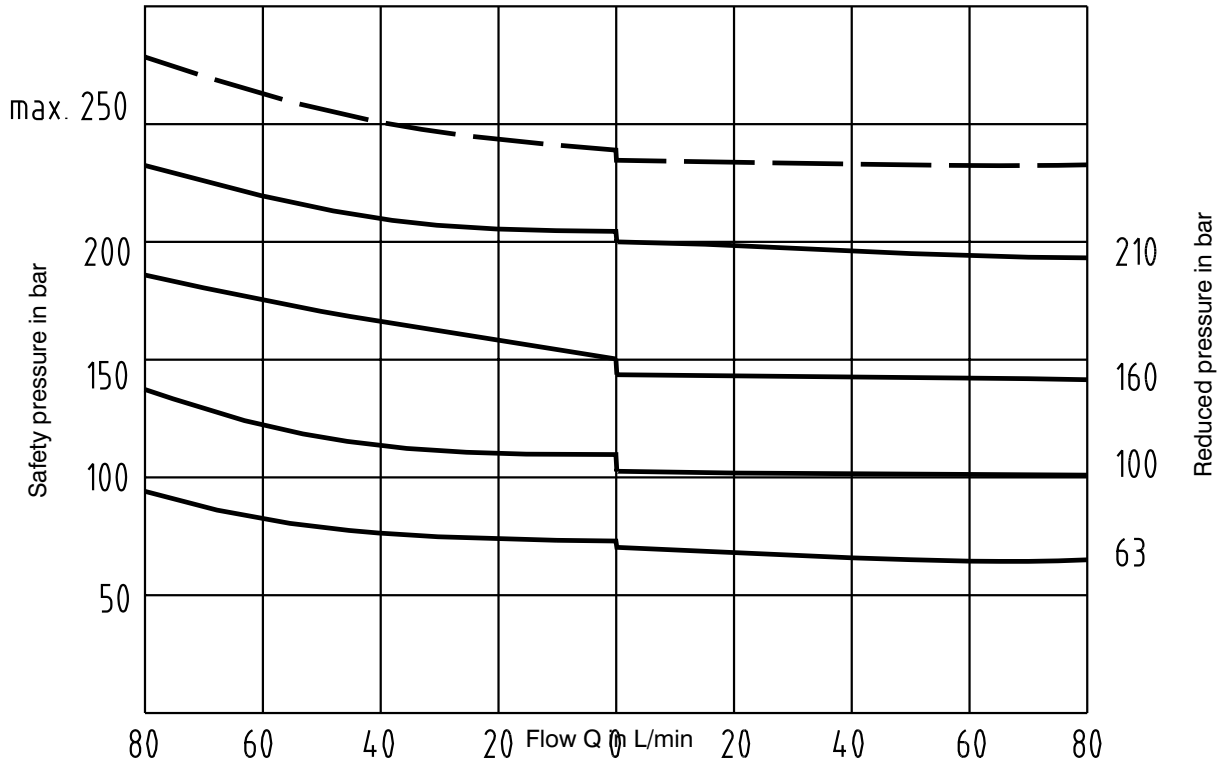
Δp-Q Cartridge characteristics in the valve body

Measured at ν = 35 mm^2/s and t = 40 °C



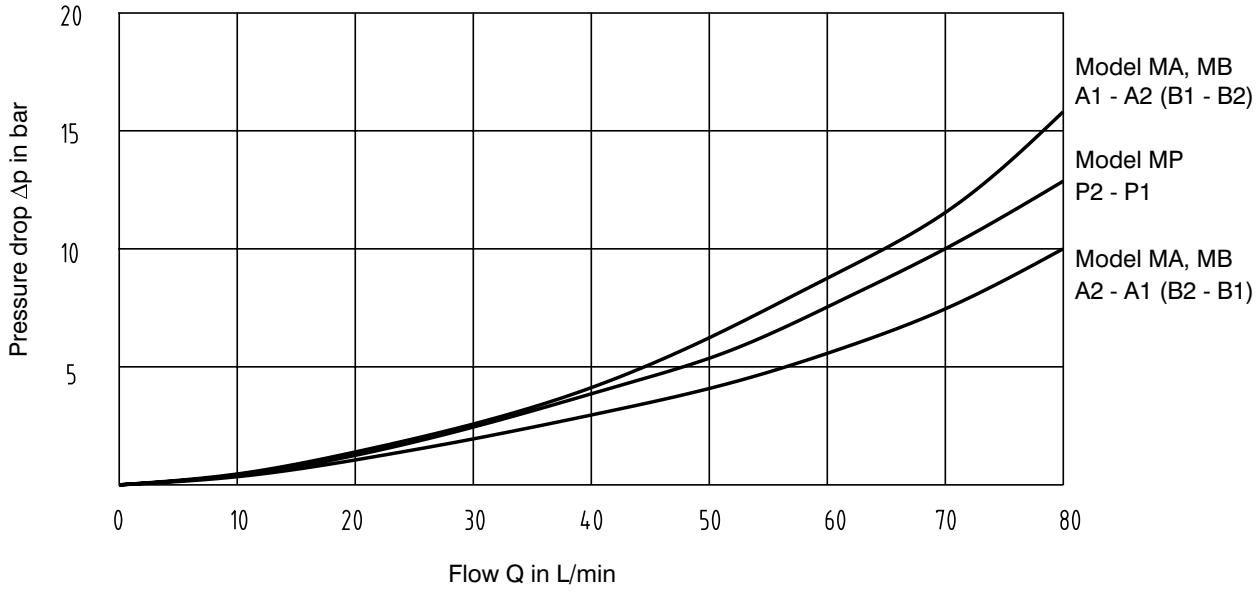
p-Q MA, MB, MP characteristics

Measured at ν = 35 mm^2/s and t = 40 °C



Δp-Q Modular valve characteristics

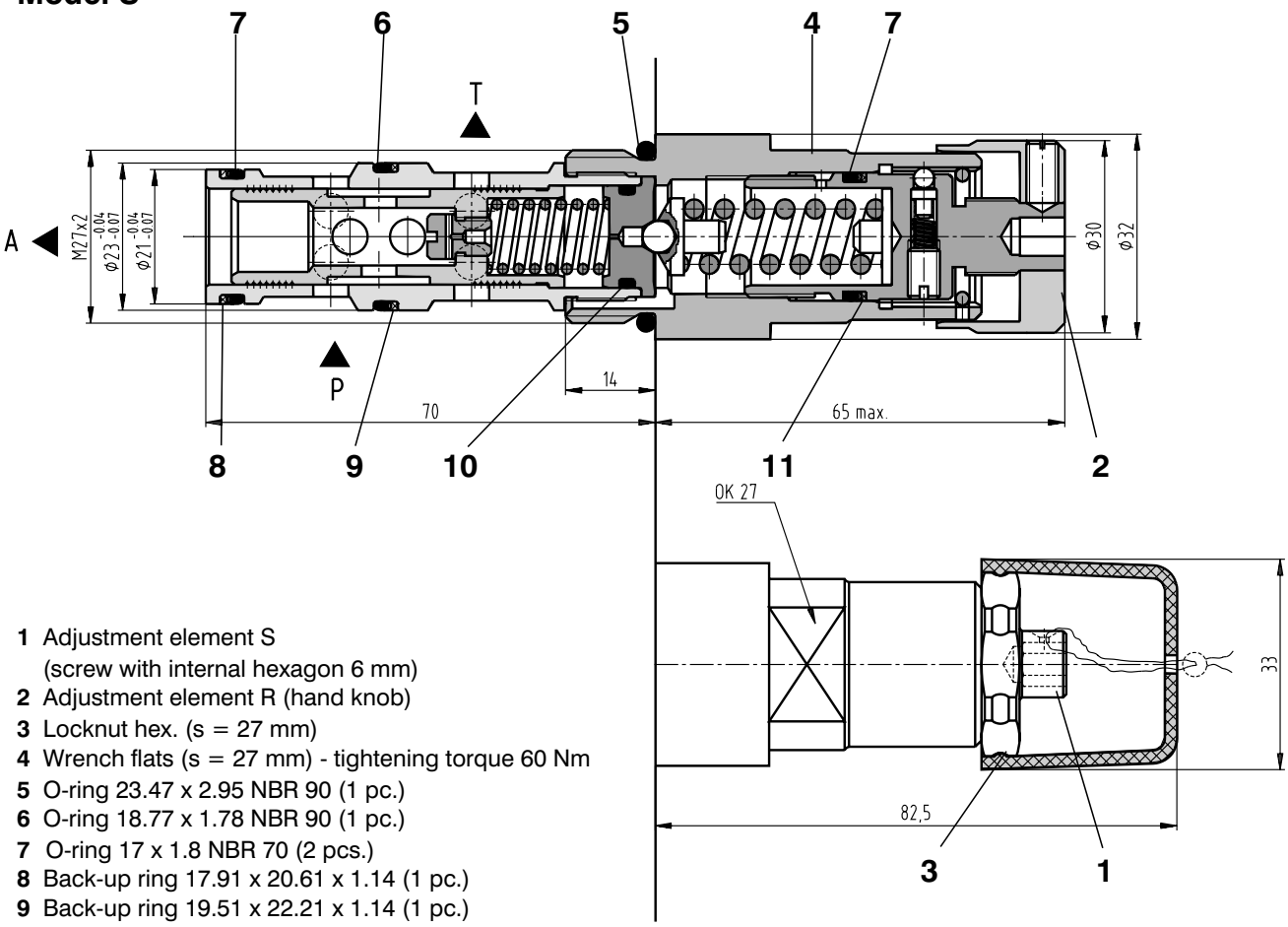
Measured at ν = 35 mm^2/s and t = 40 °C



Valve Dimensions

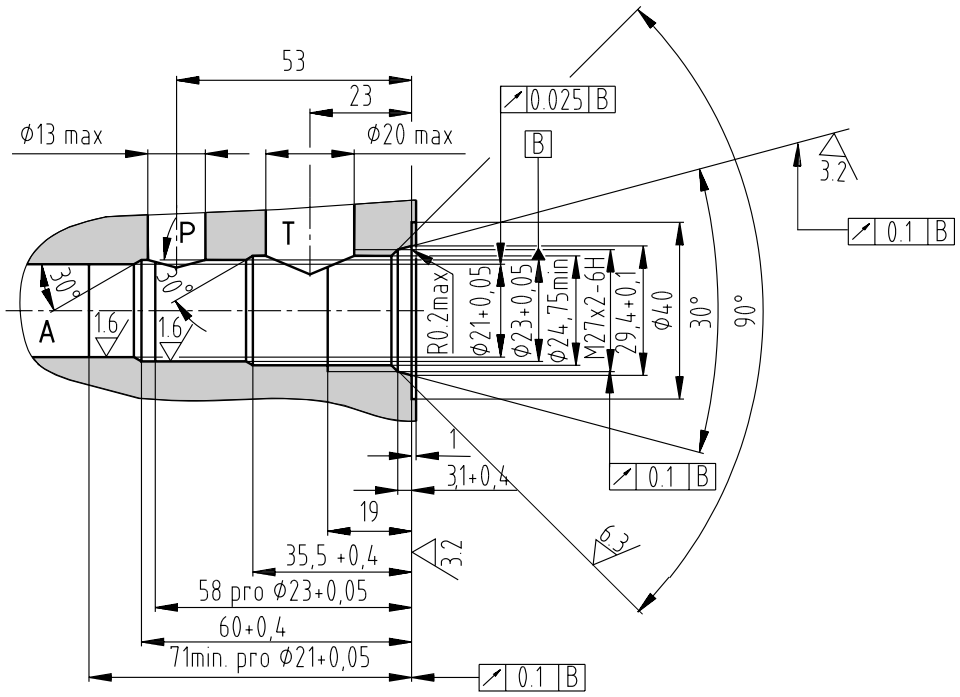
Dimensions in millimeters

Model S



1 Adjustment element S
(screw with internal hexagon 6 mm)
2 Adjustment element R (hand knob)
3 Locknut hex. (s = 27 mm)
4 Wrench flats (s = 27 mm) - tightening torque 60 Nm
5 O-ring 23.47 x 2.95 NBR 90 (1 pc.)
6 O-ring 18.77 x 1.78 NBR 90 (1 pc.)
7 O-ring 17 x 1.8 NBR 70 (2 pcs.)
8 Back-up ring 17.91 x 20.61 x 1.14 (1 pc.)
9 Back-up ring 19.51 x 22.21 x 1.14 (1 pc.)
10 O-ring 12.42 x 1.78 NBR 90 (1 pc.)
11 Back-up ring 16.33 x 19.03 x 1.14 (1 pc.)

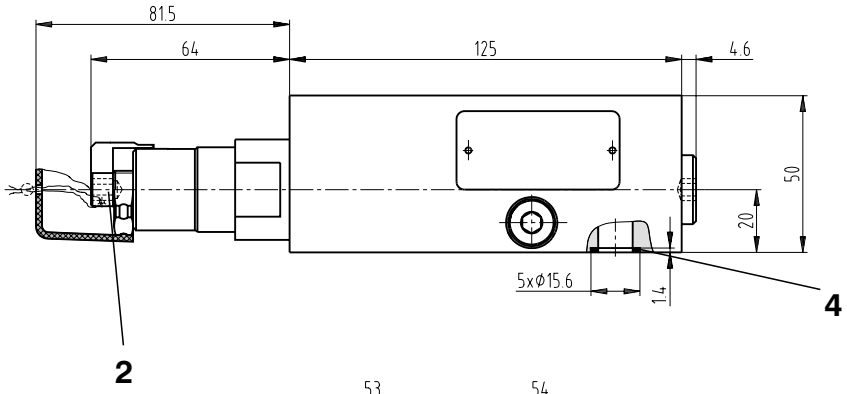
Mounting cavity



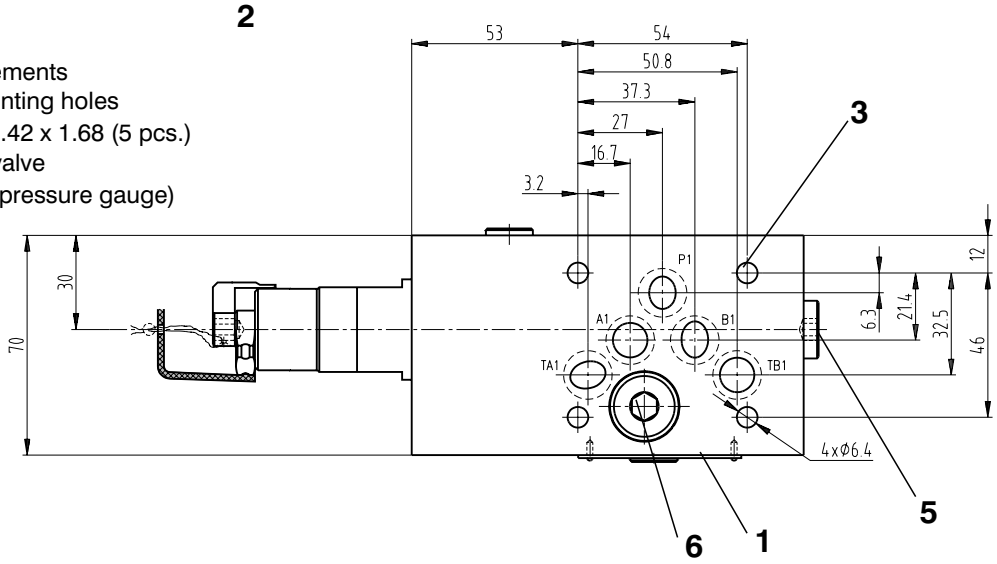
Valve Dimensions

Dimensions in millimeters

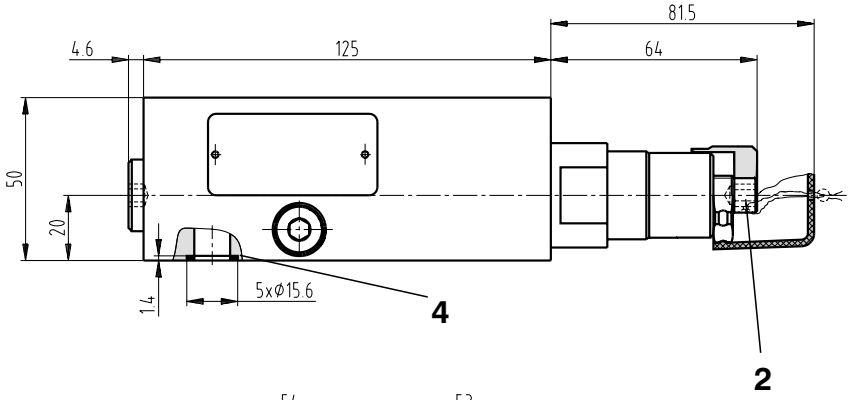
Model MA

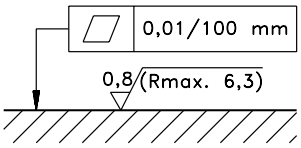


1 Name plate
2 Adjustment elements
3 4 through mounting holes
4 Square ring 12.42 x 1.68 (5 pcs.) supplied with valve
5 Plug G1/4 (for pressure gauge)
6 Check valve

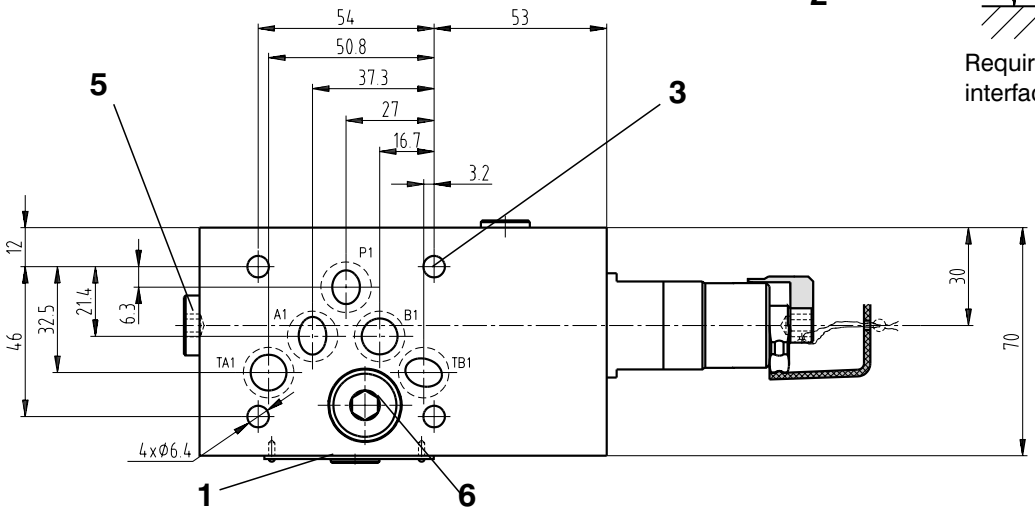


Model MB





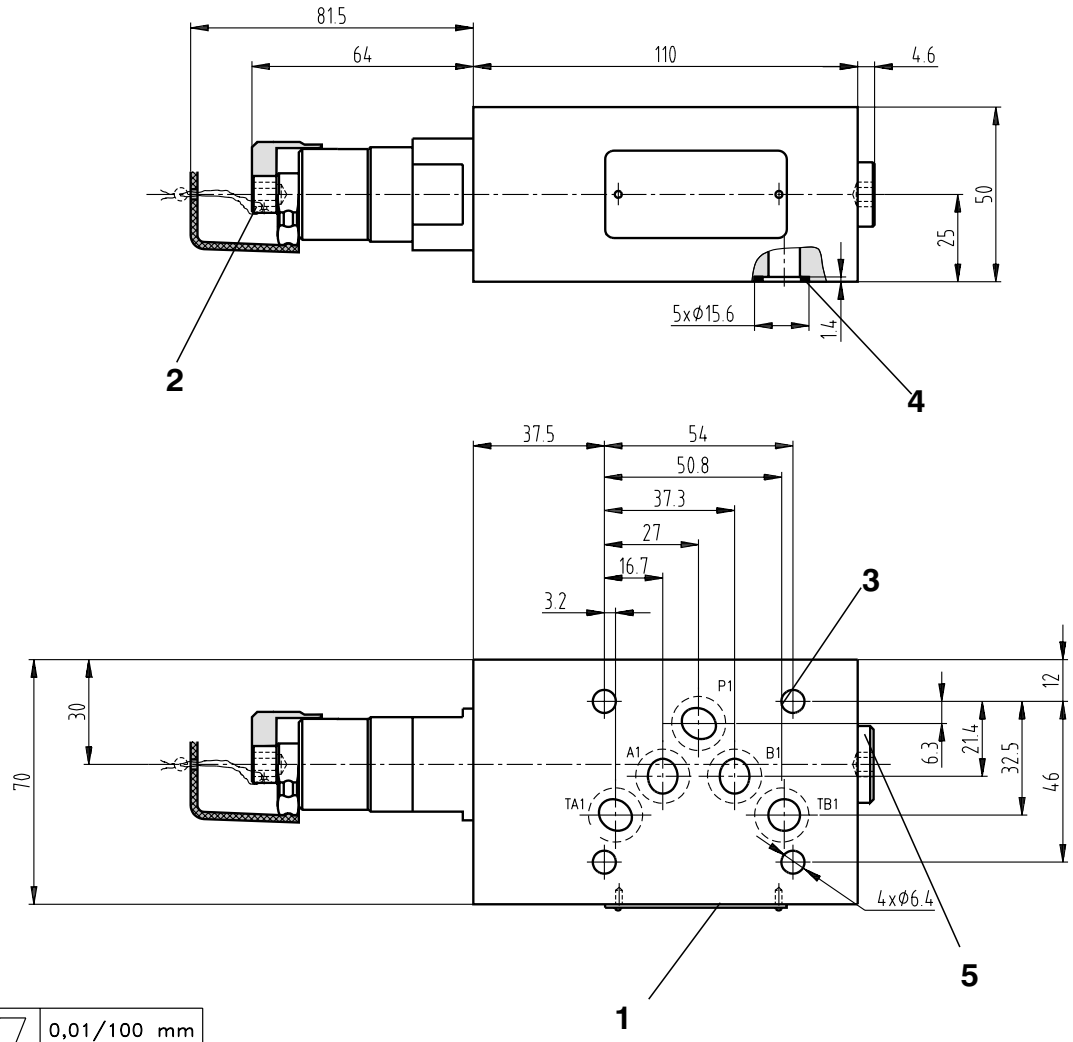
Required surface finish of interface

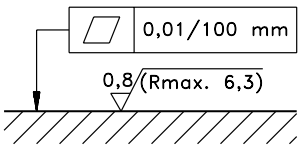


Valve Dimensions

Dimensions in millimeters

Model MP





Required surface finish of interface

1 Name plate
2 Adjustment elements
3 4 through mounting holes
4 Square ring 12.42 x 1.68 (5 pcs.), supplied with valve
5 Plug G1/4 (for pressure gauge)

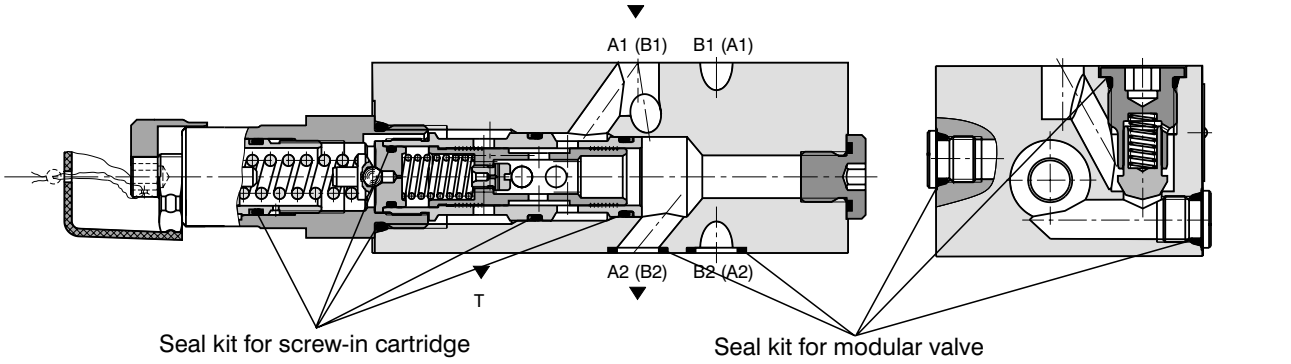
Ordering Numbers of Sandwich / Valve Bodies (without screw-in cartridge)

Valve body for modular valve - NBR	Ordering number	Valve body for modular valve - Viton	Ordering number
MA10-VR	556-0017	MA10-VR/V	556-0014
MB10-VR	556-0018	MB10-VR/V	556-0015
MP10-VR	556-0019	MP10-VR/V	556-0016

Preferred Types of Valves

Type	Ordering Number
VRN2-10/S-10S	556-0002
VRN2-10/S-21S	556-0004
VRN2-10/MP-10S	556-0052
VRN2-10/MP-21S	556-0054

Spare Parts - Seal Kits



Model	Dimensions, quantity	Ordering number
Screw-in cartridge - NBR	O-ring 17 x 1.8 NBR 70 (2 pcs.)	556-0060
	O-ring 12.42 x 1.78 NBR 90 (1 pc.)	
	O-ring 18.77 x 1.78 NBR 90 (1 pc.)	
	O-ring 23.47 x 2.95 NBR 90 (1 pc.)	
	Back-up ring BBP80B018N962N 19.51 x 22.21 x 1.14 (1 pcs.)	
	Back-up ring BBP80B017N962N 17.91 x 20.61 x 1.14 (1 pc.)	
	Back-up ring BBP80B016N9 16.33 x 19.03 x 1.14 (1 pc.)	
Screw-in cartridge - Viton	O-ring 17.17 x 1.78 (2 pcs.)	556-0061
	O-ring 12.42 x 1.78 (1 pc.)	
	O-ring 18.77 x 1.78 (1 pc.)	
	O-ring 23.47 x 2.95 (1 pc.)	
	Back-up ring BBP80B017V96E1 17.91 x 20.61 x 1.14 (1 pc.)	
	Back-up ring BG1300174-PT00 17.4 x 1.3 (1 pc.)	
	Back-up ring BBP80B018V9 19.51 x 22.21 x 1.14 (1 pcs.)	
Modular valve - NBR	O-ring 15.4 x 2.1 (1 pc.)	556-0062
	O-ring 10 x 1.8 (2 pcs.)	
	O-ring 17 x 1.8 (2 pcs.)	
	O-ring 12.42 x 1.78 (1 pc.)	
	O-ring 18.77 x 1.78 (1 pc.)	
	O-ring 23.47 x 2.95 (1 pc.)	
	Back-up ring BBP80B016N9 16.33 x 19.03 x 1.14 (1 pc.)	
	Back-up ring BBP80B018N962N 19.51 x 22.21 x 1.14 (1 pcs.)	
	Back-up ring BBP80B017N962N 17.91 x 20.61 x 1.14 (1 pc.)	
	Square ring 12.42 x 1.68 (5 pcs.)	
Modular valve - Viton	O-ring 15.4 x 2.1 (1 pc.)	556-0063
	O-ring 9.75 x 1.78 (2 pcs.)	
	O-ring 12.42 x 1.78 (6 pcs.)	
	O-ring 17.17 x 1.78 (2 pcs.)	
	O-ring 18.77 x 1.78 (1 pc.)	
	O-ring 23.47 x 2.95 (1 pc.)	
	Back-up ring BBP80B017V96E1 17.91 x 20.61 x 1.14 (1 pc.)	
	Back-up ring BG1300174-PT00 17.4 x 1.3 (1 pc.)	
	Back-up ring BBP80B18-V9 19.51 x 22.21 x 1.14 (1 pcs.)	

Caution!

- The packing foil is recyclable.
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law.

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www.argo-hytos.com

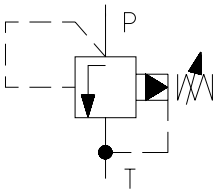
Pilot operated pressure relief valve

VPN1-06

Size 06 • p_{max} up to 320 bar • Q_{max} up to 70 L/min

HA 5161
1/2003

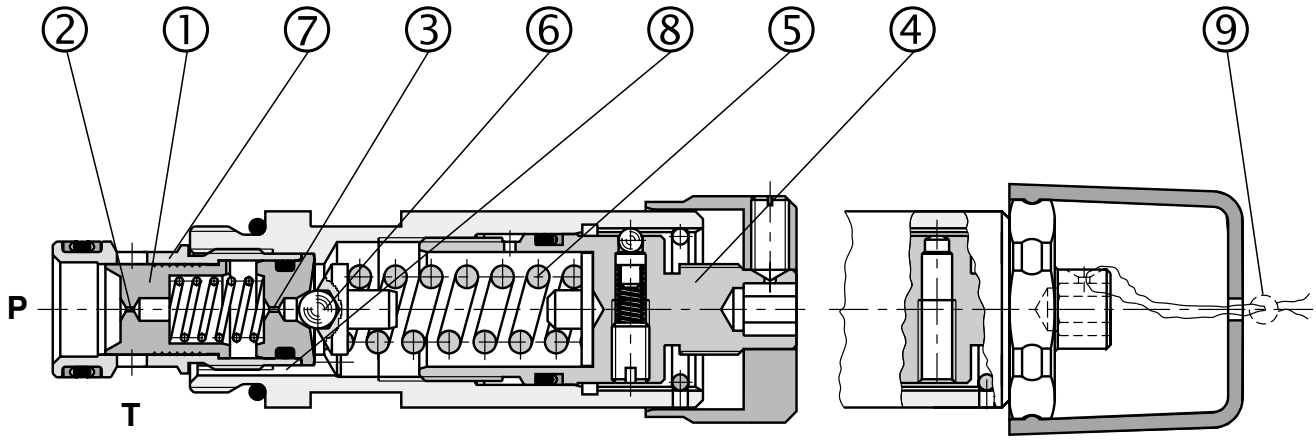
Replaces
HA 5161 3/2002



- **Cartridge, modular and in-line design**
- **Five pressure ranges**
- **Two pressure adjustment options:**
  - screw with internal hexagon
  - hand knob with arrestment

Functional Description

Pressure relief valves VPN1 are pilot operated pressure valves designed for system pressure limitation.
The pressure adjustment provides the adjustment screw (4). In its basic state, the valve is closed. The pressure acts on the face area of the control spool (1) and at the same time through orifice (2) on the control spool rear side, which is preloaded by a spring and further on through orifice (3) on the pilot valve ball (6). When the increasing system pressure reaches the value, which is preset by spring (5), the valve opens and the control flow passes through the pilot valves. The spool area which is preloaded by the spring becomes relieved, the spool control edge opens the radial bores in bushing (7) and the fluid passes from port P to T. The control flow is routed through groove (8) to channel T. Valve adjustment can be lockwired (9).
The valve body and the adjustment screw are zinc coated. With models M and R the valve bodies are phosphate coated.



Ordering Code

VPN1-06/ ☐ - ☐ ☐ ☐

Pilot operated pressure relief valve

Nominal size

Model

screw in cartridge	**S**
modular valve, flow from A to T	MA
modular valve, flow from B to T	MB
modular valve, flow from P to T	**MP**
modular valve, flow from A to B and B to A	MC
modular valve, flow from A and B to T	MD
in-line valve, thread G3/8	RA1
in-line valve, thread G1/2	**RA2**
in-line valve, thread G3/8	RB1
in-line valve, thread G1/2	RB2

Sealing

without designation	NBR
V	FPM (Viton)

Adjustment element

S	screw with internal hexagon
R	hand knob

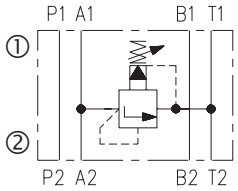
Pressure range

6	up to 63 bar
10	up to 100 bar
16	up to 160 bar
21	up to 210 bar
32	up to 320 bar

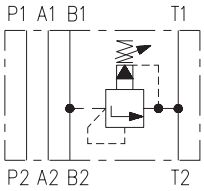
FOR PREFERRED TYPES SEE BOLD TYPING IN ORDERING CODE AND TABLE OF PREFERRED TYPES ON PAGE 10

Functional Symbols

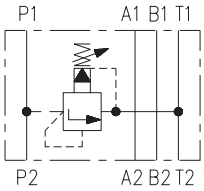
Model MA



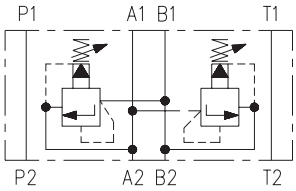
Model MB



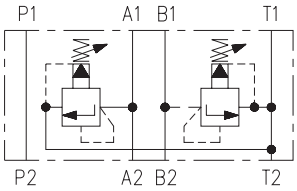
Model MP



Model MC

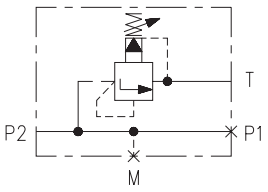


Model MD

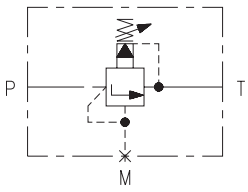


① Valve side
② Subplate side

Model RA



Model RB



Ordering Numbers of Sandwich / Valve Bodies (without screw-in cartridge)

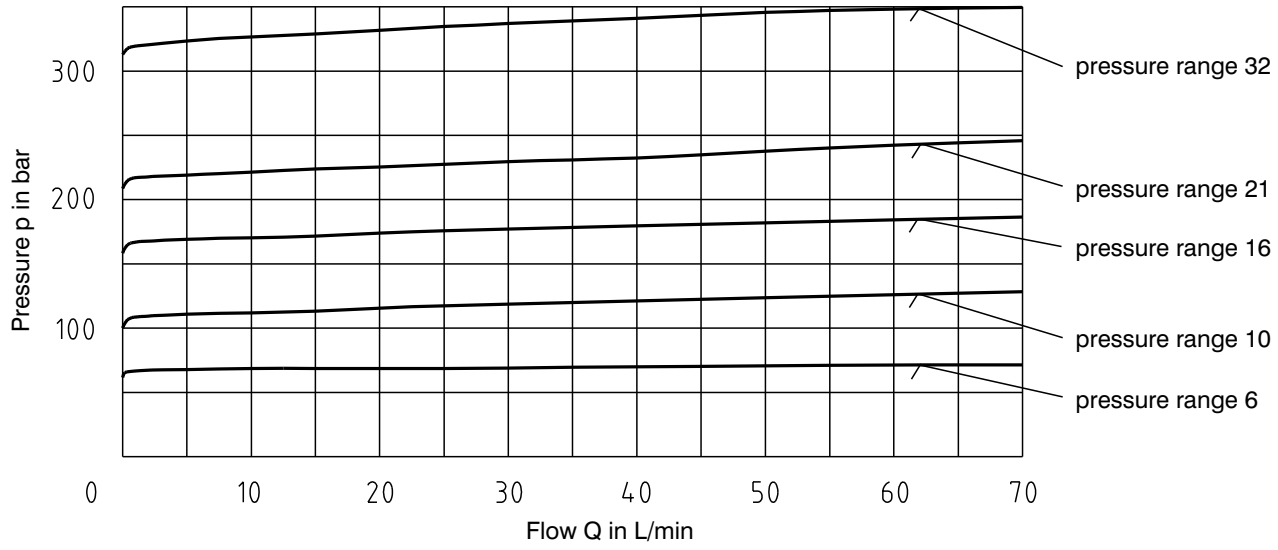
Valve body for modular valve - NBR	Ordering number	Valve body for modular valve - Viton	Ordering number
MA06-VP	556-0330	MA06-VP/V	556-0430
MB06-VP	556-0331	MB06-VP/V	556-0431
MP06-VP	556-0332	MP06-VP/V	556-0432
MC06-VP	556-0333	MC06-VP/V	556-0433
MD06-VP	556-0334	MD06-VP/V	556-0434
Valve body for in-line valve - NBR	**Ordering number**	**Valve body for in-line valve - Viton**	**Ordering number**
RA1-06-VP	556-0336	RA1-06-VP/V	556-0436
RA2-06-VP	556-0337	RA2-06-VP/V	556-0437
RB1-06-VP	556-0338	RB1-06-VP/V	556-0438
RB2-06-VP	556-0339	RB2-06-VP/V	556-0439

Technical Data

Nominal size	mm	06
Max. flow rate	L/min	70
Max. control flow	L/min	0.35
Max. input pressure (ports P, A, B)	bar	63; 100; 160; 210; 320
Max. output pressure (port T)	bar	320
Working pressure related to flow	bar	see p-Q characteristics
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP-RP 91H in viscosity classes ISO VG 32, 46 and 68.
Fluid temperature range for standard sealing (NBR)	°C	-30 ... +80
Fluid temperature range for Viton sealing (FPM)	°C	-20 ... +80
Viscosity range	mm^2/s	20 ... 400
Max. degree of fluid contamination		Class 21/18/15 according to ISO 4406 (1999).
Weight - model S - models MA, MB, MP - models MC, MD - models RA1, RA2, RB1, RB2	kg	0.25 1.2 1.5 1.25
Mounting position		optional

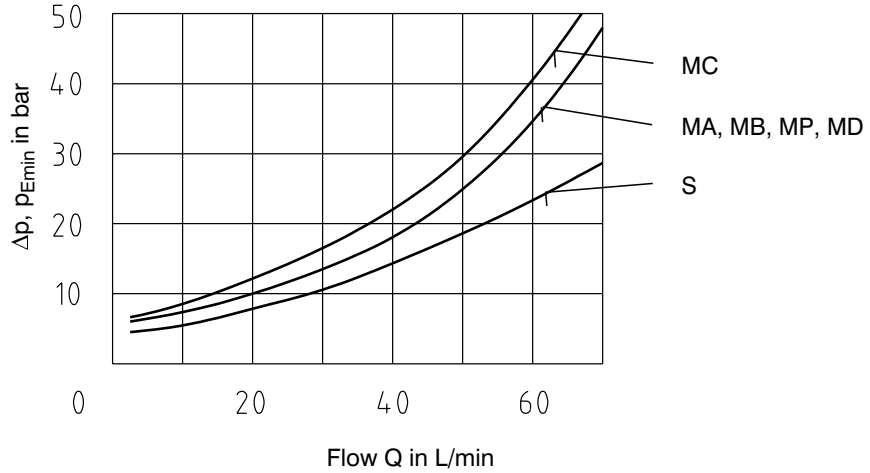
p-Q Characteristics for Model S

Measured at $\nu = 35\ mm^2/s$ and $t = 40\ °C$



Δp-Q Characteristics

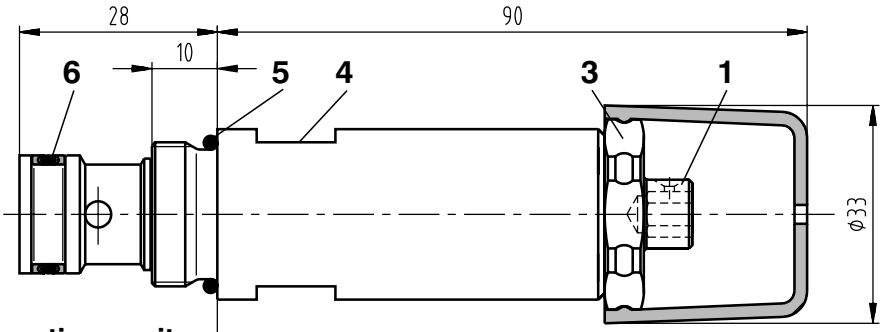
Measured at $\nu = 35\ mm^2/s$ and $t = 40\ °C$



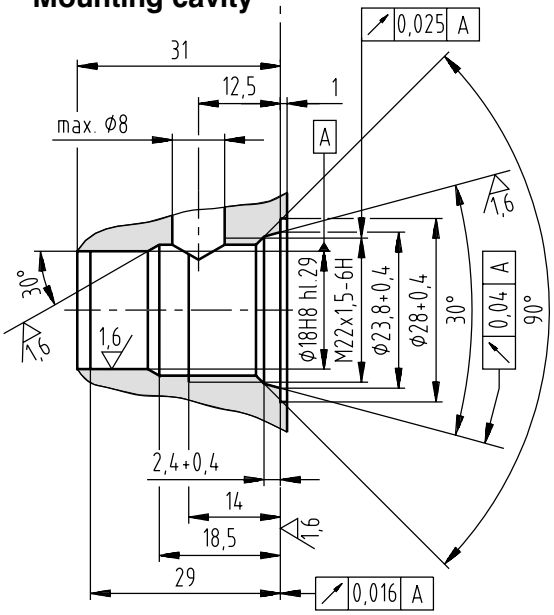
Valve Dimensions

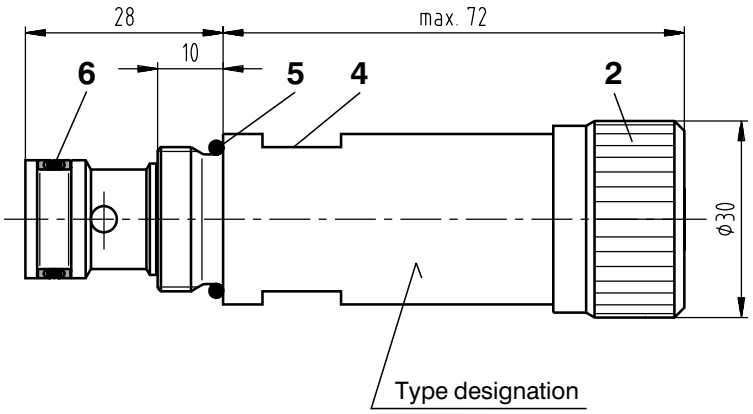
Dimensions in millimetres

Model S



Mounting cavity





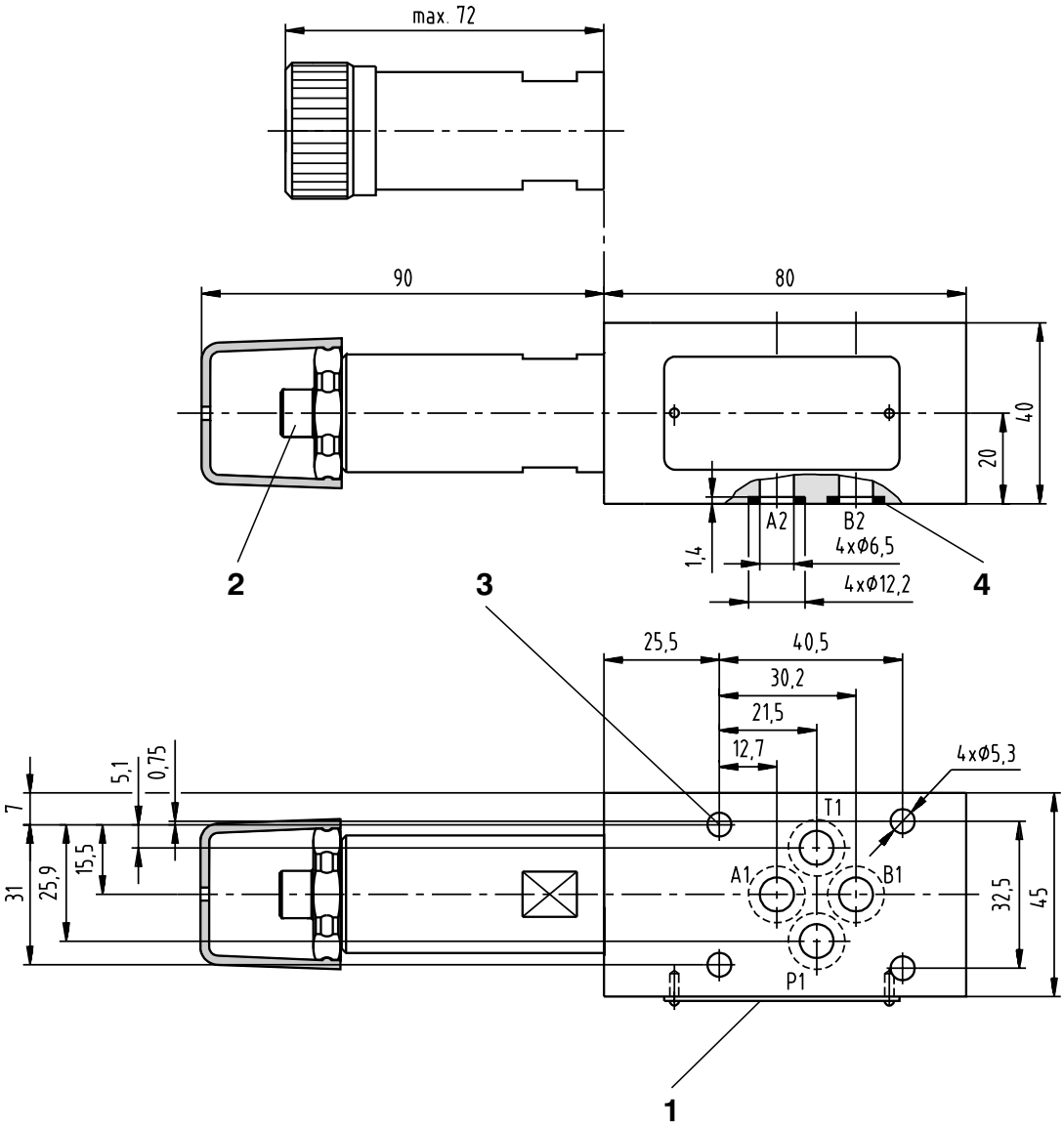
1 Adjustment element (screw with internal hexagon 6 mm)
2 Adjustment element R (hand knob)
With all adjustment elements:
- clockwise rotation - pressure increase
- anticlockwise rotation - pressure decrease

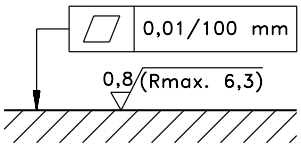
3 Locknut hex. 27 mm
4 Wrench flats s = 24 mm - tightening torque 60 Nm
5 O-ring 19.4 x 2.1 NBR 80 (1 pc.)
supplied with valve
6 Combined sealing:
O-ring 14 x 1.78 NBR 90 (1 pc.)
Back-up ring BBP80B015-N9 14.73 x 17.43 x 1.14 (2 pcs.)
supplied with valve

Valve Dimensions

Dimensions in millimetres

Model MA





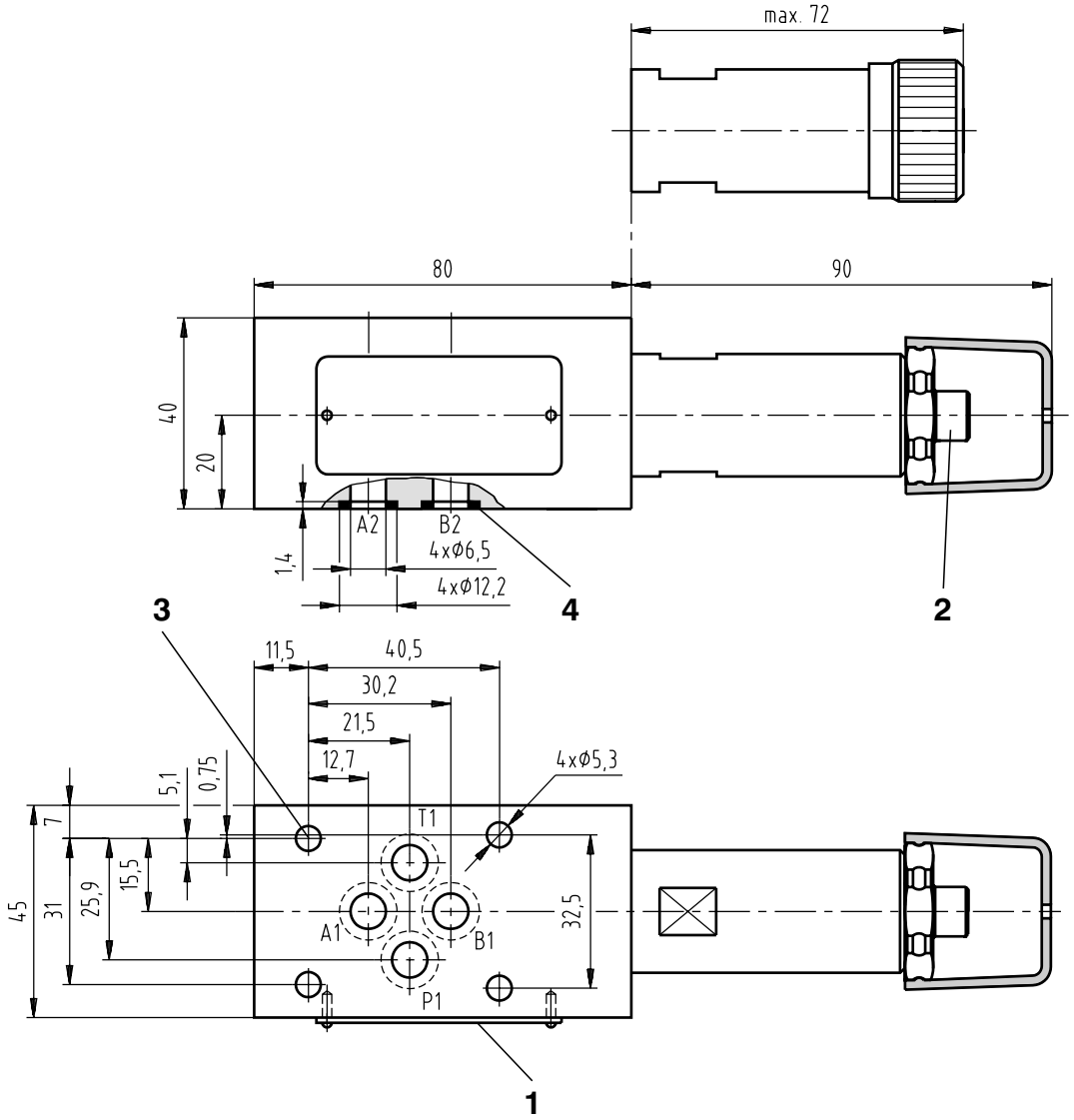
Required surfacefinish of interface

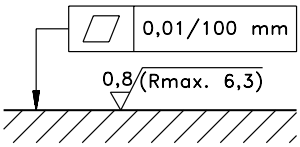
1 Name plate
2 Adjustment elements for pressure setting
3 4 through mounting holes
4 Square rings 9.25 x 1.68 (4 pcs.) supplied with valve

Valve Dimensions

Dimensions in millimetres

Models MB and MP





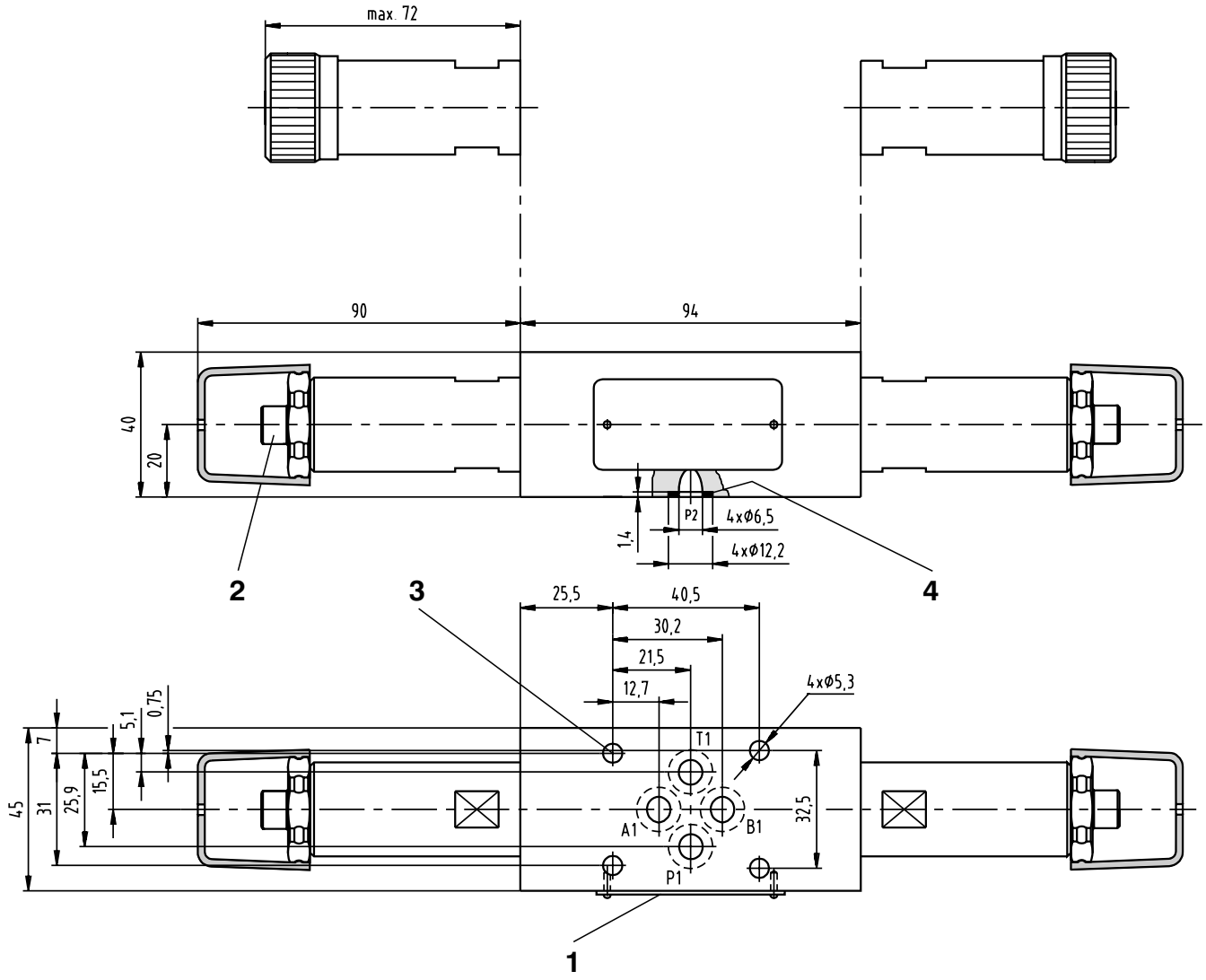
Required surfacefinish of interface

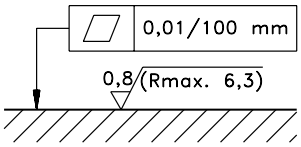
1 Name plate
2 Adjustment elements for pressure setting
3 4 through mounting holes
4 Square rings 9.25 x 1.68 (4 pcs.) supplied with valve

Valve Dimensions

Dimensions in milimetres

Models MC and MD





Required surfacefinish of interface

1 Name plate
2 Adjustment elements for pressure setting
3 4 through mounting holes
4 Square rings 9.25 x 1.68 (4 pcs.) supplied with valve

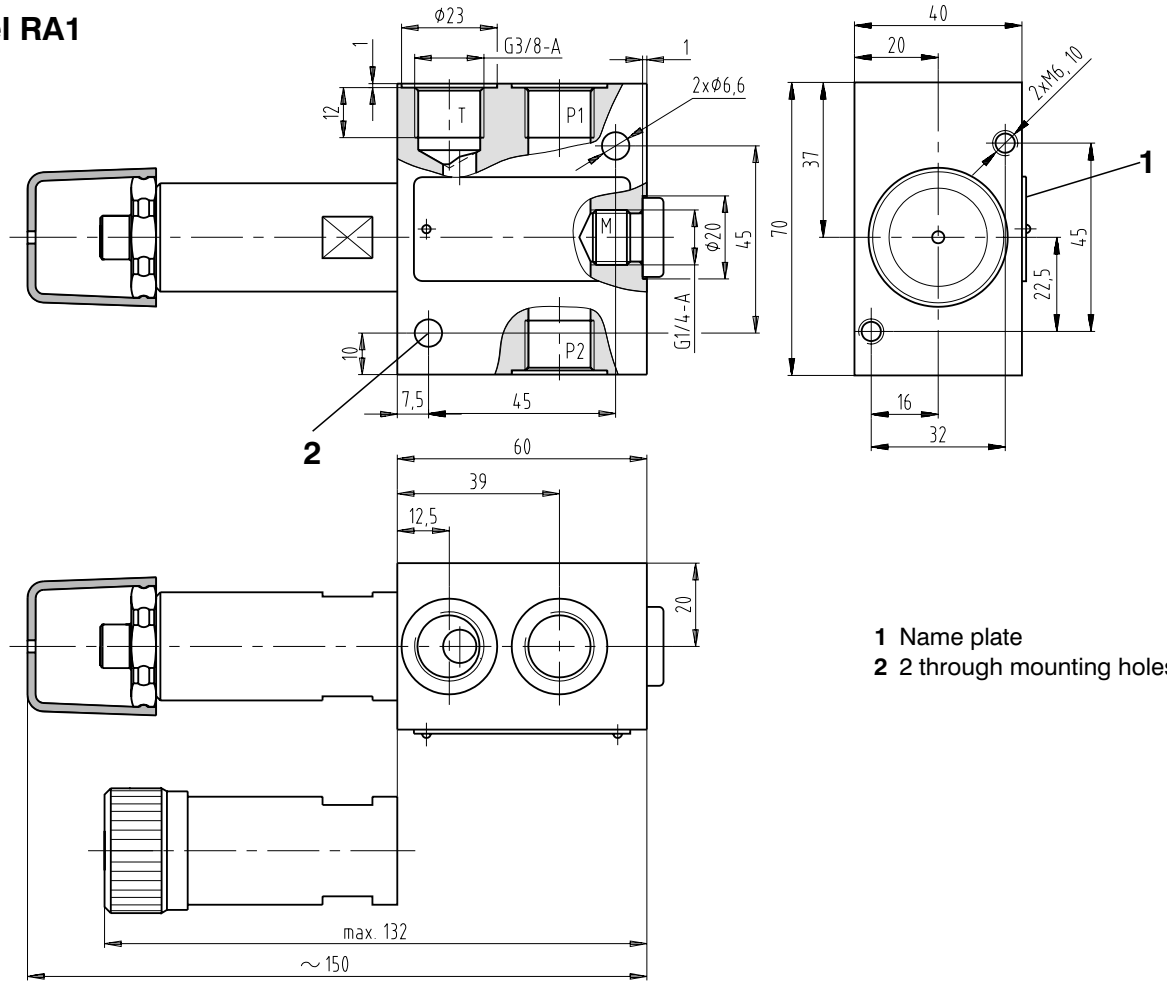
Caution!

- The packing foil is recyclable.
- The protecting plate can be returned to the manufacturer.
- Mounting studs must be ordered separately. Tightening torque is 8.9 Nm.
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law

Valve Dimensions

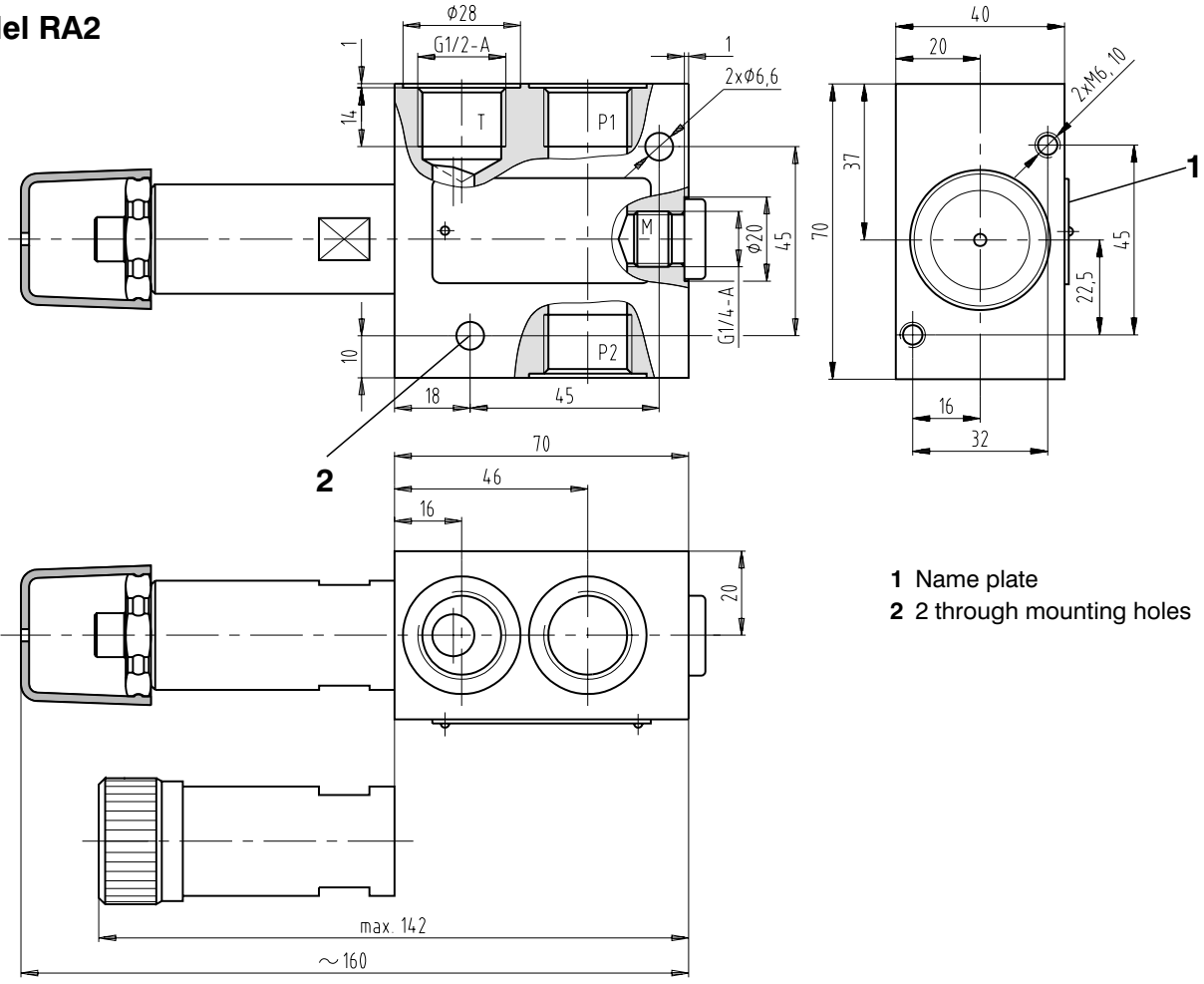
Dimensions in millimetres

Model RA1



1 Name plate
2 2 through mounting holes

Model RA2

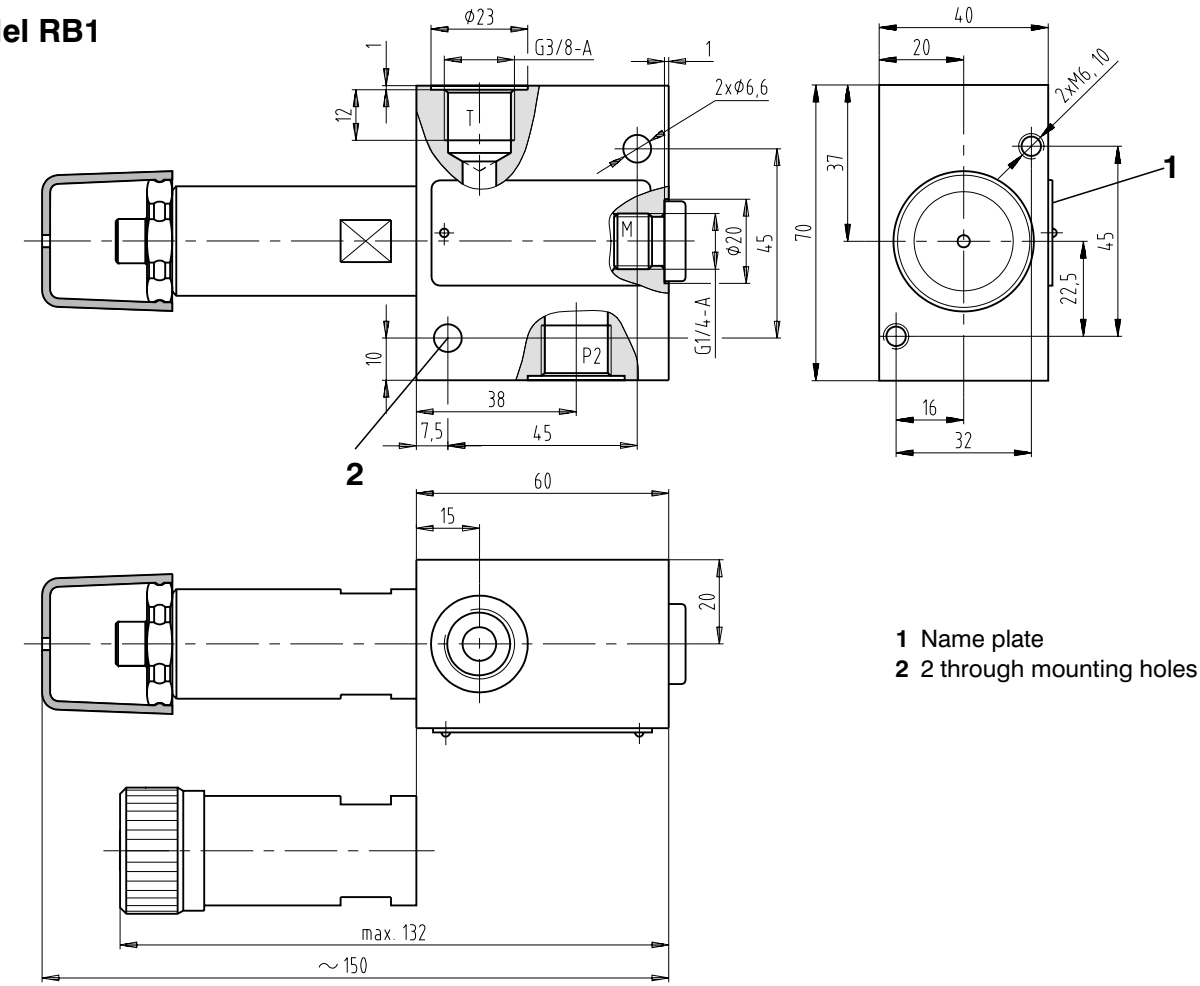


1 Name plate
2 2 through mounting holes

Valve Dimensions

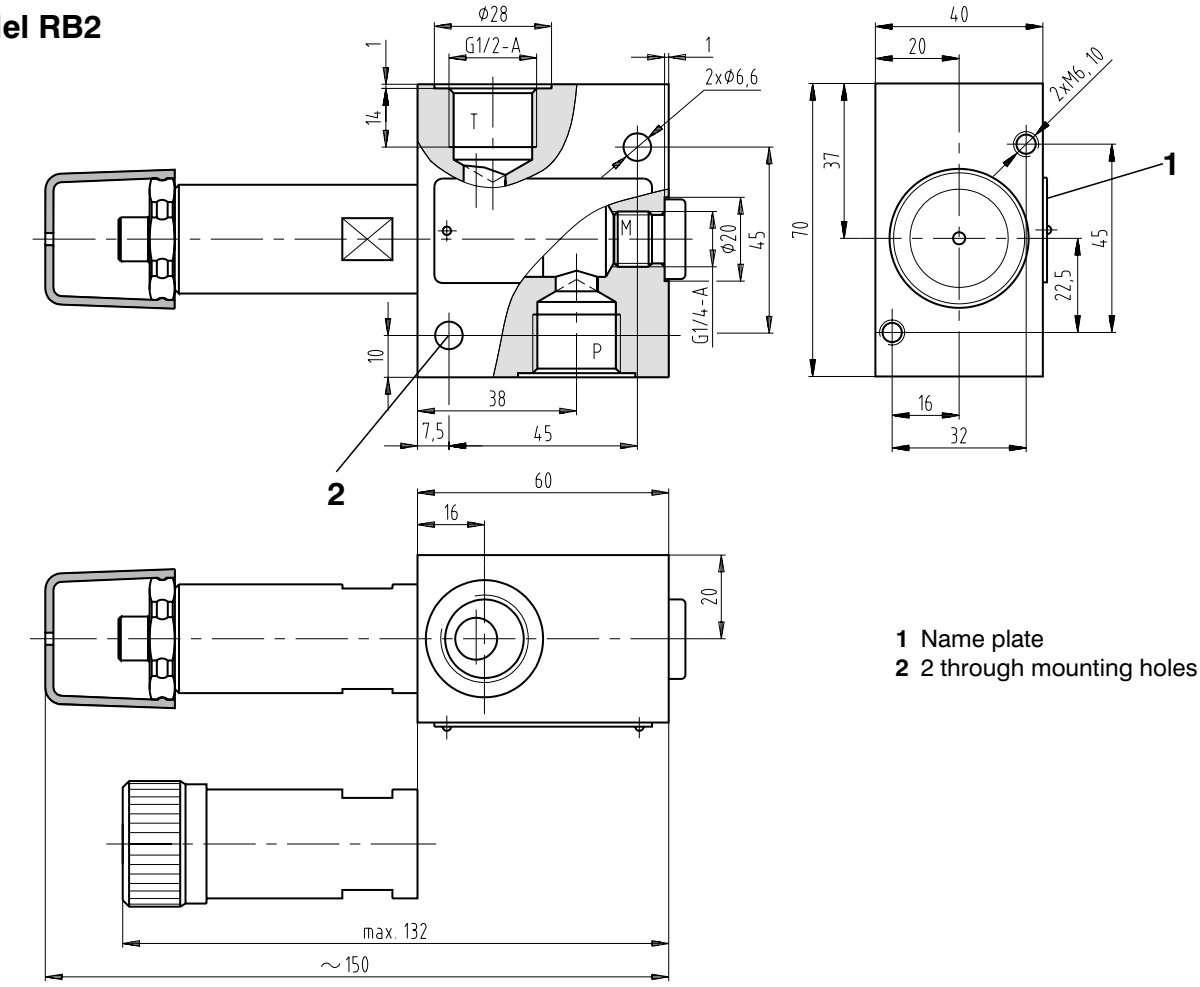
Dimensions in milimetres

Model RB1



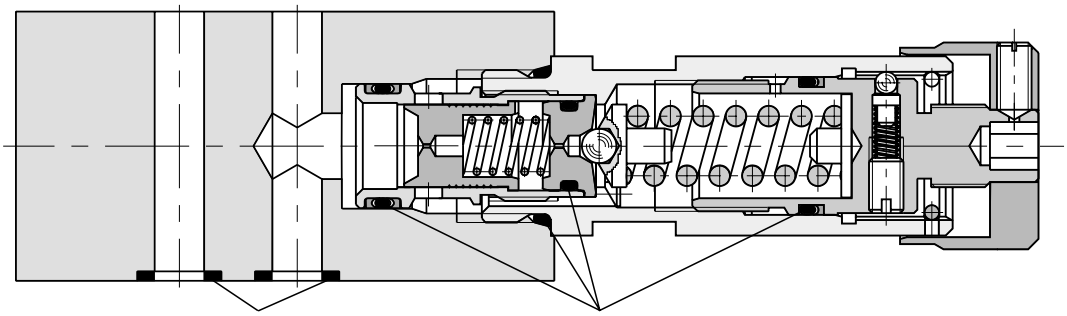
1 Name plate
2 2 through mounting holes

Model RB2



1 Name plate
2 2 through mounting holes

Spare Parts



Set of the seals for modular valve

Set of the seals for screw-in cartridge

Model	Dimensions, number	Ordering number
Screw-in cartridge - NBR	O-ring 14 x 1.78 NBR 90 (1 pc.)	556-0399
	O-ring 17 x 1.8 NBR 70 (1 pc.)	
	O-ring 19.4 x 2.1 NBR 80 (1 pc.)	
	O-ring 9.25 x 1.78 NBR 90 (1 pc.)	
	Back-up ring BBP80B015-N9 14.73 x 17.43 x 1.14 (1 pc.)	
	Back-up ring BBP80B016-N9 16.33 x 19.03 x 1.14 (1 pc.)	
Screw-in cartridge - Viton	O-ring 14 x 1.78 (1 pc.)	556-0398
	O-ring 17 x 1.8 (1 pc.)	
	O-ring 19.4 x 2.1 (1 pc.)	
	O-ring 9.25 x 1.78 (1 pc.)	
	Back-up ring BBP80B015 14.73 x 17.43 x 1.14 (1 pc.)	
	Back-up ring BBP80B016 16.33 x 19.03 x 1.14 (1 pc.)	

Model	Dimensions, number	Ordering number
Modular valve - NBR	Square ring 9.25 x 1.68 (4 pcs.)	556-0397
Modular valve - Viton	O-ring 9.25 x 1.78 (4 pcs.)	556-0396

Model	Typ, number	Ordering number
In-line valve RA1 - NBR	VSTI R1/4-ED (1 pc.) VSTI R3/8-ED (1 pc.)	556-0391
In-line valve RA2 - NBR	VSTI R1/4-ED (1 pc.) VSTI R1/2-ED (1 pc.)	556-0393
In-line valve RB1 - NBR	VSTI R1/4-ED (1 pc.)	556-0395
In-line valve RB2 - NBR		
In-line valve RA1 - Viton	VSTI R1/4-ED - Viton (1 pc.) VSTI R3/8-ED - Viton (1 pc.)	556-0390
In-line valve RA2 - Viton	VSTI R1/4-ED - Viton (1 pc.) VSTI R1/2-ED - Viton (1 pc.)	556-0392
In-line valve RB1 - Viton	VSTI R1/4-ED - Viton (1 pc.)	556-0394
In-line valve RB2 - Viton		

Preferred Types of Valves

Type	Ordering number	Type	Ordering number
VPN1-06/S-10S	556-0301	VPN1-06/MP-32S	556-0424
VPN1-06/S-21S	556-0303	VPN1-06/RA2-10S	556-0561
VPN1-06/S-32S	556-0304	VPN1-06/RA2-21S	556-0563
VPN1-06/MP-10S	556-0421	VPN1-06/RA2-32S	556-0564
VPN1-06/MP-21S	556-0423		

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www.argo-hytos.com

ARGO HYTOS

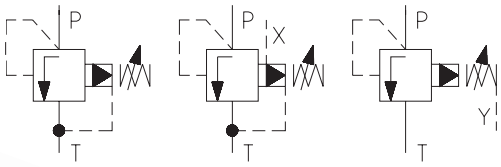
Pilot Operated Pressure Relief Valve

VPN2-10/S

Size 10 • ...5076 PSI (350 bar) • ...39.68 US GPM (150 L/min)

HA 5163
2/2005

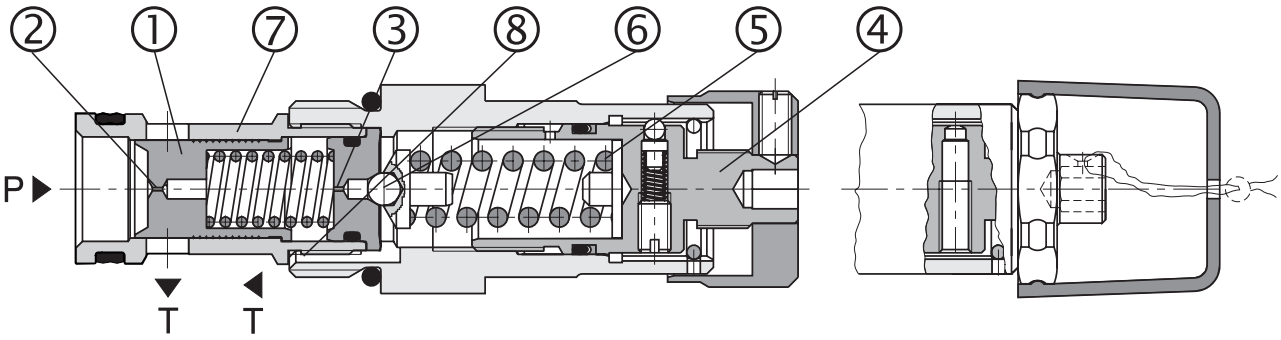
Replaces
HA 5163 1/2003

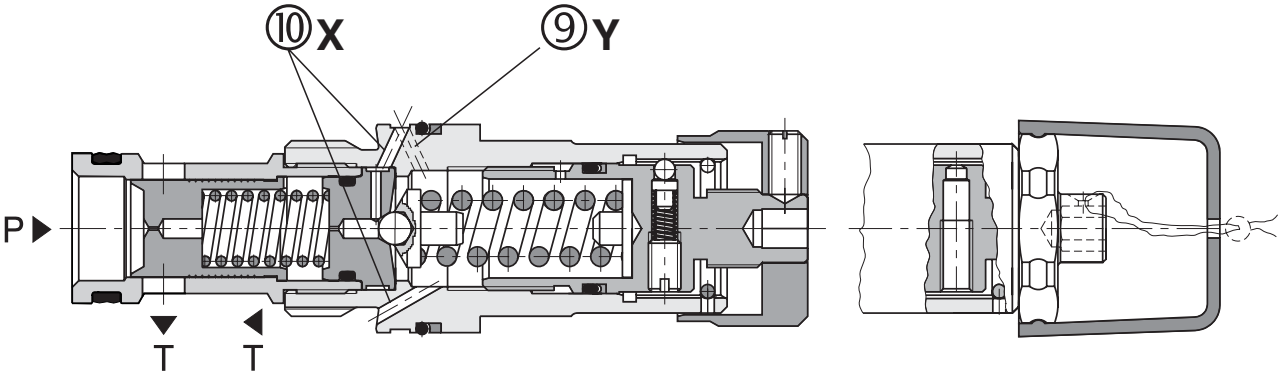


- ❑ **Screw in cartridge design**
- ❑ **Five pressure ranges**
- ❑ **Two pressure adjustment options:**
  - screw with internal hexagon
  - hand knob with arrestment

Functional Description

Pressure relief valves VPN2 are pilot operated pressure valves designed for system pressure limitation.
The pressure adjustment is controled by the adjustment screw (4). In its basic state, the valve is closed. The pressure acts on the face area of the control spool (1) and at the same time through orifice (2) on the control spool rear side, which is preloaded by a spring and further on through orifice (3) on the pilot valve ball (6).
When the increasing system pressure reaches the value, which is preset by spring (5), the valve opens and the control flow passes through the pilot valve. The spool area which is preloaded by spring becomes relieved, the spool control edge opens the radial bores in bushing (7) and the fluid passes from port P to T. The control flow is routed through slot (8) to port T.
When an accurate pressure control, which does not depend on pressure variations in port T, is required, the model "Y" with external port for pilot flow is to be used.
If a relieving of the valve on a lower pressure as that set up by the spring (5) is needed, the model with port "X" (10) is to be used.
The basic surface treatment of the valve body and the adjustment screw are zinc coated.





Ordering Code

VPN2-10/ ☐ - ☐ ☐ ☐

Pilot operated pressure relief valve

Nominal size **10**

Model

screw in cartridge - internally piloted, internally drained	**S**
screw in cartridge - externally piloted, internally drained	SX
screw in cartridge - internally piloted, externally drained	SY

Adjustment element

S	screw with internal hexagon
R	hand knob

Seals

without designation	NBR
V	FPM (Viton)

Pressure range

6	up to 913 PSI (63 bar)
10	up to 1450 PSI (100 bar)
16	up to 2321 PSI (160 bar)
21	up to 3045 PSI (210 bar)
32	up to 5076 PSI (350 bar)

FOR PREFERRED TYPES SEE BOLD TYPING IN ORDERING CODE AND TABLE OF PREFERRED TYPES ON PAGE 6

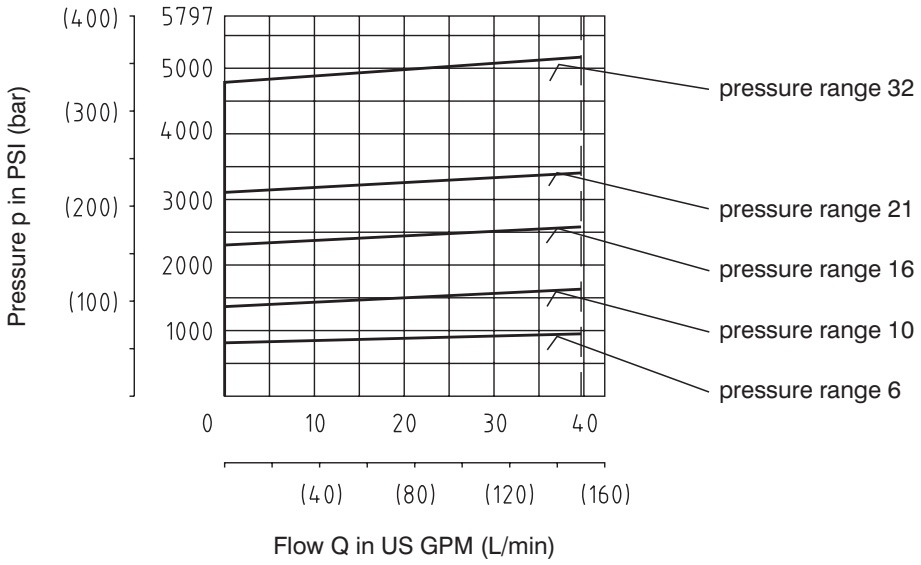
Technical Data

Nominal size	mm	10
Max. flow rate	US GPM (L/min)	39.683 (150)
Max. control flow	US GPM (L/min)	0.132 (0.5)
Max. input pressure (port P)	PSI (bar)	913 (63); 1450 (100); 2321 (160); 3045 (210); 5076 (350)
Max. output pressure (port T)	PSI (bar)	5076 (350)
Working pressure related to flow	PSI (bar)	see p-Q Characteristics
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP - RP 91H in viscosity classes ISO VG 32, 46 and 68.
Fluid temperature range for standard sealing (NBR)	°F (°C)	-22 ... 176 (-30 ... +80)
Fluid temperature range for Viton sealing (FPM)	°F (°C)	-4 ... 176 (-20 ... +80)
Viscosity range	SUS (mm^2/s)	68 ... 1840 (20 ... 400)
Max. degree of fluid contamination		Class 21/18/15 according to ISO 4406 (1999).
Weight	lbs (kg	0.659 (0.3)
Mounting position		optional

p-Q Characteristics

Measured at ν= 166 SUS (35 mm²/s) and t = 104 °F (40 °C)

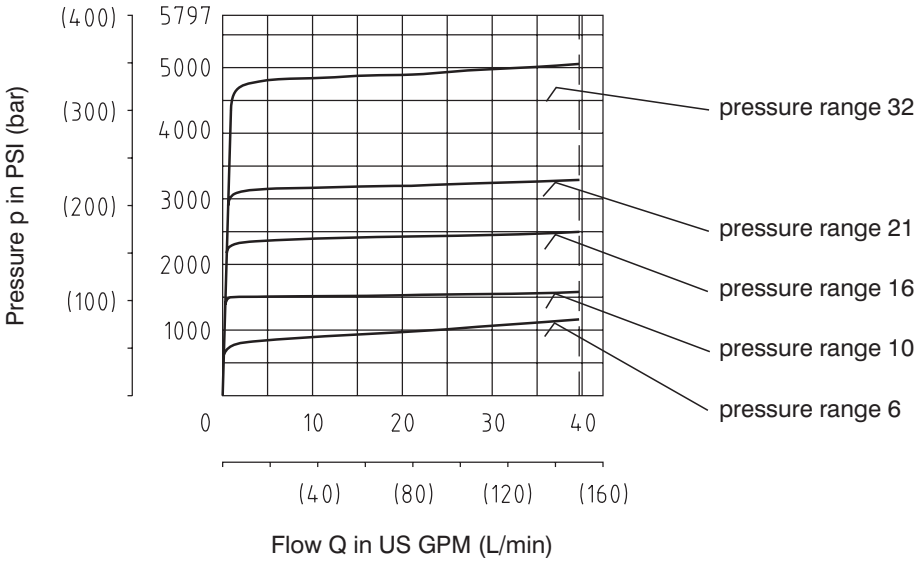
Model S, SX



p-Q Characteristics

Measured at ν= 166 SUS (35 mm²/s) and t = 104 °F (40 °C)

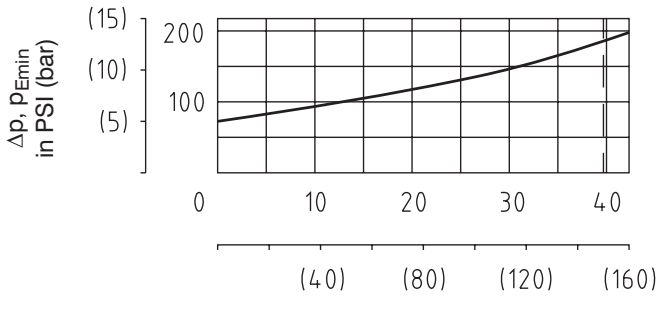
Model SY



Δp-Q Characteristic

Measured at ν= 166 SUS (35 mm²/s) and t = 104 °F (40 °C)

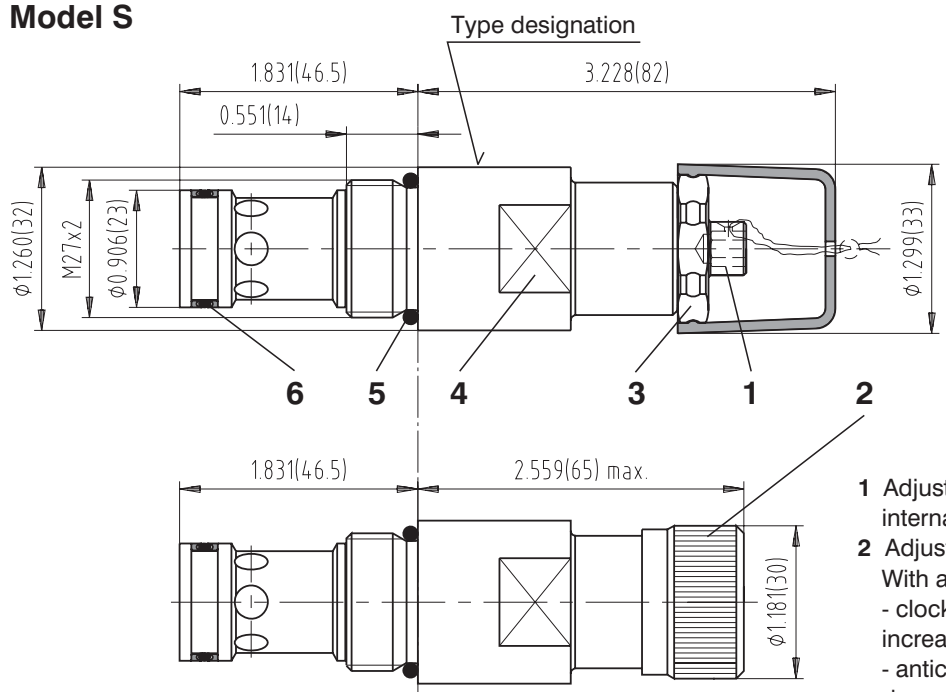
Model S, SX, SY



Valve Dimensions

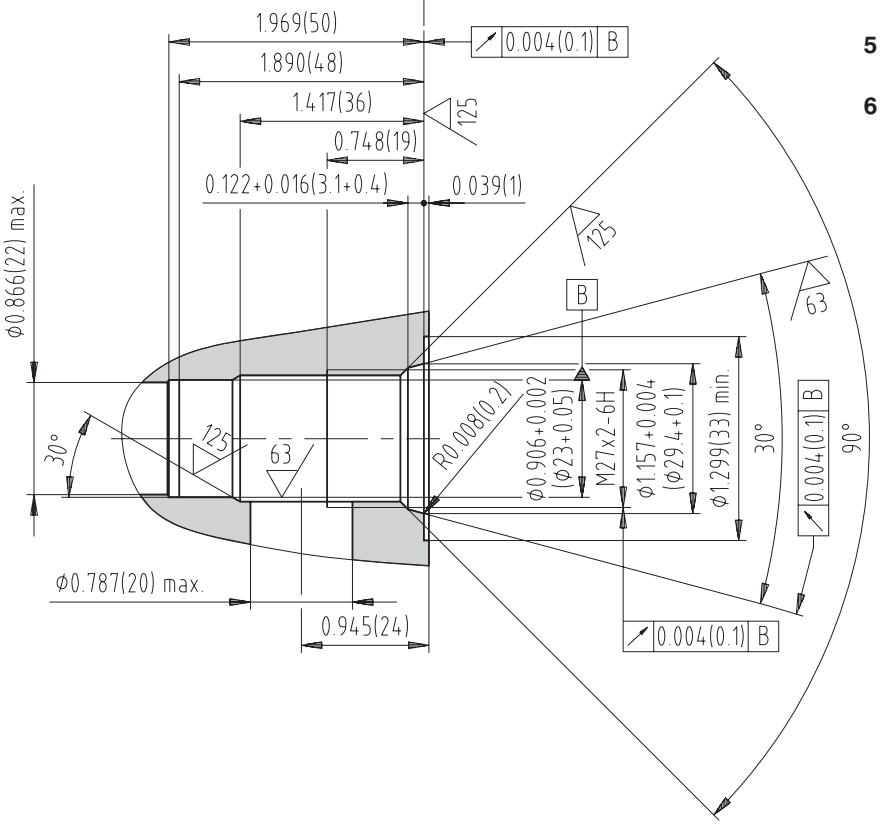
Dimensions in inches and millimetres (in brackets)

Model S



1 Adjustment element (screw with internal hexagon 6 mm)
2 Adjustment element R (hand knob)
With all adjustment elements:
- clockwise rotation - pressure increase
- anticlockwise rotation - pressure decrease
3 Locknut hex. 1.063 in. (27 mm)
4 Wrench flats s = 0.945 in. (24 mm) -
- tightening torque 22.11 ft-lbs (60 Nm)
5 O-ring 23.47 x 2.62 NBR 70 (1 pc.) supplied with each valve
6 Combined sealing:
O-ring 18.77 x 1.8 NBR 70 (1 pc.)
Back-up ring BH14L0230-PTGB 20.2 x 23 x 1.4 (2 pcs.)
supplied with each valve

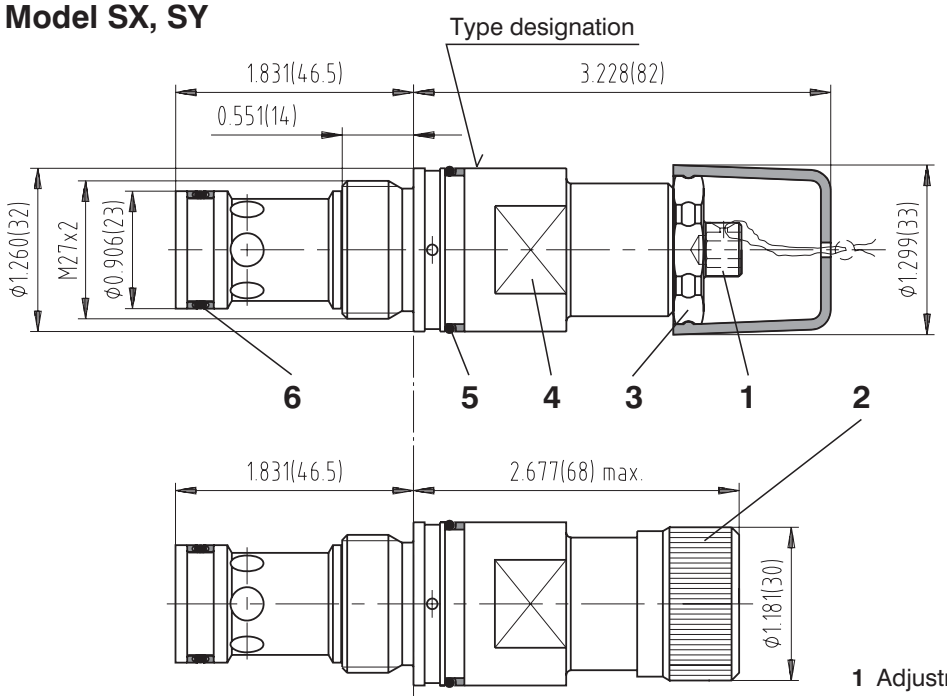
Mounting cavity



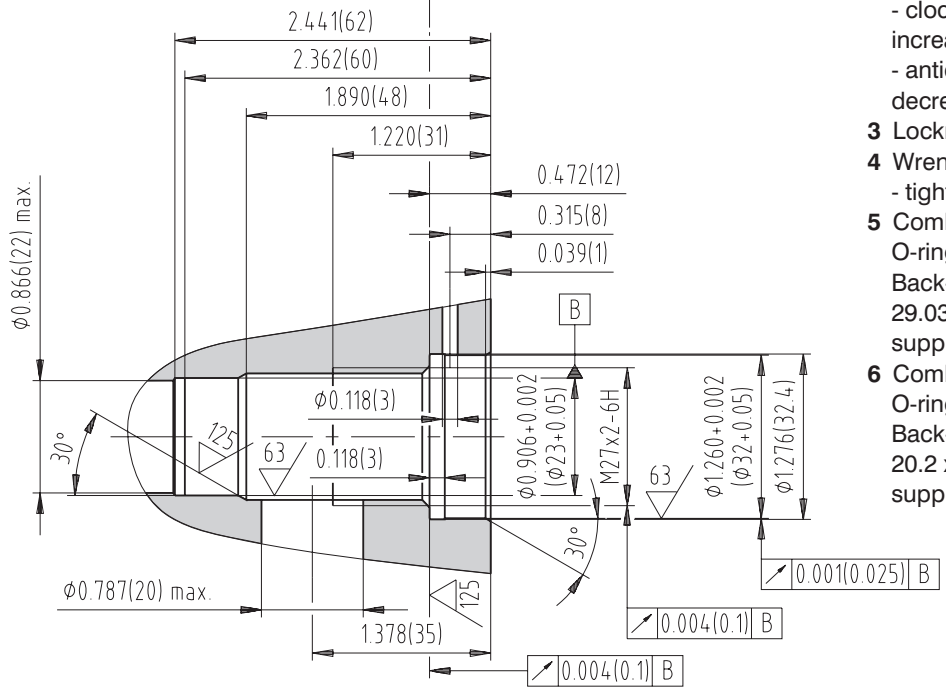
Valve Dimensions

Dimensions in inches and millimetres (in brackets)

Model SX, SY



Mounting cavity



1 Adjustment element (screw with internal hexagon 6 mm)

2 Adjustment element R (hand knob)
With all adjustment elements:
- clockwise rotation - pressure increase
- anticlockwise rotation - pressure decrease

3 Locknut hex. 1.063 in. (27 mm)

4 Wrench flats s = 0.945 in. (24 mm) -
- tightening torque 22.11 ft-lbs (60 Nm)

5 Combined sealing:
O-ring 28.3 x 1.78 (1 pc.)
Back-up ring BBP80B024
29.03 x 31.73 x 1.14 (1 pc.)
supplied with each valve

6 Combined sealing:
O-ring 18.77 x 1.8 NBR 70 (1 pc.)
Back-up ring BH14L0230-PTGB
20.2 x 23 x 1.4 (2 pcs.)
supplied with each valve

Spare Parts

Model	Dimensions, number	Ordering number
S - NBR	O-ring 17 x 1.8 NBR 70 (1 pc.)	556-0380
	O-ring 12.42 x 1.78 NBR 90 (1 pc.)	
	O-ring 18.77 x 1.78 NBR 90 (1 pc.)	
	O-ring 23.47 x 2.62 NBR 70 (1 pc.)	
	Back-up ring BH14HJ0200-PTGB 17,1 x 20 x 1,2 (1 pc.)	
	Back-up ring BH14L0230-PTGB 20,2 x 23 x 1,4 (2 pcs.)	
S - Viton	O-ring 17.17 x 1.78 (1 pc.)	556-0381
	O-ring 23.47 x 2.62 (1 pc.)	
	O-ring 18.77 x 1.78 (1 pc.)	
	O-ring 12.42 x 1.78 (1 pc.)	
	Back-up ring BH14HJ0200-PTGB 17,1 x 20 x 1,2 (1 pcs.)	
	Back-up ring BH14L0230-PTGB 20,2 x 23 x 1,4 (2 pc.)	
Model	**Dimensions, number**	**Ordering number**
SX, SY - NBR	O-ring 17 x 1.8 NBR 70 (1 pc.)	556-0382
	O-ring 12.42 x 1.78 NBR 90 (1 pc.)	
	O-ring 18.77 x 1.78 NBR 90 (1 pc.)	
	O-ring 23.47 x 2.62 NBR 70 (1 pc.)	
	O-ring 28.3 x 1.78 ORAR 00 024 (1 pc.)	
	Back-up ring BH14HJ0200-PTGB 17,1 x 20 x 1,2 (1 pc.)	
	Back-up ring BH14L0230-PTGB 20,2 x 23 x 1,4 (2 pc.)	
	Back-up ring BBP80B024 29.03 x 31.73 x 1.14 (1 pc.)	
SX, SY - Viton	O-ring 17.17 x 1.78 (1 pc.)	556-0383
	O-ring 23.47 x 2.62 (1 pc.)	
	O-ring 18.77 x 1.78 (1 pc.)	
	O-ring 12.42 x 1.78 (1 pc.)	
	O-ring 28.3 x 1.78 (1 pc.)	
	Back-up ring BH14HJ0200-PTGB 17,1 x 20 x 1,2 (1 pc.)	
	Back-up ring BH14L0230-PTGB 20,2 x 23 x 1,4 (2 pcs.)	
	Back-up ring BBP80B024-V96 29.03 x 31.73 x 1.14 (1 pc.)	

Preferred Types of Valves

Type	Ordering Number
VPN2-10/S-10S	556-0351
VPN2-10/S-21S	556-0353
VPN2-10/S-32S	556-0354

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www.argo-hytos.com

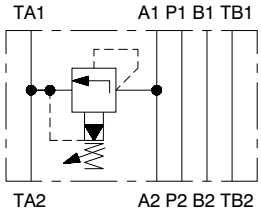
Pilot operated pressure relief valve

VPN2-10/MR

Size 10 ...5076 PSI (350 bar) ...39.68 US GPM (150 L/min)

HA 5164 2/2005

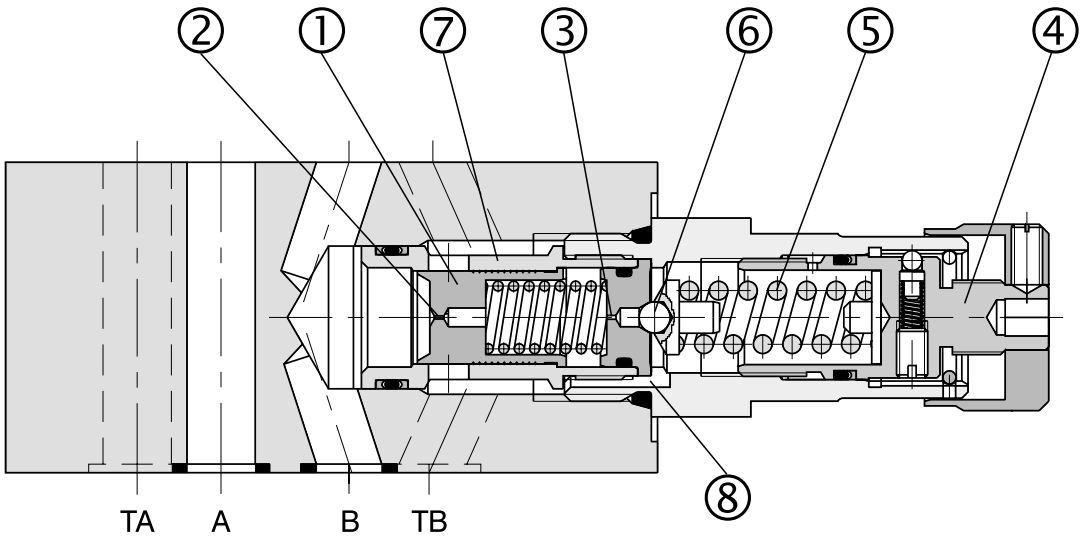
Replaces HA 5164 1/2003



- **Modular and in-line design**
- **Five pressure ranges**
- **Two pressure adjustment options:**
  - screw with internal hexagon
  - hand knob with arrestment
- **Installation dimensions to ISO 4401 and DIN 24 340-A10**

Functional Description

Pressure relief valves VPN2 are pilot operated pressure valves designed for system pressure limitation.
The pressure adjustment is controled by the adjustment screw (4). In its basic state, the valve is closed. The pressure acts on the face area of the control spool (1) and at the same time through orifice (2) on the control spool rear side, which is preloaded by a spring and further on through orifice (3) on the pilot valve ball (6).
When the increasing system pressure reaches the value, which is preset by spring (5), the valve opens and the control flow passes through the pilot valve. The spool area which is preloaded by spring becomes relieved, the spool control edge opens the radial bores in bushing (7) and the fluid passes from port B to T. The control flow is routed through slot (8) to port T.
When an accurate pressure control, which does not depend on pressure variations in port T (only for models RC2 and RC3, see Functional Symbols), is required the model "Y" with external port for pilot flow is to be used. If a relieving of the valve on a lower pressure as that set up by the spring (5) is needed, the model with port "X" (10) is to be used.
The valve body and the adjustment screw are zinc coated. With models M and R the valve bodies are phosphate coated.



Ordering Code

VPN2-10/ □ - □ □ □

Pilot operated pressure relief valve

Nominal size **10**

Seals

without designation	NBR
V	FPM (Viton)

Adjustment element

S	screw with internal hexagon
R	hand knob

Model

modular valve, flow from A to TA	MA
modular valve, flow from B to TB	MB
modular valve, flow from P to TA	**MP**
modular valve, flow from A to B and B to A	MC
modular valve, flow from A to TA and B to TB	MD
in-line valve, thread P1, P2 - G3/4; T - G1	**RA2**
in-line valve, thread P - G3/4; T - G1	RB2
in-line valve, thread P - G3/4; T - G1; X - G1/4	RC2
in-line valve, thread P - G3/4; T - G1; Y - G1/4	RC3

Pressure range

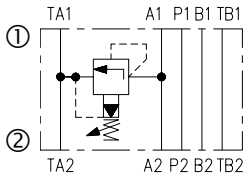
6	up to 913 PSI (63 bar)
10	up to 1450 PSI (100 bar)
16	up to 2321 PSI (160 bar)
21	up to 3045 PSI (210 bar)
32	up to 5076 PSI (350 bar)

Model with two pressure relief cartridges
32/10 pressure setting 5076 PSI (350 bar)
in port A and 1450 PSI (100 bar) in port B, etc.

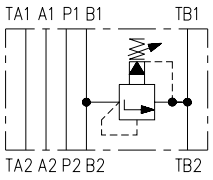
FOR PREFERRED TYPES SEE BOLD TYPING IN ORDERING CODE AND TABLE OF PREFERRED TYPES ON PAGE 7

Functional Symbols

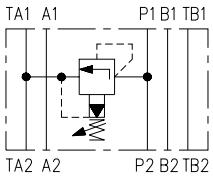
Model MA



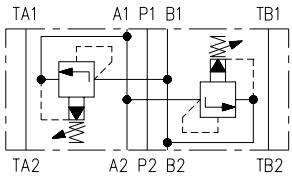
Model MB



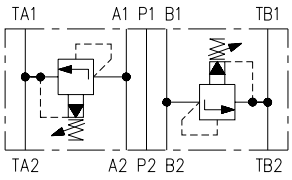
Model MP



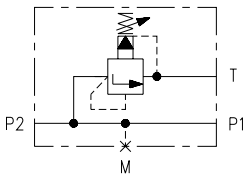
Model MC



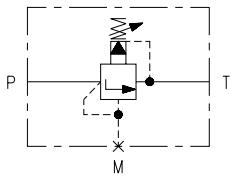
Model MD



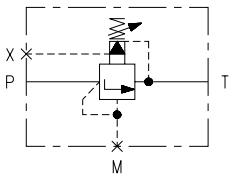
Model RA2



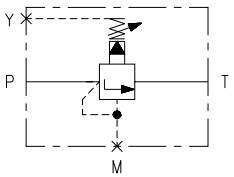
Model RB2



Model RC2



Model RC3



① Valve side
② Subplate side

Ordering Numbers of Sandwich / Valve Bodies (without screw-in cartridge)

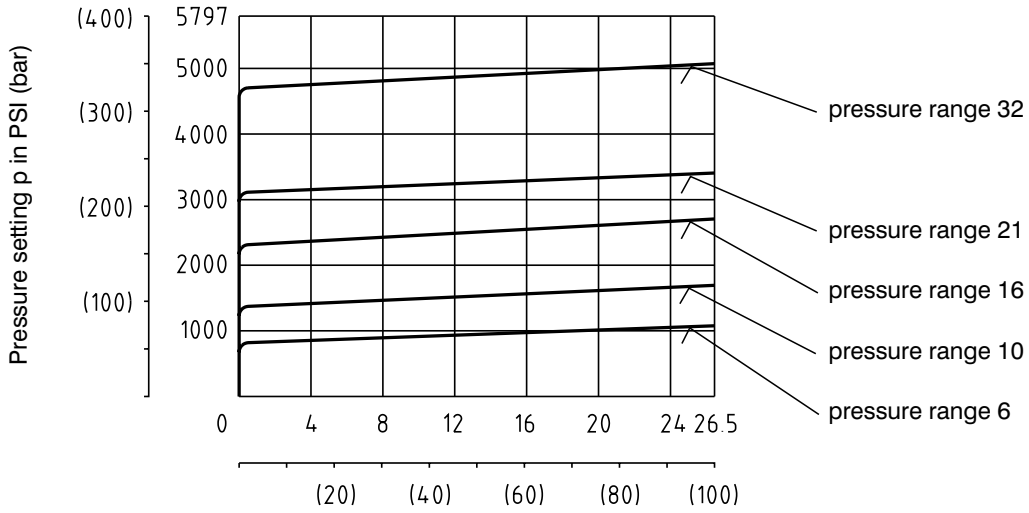
Valve body for modular valve - NBR	Ordering number	Valve body for modular valve - Viton	Ordering number
MA10-VP	556-0670	MA10-VP/V	556-0675
MB10-VP	556-0671	MB10-VP/V	556-0676
MP10-VP	556-0672	MP10-VP/V	556-0677
MC10-VP	556-0673	MC10-VP/V	556-0678
MD10-VP	556-0674	MD10-VP/V	556-0679
Valve body for in-line valve - NBR	**Ordering number**	**Valve body for in-line valve - Viton**	**Ordering number**
RA2-10-VP	556-0688	RA2-10-VP/V	556-0689
RB2-10-VP	556-0682	RB2-10-VP/V	556-0686
RC2-10-VP (RC3-10-VP)	556-0683	RC2-10-VP/V (RC3-10-VP/V)	556-0687

Technical Data

Nominal size	mm	10
Max. flow rate	US GPM (L/min)	39.683 (150)
Max. control flow	US GPM (L/min)	0.132 (0.5)
Max. input pressure (ports P, A, B)	PSI (bar)	913 (63); 1450 (100); 2321 (160); 3045 (210); 5076 (350)
Max. output pressure (port T)	PSI (bar)	5076 (350)
Working pressure related to flow	PSI (bar)	see p-Q characteristics
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP-RP 91H in viscosity classes ISO VG 32, 46 and 68.
Fluid temperature range for standard sealing (NBR)	°F (°C)	-22 ... 176 (-30 ... +80)
Fluid temperature range for Viton sealing (FPM)	°F (°C)	-4 ... 176 (-20 ... +80)
Viscosity range	SUS (mm^2/s)	68 ... 1840 (20 ... 400)
Max. degree of fluid contamination		Class 21/18/15 according to ISO 4406 (1999).
Weight - models MA, MB, MP - models MC, MD - models RA2, RB2, RC2, RC3	lbs (kg)	5.714 (2.6) 6.593 (3.0) 5.934 (2.7)
Mounting position		optional

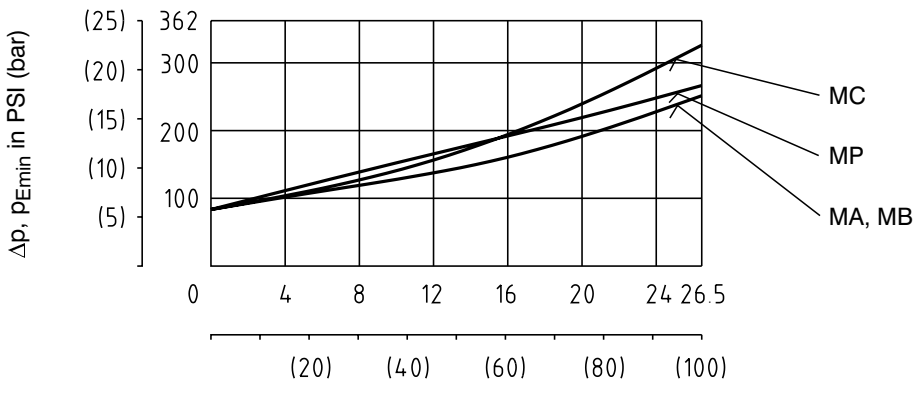
p-Q Characteristics

Measured at ν= 166 SUS (35 mm^2/s) and t = 104 °F (40 °C)



Δp-Q Characteristics

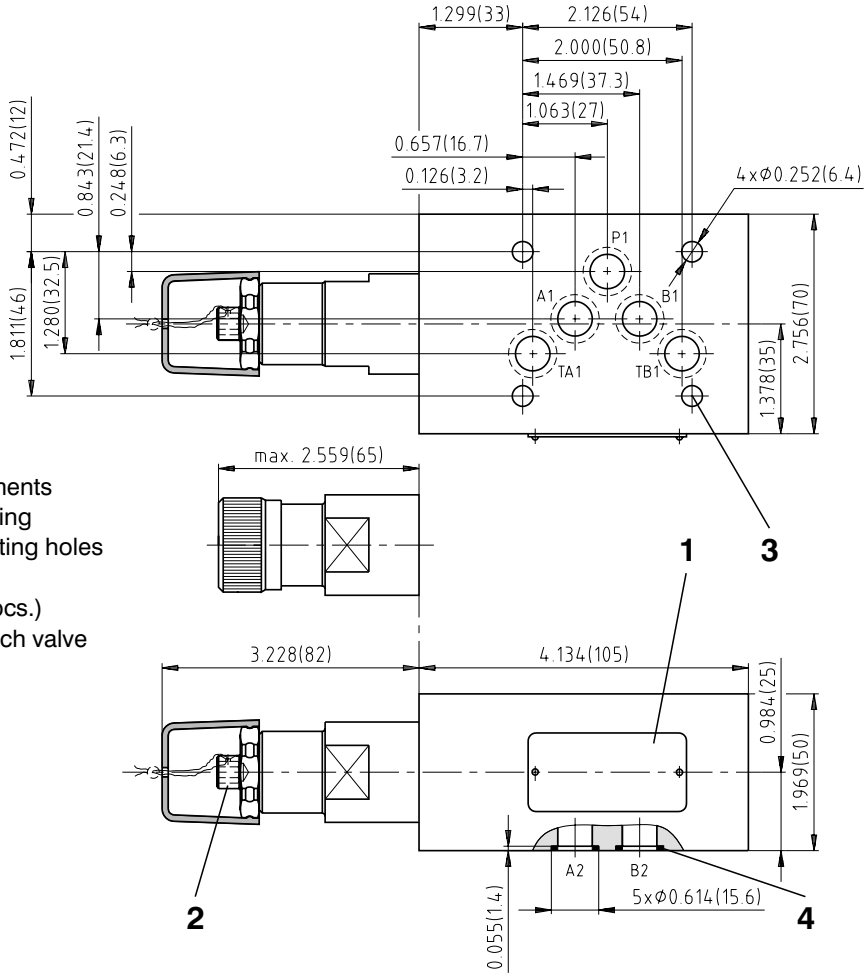
Measured at ν= 166 SUS (35 mm^2/s) and t = 104 °F (40 °C)



Valve Dimensions

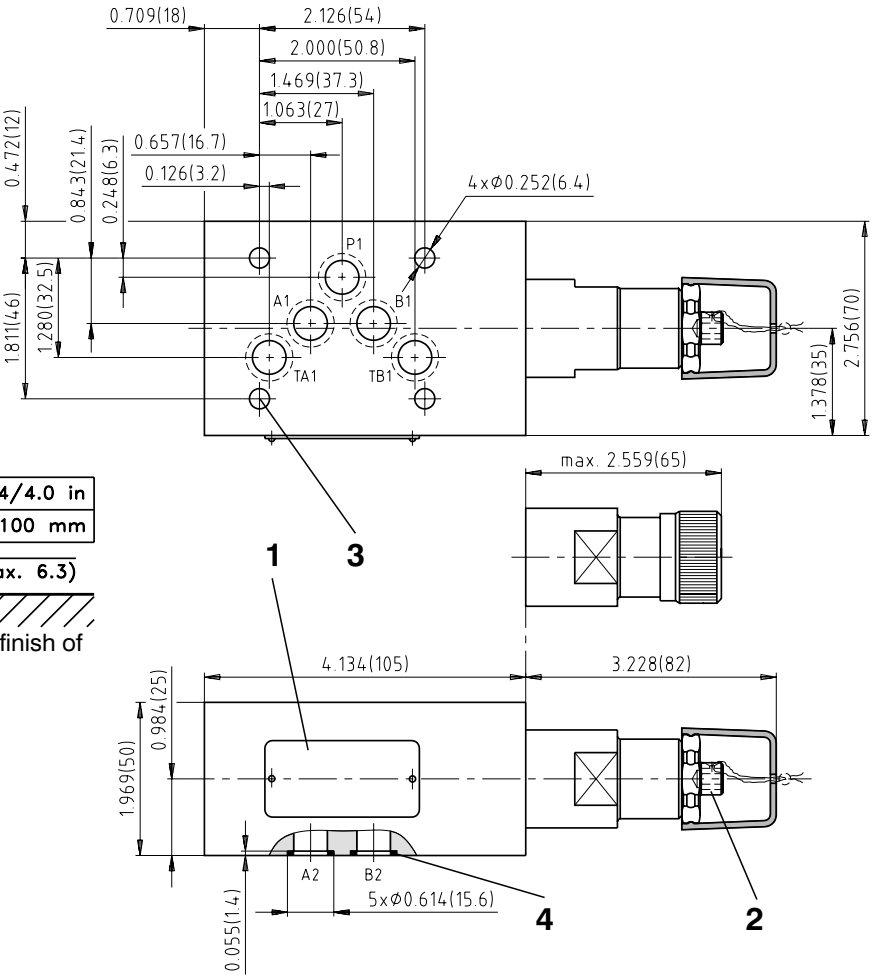
Dimensions in inches and millimetres (in brackets)

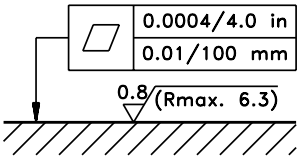
Model MA



1 Name plate
2 Adjustment elements for pressure setting
3 4 through mounting holes
4 Square rings 12.42 x 1.68 (5 pcs.) supplied with each valve

Model MB



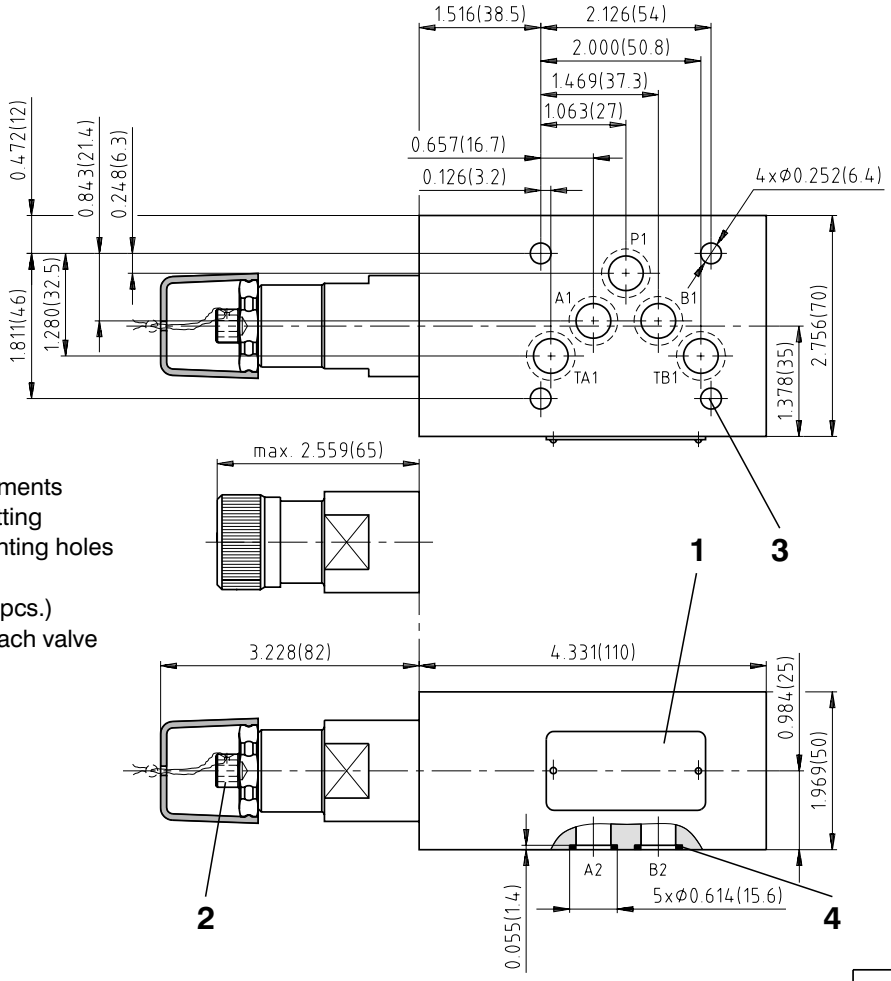


Required surface finish of interface

Valve Dimensions

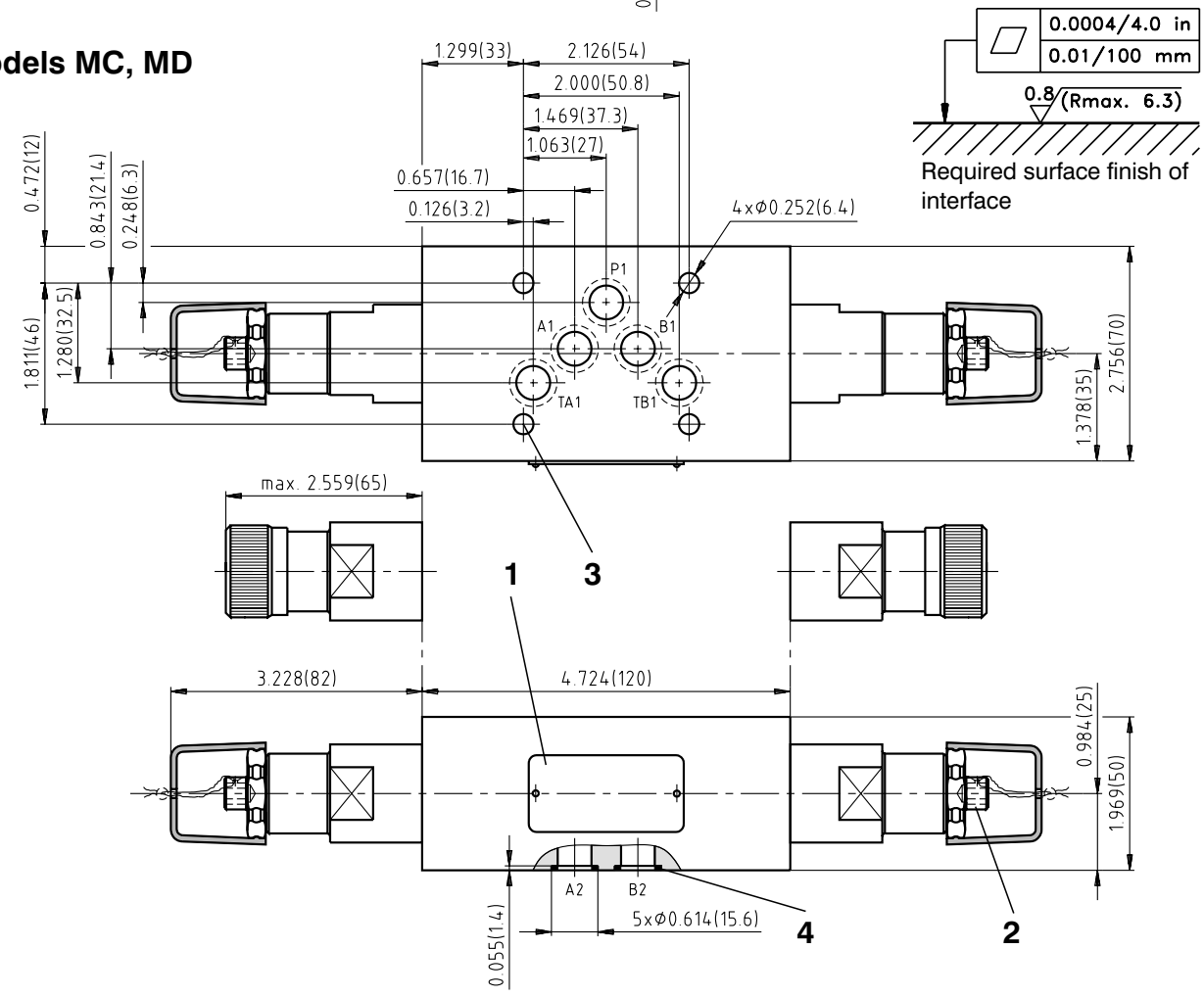
Dimensions in inches and millimetres (in brackets)

Model MP



1 Name plate
2 Adjustment elements for pressure setting
3 4 through mounting holes
4 Square rings 12.42 x 1.68 (5 pcs.) supplied with each valve

Models MC, MD

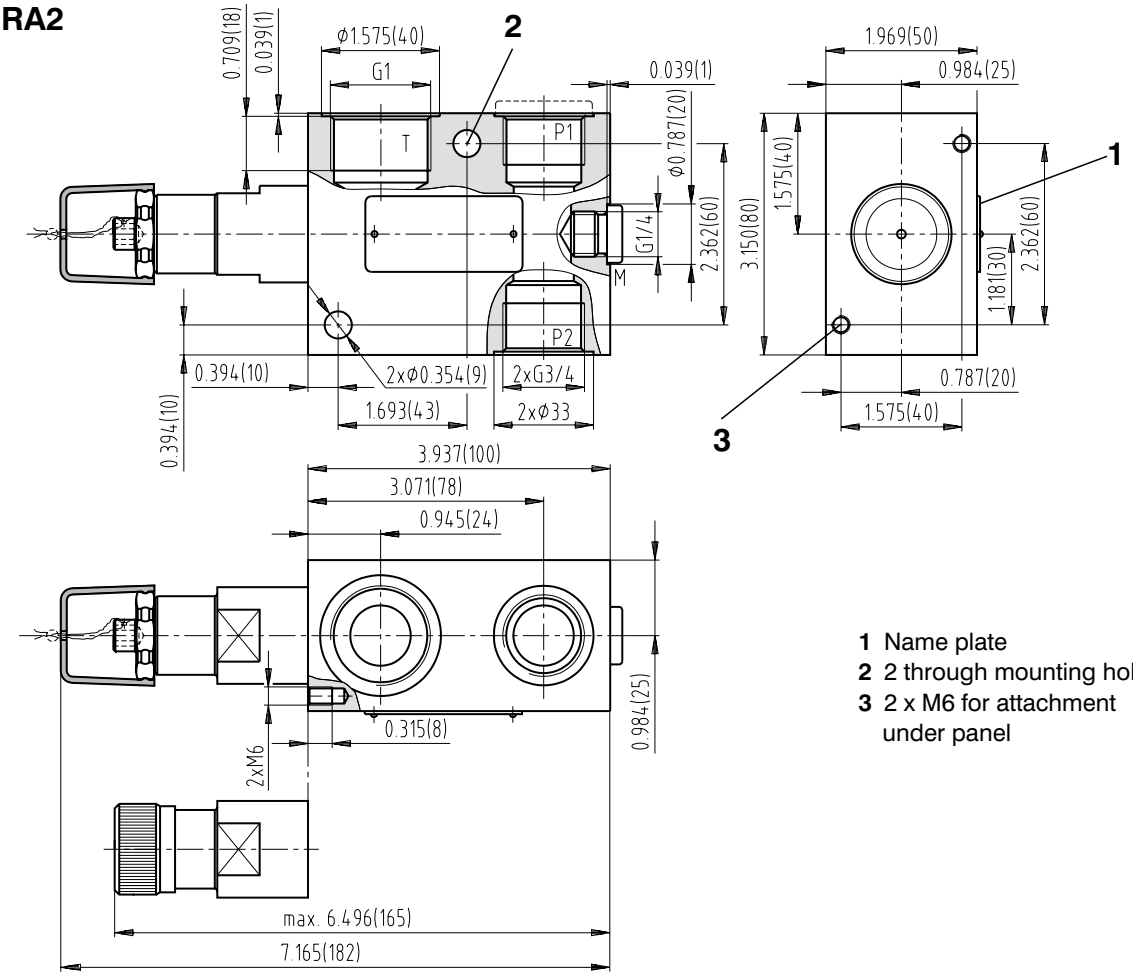


Required surface finish of interface

Valve Dimensions

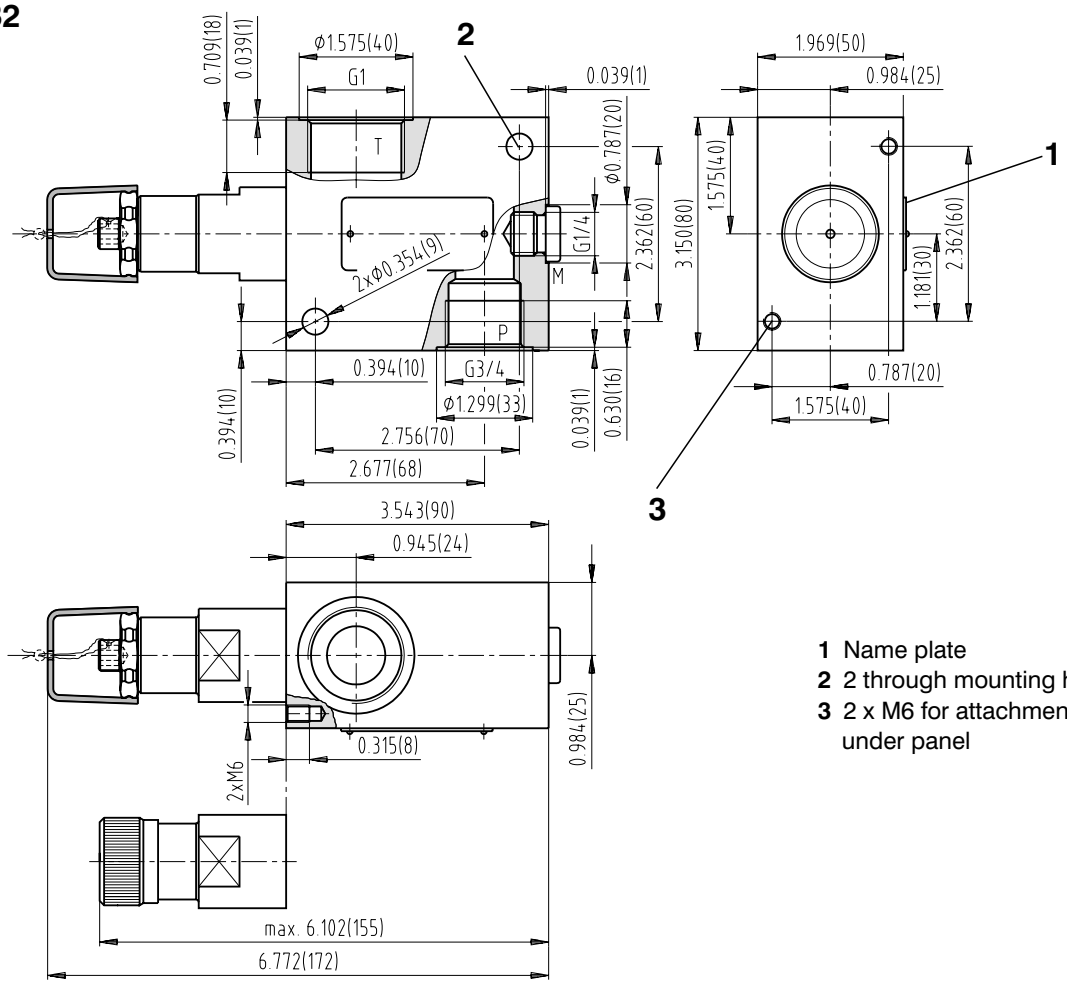
Dimensions in inches and millimetres (in brackets)

Model RA2



1 Name plate
2 2 through mounting holes
3 2 x M6 for attachment under panel

Model RB2

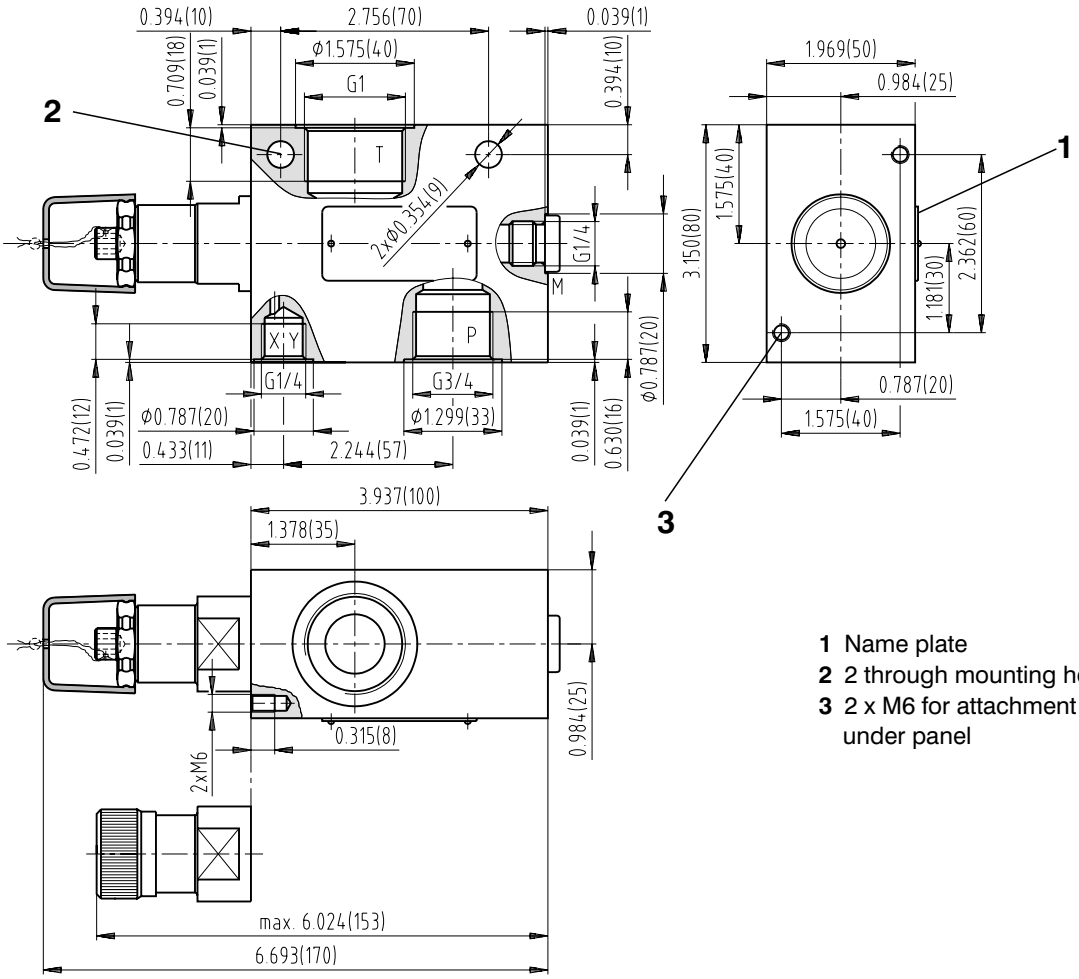


1 Name plate
2 2 through mounting holes
3 2 x M6 for attachment under panel

Valve Dimensions

Dimensions in inches and millimetres (in brackets)

Model RC2, RC3



1 Name plate
2 2 through mounting holes
3 2 x M6 for attachment under panel

Spare Parts

Model	Dimensions, number	Ordering number
Modular valve - NBR	Square ring 12.42 x 1.68 NBR 90 (5 pcs.)	556-0384
Modular valve - Viton	O-ring 12.42 x 1.78 (5 pcs.)	556-0385
Model	**Typ, number**	**Ordering number**
In-line valve RA2 - NBR	VSTI R1/4-ED (1 pc.) VSTI R3/4-ED (1 pc.)	556-0655
In-line valve RB2, RC2, RC3 - NBR	VSTI R1/4-ED (1 pc.)	556-0657
In-line valve RA2 - Viton	VSTI R1/4-ED - Viton (1 pc.) VSTI R3/4-ED - Viton (1 pc.)	556-0656
In-line valve RB2, RC2, RC3 - Viton	VSTI R1/4-ED - Viton (1 pc.)	556-0658

Preferred Types of Valves

Type	Ordering number	Type	Ordering number
VPN2-10/MP-10S	556-1421	VPN2-10/RA2-10S	556-1561
VPN2-10/MP-21S	556-1423	VPN2-10/RA2-21S	556-1563
VPN2-10/MP-32S	556-1424	VPN2-10/RA2-32S	556-1564

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www.argo-hytos.com

2-way pressure compensator

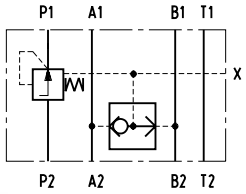
TV2-062/M

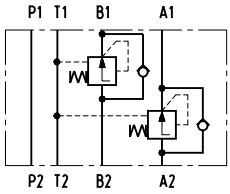
Size 06 • p_{max} up to 320 bar • Q_{max} up to 35 L/min

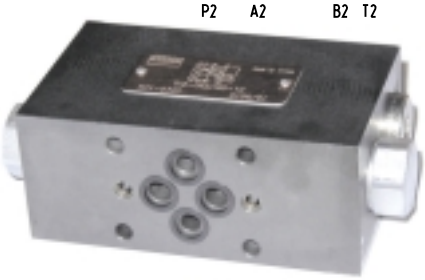
HA 5166
6/2001

Replaces
HA 5166 4/2001

- **Modular design for vertical stacking assemblies**
- **Build-in load sensing shuttle valve**
- **Installation dimensions to ISO 4401:1994 and DIN 24 340-A6**







Functional Description

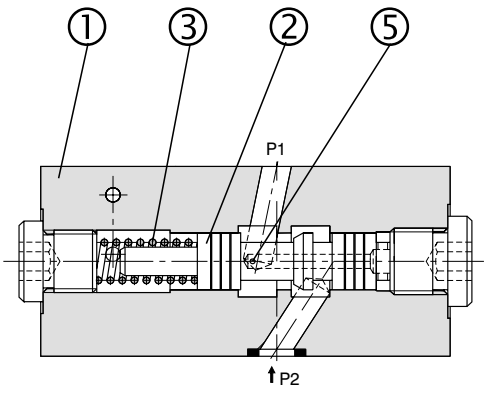
2-Way pressure compensator for meter-in application

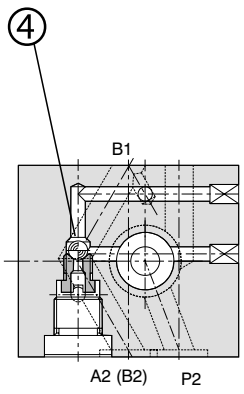
The 2-way pressure compensators in meter-in application will maintain a constant pressure difference across the metering edge of the proportional direction valve. In this case, the pressure variations due to loading changes, as well as pump pressure changes are compensated so any increase in pump pressure does not affect the flow. The meter-in compensators may only be used with positive load direction.

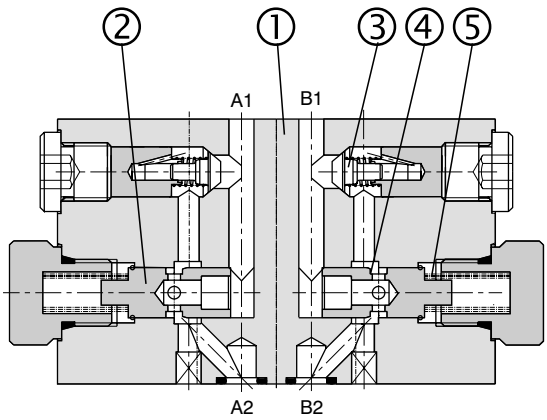
Valves TV2-062/M are directly operated 2-way pressure compensators in sandwich plate design. They are designated for load compensation in channel P.
The main parts of these valves are the housing (1), control spool (2), spring (3) and shuttle valve (4). The spring (3) holds the spool in the open position from P2 to P1, provided that the pressure difference between P1 and A (P1 - B) is less than 10 bar. When the pressure difference exceeds the value of 10 bar, the spool shifts against the spring until the desired pressure difference has been restored.
The pressure signal comes through passage (5) from channel P.
The valve body is phosphated, all other parts are zinc coated.

2-Way pressure compensator for meter-out application

In systems with changing load directions, the use of meter-out pressure compensators is required. With respect to the application a valve with pressure compensator installed in one, or in both actuator ports are available.
The pressure compensator is always mounted between the actuator and the proportional directional valve. The valve will maintain the pressure difference between A and T or B and T constant. The flow rate and the flow direction are adjusted by the proportional directional valve. To enable the reverse flow, two by-pass check valves are incorporated into the valve body.
The valve consists of the valve body (1), one or two control spools (2) and poppets of the by-pass check valves (3). If the pump, for example, is connected to port A, the fluid passes to the actuator through a check valve and returns from the actuator through channel B to the proportional directional valve. The pressure difference across the metering edge of the directional valve is maintained at a constant level. This ensures a constant flow rate independent to the load. The pressure difference is controlled by the metering edge (4), its value being determined by spring force (5).







Ordering Code

TV2 - 062/M □ □

Pressure compensator

Nominal size

2-Way pressure compensator

Sandwich plate design

Seals

without designation NBR

V FPM (Viton)

Model

A Meter-in compensator in channel A

B Meter-in compensator in channel B

C Meter-in compensator in channels A and B

D Meter-out compensator in channels A and B

E Meter-out compensator in channel A

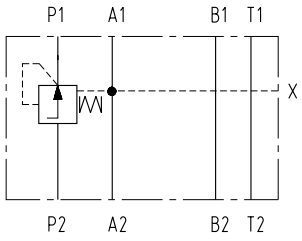
F Meter-out compensator in channel B

Technical Data

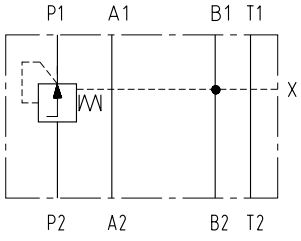
Nominal size	mm	06
Maximum flow	L/min	35
Max. operating pressure	bar	320
Pressure drop on valve Δp	bar	10
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP-RP 91H in viscosity classes ISO VG 32, 46 and 68.
Maximum degree of fluid contamination		Class 21/18/15 to ISO 4406 (1999).
Weight (Model A,B,C,D,E,F)	kg	1.00
Mounting position		optional

Functional Symbols

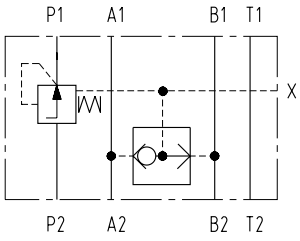
Model A



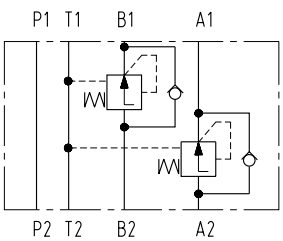
Model B



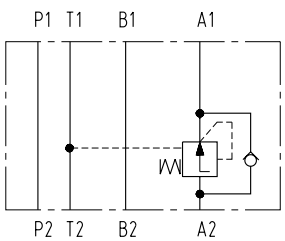
Model C



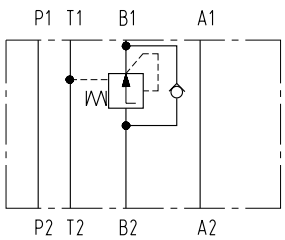
Model D



Model E

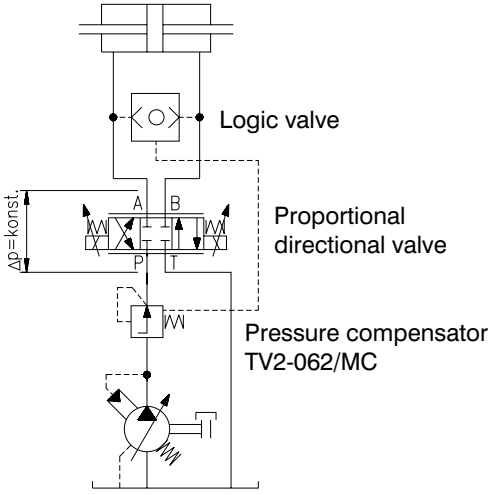


Model F

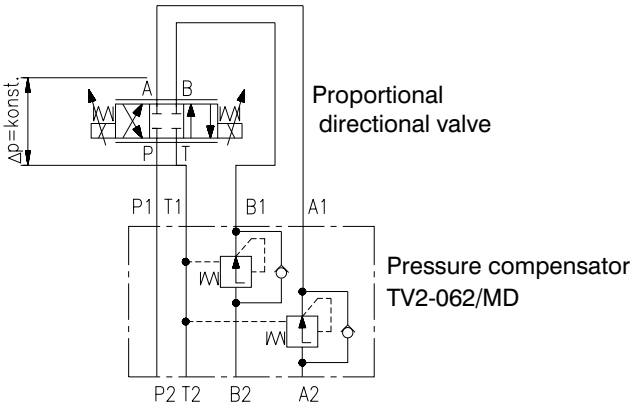


Typical applications

TV2-062/MC Meter-in compensator



TV2-062/MD Meter-out compensator

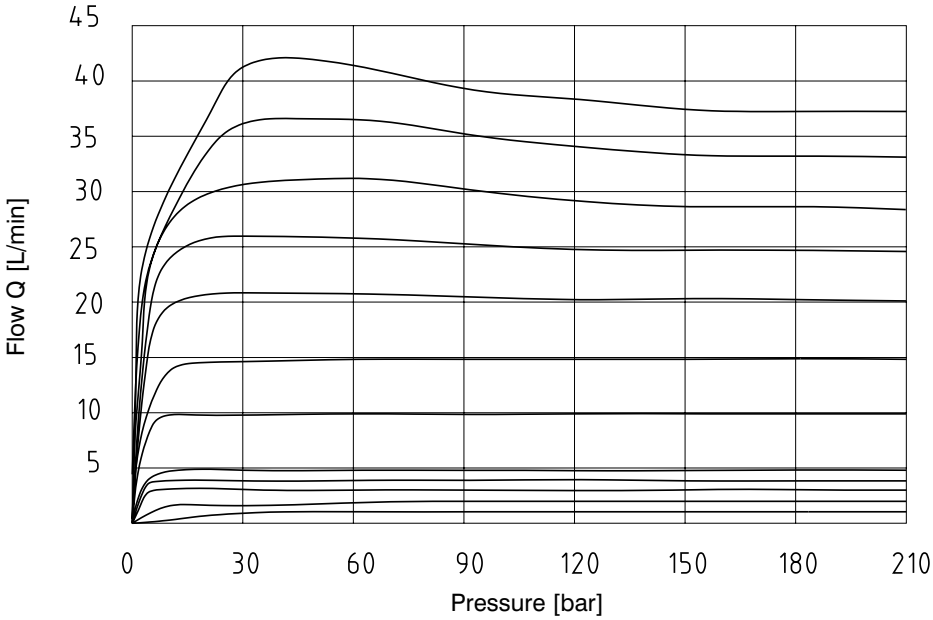


Δp-Q Characteristics

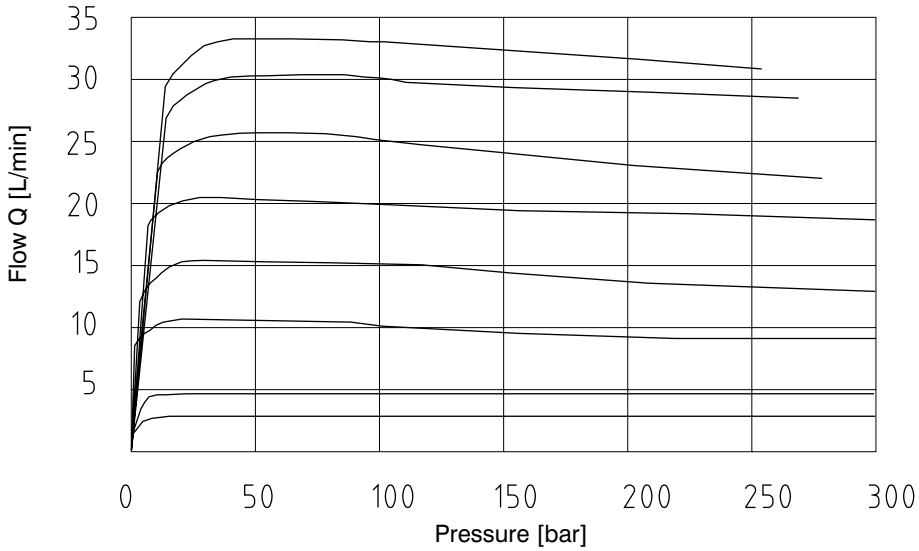
Measured at ν = 35 mm^2/s and t = 40 °C

The characteristic of the pressure compensator corresponds to the flow rate of a PRM2-063Z11/30 proportional directional valve. By increasing the flow resistance due to a flow rate increase, also the outside pressure difference has to be increased, in order to ensure the correct control function.

TV2-062/MC Meter-in compensator



TV2-062/MD Meter-out compensator

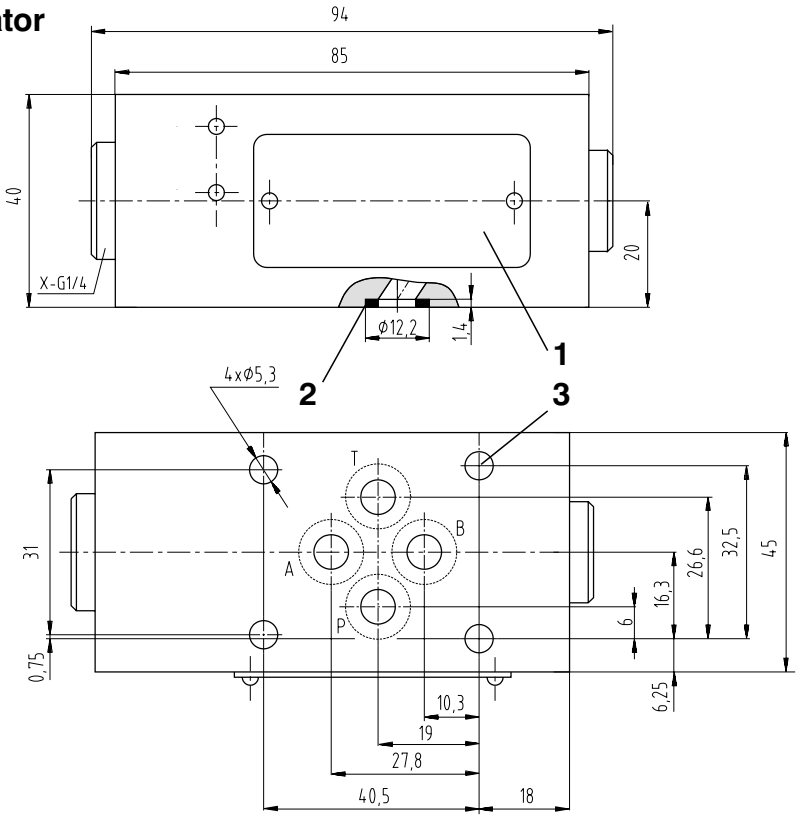


Valve Dimensions

Dimensions in millimetres

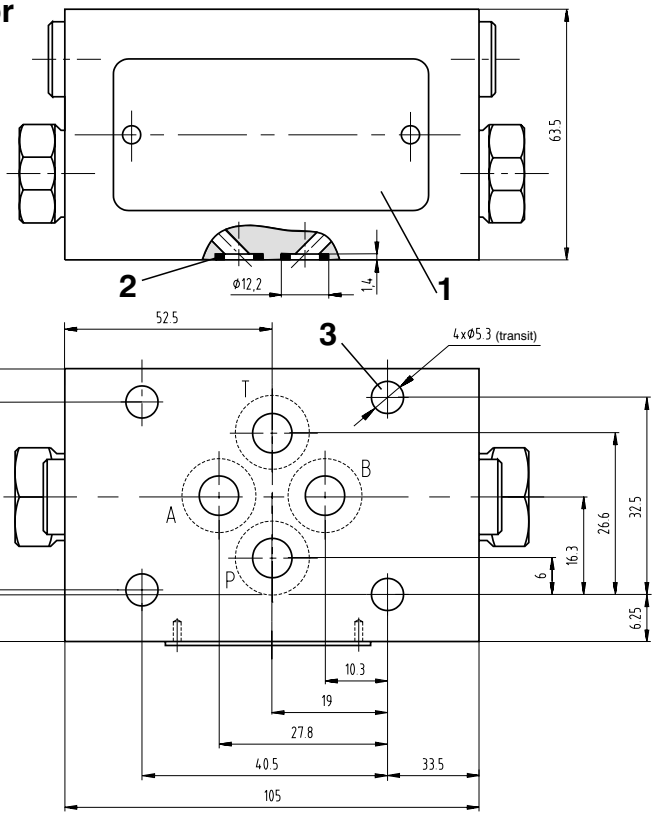
TV2-062/M Meter-in compensator

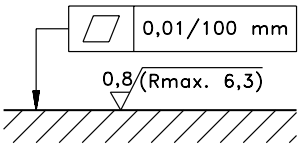
1 Name plate
2 Square ring 9.25 x 1.68 (4 pcs.)
3 4 mounting holes



TV2-062/M Meter-out compensator

1 Name plate
2 Square ring 9.25 x 1.68 (4 pcs.)
3 4 mounting holes





Required surface finish of interface

Caution!

- The packing foil is recyclable.
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law.

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2-way pressure compensator

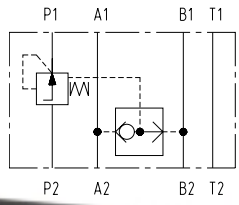
TV2-042/M

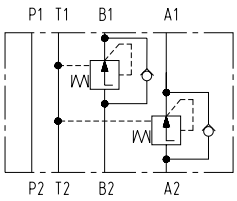
Size 04 • p_{max} up to 320 bar • Q_{max} up to 16 L/min

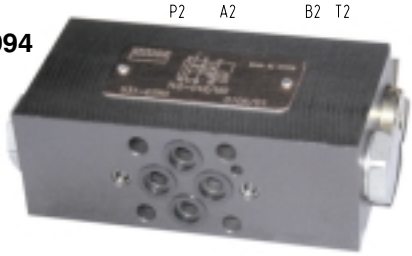
HA 5167
6/2001

Replaces
HA 5167 4/2001

- ❑ **Modular design for vertical stacking assemblies**
- ❑ **Build-in load sensing shuttle valve**
- ❑ **Installation dimensions to ISO 4401:1994**





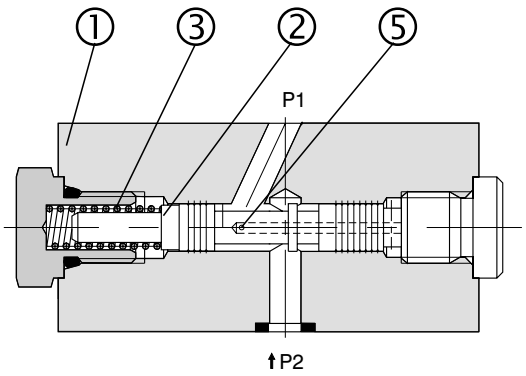


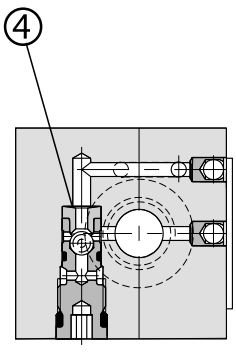
Functional Description

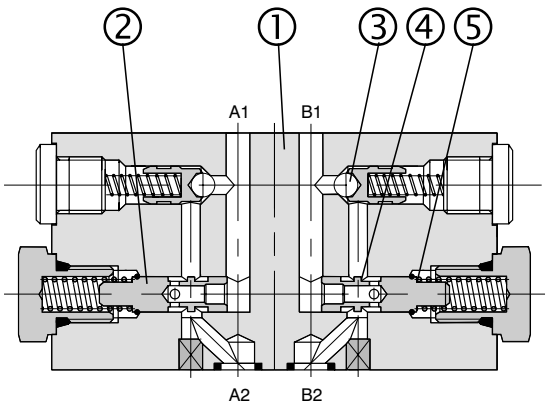
2-Way pressure compensator for meter-in application
The 2-way pressure compensators in meter-in application will maintain a constant pressure difference across the metering edge of the proportional direction valve. In this case, the pressure variations due to loading changes, as well as pump pressure changes are compensated so any increase in pump pressure does not affect the flow. The meter-in compensators may only be used with positive load direction.

Valves TV2-042/M are directly operated 2-way pressure compensators in sandwich plate design. They are designated for load compensation in channel P.
The main parts of these valves are the housing (1), control spool (2), spring (3) and shuttle valve (4). The spring (3) holds the spool in the open position from P2 to P1, provided that the pressure difference between P1 and A (P1 - B) is less than 10 bar. When the pressure difference exceeds the value of 10 bar, the spool shifts against the spring until the desired pressure difference has been restored.
The pressure signal comes through passage (5) from channel P.
The valve body is phosphated, all other parts are zinc coated.

2-Way pressure compensator for meter-out application
In systems with changing load directions, the use of meter-out pressure compensators is required. With respect to the application a valve with pressure compensator installed in one, or in both actuator ports are available.
The pressure compensator is always mounted between the actuator and the proportional directional valve. The valve will maintain the pressure difference between A and T or B and T constant. The flow rate and the flow direction are adjusted by the proportional directional valve. To enable the reverse flow, two by-pass check valves are incorporated into the valve body.
The valve consists of the valve body (1), one or two control spools (2) and poppets of the by-pass check valves (3). If the pump, for example, is connected to port A, the fluid passes to the actuator through a check valve and returns from the actuator through channel B to the proportional directional valve. The pressure difference across the metering edge of the directional valve is maintained at a constant level. This ensures a constant flow rate independent to the load. The pressure difference is controlled by the metering edge (4), its value being determined by spring force (5).







Ordering Code

TV2 - 042/M □ □

Pressure compensator

Nominal size

2-Way pressure compensator

Sandwich plate design

Seals

without designation NBR

V FPM (Viton)

Model

A Meter-in compensator in channel A

B Meter-in compensator in channel B

C Meter-in compensator in channels A and B

D Meter-out compensator in channels A and B

E Meter-out compensator in channel A

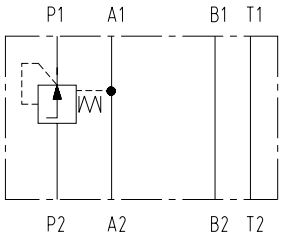
F Meter-out compensator in channel B

Technical Data

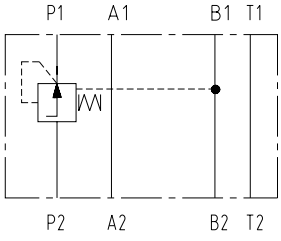
Nominal size	mm	04
Maximum flow	L/min	20
Max. operating pressure	bar	320
Pressure drop on valve Δp	bar	10
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP-RP 91H in viscosity classes ISO VG 32, 46 and 68.
Maximum degree of fluid contamination		Class 21/18/15 to ISO 4406 (1999).
Weight (Model A,B,C,D,E,F)	kg	0.6
Mounting position		optional

Functional Symbols

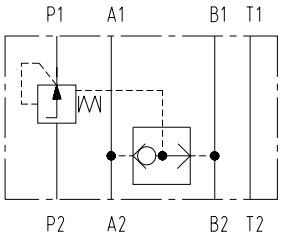
Model A



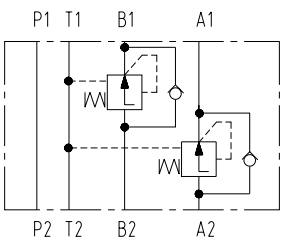
Model B



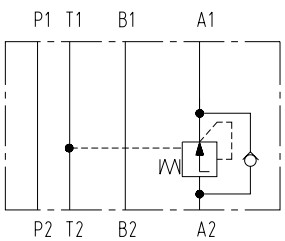
Model C



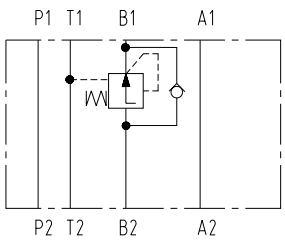
Model D



Model E

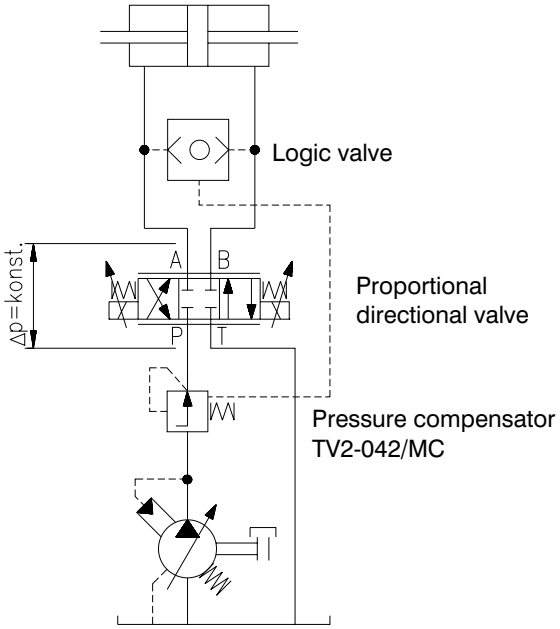


Model F

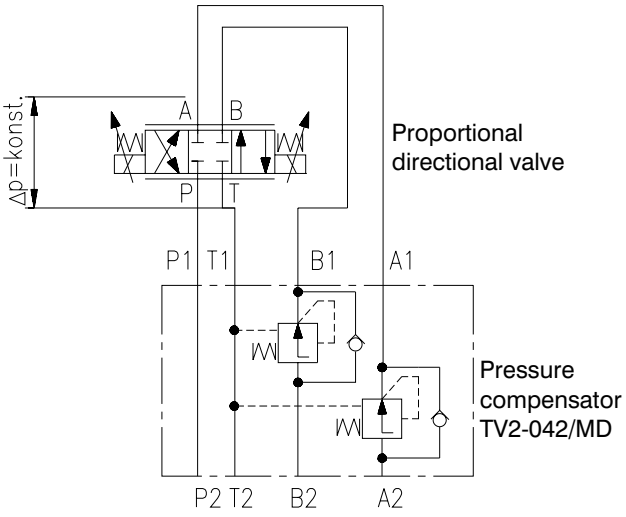


Typical applications

TV2-042/MC Meter-in compensator



TV2-042/MD Meter-out compensator

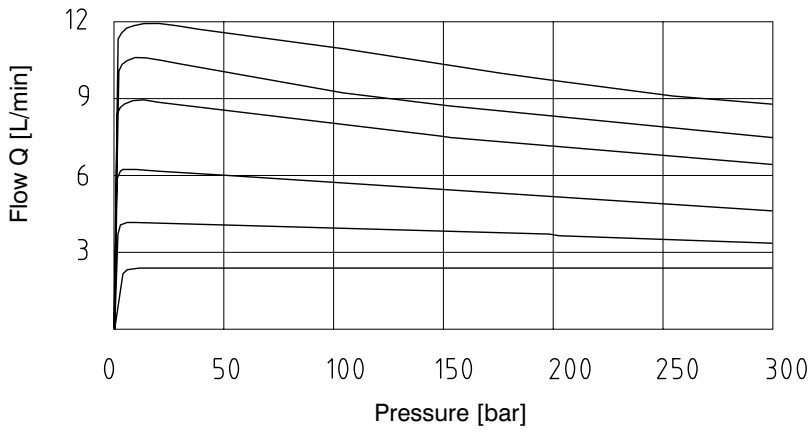


Characteristics

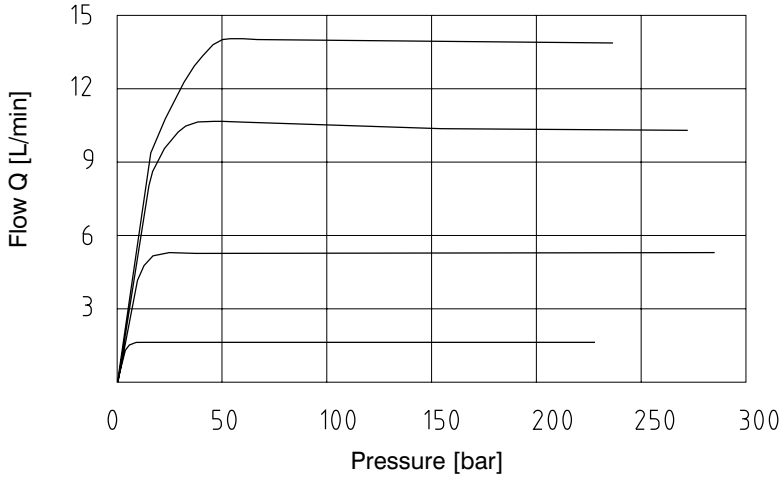
Measured at ν = 35 mm^2/s and t = 40 °C

The characteristic of the pressure compensator corresponds to the flow rate of a PRM2-043Z11/12 proportional directional valve. By increasing the flow resistance due to a flow rate increase, also the outside pressure difference has to be increased, in order to ensure the correct control function.

TV2-042/MC Meter-in compensator



TV2-042/MD Meter-out compensator

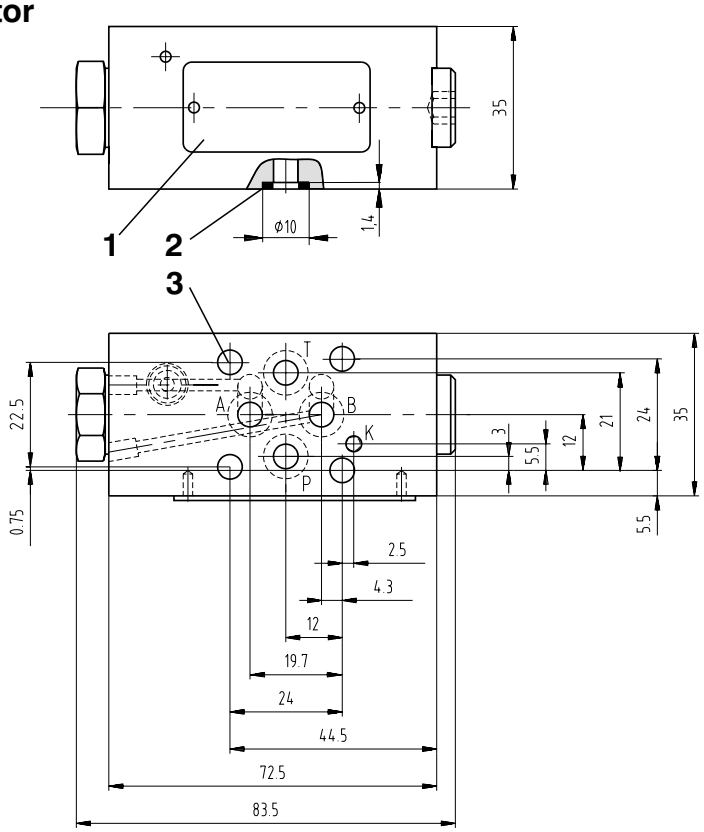


Valve Dimensions

Dimensions in millimetres

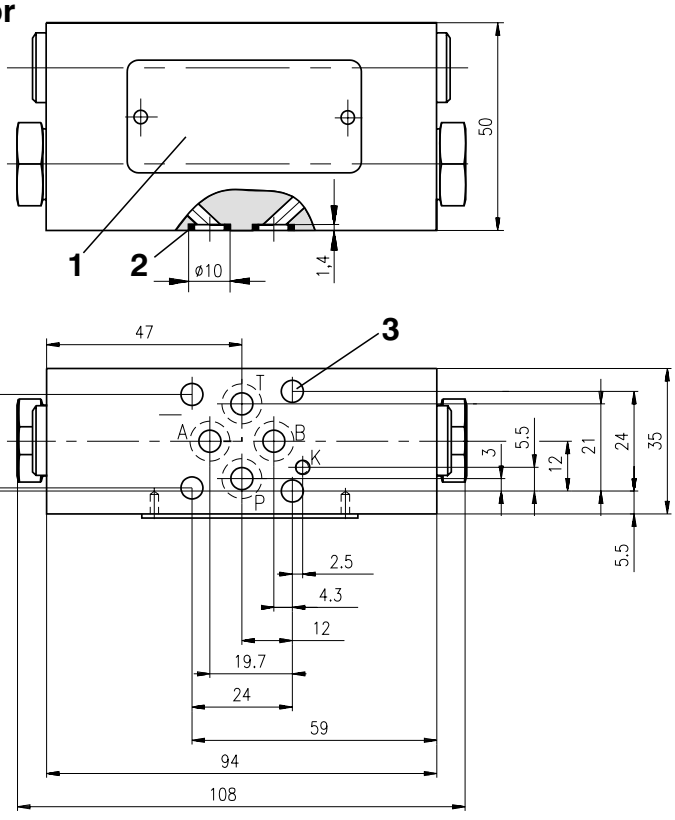
TV2-042/M Meter-in compensator

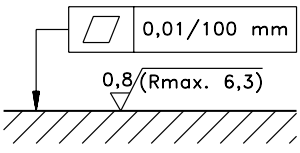
1 Name plate
2 Squarq ring 7.65 x 1.68 (4 pcs.)
3 4 mounting holes



TV2-042/M Meter-out compensator

1 Name plate
2 Squarq ring 7.65 x 1.68 (4 pcs.)
3 4 mounting holes





Required surface finish of interface

Caution!

- The packing foil is recyclable.
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law.

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ARGO HYTOS

3-way Pressure Compensators

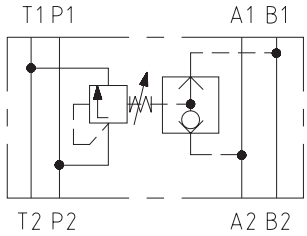
TV2-043/M
TV2-063/M

Size 04, 06 • p_{max} up to 320 bar • Q_{max} up to 15 - 35 L/min

HA 5168
2/2005

Replaces
HA 5168 6/2001

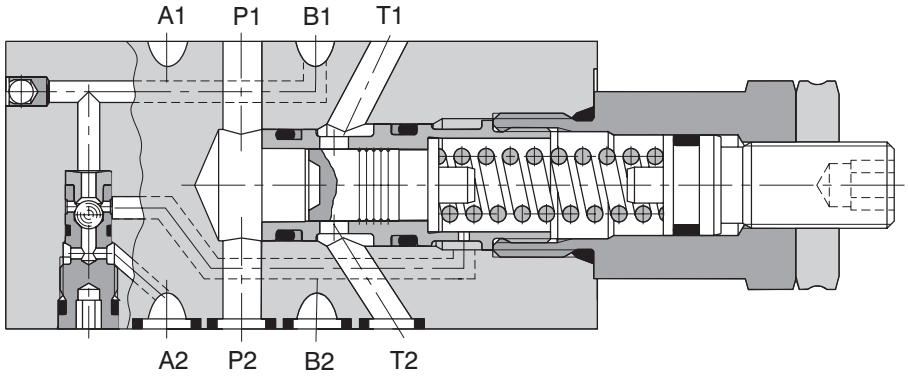
- **Sandwich plate design for use in vertical stacking assemblies**
- **With integrated logic valve**
- **Pressure difference adjustable from 5 - 40 bar**
- **Installation dimensions to ISO 4401 CETOP-RP 121H, ISO 4401:1994 and DIN 24 340-A6**



Functional Description

The valves TV2-043/M and TV2-063/M are designed as a sandwich plate of size 04 and 06. They consists of a body, a logic valve and a pressure compensator with control spool.
The ports A and B are always connected through the logic valve seat with the spring side of spool. The higher pressure pushes the ball onto the seat that is affected by lower pressure. This always causes the channel with the higher pressure to be connected with the control spool spring room.
The required pressure difference between port P and the spring room is adjusted. When the pressure difference between P and the spring room exceeds the value set, the control spool shifts, causing the part of pressure fluid to pass from P to T until the desired pressure difference has been restored.

Usually, this pressure compensator is used in connection with a proportional directional valve. In this case, each value of the control signal a particular constant flow rate can be assigned, this being independent of load.



Ordering Code

TV2 - □ 3/M □ □

Pressure compensator

Nominal size
size 04 **04**
size 06 **06**

3-Way pressure compensator

Seals
without designation NBR
V FPM (Viton)

Model
A in channel A
B in channel B
C in channels A and B

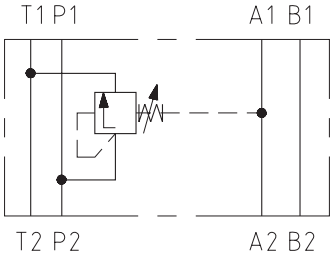
Sandwich plate design

Technical Data

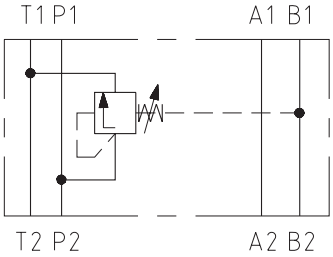
Nominal size	mm	04	06
Maximum flow	L/min	20	40
Max. operating pressure	bar	320	
Pressure drop on valve Δp	bar	5 - 40	
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP-RP 91H in viscosity classes ISO VG 32, 46 and 68.	
Maximum degree of fluid contamination		Class 21/18/15 to ISO 4406 (1999).	
Weight (Model A,B,C)	kg	0.6	1.00
Mounting position		optional	

Functional Symbols

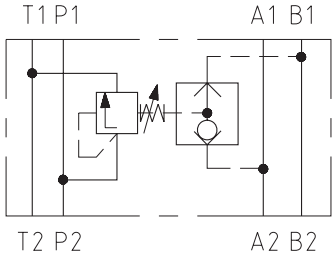
Model A



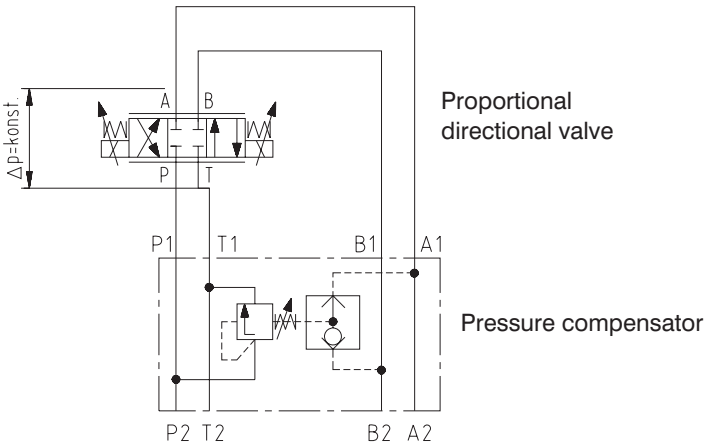
Model B



Model C



Typical applications

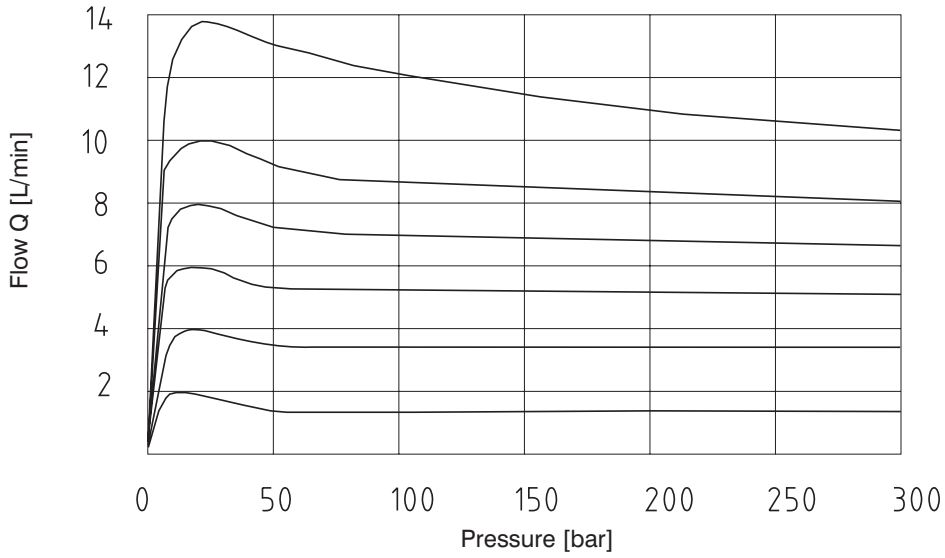


Characteristics

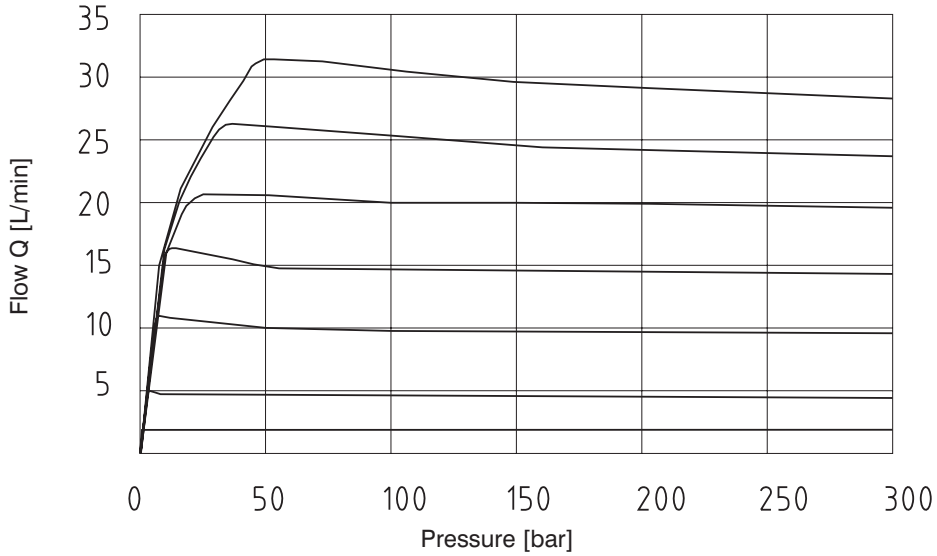
Measured at ν = 35mm^2/s and t = 40 °C

The characteristic of the pressure compensator corresponds with the flow rate of a PRM2-043Z11/12 and PRM2-063Z11/30 proportional directional valve. By increasing the flow resistance due to a flow rate increase, also the outside pressure difference has to be increased, in order to ensure the correct control function.

Tv2-043/M



TV2-063/M

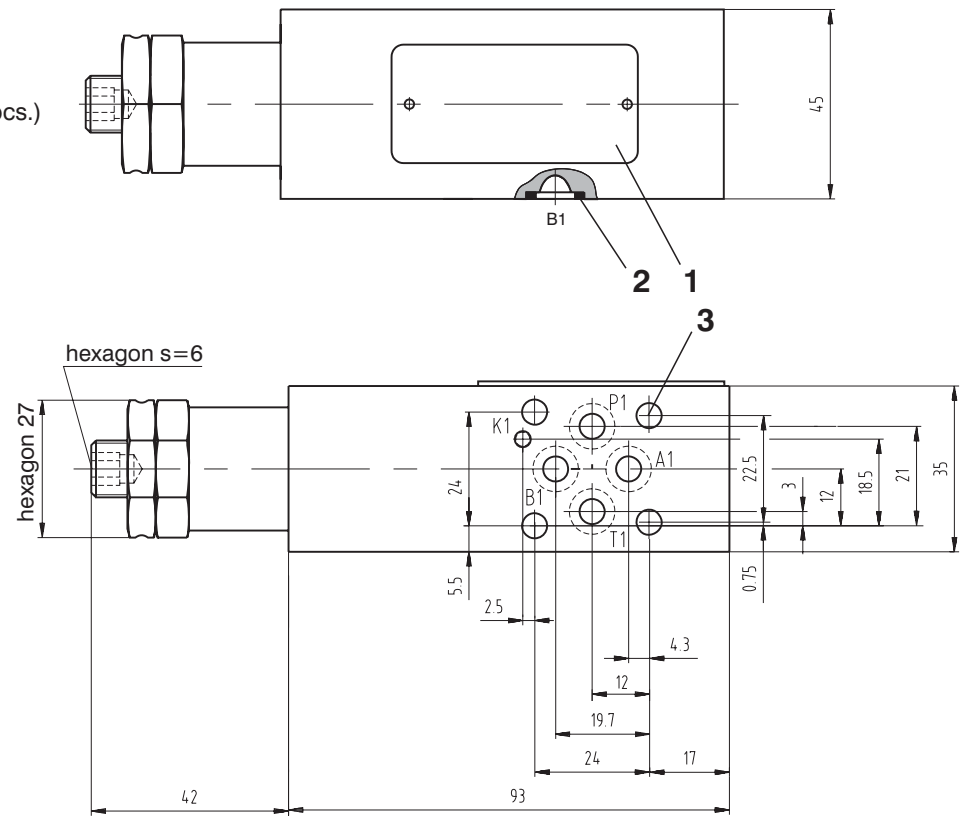


Valve Dimensions

Dimensions in millimetres

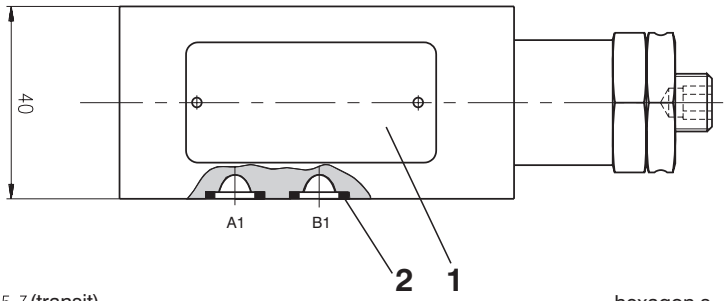
TV2-043/M

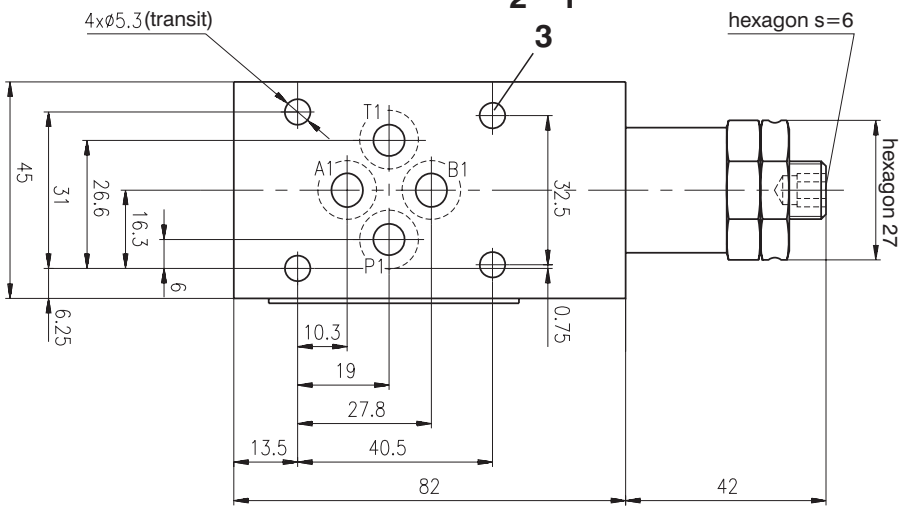
1 Name plate
2 Square ring 7.65 x 1.68 (4 pcs.)
3 4 mounting holes

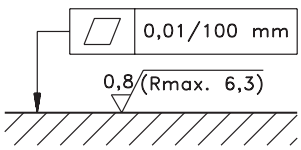


TV2-063/M

1 Name plate
2 Square ring 9.25 x 1.68 (4 pcs.)
3 4 mounting holes







Required surface finish of interface

Caution!

- The packing foil is recyclable.
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law.

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ARGO HYTOS

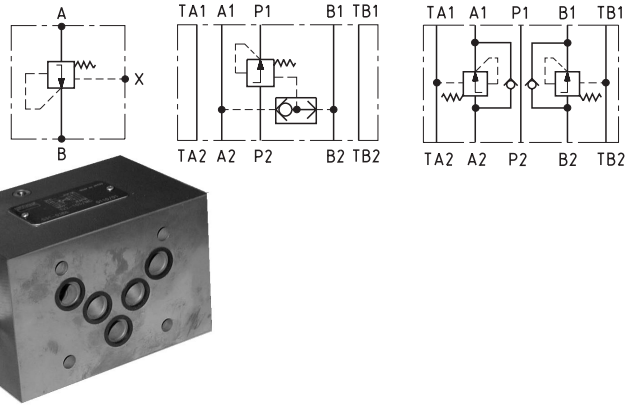
2-way pressure compensator TV2-102

Size 10 • p_{max} up to 320 bar • Q_{max} up to 80 L/min

HA 5169
5/2005

Replaces
HA 5169 11/2001

- ❑ **Cartridge design**
- ❑ **Sandwich plate design for use in vertical stacking assemblies**
- ❑ **Build-in load sensing shuttle valve**
- ❑ **Installation dimensions to ISO 4401:1994 and DIN 24 340-A10**



Functional Description

2-Way pressure compensator for meter-in application

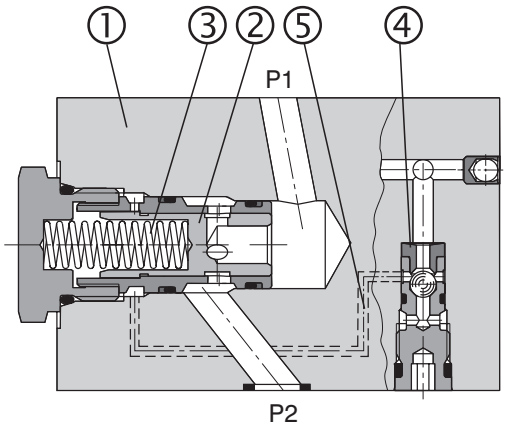
The 2-way pressure compensators in meter-in application will maintain a constant pressure difference across the metering edge of the proportional direction valve. In this case, the pressure variations due to load changes, as well as pump pressure changes are compensated so any increase in pump pressure does not affect the flow. The meter-in compensators may only be used with positive load direction.

Valves type TV2-102/MA,B,C are directly operated 2-way pressure compensators cartridge design in sandwich plate. They are designated for load compensation in channel P.

The main parts of these valves are the housing (1), control spool (2), spring (3) and shuttle valve (4). The spring (3) holds the spool in the open position from P2 to P1, provided that the pressure difference between P1 and A (P1 - B) is less than 10 bar. When the pressure difference exceeds the value of 10 bar, the spool shifts against the spring and throttled radial the housing openings until the desired pressure difference has been restored.

The pressure signal comes through passage (5) from channel A or B.

The valve body is phosphated, all other parts are zinc coated.

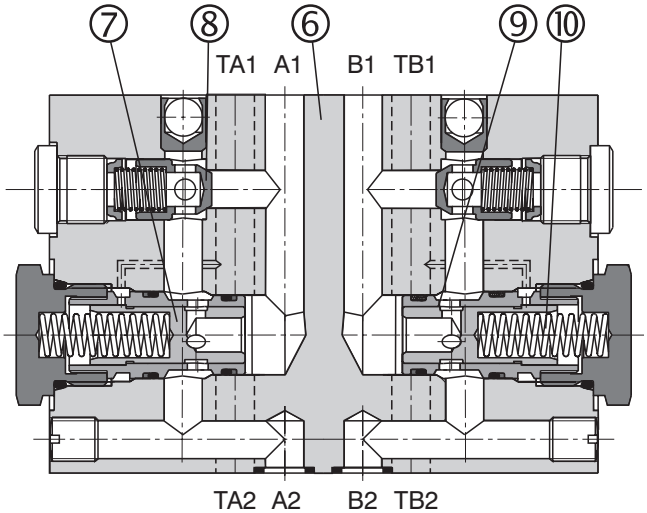


2-Way pressure compensator for meter-out application

In systems with changing load directions, the use of meter-out pressure compensators is required. With respect to the application a valve with pressure compensator installed in one, or in both actuator ports are available.

The pressure compensator is always mounted between the actuator and the proportional directional valve. The valve will maintain the pressure difference between A and T or B and T constant. The flow rate and the flow direction are adjusted by the proportional directional valve. To enable the reverse flow, two by-pass check valves are incorporated into the valve body.

The valve consists of the valve body (6), one or two control spools (7) and poppets of the by-pass check valves (8). If the pump, for example, is connected to port A, the fluid passes to the actuator through a check valve and returns from the actuator through channel B to the proportional directional valve. The pressure difference across the metering edge of the directional valve is maintained at a constant level. This ensures a constant flow rate independent to the load. The pressure difference is controlled by the metering edge (9), its value being determined by spring force (10). A similar valve function develops when the proportional valve ports P and B are connected.



Ordering Code

TV2 - 102/ □ □ □

Pressure compensator

Nominal size

2-Way pressure compensator

Design

Cartridge	**S**
Sandwich plate	**M**

Seals

without designation	NBR
V	FPM (Viton)

Model

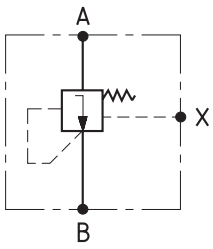
A	Meter-in compensator - function in channel A
B	Meter-in compensator - function in channel B
C	Meter-in compensator - function in channels A and B
D	Meter-out compensator - function in channels A and B
E	Meter-out compensator - function in channel A
F	Meter-out compensator - function in channel B

Technical Data

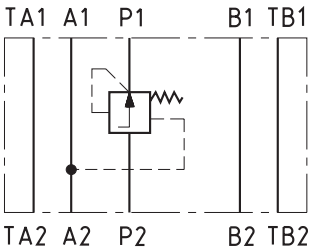
Nominal size	mm	10
Maximum flow	L/min	80
Max. operating pressure	bar	320
Pressure drop on valve Δp	bar	10
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP-RP 91H in viscosity classes ISO VG 32, 46 and 68.
Maximum degree of fluid contamination		Class 21/18/15 to ISO 4406 (1999).
Weight TV2-102/S TV2-102/MA (MB, MC) TV2-102/MD (ME, MF)	kg	0.15 3.70 6.65
Valve tightening torque for design S	Nm	70
Mounting position		optional

Functional symbols

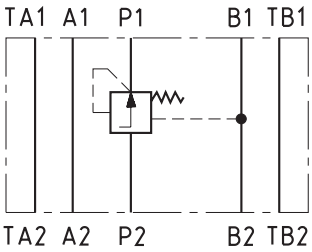
Model S



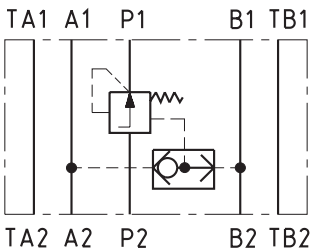
Model MA



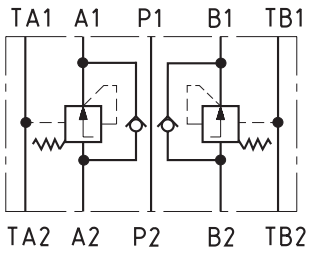
Model MB



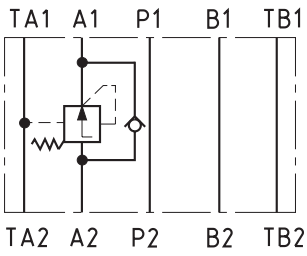
Model MC



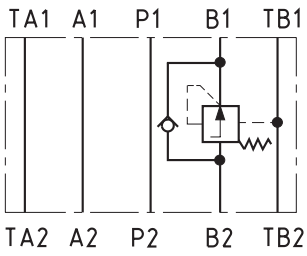
Model MD



Model ME



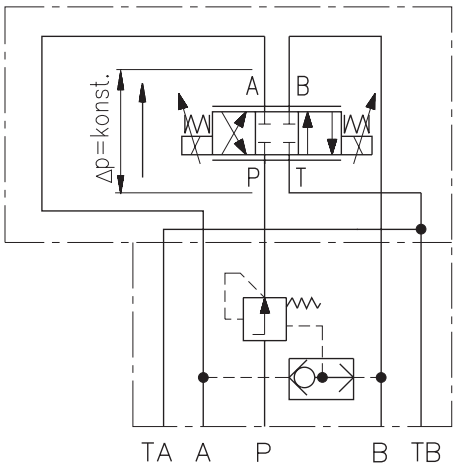
Model MF



① valve side
② plate side

Typical application

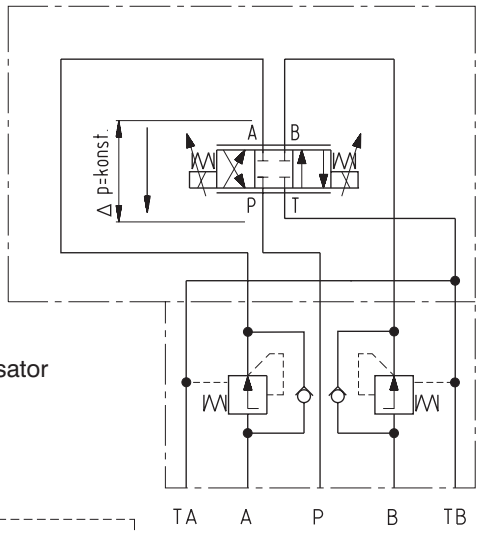
TV2-102/MC Meter-in compensator



Proportional directional valve

Pressure compensator TV2-102/MC

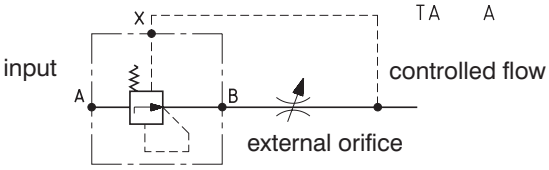
TV2-102/MD Meter-out compensator



Proportional directional valve

Pressure compensator TV2-102/MD

TV2-102/S

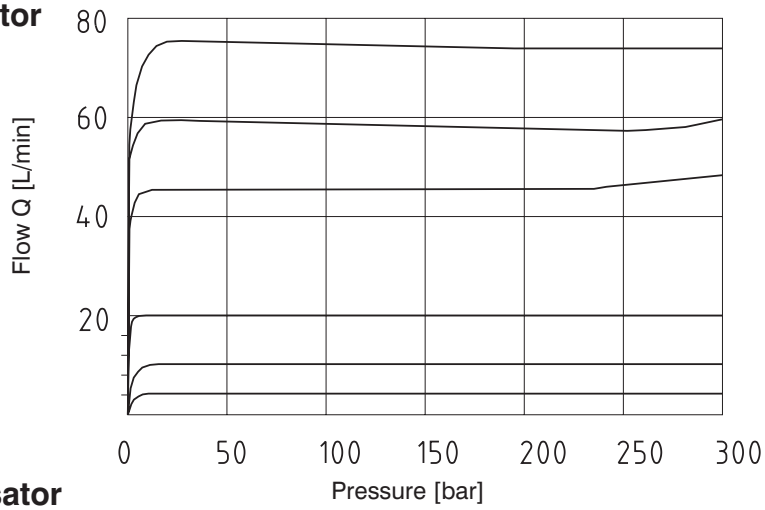


Characteristics

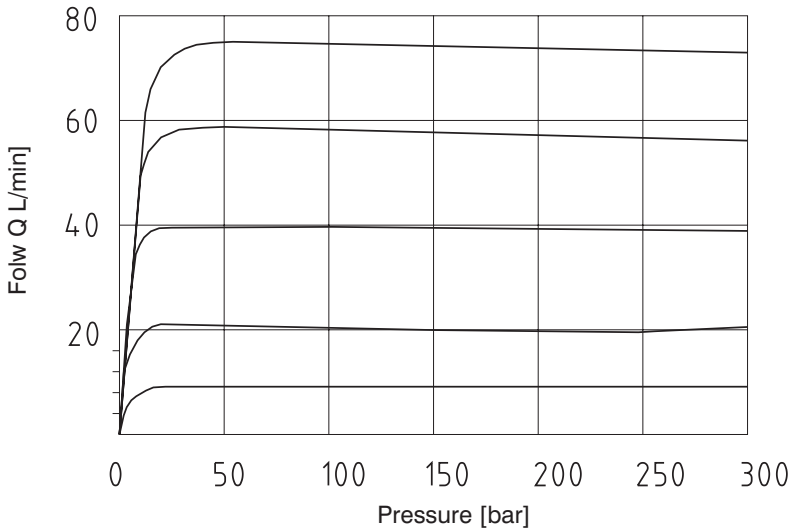
Measured at ν = 35 mm^2/s and t = 40 °C

The characteristic of the pressure compensator corresponds with the flow rate of a PRM2-103Z11/60 proportional directional valve.

TV2-102/MC Meter-in compensator



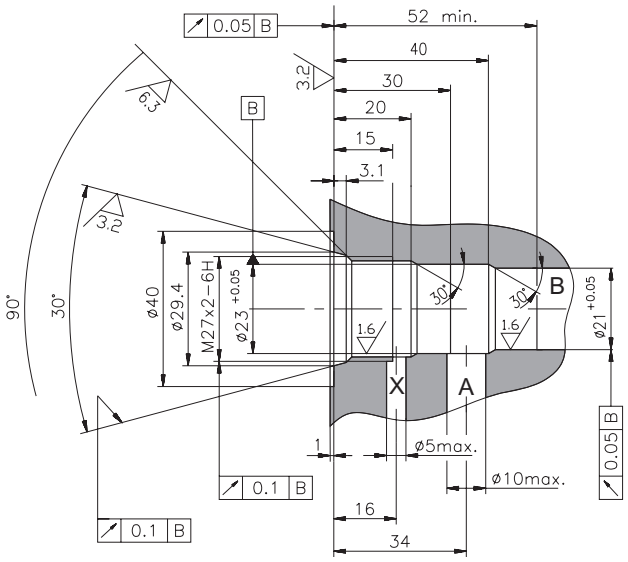
TV2-102/MD Meter-out compensator



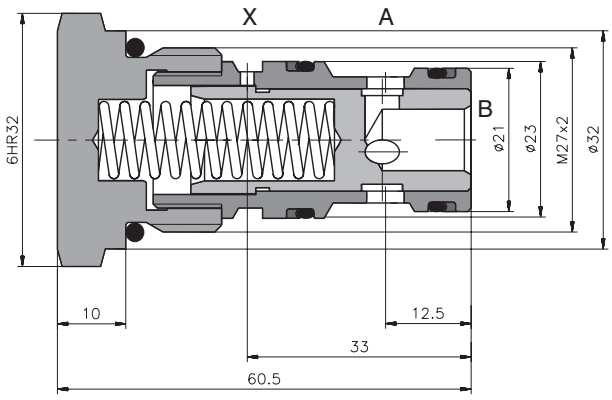
Valve Dimensions

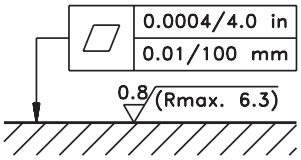
Dimensions in millimeters

Installation cavity TV2-102



Installation cavity TV2-102/S

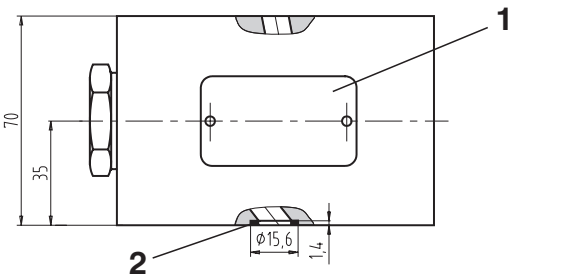


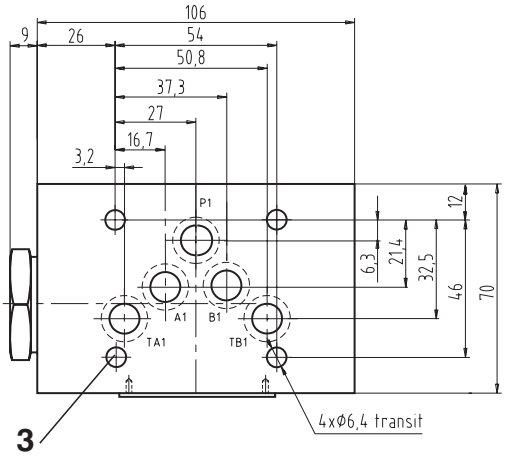


Required surface finish of interface

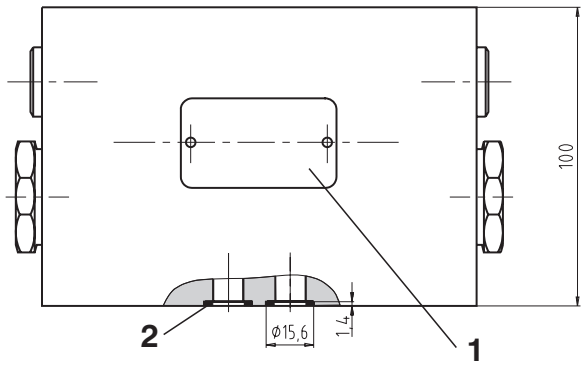
1 Name plate
2 Square Ring 014S - 12.42 x 1.68 (5 pcs.) (supplied with valve)
3 4 mounting holes

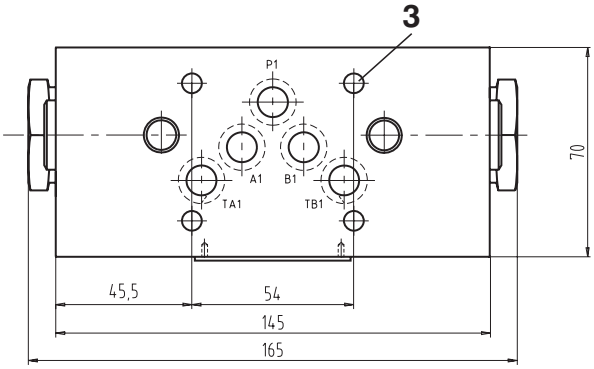
TV2-102/M Meter-in compensator





TV2-102/M Meter-out compensator





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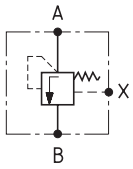
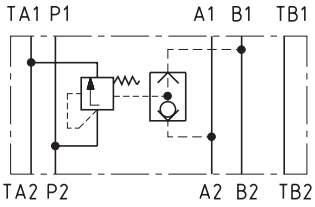
3-way pressure compensator TV2-103

Size 10 • p_{max} up to 320 bar • Q_{max} up to 80 L/min

HA 5170
11/2001

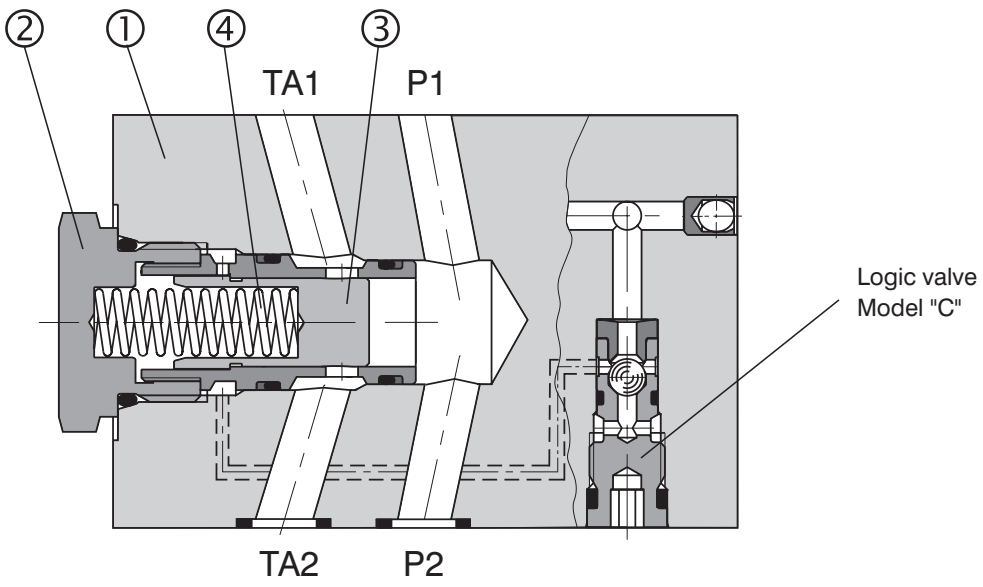




- **Cartridge design**
- **Sandwich plate design for use in vertical stacking assemblies**
- **With integrated logic valve**
- **Installation dimensions to ISO 4401 and DIN 24 340-A10**

Functional Description

The valve TV2-103 is designed as a sandwich and cartridge plate. Sandwich design consist of a body (1), cartridge pressure compensator (2) with control spool (3) and logic valve in model "C" - where the ports A and B are always connected through the logic valve seat with the spring side of spool. The higher pressure pushes the ball onto the seat that is affected by lower pressure. This always causes the channel with the higher pressure to be connected with the control spool spring room (4).
The required pressure difference between port P and the spring room is adjusted. When the pressure difference between P and the spring room exceeds the value set, the control spool shifts, causing the part of pressure fluid to pass from P to T until the desired pressure difference has been restored.
Usually, this pressure compensator is used in connection with a proportional directional valve. In this case, each value of the control signal a particular constant flow rate can be assigned, this being independent of load**.** The valve body is phosphated, all other parts are zinc coated.



Ordering Code

TV2 - 10 3/□□□

Pressure compensator

Nominal size

3-Way pressure compensator

Design
Cartridge — **S**
Sandwich plate — **M**

Seals
without designation — NBR
V — FPM (Viton)

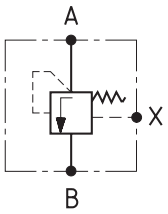
Model
A — function in channel A
B — functin in channel B
C — function in channels A and B

Technical Data

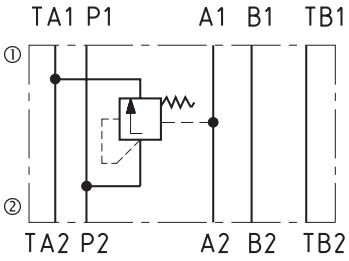
Nominal size	mm	10
Maximum flow	L/min	80
Max. operating pressure	bar	320
Pressure drop on valve Δp	bar	10
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP-RP 91H in viscosity classes ISO VG 32, 46 and 68.
Maximum degree of fluid contamination		Class 21/18/15 to ISO 4406 (1999).
Weight TV2-103/MA (MB, MC) TV2-103/S	kg	3.70 0.15
Valve tightening torque for design S	Nm	70
Mounting position		optional

Functional Symbols

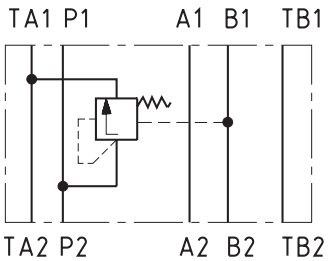
Model S



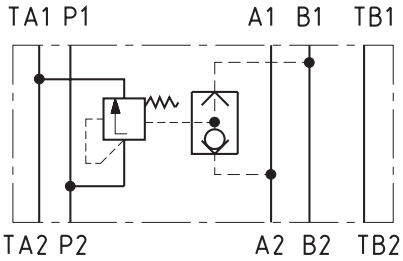
Model MA



Model MB



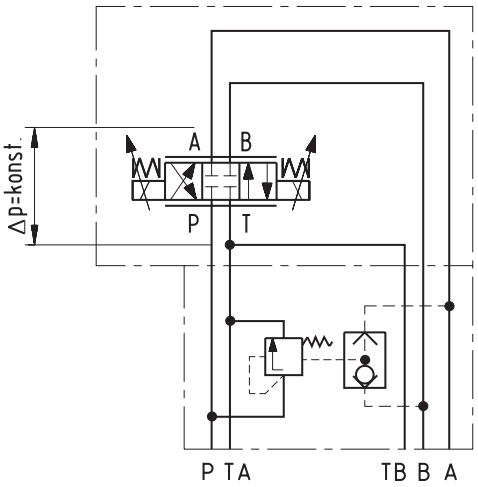
Model MC



① valve side
② plate side

Typical applications

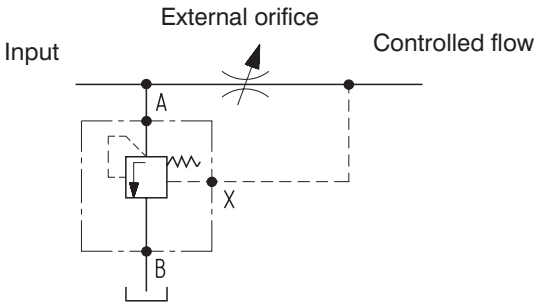
TV2-103/MC



Proportional directional valve

Pressure compensator TV2-103/MC

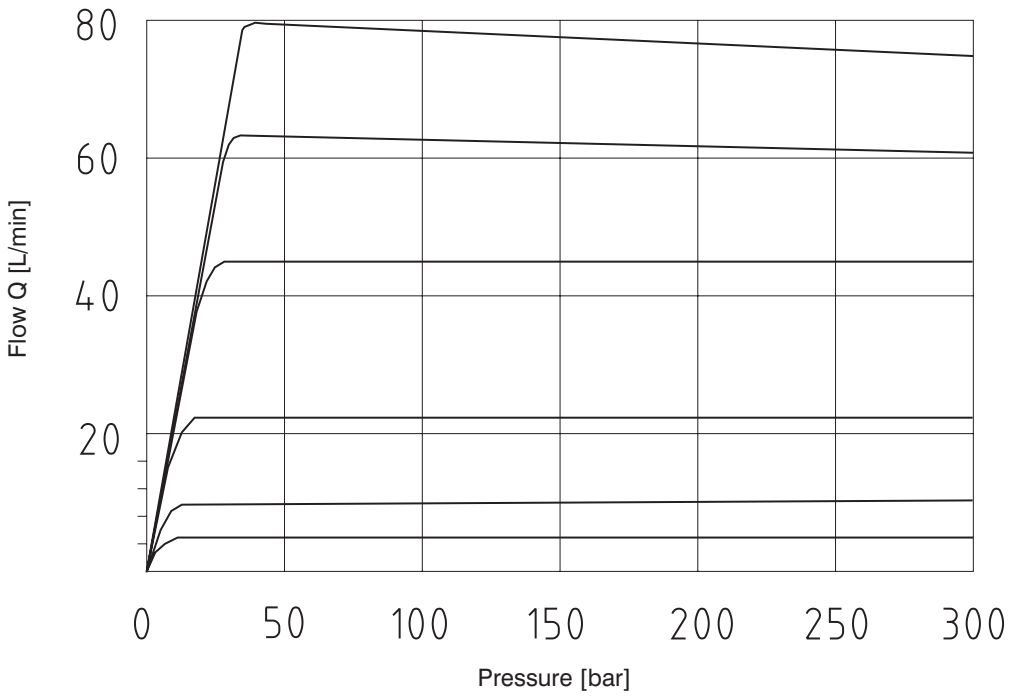
TV2-103/S



Characteristic

Measured at $\nu = 35\ mm^2/s$ and $t = 40\ °C$

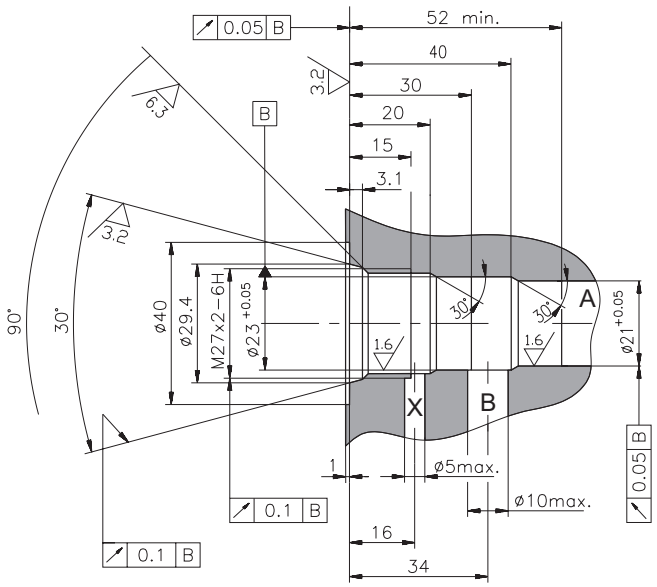
The characteristic of the pressure compensator corresponds with the flow rate of a PRM2-103Z11/60 proportional directional valve.



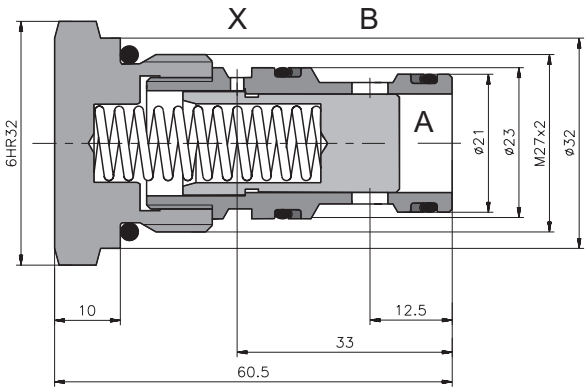
Valve Dimensions

Dimensions in millimeters

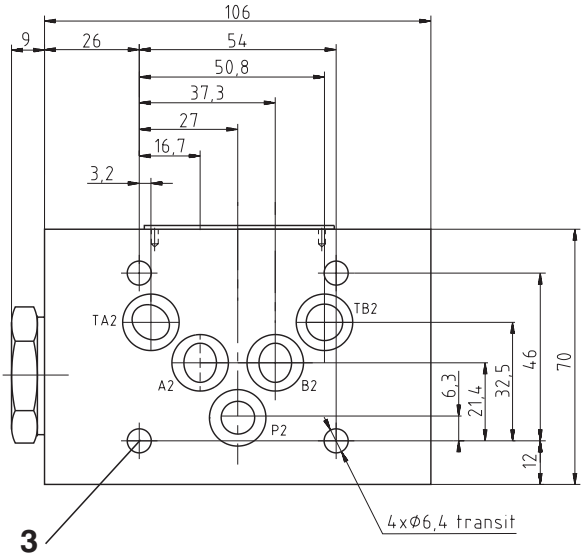
Installation cavity TV2-103



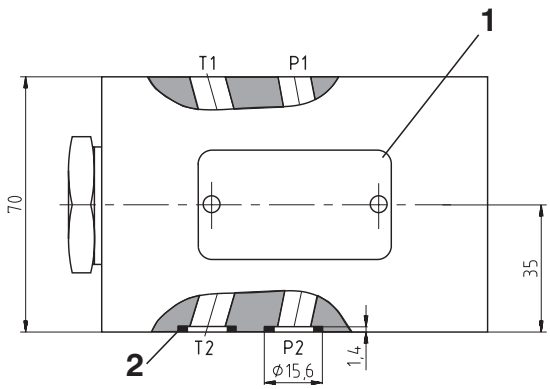
TV2-103/S

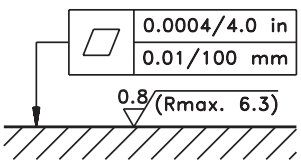


TV2-103/M



1 Name plate
2 Square ring 014S - 12,42 x 1,68 (5 pcs.) (supplied with valve)
3 4 mounting holes





Required surface finish of interface

Caution!

- The packing foil is recyclable.
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law.

ARGO-HYTOS a. s. CZ - 543 15 Vrchlabí
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www.argo-hytos.com

ARGO HYTOS

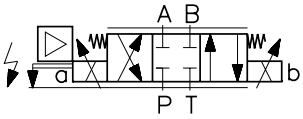
Accessories for proportional directional valve

Size 04, 06, 10 • p_{max} up to 320 bar

PRM

HA 5171
3/2004

Replaces
HA 5171 2/2003



Basic information

The control electronics is provided ex-work with an operative basic adjustment.
But it can be, if needed, any time individually modified according to the particular use. Compact manual programmer or PC user software serve this reason.

Manual programmer

The manual programmer and the PC user software enable the following:

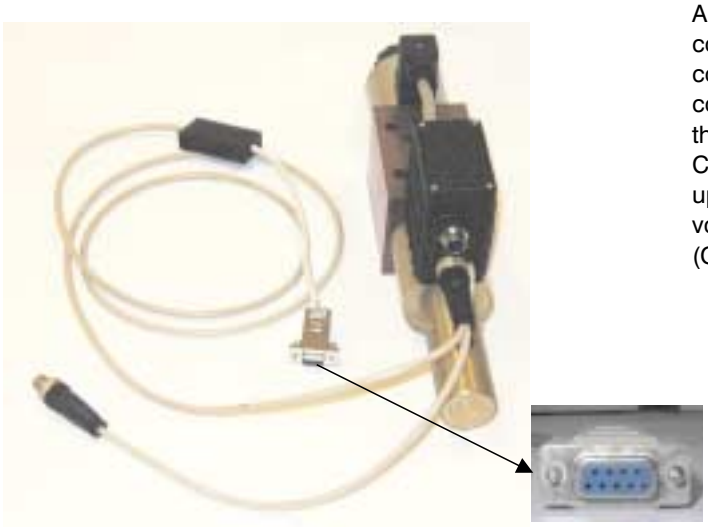
- *Electronics adjustment*
- *Checking the valve function*

Note: The function and handling of the manual programmer and the PC-Software are identical.

Tester for PRM2 and PRM4

The TESTER is the device serving as a source of the control signal for proportional directional valves the series PRM2 and PRM4 with integrated electronics. The design of the TESTER enables the generation of any control signals , current and voltage signals, that are used with the proportional directional valves ARGO-HYTOS with integrated electronics.

A similar cable provides the connection with the manual programmer. In this case, however, the 9-pole connector has been replaced by a MINI DIN MDD8ST connector.
(Ordering No.566-9555)



A special cable provides the valve connection with the computer via a 5-pole connector M12 x 1 (male plug), the connection with the supply voltage via a 5-pole connector M12 x 1 (female plug) and the connection with the series port of the computer via a 9-pole connector CANNON 9. A part of the connection cable is also build up by an interface providing adaptation of the signal voltages.
(Ordering No. 566-9550)

The connecting cables serve for setting the required parameters directly on the particulat hydraulic circuit. After tuning the parameters, the connecting cables are replaced by a direct connection via cables of the control unit.

Accessories

Ordering number	Contens
566-9505	Cable for connection with PC, CD-ROM with Software and manual (hc, hd, ha version)
566-9540	Manual programmer
566-9550	Cable for connection with PC
566-9555	Cable for connection with the manual programmer
566-9525	Manual programmer, Cable for connection with PC, CD-ROM with Software and manual (hc, hd, ha version)

Tester

Order number	Contens
566-9600	Tester PRM,2 pcs of the extension cables 2m with connectors M12x1 (socket - plug)
566-9620	External power supply
566-9630	Tester PRM, 2 pcs of the extension cables 2m with connectors M12x1 (socket - plug), External power supply

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ARGO HYTOS

Source of the control signal for the proportional valves

Size 04, 06, 10

TESTER PRM

HA 5172 8/2004

Replaces HA 5172 3/2004

- **Use for directional valves ARGO-HYTOS PRM2, PRM4 with integrated electronics**
- **Nominal size 04, 06,10 of proportional valves**
- **Enclosure type - IP20**

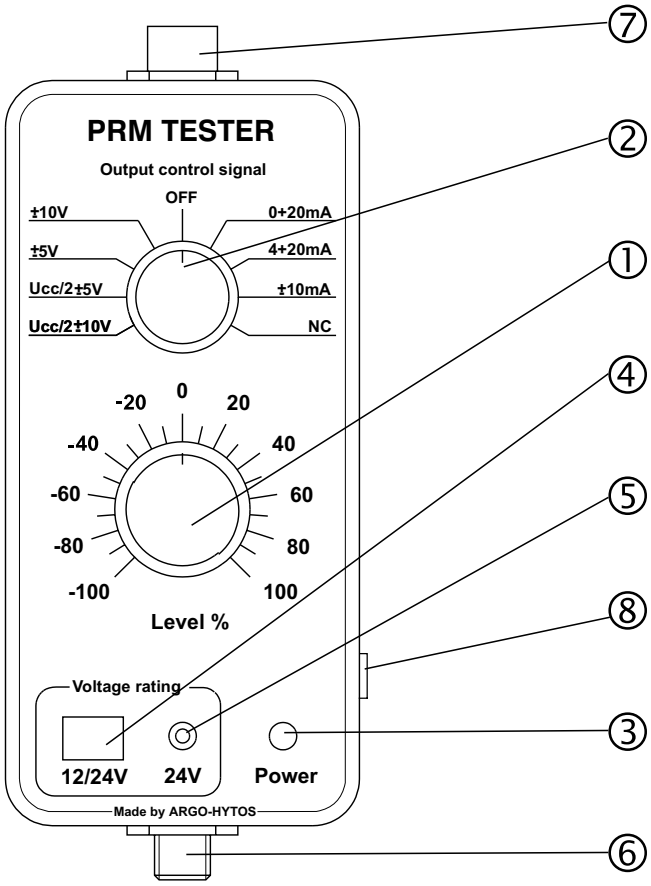
Functional Description

The TESTER is the device serving as a source of the control signal for proportional directional valves the series PRM2 and PRM4 with integrated electronics. The main field of the tester use is the tuning of proportional directional valves in particular hydraulic circuits where their direct connection to the central control system would be very risky. The TESTER can also be used for detection of the control signal errors (interruption, disturbance) for a proportional directional valve or for simulation of nonstandard states of a hydraulic system, the realization of which in the central control system would be difficult.

The design of the TESTER enables the generation of any control signals , current and voltage signals, that are used with the proportional directional valves ARGO-HYTOS with integrated electronics. Implemented in the TESTER are also the basic protective functions that minimize the possible risk of damaging both the TESTER and the integrated electronics of the proportional directional valve tested.
The TESTER PRM is fitted in a plastic box with the dimensions 80 x 160 x 55mm, is resistant against mechanical damages and hydraulic oils, enclosure type IP20.

Functional Description

Tester front panel includes the following elements:



1. Rotary potentiometer (340°) with calibrated scale ± 100%
2. Rotary switch for output control signal selection ± 10V, ± 5V, $U_{cc}/2$ ± 10V, $U_{cc}/2$ ± 5V, 4..20mA, 0..20mA, ± 10mA
3. Indication of the supply voltage presence (green LED - Power)
4. Rocker-type change-over switch of supply voltage level 12V/24V
5. Selection indication of 24V output voltage by supplying with an external power supply (red LED)
6. Input connector (INPUT) 5 pins M12x1
7. Output connector (OUTPUT) 5 pins M12x1
8. Connector for the external supply (24V DC)

Ordering numbers

Type	Ordering number
Tester PRM 2 pcs of the extension cables (2m) with connectors M12x1 (socket - plug)	566-9600
External power supply	566-9620
Tester PRM 2 pcs of the extension cables (2m) with connectors M12x1 (socket - plug) External power supply	566-9630

Technical Data

Technical parameters of TESTER PRM	Specification
Supply	12V, 24V ± 10% from the control system 24V ± 10% with external power supply
El. ripple effect	Max. 50mV$_{p-p}$
Input power	Max. 36W
Output supply voltage for the directional valves	24V / 1,5A 12V / 3A
Output control signal	0…20mA / load R = 100…450Ω
	4…20mA / load R = 100…450Ω
	± 10mA
	± 10V / 5mA
	± 5V / 5mA
	U_{cc}/2 ± 10V/5mA
	U_{cc}/2 ± 5V/5mA
Use for directional valves ARGO-HYTOS PRM2, PRM4 with integrated electronics	Size 04, Size 06, Size 10
External dimensions	160 x 76 x 55mm
Weight	350g
Enclosure type	IP 20
Operating ambient temperature	-20°C…+50°C
Delivered accessories	2 pcs of the extension cables (2m) with connectors M12x1 (socket - plug)
Technical parameters of the external power supply delivered for TESTER PRM	**Specification**
Input supply voltage	90 – 264V AC / 40 – 63Hz
Output supply voltage	24V DC ± 5%
Output current	1,8A
Power	Max. 45W
Socket fork	2 pins IEC 320 (C8)
External dimensions	34 x 60 x 119mm
Weight	160g
Enclosure type	IP 20
Operating ambient temperature	0°C…+40°C
Delivered accessories	Cable for interconnection of the power supply and the TESTER PRM with a supply connector 2,5 m for low voltages

TESTER connection to the tested valve

The TESTER is provided with two 5-pole connectors M12x1 (socket, plug) designated as INPUT and OUTPUT. A part of the TESTER is a pair of 2-meter long extension cables provided with connectors M12x1 at their ends.

Electric connection of the external supply source to the TESTER

Provided that there is not any supply voltage from a control system available, an external supply source to the respective specification can be connected directly to the TESTER through a 2,5 mm connector.

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Proportional directional valve with integrated electronics

PRM4

Size 04, 06, 10

HA 5173
3/2003

Installation manual and guidance on the use

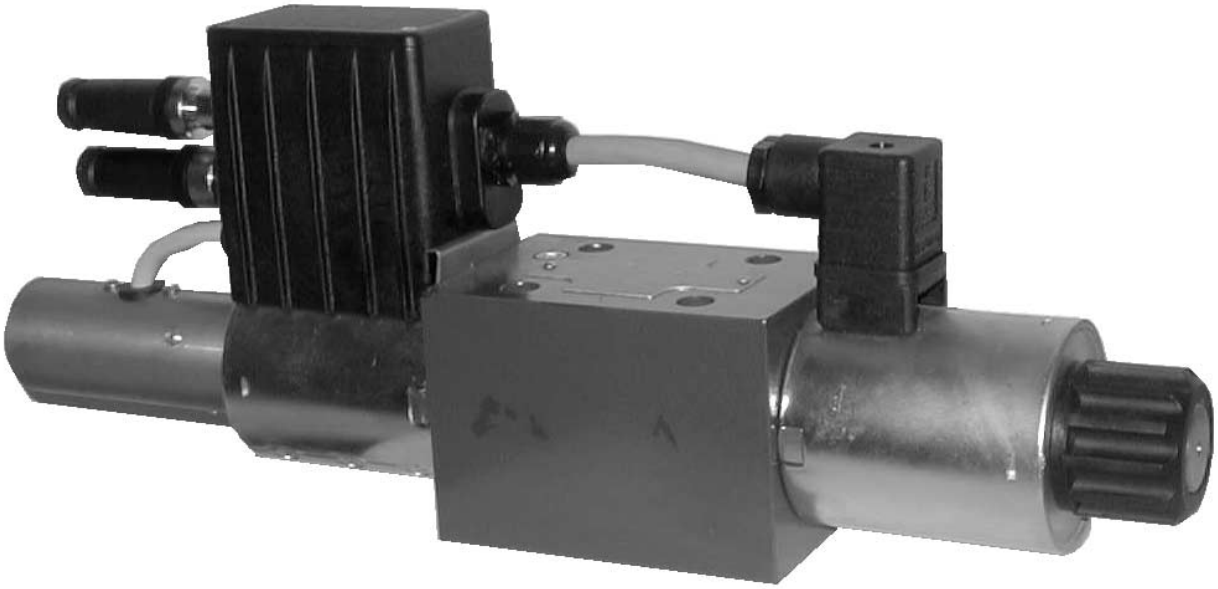


Table of contents

1. Common

1.1 Introduction

The main feature of the proportional directional valves series PRM4 is the digital control electronics. This electronics opens and closes the valve spool in accordance with the command variable acting in an open or closed control system. The compact design enables direct mounting on the valve. The electronics is mounted in a robust, shockproof plastic box with plug-and-socket connectors providing high grade of protection.
By use of a serial interface, the valve function and parameters can be adjusted. To enable this, a programmer or a PC-user-software is available.
Digital design of the control electronics eliminates completely “turning of potentiometers” and “setting of jumpers”. Consecutively, a permanent and fast adjustment can be carried out directly on the valve.

1.2 Elimination of warranty

The manual includes only the most important information needed by the customer to adjust correctly the important parameters and to operate the valves safely. If the instructions are not observed, in case of their incorrect interpretation or by misunderstanding, the responsibility and the warranty remain by the user.
Due to the continuous development oriented on improvement of functional parameters of directional valves with digital electronics, some particulars presented in this manual may be obsolete.
For actual information or in case of any doubtfulness, please contact directly the manufacturer.

1.3 Signs and Symbols

This symbol points out that there may be a great danger for persons, machines, material or environment, if the instructions are not strongly kept.

This symbol refers to advices and help information.

1.4 Appropriate use of valves

The proportional valves with integrated control or regulating electronics are used to adjust the oil flow rate according to the respective set point signal. To provide this, the following modes are available:

- *Open loop controlled valve*
- *Closed loop controlled valve with position feedback (valve spool position)*
- *Closed loop controlled valve with process feedback (pressure, speed, revolutions, etc.)*
- *Closed loop controlled valve with spool position and process feedback (cascade control)*

1.5 Safety instructions

Before putting the valve into operation, this manual is to be red carefully. If the respective advises are not taken in account or in case of the operation outside the prescribed use, by an encroachment on the valve, incorrect installation or operation, a great safety impartment of people or devices can arise. These cases exclude the liability and warranty.
The valve may be installed and put into operation only by educated and authorized persons.
The valve shall be taken out of operation and protected against its reuse in case of the following:

- *Visible damage*
- *Damaged electric connections*
- *Incorrect function*
- *After inappropriate use, handling or storage*

Parts of the valve can become hot during the operation.

By using the valves in applications with high safety demands, or if required by the regulations for accident prevention, a special precaution (special contacts) is to be made to disconnect the valve supply voltage or the set point signal in case of a failure (NOT-OFF). In this case, the valve spool is shifted by the centering springs in the rest position.

After switching-on or re-closure in the case of a failure (NOT-OFF), the preset set point signal is, after a short initialization phase (1 – 2 sec), again active. It is necessary to ensure that in this case the set point signal cannot cause any undesirable valve function.

By valve installation, a respective care of cautiously planning and carrying out of works shall be taken of. Before taking into operation, all the electric connections and screw joins of the valve shall be inspected. To avoid any collisions during putting into operation, any safety devices and limit switches shall be functional. In this case, all the safety instructions are to be kept carefully.

2. Technical Description

2.1 Technical Data

Parameters	Range, characteristics						
Common							
Environment temperature	-20°C ... +50°C						
Enclosure type	IP65						
Vibrations	Oscillations, sinusoidal to EN IEC 68-2-6 Shock to IEC 68-2-27						
Noise immunity	Burst on wires as per EN 61000-4-4 HF-Field as per EN 61000-4-3 HF feeding on wires as per EN 61000-4-6 ESD as per EN 61000-4-2						
Emission	Radiated emission as per EN 55011						
Valve parameters							
Size	NG 04			NG 06		NG 10	
Nominal flow rate at p=10bar L/min	4	8	12	15	30	30	60
Max. operating pressure at port T	100 bar			210 bar		210 bar	
Max. operating pressure at port P, A, B	320 bar						
Hydraulic fluid	Hydraulic oils of power classes HM,HV to CETOP - RP 91H in viscosity classes ISO VG 32,46,68.						
Fluid temperature range (MBR/Viton)	-30°C...+80°C / -20°C...+80°C						
Viscosity range	20 mm^2 / s...400 mm^2 / s						
Degree of fluid contamination	Class 21/18/15 to ISO 4406 (1999).						
Installation dimensions	DIN 24 340 and ISO 4401						
Parameter of electronics							
Protection against incorrect polarity	24 V DC +/- 20%, other supply voltages on request						
Input: control signal	+/- 10V, 0…10V, +/-10 mA, 4…20 mA, 0…20 mA						
Input: actual value (valve position), valve spool position	0...5V						
Input: actual value (process, external feedback)	0...10V, 2...10V, 4...20mA, 0...20mA						
Output: solenoids	2 output stages with PWM max. 2,5 A at coil resistance < 5 Ω						
PWM frequency	13 kHz						
Controller cycle-time	1,3 ms						
Setting of parameters	by means of the manual programmer or a PC/ Laptop with user software (RS232)						
CAN series interface	on request						

Tabelle 1: Technical data

2.2 Block Diagram

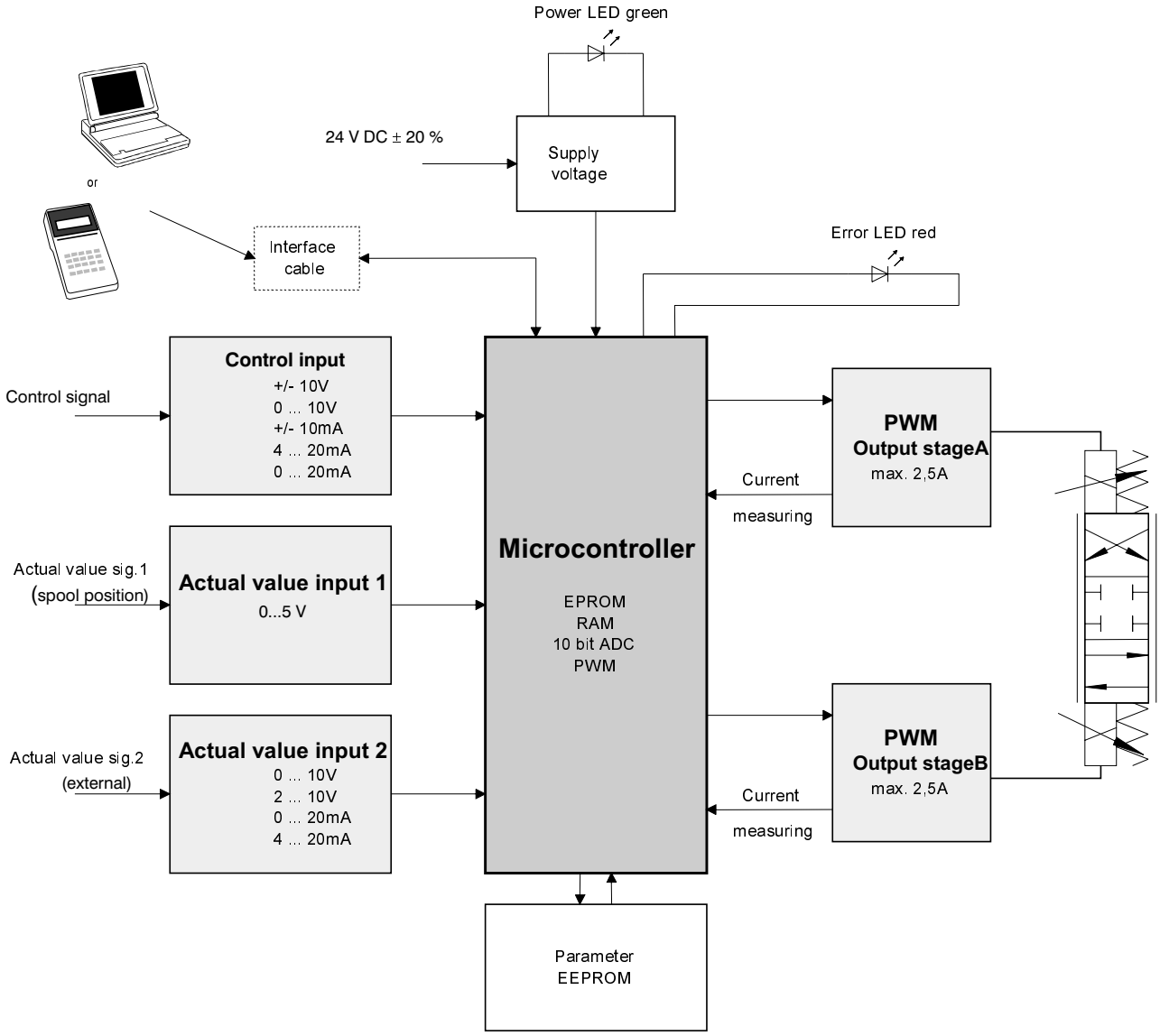


Fig 1: Block diagram of the digital electronics for directional valve PRM4

Both PWM output stages measure the coil current and control it, thus eliminating the differences of the coil currents, e.g. due warming, sample variability and coil resistance deviations.

2.3 Valve mounting

Valve installation dimensions to DIN 24 340 and ISO 4401

Check the correct seating of the sealing rings on the bolting face.

For valve fixing without any components of the vertical stacking assembly, e.g. a pressure compensator, the following bolts can be used, tightened by the relevant torques. The bolts can be ordered separately as accessory items (one set of bolts consists of 4 pieces).

Nominal size	Bolts DIN 912-10.9	Tightening torque in steel	Ordering number
04	M5 x 35	5 Nm	486-9011
06	M5 x 45	8,9 Nm	484-9958
10	M6 x 40	14 Nm	485-9964

Tabelle 2: Tightening torques of bolts

The box of the control electronics can be turned by 90°

2.4 Electric connection

The digital electronics is mounted in a plastic case directly on the solenoid of the proportional directional valve. An integrated connector situated on the case bottom provides the connection of the control electronics with solenoids. The connection of the second solenoid with the electronics is accomplished by a cable with a plug connector to DIN 43650.

The supply voltage, the set point signal, the programmer and the external output of the position sensors are connected via a 5- or 4- pole connector M12 x 1 (male plug connector K1).
The number of contact pins of the connector depends on the valve operation configuration. For models E01 and E03, one 4-pole female plug connector M12 x 1 is used. The models E02S 01 and E 04S 01have a 5-pole female plug connector M12 x 1. On the fifth contact pin, the voltage signal of the position sensor is available.

The connection of the external feedback occurs via a 5-pole socket. In addition to the connection input of the external feedback, the supply voltages +24V, +10V and –5V for an external sensor are available (female plug connector K2).

According to the current consumption, the connecting wires for the supply voltage shall be sufficiently dimensioned.

All connecting works are to be carried out without tension.

2.4.1 Connection of the supply voltage plug connector K1 M12 x 1 (male plug)

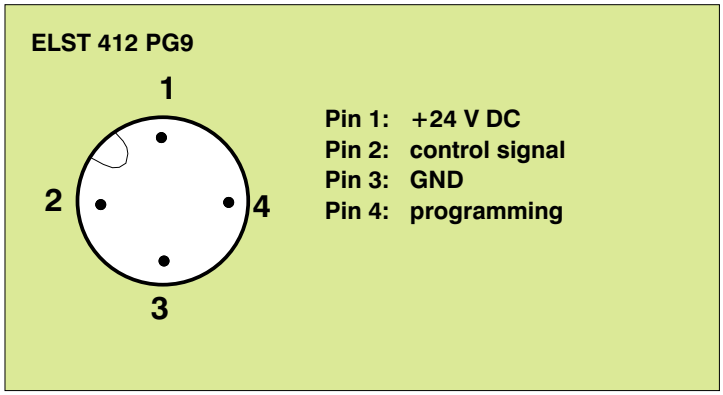


Fig 2: Plug connectors - models E01 and E03

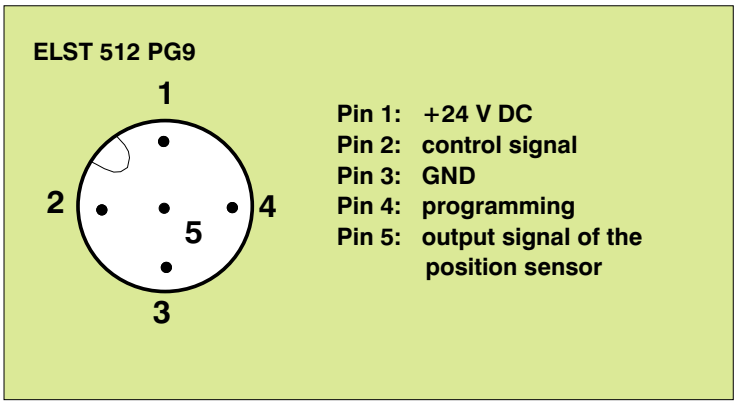


Fig 3: Plug connectors - models E02S01 and E04S01

The control signal requires the reference ground (GND) of the supply voltage.

The input resistances of the control signals are following:

- *Voltage signals 100 k (+/- 10V, 0…10V)*
- *Current signals (+/- 10mA, 4…20mA 0…20mA)*

Rating capacity of the external voltage output of the position sensor: 1,5mA

2.4.2 Plug connector of the external feedback K2 M12 x 1 (female plug)

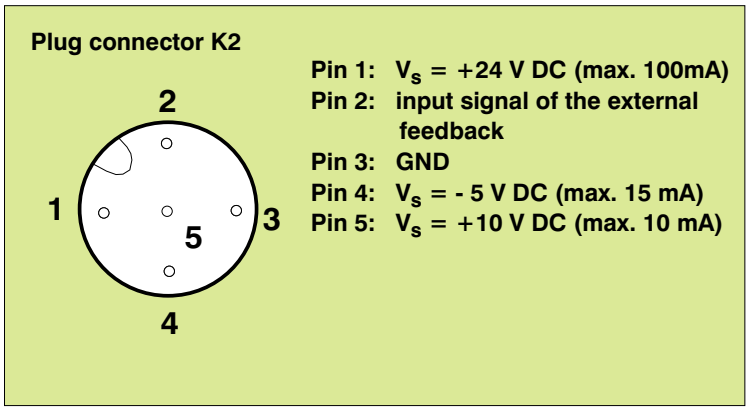


Fig 4: Plug connector for external feedback connection for configuration 03

2.5 Putting into operation

Before connecting the supply voltage, any electric and hydraulic connection shall be checked carefully. End switches and safety measures shall be activated to avoid any uncontrolled actions. The relevant safety guidelines shall be carefully pursued. Suitable Not-Off measures are to be taken.

2.5.1 Switching-on procedure

After switching-on the supply voltage, the control electronics is subjected to a plausibility test. During the test, the green Power LED and the red Error LED are lighting. If there is no failure detected, the red Error LED is disconnected after ca. 1 s. In case of a failure, the Error LED remains switched-on.

The following are the possible reasons:
a) No signal on the input for the position sensor and/or external feedback.
b) Overload on input
c) Solenoid coils not connected
d) Faulty memory content
e) Functional faulty electronics

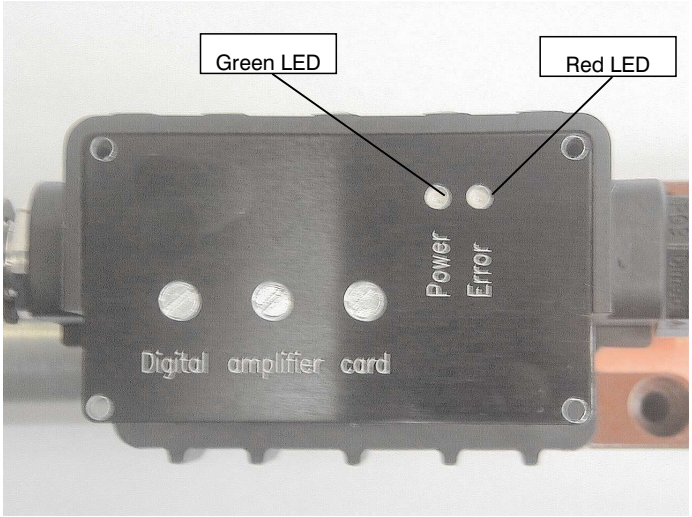


Fig 5: Signalization of the operation status

2.5.2 Parameter adjustment of the digital electronics

The control electronics is provided ex-work with an operative basic adjustment (see Chapter 3).
But it can be, if needed, any time individually modified according to the particular use. Compact manual programmer or PC user software serve this reason.

Fig 6: Manual programmer

The manual programmer and the PC user software enable the following:

- *Electronics adjustment*
- *Checking the valve function*

Attached to the manual programmer and the PC user software is a suitable interface cable, which enables a simple plug-in connection with the valve.

The function and handling of the manual programmer and the PC-Software are identical.

2.5.3 Connection of the interface cable

A special cable provides the valve connection with the computer via a 5-pole connector M12 x 1 (male plug), the connection with the supply voltage via a 5-pole connector M12 x 1 (female plug) and the connection with the series port of the computer via a 9-pole connector CANNON 9. A part of the connection cable is also build up by an interface providing adaptation of the signal voltages (ordering No. 566-9550).

A similar cable provides the connection with the manual programmer. In this case, however, the 9-pole connector has been replaced by a MINI DIN MDD8ST connector (ordering No.566-9555).

The connecting cables serve for setting the required parameters directly on the particulat hydraulic circuit. After tuning the parameters, the connecting cables are replaced by a direct connection via cables of the control unit.

The interface cables are installed as follows:

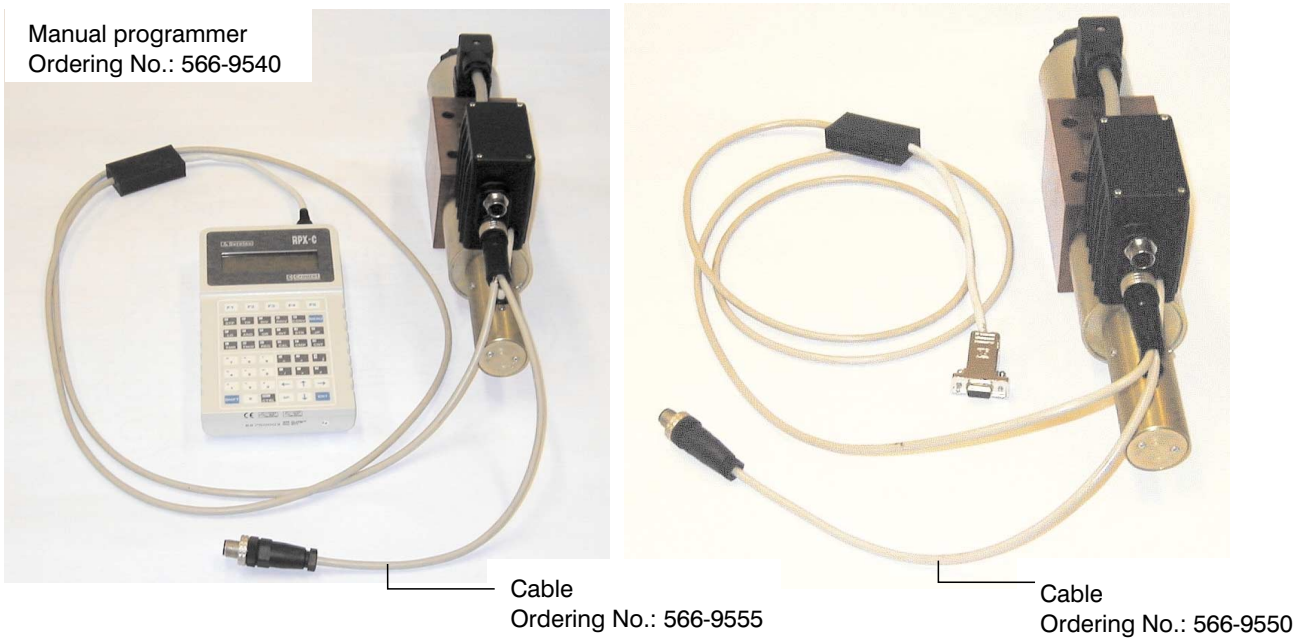


Fig. 7: Connection of the manual programmer or the PC computer via respective cables

The interface electronics is supplied via the valve supply voltage. It is possible to present the control signal on input of the electronics even with the interface cable plugged-in (pin 2).

2.6 Description of the PC-user-software

2.6.1 Connection of the interface cable to PC

The interface cable of the PC-user-software is provided for connection with a PC, or a Laptop with a SUB-D-9 connector socket. The connection is usually accomplished via the series interface COM1. The 9-pole extension cable with a plug connector on the cable socket can be used up to the length of 3 m.

2.6.2 Installation of the PC-user-software

- *Hytos_com1.bat/…com2.bat 7 …_com3.bat/…_com4.bat*

According to the interface used - COM1 to COM4
(Software for parameter setting of the control electronics).

- *Loadeep32.exe*

(For describing the EEPROM of the control electronics with complete parameter sets)

- *Saveep.exe*

(For reading and saving the EEPROM content of the control electronics)

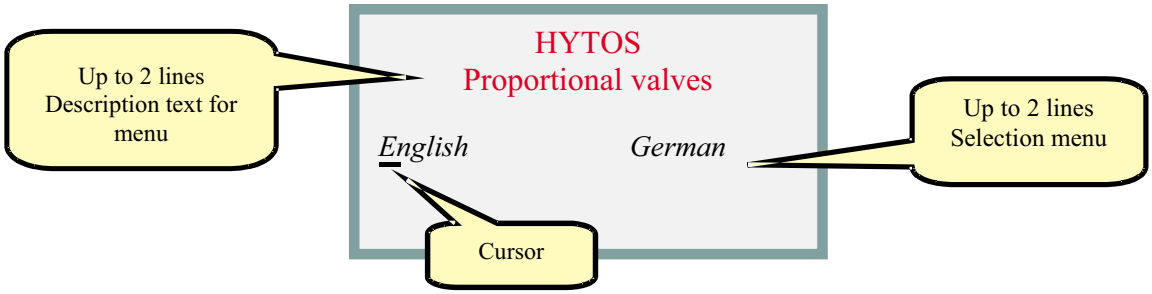
Starting the programs is accomplished by inputting the program names and the program paths.
By using the series interface COM2, the program is for example started as follows:

c:\hytos\hytos_com2.bat

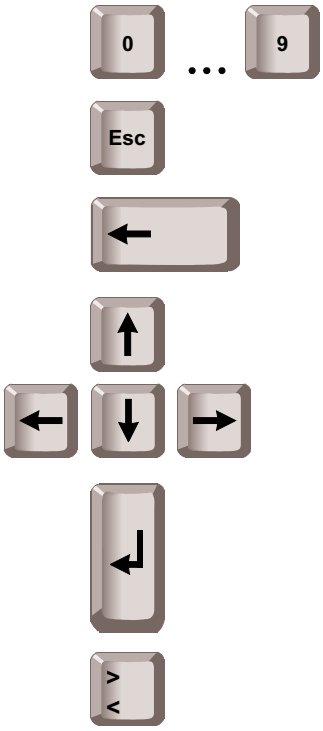
The programs can also be started by a double-click in any program for program management.
For examples for execution of *Loadeep.exe* and *Saveep.exe* refer to chapter 2.6.7.

2.6.3 Software basic information

After a program call the following dialog window appears. A flashing cursor characterizes a selection that can be activated by the Return key.



Keys for program operation



For inputting parameters

Ends the program

Erases the last entered characters

Moves the cursor through the menu shown

Activated the menu selection

Branches into the last shown menu

2.6.4 Main menu

After language selection, the main menu changes and the following three function can be selected:

- *Configuration* — For checking the valve configuration:
  The actual operation mode, the kind of the set point signal, the kind of the position and process sensors and the version number of the hardware and software can be read.
- *Test* — For testing the interface connection:
  After a successful testing, the following announcement appears: “Test successful”
- *Modification* — For setting of valve parameters.

The following chapter presents graphically these functions with their particular submenus. At menu points, which require a numeric input, an error report including the permitted adjustment range appears in case of an incorrect input. After the selection: “Change”, a new value can be inputted.

In case of an incorrect input or a value exceeding the adjustment range, the initial value is retained.

Changes carried out under the menu point “Configuration” are not valid until the supply voltage has been switched off and on.

2.6.5 Software structure for setting of parameters

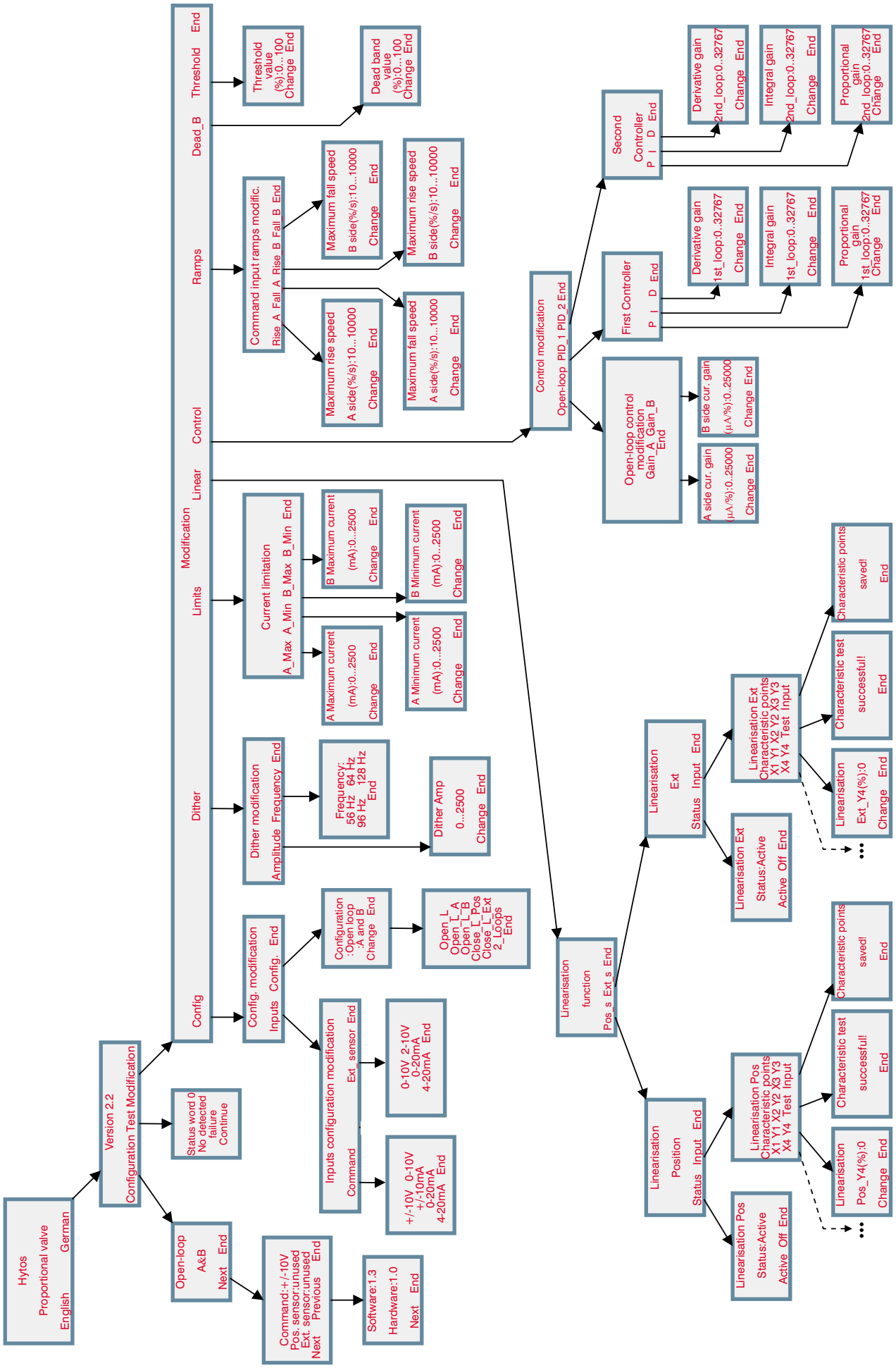


Fig. 8: Software structure for setting of parameters

2.6.6 Error reports

Transmission error reports

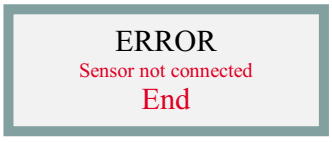
The control electronics does not react.
Check the connection and the correct voltage supply.

An error was found in the transmission protocol.
The reason can be a too long interface cable or strong electromagnetic interference fields.

Function error reports

The memory contest is incorrect.
It can be restored by the program LOADEEP.EXE.
See chapter 2.6.7.

The measured current does not correspond with the set point.
Check the connection of the electronics with solenoid coils.

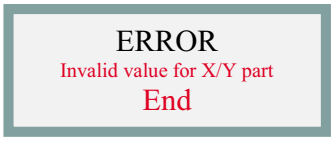


The control electronics identified the signal absence.
Check function of the sensor and its connection.

Input error reports

The entered value is outside the permissible range.
Enter a value that is within the permitted input boundaries.

The entered value is not plausible.
The entered lower value e.g. is bigger than the upper value.
Correct the input.



The entered value is incorrect. It does not fulfill the condition for creation of a continuous linearization curve.

The inputted value is incorrect. It does not fulfill the required conditions for a continuous curve.

2.6.7 Saving and loading the complete parameter sets

The Program SAVEEP32.EXE enables saving the set configuration data and parameters in a PC file. The name of the file (separated by a blank space) in which the data should be saved is to be appended to the program call. The name mustn't have more than 8 characters.

Example: SAVEEP32 Reserve

The saved parameters can be written into memory via program LOADEEP32.EXE.
The name of the file that contains the desired data serves as the command parameter.
The file name is to be separated by a blank space.

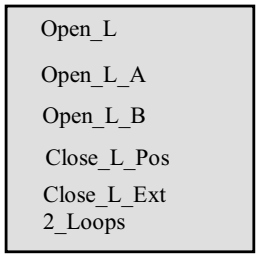
Example: LOADEEP32 Reserve

The user-software of the 2.2 versions is preliminary derived from the software of the manual programmer, but it is supposed to be updated in the future. The new version will be based on a graphical software and a simple service. For more information please contact the manufacturer.

2.7 Description of software function blocks

2.7.1 Application configuration

Symbol: Configuration



Description:
The control electronics can be operated in different configurations.

In this case, a PWM signal for the solenoid coils is generated which shifts the valve control spool nearly proportionally to the set point. For this purpose, three variants are possible:

- *Open_L: open loop for a valve with two solenoids*
- *Open_L_A*: open loop for a valve with a solenoid on side A
- *Open_L_B*: open loop for a valve with a solenoid on side B

The assignment of the control signal and the valve spool position is described in chapter 2.7.2.

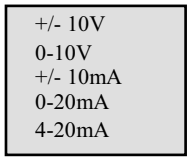
For demanding applications, the closed loop controlled (regulated) configurations are available. For this purpose, the signal from a measuring device is used as the feedback value. In this case, a position sensor measuring the valve spool position is preferably used. Instead of the position sensor signal, also an external signal from a process value can be used as a feedback signal.
In the end, also a combination from the valve spool position and an external process feedback value is possible (cascade control).

- *Close_L_Pos*: valve with spool position feedback
- *Close_L_Ext*: valve with external feedback
- *2_loops: valve with spool position feedback and external feedback*

For every configuration, an application with the corresponding software block diagram is represented in chapter 3.

2.7.2 Selection of control signal

Symbol: Command



Description:
In the software block *Command*, the input signal, which is connected to the control electronics, is determined. The following table shows all the available signal types including their particular input resistances. In addition, three examples are given for each signal type that show the relationship signal value ⇔ excitation of the solenoid valve.

Signal	R_{Ein}	Example	Solenoid on side A	Solenoid on side B	Model with 2 solenoids
			Spool position	Spool position	Spool position
+/- 10 V	> 100 kΩ	-10 V	-	-Max	-Max
		0 V	0	0	0
		+10 V	+Max	-	+Max
0 ... 10 V	> 100 kΩ	0 V	0	0	-
		5 V	1/2	1/2	-
		10 V	Max	-Max	-
+/- 10 mA	200 Ω	-10 mA	-	-Max	-Max
		0 mA	0	0	0
		+10 mA	+Max	-	+Max
4 ... 20 mA	200 Ω	4 mA	0	0	-
		12 mA	1/2	1/2	-
		20 mA	+Max	-Max	-
0 ... 20 mA	200 Ω	0 mA	0	0	-
		10 mA	1/2	1/2	-
		20 mA	+Max	-Max	-

Table 3: Valve spool position at different configurations in dependence on the input signal

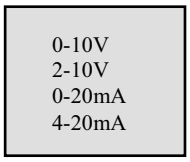
Interpretations:
0 … middle position (normal position)
-Max…1. valve spool end position set up by solenoid on side B
+Max…2. valve spool end position set up by solenoid on side A

By setting the input signal on 4…20 mA, an error is detected at a signal < 3,5 mA (red LED) and the valve is shifted into its 0-position (e.g. a cable interruption).

.

2.7.3 Selection of external feedback signal

Symbol: Ext_Sensor

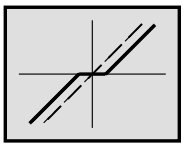


Description:
The block *Ext_Sensor* serves the selection of the external process signal.
As a standard, the valves in configurations with external feedback E03 and E04S01 are supplied and have their inputs as voltage inputs (0-10V) configured.

A change of setting is not possible before switching off and on the supply voltage.

2.7.4 Threshold

Symbol: Threshold



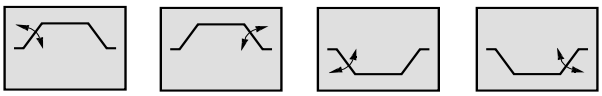
Description:
The block Threshold determines the sensitivity of the valve on the set point signal in the region of its null cross over point.
Its size is expressed in percent of the maximum control signal of one polarity.

Example:
Control signal +/- 10V
Threshold 10%
In the control signal range is no valve reaction from –1…+1V (10% of 10V).

This function can be used in all configurations of the proportional directional valves (open loop controlled valve, valve with feedback) to suppress the command signal noise.
The valve ignores the set point signal until it exceeds the particular threshold.

2.7.5 Ramps

Symbol: Rise_A Fall_A Rise_B Fall_B



Description:
By means of these parameters, the jump form of the control signal for controlling the valve in an open loop or a closed loop mode can be changed into a ramp form.

The blocks Rise_A, Fall_A, Rise_B and Fall_B enable to set the speed of changing the spool position, expressed in % of the output current per second. By suitable selection of the given parameters, a continuous run-up of a hydraulic rotary motor or a hydraulic cylinder can be e.g. realized.

Example:
Range of the input signal: +/- 10V

Setting of the parameters *Rise_A:* = 50% means that it takes 2 seconds until the maximum current acts on the solenoids (100% corresponds with +10V). The ramp parameters are a measure of increase and do not depend on the input signal.
For setting “without ramp”, the greatest value (10 000%/s) is to be selected. This value is preset at delivery of the control electronics.

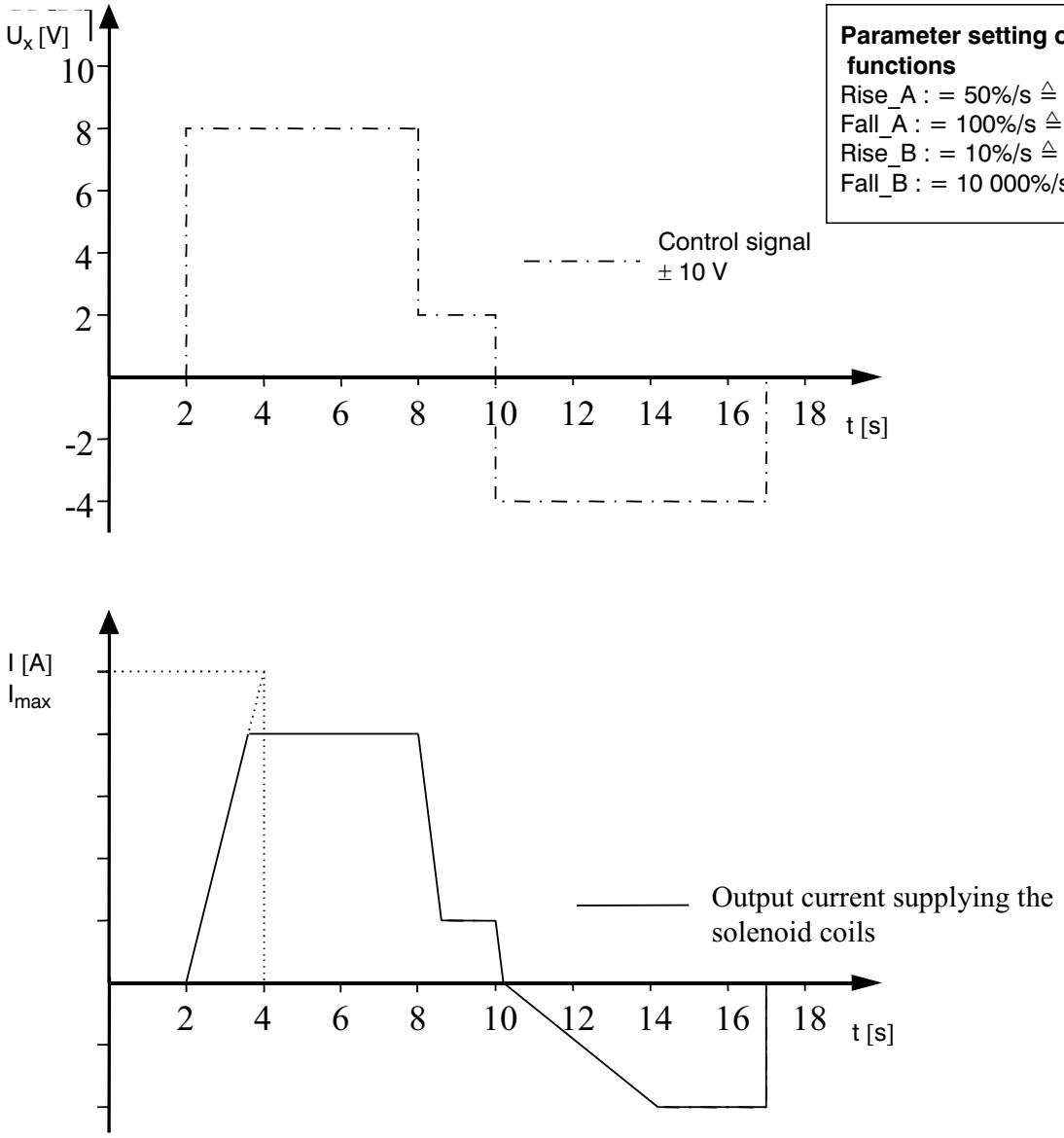
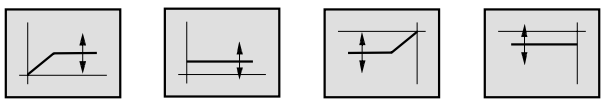


Fig. 9:Course of the output signal at the given setting of ramp functions

The ramp causes a constant rate of the valve spool movement

2.7.6 Current limiting

Symbol: **A_Max** **A_Min** **B_Max** **B_Min**



Description:

The blocks A_Max, B_Max serve the limiting of the maximum current supplied by the electronics to solenoid coils. This value is reached by a 100% input signal.
With valves with spool position feedback, the current limiting can also appear during the dynamic control operations.
The intensity of the maximum current depends on type of the coils used with regard to their power parameters.

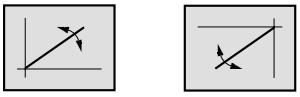
The Blocks A_Min, B_Min set the lowest current available to the solenoid coils if the set point signal is greater than the switching threshold.
The minimum current excites a magnetic force that is necessary to move the spool from its rest position in case of a further little current increase.

Note:
In case of an open loop control, the coil current results from the following dependence:

If control signal > threshold *then* coil current = MIN_A + Gain_A * control signal
else coil current I_A=0

2.7.7 Gain of coil current

Symbol: **Gain_A** **Gain_B**

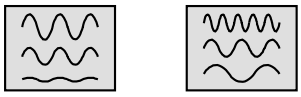


Description:
The gain of the control signal can be defined in blocks Gain_A and Gain_B.
The gain indicates the relationship between the coil current and the control signal expressed in mA / %.

Either software blocks are active only in the open loop valve control.
In a closed loop control mode, the assignment of the parameters depends on the PID-Controller (dependence coil current / set point signal).

2.7.8 Dither signal

Symbol: **Dither Amplitude** **Dither Frequency**



Description:
Due to the friction forces acting on the spool of the proportional valve, different spool positions are taken at increasing and decreasing the input signals. This effect is called valve hysteresis. It can be significantly reduced especially in an open control mode, provided that a dither signal is superimposed to the coil current (superposition). This signal keeps the valve spool in a permanent slight motion, thus reducing the spool sticking.

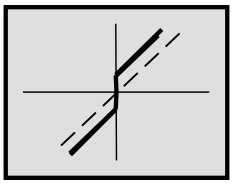
Setting of the dither signal depends strongly on the hydraulic circuit and has to be determined experimentally. Generally, the lower frequencies of the dither signal are more effective but they can result in form of disturbing noises and self-oscillations.
The actual value of the dither signal depends on its frequency and type of the coil used (its inductivity). For each coil a maximum dither amplitude is permitted at the given frequency and coil voltage that may not be exceeded. A further amplitude increase set in program does not practically change its actual maximum value. Table 1 gives the usual values of the dither amplitudes preset in the program with regard to the respective frequencies, as well as the values measured on particular coil types used on valves PRM4.

Nominal size of the valve	Dither frequency used (Hz)	Set value of dither amplitude	Actual dither amplitude (mA)
04	96	250	80
06	64	100	60
10	56	230	100

Table 4: Set and actual values of dither amplitudes for given frequencies

2.7.9 Compensation of overlap

Symbol: Dead_B



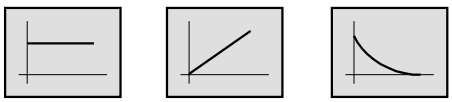
Description:
The block Overlap enables a defined compensation of the positive overlap of the proportional valve control spool. The objective of the compensation it to obtain nearly a linear dependence of the flow rate on the signal value.

The positive spool overlap is necessary to ensure a complete closure in the valve middle position with regard to the type of the hydraulic connection and the necessary production tolerances.

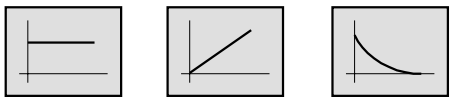
This kind of compensation acts as an additional set point that is added to the input signal in dependence on its direction, as soon as a set point sign change appears.
The block of the overlap compensation is active only in a close loop controlled mode.

2.7.10 Controller parameters

Symbol: P_1 I_1 D_1



Symbol: P_2 I_2 D_2



Description:
The control electronics contains two PID-Controllers. The first controller is characterized by parameters P_1, I_1 and D_1 and is being used in simple control circuits. The parameter P_1 represents the proportional part, parameter I_1 the integral part and the D_1 the differential part of the controller. The second controller is being used in cascade control circuits for the main control circuit (external control circuit) and is to be adjusted with parameters P_2, I_2 and D_2.

The control algorithm is based upon the general Laplace-Transfer function of an analog PID-Controller:

$$G_R(s) = K_{PR}\left(1 + \frac{1}{T_n \cdot s} + T_v \cdot s\right)$$

The transformation into a discrete form yields the implemented difference equation.

$$y_k = K_{PR}\, e_k + \frac{K_{PR}}{T_n}\, T \sum_{i=0}^{k} e_i + K_{PR}\, T_v \frac{1}{T}\left(e_k - e_{(k-1)}\right)$$

y_k : manipulated variable
e_k : control difference
T : = sampling time

The set values of the controller are in the following relationship with the difference equation:

$$P\_1 = 8192\ K_{PR}$$

$$I\_1 = 8192\ \frac{K_{PR}}{T_n}\ T$$

$$D\_1 = 8192\ K_{PR}\ T_V\ \frac{1}{T}$$

K_{PR} : proportional coefficient [A]
Tn : integral time constant [s]
Tv : derivative time constant [s]
T: sampling time T = 0,0013 s

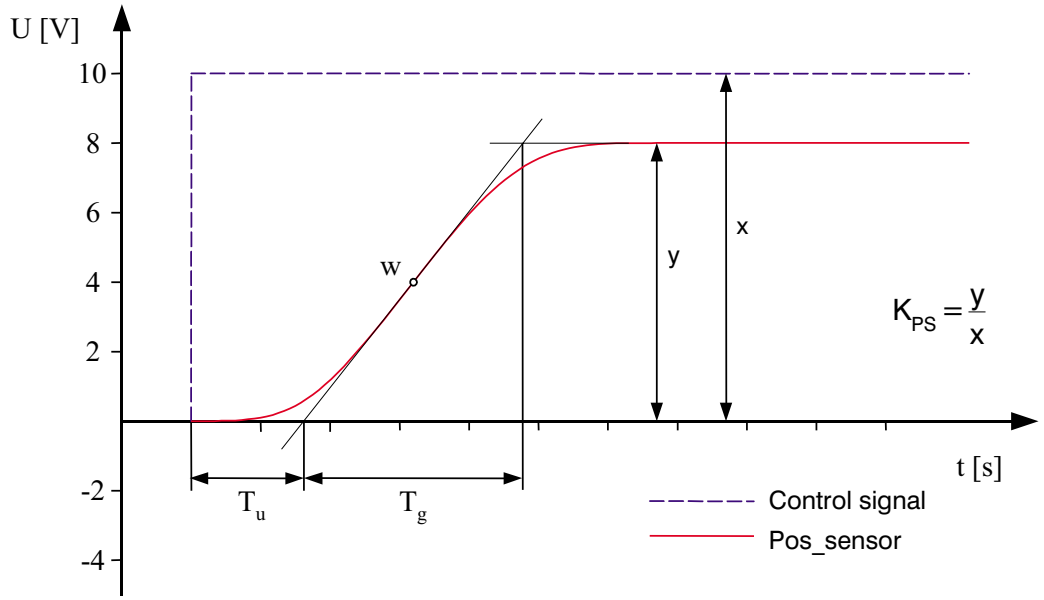
Please avoid the control circuit instabilities during the setting procedure. These could result in drive or machine damages.

REFERENCE: The parameters of the PID-Controller for a position control circuit (internal control circuit) are set at the manufacturer.

To determine the control parameters for a simple control with an external control value, the following adjusting rule can be used for controlled systems with proportional behavior.

Setting rules:

For finding the first controller setting, the adjustment procedure to Ziegler-Nichols is described. By this procedure, the setting values are obtained from a measured transient characteristic.
The transient characteristic is recorded on a valve with the open loop control. Before recording, both the ramps and the switching threshold must be disconnected. One gives the valve a control jump and measures the corresponding actual value signal; e.g. signal from a pos_ sensor for the feedback in the pos_ control circuit.



T_u = delay T_g = compensation time K_{PS} =proportional coefficient of the controlled member
W = inflexion point

Fig. 10: Step response of the controlled member

If a tangent is applied on the inflexion point of the actual value signal, then it is possible to use the above shown figure and determine graphically the delay, compensation time and the proportional coefficient of the controlled member. In this way, the control system parameters K_{PR} , T_n and T_V can be calculated from the following table:

Controller	K_{PR}	T_n	T_v
P	$\frac{T_g}{K_{PS}\ T_u}$	-	-
PI	$0{,}9\ \frac{T_g}{K_{PS}\ T_u}$	$3{,}3\ T_u$	-
PID	$1{,}2\ \frac{T_g}{K_{PS}\ T_u}$	$2\ T_u$	$0{,}5\ T_u$

Table 5: Calculation of controller parameters to Ziegler – Nichols

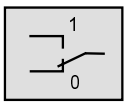
By inserting these values into the above given relations, the first setting values for the controller are found. However, these parameters are to be experimentally tuned according to the particular conditions.

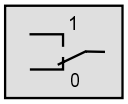
By a cascade control, an analog procedure is to be used to determine the parameters of the main controller. In this case, the position controller has to be activated.

1)Ziegler, J.G., N.B .Nichols: Optimum setting for automatic controllers

2.7.11 Linearization of sensor signals

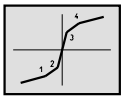
Symbol: Pos. Linearisation Status Ext_Linearisation Status

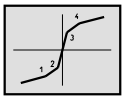




Description:
The options Pos. Linearisation Status and Ext_Linearisation Status determine, whether the feedback signals will be linearised or if these signals will be routed to the control electronics without linearisation.

Symbol: Pos. Linearisation Ext. Linearisation





Description:
The linearisation is described by a 5 segments curve. This curve consists of 4 programmable points and the end points of the characteristic field. The coordinates of the linearisation curve are given in percents.
The following example shows a linearisation for a position feedback.

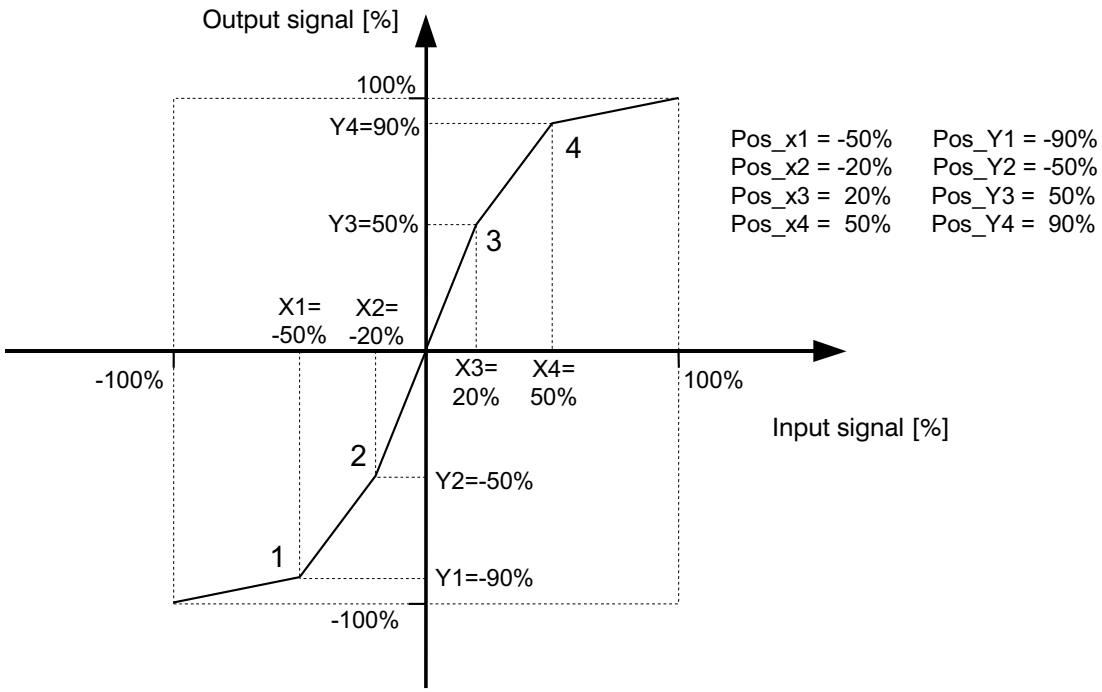


Fig 11: Example of a linearisation curve

Linearisation is normally useful and/or required only for the external feedback signal.

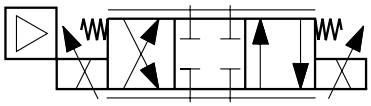
3. Features and use of directional valves in individual configurations

The following chapters show the typical operation configurations of proportional directional valves with the corresponding work setting of software parameters.

The parameters which limit the maximum coil current must not be changed (increased) in order to ensure a reliable valve function at the limiting temperature of the ambient air and oil at 100% ED.

3.1 Open loop controlled proportional directional valve (E01)

Functional symbol



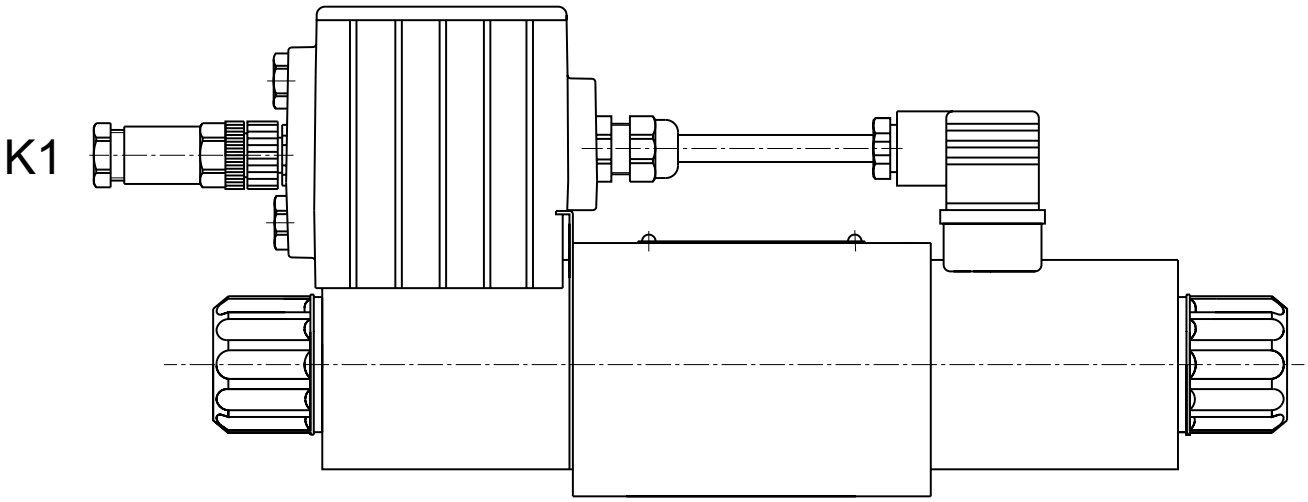


Fig. 12: Proportional directional valve in configuration E01 – open loop controlled valve

3.1.1 Model specifications

The proportional directional valve in configuration E01 (open loop controlled valve) can be used for controlling the flow rate (motion speed) and the flow direction in dependence on the valve spool type. The digital electronics enables the specification and settings of the control signal level, the time constants of ramp functions, the current limiting (maximum and minimum coil currents), as well as setting of dither parameters.

Software block diagram

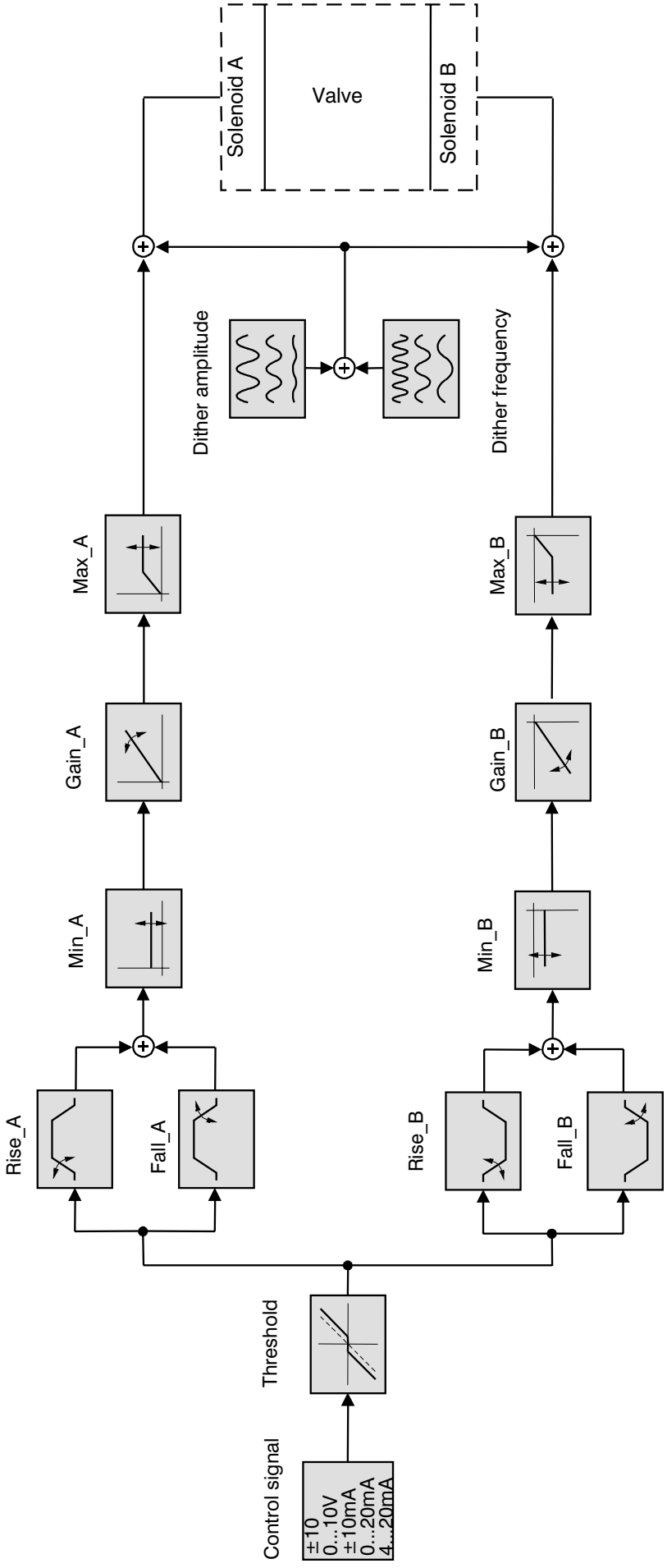


Fig. 13: Block diagram of configuration E01

3.1.2 Work setting of software parameters

Table 6 shows the possible setting ranges of individual parameters in an open loop mode.
Changing the other parameters does not have any influence on the valve function.

Name	Function	Setting possibilities
Configuration	Determines the function features of the control electronics	Open_L Open_L_A, Open_L_B
Command	Control signal	+/-10V, 0...10V, +/-10mA, 0...20mA, 4...20mA
Dither amplitude	Amplitude of the dither signal	0...2500
Dither frequency	Frequency of the dither signal	56Hz, 64Hz, 96Hz, 128Hz
Max_A	Maximum coil current A	0...2500mA
Min_A	Minimum coil current A	0...2500mA
Max_B	Maximum coil current B	0...2500mA
Min_B	Minimum coil current B	0...2500mA
Current gain A	Current gain of coil A	0...25000 μA / %
Current gain B	Current gain of coil B	0...25000 μA / %
Rise_A	Ramp ascending edge – coil current A	10...10000% / s
Fall_A	Ramp descending edge – coil current A	10...10000% / s
Rise_B	Ramp ascending edge – coil current B	10...10000% / s
Fall_B	Ramp descending edge – coil current B	10...10000% / s
Threshold	Threshold of the valve – response on the control signal	0...100%

Table 6: Setting range of individual parameters in configuration E01

The following tables (7,8) give nominal values of the work set parameters in dependence on the nominal size and type of the proportional directional valve. Setting of parameters marked with "*" depends on the particular features of the valve and the respective hydraulic circuit and can differ with the individual valves. The values in parenthesis are valid for valves with one coil on the side of port B (2Z11, 2Y11). In case that some audible vibrations arise in the hydraulic circuit during the valve operation, the amplitude and/or frequency of the dither signal have to be changed. Too a great decreasing of the dither signal may result in deterioration of hysteresis and/or valve sensitivity. Setting of the control signal type has to be carried out with regard to parameters named in chapter 2.7.2 – Table 3.

Name	PRM4-043..../..-24E01	PRM4-063..../..-24E01	PRM4-103..../..-24E01
Configuration	Open_L	Open_L	Open_L
Command	+/-10 V	+/-10 V	+/-10 V
Dither amplitude *	250	100	230
Dither frequency*	96 Hz	64 Hz	56 Hz
Max_A	800 mA	1000 mA	1100 mA
Min_A*	250 mA	200 mA	210 mA
Max_B	800 mA	1000 mA	1100 mA
Min_B*	250 mA	200 mA	210 mA
Current gain A*	8000 μA / %	10000 μA / %	11000 μA / %
Current gain B*	8000 μA / %	10000 μA / %	11000 μA / %
Rise_A	10000% / s	10000% / s	10000% / s
Fall_A	10000% / s	10000% / s	10000% / s
Rise_B	10000% / s	10000% / s	10000% / s
Fall_B	10000% / s	10000% / s	10000% / s
Threshold	0%	0%	0%

Table 7: Work setting of valve in configuration E01 with two solenoids

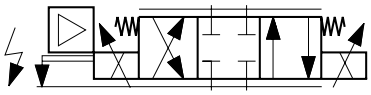
Name	PRM4-042..../..-24E01	PRM4-062..../..-24E01	PRM4-102..../..-24E01
Configuration	Open_L_A(Open_L_B)	Open_L_A(Open_L_B)	Open_L_A(Open_L_B)
Command	0...+10 V	0...+10 V	0...+10 V
Dither amplitude *	250	100	230
Dither frequency*	96 Hz	64 Hz	56 Hz
Max_A	800 mA (0 mA)	1000 mA (0 mA)	1100 mA (0 mA)
Min_A*	250 mA	200 mA (0 mA)	210 mA (0 mA)
Max_B	0 mA (800 mA)	0 mA (1000 mA)	0 mA (1100 mA)
Min_B*	0 mA (250mA)	0 mA (200 mA)	0 mA (210 mA)
Current gain A*	8000 µA / % (0 µA / %)	10000 µA / % (0 µA / %)	11000 µA / % (0 µA / %)
Current gain B*	0 µA / % (8000 µA / %)	0 µA / % (10000 µA / %)	0 µA / % (11000 µA / %)
Rise_A	10000% / s	10000% / s	10000% / s
Fall_A	10000% / s	10000% / s	10000% / s
Rise_B	10000% / s	10000% / s	10000% / s
Fall_B	10000% / s	10000% / s	10000% / s
Threshold	0%	0%	0%

Table 8: Work setting of valve in configuration E01 with one solenoid

Parameters marked with ▭ have an essential effect on functional features of the directional valve and should not be modified by the user.

3.2 Proportional directional valves with spool position feedback (E02S01)

Functional symbol



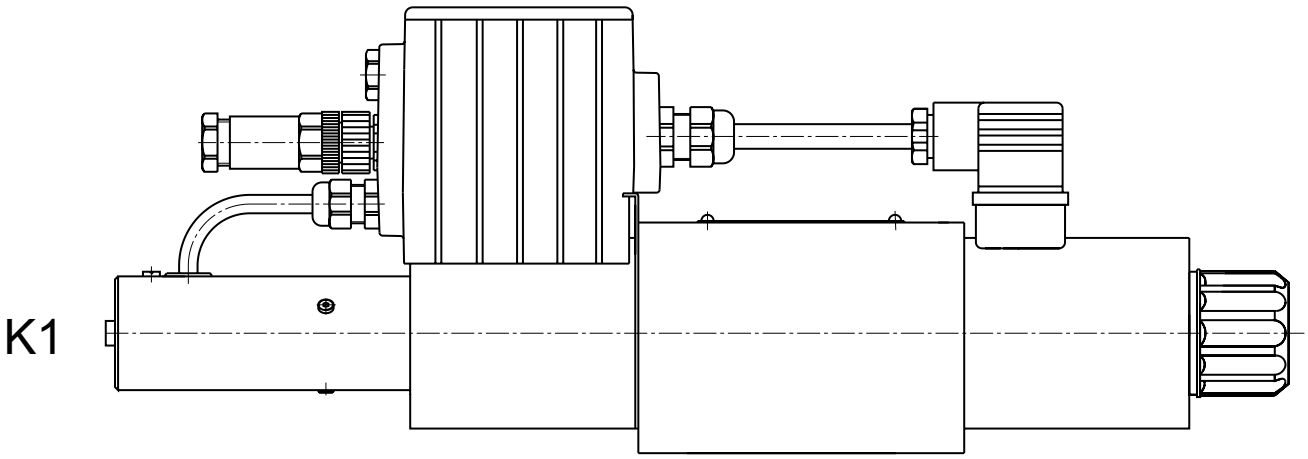


Fig. 14: Proportional directional valve in configuration E02S01 – spool position feedback

3.2.1 Model specification

The proportional directional valve in configuration E02S01 (with spool position feedback) can be used for controlling the flow rate (motion speed) and the flow direction in dependence on the valve spool type. Considering the functional valve features, the control signal, insensitivity zone for the control signal level, overlap compensation, time constant of ramp functions, current limiting (maximum and minimum current) and the dither parameters can be specified. Additionally, it is possible to set the parameters of the PID-Controller, which works with the signal of the spool position and can be, in case of necessity, also modified with a linearization function with regard to the features of the particular hydraulic circuit. Thanks to the spool position feedback, the valve has better dynamic parameters, is marked by minimal hysteresis and in a certain range also with greater power parameters in comparison with a valve in configuration E01.

Software block diagram of directional valve with spool position feedback

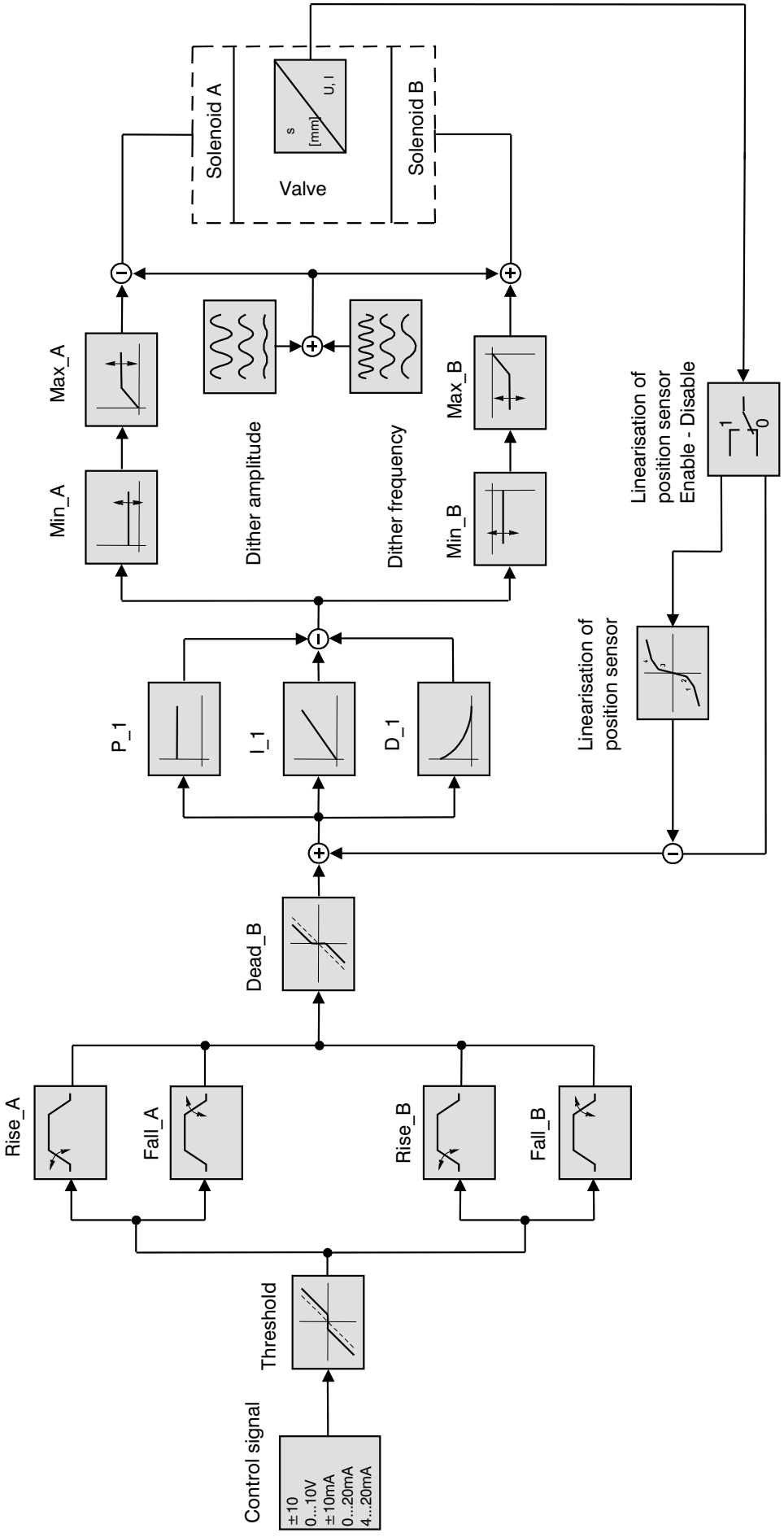


Fig. 15: Software block diagram of valve in configuration E02S01

3.2.2. Work setting of software parameters

Table 9 includes the range of individual setting parameters for a valve in configuration with spool position feedback. Changing other parameters has no effect on the valve function.

Name	Function	Setting possibilities
Configuration	Determines functional features of the control electronics	Close_L_Pos
Command	Control signal	+/-10 V, 0...10 V, +/-10 mA, 0...20 mA, 4...20 mA
Dither amplitude	Amplitude of the dither signal	0...2500
Dither frequency	Frequency of the dither signal	56 Hz, 64 Hz, 96 Hz, 128 Hz
Max_A	Maximum coil current A	0...2500 mA
Min_A	Minimum coil current A	0...2500 mA
Max_B	Maximum coil current B	0...2500 mA
Min_B	Minimum coil current B	0...2500 mA
P_1	Proportional coefficient of controller 1	0...32767 A/%
I_1	Integral time constant of controller 1	0...32767 A/%
D_1	Derivative time constant of controller 1	0...32767 A/%
Rise_A	Ramp ascending edge – coil current A	10...10000% / s
Fall_ A	Ramp descending edge – coil current A	10...10000% / s
Rise_B	Ramp ascending edge – coil current B	10...10000% / s
Fall_ B	Ramp descending edge – coil current B	10...10000% / s
Dead_B	Compensation of geometric spool overlap	0...100%
Threshold	Valve threshold – control signal response	0...100%
Linear_Pos_Sensor	Linearisation activation (deactivation) of position sensor	Disable / Enable
X1	Base point	0...100%
Y1	Base point	0...100%
X2	Base point	0...100%
Y2	Base point	0...100%
X3	Base point	0...100%
Y3	Base point	0...100%
X4	Base point	0...100%
Y4	Base point	0...100%

Table 9: Setting range of individual parameters of a valve in configuration E02S01

The following table (10) includes nominal values of the work set parameters in dependence on the nominal size of the proportional directional valve. Setting of parameters marked with "*" depends on the particular features of the valve and the particular hydraulic circuit and can differ with the individual valves. In case of instability of the hydraulic circuit during the valve operation, the PID-Controller parameters and/or the dither parameters (amplitude, frequency) have to be changed. Improper setting of these parameters can result in deterioration of hysteresis and/or valve sensitivity. Setting of the control signal type has to be carried out with regard to parameters named in chapter 2.7.2 – Table 3.

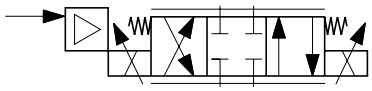
Name	PRM4-043..../..-24E02S01	PRM4-063..../..-24E02S01	PRM4-103..../..-24E02S01
Configuration	Close_L_Pos	Close_L_Pos	Close_L_Pos
Command	+/-10 V	+/-10 V	+/-10 V
Dither amplitude*	125	50	100
Dither frequency*	96 Hz	64 Hz	56 Hz
Max_A	800 mA	1000 mA	1100 mA
Min_A	250 mA	0 mA	0 mA
Max_B	800 mA	1000 mA	1100 mA
Min_B	250 mA	0 mA	0 mA
P_1*	200	250	400
I_1*	10	15	15
D_1*	0	0	0
Rise_A	10000% / s	10000% / s	10000% / s
Fall_ A	10000% / s	10000% / s	10000% / s
Rise_B	10000% / s	10000% / s	10000% / s
Fall_ B	10000% / s	10000% / s	10000% / s
Dead_B*	5%	5%	5%
Threshold	0%	0%	0%
Linear_Pos_Sensor	Disable	Disable	Disable
X1	0%	0%	0%
Y1	0%	0%	0%
X2	0%	0%	0%
Y2	0%	0%	0%
X3	0%	0%	0%
Y3	0%	0%	0%
X4	0%	0%	0%
Y4	0%	0%	0%

Table 10: Work setting of valve in configuration E02S01 with two solenoids

Parameters marked with [ ] have an essential effect on functional features of the directional valve and should not be modified by the user.

3.3 Closed loop controlled valve with external feedback (E03)

Functional diagram



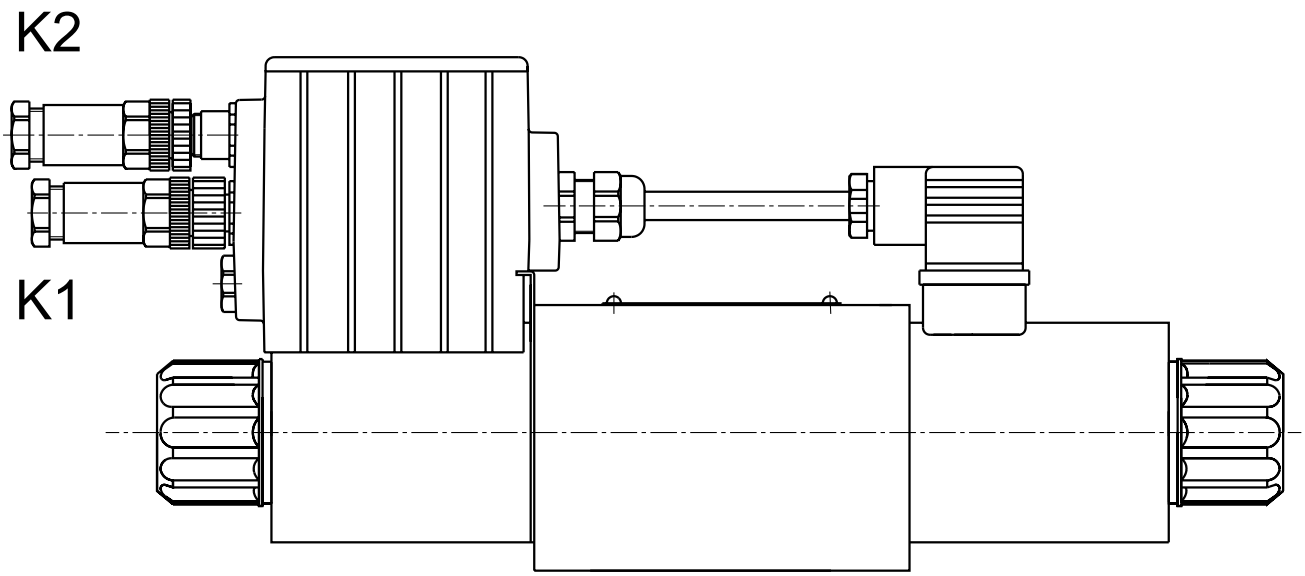


Fig. 16: Proportional directional valve in configuration E03 – external feedback

3.3.1. Model specifications

The proportional directional valve in configuration E03 (external feedback) can be used, in accordance with the particular physical feedback value, for affecting the oil flow rate (movement speed), flow direction or pressures (force, torque).

The digital electronics allows setting and specification of the following parameters:
- *Type of the control signal*
- *Dead_B related to the signal level (switching threshold)*
- *Compensation of valve spool overlap*
- *Ramp times*
- *Current limiting*
- *Dither parameters*

For adaptation on the particular hydraulic circuit, also the parameters of the PID-Controller can be adjusted.

Software block diagram of directional valve with external feedback

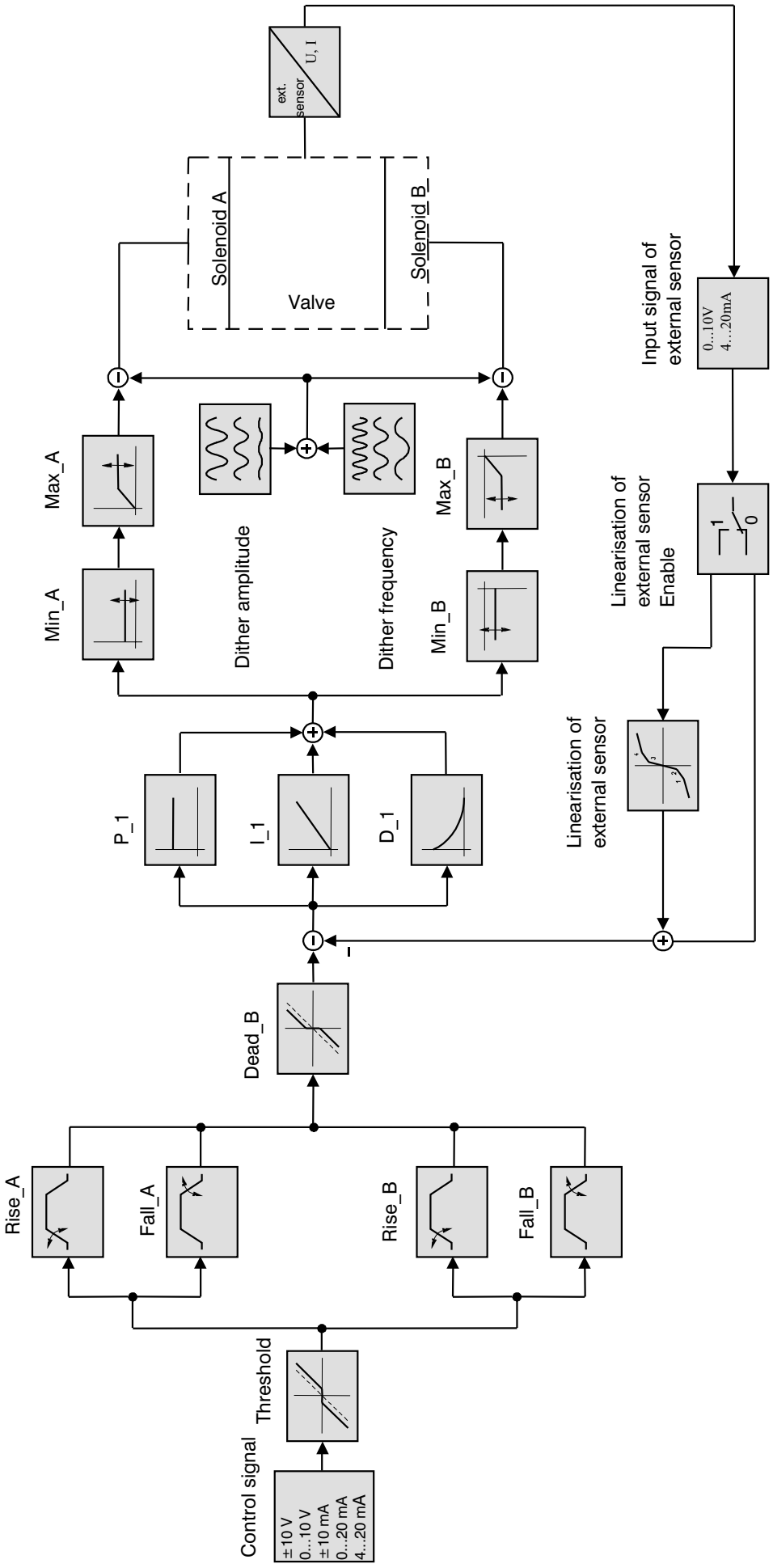


Fig. 17: Software block diagram of valve in configuration E03

3.3.2. Work setting of software parameters

The table 11 includes the ranges of individual setting parameters for a valve in configuration with external feedback. Changing other parameters has no effect on the valve function.

Name	Function	Setting possibilities
Configuration	Determines functional features of the control electronics	Close_L_Ext
Command	Control signal	+/-10 V, 0...10 V, +/-10 mA, 0...20 mA, 4...20 mA
Ext_Sensor	Output type of the external sensor	0...10 V, 2...20 V, 0...20 mA, 4...20 mA
Dither amplitude	Amplitude of the dither signal	0...2500
Dither frequency	Frequency of the dither signal	56 Hz, 64 Hz, 96 Hz, 128 Hz
Max_A	Maximum coil current A	0...2500 mA
Min_A	Minimum coil current A	0...2500 mA
Max_B	Maximum coil current B	0...2500 mA
Min_B	Minimum coil current B	0...2500 mA
P_1	Proportional coefficient of controller 1	-32768*...32767 A/%
I_1	Integral time constant of controller 1	-32768*...32767 A/%
D_1	Derivative time constant of controller 1	-32768*...32767 A/%
Rise_A	Ramp ascending edge – coil current A	10...10000% / s
Fall_ A	Ramp descending edge – coil current A	10...10000% / s
Rise_B	Ramp ascending edge – coil current B	10...10000% / s
Fall_ B	Ramp descending edge – coil current B	10...10000% / s
Dead_B	Compensation of geometric spool overlap	0...100%
Threshold	Valve threshold – control signal response	0...100%
Linear_Ext_Sensor	Linearisation activation (deactivation) of ext_ sensor	Disable / Enable
X1	Base point	0...100%
Y1	Base point	0...100%
X2	Base point	0...100%
Y2	Base point	0...100%
X3	Base point	0...100%
Y3	Base point	0...100%
X4	Base point	0...100%
Y4	Base point	0...100%

* Negative polarity means opposite polarity of the feedback signal

Table 11: Setting range of individual parameters for directional valves in configuration E03

The following table (12) includes nominal values of the work set parameters in dependence on the nominal size of the proportional directional valve. Setting of parameters marked with "*" depends on the particular features of the valve and the respective hydraulic circuit and can differ with the individual valves. Setting of parameters of the PID-Controller depends on the particular composition of the hydraulic circuit, its features and on type of the controlled value. The mentioned application of the directional valve requires a detailed consultation with the manufacturer. Setting of the control signal type has to be carried out with regard to parameters named in chapter 2.7.2 – Table 3.

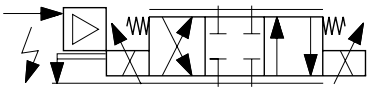
Name	PRM4-043..../..-24E03	PRM4-063..../..-24E03	PRM4-103..../..-24E03
Configuration	Close_L_Ext	Close_L_Ext	Close_L_Ext
Command	+/-10 V	+/-10 V	+/-10 V
Ext_Sensor	0...10 V	0...10 V	0...10 V
Dither amplitude*	125	50	100
Dither frequency*	96 Hz	64 Hz	56 Hz
Max_A	800 mA	1000 mA	1100 mA
Min_A	0 mA	0 mA	0 mA
Max_B	800 mA	1000 mA	1100 mA
Min_B	0 mA	0 mA	0 mA
P_1*	1	1	1
I_1*	1	1	1
D_1*	0	0	0
Rise_A	10000% / s	10000% / s	10000% / s
Fall_ A	10000% / s	10000% / s	10000% / s
Rise_B	10000% / s	10000% / s	10000% / s
Fall_ B	10000% / s	10000% / s	10000% / s
Dead_B*	5%	5%	5%
Threshold	0%	0%	0%
Linear_Pos_Sensor	Disable	Disable	Disable
X1	0%	0%	0%
Y1	0%	0%	0%
X2	0%	0%	0%
Y2	0%	0%	0%
X3	0%	0%	0%
Y3	0%	0%	0%
X4	0%	0%	0%
Y4	0%	0%	0%

Table 12: Work setting of directional valve in configuration E03 with two solenoids

Parameters marked with [ ] have an essential effect on functional features of the directional valve and should not be modified by the user.

3.4 Closed loop controlled directional valve with spool position feedback and external feedback (E04S01)

Functional diagram



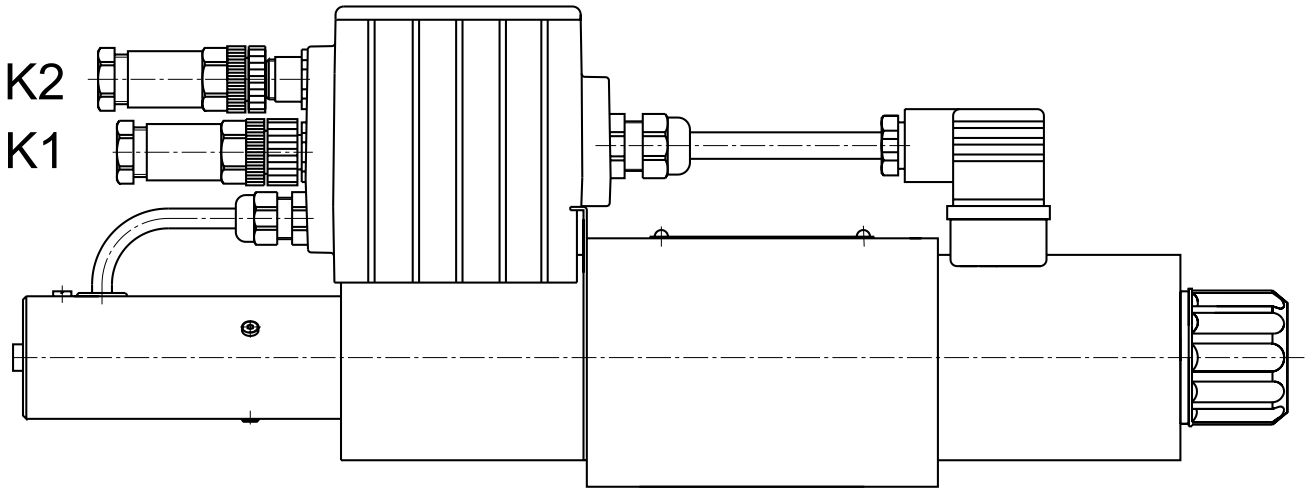


Fig. 18: Proportional directional valve in configuration E04 (spool position feedback and external feedback)

3.4.1. Model specification

The proportional directional valve in configuration E04 (spool position feedback and external feedback, cascade control) can be used, in accordance with the particular physical feedback value, for affecting the oil flow rate (movement speed), flow direction or pressures (force, torque).

The digital electronics allows setting and specification of the following parameters:
- *Type of the control signal*
- *Dead_B related to the signal level (switching threshold)*
- *Compensation of valve spool overlap*
- *Ramp times*
- *Current limiting*
- *Dither parameters*

For adaptation on the particular hydraulic circuit, also the parameters of the PID-Controller can be adjusted. Additionally, both signals can be linearised.

Software block diagram of valve with spool position feedback and external feedback

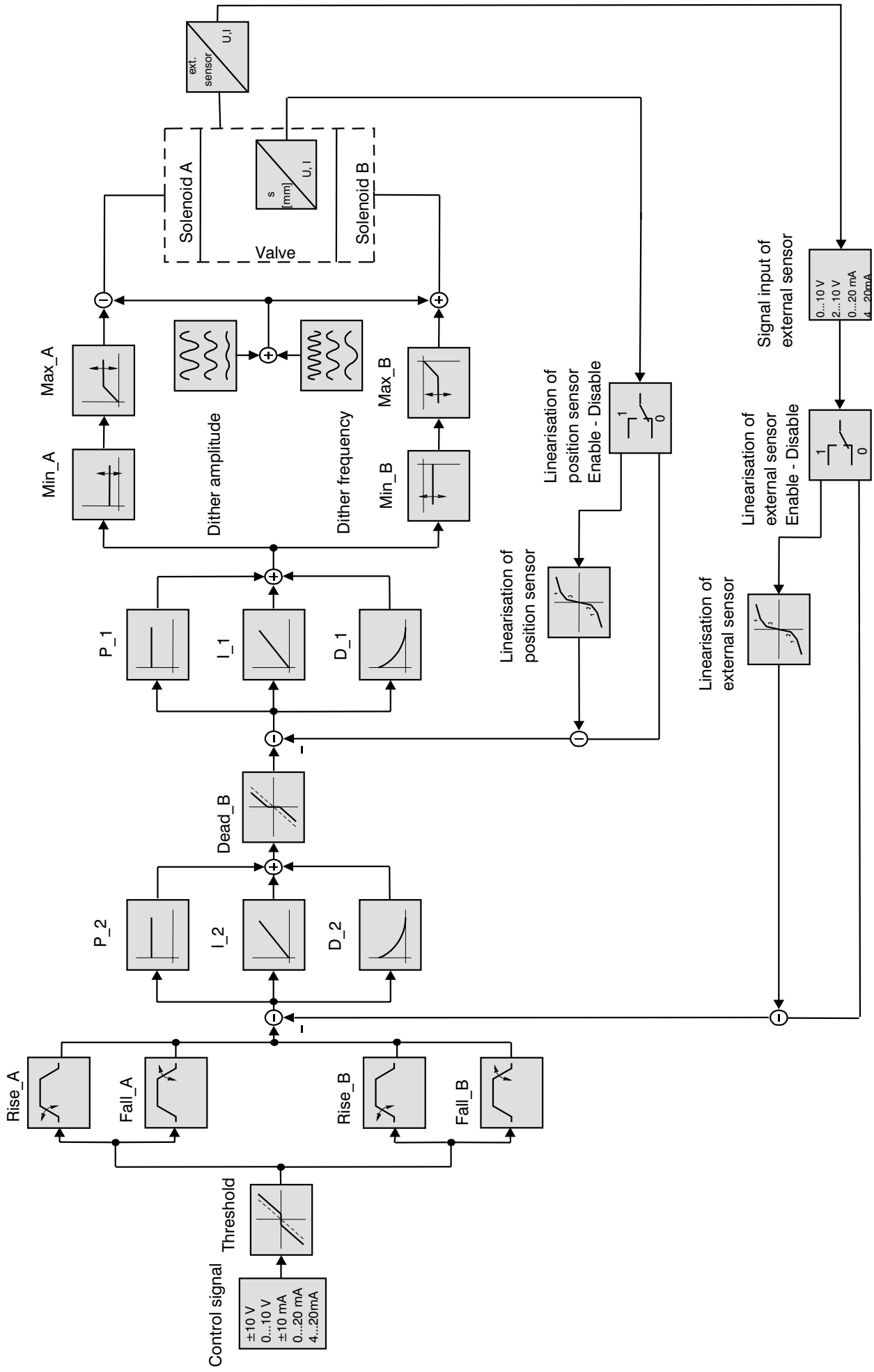


Bild 19: Software Blockschaltbild des Wegeventils in Konfiguration E04S01

3.4.2. Work setting of software parameters

Table 13 includes the ranges of individual setting parameters for valve with position feedback. Changing other parameters has no effect on the valve function.

Name	Function	Setting possibilities
Configuration	Determines functional features of the control electronics	2_Loops
Command	Control signal	+/-10 V, 0...10 V, +/-10 mA, 0...20 mA, 4...20 mA
Ext_Sensor	Output type of the external sensor	0...10 V, 2...10 V, 0...20 mA, 4...20 mA
Dither amplitude	Amplitude of the dither signal	0...2500
Dither frequency	Frequency of the dither signal	56 Hz, 64 Hz, 96 Hz, 128 Hz
Max_A	Maximum coil current A	0...2500 mA
Min_A	Minimum coil current A	0...2500 mA
Max_B	Maximum coil current B	0...2500 mA
Min_B	Minimum coil current B	0...2500 mA
P_1	Proportional coefficient of controller 1	0...32767 A/%
I_1	Integral time constant of controller 1	0...32767 A/%
D_1	Derivative time constant of controller 1	0...32767 A/%
P_2	Proportional coefficient of controller 2	-32768*...32767 A/%
I_2	Integral time constant of controller 2	-32768*...32767 A/%
D_2	Derivative time constant of controller 2	-32768*...32767 A/%
Rise_A	Ramp ascending edge – coil current A	10...10000% / s
Fall_ A	Ramp descending edge – coil current A	10...10000% / s
Rise_B	Ramp ascending edge – coil current B	10...10000% / s
Fall_ B	Ramp descending edge – coil current B	10...10000% / s
Overlap	Compensation of geometric spool overlap	0...100%
Threshold	Valve threshold – control signal response	0...100%
Linear_Pos_Sensor	Linearisation activation (deactivation) of position sensor	Disable / Enable
X1	Base point	0...100%
Y1	Base point	0...100%
X2	Base point	0...100%
Y2	Base point	0...100%
X3	Base point	0...100%
Y3	Base point	0...100%
X4	Base point	0...100%
Y4	Base point	0...100%
Linear_Ext_Sensor	Linearisation activation (deactivation) of Ext_sensor	Disable / Enable
X1	Base point	0...100%
Y1	Base point	0...100%
X2	Base point	0...100%
Y2	Base point	0...100%
X3	Base point	0...100%
Y3	Base point	0...100%
X4	Base point	0...100%
Y4	Base point	0...100%

* Negative polarity means opposite polarity of the feedback signal

Table 13: Setting range of individual parameters of directional vale in configuration E04S01

The following table (14) includes nominal values of the work set parameters in dependence on the nominal size of the proportional directional valve. Setting of parameters marked with "*" depends on the particular features of the valve and the respective hydraulic circuit and can differ with the individual valves. Setting of parameters of the PID-Controllers for both the spool position feedback and the external feedback depends on the particular composition of the hydraulic circuit, its features and on type of the controlled value. The mentioned application of the directional valve requires a detailed consultation with the manufacturer. Setting of the control signal type has to be carried out with regard to parameters named in chapter 2.7.2 – Table 3.

Name	PRM4-043..../..-24E04S01	PRM4-063..../..-24E04S01	PRM4-103..../..-24E04S01
Configuration	2_Loops	2_Loops	2_Loops
Command	+/-10 V	+/-10 V	+/-10 V
Ext_sensor	0...10 V	0...10 V	0...10 V
Dither amplitude*	125	50	100
Dither frequency	96 Hz	64 Hz	56 Hz
Max_A	800 mA	1000 mA	1100 mA
Min_A	0 mA	0 mA	0 mA
Max_B	800 mA	1000 mA	1100 mA
Min_B	0 mA	0 mA	0 mA
P_1*	200	250	400
I_1*	10	15	15
D_1*	0	0	0
P_2*	1	1	1
I_2*	1	1	1
D_2*	0	0	0
Rise_A	10000% / s	10000% / s	10000% / s
Fall_ A	10000% / s	10000% / s	10000% / s
Rise_B	10000% / s	10000% / s	10000% / s
Fall_ B	10000% / s	10000% / s	10000% / s
Dead_B*	5%	5%	5%
Threshold	0%	0%	0%
Linear_Pos_Sensor	Disable	Disable	Disable
X1	0%	0%	0%
Y1	0%	0%	0%
X2	0%	0%	0%
Y2	0%	0%	0%
X3	0%	0%	0%
Y3	0%	0%	0%
X4	0%	0%	0%
Y4	0%	0%	0%
Linear_Ext_Sensor	Disable	Disable	Disable
X1	0%	0%	0%
Y1	0%	0%	0%
X2	0%	0%	0%
Y2	0%	0%	0%
X3	0%	0%	0%
Y3	0%	0%	0%
X4	0%	0%	0%
Y4	0%	0%	0%

Table 14: Work setting of directional vale in configuration E04S01 with two solenoids

Parameters marked with [ ] have an essential effect on functional features of the directional valve and should not be modified by the user.

Caution!

- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law.

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Source of the control signal for the proportional valves

Size 04, 06, 10

TESTER PRM

HA 5174 8/2004

Replaces HA 5174 7/2003

Service instructions

1. Content

2. Basic information

2.1. Introduction

The TESTER is the device serving as a source of the control signal for proportional directional valves the series PRM2 and PRM4 with integrated electronics. The main field of the tester use is the tuning of proportional directional valves in particular hydraulic circuits where their direct connection to the central control system would be very risky. The TESTER can also be used for detection of the control signal errors (interruption, disturbance) for a proportional directional valve or for simulation of nonstandard states of a hydraulic system, the realization of which in the central control system would be difficult.
The design of the TESTER enables the generation of any control signals , current and voltage signals, that are used with the proportional directional valves ARGO-HYTOS with integrated electronics. Implemented in the TESTER are also the basic protective functions that minimize the possible risk of damaging both the TESTER and the integrated electronics of the proportional directional valve tested.

2.2. Warranty limitation

The manual was compiled by specialist with great care and represents the actual stage of knowledge in the ARGO-HYTOS A.G. In case of violation of directives, faulty handling or incorrect interpretation or misunderstanding, the responsibility and warranty remain at the user.

2.3. Symbols

This symbol warns that there may be danger for persons, machines and material, shouldn't the instructions be strictly observed .

This symbol refers to advices and information.

3. Technical description

3.1. Basic design parameters

The TESTER PRM is fitted in a plastic box with the dimensions 80 x 160 x 55mm, is resistant against mechanical damages and hydraulic oils, enclosure type IP20.

Tester front panel (Fig. 1) includes the following elements:

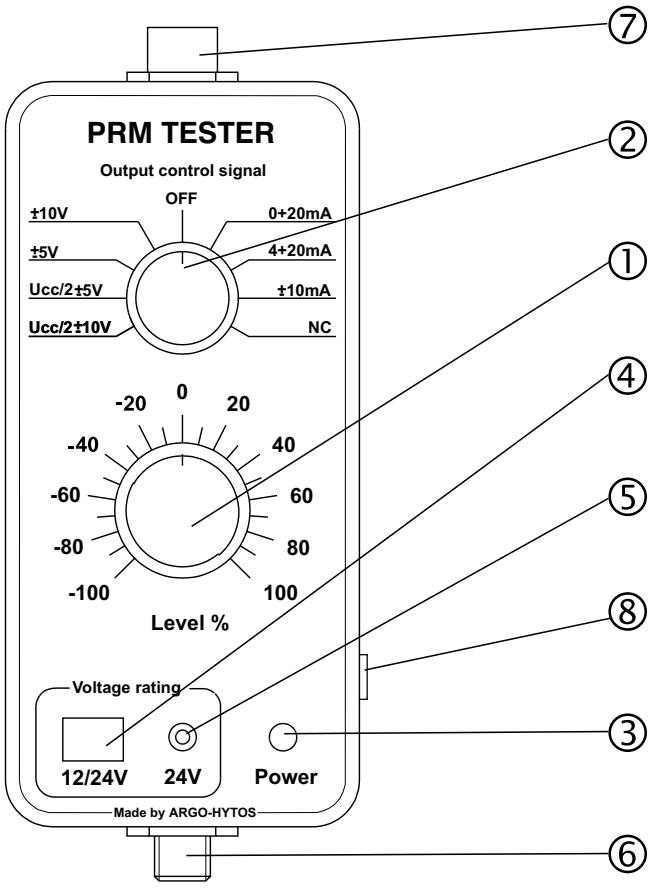

Fig. 1: Arrangement of the operating elements and connectors of the TESTER

1. Rotary potentiometer (340°) with calibrated scale ± 100%
2. Rotary switch for output control signal selection ± 10V, ± 5V, $U_{cc}/2$ ± 10V, $U_{cc}/2$ ± 5V, 4..20mA, 0..20mA, ± 10mA
3. Indication of the supply voltage presence (green LED - Power)
4. Rocker-type change-over switch of supply voltage level 12V/24V
5. Selection indication of 24V output voltage by supplying with an external power supply (red LED)
6. Input connector (INPUT) 5 pins M12x1
7. Output connector (OUTPUT) 5 pins M12x1
8. Connector for the external supply (24V DC)

By selection of an unipolar current output signal (0..20mA, 4..20mA), the whole range of the control potentiometer is functional symmetrically around the middle position 0%. That means that the output current signal increases by turning the potentiometer in either direction from the position 0%.
For the range of 0…20mA, the middle position of the potentiometer corresponds with a signal of 0mA. The signal corresponding with the middle position by a range of 4…20mA is 4mA.
With the other (bipolar) types of the output signal, the whole range of the control potentiometer is utilized. The middle position corresponds with 0 and one of the end positions with the 100% level of the output control signal, including its required polarity.

3.2. TESTER connection to the tested valve

The TESTER is provided with two 5-pole connectors M12x1 (socket, plug) designated as INPUT and OUTPUT. A part of the TESTER is a pair of 2-meter long extension cables provided with connectors M12x1 at their ends.

3.3. Electric connection of the external supply source to the TESTER

Provided that there is not any supply voltage from a control system available, an external supply source to the respective specification can be connected directly to the TESTER through a 2,5 mm connector.

The External supply voltage is not a standard part of the TESTER delivery. It is to be ordered separately to the respective type number. A different type of the supply source can be used, provided that it complies with the requirements stated in the specification of the external power supply.

3.4. Connection of connectors

The **Connector M12x1 designated as INPUT** (plug) serves the TESTER connection to the supply voltage source 12 V or 24 V

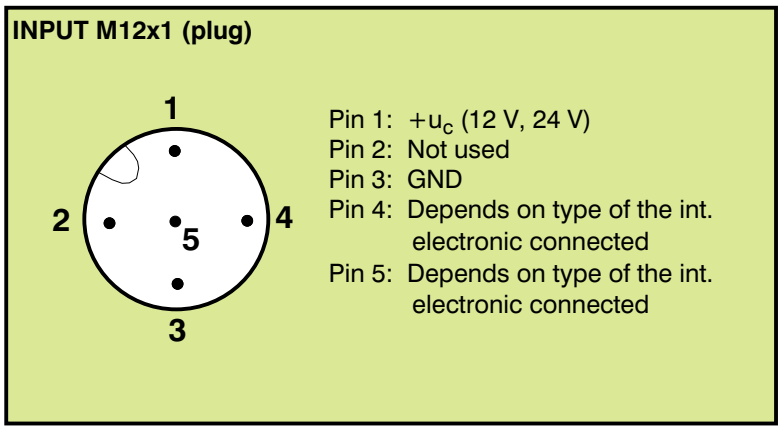

Fig. 2 :Connection of the TESTER input connector (INPUT M12x1)

The **Connector M12x1 designated as OUTPUT** (socket) serves the connection of the output control signal from the TESTER and the supply voltage to the proportional directional valve tested.

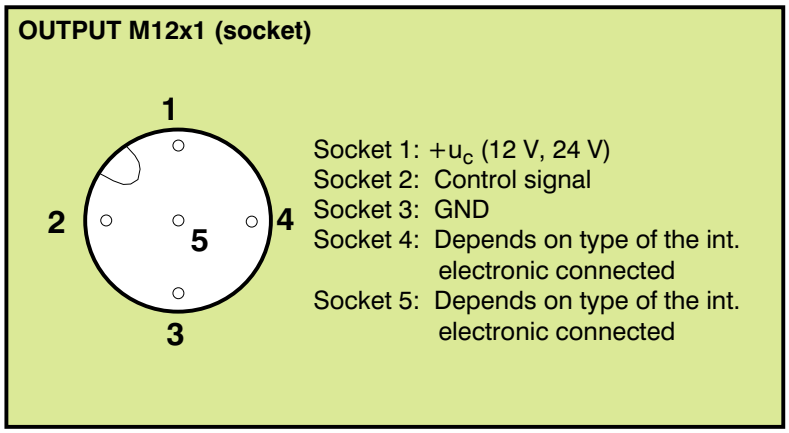

Fig. 3 :Connection of the TESTER output connector (OUTPUT M12x1)

Table 1 shows the signals on pins 4 and 5 that depend on the type of the integrated electronic connected.

	Nominal supply voltage of the integrated electronics			
	12V		**24V**	
	Pin No. 4	Pin No. 5	Pin No. 4	Pin No. 5
Analogue electronics EL3	Output + 5V DC	-	Output +10V DC	-
Digital electronics PRM4	Programming	Voltage signal of the spool position sensor	Programming	Voltage signal of the spool position sensor

Table 1: Signals on pins 4 and 5 of the TESTER output connector

The Connector 2,5 mm designated as 24V DC for connection of the external power supply 24V/1,5A.

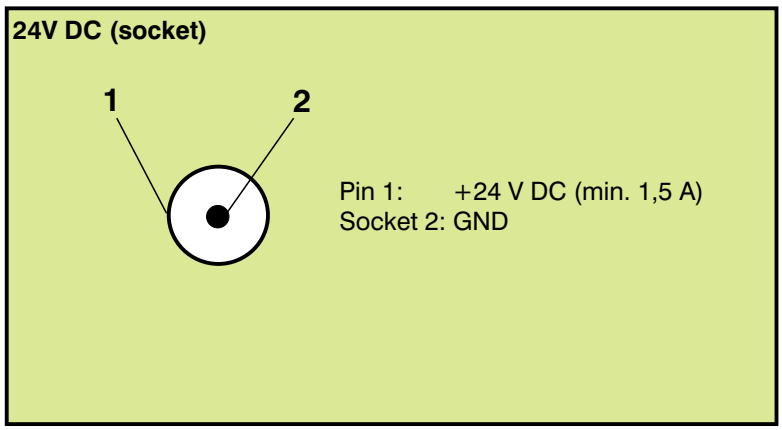

Fig. 4: Connection of the TESTER connector for the external supply (24V DC) and the proportional directional valve connected

It is necessary to ensure the output voltage of the power supply used to be galvanic separated from the electric net. The enclosure type of the power supply shall comply with the respective regulations for operation of the electric equipment.

As the supply voltage source, the supply voltage from the connector determined for the direct interconnection of the control system with the proportional directional valve can be used. That assumes the required supply voltage to be here available (the control system of the equipment will be active). According to the particular situation, the connector for supplying the valve can be connected directly to the TESTER, or if needed, one of the extension cables can be used.

In case of the external supplying, the correct supply voltage on the TESTER corresponding with the nominal supply voltage of the integrated electronics has to be selected. An incorrect selection can cause the incorrect cooperation of the directional valve and the TESTER and may result in damaging the integrated electronics.

Provided that the TESTER is supplied directly from the control system, its supply voltage gives the value of the supply voltage for the proportional directional valve.

4. Testing of PRM valves by TESTER

4.1. Procedure by use of the TESTER

Prior to connecting the TESTER to the tested proportional directional valve, the mutual compatibility of the control signal of the valve electronics and the type of the control signal set on the TESTER is to be checked. To avoid the unexpected reaction of the directional valve, the control potentiometer is to be set to the middle position designated as 0%.

By using the TESTER, the manufacturer recommends using the bellow given procedure to ensure the correct cooperation of TESTER PRM and the connected directional valve and at the same time to reduce the risk of damaging the whole hydraulic equipment.

1. Select the correct supply voltage on the TESTER according to the nominal supply voltage of the integrated electronics connected.
2. Select the corresponding type of the control signal of the integrated electronics of the proportional directional valve.
3. Set the control potentiometer of the TESTER in the middle position to ensure the rest position of the control spool also after connection to the supply voltage.
4. Connect the TESTER to the directional valve to be tested by means of an extension cable and the connector designated as OUTPUT.
5. Connect the TESTER to the INPUT connector of the associated control system of the particular equipment, eventually to the supply source via connector for the external supply (24 V).

The proportional directional valves ARGO-HYTOS with integrated electronics are by default configured for the voltage control signals. Table 2 shows the ranges of these voltage signals according to the integrated electronics, model and the supply voltage used. More details regarding the other types of the control signals and their ranges are in the catalogue sheets of the particular models of the proportional directional valves.

	Nominal supply voltage of the electronics			
	12V		**24V**	
	With one solenoid	With two solenoids	With one solenoid	With two solenoids
Analogue electronics EL3	0...5V	± 5V	0...10V	± 10V
Digital electronics PRM4	0...10V	± 10V	0...10V	± 10V

Table 2: Standard configuration of the integrated electronics

For testing the directional valves with one solenoid and the voltage control signal, the same output signal is to be selected as for a directional valve with two solenoids. The functional range of the control potentiometer will lie in this case in the field of positive values (0%…100%). Setting the potentiometer into the field of negative values will not have any effect on the spool position of the proportional directional valve – the valve will not react.

The voltage output of the electronics is protected electronically against overloading (short circuit). Should, no matter what the reason, the output be overloaded, it would not cause any damage to the TESTER electronics.

In case of a correct interconnection of all the connectors, the control LED on the TESTER and as well the control LED on the integrated electronics of the proportional directional valve will light, as soon as the supply voltage is connected (with the analog electronics EL3, the LED is situated under the non-transparent cover of the integrated electronics).
By turning the control potentiometer of the TESTER, the position of the valve spool should change continuously and consequently also the oil flow rate (direction) through the directional valve, eventually the pressure in channels A, B (depends on the particular type of the directional valve and the arrangement of the hydraulic circuit). The position of the potentiometer designated as 100% will correspond with the maximum displacement of the valve spool from its middle position.

4.2. Valve behavior at an incorrect selection of the control signal type

Provided that another type (range) of the control signal is selected on the TESTER than that one just configured in the integrated electronics, an incorrect behavior of the proportional directional valve can be expected. Table 3 shows the possible operational stages in these cases.

Configuration of the valve integrated electronics – type of the control signal	**Type of the TESTER PRM output control signal**						
	0...20mA	4...20mA	±10mA	±5V	±10V	$U_{cc}/2 \pm 5V$	$U_{cc}/2 \pm 10V$
0...20mA	O.K.	1	2	3	3	3	3
4...20mA	4	O.K.	2	3	3	3	3
±10mA	5	5	O.K.	3	3	3	3
0...5V	6	6	6	O.K.*	4	3	3
0...10V	6	6	6	6	O.K.*	7	7
±5V	6	6	6	O.K.	4	7	7
±10V	6	6	6	1	O.K.	7	7
$U_{cc}/2 \pm 5V$	6	6	6	5	5	O.K.	4
$U_{cc}/2 \pm 10V$	6	6	6	5	5	1	O.K.

Table 3: Operational stages of the TESTER and the proportional directional valve

Legend:

O.K.
The range of the output control signal of the TESTER is selected correctly. The position of the proportional directional valve will correspond with setting of the potentiometer of the TESTER with its scale expressed in %.

O.K.*
The range of the output control signal of the TESTER is selected correctly. The position of the proportional directional valve will correspond with setting of the potentiometer of the TESTER with its scale expressed in %. Owing to the configuration of the integrated electronics of the directional valve (unipolar signal), the directional valve will react only in the range of the positive values of the control signal.

1
The range of the TESTER output signal is lesser than the range corresponding with the configuration of the integrated electronics of the directional valve.
Consequence: It won't be possible to achieve changing the spool position in the full range. The middle position of the control potentiometer does not correspond with the rest position of the directional valve spool. The scale on the TESTER expressed in % does not correspond with the actual spool position.

2
The range of the TESTER output signal is lesser than the range corresponding with the configuration of the integrated electronics of the directional valve.
Consequence: It won't be possible to achieve changing the spool position in the full range. The middle position of the control potentiometer does not correspond with the rest position of the directional valve spool. The scale on the TESTER expressed in % does not correspond with the actual spool position.

3
A voltage TESTER output signal is used for controlling the integrated electronics of the proportional directional valve which is configured for a current signal.
Consequence: The incompatible signals are used in this case. The scale of the TESTER expressed in % does not correspond with the valve spool position. **The manufacturer does not recommend the equipment operation in this regime!**

4
The range of the TESTER output control signal is greater than the range corresponding with the configuration of the integrated electronics of the directional valve.
Consequence: The scale on the TESTER expressed in % does not correspond with the actual spool position.

5
An incompatible control signal regarding its polarity is used (bipolar – unipolar).
Consequence: It won't be possible to achieve changing the spool position in the full range. The scale on the TESTER expressed in % does not correspond with the actual spool position.

6
A current TESTER output signal is used for controlling the integrated electronics of the proportional directional valve which is configured for a voltage signal.
Consequence: It won't be possible to achieve changing the spool position in the full range. The scale on the TESTER expressed in % does not correspond with the actual spool position.

7
An output control signal of the TESTER with its middle in of the supply voltage level is used for controlling the integrated electronics that is configured for a control signal with its middle at 0V.
Consequence: It won't be possible to achieve changing the spool position in the full range. The scale on the TESTER expressed in % does not correspond with the actual spool position.

5. Solving the problems

5.1. Controlling LED POWER does not light

- Check up, if the selection switch of the control signal type is not in the OFF position.
- Check presence of the supply voltage on the TESTER input connector.
  By use of an external supply, the output voltage of the supply source is to be checked up.
- Check the correctness of the TESTER connection to the input connector of the proportional directional valve.

5.2. By external supplying, the LED Voltage rating for the output voltage of 24V does not light

- Check the function of the external power supply and correctness of its interconnection with the TESTER.
- Check the presence of the net supply voltage at the input of the external power supply.
- Check the selection of 24V on rocker-type change-over switch Voltage rating.

5.3. The connected proportional directional valve does not react on position changes of the control potentiometer

- Check, if the LED POWER on the TESTER lights.
- Check the mutual compatibility of the selected TESTER control signal and the integrated electronics.
- Check the correct selection of the supply voltage for supplying the integrated electronics of the proportional directional valve
- Check the presence of the supply voltage on the integrated electronics of the proportional directional valve. A green LED signals the presence of the voltage.
- Check the correctness of interconnection of the TESTER output connector with the input connector of the integrated electronics of the proportional directional valve.
- Check setting of the parameters of the integrated electronics.

5.4. The connected proportional directional valve is not functional in the full range of parameters (it is impossible to set the maximum flow rate through the directional valve)

- Check the mutual compatibility of the TESTER selected signal and of the integrated electronics.
- Check the correct selection of the supply voltage for supplying the integrated electronic of the proportional directional valve.
- Check setting of the parameters of the integrated electronics.
- Check, if there is not any drop of the TESTER supply voltage for the maximum values of the control signal.

5.5. The connected proportional directional valve with two solenoids is functional in the full range of parameters only for one flow direction

- Check the mutual compatibility of the TESTER selected signal and of the integrated electronics.
- Check setting of the parameters of the integrated electronics.

6. Technical parameters

Technical parameters of TESTER PRM	Specification
Supply	12V, 24V ± 10% from the control system 24V ± 10% with external power supply
El. ripple effect	Max. 50mV$_{p-p}$
Input power	Max. 36W
Output supply voltage for the directional valves	24V / 1,5A 12V / 3A
Output control signal	0…20mA / load R = 100…450Ω
	4…20mA / load R = 100…450Ω
	± 10mA
	± 10V / 5mA
	± 5V / 5mA
	U_{cc}/2 ± 10V/5mA
	U_{cc}/2 ± 5V/5mA
Use for directional valves ARGO-HYTOS PRM2, PRM4 with integrated electronics	Size 04, Size 06, Size 10
External dimensions	160 x 76 x 55mm
Weight	350g
Enclosure type	IP 20
Operating ambient temperature	-20°C…+50°C
Delivered accessories	2 pcs of the extension cables (2m) with connectors M12x1 (socket - plug)
Technical parameters of the external power supply delivered for TESTER PRM	**Specification**
Input supply voltage	90 – 264V AC / 40 – 63Hz
Output supply voltage	24V DC ± 5%
Output current	1,8A
Power	Max. 45W
Socket fork	2 pins IEC 320 (C8)
External dimensions	34 x 60 x 119mm
Weight	160g
Enclosure type	IP 20
Operating ambient temperature	0°C…+40°C
Delivered accessories	Cable for interconnection of the power supply and the TESTER PRM with a supply connector 2,5 m for low voltages

Table 4: Technical parameters of the TESTER PRM and the external power supply

Note: For ordering numbers see HA 5171, HA 5172

Caution!

- The packing foil is recyclable.
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law.

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ARGO HYTOS

Overcentre Valve

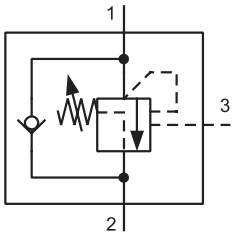
SO5A-Q3/I

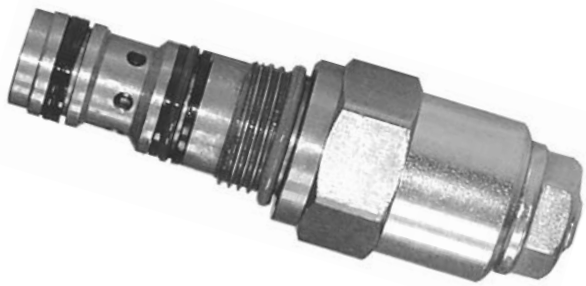
M20 x 1,5 • pmax 350 bar • Q 30 L/min

HA 5200
9/2006

Replaces
HA 5200 8/2005

- **The valve prevents runaway in the event of a negative load**
- **Load-holding without leakage**
- **Pressure relief function protecting the actuator against overload and pressure peaks**
- **When installed into the actuator the valve can be used as a hose burst valve**
- **When used as pressure relief the check valve will act as an anti-cavitation valve**
- **The valve should be mounted as close as possible to the actuator**





Functional Description

The valve consists of a seat by-pass, relief valve fitted with an auxiliary control with a differential piston and by-pass single-way valve serving for reverse direction of flow. The liquid is flowing through the single-way valve from the channel (2) to the channel (1) with a small pressure drop. In the opposite direction the single-way valve on the rear side of which a gate valve seat is fitted is pressed through the action of a spring and the load pressure against the spring-loaded valve gate valve. In this way the valve is nearly closed hermetically. If the pressure in the channel (1) exceeds a set up value of the spring force the gate valve is pressed out of the seat and the overpressure in that case is relieved into channel (2). For ensuring the function of holding the load the spring force should be set up to a value by 30 % higher when compared to an expected pressure exerted by the load.

If the load has to be moved it is possible to ensure it with the help of so called auxiliary control from the channel (3) by introducing already certain control pressure.

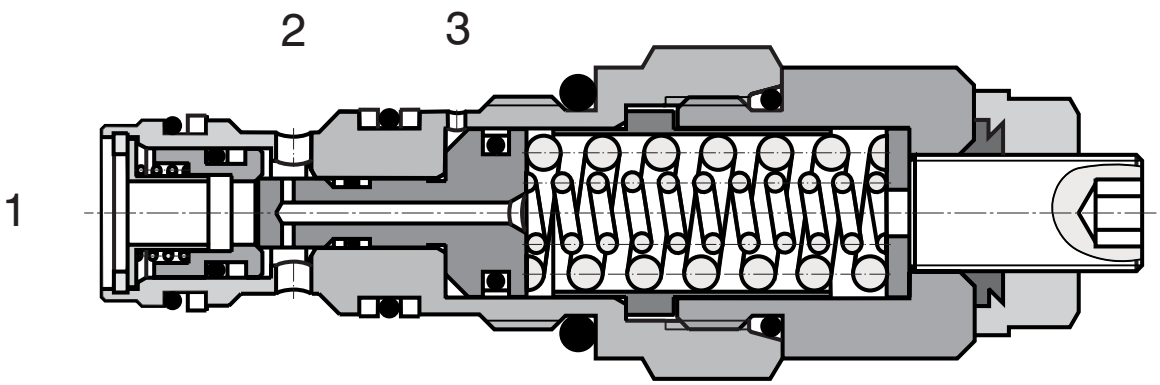
The control pressure is calculated in the following way:

$$\text{Control pressure} = \frac{\text{set up pressure} - \text{load pressure}}{\text{ratio of control}}$$

The ratio of control designates a ratio of surfaces of the differential slide valve cross-section area and its seat. Therefore, the necessary control pressure for opening the valve does not correspond to the difference between the set up pressure and load pressure however; it corresponds to the ratio of this difference and the control ratio. In the formula as mentioned above it is necessary to take into consideration that in differential cylinders it is necessary to add to the control ratio also the appropriate ratio of piston surfaces in the direction of movement.

As soon as the control pressure attains a necessary value the differential gate valve is moved out from the seat and then the way from the channel (1) to the channel (2) is released. If now the load tries to accelerate and be fast as for the oil supply the supply pressure decreases, therefore, also the control pressure in the channel (3) is decreased. The spring force tries to shut off the valve again, therefore, in consequence of which the flow from the consumer decreases and the inlet pressure to the consumer increases again. In this way it is ensured aconstant inlet pressure by means of which the movement of the load can be controlled.

As for appropriate basic surface finish the external parts are zinc coated.



Ordering Code

SO5A-Q3/I □ □

Overcentre valve

Pilot ratio

For applications with varying load	2,5:1	**2**
Standard	5:1	**5**
For applications with a constant load	10:1	**10**

NBR — **No designation**

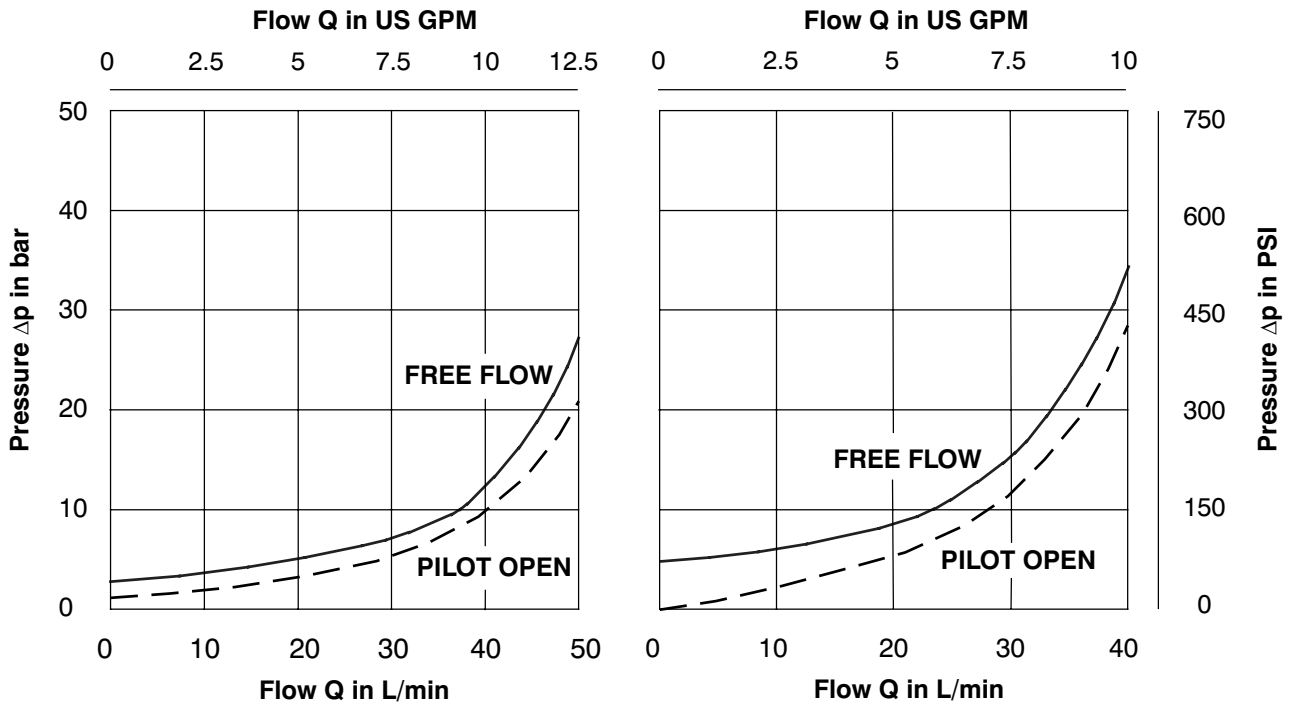
Technical Data

Figures based on: Oil Temp = 40 °C / Viscosity = 40 mm^2/s

Cavity		M20 x 1,5
Maximum flow	L/min	30
Max. pressure	bar	270
Max. input pressure	bar	350
Pressure drops	bar	see Δp - Q characteristics
Hydraulic fluid		Hydraulic oil (HM, HV) according to DIN 51254
Fluid temperature range	°C	-20 to +80
Ambient temperature	°C	-20 to +80
Viscosity	mm^2/s	10 to 500
Maximum degree of fluid contamination		according to ISO 4406 (1999), Class 21/18/15
Weight	kg	0,15
Maximum valve tightening torque in valve body or in control block	Nm	45^{+2}
Mounting position		any

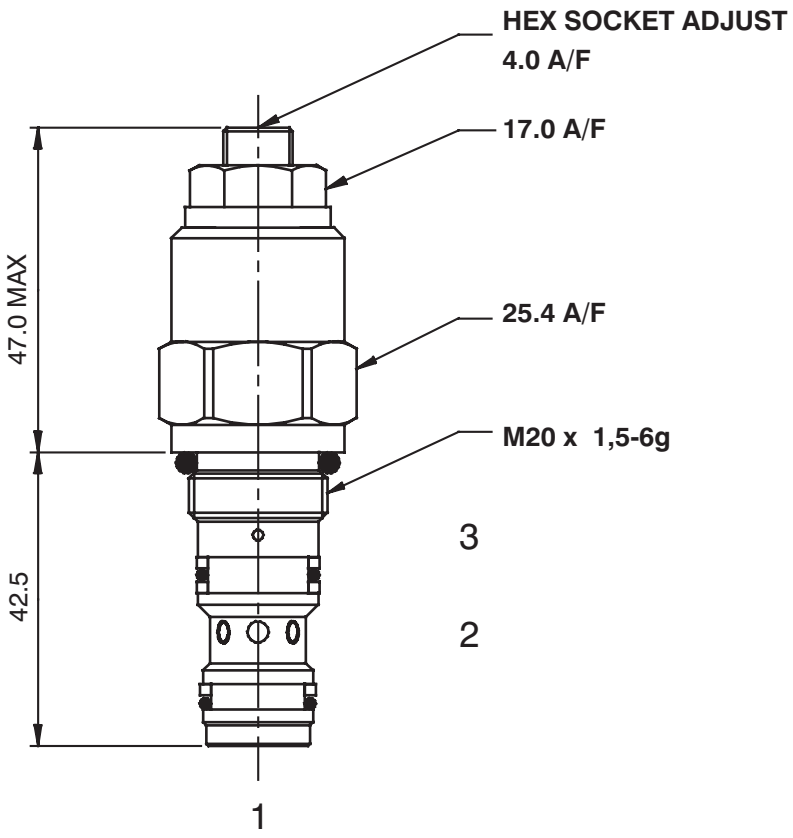
Δp-Q Characteristics

characteristics determined at n = 35 mm^2/s and t = 40 °C



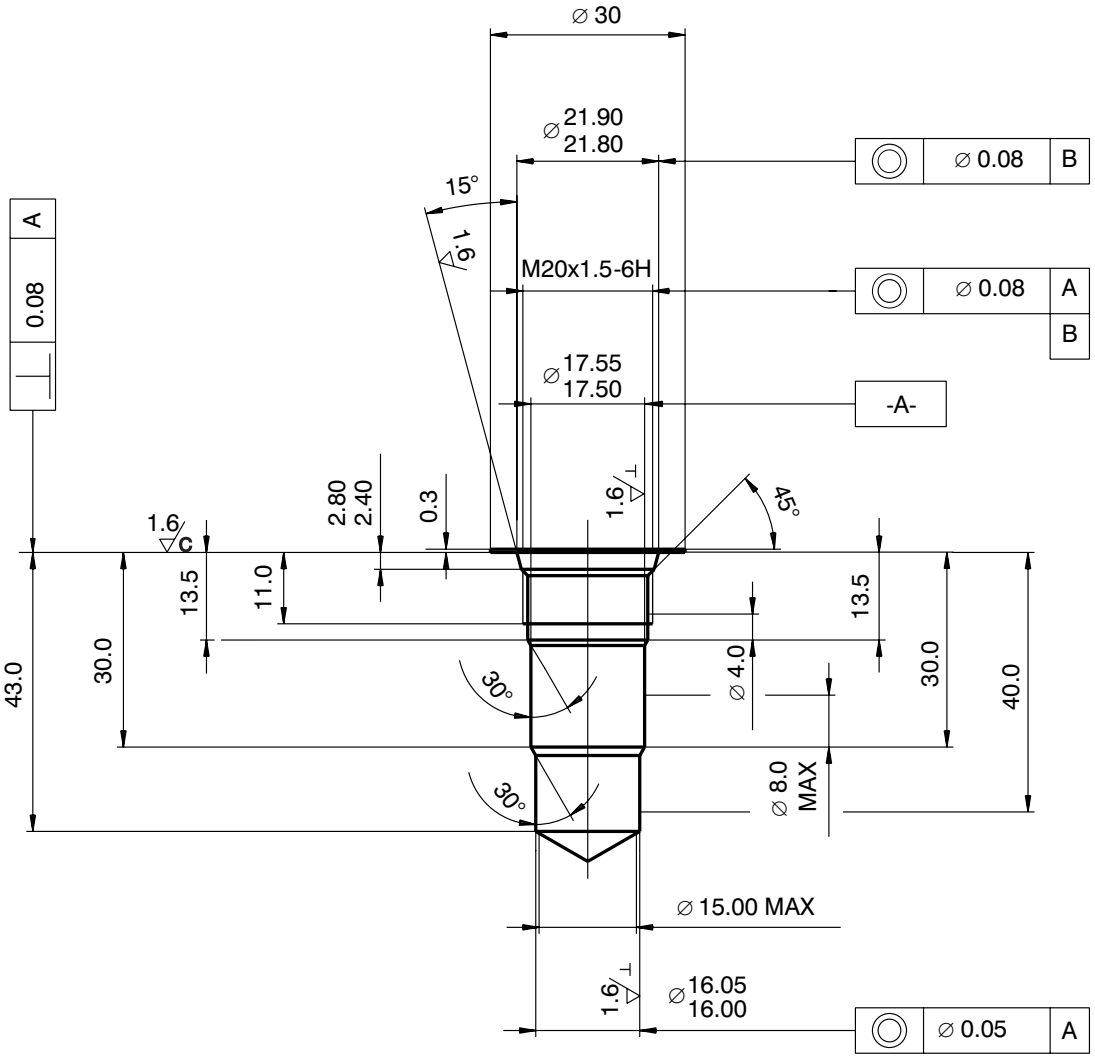
Dimensions

Measurements in millimeters



Cavity

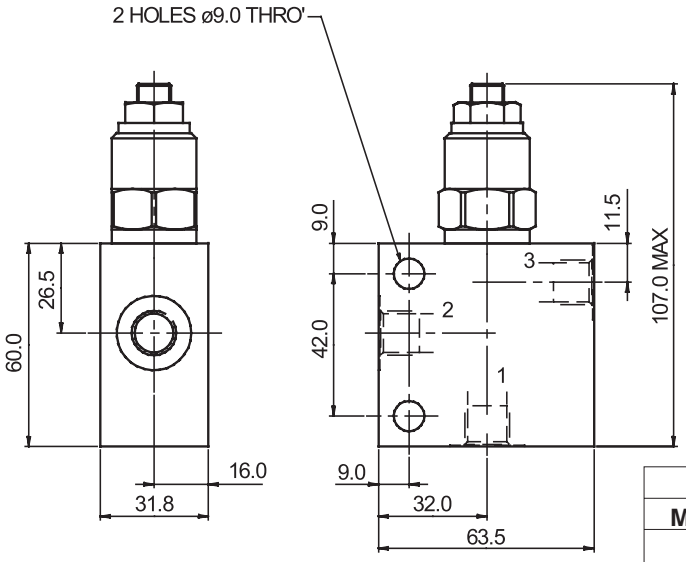
Measurements in millimeters



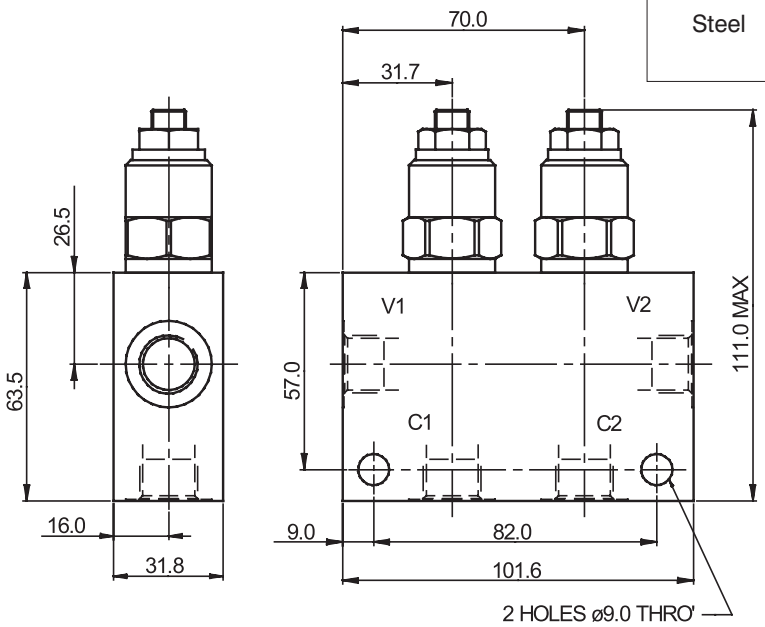
Valve Bodies

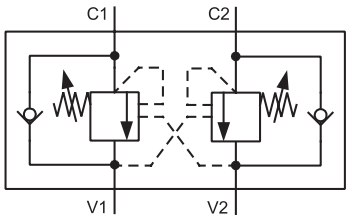
Measurements in millimeters

ISO A



Body without valve			
Material	**Ports**	**Port size**	**Type code**
Aluminium	1, 2	G3/8	SB-Q3-0103AL
	3	G1/4	
	1, 2	SAE 8, 3/4-16	SB-Q3-0104AL
	3	SAE 6, 9/16-18	
Steel	1, 2	G3/8	SB-Q3-0103ST
	3	G1/4	
	1, 2	SAE 8, 3/4-16	SB-Q3-0104ST
	3	SAE 6, 9/16-18	





Dual body without valve			
Material	**Ports**	**Port size**	**Type code**
Aluminium	C1, C2, V1, V2	G3/8	SB-Q4-0203AL
	C1, C2, V1, V2	SAE 8, 3/4-16	SB-Q4-0204AL
Steel	C1, C2, V1, V2	G3/8	SB-Q4-0203ST
	C1, C2, V1, V2	SAE 8, 3/4-16	SB-Q4-0204ST

The use of aluminium bodies is limited to a maximum operating pressure of 210 bar.

Spare Parts

Seal kits on request.

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Overcentre Valve
Part Balanced

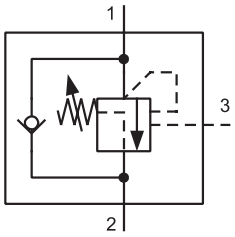
M20 x 1,5 • pmax 350 bar • Q 30 L/min

SOP5A-Q3/I

HA 5201
9/2006

Replaces
HA 5201 8/2005

- **The valve prevents runaway in the event of a negative load**
- **Load-holding without leakage**
- **Pressure relief function protecting the actuator against overload and pressure peaks**
- **When installed into the actuator the valve can be used as a hose burst valve**
- **When used as pressure relief the check valve will act as an anti-cavitation valve**
- **Relief setting is unaffected by back pressure**
- **The valve should be mounted as close as possible to the actuator**

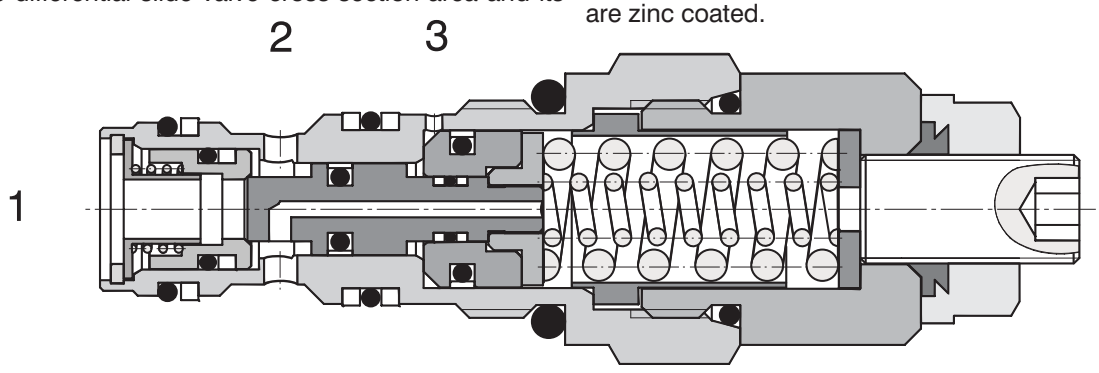


Functional Description

The valve consists of a seat by-pass, relief valve fitted with an auxiliary control with a differential piston and by-pass single-way valve serving for reverse direction of flow. The liquid is flowing through the single-way valve from the channel (2) to the channel (1) with a small pressure drop. In the opposite direction the single-way valve on the rear side of which a gate valve seat is fitted is pressed through the action of a spring and the load pressure against the spring-loaded valve gate valve. In this way the valve is nearly closed hermetically. If the pressure in the channel (1) exceeds a set up value of the spring force the gate valve is pressed out of the seat and the overpressure in that case is relieved into channel (2). For ensuring the function of holding the load the spring force should be set up to a value by 30 % higher when compared to an expected pressure exerted by the load. If the load has to be moved it is possible to ensure it with the help of so called auxiliary control from the channel (3) by introducing already certain control pressure.
The control pressure is calculated in the following way:

$$\text{Control pressure} = \frac{\text{set up pressure} - \text{load pressure}}{\text{ratio of control}}$$

The ratio of control designates a ratio of surfaces of the differential slide valve cross-section area and its seat. Therefore, the necessary control pressure for opening the valve does not correspond to the difference between the set up pressure and load pressure however; it corresponds to the ratio of this difference and the control ratio. In the formula as mentioned above it is necessary to take into consideration that in differential cylinders it is necessary to add to the control ratio also the appropriate ratio of piston surfaces in the direction of movement.
As soon as the control pressure attains a necessary value the differential gate valve is moved out from the seat and then the way from the channel (1) to the channel (2) is released. If now the load tries to accelerate and be fast as for the oil supply the supply pressure decreases, therefore, also the control pressure in the channel (3) is decreased. The spring force tries to shut off the valve again, therefore, in consequence of which the flow from the consumer decreases and the inlet pressure to the consumer increases again. In this way it is ensured a constant inlet pressure by means of which the movement of the load can be controlled.
Dynamic pressures in the outlet do not influence the set up value thanks to a special arrangement of the slide valve. However, it is necessary to take care of the fact the control channel is independent on the dynamic pressure.
As for appropriate basic surface finish the external parts are zinc coated.



Ordering Code

SOP5A-Q3/I □ □

Overcentre valve
part balanced

Pilot ratio
Standard 4:1 **4**

NBR **No designation**

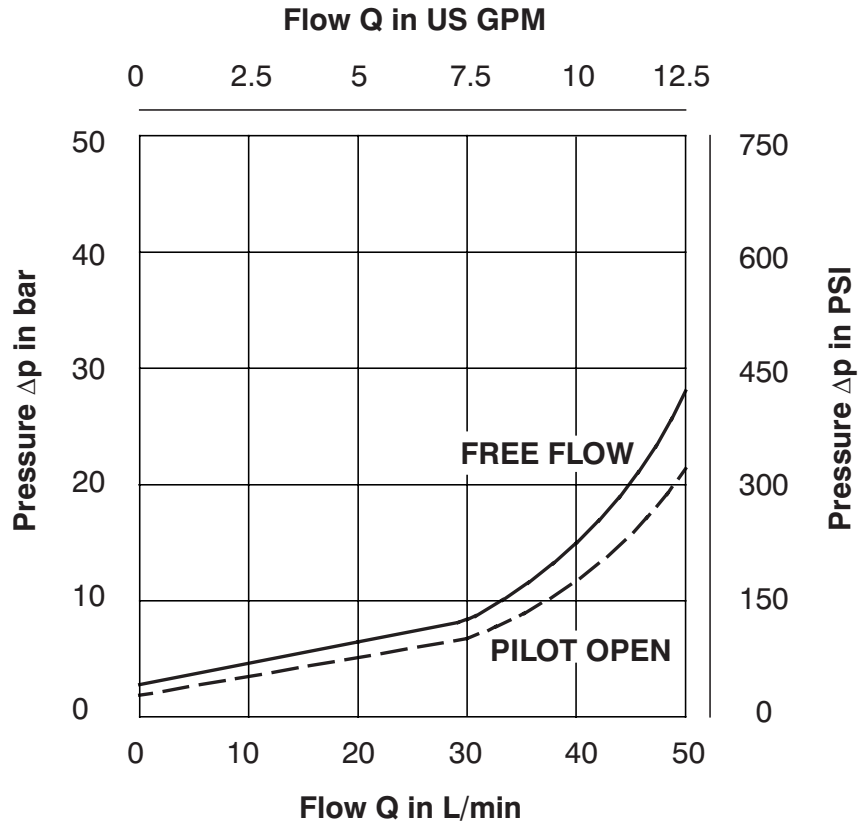
Technical Data

Figures based on: Oil Temp = 40 °C / Viscosity = 40 mm^2/s

Cavity		M20 x 1,5
Maximum flow	L/min	30
Max. pressure	bar	270
Max. input pressure	bar	350
Pressure drops	bar	see Δp - Q characteristics
Hydraulic fluid		Hydraulic oil (HM, HV) according to DIN 51254
Fluid temperature range	°C	-20 to +80
Ambient temperature	°C	-20 to +80
Viscosity	mm^2/s	10 to 500
Maximum degree of fluid contamination		according to ISO 4406 (1999), Class 21/18/15
Weight	kg	0,15
Maximum valve tightening torque in valve body or in control block	Nm	45^{+2}
Mounting position		any

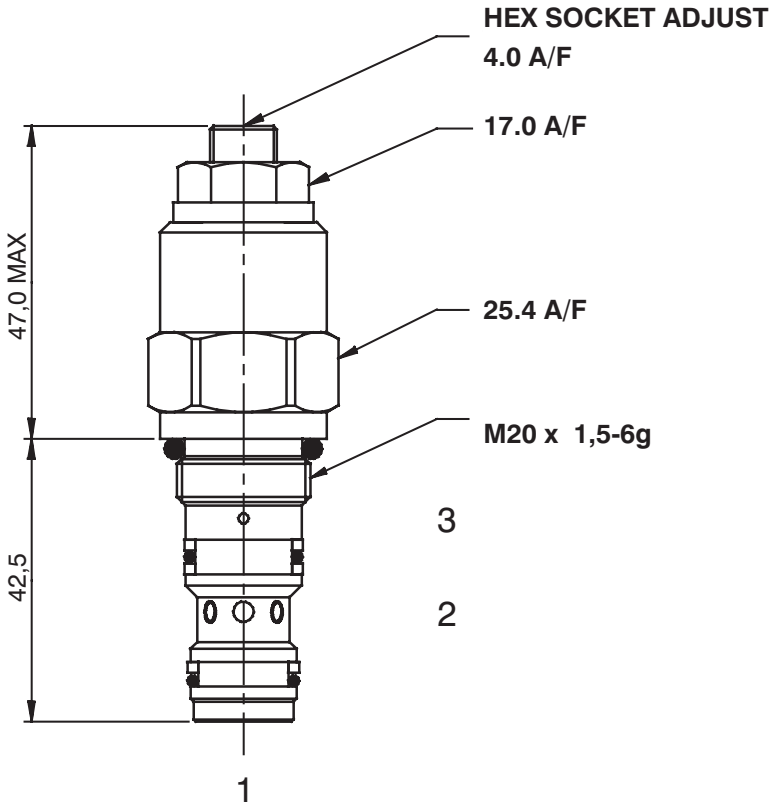
Δp-Q Characteristics

characteristics determined at n = 35 mm^2/s and t = 40 °C



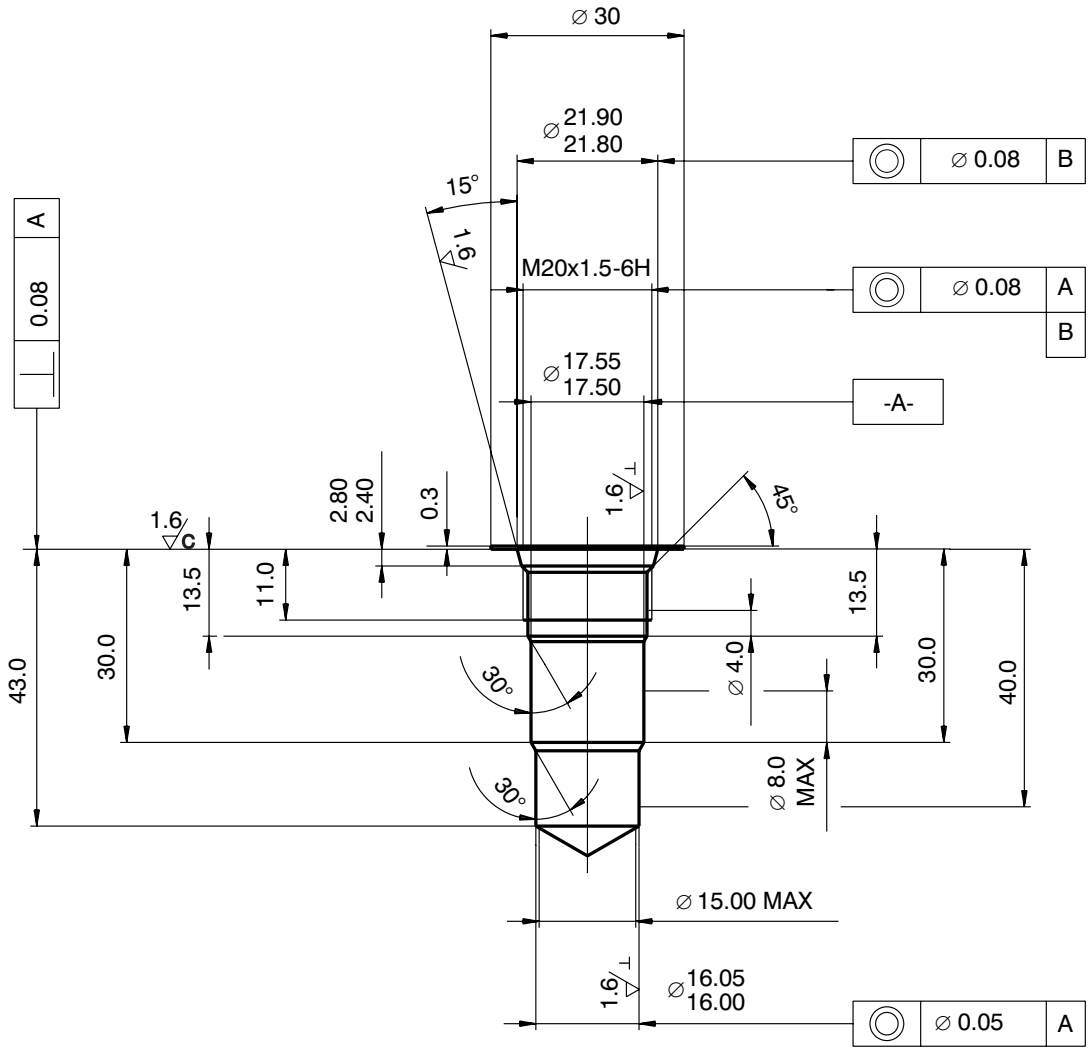
Dimensions

Measurements in millimeters



Cavity

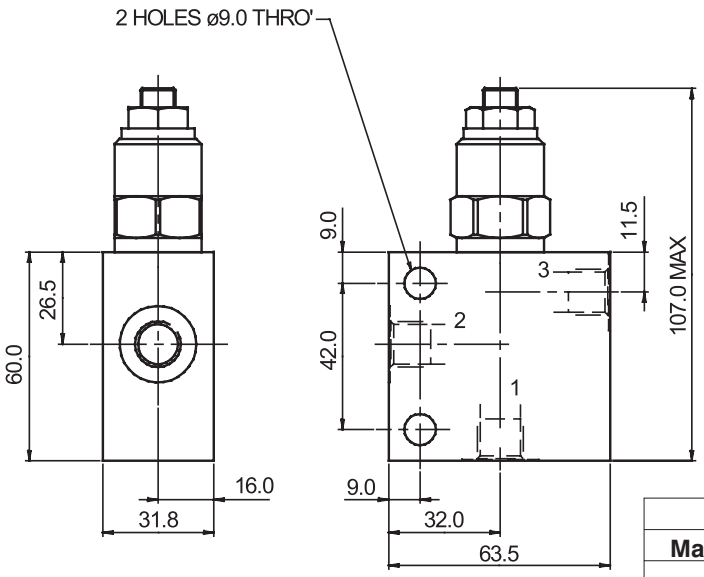
Measurements in millimeters



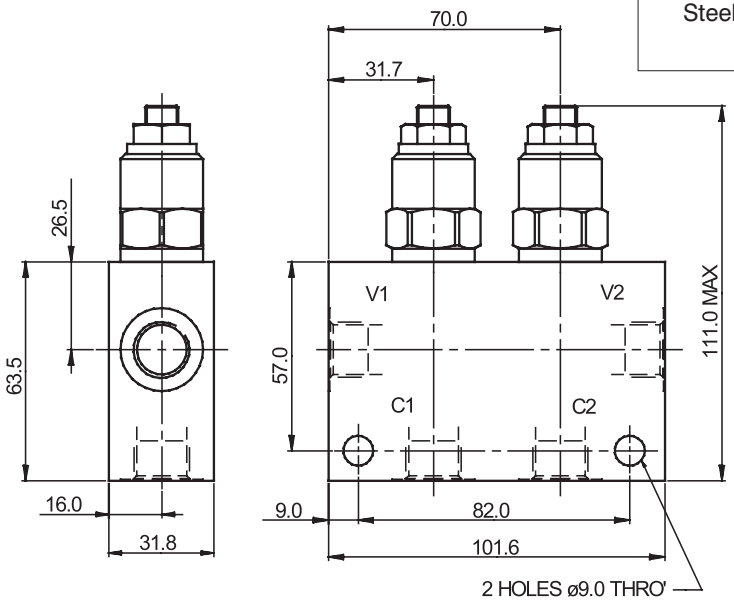
Valve Bodies

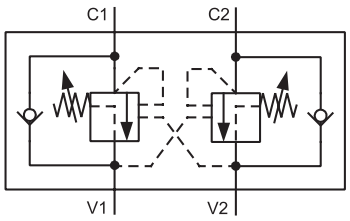
Measurements in millimeters

ISO A



Body without valve			
Material	**Ports**	**Port size**	**Type code**
Aluminium	1, 2	G3/8	SB-Q3-0103AL
	3	G1/4	
	1, 2	SAE 8, 3/4-16	SB-Q3-0104AL
	3	SAE 6, 9/16-18	
Steel	1, 2	G3/8	SB-Q3-0103ST
	3	G1/4	
	1, 2	SAE 8, 3/4-16	SB-Q3-0104ST
	3	SAE 6, 9/16-18	





Dual body without valve			
Material	**Ports**	**Port size**	**Type code**
Aluminium	C1, C2, V1, V2	G3/8	SB-Q4-0203AL
	C1, C2, V1, V2	SAE 8, 3/4-16	SB-Q4-0204AL
Steel	C1, C2, V1, V2	G3/8	SB-Q4-0203ST
	C1, C2, V1, V2	SAE 8, 3/4-16	SB-Q4-0204ST

The use of aluminium bodies is limited to a maximum operating pressure of 210 bar.

Spare Parts

Seal kits on request.

Caution!

- The packing foil is recyclable.
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law.

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E-mail: sales.cz@argo-hytos.com
www.argo-hytos.com

Overcentre Valve

Fully Balanced

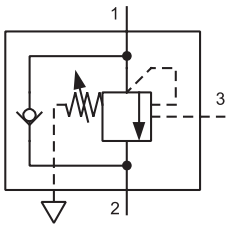
M20 x 1,5 • p_{max} 350 bar • Q 30 L/min

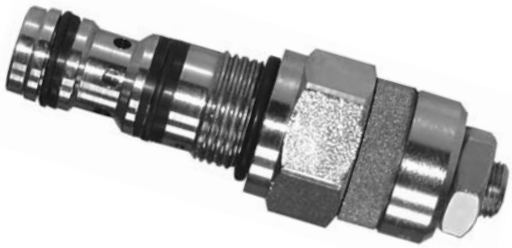
SOB5A-Q3/I

HA 5202
9/2006

Replaces
HA 5202 8/2005

- ❑ **The valve prevents runaway in the event of a negative load**
- ❑ **Load-holding without leakage**
- ❑ **Pressure relief function protecting the actuator against overload and pressure peaks**
- ❑ **When installed into the actuator the valve can be used as a hose burst valve**
- ❑ **When used as pressure relief the check valve will act as an anti-cavitation valve**
- ❑ **Relief setting is unaffected by back pressure**
- ❑ **The valve should be mounted as close as possible to the actuator**





Functional Description

The valve consists of a seat by-pass, relief valve fitted with an auxiliary control with a differential piston and by-pass single-way valve serving for reverse direction of flow. The liquid is flowing through the single-way valve from the channel (2) to the channel (1) with a small pressure drop. In the opposite direction the single-way valve on the rear side of which a gate valve seat is fitted is pressed through the action of a spring and the load pressure against the spring-loaded valve gate valve. In this way the valve is nearly closed hermetically. If the pressure in the channel (1) exceeds a set up value of the spring force the gate valve is pressed out of the seat and the overpressure in that case is relieved into channel (2). For ensuring the function of holding the load the spring force should be set up to a value by 30 % higher when compared to an expected pressure exerted by the load.

If the load has to be moved it is possible to ensure it with the help of so called auxiliary control from the channel (3) by introducing already certain control pressure.

The control pressure is calculated in the following way:

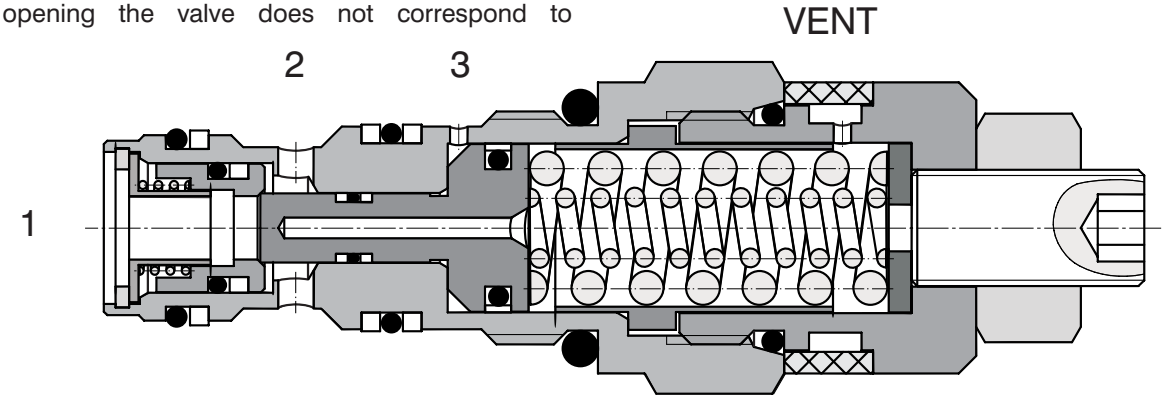
$$\text{Control pressure} = \frac{\text{set up pressure} - \text{load pressure}}{\text{ratio of control}}$$

The ratio of control designates a ratio of surfaces of the differential slide valve cross-section area and its seat. Therefore, the necessary control pressure for opening the valve does not correspond to the difference between the set up pressure and load pressure however; it corresponds to the ratio of this difference and the control ratio. In the formula as mentioned above it is necessary to take into consideration that in differential cylinders it is necessary to add to the control ratio also the appropriate ratio of piston surfaces in the direction of movement.

As soon as the control pressure attains a necessary value the differential gate valve is moved out from the seat and then the way from the channel (1) to the channel (2) is released. If now the load tries to accelerate and be fast as for the oil supply the supply pressure decreases, therefore, also the control pressure in the channel (3) is decreased. The spring force tries to shut off the valve again, therefore, in consequence of which the flow from the consumer decreases and the inlet pressure to the consumer increases again. In this way it is ensured a constant inlet pressure by means of which the movement of the load can be controlled.

Dynamic pressures in the outlet do not influence the set up value thanks to a special arrangement of the slide valve. However, it is necessary to take care of the fact the control channel is independent on the dynamic pressure.

As for appropriate basic surface finish the external parts are zinc coated.



Ordering Code

SOB5A-Q3/I [ ] [ ]

Overcentre valve
Fully Balanced

Pilot ratio
Standard 5:1 **5**

NBR **No designation**

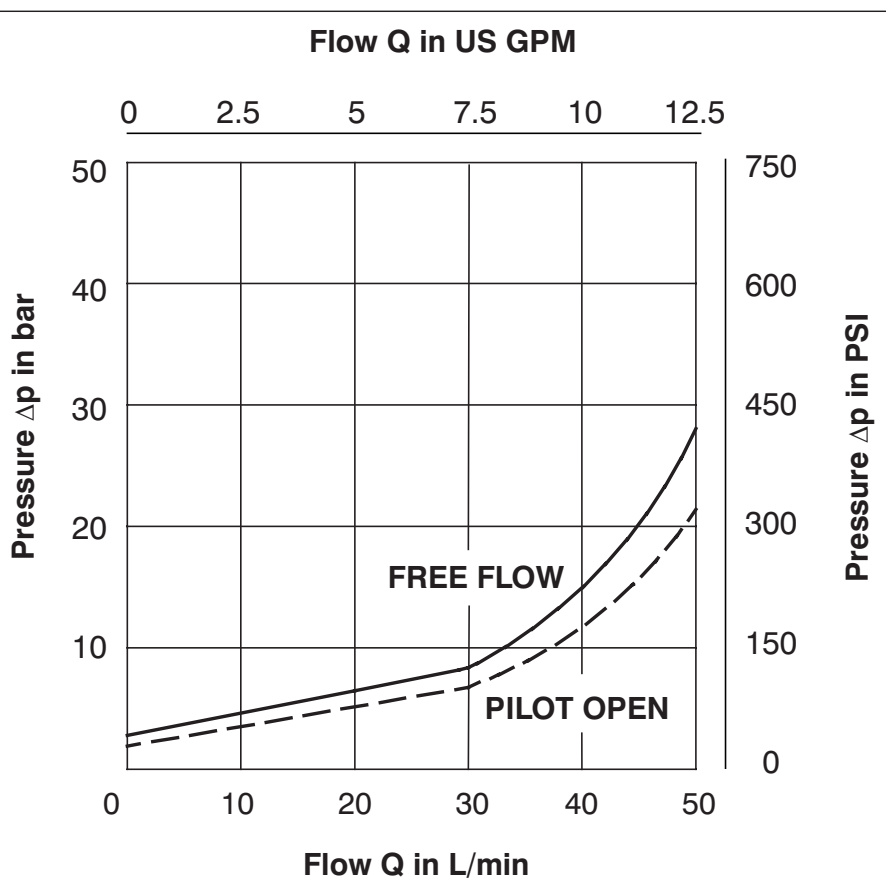
Technical Data

Figures based on: Oil Temp = 40 °C / Viscosity = 40 mm^2/s

Cavity		M20 x 1,5
Maximum flow	L/min	30
Max. pressure	bar	270
Max. input pressure	bar	350
Pressure drops	bar	see Δp - Q characteristics
Hydraulic fluid		Hydraulic oil (HM, HV) according to DIN 51254
Fluid temperature range	°C	-20 to +80
Ambient temperature	°C	-20 to +80
Viscosity	mm^2/s	10 to 500
Maximum degree of fluid contamination		according to ISO 4406 (1999), Class 21/18/15
Weight	kg	0,14
Maximum valve tightening torque in valve body or in control block	Nm	45^{+2}
Mounting position		any

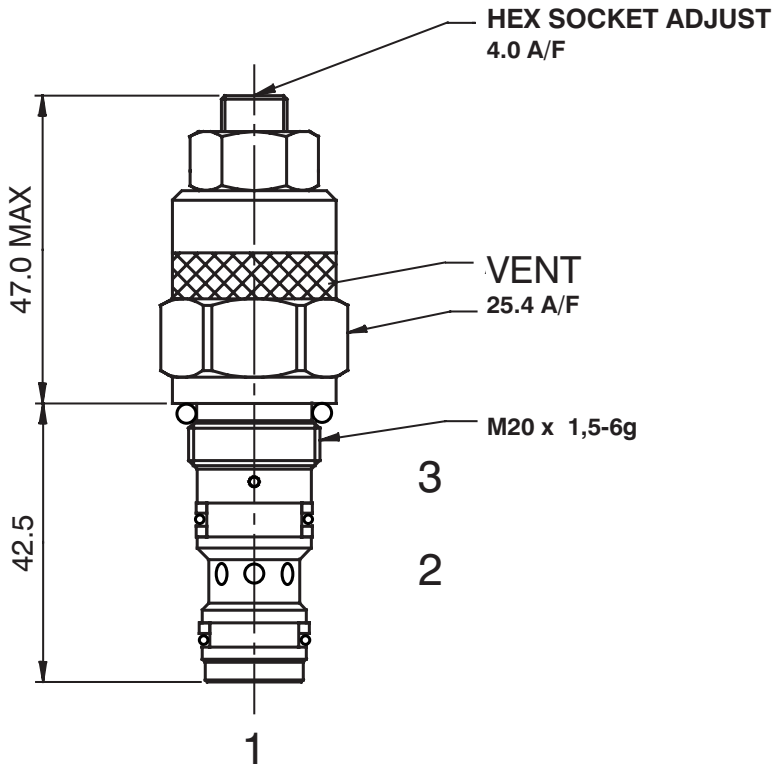
Δp-Q Characteristics

characteristics determined at n = 35 mm^2/s and t = 40 °C



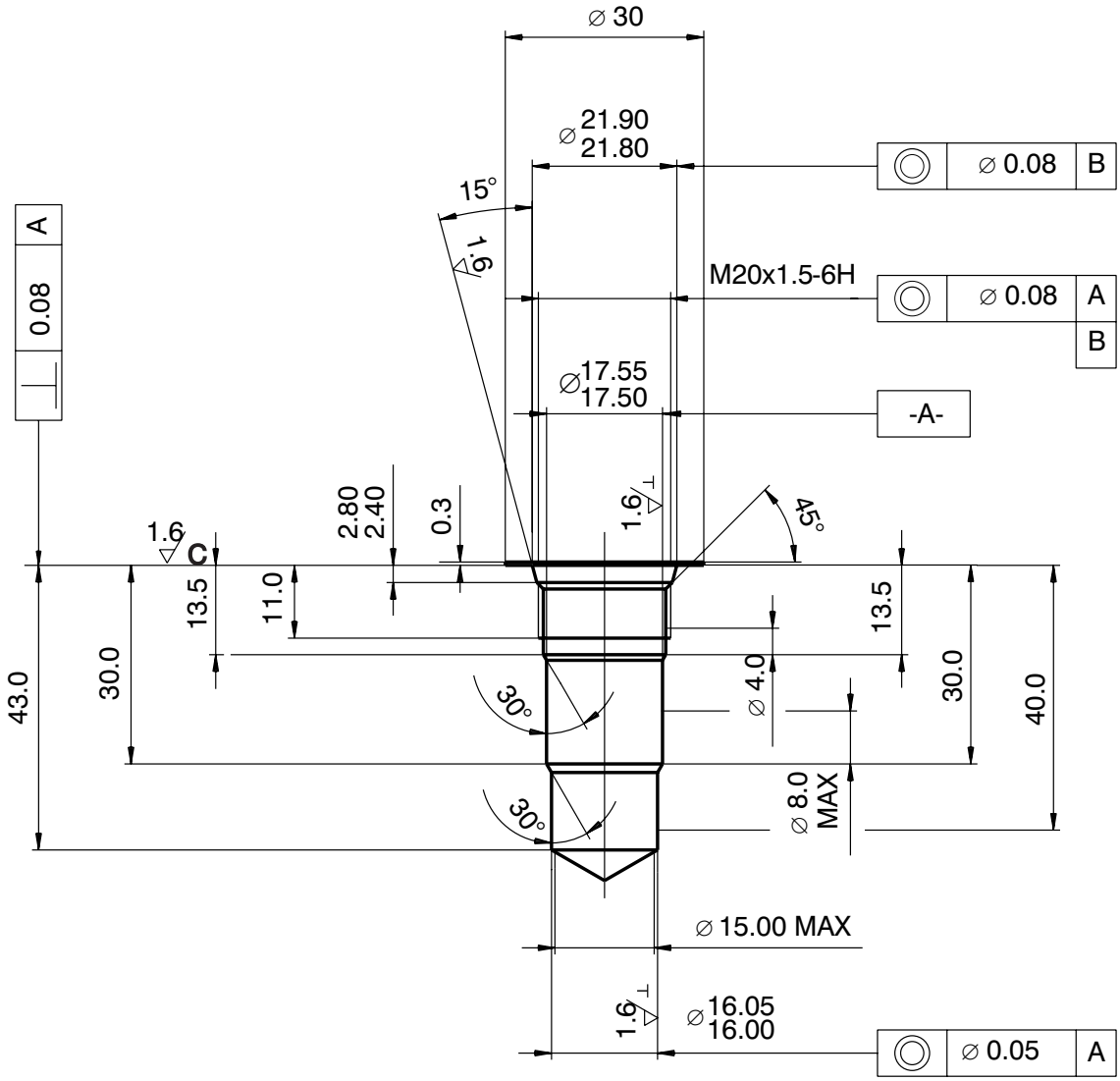
Dimensions

Measurements in millimeters



Cavity

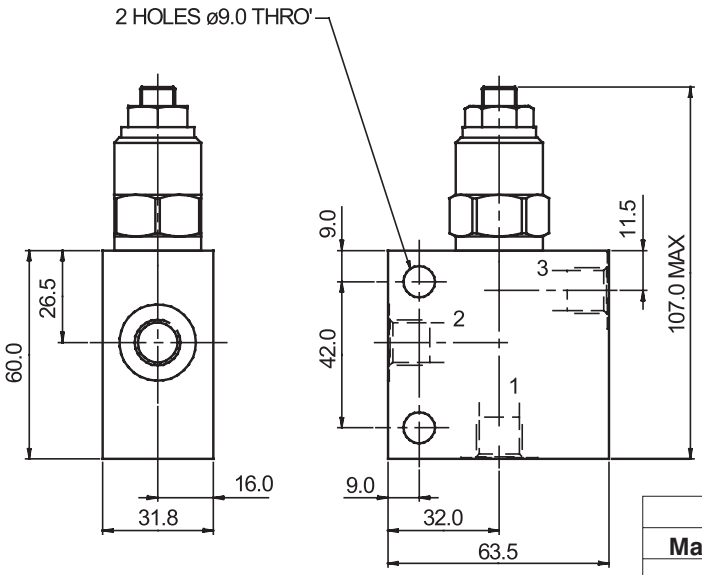
Measurements in millimeters



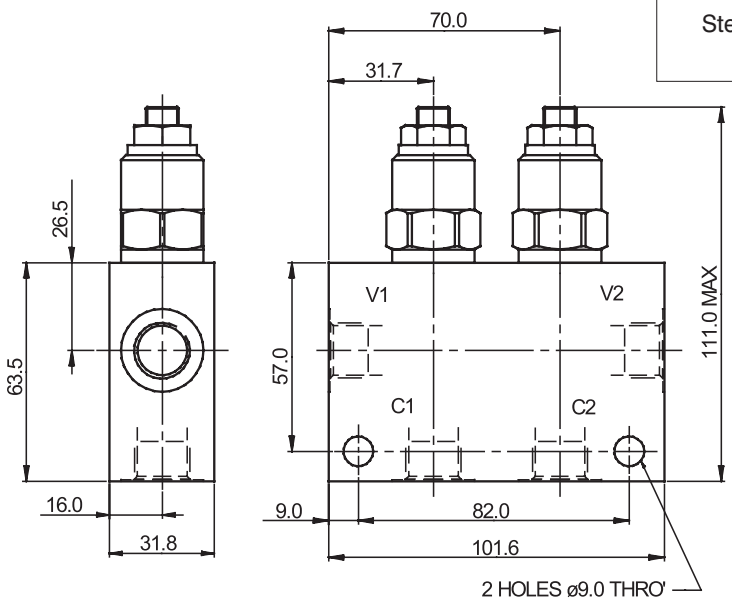
Valve Bodies

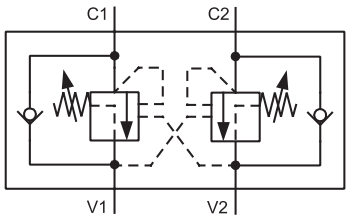
Measurements in millimeters

ISO A



Body without valve			
Material	**Ports**	**Port size**	**Type code**
Aluminium	1, 2	G3/8	SB-Q3-0103AL
	3	G1/4	
	1, 2	SAE 8, 3/4-16	SB-Q3-0104AL
	3	SAE 6, 9/16-18	
Steel	1, 2	G3/8	SB-Q3-0103ST
	3	G1/4	
	1, 2	SAE 8, 3/4-16	SB-Q3-0104ST
	3	SAE 6, 9/16-18	





Dual body without valve			
Material	**Ports**	**Port size**	**Type code**
Aluminium	C1, C2, V1, V2	G3/8	SB-Q4-0203AL
	C1, C2, V1, V2	SAE 8, 3/4-16	SB-Q4-0204AL
Steel	C1, C2, V1, V2	G3/8	SB-Q4-0203ST
	C1, C2, V1, V2	SAE 8, 3/4-16	SB-Q4-0204ST

The use of aluminium bodies is limited to a maximum operating pressure of 210 bar.

Spare Parts

Seal kits on request.

Caution!

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Overcentre Valve
2 Stage

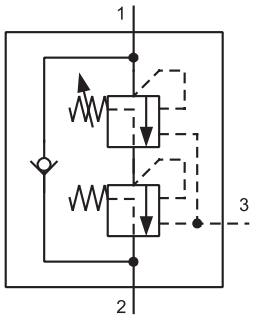
M20 x 1,5 • p_{max} 380 bar • Q 30 L/min

SOD5A-Q3/I

HA 5203
9/2006

Replaces
HA 5203 8/2005

- **The valve prevents runaway in the event of a negative load**
- **Load-holding without leakage**
- **Pressure relief function protecting the actuator against overload and pressure peaks**
- **When installed into the actuator the valve can be used as a hose burst valve**
- **Stabile performance by maintaining a counterbalance pressure**
- **The valve should be mounted as close as possible to the actuator**

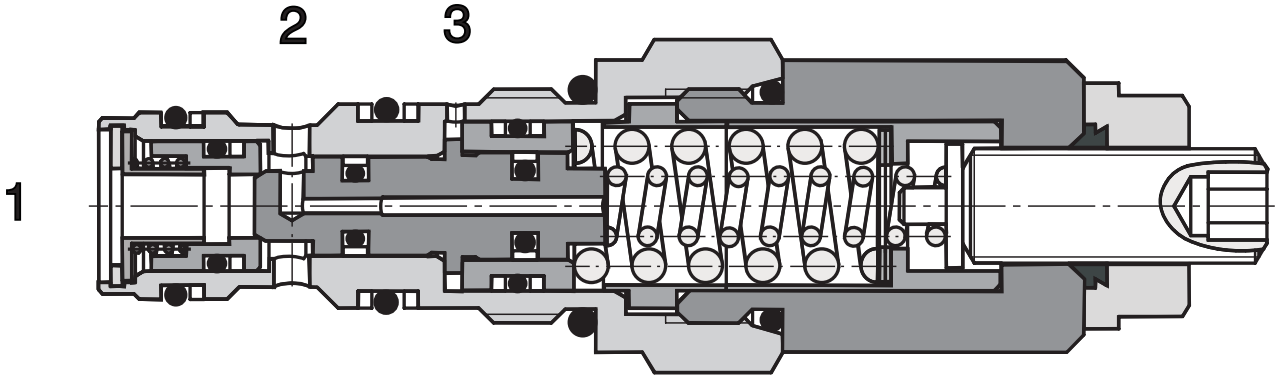


Functional Description

The valve consists of a seat by-pass, relief valve fitted with an auxiliary control with a differential piston and by-pass single-way valve serving for reverse direction of flow. The liquid is flowing through the single-way valve from the channel (2) to the channel (1) with a small pressure drop. In the opposite direction the single-way valve on the rear side of which a gate valve seat is fitted is pressed through the action of a spring and the load pressure against the spring-loaded valve gate valve. In this way the valve is nearly closed hermetically. If the pressure in the channel (1) exceeds a set up value of the spring force the gate valve is pressed out of the seat and the overpressure in that case is relieved into channel (2). For ensuring the function of holding the load the spring force should be set up to a value by 30 % higher when compared to an expected pressure exerted by the load.
If the load has to be moved it is possible to ensure it with the help of so called auxiliary control from the channel (3) by introducing already certain control pressure.
The control pressure is calculated in the following way:

$$\text{Control pressure} = \frac{\text{set up pressure} - \text{load pressure}}{\text{ratio of control}}$$

The ratio of control designates a ratio of surfaces of the differential slide valve cross-section area and its seat. Therefore, the necessary control pressure for opening the valve does not correspond to the difference between the set up pressure and load pressure however; it corresponds to the ratio of this difference and the control ratio. In the formula as mentioned above it is necessary to take into consideration that in differential cylinders it is necessary to add to the control ratio also the appropriate ratio of piston surfaces in the direction of movement.
As soon as the control pressure attains a necessary value the differential gate valve is moved out from the seat and then the way from the channel (1) to the channel (2) is released. If now the load tries to accelerate and be fast as for the oil supply the supply pressure decreases, therefore, also the control pressure in the channel (3) is decreased. The spring force tries to shut off the valve again, therefore, in consequence of which the flow from the consumer decreases and the inlet pressure to the consumer increases again. In this way it is ensured a constant inlet pressure by means of which the movement of the load can be controlled.
Starting braking valves of SOD5A series cover the whole range of the use of single-stage starting braking valves. In addition to it, this valve exerts a counter pressure to prevent from a sharp pressure drop at opening the valve. In this way the valve makes a particularly sensitive movement of consumers possible.



Ordering Code

SOD5A-Q3/I [ ] [ ]

Overcentre valve
2 stage

Preassare range
240 - 370 bar **30**

NBR **No designation**

Factory setting 280(230/50) bar for Q=4.8L/min

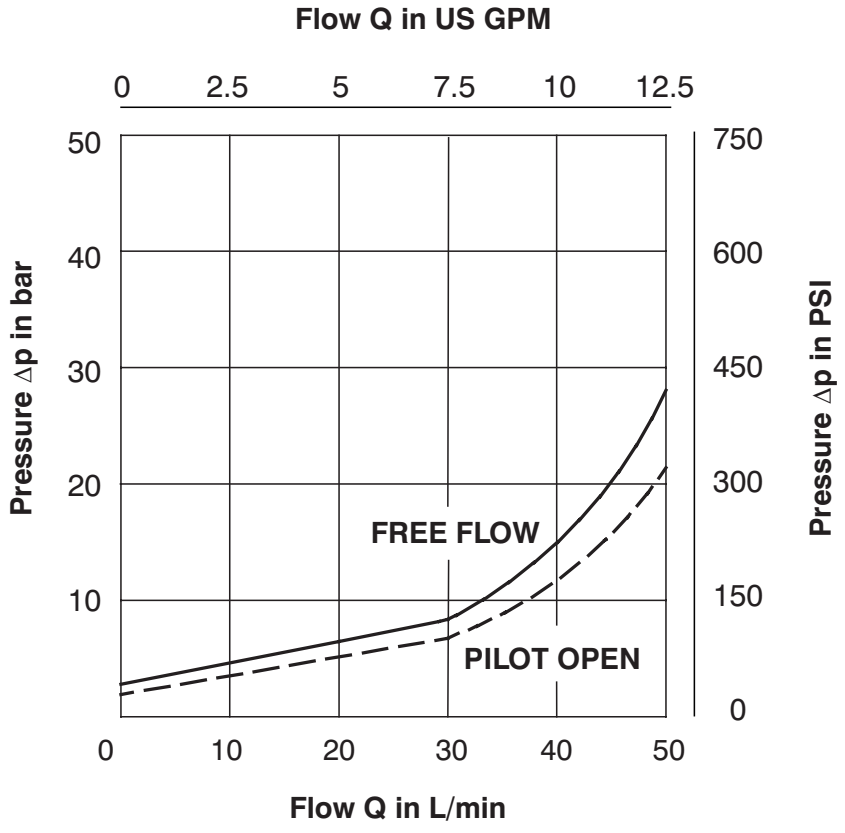
Technical Data

Figures based on: Oil Temp = 40 °C / Viscosity = 40 mm^2/s

Cavity		M20 x 1,5
Maximum flow	L/min	30
Max. pressure	bar	380
Pressure drops	bar	see Δp - Q characteristics
Hydraulic fluid		Hydraulic oil (HM, HV) according to DIN 51254
Fluid temperature range	°C	-20 to +80
Ambient temperature	°C	-20 to +80
Viscosity	mm^2/s	10 to 500
Maximum degree of fluid contamination		according to ISO 4406 (1999), Class 21/18/15
Weight	kg	0,15
Maximum valve tightening torque in valve body or in control block	Nm	45^{+2}
Mounting position		any

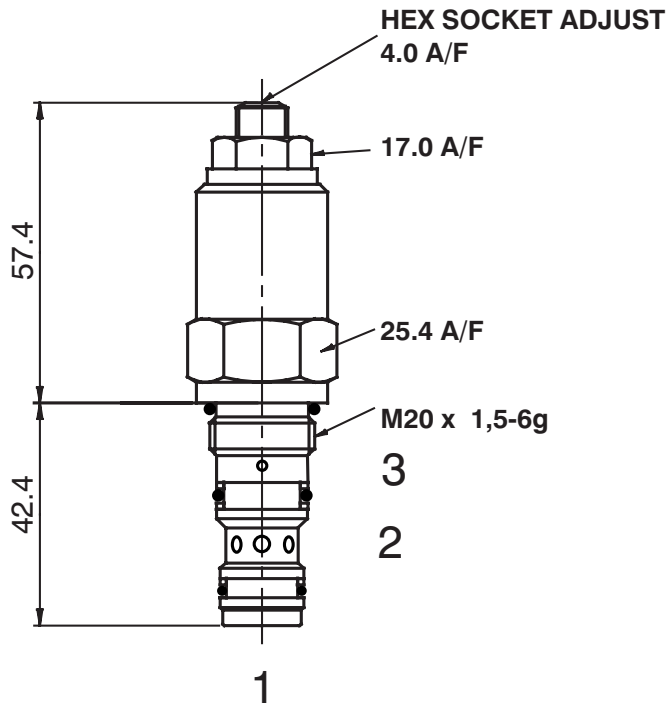
Δp-Q Characteristics

characteristics determined at n = 35 mm^2/s and t = 40 °C



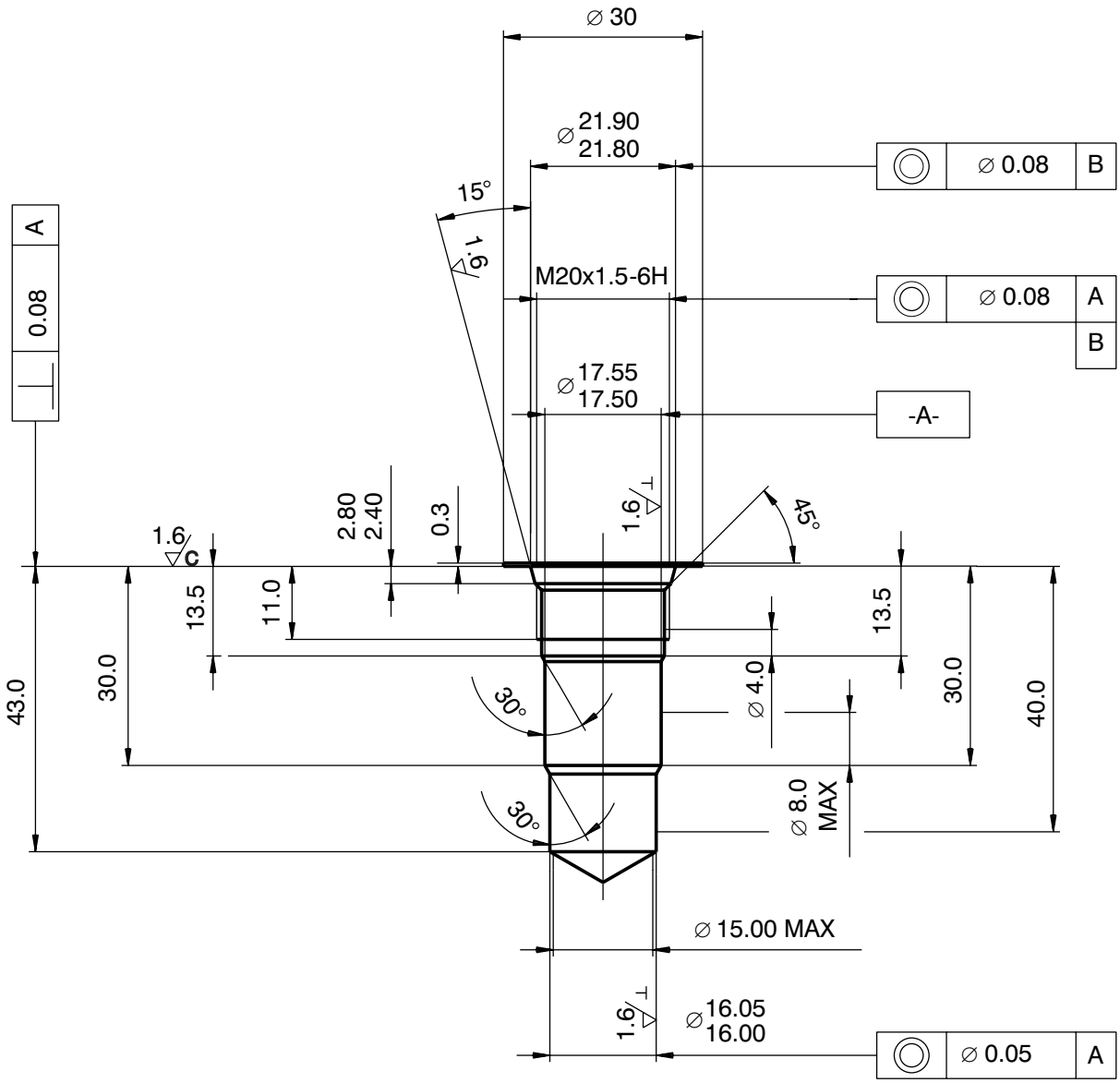
Dimensions

Measurements in millimeters



Cavity

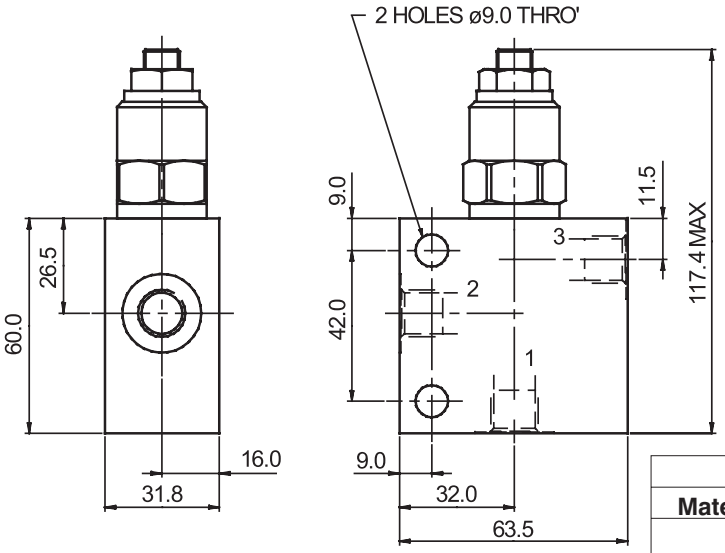
Measurements in millimeters



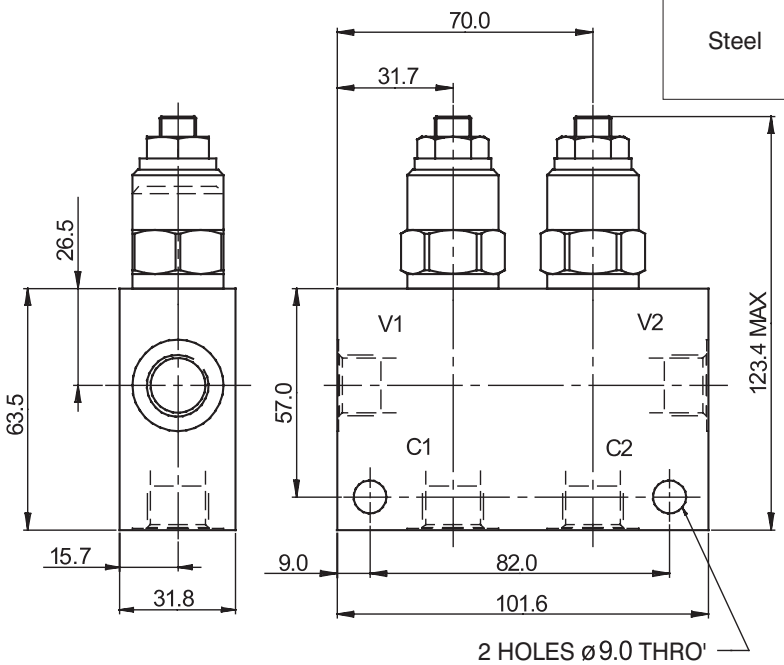
Valve Bodies

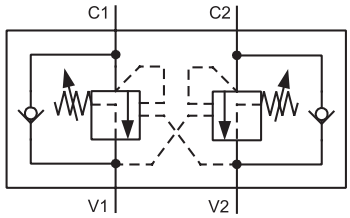
Measurements in millimeters

ISO A



Body without valve			
Material	**Ports**	**Port size**	**Type code**
Aluminium	1, 2	G3/8	SB-Q3-0103AL
	3	G1/4	
	1, 2	SAE 8, 3/4-16	SB-Q3-0104AL
	3	SAE 6, 9/16-18	
Steel	1, 2	G3/8	SB-Q3-0103ST
	3	G1/4	
	1, 2	SAE 8, 3/4-16	SB-Q3-0104ST
	3	SAE 6, 9/16-18	





Dual body without valve			
Material	**Ports**	**Port size**	**Type code**
Aluminium	C1, C2, V1, V2	G3/8	SB-Q4-0203AL
	C1, C2, V1, V2	SAE 8, 3/4-16	SB-Q4-0204AL
Steel	C1, C2, V1, V2	G3/8	SB-Q4-0203ST
	C1, C2, V1, V2	SAE 8, 3/4-16	SB-Q4-0204ST

The use of aluminium bodies is limited to a maximum operating pressure of 210 bar.

Spare Parts

Seal kits on request.

Caution!

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Overcentre Valve

Zero Differential

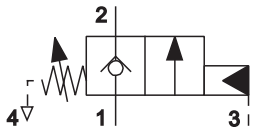
M20 x 1,5 • p_{max} 350 bar • Q 30 L/min

SOZ5A-Q3/I

HA 5204
9/2006

Replaces
HA 5204 8/2005

- **The valve prevents runaway in the event of a negative load**
- **Smooth and continuous motion by maintaining a constant back pressure**
- **Load-holding without leakage**
- **When installed into the actuator the valve can be used as a hose burst valve**
- **The valve should be mounted as close as possible to the actuator**



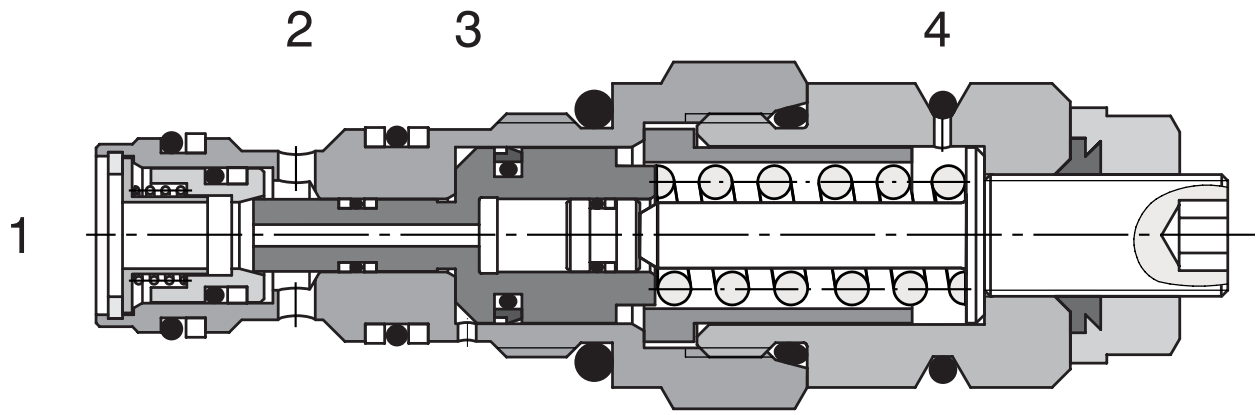
Functional Description

The valve consists of a seat relief valve fitted with an auxiliary control and by-pass single-way valve serving for reverse direction of flow. The liquid is flowing through the single-way valve from the channel (2) to the channel (1) with a small pressure drop. In the opposite direction the single-way valve on the rear side of which a gate valve seat is fitted is pressed through the action of a spring and the load pressure against the spring-loaded valve gate valve. In this way the valve is nearly closed hermetically. For ensuring the function of holding the load the spring force should be set up to a value by 30 % higher when compared to an expected pressure exerted by the load. If a load pressure caused by the action of the force on the consumer or in consequence of the liquid thermal dilatation exceeds a set up value of the spring force the gate valve is pressed out of the seat and the overpressure in that case is relieved from channel (1) to channel (2).
If the load has to be moved in opposite direction from the other connection of the consumer being in that case under pressure it is possible to ensure it with the help of so called auxiliary control from the channel (3) by introducing already certain control pressure.

The control pressure is calculated in the following way:
Control pressure = set up pressure – load pressure.

The necessary control pressure for opening the valve corresponds to the difference between the set up pressure and load pressure. In the formula as mentioned above it is necessary to take into consideration that in differential cylinders it is necessary to take into consideration the relation of surfaces of the cylinder piston in the direction of movement.
As soon as the control pressure attains a necessary value the gate valve is moved out from the seat and then the way from the channel (1) to the channel (2) is released.
If now the load tries to accelerate and be fast as for the oil supply the supply pressure decreases, therefore, also the control pressure in the channel (3) is reduced. The spring force tries to shut off the valve again, therefore, in consequence of which the supply flow to the consumer is reduced and the inlet pressure increases again. In this way it is ensured a constant inlet pressure by means of which it would be possible to control the movement of the load.

As for appropriate basic surface finish the external parts are zinc coated.



Ordering Code

SOZ5A-Q3/I [ ] [ ]

Overcentre valve
zero differential

Preassare range
5 - 20 bar — **2**

NBR — **No designation**

Factory setting 10 bar for Q=4.8L/min

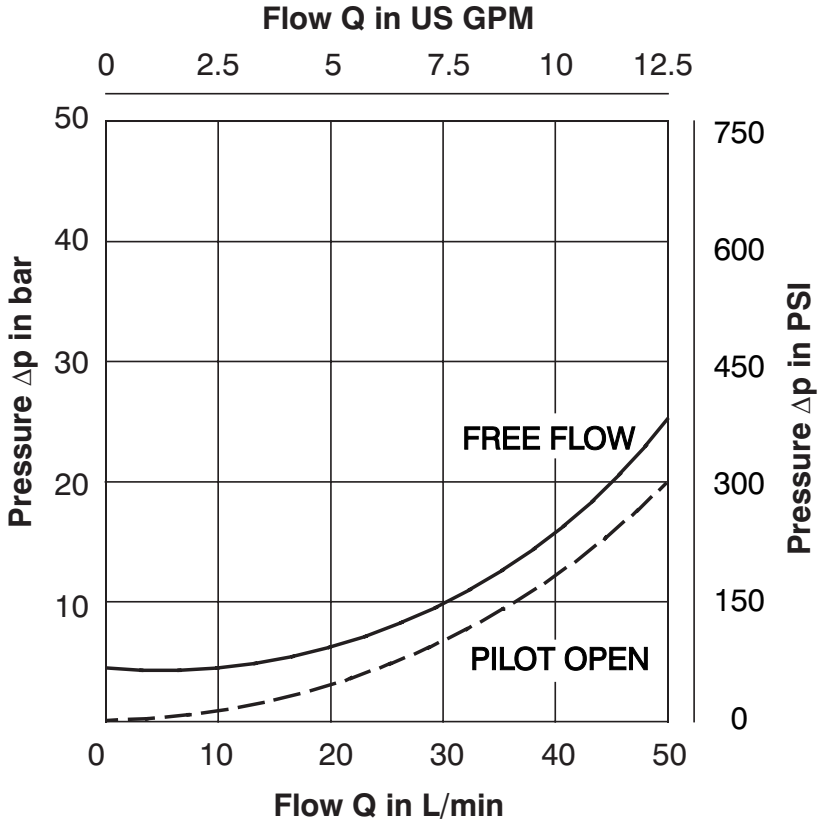
Technical Data

Figures based on: Oil Temp = 40 °C / Viscosity = 40 mm^2/s

Cavity		M20 x 1,5
Maximum flow	L/min	30
Max. pressure	bar	350
Max. input pressure	bar	5 - 20
Pressure drops	bar	see Δp - Q characteristics
Hydraulic fluid		Hydraulic oil (HM, HV) according to DIN 51254
Fluid temperature range	°C	-20 to +80
Ambient temperature	°C	-20 to +80
Viscosity	mm^2/s	10 to 500
Maximum degree of fluid contamination		according to ISO 4406 (1999), Class 21/18/15
Weight	kg	0,15
Maximum valve tightening torque in valve body or in control block	Nm	45^{+2}
Mounting position		any

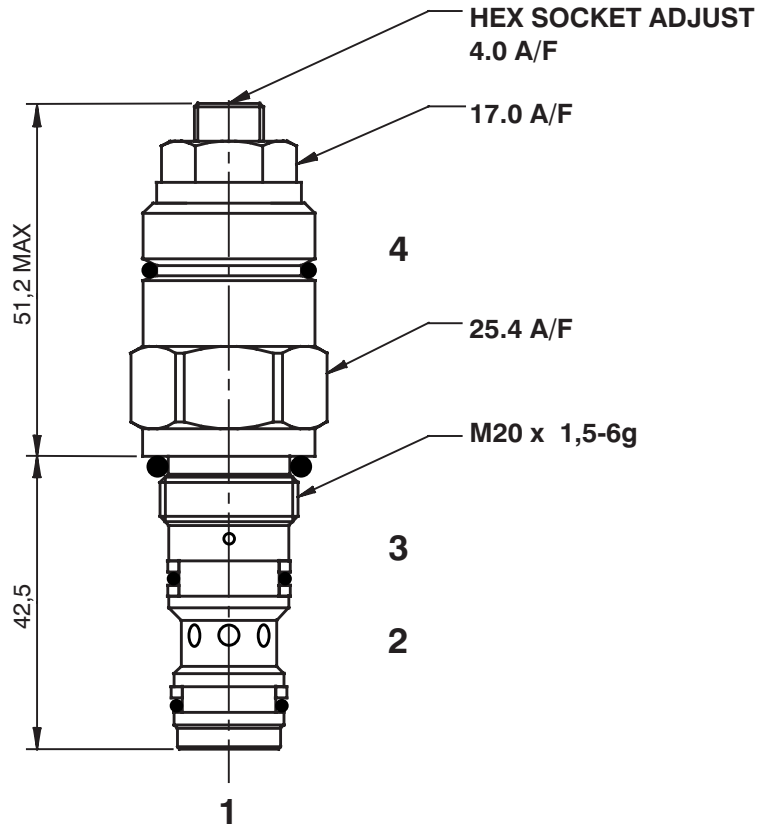
Δp-Q Characteristics

characteristics determined at n = 35 mm^2/s and t = 40 °C



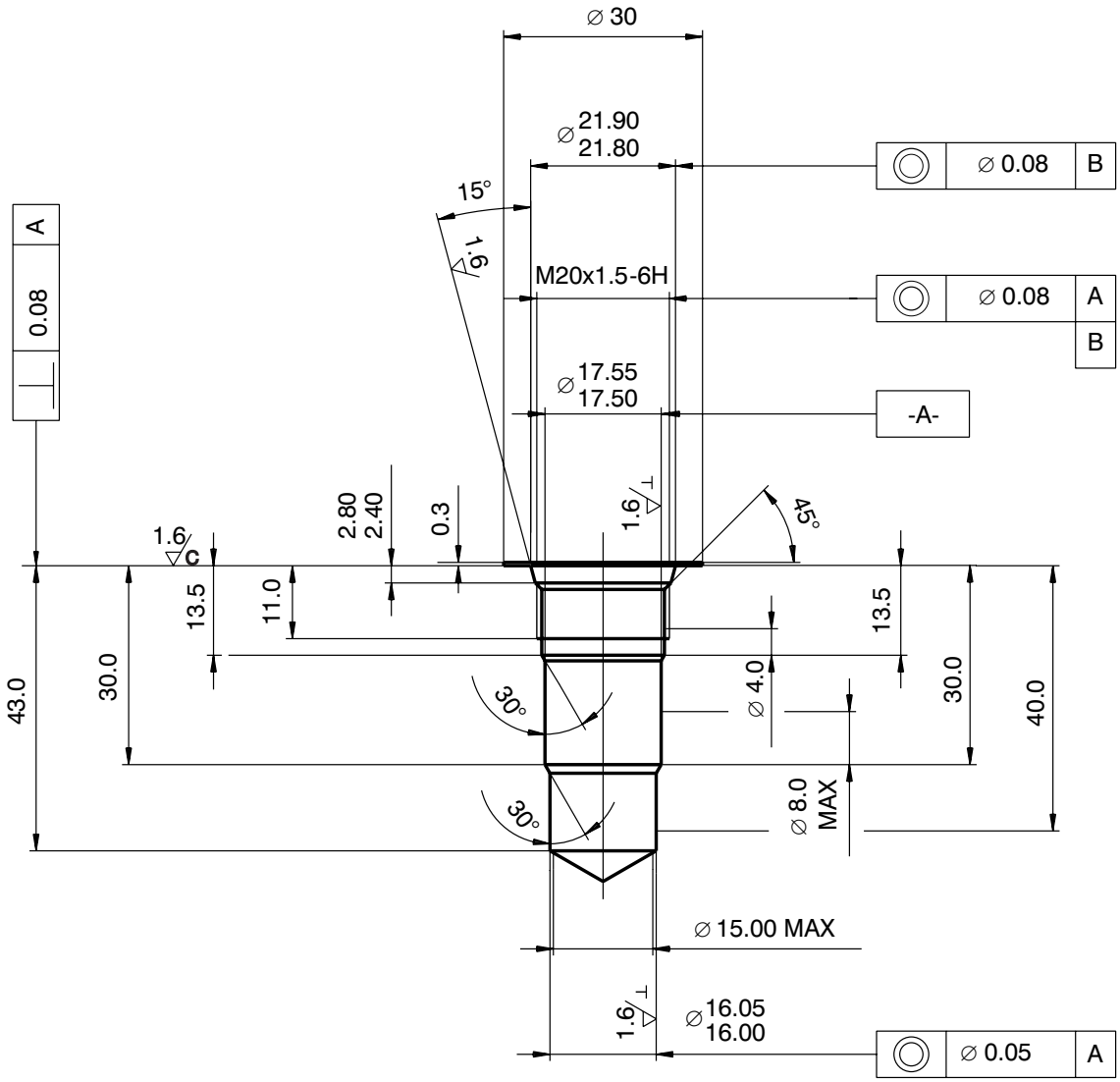
Dimensions

Measurements in millimeters



Cavity

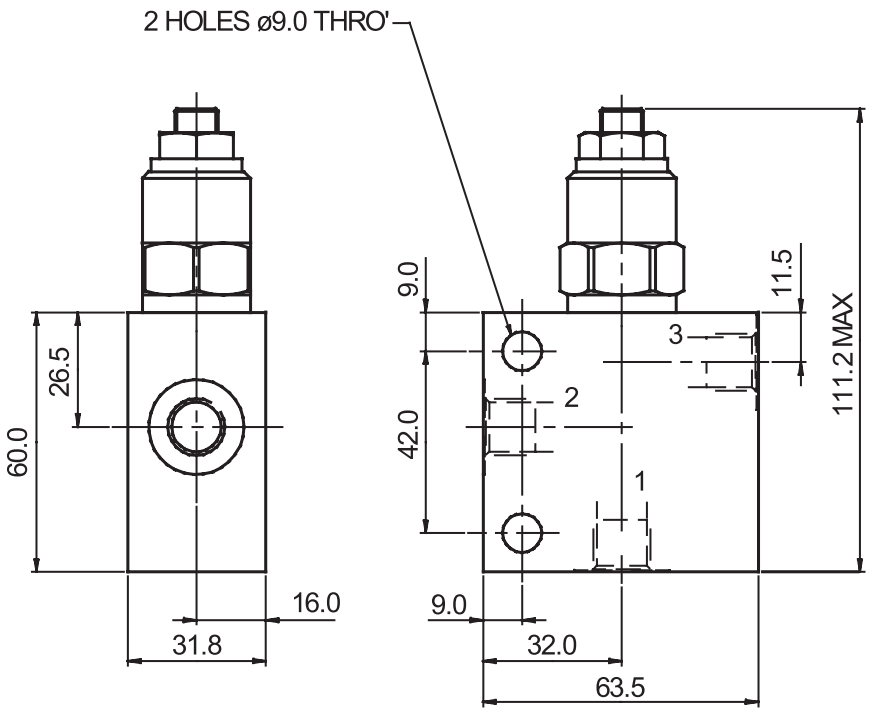
Measurements in millimeters



Valve Bodies

Measurements in millimeters

ISO A



Body without valve			
Material	**Ports**	**Port size**	**Type code**
Aluminium	1, 2	G3/8	SB-Q3-0103AL
	3	G1/4	
	1, 2	SAE 8, 3/4-16	SB-Q3-0104AL
	3	SAE 6, 9/16-18	
Steel	1, 2	G3/8	SB-Q3-0103ST
	3	G1/4	
	1, 2	SAE 8, 3/4-16	SB-Q3-0104ST
	3	SAE 6, 9/16-18	

The use of aluminium bodies is limited to a maximum operating pressure of 210 bar.

Spare Parts

Seal kits on request.

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Overcentre Valve

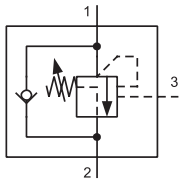
SO5A-R3/I

M27 x 1,5 • p_{max} 350 bar • Q 90 L/min

HA 5205
9/2006

Replaces
HA 5205 8/2005

- **The valve prevents runaway in the event of a negative load**
- **Load-holding with minimal leakage**
- **Pressure relief function protecting the actuator against overload and pressure peaks**
- **When installed into the actuator the valve can be used as a hose burst valve**
- **When installed into the actuator the valve can be used as a hose burst valve**
- **The valve should be mounted as close as possible to the actuator**

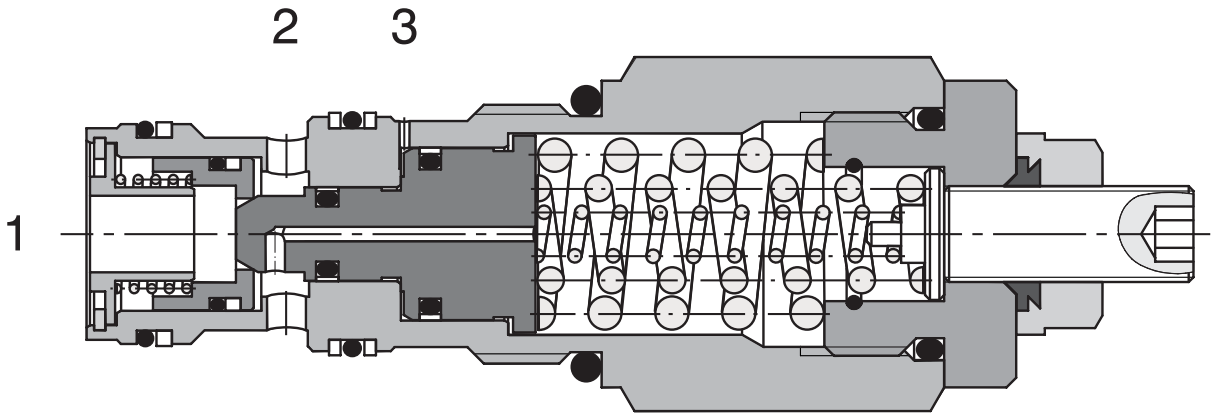


Functional Description

The valve consists of a seat by-pass, relief valve fitted with an auxiliary control with a differential piston and by-pass single-way valve serving for reverse direction of flow. The liquid is flowing through the single-way valve from the channel (2) to the channel (1) with a small pressure drop. In the opposite direction the single-way valve on the rear side of which a gate valve seat is fitted is pressed through the action of a spring and the load pressure against the spring-loaded valve gate valve. In this way the valve is nearly closed hermetically. If the pressure in the channel (1) exceeds a set up value of the spring force the gate valve is pressed out of the seat and the overpressure in that case is relieved into channel (2). For ensuring the function of holding the load the spring force should be set up to a value by 30 % higher when compared to an expected pressure exerted by the load. If the load has to be moved it is possible to ensure it with the help of so called auxiliary control from the channel (3) by introducing already certain control pressure.
The control pressure is calculated in the following way:

$$\text{Control pressure} = \frac{\text{set up pressure} - \text{load pressure}}{\text{ratio of control}}$$

The ratio of control designates a ratio of surfaces of the differential slide valve cross-section area and its seat. Therefore, the necessary control pressure for opening the valve does not correspond to the difference between the set up pressure and load pressure however; it corresponds to the ratio of this difference and the control ratio. In the formula as mentioned above it is necessary to take into consideration that in differential cylinders it is necessary to add to the control ratio also the appropriate ratio of piston surfaces in the direction of movement.
As soon as the control pressure attains a necessary value the differential gate valve is moved out from the seat and then the way from the channel (1) to the channel (2) is released. If now the load tries to accelerate and be fast as for the oil supply the supply pressure decreases, therefore, also the control pressure in the channel (3) is decreased. The spring force tries to shut off the valve again, therefore, in consequence of which the flow from the consumer decreases and the inlet pressure to the consumer increases again. In this way it is ensured a constant inlet pressure by means of which the movement of the load can be controlled.
Dynamic pressures in the outlet do not influence the set up value thanks to a special arrangement of the slide valve. However, it is necessary to take care of the fact the control channel is independent on the dynamic pressure.
As for appropriate basic surface finish the external parts are zinc coated.



Ordering Code

SO5A-R3/I [ ] [ ]

Overcentre valve

Preassare range
Standard 4:1 **4**

NBR **No designation**

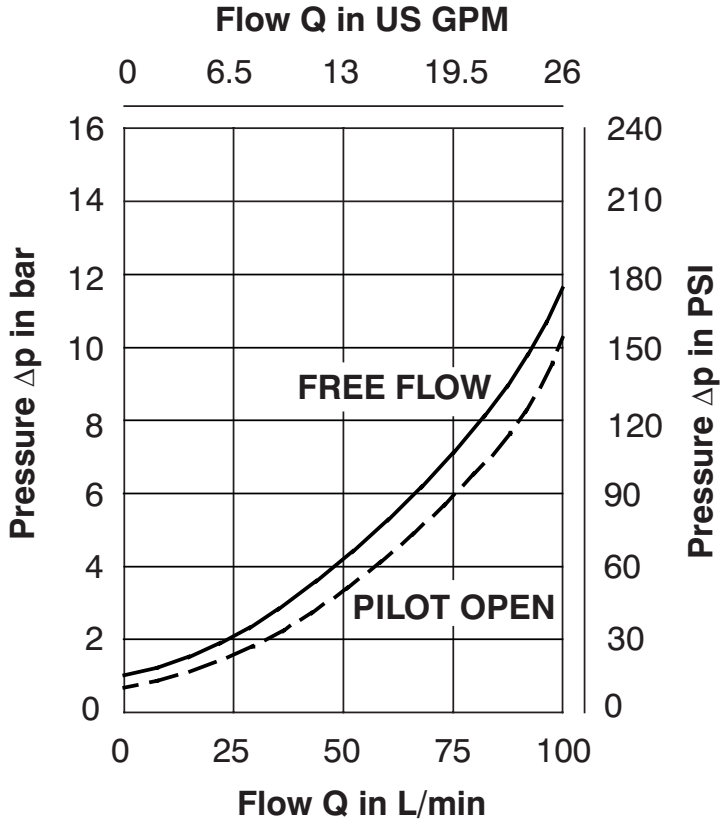
Technical Data

Figures based on: Oil Temp = 40 °C / Viscosity = 40 mm^2/s

Cavity		M27 x 1,5
Maximum flow	L/min	90
Max. pressure	bar	270
Max. input pressure	bar	350
Pressure drops	bar	see Δp - Q characteristics
Hydraulic fluid		Hydraulic oil (HM, HV) according to DIN 51254
Fluid temperature range	°C	-20 to +80
Ambient temperature	°C	-20 to +80
Viscosity	mm^2/s	10 to 500
Maximum degree of fluid contamination		according to ISO 4406 (1999), Class 21/18/15
Weight	kg	0,29
Maximum valve tightening torque in valve body or in control block	Nm	60^{+2}
Mounting position		any

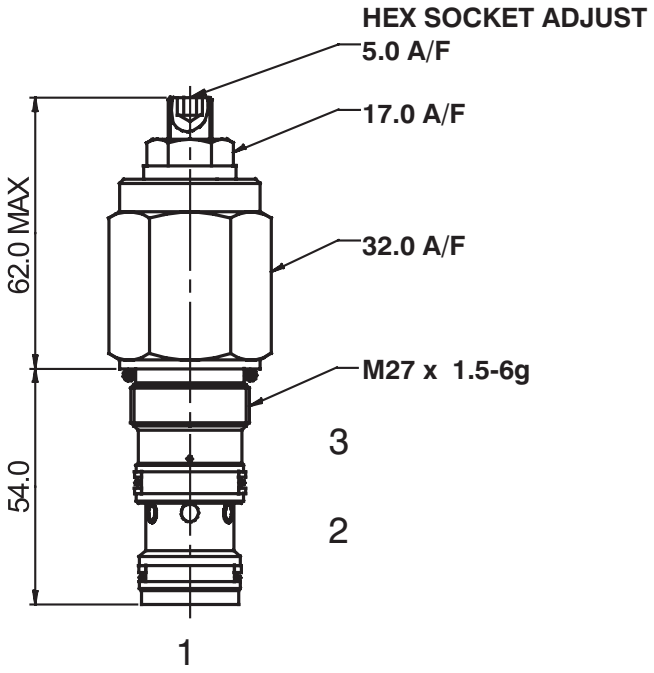
Δp-Q Characteristics

characteristics determined at n = 35 mm^2/s and t = 40 °C



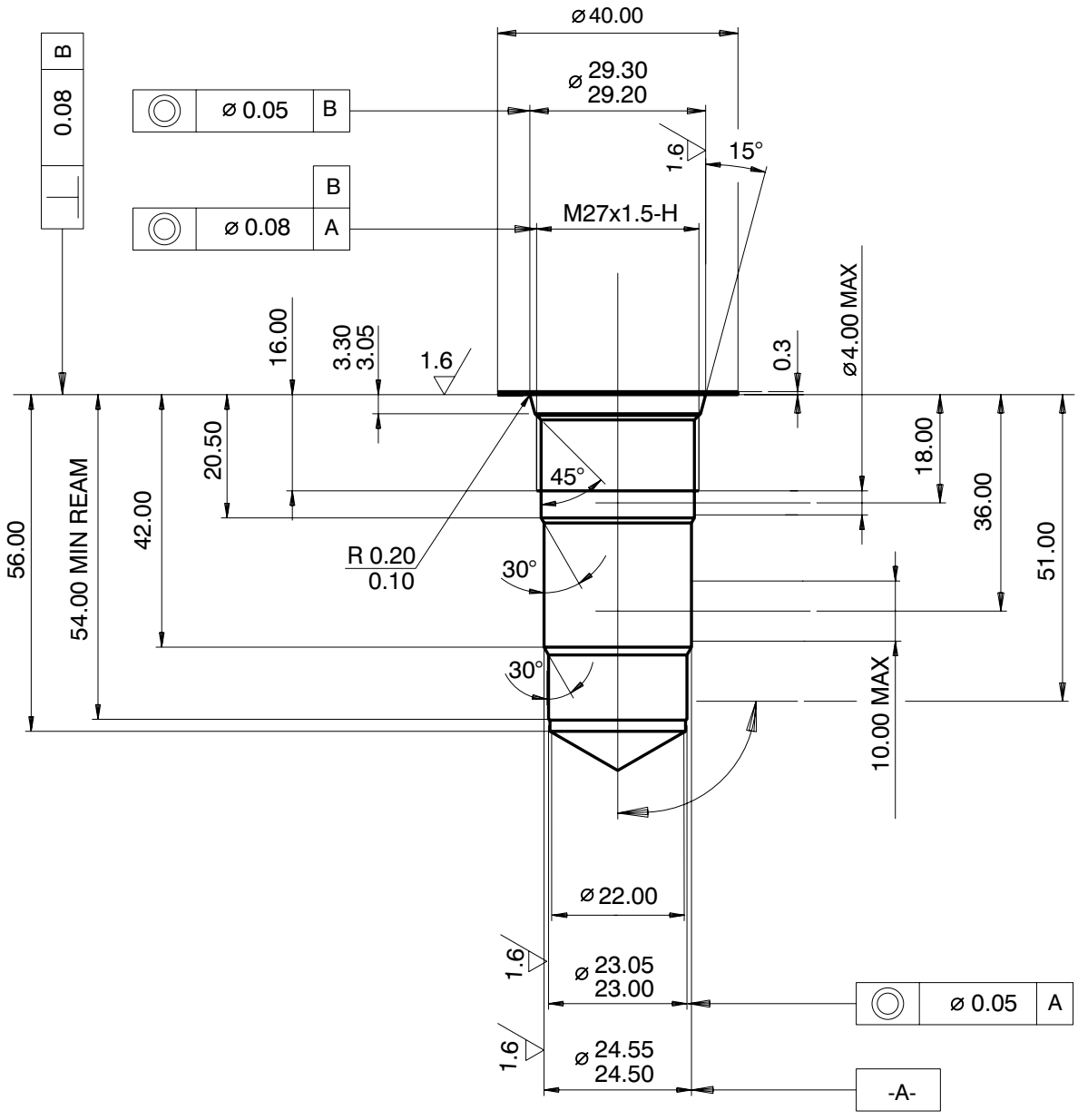
Dimensions

Measurements in millimeters



Cavity

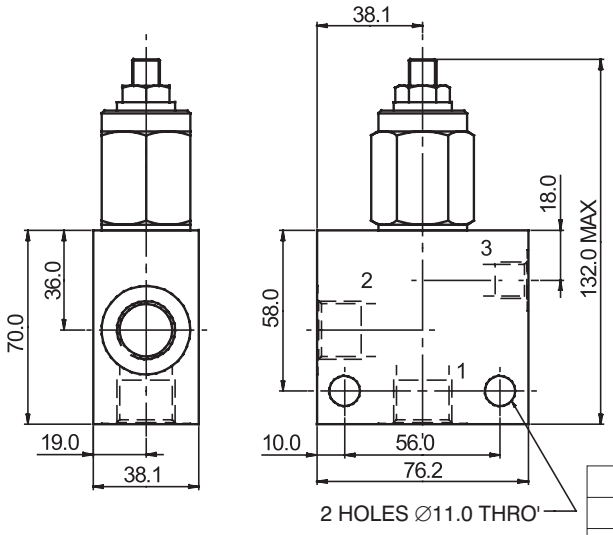
Measurements in millimeters



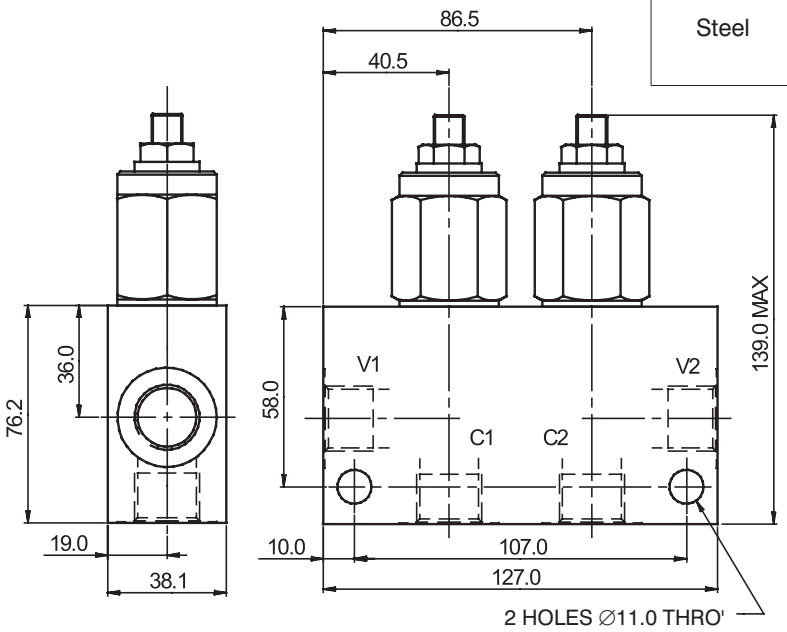
Valve Bodies

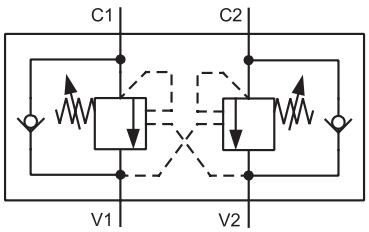
Measurements in millimeters

ISO A



Body without valve			
Material	**Ports**	**Port size**	**Type code**
Aluminium	1, 2	G1/2	SB-R3-0105AL
	3	G1/4	
	1, 2	SAE 10, 7/8-14	SB-R3-0106AL
	3	SAE 6, 9/16-18	
Steel	1, 2	G1/2	SB-R3-0105ST
	3	G1/4	
	1, 2	SAE 10, 7/8-14	SB-R3-0106ST
	3	SAE 6, 9/16-18	





Dual body without valve			
Material	**Ports**	**Port size**	**Type code**
Aluminium	C1, C2, V1, V2	G1/2	SB-R4-0205AL
	C1, C2, V1, V2	SAE 10, 7/8-14	SB-R4-0206AL
Steel	C1, C2, V1, V2	G1/2	SB-R4-0205ST
	C1, C2, V1, V2	SAE 10, 7/8-14	SB-R4-0206ST

The use of aluminium bodies is limited to a maximum operating pressure of 210 bar.

Spare Parts

Seal kits on request.

Caution!

- The packing foil is recyclable.
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law.

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www.argo-hytos.com

Overcentre Valve

Part Balanced

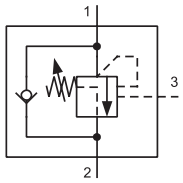
M27 x 1,5 • p_{max} 350 bar • Q 90 L/min

SOP5A-R3/I

HA 5206
9/2006

Replaces
HA 5206 8/2005

- **The valve prevents runaway in the event of a negative load**
- **Load-holding with minimal leakage**
- **Pressure relief function protecting the actuator against overload and pressure peaks**
- **When installed into the actuator the valve can be used as a hose burst valve**
- **When used as pressure relief the check valve will act as an anti-cavitation valve**
- **Relief setting is unaffected by back pressure**
- **The valve should be mounted as close as possible to the actuator**



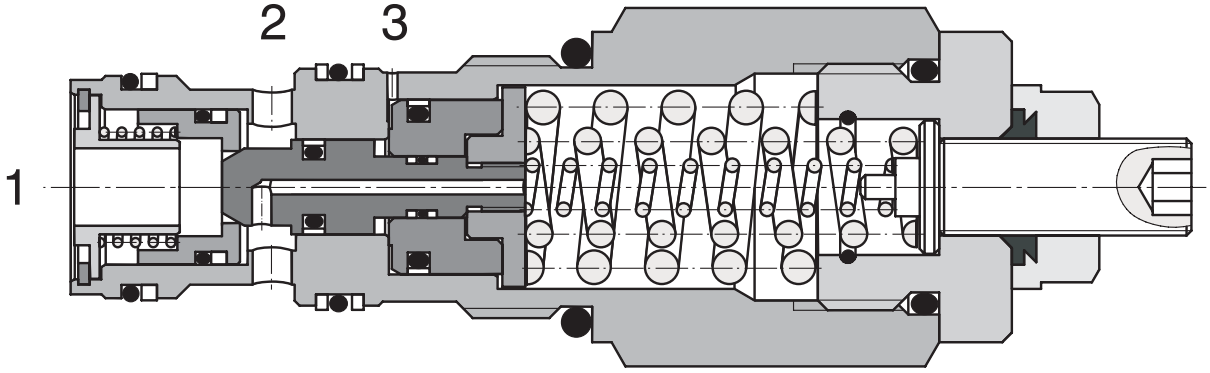
Functional Description

The valve consists of a seat by-pass, relief valve fitted with an auxiliary control with a differential piston and by-pass single-way valve serving for reverse direction of flow. The liquid is flowing through the single-way valve from the channel (2) to the channel (1) with a small pressure drop. In the opposite direction the single-way valve on the rear side of which a gate valve seat is fitted is pressed through the action of a spring and the load pressure against the spring-loaded valve gate valve. In this way the valve is nearly closed hermetically. If the pressure in the channel (1) exceeds a set up value of the spring force the gate valve is pressed out of the seat and the overpressure in that case is relieved into channel (2). For ensuring the function of holding the load the spring force should be set up to a value by 30 % higher when compared to an expected pressure exerted by the load. If the load has to be moved it is possible to ensure it with the help of so called auxiliary control from the channel (3) by introducing already certain control pressure.
The control pressure is calculated in the following way:

$$\text{Control pressure} = \frac{\text{set up pressure} - \text{load pressure}}{\text{ratio of control}}$$

The ratio of control designates a ratio of surfaces of the differential slide valve cross-section area and its seat. Therefore, the necessary control pressure for opening the valve does not correspond to the difference between the set up pressure and load pressure however; it corresponds to the ratio of this difference and the control ratio. In the formula as mentioned above it is necessary to take into consideration that in differential cylinders it is necessary to add to the control ratio also the appropriate ratio of piston surfaces in the direction of movement.
As soon as the control pressure attains a necessary value the differential gate valve is moved out from the seat and then the way from the channel (1) to the channel (2) is released. If now the load tries to accelerate and be fast as for the oil supply the supply pressure decreases, therefore, also the control pressure in the channel (3) is decreased. The spring force tries to shut off the valve again, therefore, in consequence of which the flow from the consumer decreases and the inlet pressure to the consumer increases again. In this way it is ensured a constant inlet pressure by means of which the movement of the load can be controlled.
Dynamic pressures in the outlet do not influence the set up value thanks to a special arrangement of the slide valve. However, it is necessary to take care of the fact the control channel is independent on the dynamic pressure.

As for appropriate basic surface finish the external parts are zinc coated.



Ordering Code

SOP5A-R3/I □ □

Overcentre valve
Part Balanced

Preassare range
Standard 4:1 **4**

NBR **No designation**

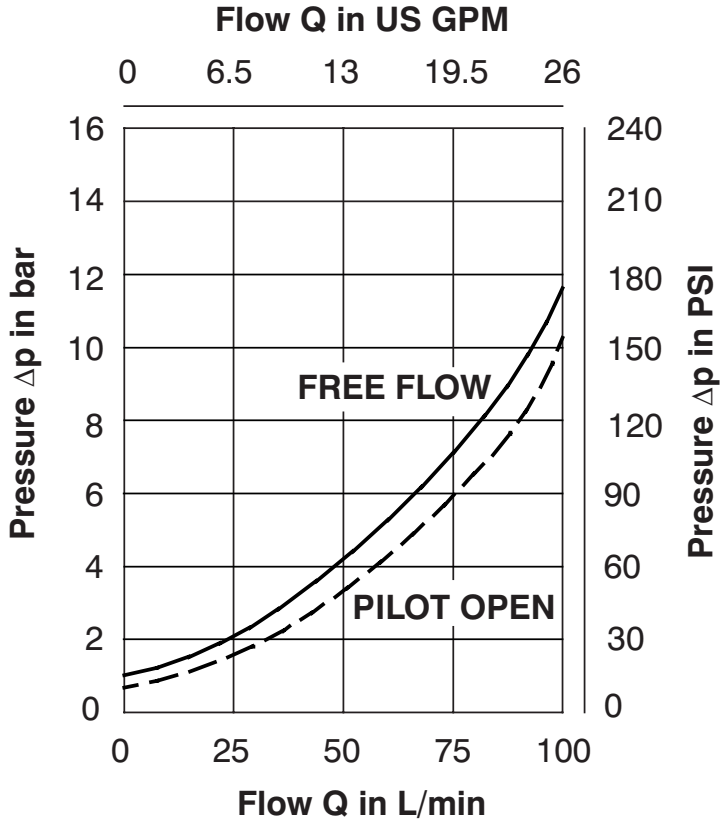
Technical Data

Figures based on: Oil Temp = 40 °C / Viscosity = 40 mm^2/s

Cavity		M27 x 1,5
Maximum flow	L/min	90
Max. pressure	bar	270
Max. input pressure	bar	350
Pressure drops	bar	see Δp - Q characteristics
Hydraulic fluid		Hydraulic oil (HM, HV) according to DIN 51254
Fluid temperature range	°C	-20 to +80
Ambient temperature	°C	-20 to +80
Viscosity	mm^2/s	10 to 500
Maximum degree of fluid contamination		according to ISO 4406 (1999), Class 21/18/15
Weight	kg	0,29
Maximum valve tightening torque in valve body or in control block	Nm	60^{+2}
Mounting position		any

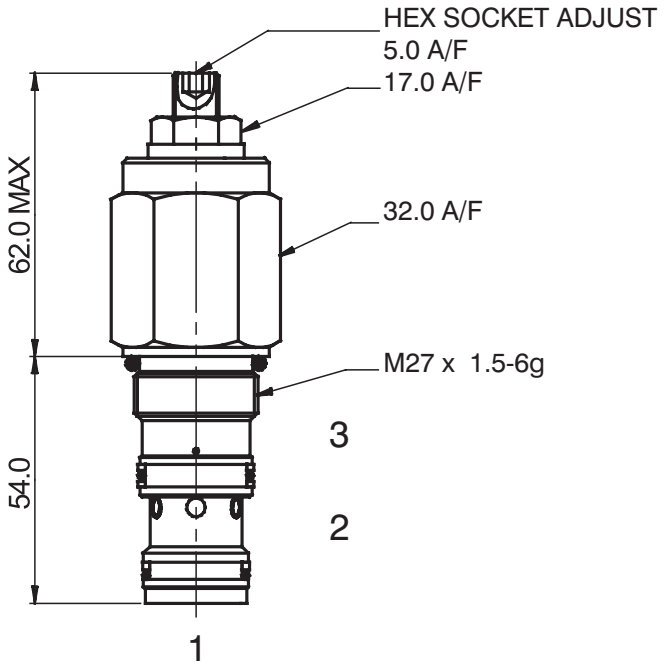
Δp-Q Characteristics

characteristics determined at ν = 35 mm^2/s and t = 40 °C



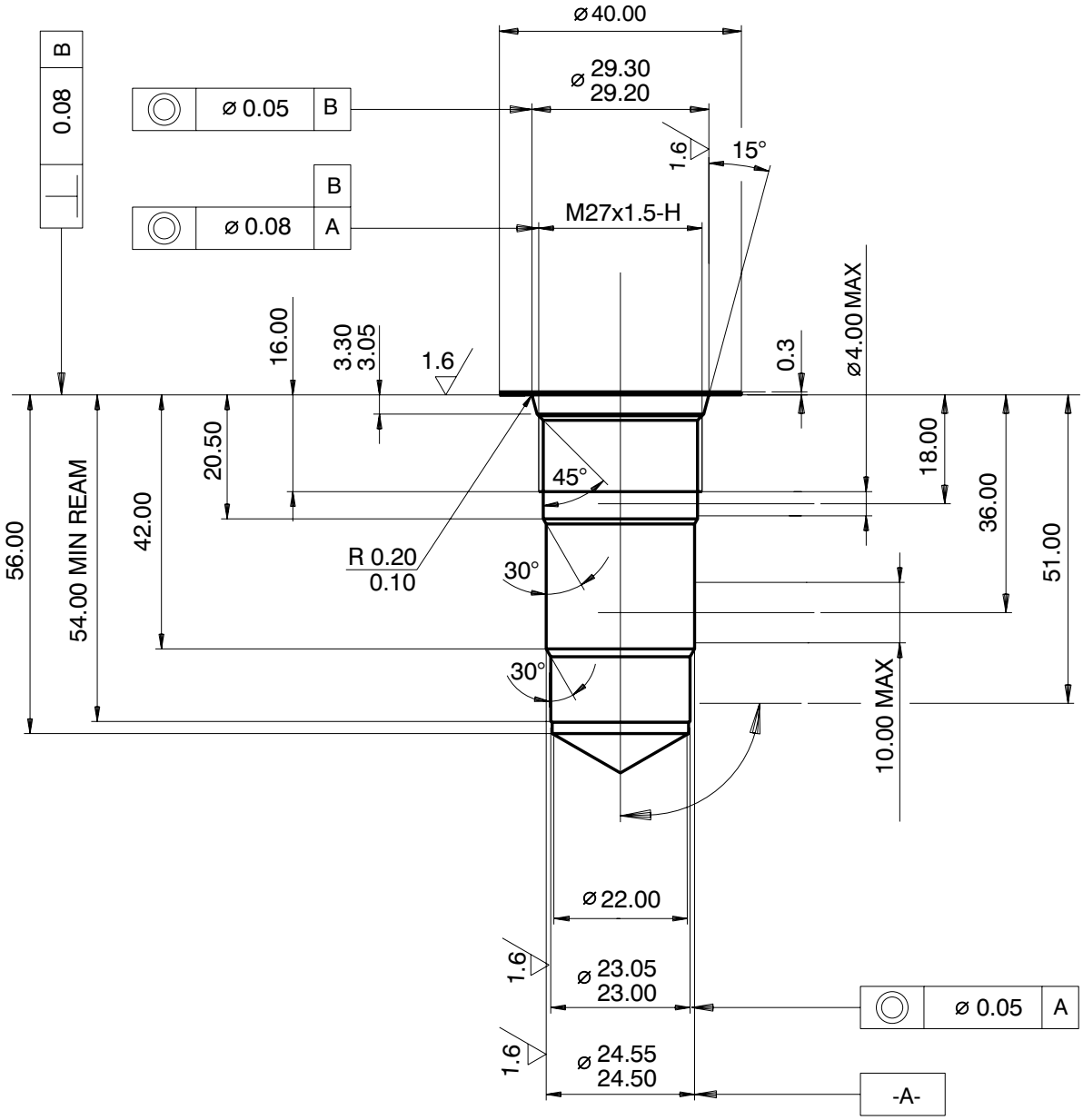
Dimensions

Measurements in millimeters



Cavity

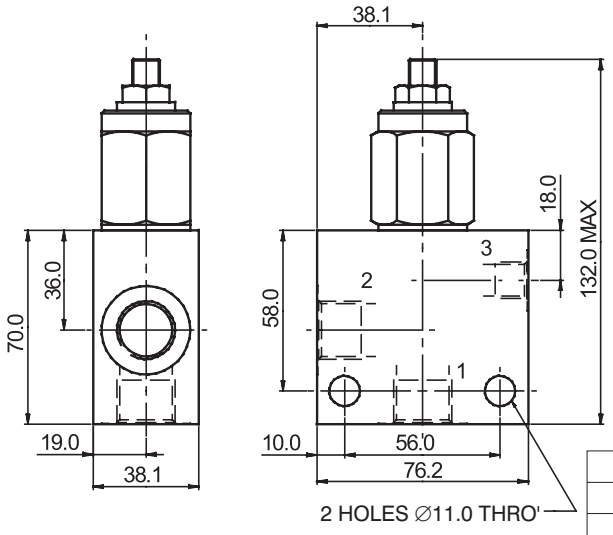
Measurements in millimeters



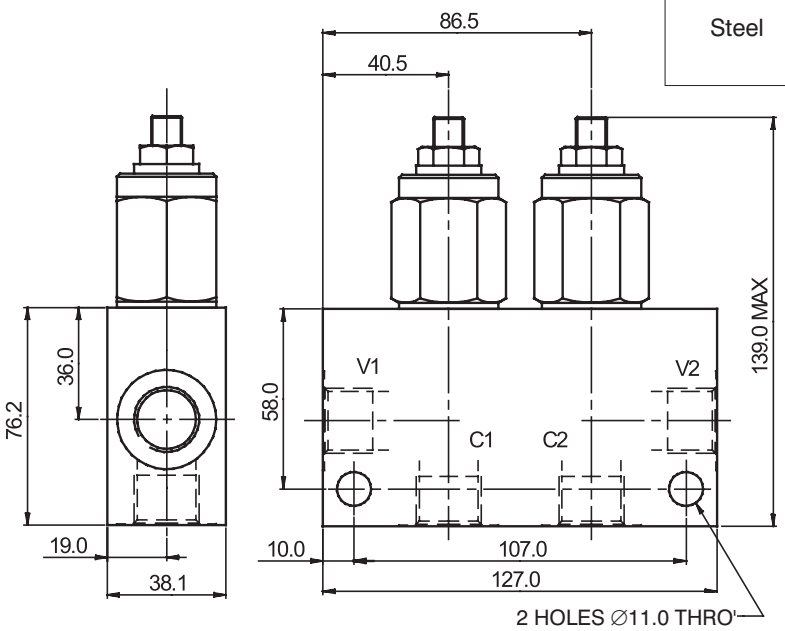
Valve Bodies

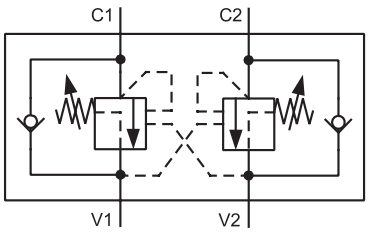
Measurements in millimeters

ISO A



Body without valve			
Material	**Ports**	**Port size**	**Type code**
Aluminium	1, 2	G1/2	SB-R3-0105AL
	3	G1/4	
	1, 2	SAE 10, 7/8-14	SB-R3-0106AL
	3	SAE 6, 9/16-18	
Steel	1, 2	G1/2	SB-R3-0105ST
	3	G1/4	
	1, 2	SAE 10, 7/8-14	SB-R3-0106ST
	3	SAE 6, 9/16-18	





Dual body without valve			
Material	**Ports**	**Port size**	**Type code**
Aluminium	C1, C2, V1, V2	G1/2	SB-R4-0205AL
	C1, C2, V1, V2	SAE 10, 7/8-14	SB-R4-0206AL
Steel	C1, C2, V1, V2	G1/2	SB-R4-0205ST
	C1, C2, V1, V2	SAE 10, 7/8-14	SB-R4-0206ST

The use of aluminium bodies is limited to a maximum operating pressure of 210 bar.

Spare Parts

Seal kits on request.

Caution!

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Overcentre Valve
Fully Balanced

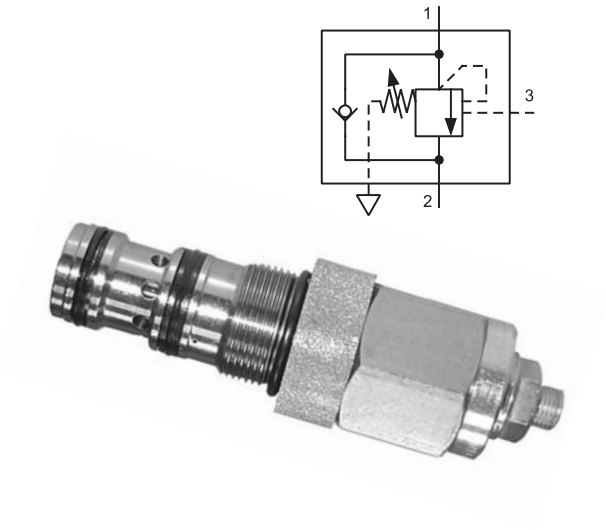
SOB5A-R3/I

M27 x 1,5 • p_{max} 350 bar • Q 90 L/min

HA 5207
9/2006

Replaces
HA 5207 8/2005

- ❑ **The valve prevents runaway in the event of a negative load**
- ❑ **Load-holding with minimal leakage**
- ❑ **Pressure relief function protecting the actuator against overload and pressure peaks**
- ❑ **When installed into the actuator the valve can be used as a hose burst valve**
- ❑ **When used as pressure relief the check valve will act as an anti-cavitation valve**
- ❑ **The valve should be mounted as close as possible to the actuator**



Functional Description

The valve consists of a seat by-pass, relief valve fitted with an auxiliary control with a differential piston and by-pass single-way valve serving for reverse direction of flow. The liquid is flowing through the single-way valve from the channel (2) to the channel (1) with a small pressure drop. In the opposite direction the single-way valve on the rear side of which a gate valve seat is fitted is pressed through the action of a spring and the load pressure against the spring-loaded valve gate valve. In this way the valve is nearly closed hermetically. If the pressure in the channel (1) exceeds a set up value of the spring force the gate valve is pressed out of the seat and the overpressure in that case is relieved into channel (2). For ensuring the function of holding the load the spring force should be set up to a value by 30 % higher when compared to an expected pressure exerted by the load. If the load has to be moved it is possible to ensure it with the help of so called auxiliary control from the channel (3) by introducing already certain control pressure.
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$$\text{Control pressure} = \frac{\text{set up pressure} - \text{load pressure}}{\text{ratio of control}}$$

The ratio of control designates a ratio of surfaces of the differential slide valve cross-section area and its seat. Therefore, the necessary control pressure for opening the valve does not correspond to the difference between the set up pressure and load pressure however; it corresponds to the ratio of this difference and the control ratio. In the formula as mentioned above it is necessary to take into consideration that in differential cylinders it is necessary to add to the control ratio also the appropriate ratio of piston surfaces in the direction of movement.
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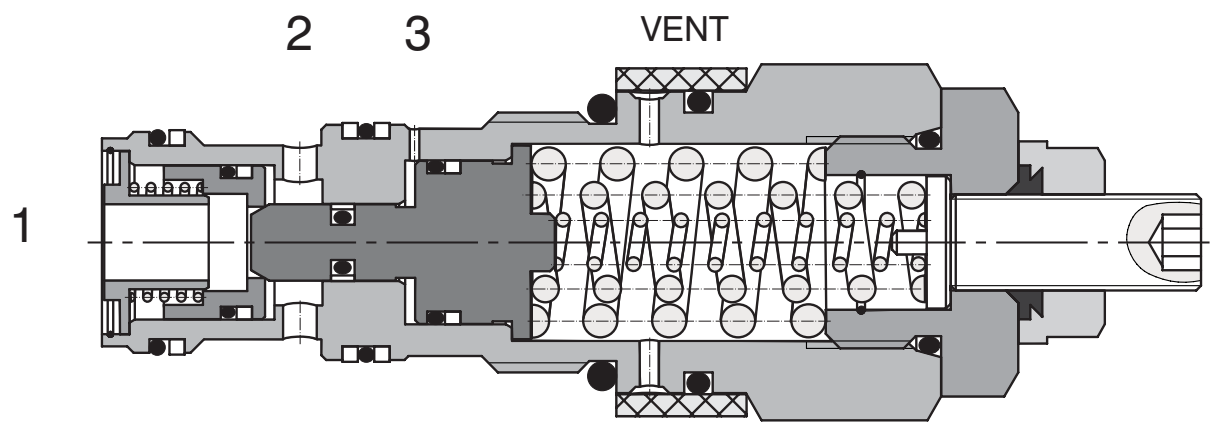
Dynamic pressures in the outlet do not influence the set up value thanks to a special arrangement of the slide valve. However, it is necessary to take care of the fact the control channel is independent on the dynamic pressure.

As for appropriate basic surface finish the external parts are zinc coated.



Ordering Code

SOB5A-R3/I □ □

Overcentre valve
Fully Balanced

Preassare range
Standard 4:1 **4**

NBR **No designation**

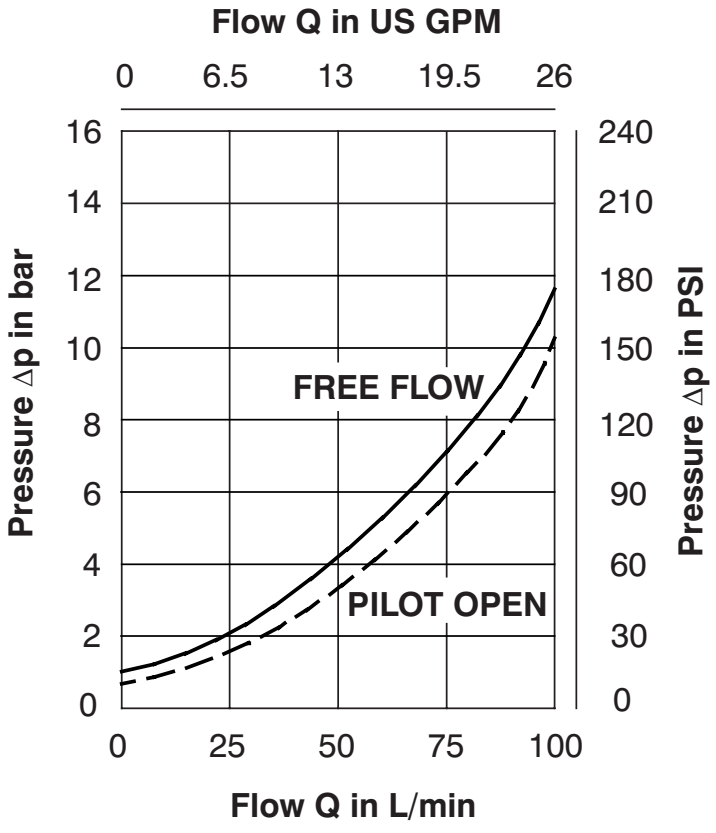
Technical Data

Figures based on: Oil Temp = 40 °C / Viscosity = 40 mm^2/s

Cavity		M27 x 1,5
Maximum flow	L/min	90
Max. pressure	bar	270
Max. input pressure	bar	350
Pressure drops	bar	see Δp - Q characteristics
Hydraulic fluid		Hydraulic oil (HM, HV) according to DIN 51254
Fluid temperature range	°C	-20 to +80
Ambient temperature	°C	-20 to +80
Viscosity	mm^2/s	10 to 500
Maximum degree of fluid contamination		according to ISO 4406 (1999), Class 21/18/15
Weight	kg	0.29
Maximum valve tightening torque in valve body or in control block	Nm	60^{+2}
Mounting position		any

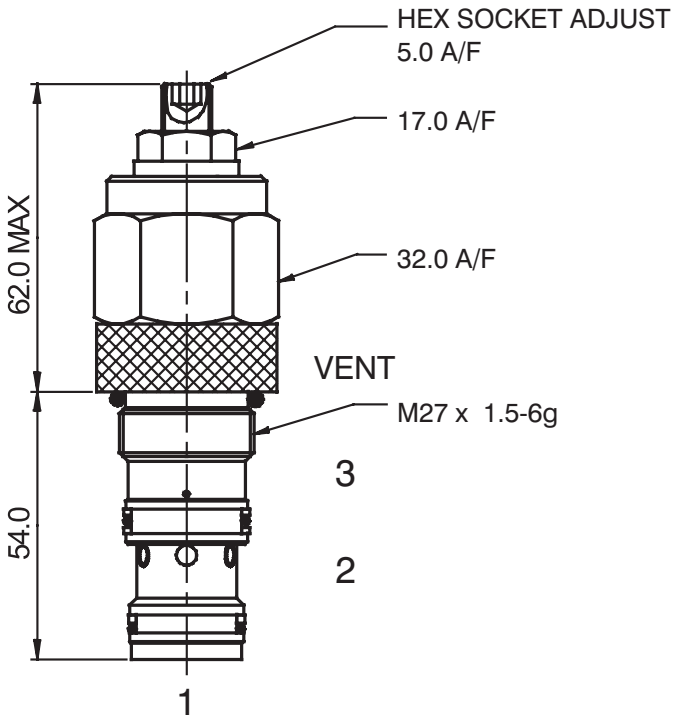
Δp-Q Characteristics

characteristics determined at ν = 35 mm^2/s and t = 40 °C



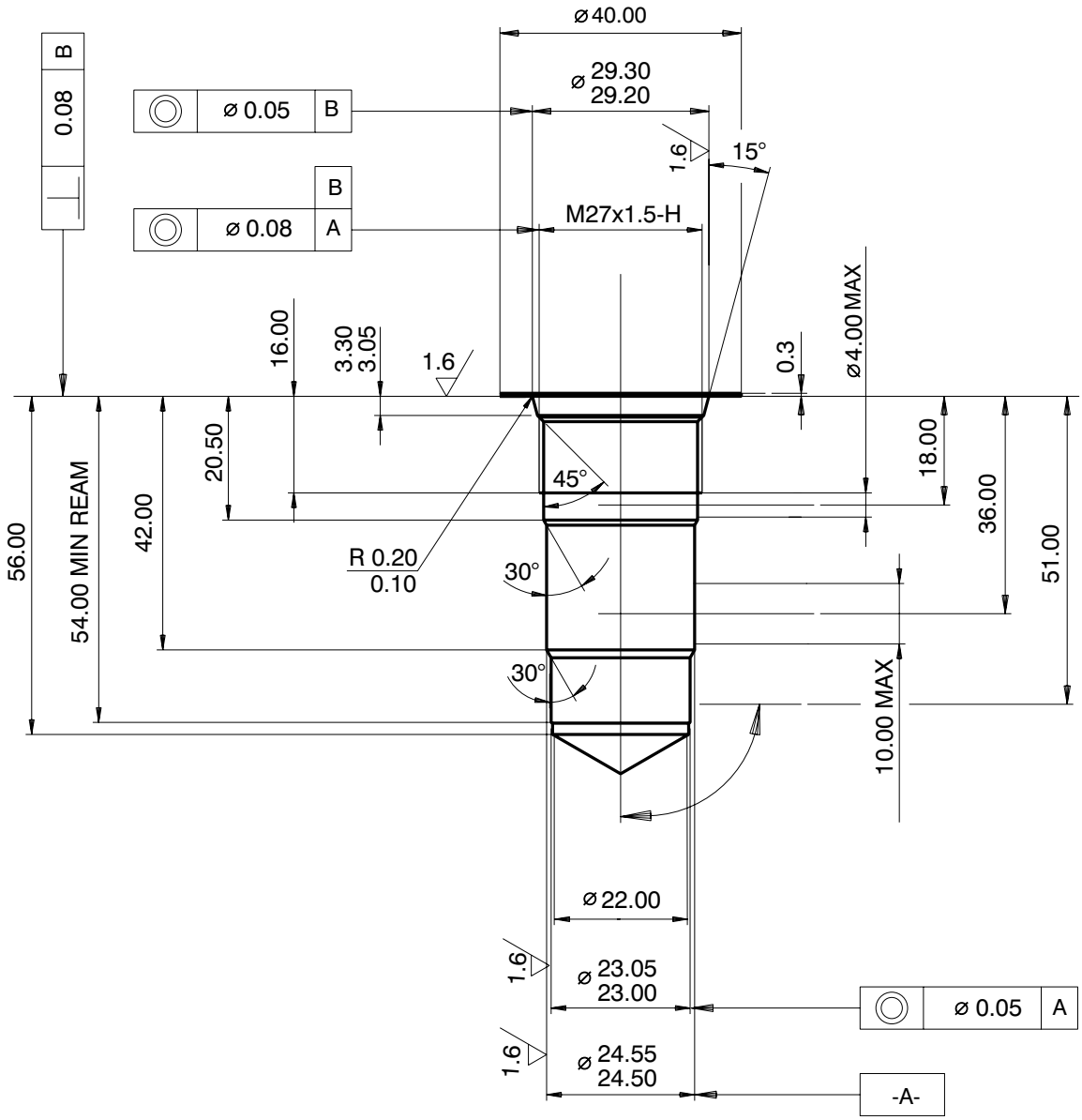
Dimensions

Measurements in millimeters



Cavity

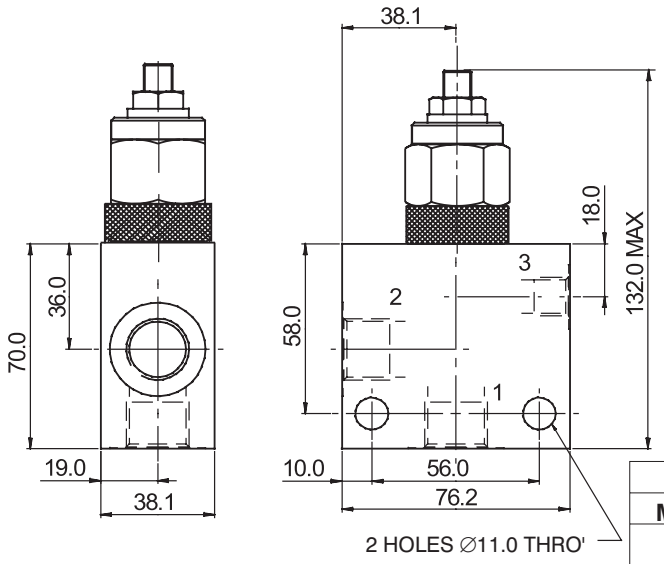
Measurements in millimeters



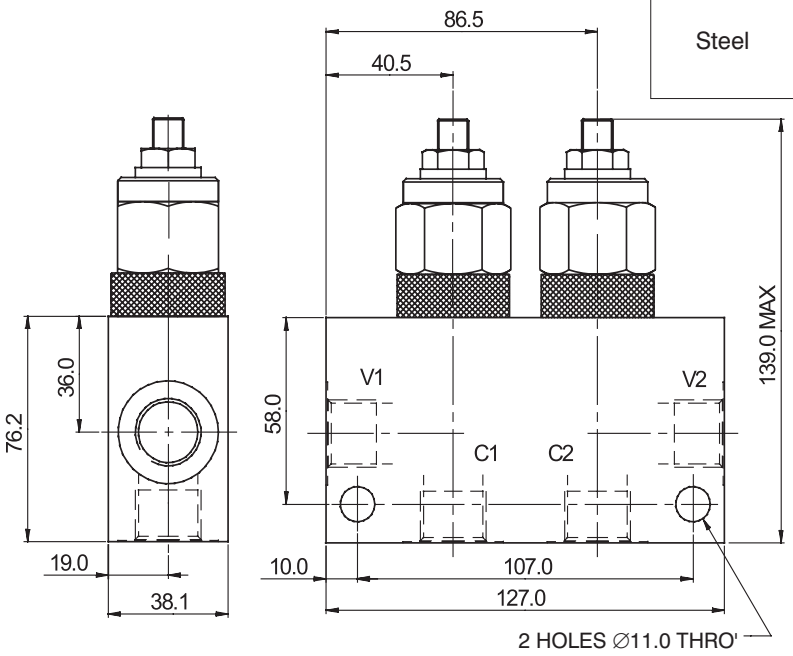
Valve Bodies

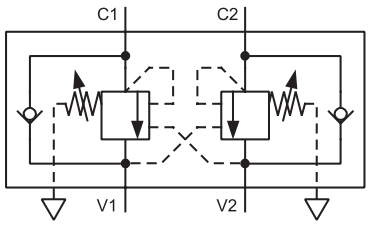
Measurements in millimeters

ISO A



Body without valve			
Material	**Ports**	**Port size**	**Type code**
Aluminium	1, 2	G1/2	SB-R3-0105AL
	3	G1/4	
	1, 2	SAE 10, 7/8-14	SB-R3-0106AL
	3	SAE 6, 9/16-18	
Steel	1, 2	G1/2	SB-R3-0105ST
	3	G1/4	
	1, 2	SAE 10, 7/8-14	SB-R3-0106ST
	3	SAE 6, 9/16-18	





Dual body without valve			
Material	**Ports**	**Port size**	**Type code**
Aluminium	C1, C2, V1, V2	G1/2	SB-R4-0205AL
	C1, C2, V1, V2	SAE 10, 7/8-14	SB-R4-0206AL
Steel	C1, C2, V1, V2	G1/2	SB-R4-0205ST
	C1, C2, V1, V2	SAE 10, 7/8-14	SB-R4-0206ST

The use of aluminium bodies is limited to a maximum operating pressure of 210 bar.

Spare Parts

Seal kits on request.

Caution!

- The packing foil is recyclable.
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Overcentre Valve
Fully Balanced

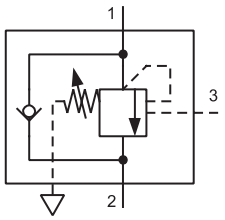
SOBD5A-R4/I

M27 x 1,5 • p_{max} 350 bar • Q 90 L/min

HA 5208
9/2006

Replaces
HA 5208 8/2005

- **The valve prevents runaway in the event of a negative load**
- **Load-holding with minimal leakage**
- **Pressure relief function protecting the actuator against overload and pressure peaks**
- **When installed into the actuator the valve can be used as a hose burst valve**
- **When used as pressure relief the check valve will act as an anti-cavitation valve**
- **Relief setting is unaffected by back pressure**
- **The valve should be mounted as close as possible to the actuator**

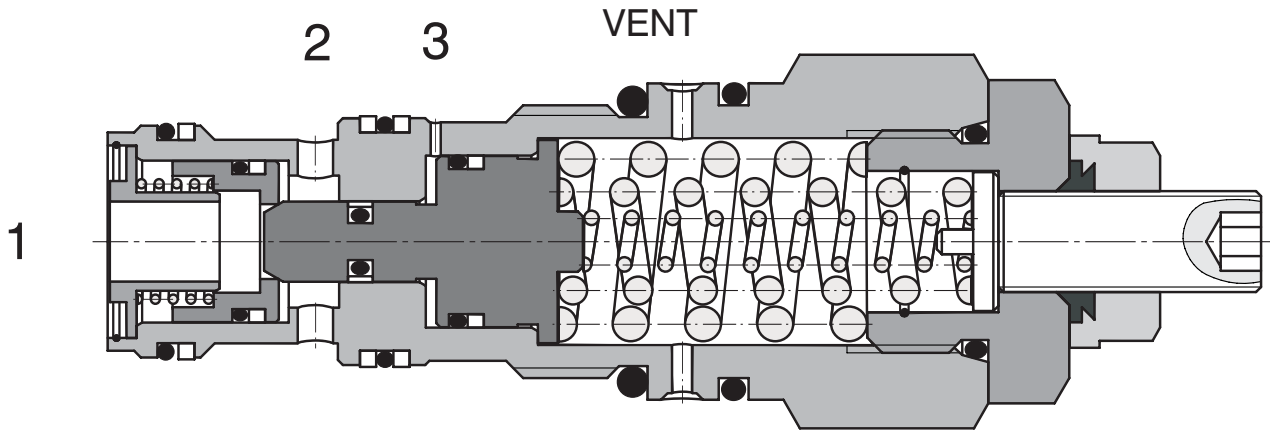


Functional Description

The valve consists of a seat by-pass, relief valve fitted with an auxiliary control with a differential piston and by-pass single-way valve serving for reverse direction of flow. The liquid is flowing through the single-way valve from the channel (2) to the channel (1) with a small pressure drop. In the opposite direction the single-way valve on the rear side of which a gate valve seat is fitted is pressed through the action of a spring and the load pressure against the spring-loaded valve gate valve. In this way the valve is nearly closed hermetically. If the pressure in the channel (1) exceeds a set up value of the spring force the gate valve is pressed out of the seat and the overpressure in that case is relieved into channel (2). For ensuring the function of holding the load the spring force should be set up to a value by 30 % higher when compared to an expected pressure exerted by the load. If the load has to be moved it is possible to ensure it with the help of so called auxiliary control from the channel (3) by introducing already certain control pressure.
The control pressure is calculated in the following way:

$$\text{Control pressure} = \frac{\text{set up pressure} - \text{load pressure}}{\text{ratio of control}}$$

The ratio of control designates a ratio of surfaces of the differential slide valve cross-section area and its seat. Therefore, the necessary control pressure for opening the valve does not correspond to the difference between the set up pressure and load pressure however; it corresponds to the ratio of this difference and the control ratio. In the formula as mentioned above it is necessary to take into consideration that in differential cylinders it is necessary to add to the control ratio also the appropriate ratio of piston surfaces in the direction of movement.
As soon as the control pressure attains a necessary value the differential gate valve is moved out from the seat and then the way from the channel (1) to the channel (2) is released. If now the load tries to accelerate and be fast as for the oil supply the supply pressure decreases, therefore, also the control pressure in the channel (3) is decreased. The spring force tries to shut off the valve again, therefore, in consequence of which the flow from the consumer decreases and the inlet pressure to the consumer increases again. In this way it is ensured a constant inlet pressure by means of which the movement of the load can be controlled.
Dynamic pressures in the outlet do not influence the set up value thanks to a special arrangement of the slide valve. However, it is necessary to take care of the fact the control channel is independent on the dynamic pressure.



Ordering Code

SOBD5A-R4/I [ ] [ ]

Overcentre valve
Fully Balanced

Preassare range
Standard 4:1 **4**

NBR **No designation**

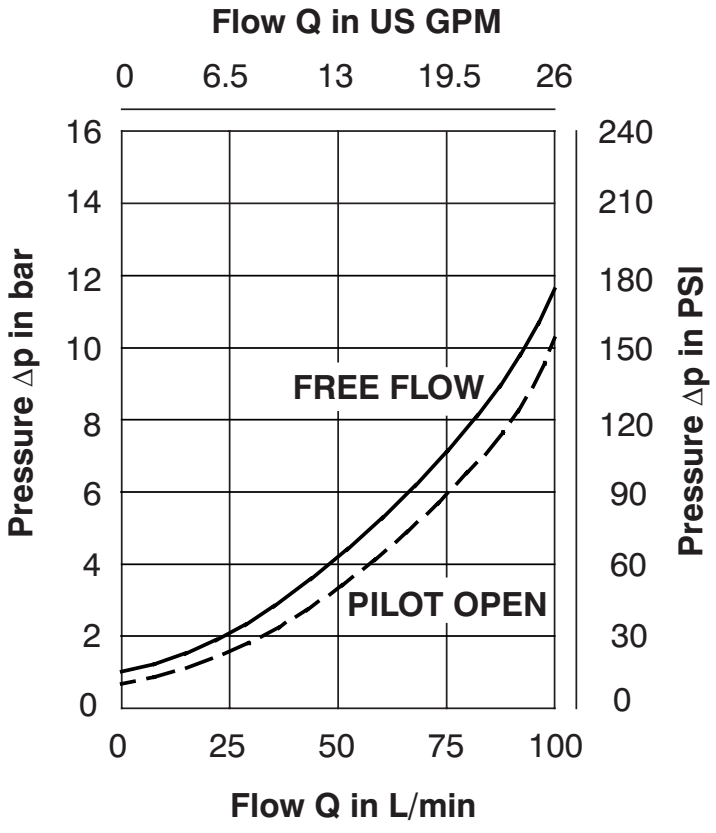
Technical Data

Figures based on: Oil Temp = 40 °C / Viscosity = 40 mm^2/s

Cavity		M27 x 1,5
Maximum flow	L/min	90
Max. pressure	bar	270
Max. input pressure	bar	350
Pressure drops	bar	see Δp - Q characteristics
Hydraulic fluid		Hydraulic oil (HM, HV) according to DIN 51254
Fluid temperature range	°C	-20 to +80
Ambient temperature	°C	-20 to +80
Viscosity	mm^2/s	10 to 500
Maximum degree of fluid contamination		according to ISO 4406 (1999), Class 21/18/15
Weight	kg	0,29
Maximum valve tightening torque in valve body or in control block	Nm	60^{+2}
Mounting position		any

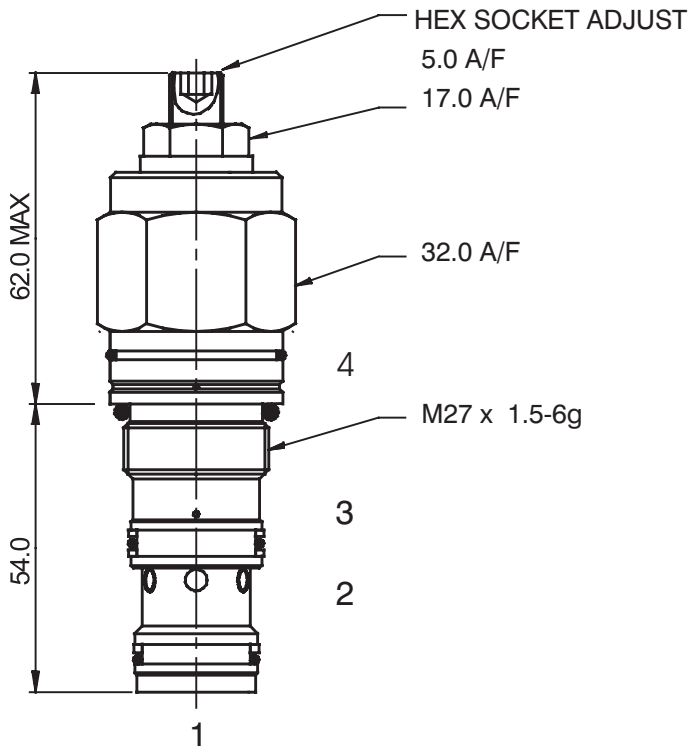
Δp-Q Characteristics

characteristics determined at ν = 35 mm^2/s and t = 40 °C



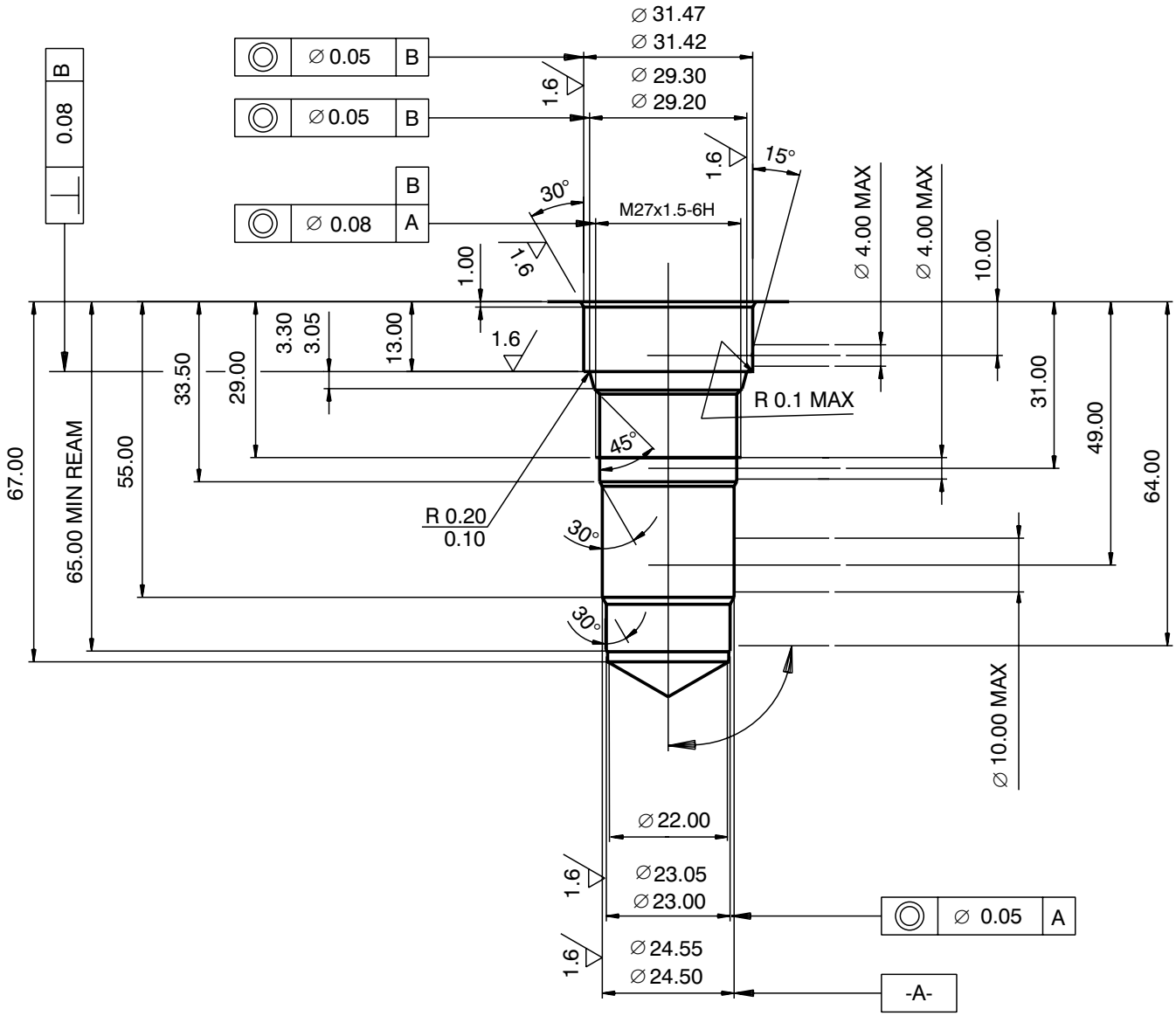
Dimensions

Measurements in millimeters



Cavity

Measurements in millimeters



Spare Parts

Seal kits on request.

Caution!

- The packing foil is recyclable.
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www.argo-hytos.com

Overcentre Valve
2 Stage

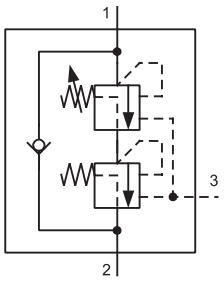
M27 x 1,5 • p_{max} 380 bar • Q 90 L/min

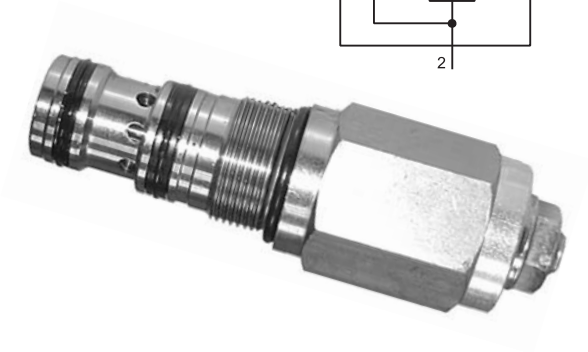
SOD5A-R3/I

HA 5209
9/2006

Replaces
HA 5209 8/2005

- **The valve prevents runaway in the event of a negative load**
- **Load-holding with minimal leakage**
- **Pressure relief function protecting the actuator against overload and pressure peaks**
- **When installed into the actuator the valve can be used as a hose burst valve**
- **Stabile performance by maintaining a counterbalance pressure**
- **The valve should be mounted as close as possible to the actuator**





Functional Description

The valve consists of a seat by-pass, relief valve fitted with an auxiliary control with a differential piston and by-pass single-way valve serving for reverse direction of flow. The liquid is flowing through the single-way valve from the channel (2) to the channel (1) with a small pressure drop. In the opposite direction the single-way valve on the rear side of which a gate valve seat is fitted is pressed through the action of a spring and the load pressure against the spring-loaded valve gate valve. In this way the valve is nearly closed hermetically. If the pressure in the channel (1) exceeds a set up value of the spring force the gate valve is pressed out of the seat and the overpressure in that case is relieved into channel (2). For ensuring the function of holding the load the spring force should be set up to a value by 30 % higher when compared to an expected pressure exerted by the load.

If the load has to be moved it is possible to ensure it with the help of so called auxiliary control from the channel (3) by introducing already certain control pressure.

The control pressure is calculated in the following way:

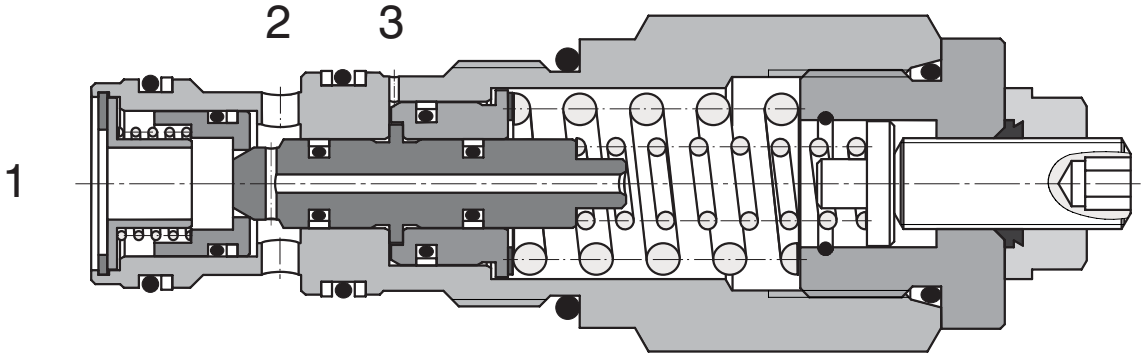
$$\text{Control pressure} = \frac{\text{set up pressure} - \text{load pressure}}{\text{ratio of control}}$$

The ratio of control designates a ratio of surfaces of the differential slide valve cross-section area and its seat. Therefore, the necessary control pressure for opening the valve does not correspond to the difference between the set up pressure and load pressure however; it corresponds to the ratio of this difference and the control ratio. In the formula as mentioned above it is necessary to take into consideration that in differential cylinders it is necessary to add to the control ratio also the appropriate ratio of piston surfaces in the direction of movement.

As soon as the control pressure attains a necessary value the differential gate valve is moved out from the seat and then the way from the channel (1) to the channel (2) is released. If now the load tries to accelerate and be fast as for the oil supply the supply pressure decreases, therefore, also the control pressure in the channel (3) is decreased. The spring force tries to shut off the valve again, therefore, in consequence of which the flow from the consumer decreases and the inlet pressure to the consumer increases again. In this way it is ensured a constant inlet pressure by means of which the movement of the load can be controlled.

Starting braking valves of SOD5A series cover the whole range of the use of single-stage starting braking valves. In addition to it, this valve exerts a counter pressure to prevent from a sharp pressure drop at opening the valve. In this way the valve makes a particularly sensitive movement of consumers possible.

As for appropriate basic surface finish the external parts are zinc coated.



Ordering Code

SOD5A-R3/I □ □

Overcentre valve
2 Stage

Preassare range
210 - 380 bar **30**

NBR **No designation**

Factory setting 280 (220/60)bar for Q=4.8L/min

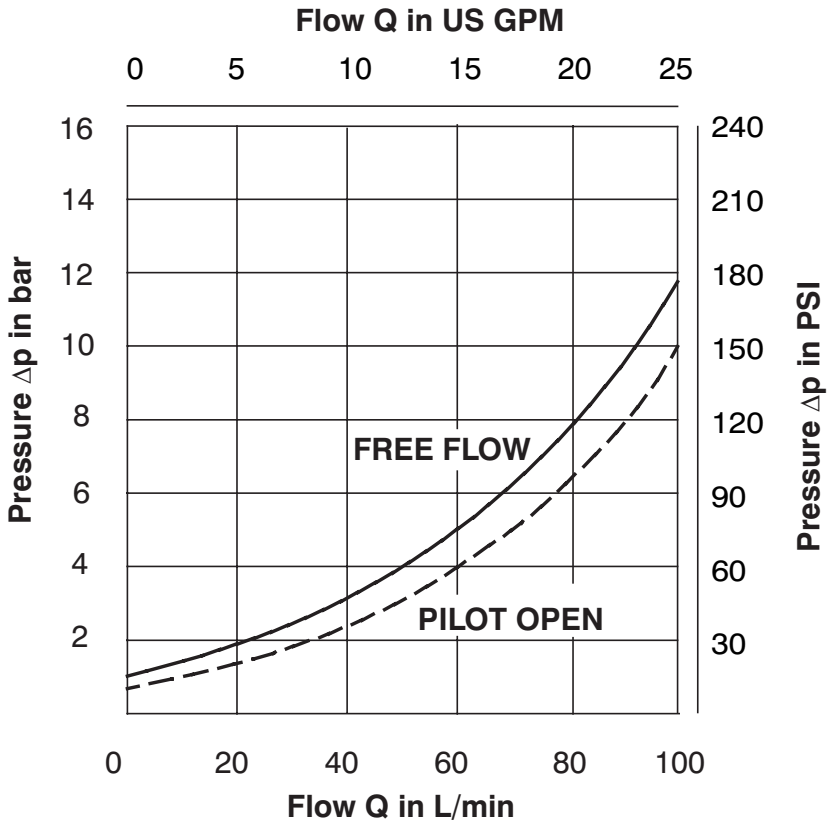
Technical Data

Figures based on: Oil Temp = 40 °C / Viscosity = 40 mm^2/s

Cavity		M27 x 1,5
Maximum flow	L/min	90
Max. pressure	bar	380
Pressure drops	bar	see Δp - Q characteristics
Hydraulic fluid		Hydraulic oil (HM, HV) according to DIN 51254
Fluid temperature range	°C	-20 to +80
Ambient temperature	°C	-20 to +80
Viscosity	mm^2/s	10 to 500
Maximum degree of fluid contamination		according to ISO 4406 (1999), Class 21/18/15
Weight	kg	0,29
Maximum valve tightening torque in valve body or in control block	Nm	60^{+2}
Mounting position		any

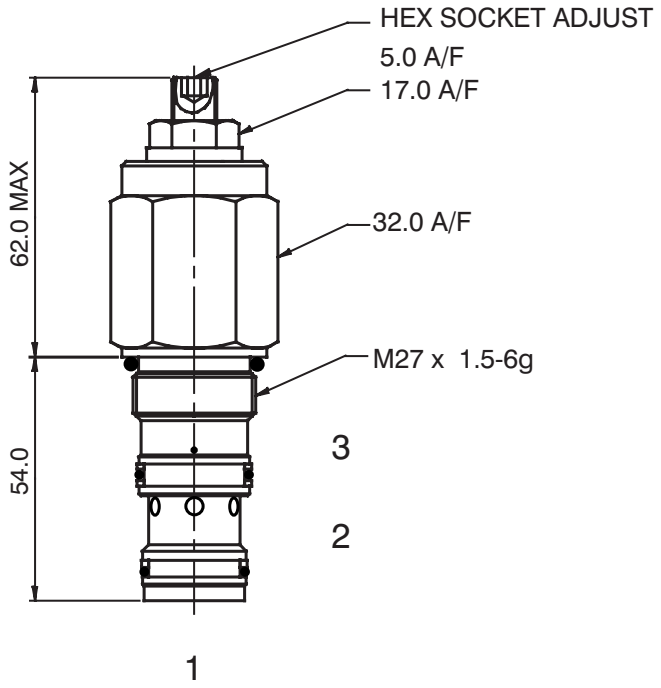
Δp-Q Characteristics

characteristics determined at ν = 35 mm^2/s and t = 40 °C



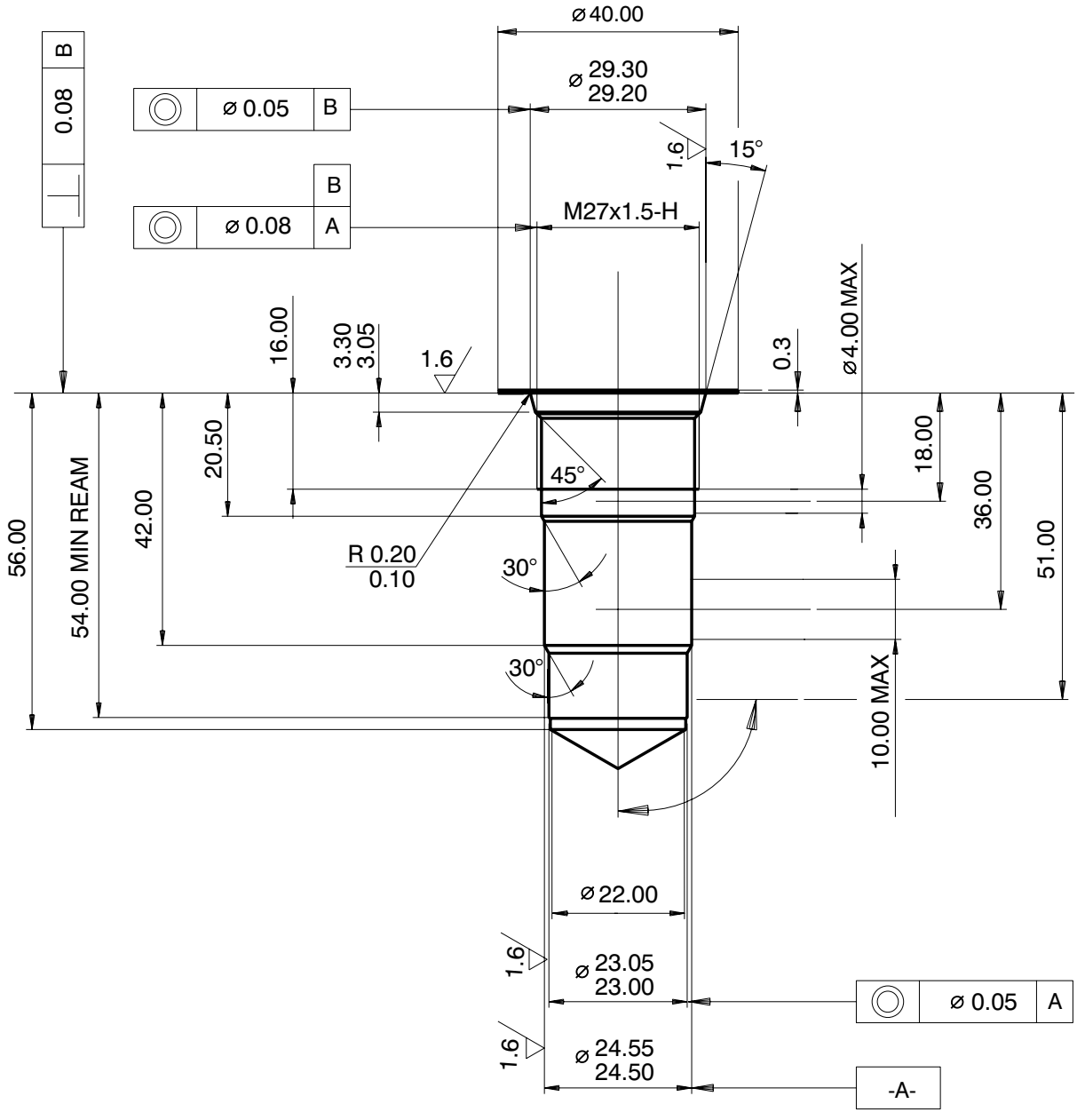
Dimensions

Measurements in millimeters



Cavity

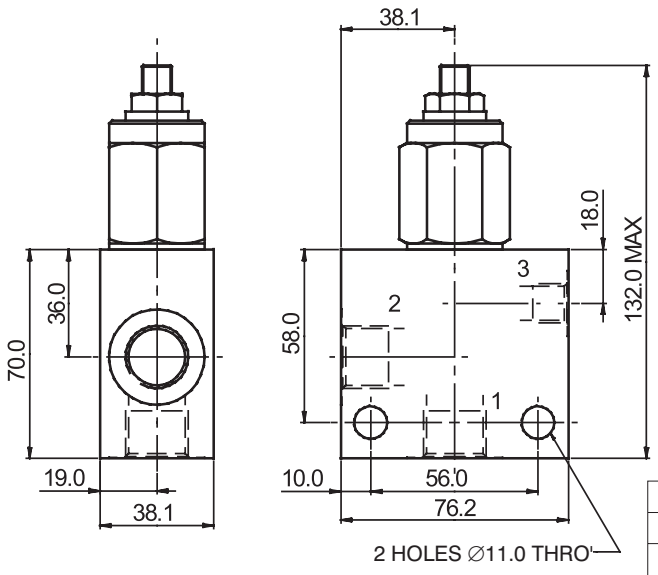
Measurements in millimeters



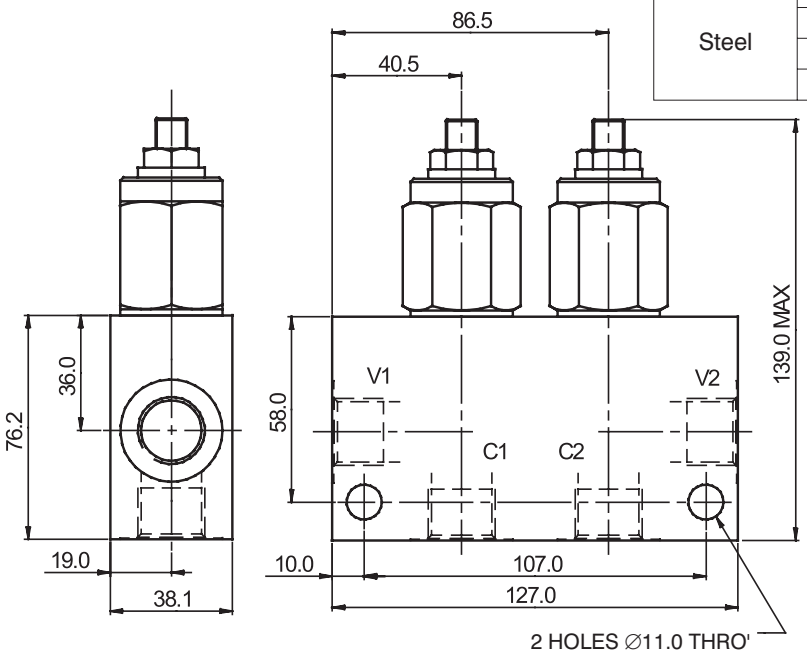
Valve Bodies

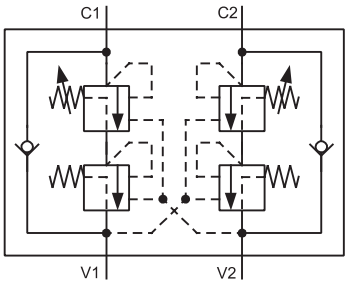
Measurements in millimeters

ISO A



Body without valve			
Material	**Ports**	**Port size**	**Type code**
Aluminium	1, 2	G1/2	SB-R3-0105AL
	3	G1/4	
	1, 2	SAE 10, 7/8-14	SB-R3-0106AL
	3	SAE 6, 9/16-18	
Steel	1, 2	G1/2	SB-R3-0105ST
	3	G1/4	
	1, 2	SAE 10, 7/8-14	SB-R3-0106ST
	3	SAE 6, 9/16-18	





Dual body without valve			
Material	**Ports**	**Port size**	**Type code**
Aluminium	C1, C2, V1, V2	G1/2	SB-R4-0205AL
	C1, C2, V1, V2	SAE 10, 7/8-14	SB-R4-0206AL
Steel	C1, C2, V1, V2	G1/2	SB-R4-0205ST
	C1, C2, V1, V2	SAE 10, 7/8-14	SB-R4-0206ST

The use of aluminium bodies is limited to a maximum operating pressure of 210 bar.

Spare Parts

Seal kits on request.

Caution!

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Overcentre Valve
Zero Differential

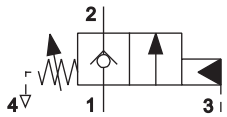
SOZD5A-R4/I

M27 x 1,5 • p_{max} 350 bar • Q 90 L/min

HA 5210
9/2006

Replaces
HA 5210 8/2005

- ❑ **The valve prevents runaway in the event of a negative load**
- ❑ **Smooth and continuous motion by maintaining a constant back pressure**
- ❑ **Load-holding with minimal leakage**
- ❑ **When installed into the actuator the valve can be used as a hose burst valve**
- ❑ **The valve should be mounted as close as possible to the actuator**



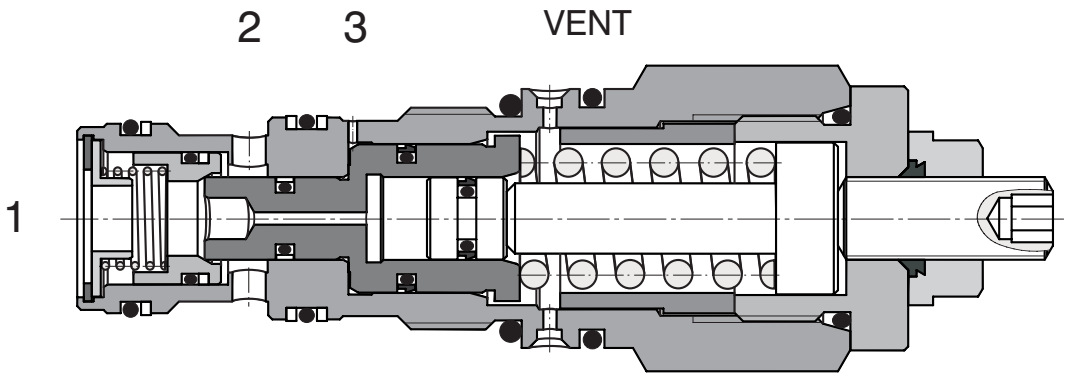
Functional Description

The valve consists of a seat relief valve fitted with an auxiliary control and by-pass single-way valve serving for reverse direction of flow. The liquid is flowing through the single-way valve from the channel (2) to the channel (1) with a small pressure drop. In the opposite direction the single-way valve on the rear side of which a gate valve seat is fitted is pressed through the action of a spring and the load pressure against the spring-loaded valve gate valve. In this way the valve is nearly closed hermetically. For ensuring the function of holding the load the spring force should be set up to a value by 30 % higher when compared to an expected pressure exerted by the load. If a load pressure caused by the action of the force on the consumer or in consequence of the liquid thermal dilatation exceeds a set up value of the spring force the gate valve is pressed out of the seat and the overpressure in that case is relieved from channel (1) to channel (2).
If the load has to be moved in opposite direction from the other connection of the consumer being in that case under pressure it is possible to ensure it with the help of so called auxiliary control from the channel (3) by introducing already certain control pressure.

The control pressure is calculated in the following way:
Control pressure = set up pressure – load pressure.

The necessary control pressure for opening the valve corresponds to the difference between the set up pressure and load pressure. In the formula as mentioned above it is necessary to take into consideration that in differential cylinders it is necessary to take into consideration the relation of surfaces of the cylinder piston in the direction of movement.
As soon as the control pressure attains a necessary value the gate valve is moved out from the seat and then the way from the channel (1) to the channel (2) is released.
If now the load tries to accelerate and be fast as for the oil supply the supply pressure decreases, therefore, also the control pressure in the channel (3) is reduced. The spring force tries to shut off the valve again, therefore, in consequence of which the supply flow to the consumer is reduced and the inlet pressure increases again. In this way it is ensured a constant inlet pressure by means of which it would be possible to control the movement of the load.

As for appropriate basic surface finish the external parts are zinc coated.



Ordering Code

SOZD5A-R4/I [ ] [ ]

Overcentre valve
Zero Differential

Preassare range
5 - 20 bar **2**

NBR

No designation

Factory setting 10 bar for Q=4.8 L/min

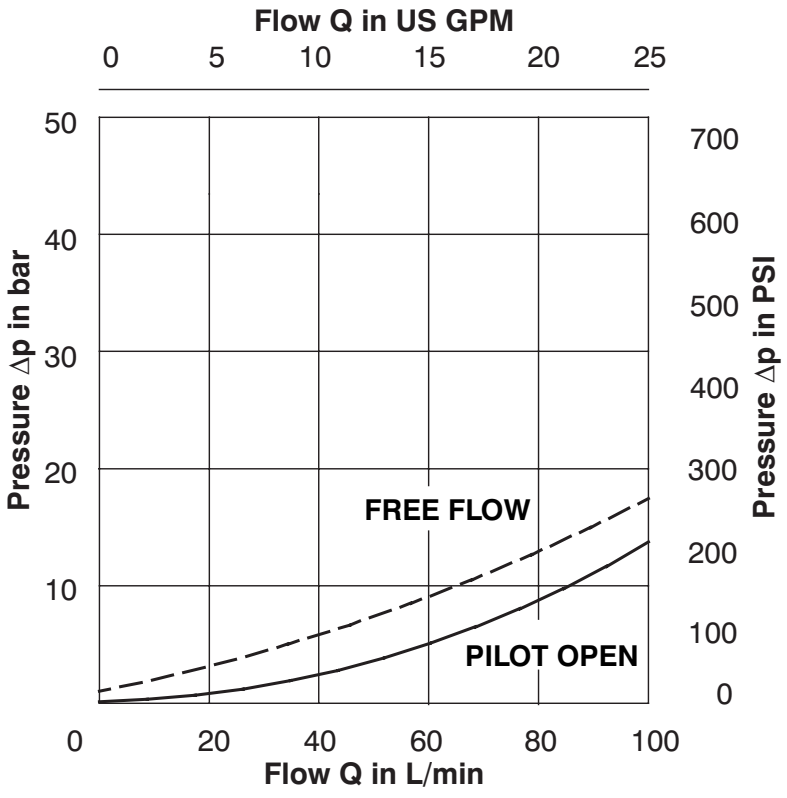
Technical Data

Figures based on: Oil Temp = 40 °C / Viscosity = 40 mm^2/s

Cavity		M27 x 1.5
Maximum flow	L/min	90
Max. pressure	bar	350
Max. input pressure	bar	5 - 20
Pressure drops	bar	see Δp - Q characteristics
Hydraulic fluid		Hydraulic oil (HM, HV) according to DIN 51254
Fluid temperature range	°C	-20 to +80
Ambient temperature	°C	-20 to +80
Viscosity	mm^2/s	10 to 500
Maximum degree of fluid contamination		according to ISO 4406 (1999), Class 21/18/15
Weight	kg	0,29
Maximum valve tightening torque in valve body or in control block	Nm	60^{+2}
Mounting position		any

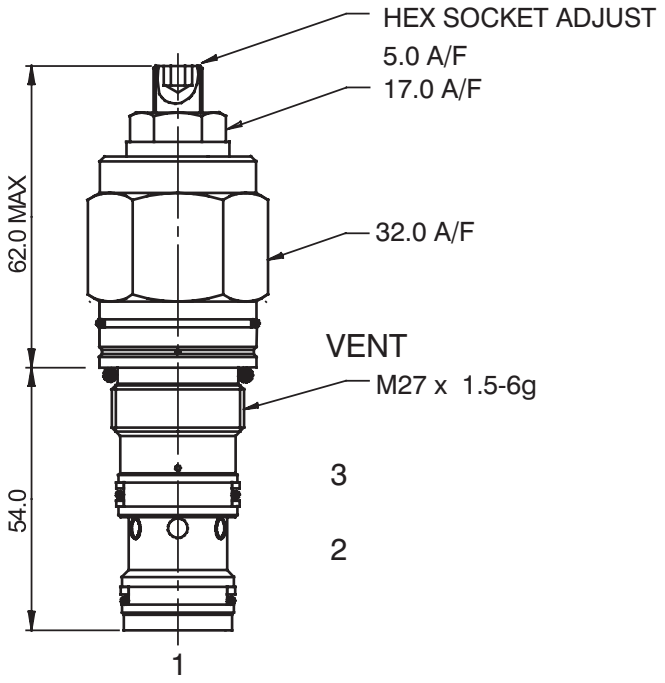
Δp-Q Characteristics

characteristics determined at ν = 35 mm^2/s and t = 40 °C



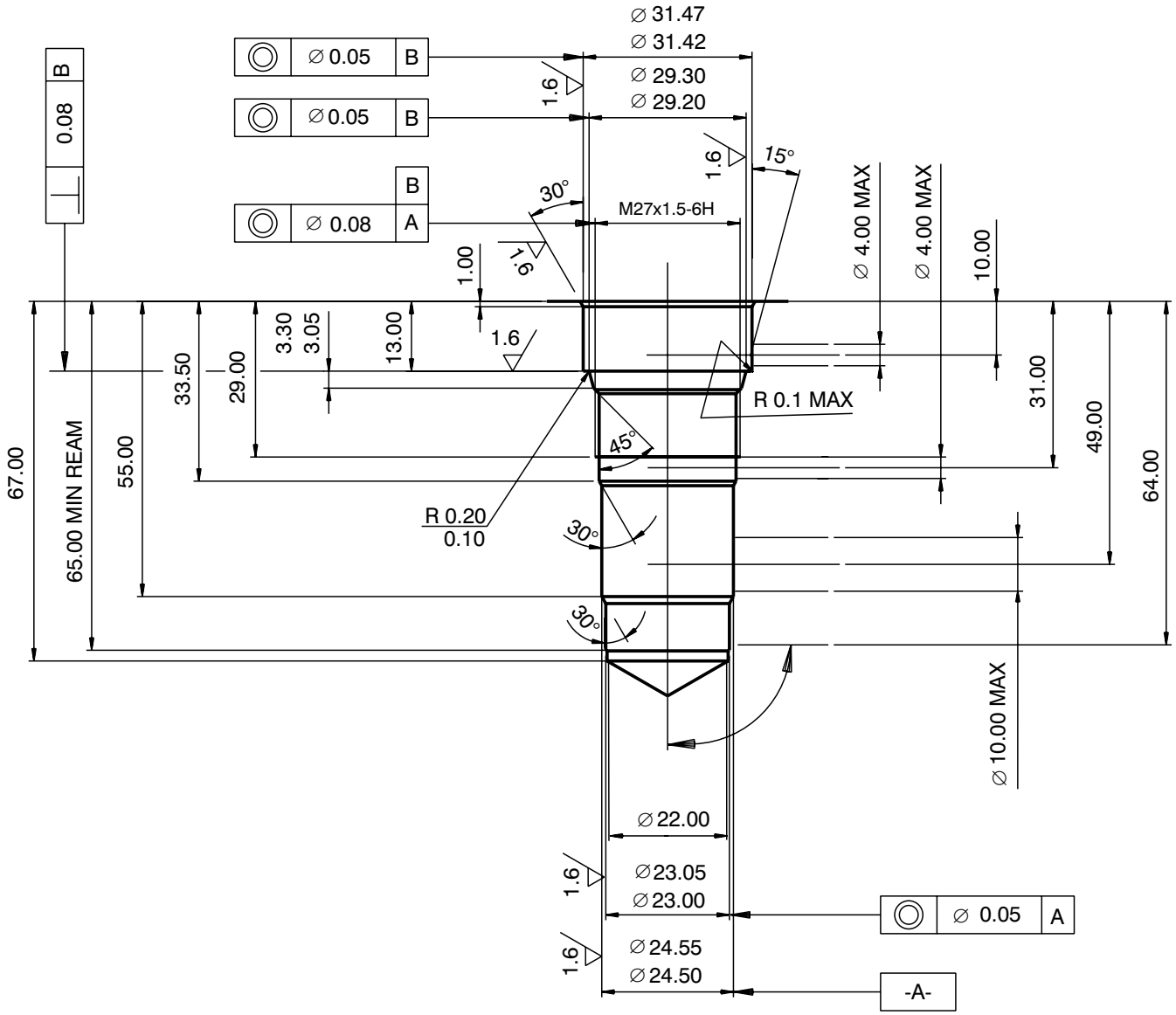
Dimensions

Measurements in millimeters



Cavity

Measurements in millimeters



Spare Parts

Seal kits on request.

Caution!

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Overcentre Valve

Fully Balanced

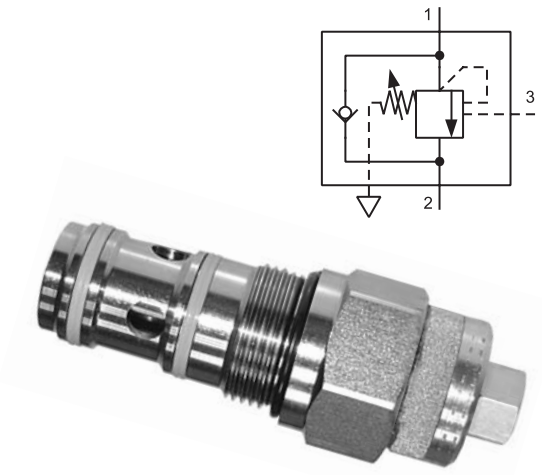
SOB5A-S3/I

1-5/16-12 UN-2A • p_{max} 350 bar • Q 120 L/min

HA 5211
9/2006

Replaces
HA 5211 8/2005

- **The valve prevents runaway in the event of a negative load**
- **Load-holding without leakage**
- **With pressure relief function protecting the actuator against overload and pressure peaks**
- **When installed into the actuator the valve can be used as a hose burst valve**
- **When used as pressure relief the check valve will act as an anti-cavitation valve**
- **Relief setting is unaffected by back pressure**
- **The valve should be mounted as close as possible to the actuator**



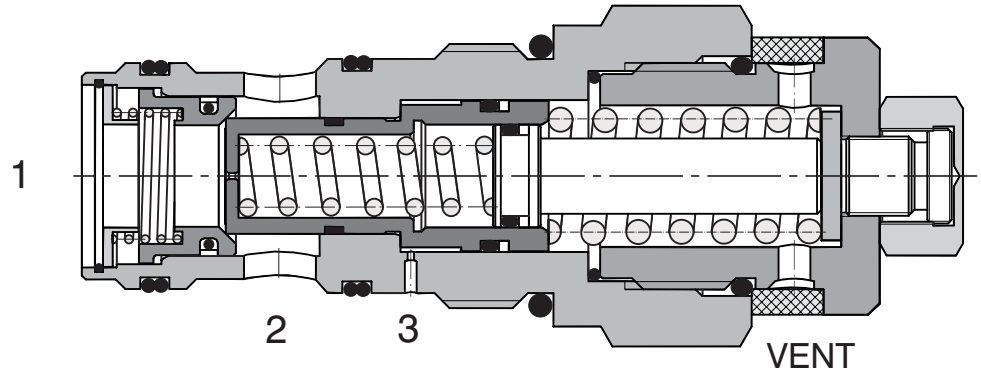
Functional Description

The valve consists of a seat by-pass, relief valve fitted with an auxiliary control with a differential piston and by-pass single-way valve serving for reverse direction of flow. The liquid is flowing through the single-way valve from the channel (2) to the channel (1) with a small pressure drop. In the opposite direction the single-way valve on the rear side of which a gate valve seat is fitted is pressed through the action of a spring and the load pressure against the spring-loaded valve gate valve. In this way the valve is nearly closed hermetically. If the pressure in the channel (1) exceeds a set up value of the spring force the gate valve is pressed out of the seat and the overpressure in that case is relieved into channel (2). For ensuring the function of holding the load the spring force should be set up to a value by 30 % higher when compared to an expected pressure exerted by the load. If the load has to be moved it is possible to ensure it with the help of so called auxiliary control from the channel (3) by introducing already certain control pressure.
The control pressure is calculated in the following way:

$$\text{Control pressure} = \frac{\text{set up pressure} - \text{load pressure}}{\text{ratio of control}}$$

The ratio of control designates a ratio of surfaces of the differential slide valve cross-section area and its seat. Therefore, the necessary control pressure for opening the valve does not correspond to the difference between the set up pressure and load pressure however; it corresponds to the ratio of this difference and the control ratio. In the formula as mentioned above it is necessary to take into consideration that in differential cylinders it is necessary to add to the control ratio also the appropriate ratio of piston surfaces in the direction of movement.
As soon as the control pressure attains a necessary value the differential gate valve is moved out from the seat and then the way from the channel (1) to the channel (2) is released. If now the load tries to accelerate and be fast as for the oil supply the supply pressure decreases, therefore, also the control pressure in the channel (3) is decreased. The spring force tries to shut off the valve again, therefore, in consequence of which the flow from the consumer decreases and the inlet pressure to the consumer increases again. In this way it is ensured a constant inlet pressure by means of which the movement of the load can be controlled.
Dynamic pressures in the outlet do not influence the set up value thanks to a special arrangement of the slide valve. However, it is necessary to take care of the fact the control channel is independent on the dynamic pressure.

As for appropriate basic surface finish the external parts are zinc coated.



Ordering Code

SOB5A-S3/I [ ] [ ]

Overcentre valve
Fully Balanced

Preassare range
Standard 3:1 **3**

NBR **No designation**

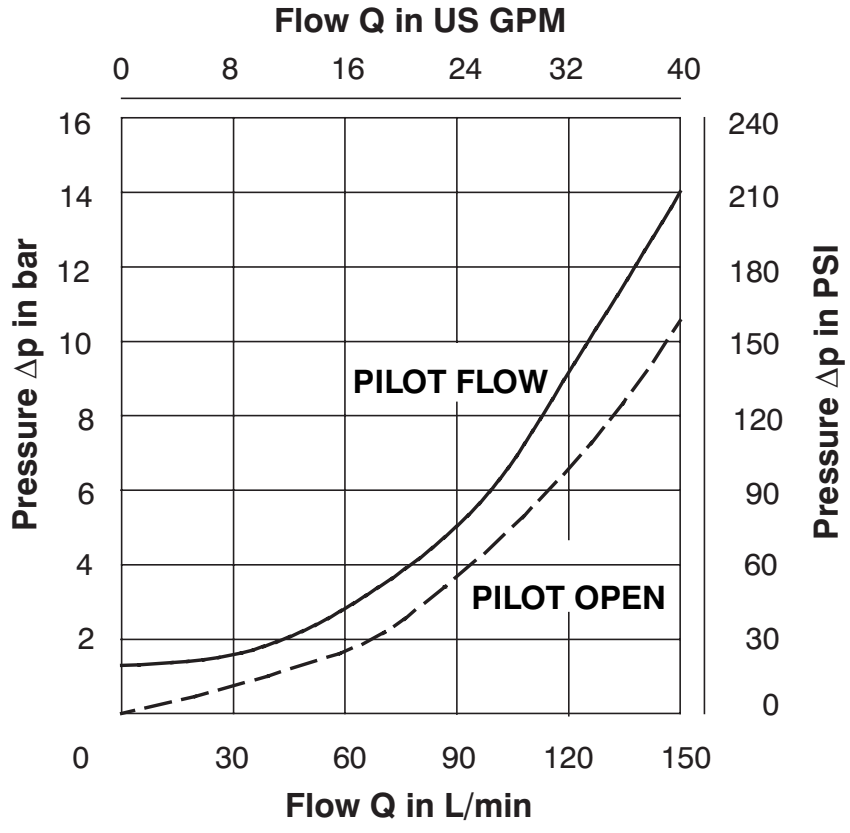
Technical Data

Figures based on: Oil Temp = 40 °C / Viscosity = 40 mm^2/s

Cavity		1-5/16-12 UN-2A
Maximum flow	L/min	120
Max. pressure	bar	270
Max. input pressure	bar	350
Pressure drops	bar	see Δp - Q characteristics
Hydraulic fluid		Hydraulic oil (HM, HV) according to DIN 51254
Fluid temperature range	°C	-20 to +80
Ambient temperature	°C	-20 to +80
Viscosity	mm^2/s	10 to 500
Maximum degree of fluid contamination		according to ISO 4406 (1999), Class 21/18/15
Weight	kg	0,59
Maximum valve tightening torque in valve body or in control block	Nm	100^{+2}
Mounting position		any

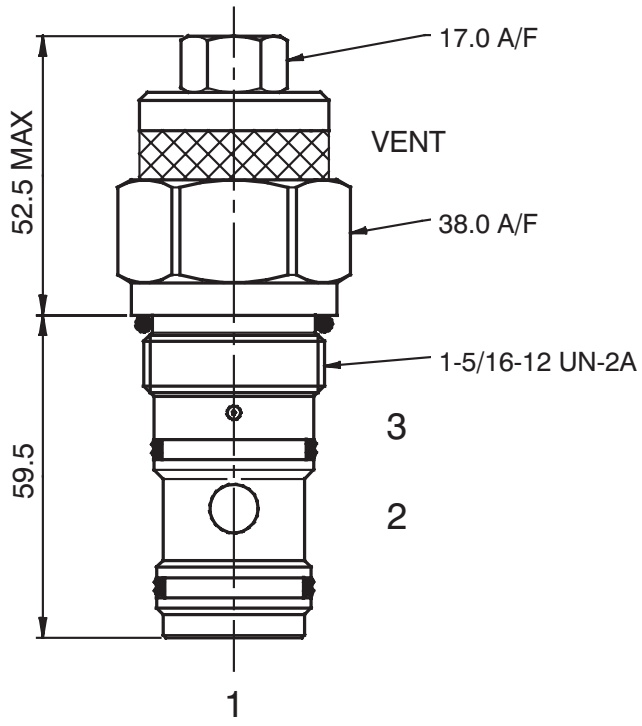
Δp-Q Characteristics

characteristics determined at ν = 35 mm^2/s and t = 40 °C



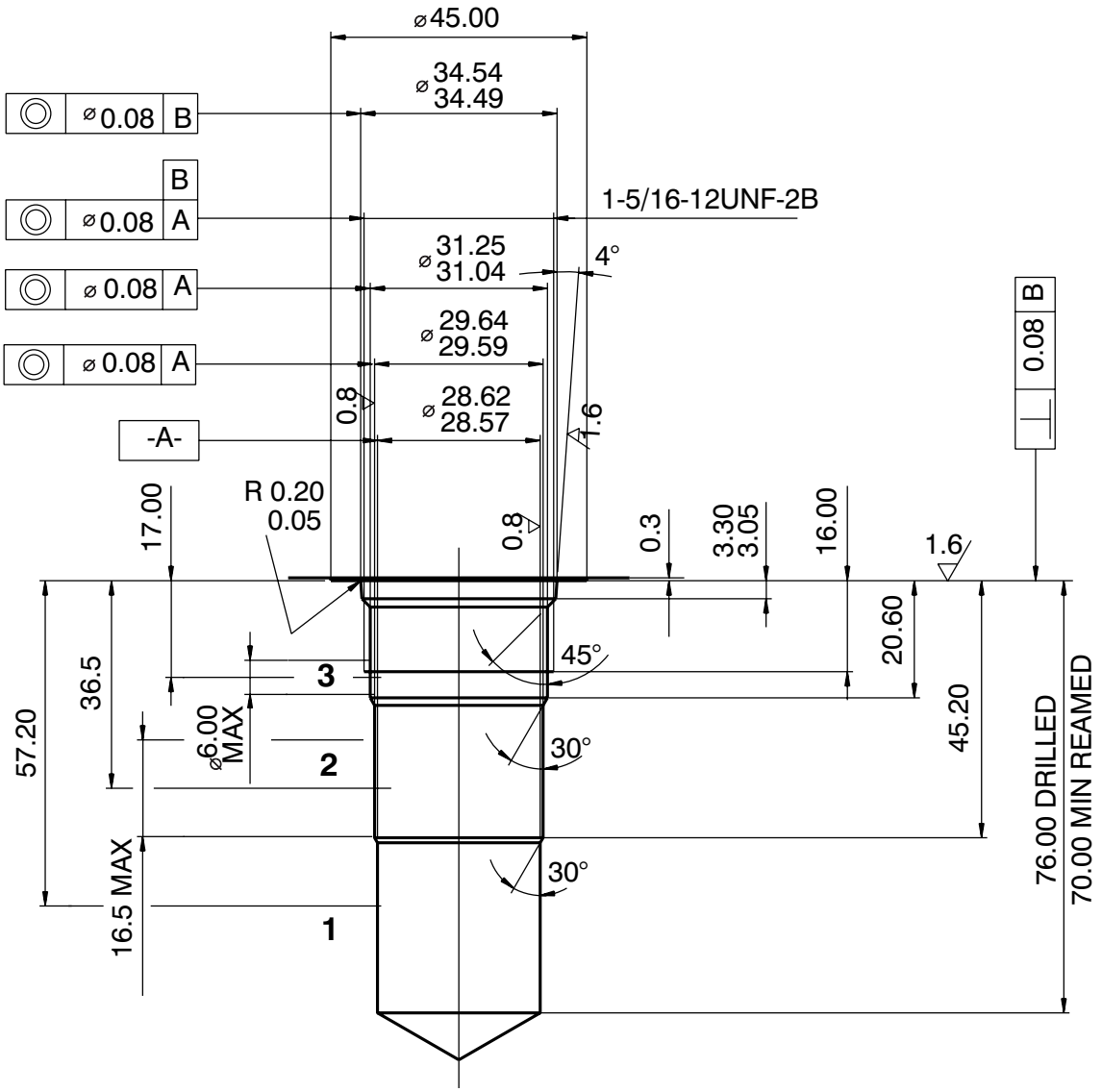
Dimensions

Measurements in millimeters



Cavity

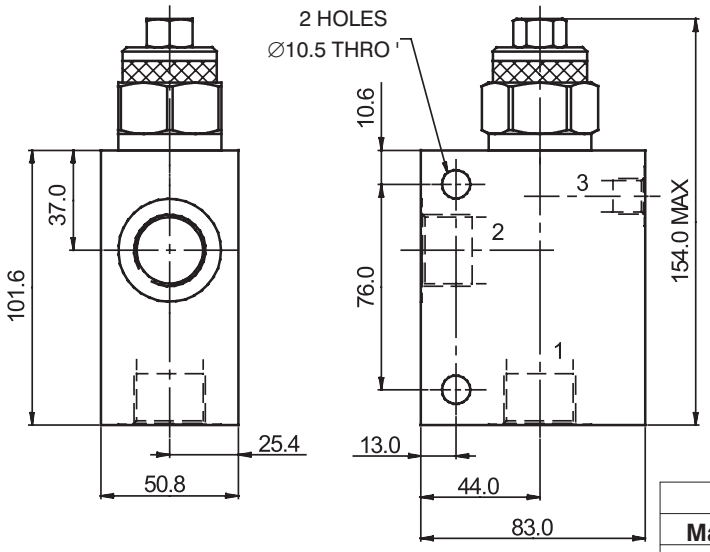
Measurements in millimeters



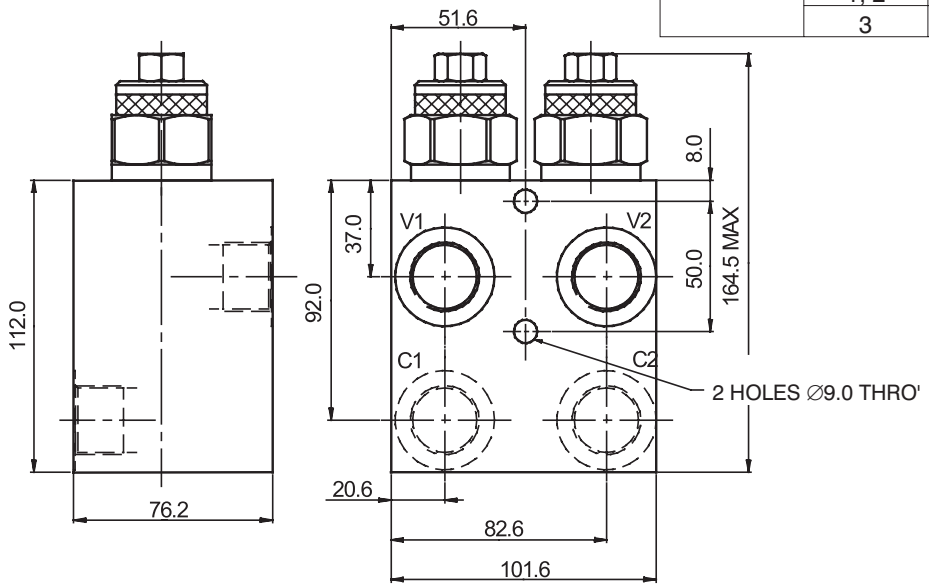
Valve Bodies

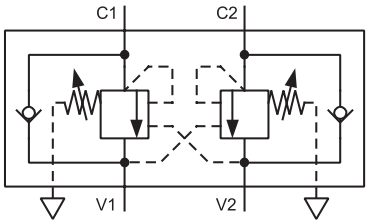
Measurements in millimeters

ISO A



Body without valve			
Material	**Ports**	**Port size**	**Type code**
Aluminium	1, 2	G3/4	SB-S3-0107AL
	3	G1/4	
	1, 2	SAE 12,1-1/16-12	SB-S3-0108AL
	3	SAE 6, 9/16-18	
Steel	1, 2	G3/4	SB-S3-0107ST
	3	G1/4	
	1, 2	SAE 12,1-1/16-12	SB-S3-0108ST
	3	SAE 6, 9/16-18	





Dual body without valve			
Material	**Ports**	**Port size**	**Type code**
Aluminium	C1, C2, V1, V2	G3/4	SB-S4-0207AL
	C1, C2, V1, V2	SAE 12,1-1/16-12	SB-S4-0208AL
Steel	C1, C2, V1, V2	G3/4	SB-S4-0207ST
	C1, C2, V1, V2	SAE 12,1-1/16-12	SB-S4-0208ST

The use of aluminium bodies is limited to a maximum operating pressure of 210 bar.

Spare Parts

Seal kits on request.

Caution!

- The packing foil is recyclable.
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ARGO HYTOS

Overcentre Valve

Fully Balanced

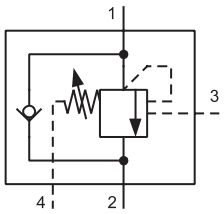
SOBD5A-S4/I

1-5/16-12 UN-2A • p_{max} 400 bar • Q 180 L/min

HA 5212
9/2006

Replaces
HA 5212 8/2005

- ❑ **The valve prevents runaway in the event of a negative load**
- ❑ **Load-holding without leakage**
- ❑ **Pressure relief function protecting the actuator against overload and pressure peaks**
- ❑ **When installed into the actuator the valve can be used as a hose burst valve**
- ❑ **When used as pressure relief the check valve will act as an anti-cavitation valve**
- ❑ **Relief setting is unaffected by back pressure**
- ❑ **The valve should be mounted as close as possible to the actuator**



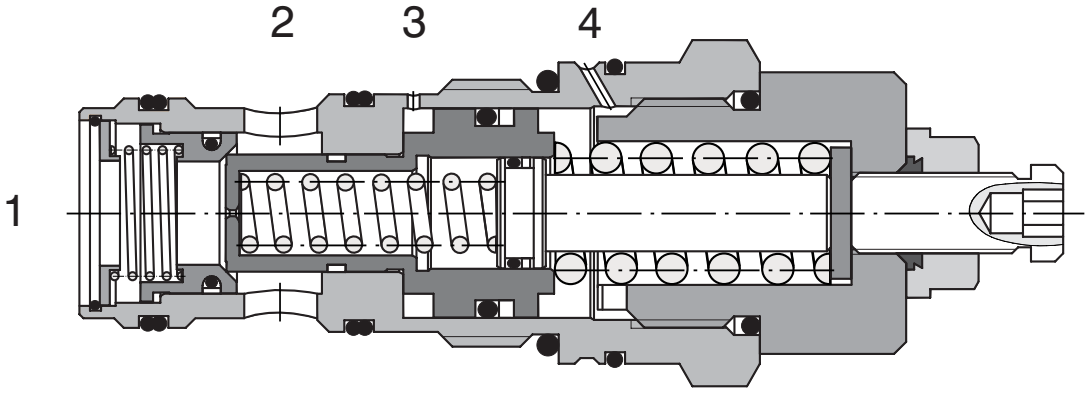
Functional Description

The valve consists of a seat by-pass, relief valve fitted with an auxiliary control with a differential piston and by-pass single-way valve serving for reverse direction of flow. The liquid is flowing through the single-way valve from the channel (2) to the channel (1) with a small pressure drop. In the opposite direction the single-way valve on the rear side of which a gate valve seat is fitted is pressed through the action of a spring and the load pressure against the spring-loaded valve gate valve. In this way the valve is nearly closed hermetically. If the pressure in the channel (1) exceeds a set up value of the spring force the gate valve is pressed out of the seat and the overpressure in that case is relieved into channel (2). For ensuring the function of holding the load the spring force should be set up to a value by 30 % higher when compared to an expected pressure exerted by the load. If the load has to be moved it is possible to ensure it with the help of so called auxiliary control from the channel (3) by introducing already certain control pressure.
The control pressure is calculated in the following way:

$$\text{Control pressure} = \frac{\text{set up pressure} - \text{load pressure}}{\text{ratio of control}}$$

The ratio of control designates a ratio of surfaces of the differential slide valve cross-section area and its seat. Therefore, the necessary control pressure for opening the valve does not correspond to the difference between the set up pressure and load pressure however; it corresponds to the ratio of this difference and the control ratio. In the formula as mentioned above it is necessary to take into consideration that in differential cylinders it is necessary to add to the control ratio also the appropriate ratio of piston surfaces in the direction of movement.
As soon as the control pressure attains a necessary value the differential gate valve is moved out from the seat and then the way from the channel (1) to the channel (2) is released. If now the load tries to accelerate and be fast as for the oil supply the supply pressure decreases, therefore, also the control pressure in the channel (3) is decreased. The spring force tries to shut off the valve again, therefore, in consequence of which the flow from the consumer decreases and the inlet pressure to the consumer increases again. In this way it is ensured a constant inlet pressure by means of which the movement of the load can be controlled.
Dynamic pressures in the outlet do not influence the set up value thanks to a special arrangement of the slide valve. However, it is necessary to take care of the fact the control channel is independent on the dynamic pressure.

As for appropriate basic surface finish the external parts are zinc coated.



Ordering Code

SOBD5A-S3/I [ ] [ ]

Overcentre valve
Fully Balanced

Preassare range
Standard 8:1 **8**

NBR **No designation**

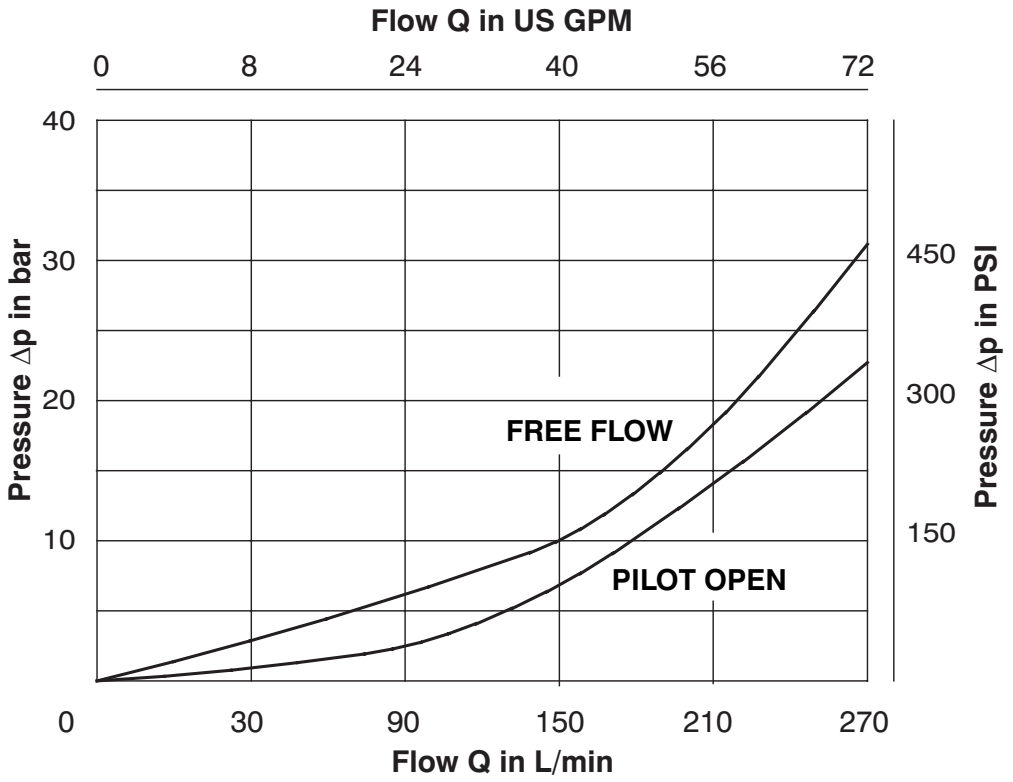
Technical Data

Figures based on: Oil Temp = 40 °C / Viscosity = 40 mm^2/s

Cavity		1-5/16-12 UN-2A
Maximum flow	L/min	180
Max. pressure	bar	270
Max. input pressure	bar	400
Pressure drops	bar	see Δp - Q characteristics
Hydraulic fluid		Hydraulic oil (HM, HV) according to DIN 51254
Fluid temperature range	°C	-20 to +80
Ambient temperature	°C	-20 to +80
Viscosity	mm^2/s	10 to 500
Maximum degree of fluid contamination		according to ISO 4406 (1999), Class 21/18/15
Weight	kg	0,59
Maximum valve tightening torque in valve body or in control block	Nm	100^{+2}
Mounting position		any

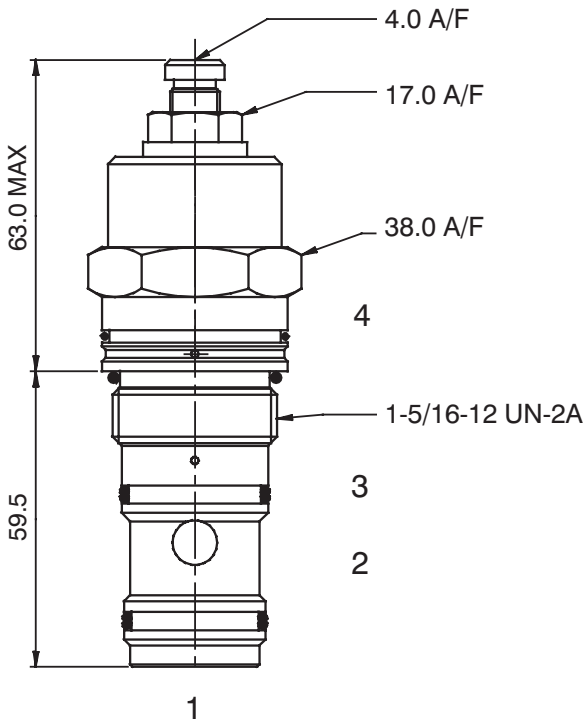
Δp-Q Characteristics

characteristics determined at ν = 35 mm^2/s and t = 40 °C



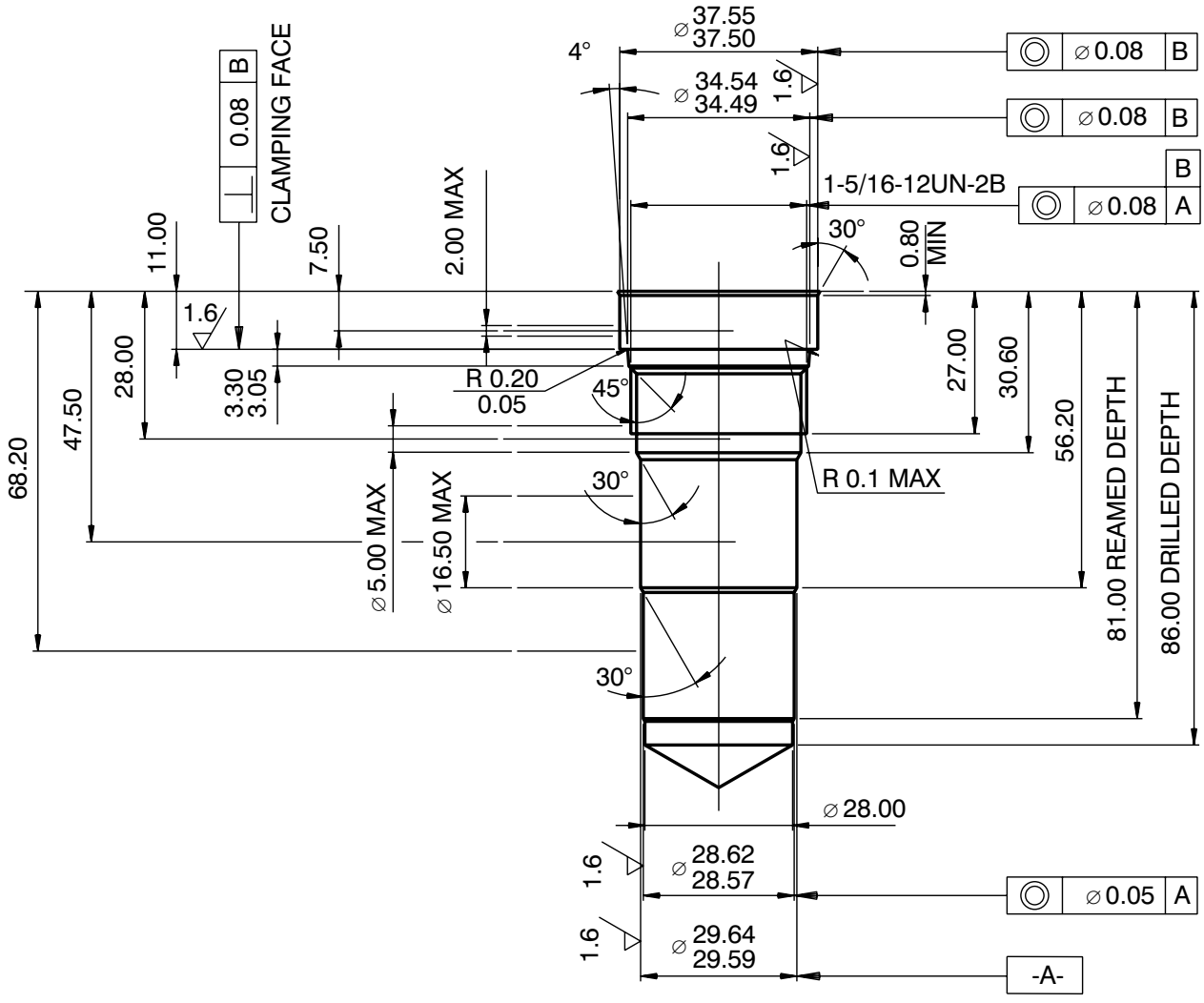
Dimensions

Measurements in millimeters



Cavity

Measurements in millimeters



Spare Parts

Seal kits on request.

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Overcentre Valve
Zero Differential

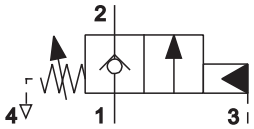
SOZD5A-S4/I

1-5/16-12 UN-2A • p_{max} 400 bar • Q 180 L/min

HA 5213
9/2006

Replaces
HA 5213 8/2005

- ❑ **The valve prevents runaway in the event of a negative load**
- ❑ **Smooth and continuous motion by maintaining a constant back pressure**
- ❑ **Load-holding without leakage**
- ❑ **When installed into the actuator the valve can be used as a hose burst valve**
- ❑ **The valve should be mounted as close as possible to the actuator**

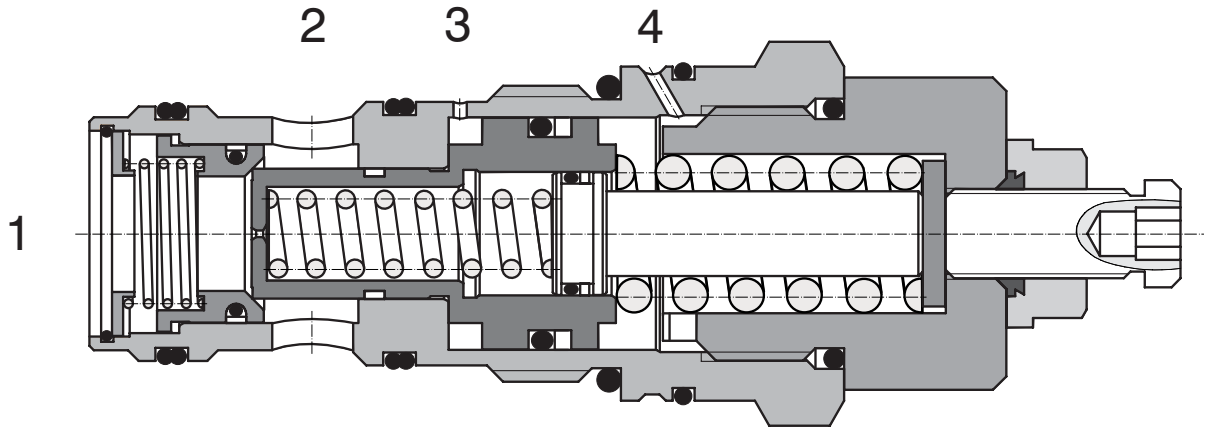


Functional Description

The valve consists of a seat relief valve fitted with an auxiliary control and by-pass single-way valve serving for reverse direction of flow. The liquid is flowing through the single-way valve from the channel (2) to the channel (1) with a small pressure drop. In the opposite direction the single-way valve on the rear side of which a gate valve seat is fitted is pressed through the action of a spring and the load pressure against the spring-loaded valve gate valve. In this way the valve is nearly closed hermetically. For ensuring the function of holding the load the spring force should be set up to a value by 30 % higher when compared to an expected pressure exerted by the load. If a load pressure caused by the action of the force on the consumer or in consequence of the liquid thermal dilatation exceeds a set up value of the spring force the gate valve is pressed out of the seat and the overpressure in that case is relieved from channel (1) to channel (2).
If the load has to be moved in opposite direction from the other connection of the consumer being in that case under pressure it is possible to ensure it with the help o so called auxiliary control from the channel (3) by introducing already certain control pressure.
The control pressure is calculated in the following way:

Control pressure = set up pressure – load pressure

The necessary control pressure for opening the valve corresponds to the difference between the set up pressure and load pressure. In the formula as mentioned above it is necessary to take into consideration that in differential cylinders it is necessary to take into consideration the relation of surfaces of the cylinder piston in the direction of movement.
As soon as the control pressure attains a necessary value the gate valve is moved out from the seat and then the way from the channel (1) to the channel (2) is released.
If now the load tries to accelerate and be fast as for the oil supply the supply pressure decreases, therefore, also the control pressure in the channel (3) is reduced. The spring force tries to shut off the valve again, therefore, in consequence of which the supply flow to the consumer is reduced and the inlet pressure increases again. In this way it is ensured a constant inlet pressure by means of which it would be possible to control the movement of the load.
As for appropriate basic surface finish the external parts are zinc coated..



Ordering Code

SOZD5A-S4/I [ ] [ ]

Overcentre valve
zero differential

Adjustable pressure
5 - 20 bar **2**

Factory setting 10 bar for Q=4.8L/min

NBR **No designation**

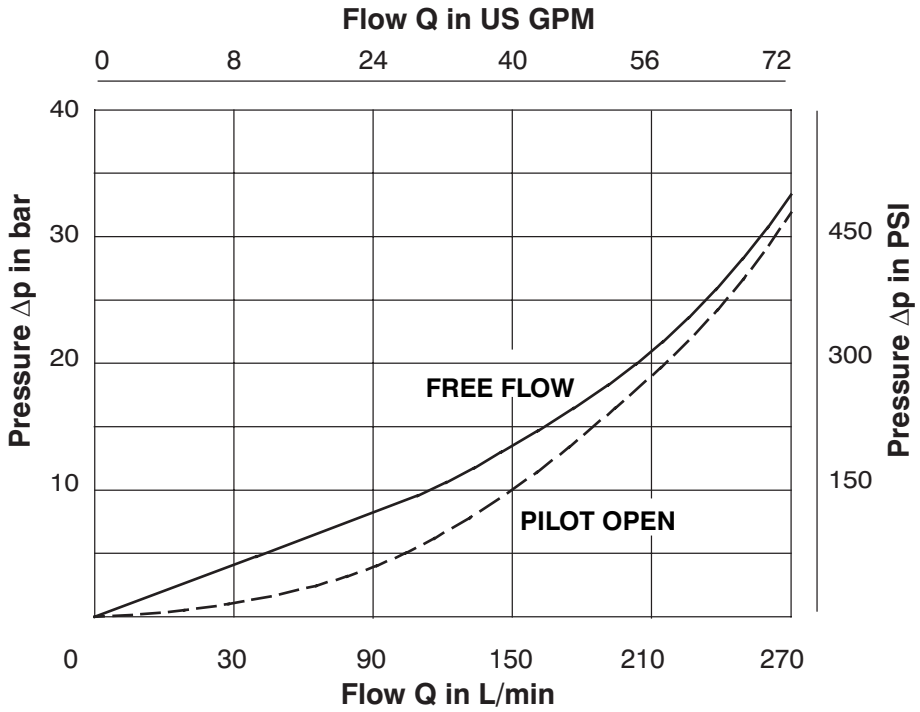
Technical Data

Figures based on: Oil Temp = 40 °C / Viscosity = 40 mm^2/s

Cavity		1-5/16-12 UN-2A
Maximum flow	L/min	180
Max. pressure	bar	400
Max. input pressure	bar	5-20
Pressure drops	bar	see Δp - Q characteristics
Hydraulic fluid		Hydraulic oil (HM, HV) according to DIN 51254
Fluid temperature range	°C	-20 to +80
Ambient temperature	°C	-20 to +80
Viscosity	mm^2/s	10 to 500
Maximum degree of fluid contamination		according to ISO 4406 (1999), Class 21/18/15
Weight	kg	0,59
Maximum valve tightening torque in valve body or in control block	Nm	100^{+2}
Mounting position		any

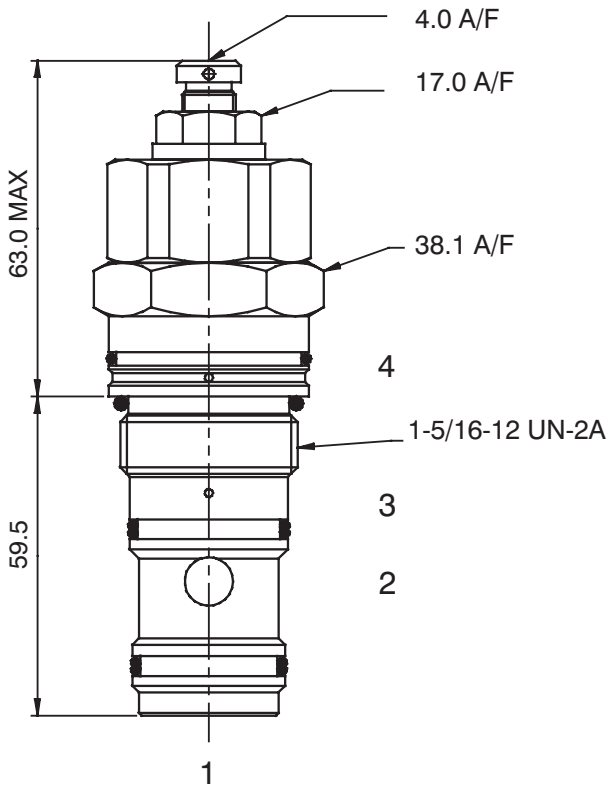
Δp-Q Characteristics

characteristics determined at n = 35 mm^2/s and t = 40 °C



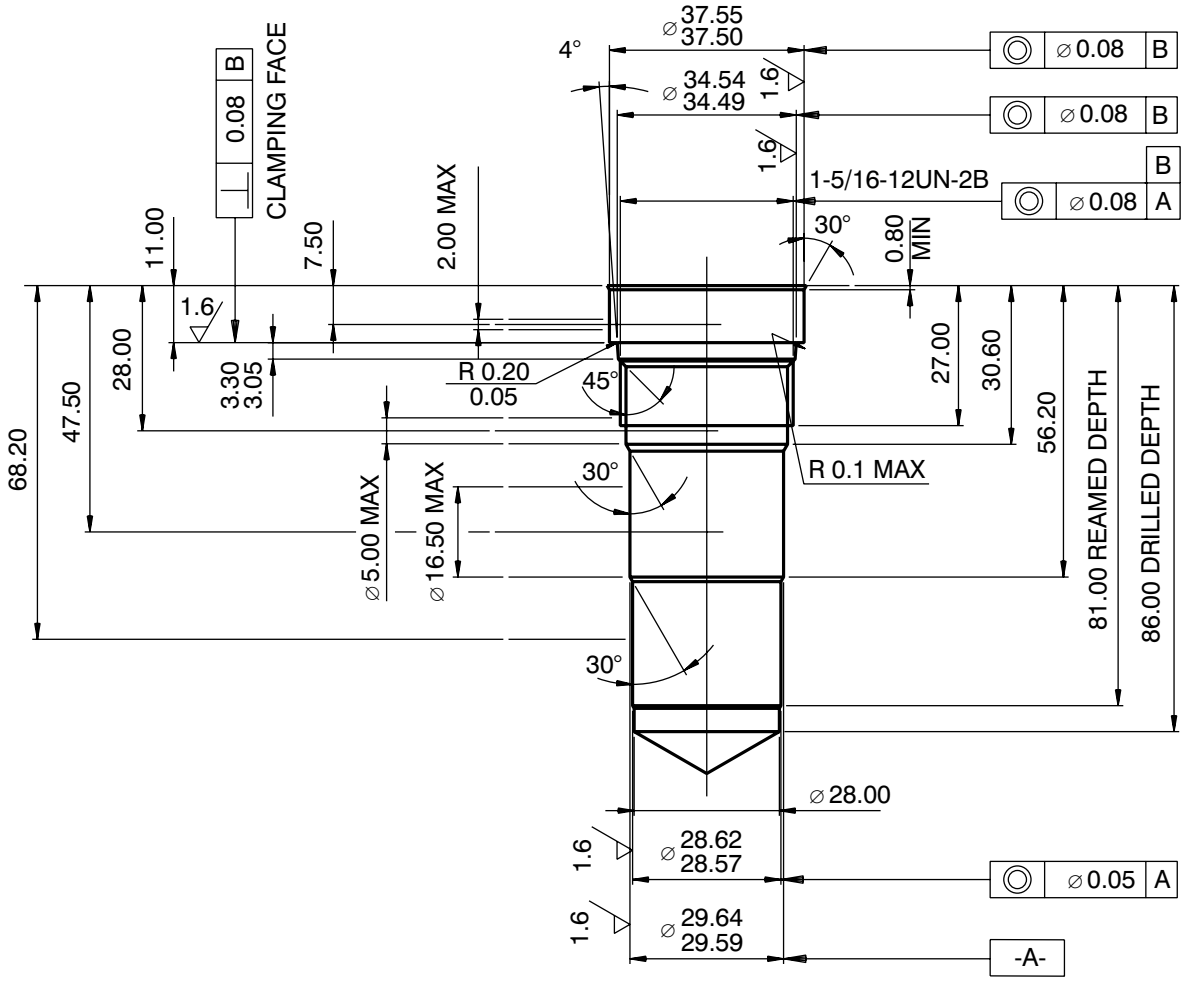
Dimensions

Measurements in millimeters



Cavity

Measurements in millimeters



Spare Parts

Seal kits on request.

Caution!

- The packing foil is recyclable.
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Overcentre Valve

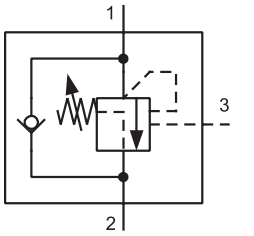
SO5A-T3/I

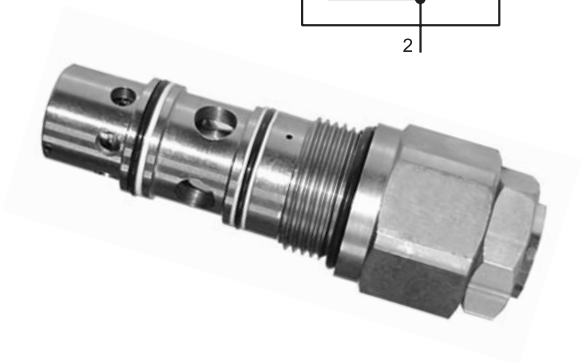
M38 x 2 • p_{max} 420 bar • Q 140 L/min

HA 5214
9/2006

Replaces
HA 5214 8/2005

- **The valve prevents runaway in the event of a negative load**
- **Load-holding without leakage**
- **Pressure relief function protecting the actuator against overload and pressure peaks**
- **When installed into the actuator the valve can be used as a hose burst valve**
- **When used as pressure relief the check valve will act as an anti-cavitation valve**
- **The valve should be mounted as close as possible to the actuator**



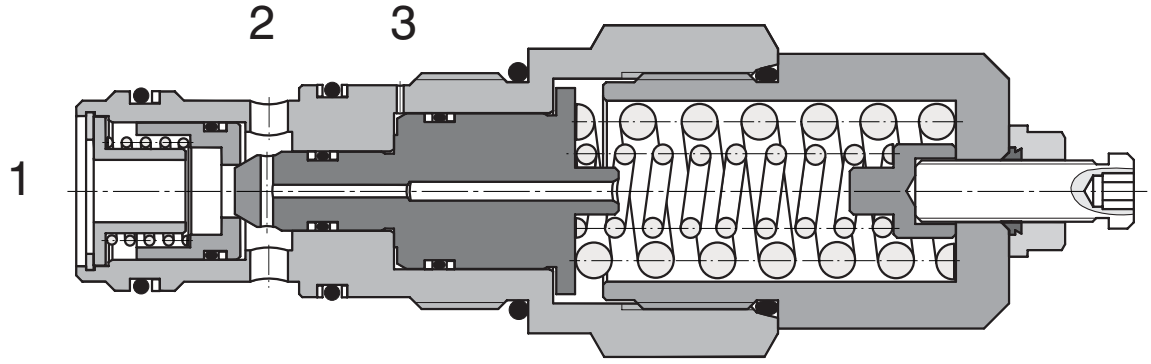


Functional Description

The valve consists of a seat by-pass, relief valve fitted with an auxiliary control with a differential piston and by-pass single-way valve serving for reverse direction of flow. The liquid is flowing through the single-way valve from the channel (2) to the channel (1) with a small pressure drop. In the opposite direction the single-way valve on the rear side of which a gate valve seat is fitted is pressed through the action of a spring and the load pressure against the spring-loaded valve gate valve. In this way the valve is nearly closed hermetically. If the pressure in the channel (1) exceeds a set up value of the spring force the gate valve is pressed out of the seat and the overpressure in that case is relieved into channel (2). For ensuring the function of holding the load the spring force should be set up to a value by 30 % higher when compared to an expected pressure exerted by the load.
If the load has to be moved it is possible to ensure it with the help of so called auxiliary control from the channel (3) by introducing already certain control pressure.
The control pressure is calculated in the following way:

$$\text{Control pressure} = \frac{\text{set up pressure} - \text{load pressure}}{\text{ratio of control}}$$

The ratio of control designates a ratio of surfaces of the differential slide valve cross-section area and its seat. Therefore, the necessary control pressure for opening the valve does not correspond to the difference between the set up pressure and load pressure however; it correspon ds to the ratio of this difference and the control ratio. In the formula as mentioned above it is necessary to take into consideration that in differential cylinders it is necessary to add to the control ratio also the appropriate ratio of piston surfaces in the direction of movement.
As soon as the control pressure attains a necessary value the differential gate valve is moved out from the seat and then the way from the channel (1) to the channel (2) is released. If now the load tries to accelerate and be fast as for the oil supply the supply pressure decreases, therefore, also the control pressure in the channel (3) is decreased. The spring force tries to shut off the valve again, therefore, in consequence of which the flow from the consumer decreases and the inlet pressure to the consumer increases again. In this way it is ensured a constant inlet pressure by means of which the movement of the load can be controlled.
As for appropriate basic surface finish the external parts are zinc coated.



Ordering Code

SO5A-T3/I □ □

Overcentre valve

Pilot ratio		
Standard	4:1	**4**
for relatively constant	6:1	**6**

NBR — **No designation**

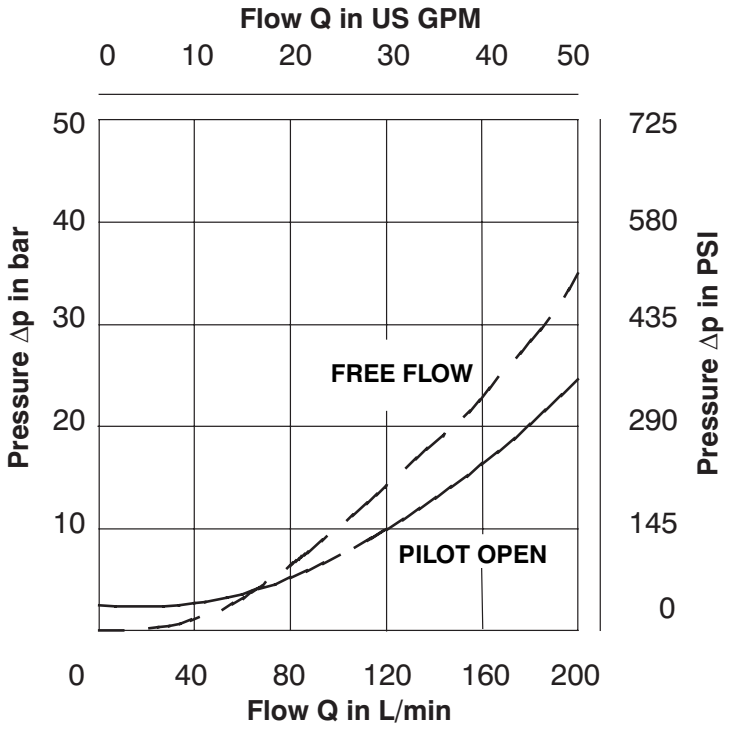
Technical Data

Figures based on: Oil Temp = 40 °C / Viscosity = 40 mm^2/s

Cavity		M38 x 2
Maximum flow	L/min	140
Max. pressure	bar	340
Max. input pressure	bar	420
Pressure drops	bar	see Δp - Q characteristics
Hydraulic fluid		Hydraulic oil (HM, HV) according to DIN 51254
Fluid temperature range	°C	-20 to +80
Ambient temperature	°C	-20 to +80
Viscosity	mm^2/s	10 to 500
Maximum degree of fluid contamination		according to ISO 4406 (1999), Class 21/18/15
Weight	kg	1.20
Maximum valve tightening torque in valve body or in control block	Nm	150^{+2}
Mounting position		any

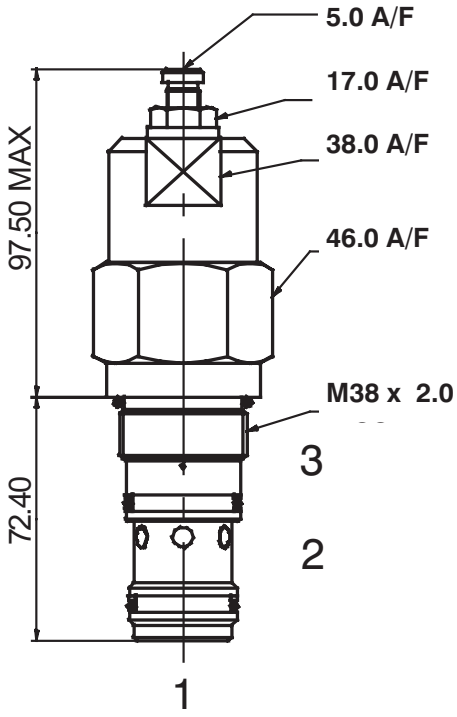
Δp-Q Characteristics

characteristics determined at n = 35 mm^2/s and t = 40 °C



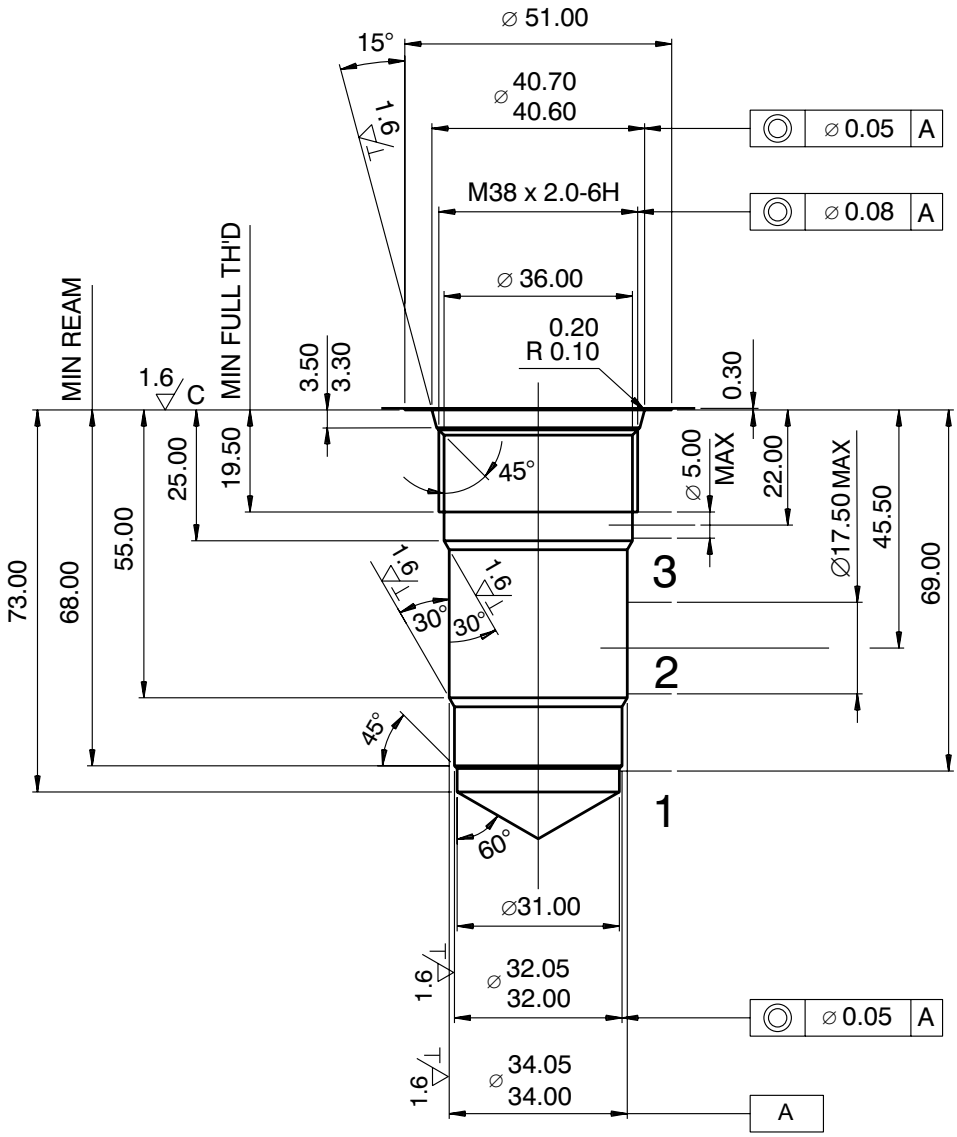
Dimensions

Measurements in millimeters



Cavity

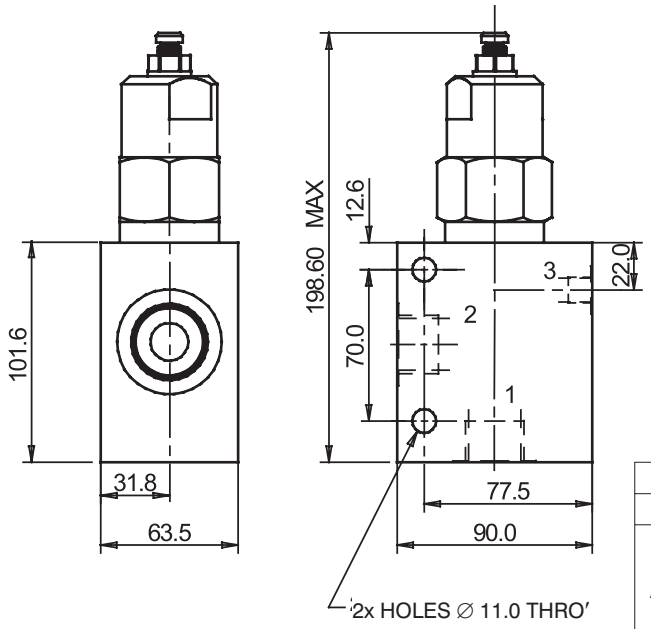
Measurements in millimeters



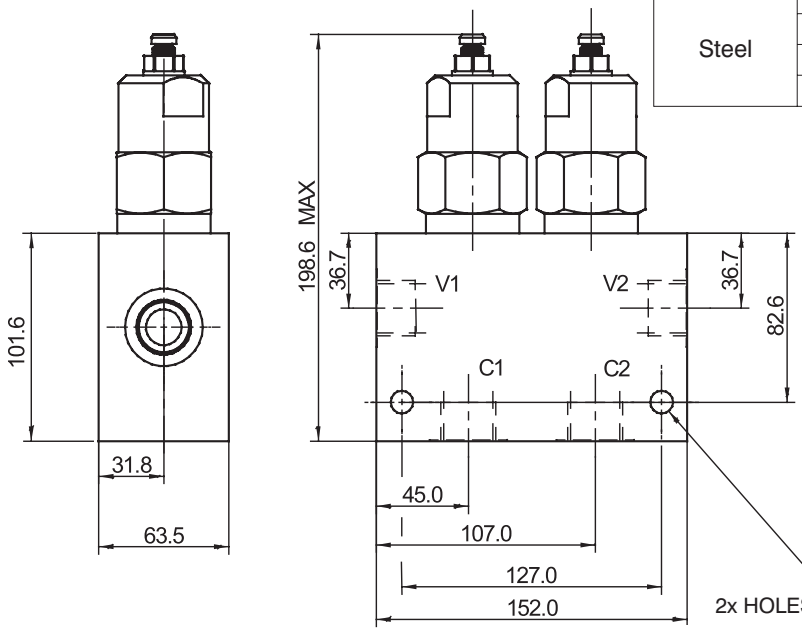
Valve Bodies

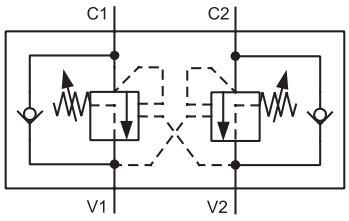
Measurements in millimeters

ISO A



Body without valve			
Material	**Ports**	**Port size**	**Type code**
Aluminium	1, 2	G1"	SB-T3-0109AL
	3	G1/4	
	1, 2	SAE 16, 1-5/16-12	SB-T3-0110AL
	3	SAE 6, 9/16-18	
Steel	1, 2	G1"	SB-T3-0109ST
	3	G1/4	
	1, 2	SAE 16, 1-5/16-12	SB-T3-0110ST
	3	SAE 6, 9/16-18	





Dual body without valve			
Material	**Ports**	**Port size**	**Type code**
Aluminium	C1, C2, V1, V2	G1"	SB-T4-0209AL
	C1, C2, V1, V2	SAE 16, 1-5/16-12	SB-T4-0210AL
Steel	C1, C2, V1, V2	G1"	SB-T4-0209ST
	C1, C2, V1, V2	SAE 16, 1-5/16-12	SB-T4-0210ST

The use of aluminium bodies is limited to a maximum operating pressure of 210 bar.

Spare Parts

Seal kits on request.

Caution!

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Overcentre Valve

Part Balanced

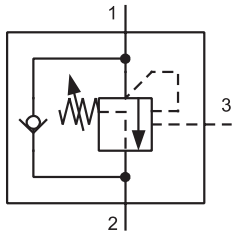
M38 x 2 • p_{max} 420 bar • Q 140 L/min

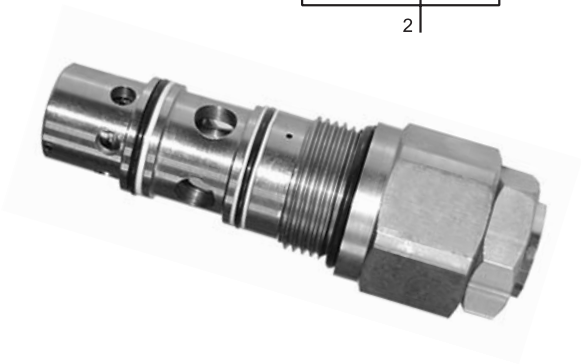
SOP5A-T3/I

HA 5215
9/2006

Replaces
HA 5215 8/2005

- **The valve prevents runaway in the event of a negative load**
- **Load-holding without leakage**
- **Pressure relief function protecting the actuator against overload and pressure peaks**
- **When installed into the actuator the valve can be used as a hose burst valve**
- **When used as pressure relief the check valve will act as an anti-cavitation valve**
- **Relief setting is unaffected by back pressure**
- **The valve should be mounted as close as possible to the actuator**





Functional Description

The valve consists of a seat by-pass, relief valve fitted with an auxiliary control with a differential piston and by-pass single-way valve serving for reverse direction of flow. The liquid is flowing through the single-way valve from the channel (2) to the channel (1) with a small pressure drop. In the opposite direction the single-way valve on the rear side of which a gate valve seat is fitted is pressed through the action of a spring and the load pressure against the spring-loaded valve gate valve. In this way the valve is nearly closed hermetically. If the pressure in the channel (1) exceeds a set up value of the spring force the gate valve is pressed out of the seat and the overpressure in that case is relieved into channel (2). For ensuring the function of holding the load the spring force should be set up to a value by 30 % higher when compared to an expected pressure exerted by the load.

If the load has to be moved it is possible to ensure it with the help of so called auxiliary control from the channel (3) by introducing already certain control pressure.

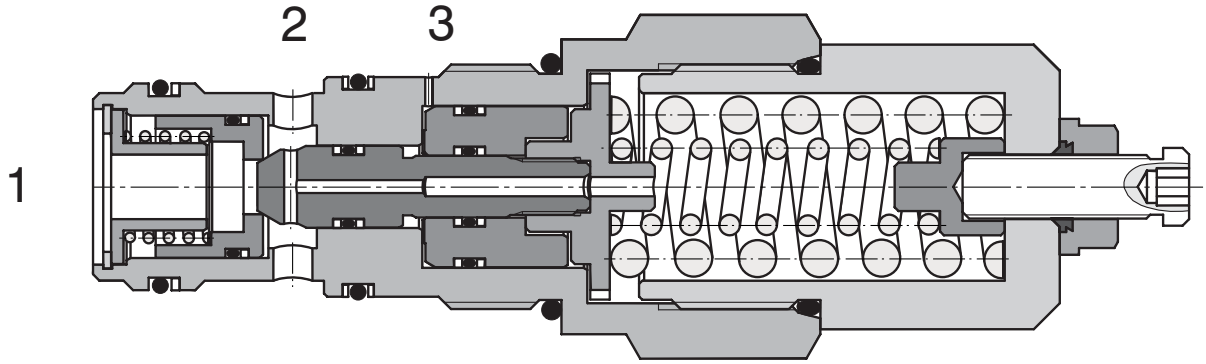
The control pressure is calculated in the following way:

$$\text{Control pressure} = \frac{\text{set up pressure} - \text{load pressure}}{\text{ratio of control}}$$

The ratio of control designates a ratio of surfaces of the differential slide valve cross-section area and its seat. Therefore, the necessary control pressure for opening the valve does not correspond to the difference between the set up pressure and load pressure however; it correspon ds to the ratio of this difference and the control ratio. In the formula as mentioned above it is necessary to take into consideration that in differential cylinders it is necessary to add to the control ratio also the appropriate ratio of piston surfaces in the direction of movement.

As soon as the control pressure attains a necessary value the differential gate valve is moved out from the seat and then the way from the channel (1) to the channel (2) is released. If now the load tries to accelerate and be fast as for the oil supply the supply pressure decreases, therefore, also the control pressure in the channel (3) is decreased. The spring force tries to shut off the valve again, therefore, in consequence of which the flow from the consumer decreases and the inlet pressure to the consumer increases again. In this way it is ensured a constant inlet pressure by means of which the movement of the load can be controlled.

As for appropriate basic surface finish the external parts are zinc coated.



Ordering Code

SOP5A-T3/I □ □

Overcentre valve

Pilot ratio

Standard	4:1	**4**
for relatively constant	6:1	**6**

NBR — **No designation**

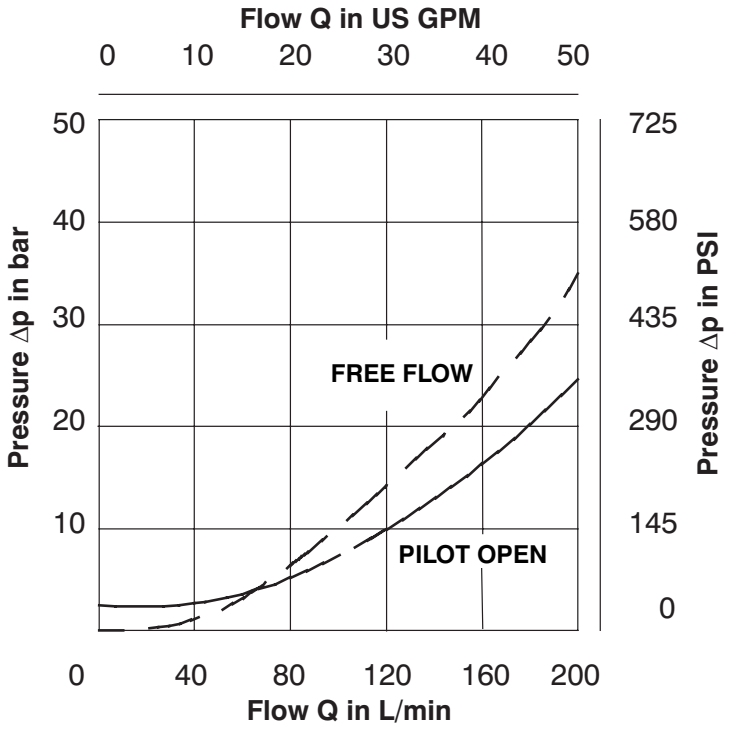
Technical Data

Figures based on: Oil Temp = 40 °C / Viscosity = 40 mm^2/s

Cavity		M38 x 2
Maximum flow	L/min	140
Max. pressure	bar	340
Max. input pressure	bar	420
Pressure drops	bar	see Δp - Q characteristics
Hydraulic fluid		Hydraulic oil (HM, HV) according to DIN 51254
Fluid temperature range	°C	-20 to +80
Ambient temperature	°C	-20 to +80
Viscosity	mm^2/s	10 to 500
Maximum degree of fluid contamination		according to ISO 4406 (1999), Class 21/18/15
Weight	kg	1.2
Maximum valve tightening torque in valve body or in control block	Nm	150^{+2}
Mounting position		any

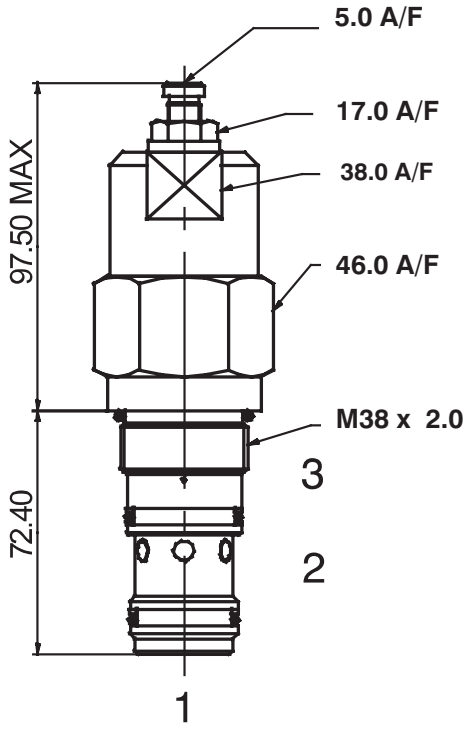
Δp-Q Characteristics

characteristics determined at n = 35 mm^2/s and t = 40 °C



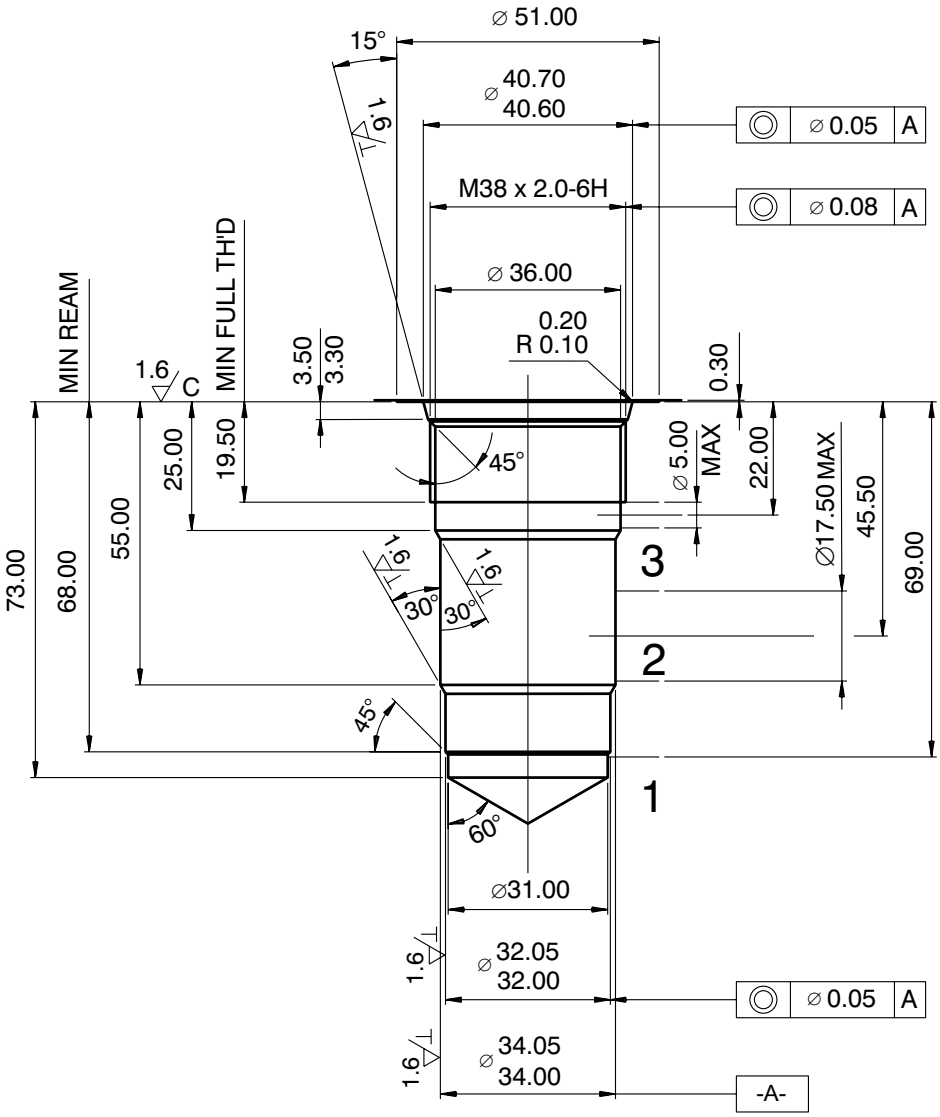
Dimensions

Measurements in millimeters



Cavity

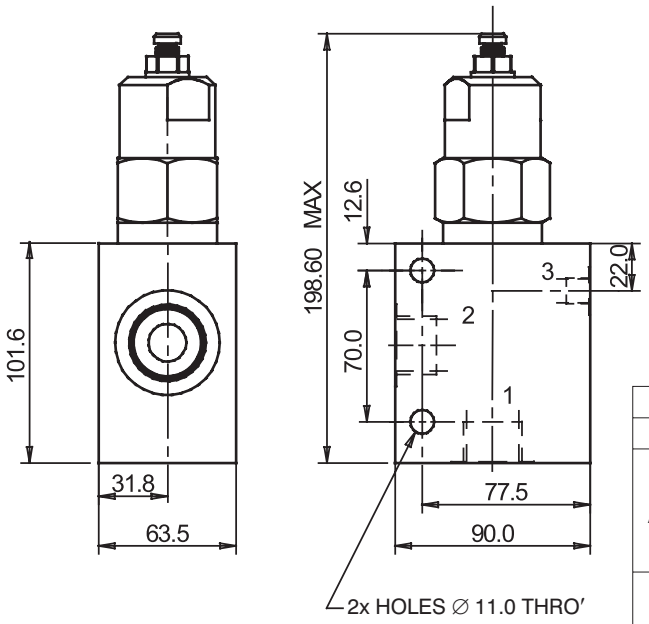
Measurements in millimeters



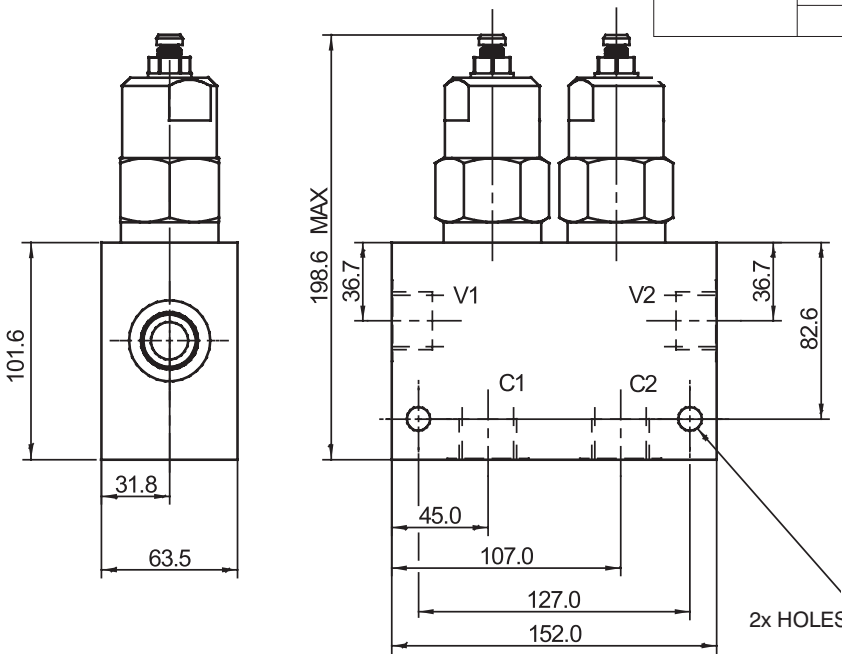
Valve Bodies

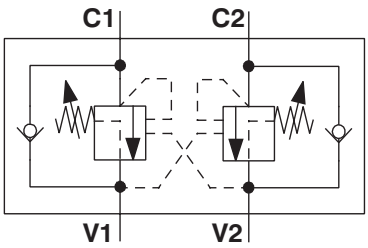
Measurements in millimeters

ISO A



Body without valve			
Material	**Ports**	**Port size**	**Type code**
Aluminium	1, 2	G1"	SB-T3-0109AL
	3	G1/4	
	1, 2	SAE 16, 1-5/16-12	SB-T3-0110AL
	3	SAE 6, 9/16-18	
Steel	1, 2	G1"	SB-T3-0109ST
	3	G1/4	
	1, 2	SAE 16, 1-5/16-12	SB-T3-0110ST
	3	SAE 6, 9/16-18	





Dual body without valve			
Material	**Ports**	**Port size**	**Type code**
Aluminium	C1, C2, V1, V2	G1"	SB-T4-0209AL
	C1, C2, V1, V2	SAE 16, 1-5/16-12	SB-T4-0210AL
Steel	C1, C2, V1, V2	G1"	SB-T4-0209ST
	C1, C2, V1, V2	SAE 16, 1-5/16-12	SB-T4-0210ST

The use of aluminium bodies is limited to a maximum operating pressure of 210 bar.

Spare Parts

Seal kits on request.

Caution!

- The packing foil is recyclable.
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law.

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Overcentre Valve
2 Stage

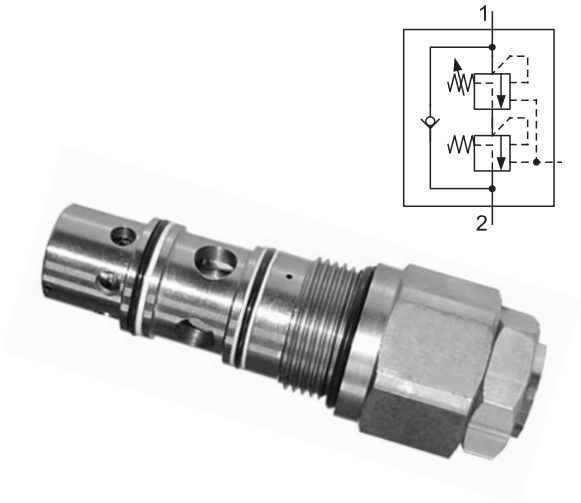
SOD5A-T3/I

M38 x 2 • p_{max} 380 bar • Q 140 L/min

HA 5216
9/2006

Replaces
HA 5216 8/2005

- **The valve prevents runaway in the event of a negative load**
- **Load-holding without leakage**
- **Pressure relief function protecting the actuator against overload and pressure peaks**
- **When installed into the actuator the valve can be used as a hose burst valve**
- **Stabile performance by maintaining a counterbalance pressure**
- **The valve should be mounted as close as possible to the actuator**

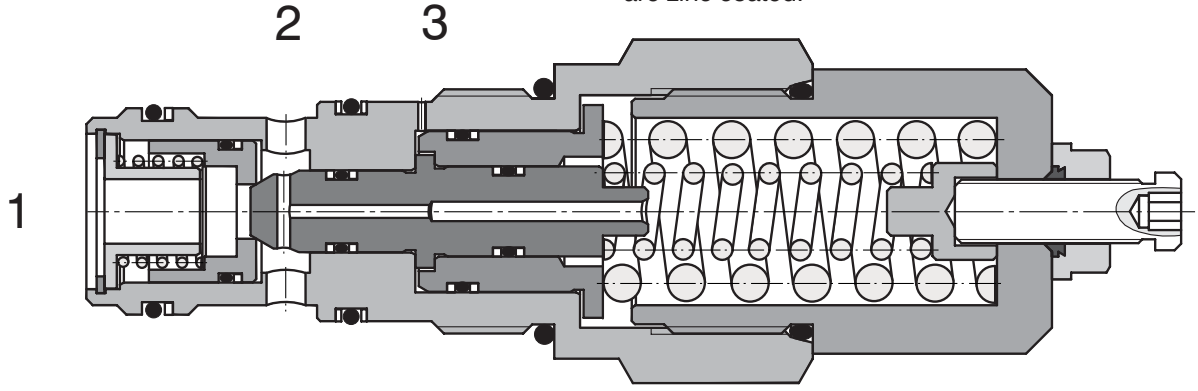


Functional Description

The valve consists of a seat by-pass, relief valve fitted with an auxiliary control with a differential piston and by-pass single-way valve serving for reverse direction of flow. The liquid is flowing through the single-way valve from the channel (2) to the channel (1) with a small pressure drop. In the opposite direction the single-way valve on the rear side of which a gate valve seat is fitted is pressed through the action of a spring and the load pressure against the spring-loaded valve gate valve. In this way the valve is nearly closed hermetically. If the pressure in the channel (1) exceeds a set up value of the spring force the gate valve is pressed out of the seat and the overpressure in that case is relieved into channel (2). For ensuring the function of holding the load the spring force should be set up to a value by 30 % higher when compared to an expected pressure exerted by the load.
If the load has to be moved it is possible to ensure it with the help of so called auxiliary control from the channel (3) by introducing already certain control pressure.
The control pressure is calculated in the following way:

$$\text{Control pressure} = \frac{\text{set up pressure} - \text{load pressure}}{\text{ratio of control}}$$

The ratio of control designates a ratio of surfaces of the differential slide valve cross-section area and its seat. Therefore, the necessary control pressure for opening the valve does not correspond to the difference between the set up pressure and load pressure however; it correspon ds to the ratio of this difference and the control ratio. In the formula as mentioned above it is necessary to take into consideration that in differential cylinders it is necessary to add to the control ratio also the appropriate ratio of piston surfaces in the direction of movement.
As soon as the control pressure attains a necessary value the differential gate valve is moved out from the seat and then the way from the channel (1) to the channel (2) is released. If now the load tries to accelerate and be fast as for the oil supply the supply pressure decreases, therefore, also the control pressure in the channel (3) is decreased. The spring force tries to shut off the valve again, therefore, in consequence of which the flow from the consumer decreases and the inlet pressure to the consumer increases again. In this way it is ensured a constant inlet pressure by means of which the movement of the load can be controlled.
Starting braking valves of SOD5A series cover the whole range of the use of single-stage starting braking valves. In addition to it, this valve exerts a counter pressure to prevent from a sharp pressure drop at opening the valve. In this way the valve makes a particularly sensitive movement of consumers possible.
As for appropriate basic surface finish the external parts are zinc coated.



Ordering Code

SOD5A-T3/I [ ] [ ]

Overcentre valve
2 Stage

Pressure range
230 - 380 bar **30**

Factory setting 280 (220/60)bar for Q=4.8L/min

NBR **No designation**

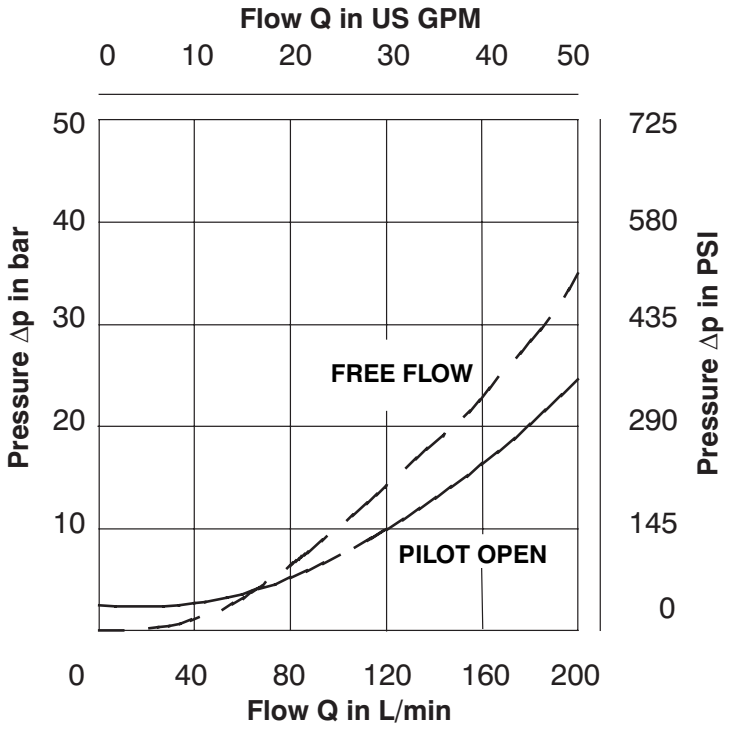
Technical Data

Figures based on: Oil Temp = 40 °C / Viscosity = 40 mm^2/s

Cavity		M38 x 2
Maximum flow	L/min	140
Max. pressure	bar	380
Pressure drops	bar	see Δp - Q characteristics
Hydraulic fluid		Hydraulic oil (HM, HV) according to DIN 51254
Fluid temperature range	°C	-20 to +80
Ambient temperature	°C	-20 to +80
Viscosity	mm^2/s	10 to 500
Maximum degree of fluid contamination		according to ISO 4406 (1999), Class 21/18/15
Weight	kg	1.2
Maximum valve tightening torque in valve body or in control block	Nm	150^{+2}
Mounting position		any

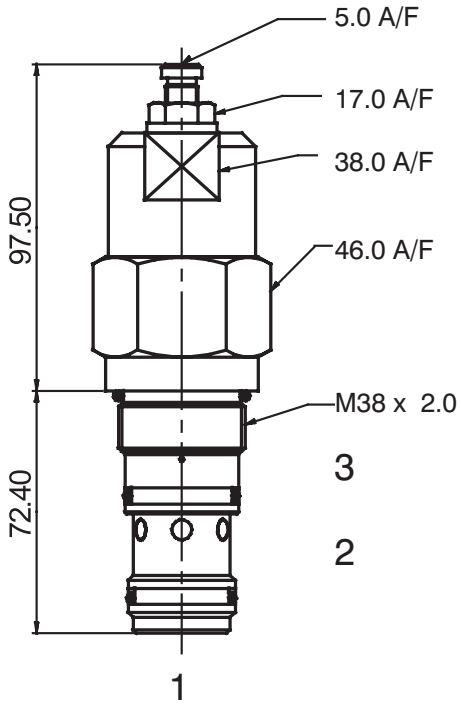
Δp-Q Characteristics

characteristics determined at n = 35 mm^2/s and t = 40 °C



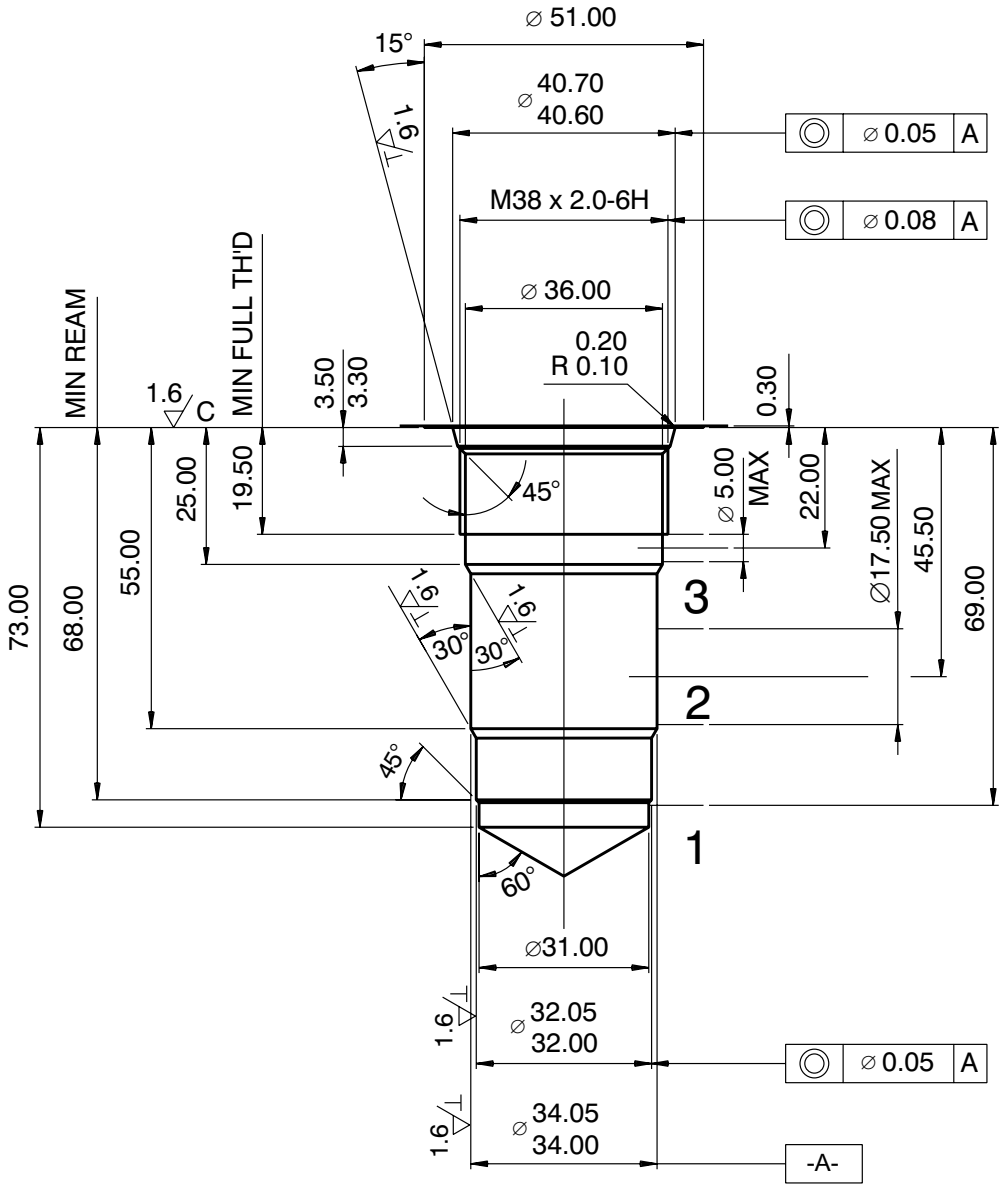
Dimensions

Measurements in millimeters



Cavity

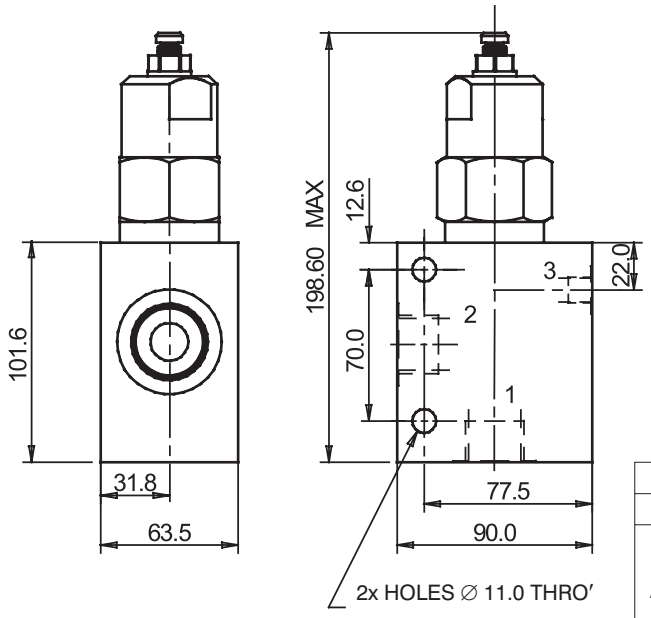
Measurements in millimeters



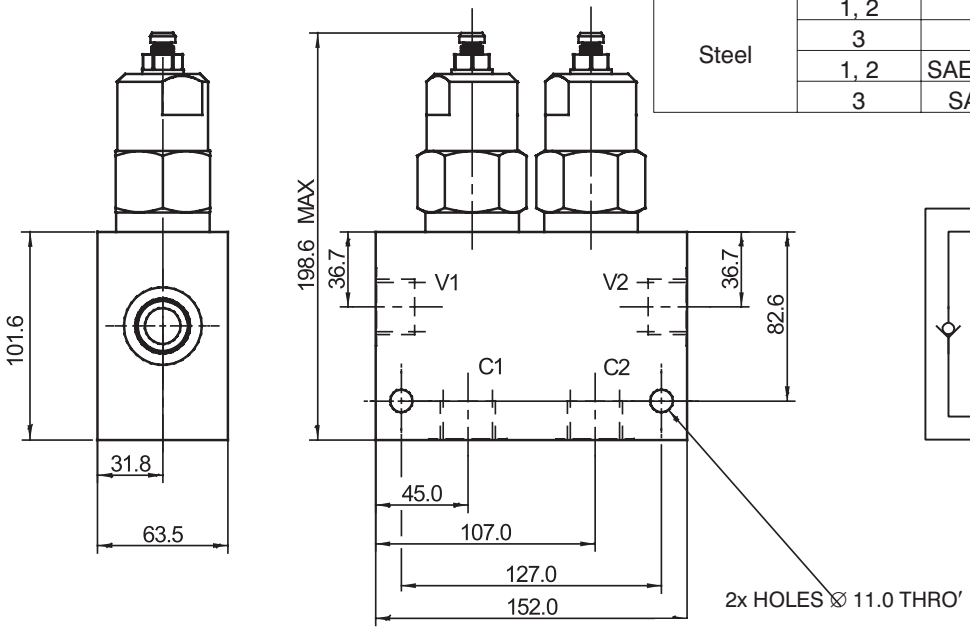
Valve Bodies

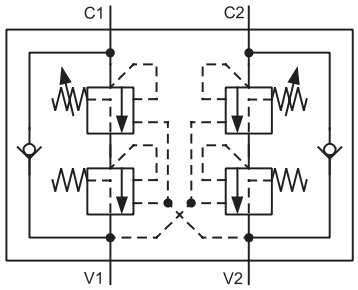
Measurements in millimeters

ISO A



Body without valve			
Material	**Ports**	**Port size**	**Type code**
Aluminium	1, 2	G1"	SB-T3-0109AL
	3	G1/4	
	1, 2	SAE 16, 1-5/16-12	SB-T3-0110AL
	3	SAE 6, 9/16-18	
Steel	1, 2	G1"	SB-T3-0109ST
	3	G1/4	
	1, 2	SAE 16, 1-5/16-12	SB-T3-0110ST
	3	SAE 6, 9/16-18	





Dual body without valve			
Material	**Ports**	**Port size**	**Type code**
Aluminium	C1, C2, V1, V2	G1"	SB-T4-0209AL
	C1, C2, V1, V2	SAE 16, 1-5/16-12	SB-T4-0210AL
Steel	C1, C2, V1, V2	G1"	SB-T4-0209ST
	C1, C2, V1, V2	SAE 16, 1-5/16-12	SB-T4-0210ST

The use of aluminium bodies is limited to a maximum operating pressure of 210 bar.

Spare Parts

Seal kits on request.

Caution!

- The packing foil is recyclable.
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law.

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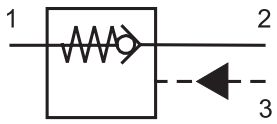
Pilot Operated Check Valve

SC5H-Q3/I

M20 x 1.5 • p_{max} 350 bar • Q 30 L/min

HA 5217
9/2006

Replaces
HA 5217 8/2005

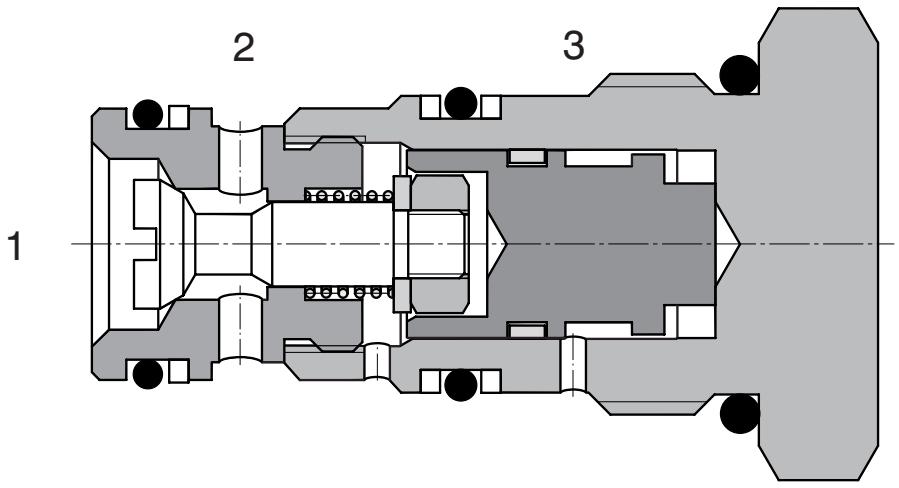


- ❑ **Load-holding without leakage**
- ❑ **Low pressure drop**
- ❑ **Optional pilot seal**
- ❑ **The valve should be mounted as close as possible to the actuator**

Functional Description

The design of the valve fitted with conical seat ensures hermetical closing in one direction and in the other direction of flow with a small pressure drop. The valve remains shut off closely if the pressure in channel (1) is equal to or higher than the pressure in channel (2) and no pressure and / or insufficient pressure only is exerted in the channel (3). As soon as the pressure in the channel (2) exceeds the pressure in the channel (1) including pressure caused by the spring the valve opens the flow from (2) to (1). If the liquid has to flow through the valve from (1) to (2) the control pressure should be introduced in the channel (3). As soon as this pressure attains a necessary value the control gate valve is shifted against the spring and moves the valve cone out of the seat. At calculating the control pressure it is necessary to take into consideration that pressure in the channel (2) will increase the control pressure by the same value multiplied by an effective differential area. This effective differential area has a value of 1 – 1/3 at a rate of control areas of 3:1.

As for appropriate basic surface finish the external parts are zinc coated.



Ordering Code

SC5H-Q3/I □ □

Pilot Operated Check Valve

Pilot ratio

Standard	3:1	**3**

NBR — **No designation**

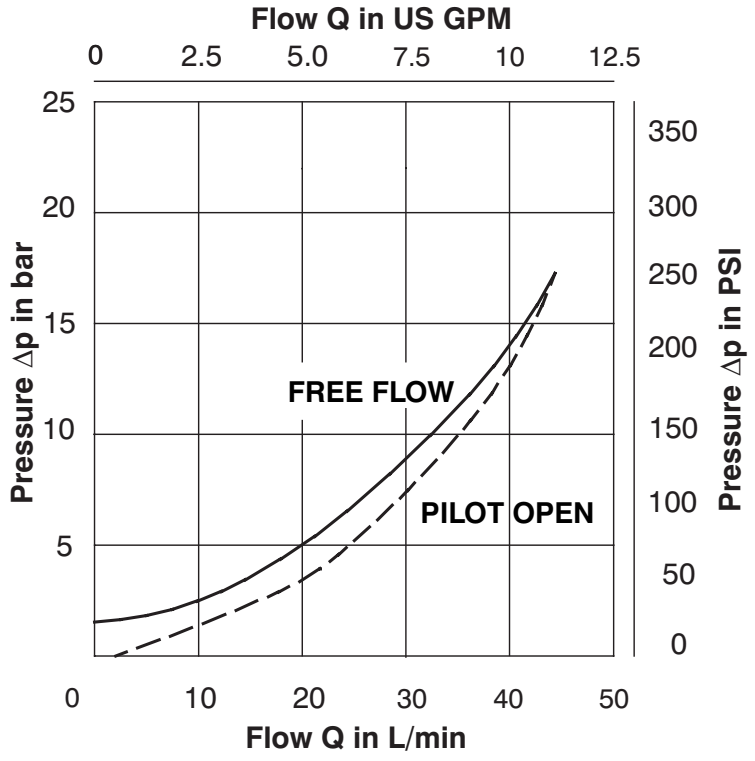
Technical Data

Figures based on: Oil Temp = 40 °C / Viscosity = 40 mm^2/s

Cavity		M20 x 1.5
Maximum flow	L/min	30
Max. pressure	bar	350
Pilot ratio		3:1
Pressure drops	bar	see Δp - Q characteristics
Hydraulic fluid		Hydraulic oil (HM, HV) according to DIN 51254
Fluid temperature range	°C	-20 to +80
Ambient temperature	°C	-20 to +80
Viscosity	mm^2/s	10 to 500
Maximum degree of fluid contamination		according to ISO 4406 (1999), Class 21/18/15
Weight	kg	0.08
Maximum valve tightening torque in valve body or in control block	Nm	45^{+2}
Mounting position		any

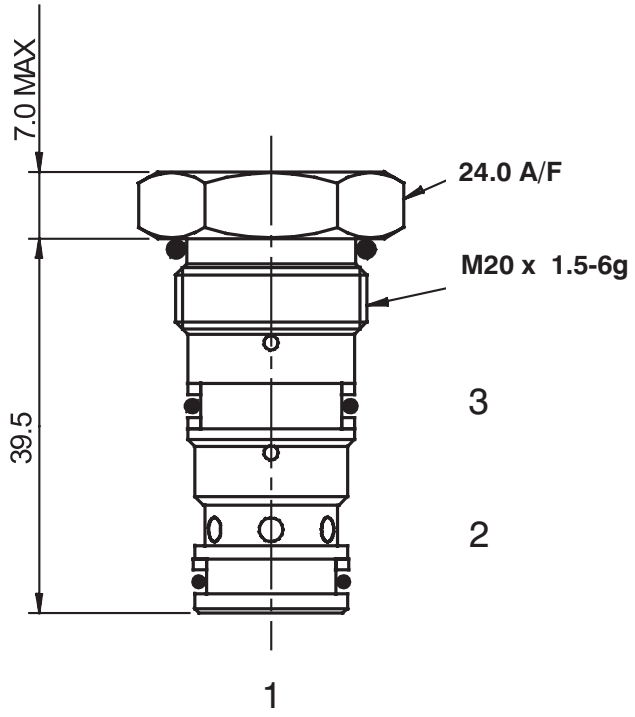
Δp-Q Characteristics

characteristics determined at n = 35 mm^2/s and t = 40 °C



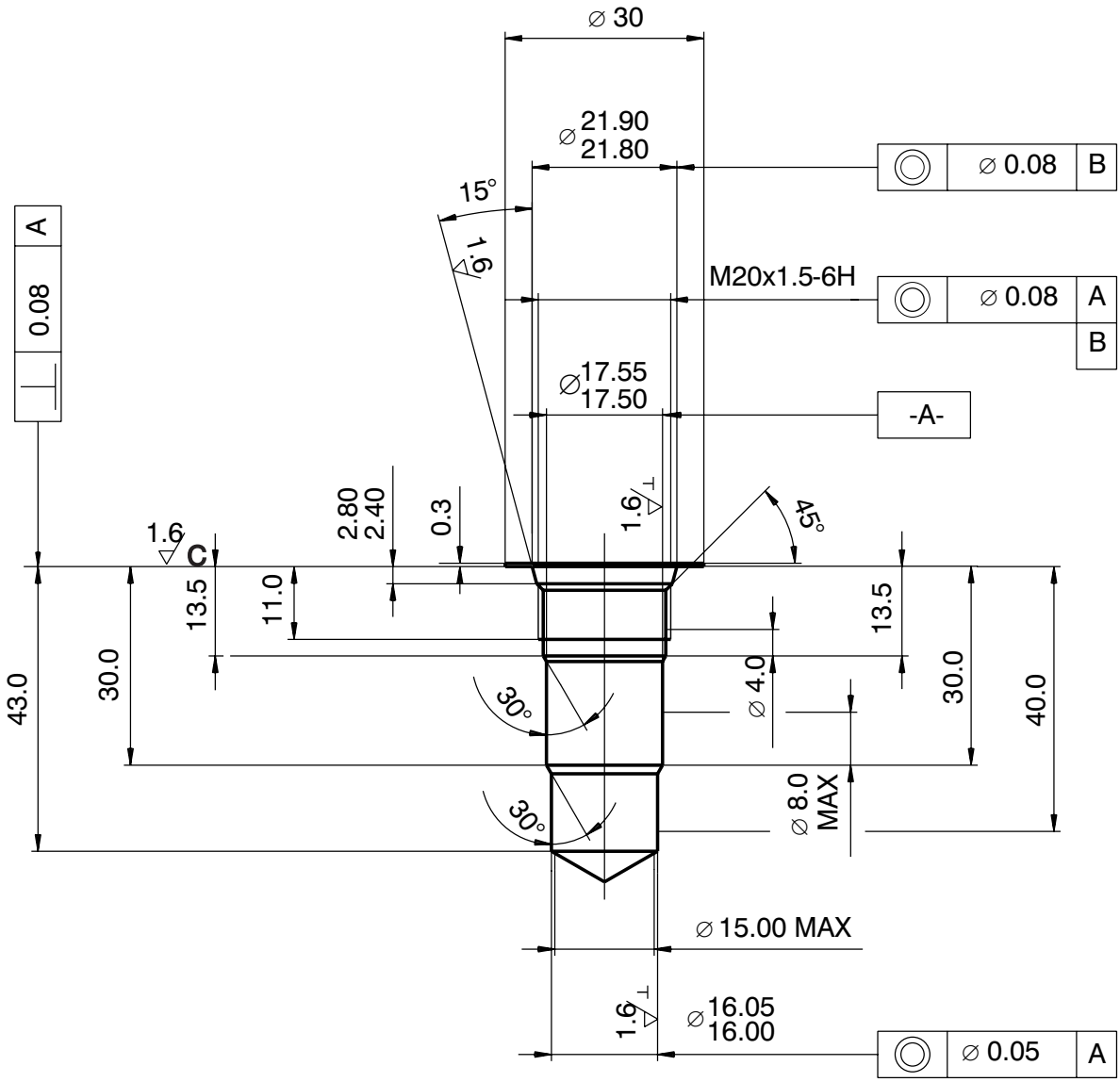
Dimensions

Measurements in millimeters



Cavity

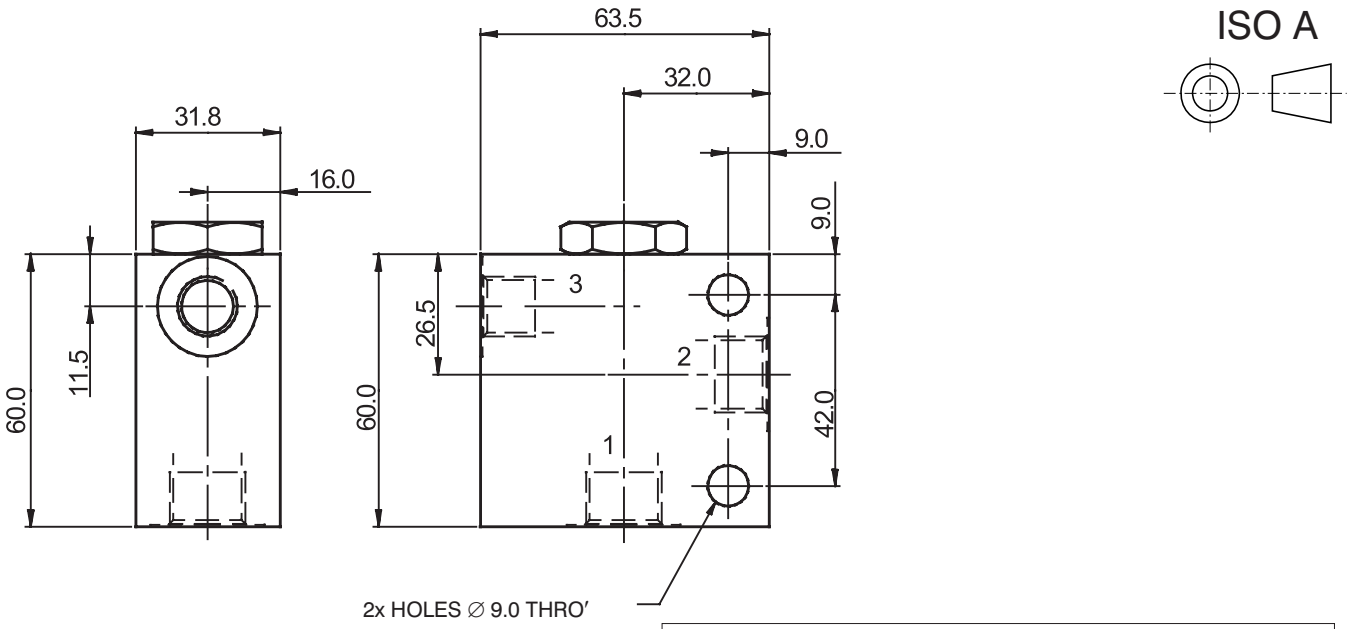
Measurements in millimeters



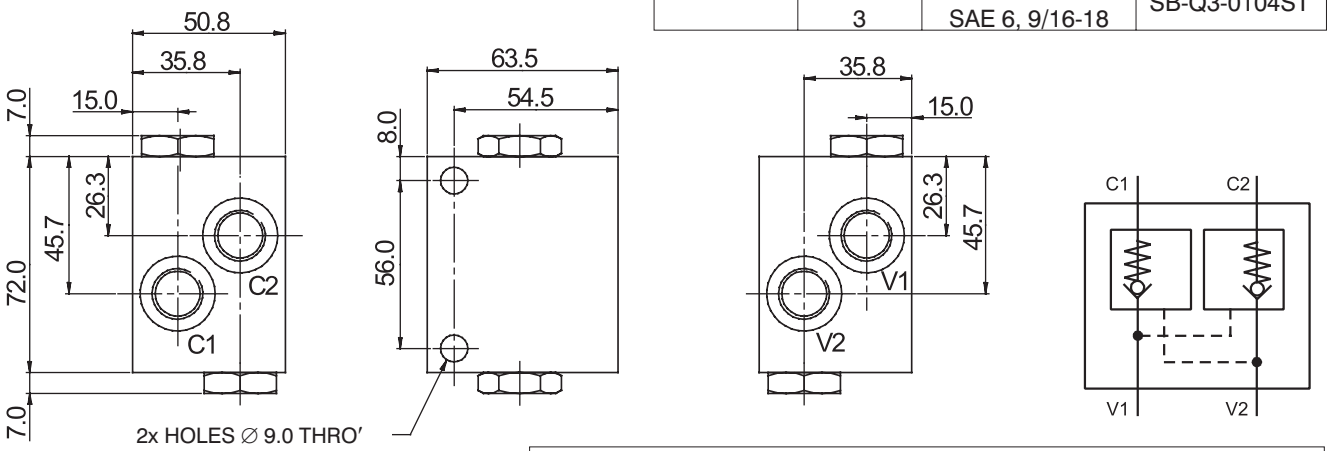
Valve Bodies

Measurements in millimeters

ISO A



Body without valve			
Material	**Ports**	**Port size**	**Type code**
Aluminium	1, 2	G3/8	SB-Q3-0103AL
	3	G1/4	
	1, 2	SAE 8, 3/4-16	SB-Q3-0104AL
	3	SAE 6, 9/16-18	
Steel	1, 2	G3/8	SB-Q3-0103ST
	3	G1/4	
	1, 2	SAE 8, 3/4-16	SB-Q3-0104ST
	3	SAE 6, 9/16-18	



Dual body without valve			
Material	**Ports**	**Port size**	**Type code**
Aluminium	C1, C2, V1, V2	G1/4	SB-Q4-0303AL
	C1, C2, V1, V2	SAE 8, 3/4-16	SB-Q4-0304AL
Steel	C1, C2, V1, V2	G1/4	SB-Q4-0303ST
	C1, C2, V1, V2	SAE 8, 3/4-16	SB-Q4-0304ST

The use of aluminium bodies is limited to a maximum operating pressure of 210 bar.

Spare Parts

Seal kits on request.

Caution!

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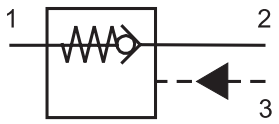
Pilot Operated Check Valve

SC5H-R3/I

M27 x 1.5 • p_{max} 350 bar • Q 90 L/min

HA 5218
9/2006

Replaces
HA 5218 8/2005

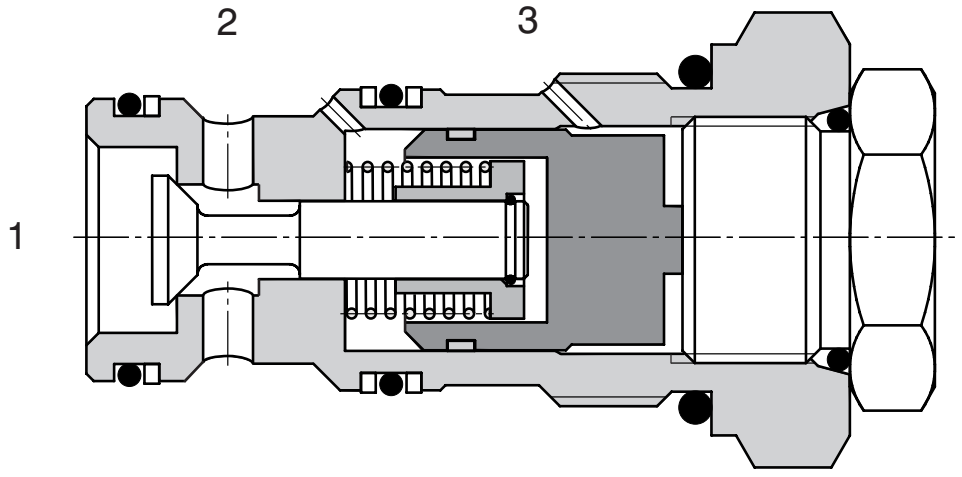


- **Load-holding without leakage**
- **Low pressure drop**
- **Optional pilot seal**
- **The valve should be mounted as close as possible to the actuator**

Functional Description

The design of the valve fitted with conical seat ensures hermetical closing in one direction and in the other direction of flow with a small pressure drop. The valve remains shut off closely if the pressure in channel (1) is equal to or higher than the pressure in channel (2) and no pressure and / or insufficient pressure only is exerted in the channel (3). As soon as the pressure in the channel (2) exceeds the pressure in the channel (1) including pressure caused by the spring the valve opens the flow from (2) to (1). If the liquid has to flow through the valve from (1) to (2) the control pressure should be introduced in the channel (3). As soon as this pressure attains a necessary value the control gate valve is shifted against the spring and moves the valve cone out of the seat. At calculating the control pressure it is necessary to take into consideration that pressure in the channel (2) will increase the control pressure by the same value multiplied by an effective differential area. This effective differential area has a value of 1 – 1/4 at a rate of control areas of 4:1.

As for appropriate basic surface finish the external parts are zinc coated.



Ordering Code

SC5H-R3/I □ □

Pilot Operated Check Valve

Pilot ratio

Standard	4:1	**4**

NBR — **No designation**

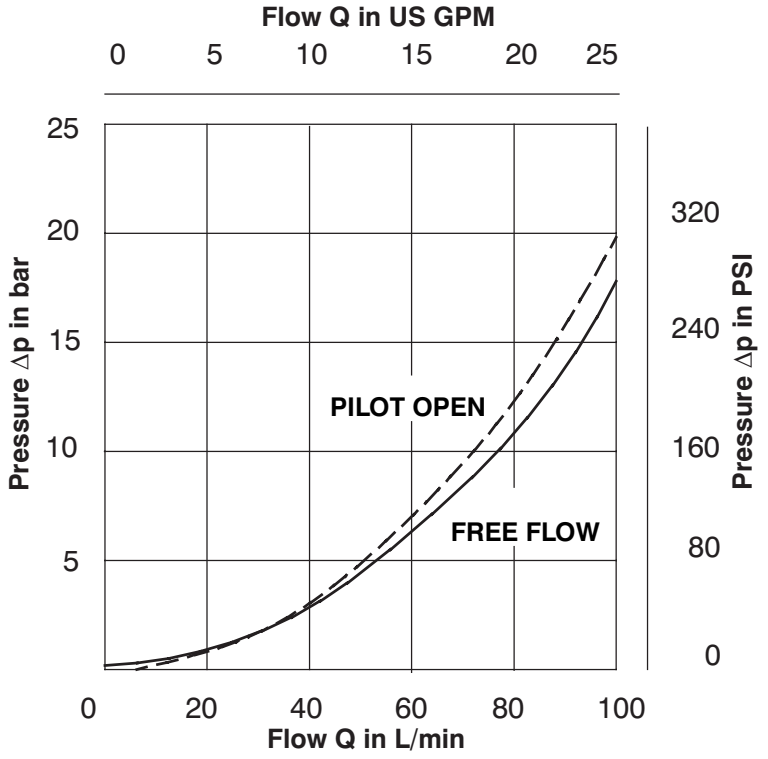
Technical Data

Figures based on: Oil Temp = 40 °C / Viscosity = 40 mm^2/s

Cavity		M27 x 1.5
Maximum flow	L/min	90
Max. pressure	bar	350
Pilot ratio		4:1
Pressure drops	bar	see Δp - Q characteristics
Hydraulic fluid		Hydraulic oil (HM, HV) according to DIN 51254
Fluid temperature range	°C	-20 to +80
Ambient temperature	°C	-20 to +80
Viscosity	mm^2/s	10 to 500
Maximum degree of fluid contamination		according to ISO 4406 (1999), Class 21/18/15
Weight	kg	0.27
Maximum valve tightening torque in valve body or in control block	Nm	60^{+2}
Mounting position		any

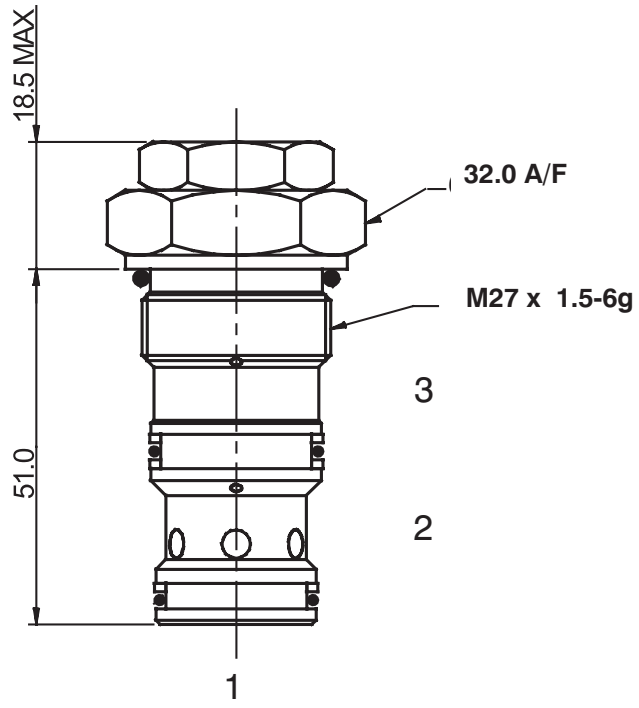
Δp-Q Characteristics

characteristics determined at n = 35 mm^2/s and t = 40 °C



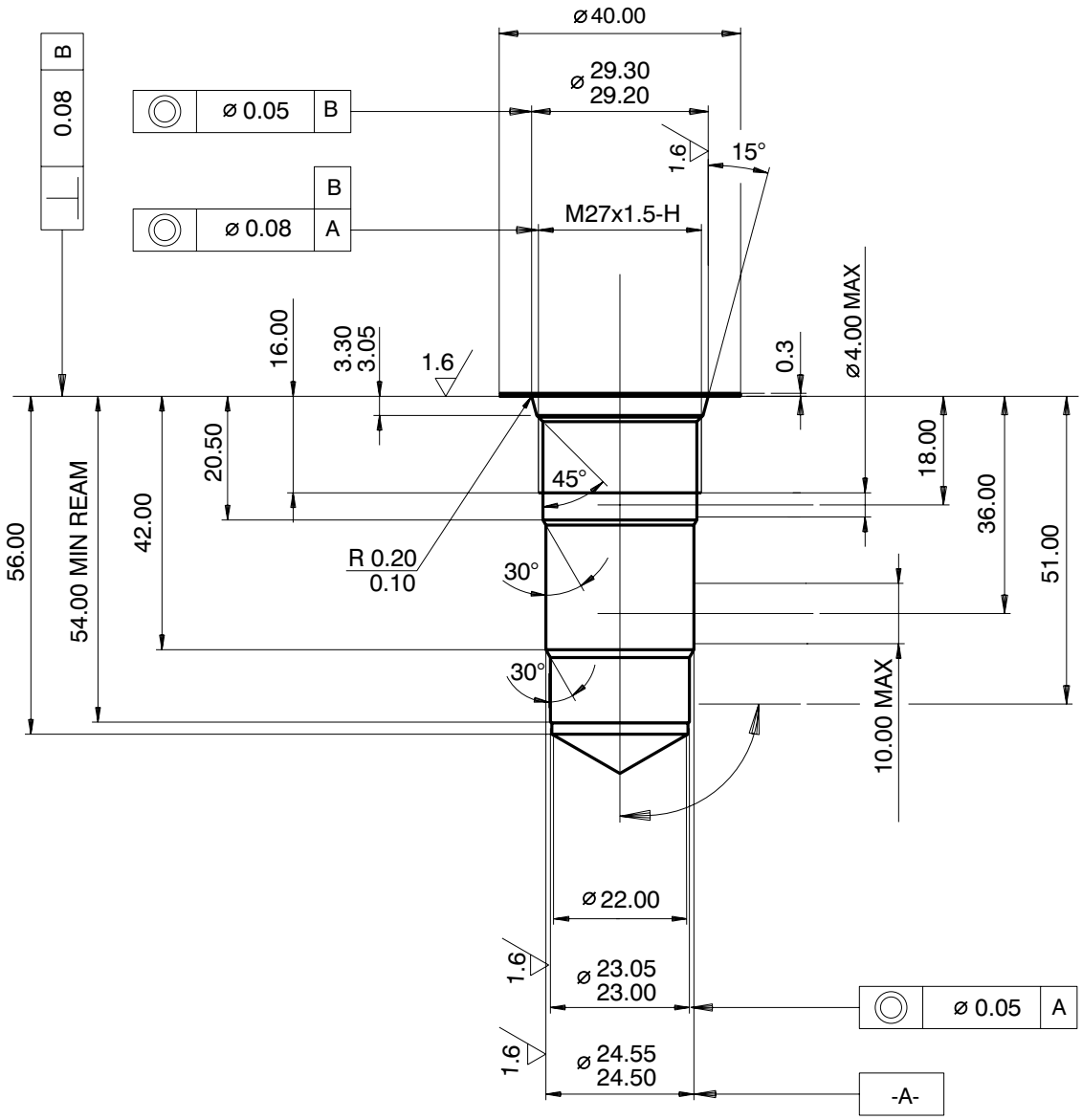
Dimensions

Measurements in millimeters



Cavity

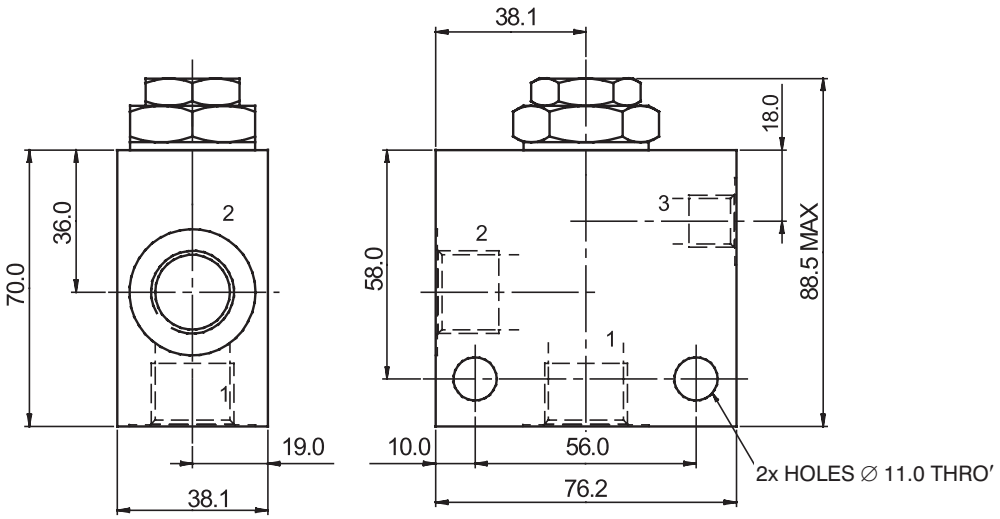
Measurements in millimeters



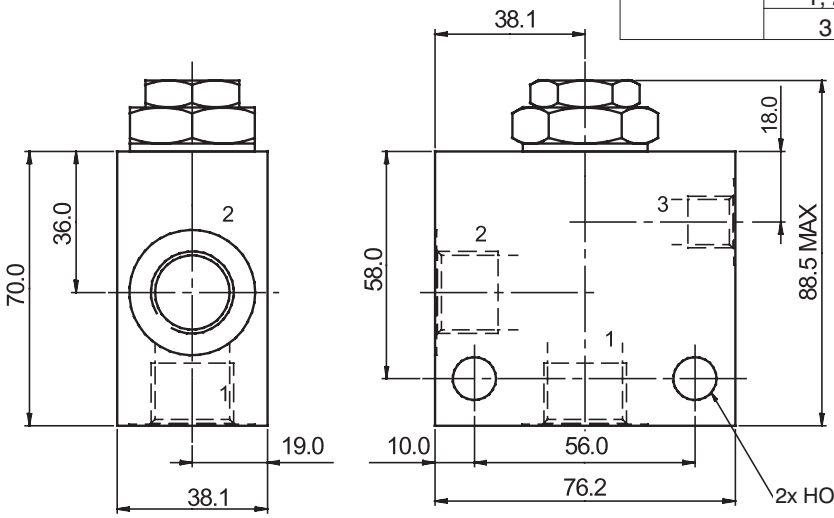
Valve Bodies

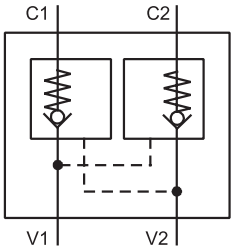
Measurements in millimeters

ISO A



Body without valve			
Material	**Ports**	**Port size**	**Type code**
Aluminium	1, 2	G1/2	SB-R3-0105AL
	3	G1/4	
	1, 2	SAE 10, 7/8-14	SB-R3-0106AL
	3	SAE 6, 9/16-18	
Steel	1, 2	G1/2	SB-R3-0105ST
	3	G1/4	
	1, 2	SAE 10, 7/8-14	SB-R3-0106ST
	3	SAE 6, 9/16-18	





Dual body without valve			
Material	**Ports**	**Port size**	**Type code**
Aluminium	C1, C2, V1, V2	G1/2	SB-R4-0205AL
	C1, C2, V1, V2	SAE 10, 7/8-14	SB-R4-0206AL
Steel	C1, C2, V1, V2	G1/2	SB-R4-0205ST
	C1, C2, V1, V2	SAE 10, 7/8-14	SB-R4-0206ST

The use of aluminium bodies is limited to a maximum operating pressure of 210 bar.

Spare Parts

Seal kits on request.

Caution!

- The packing foil is recyclable.
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law.

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www.argo-hytos.com

Pilot Operated Check Valve with Decompression

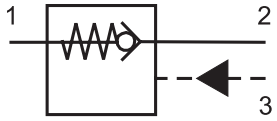
SCD5H-R3/I

M27 x 1.5 • p_{max} 350 bar • Q 90 L/min

HA 5219
9/2006

Replaces
HA 5219 8/2005

- ❑ **Load-holding without leakage**
- ❑ **Low pressure drop**
- ❑ **Decompression stage**
- ❑ **Optional pilot seal**
- ❑ **The valve should be mounted as close as possible to the actuator**



Functional Description

The design of the valve fitted with conical seat ensures hermetical closing in one direction and in the other direction of flow with a small pressure drop. In this case the question is an indirectly controlled one-way valve opened hydraulically. The closing element (valve cone of the main stage of the valve) and a ball (of the control stage) are pressed to the seat of the valve by the spring force. If the channel (2) pressure exceeds the spring pressure and pressure in the channel (1) the liquid flows through the valve opened. The appropriate pressure drops are identified on the characteristics as a free rate of flow. In the case of this direction of flow the valve operates as a simple one-way valve.
In the opposite direction the liquid can flow from the -channel (1) to the channel (2) in the case a sufficient control pressure acts in the channel (3) only.

$$\text{Opening pressure of the control stage (decompression)} = \frac{\text{Pressure of channel (1)}}{25}$$

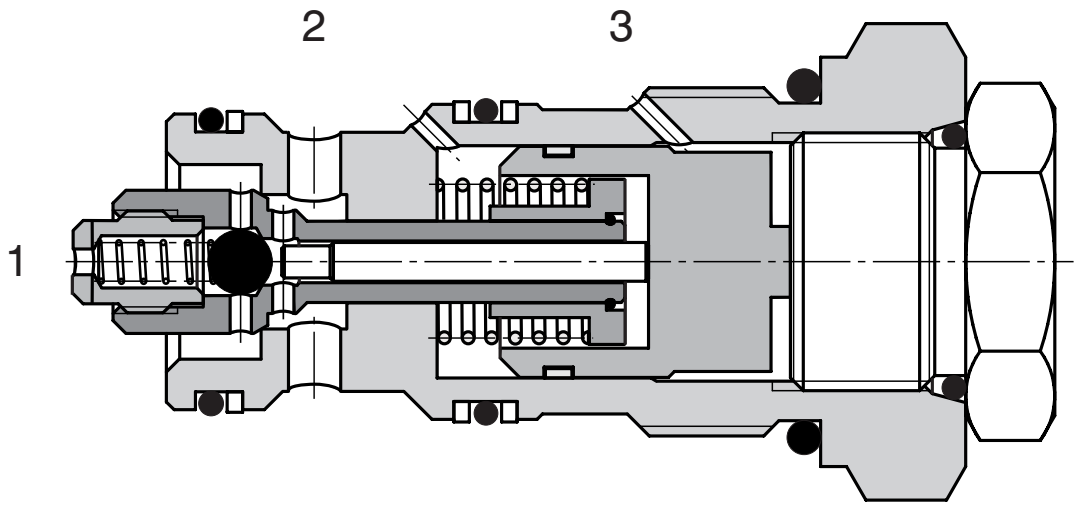
By opening a small amount the control valve the pressure in the channel (2) is dropped in such extent that he control pressure in the channel (3) is sufficient for opening the main stage.

$$\text{Opening pressure of the main stage} = \frac{\text{Pressure of channel (1)}}{3}$$

Pressure drop values at the main stage opened are identified in the flow characteristics as open by the control.

During computing the control pressure it is necessary to take into consideration that pressure acting in the channel (2) increases the control pressure by the same value multiplied by the effective differential area having a value of 1 – 1/25 in case of a value of the ratio of control surfaces of 25:1.

As for appropriate basic surface finish the external parts are zinc coated.



Ordering Code

SC5H-R3/I □ □

Pilot Operated Check Valve
with decompression

Pilot ratio

Decompression	25:1	
Full flow	3:1	**3**

NBR — **No designation**

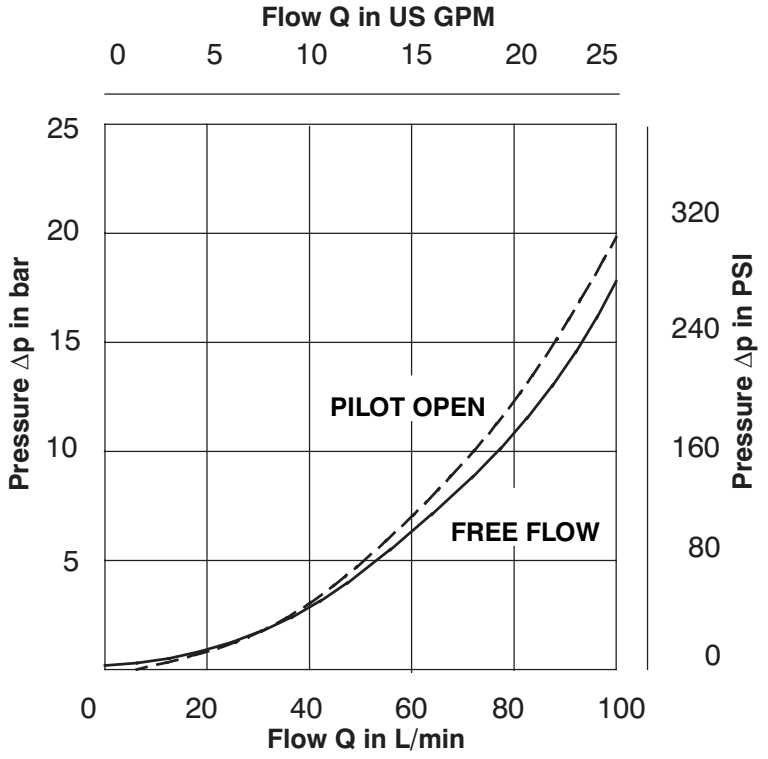
Technical Data

Figures based on: Oil Temp = 40 °C / Viscosity = 40 mm^2/s

Cavity		M27 x 1.5
Maximum flow	L/min	90
Max. pressure	bar	350
Pilot ratio decomperssion		25:1
Pilot ratio full flow		3:1
Pressure drops	bar	see Δp - Q characteristics
Hydraulic fluid		Hydraulic oil (HM, HV) according to DIN 51254
Fluid temperature range	°C	-20 to +80
Ambient temperature	°C	-20 to +80
Viscosity	mm^2/s	10 to 500
Maximum degree of fluid contamination		according to ISO 4406 (1999), Class 21/18/15
Weight	kg	0.24
Maximum valve tightening torque in valve body or in control block	Nm	60^{+2}
Mounting position		any

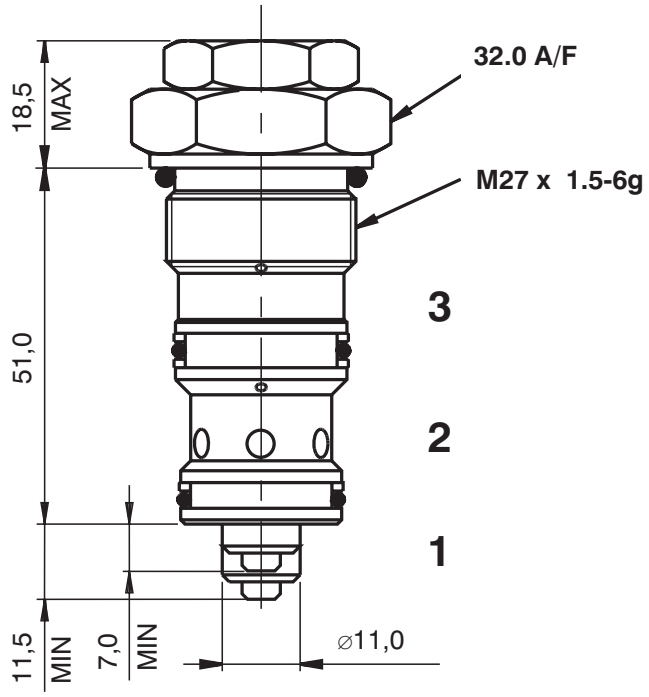
Δp-Q Characteristics

characteristics determined at n = 35 mm^2/s and t = 40 °C



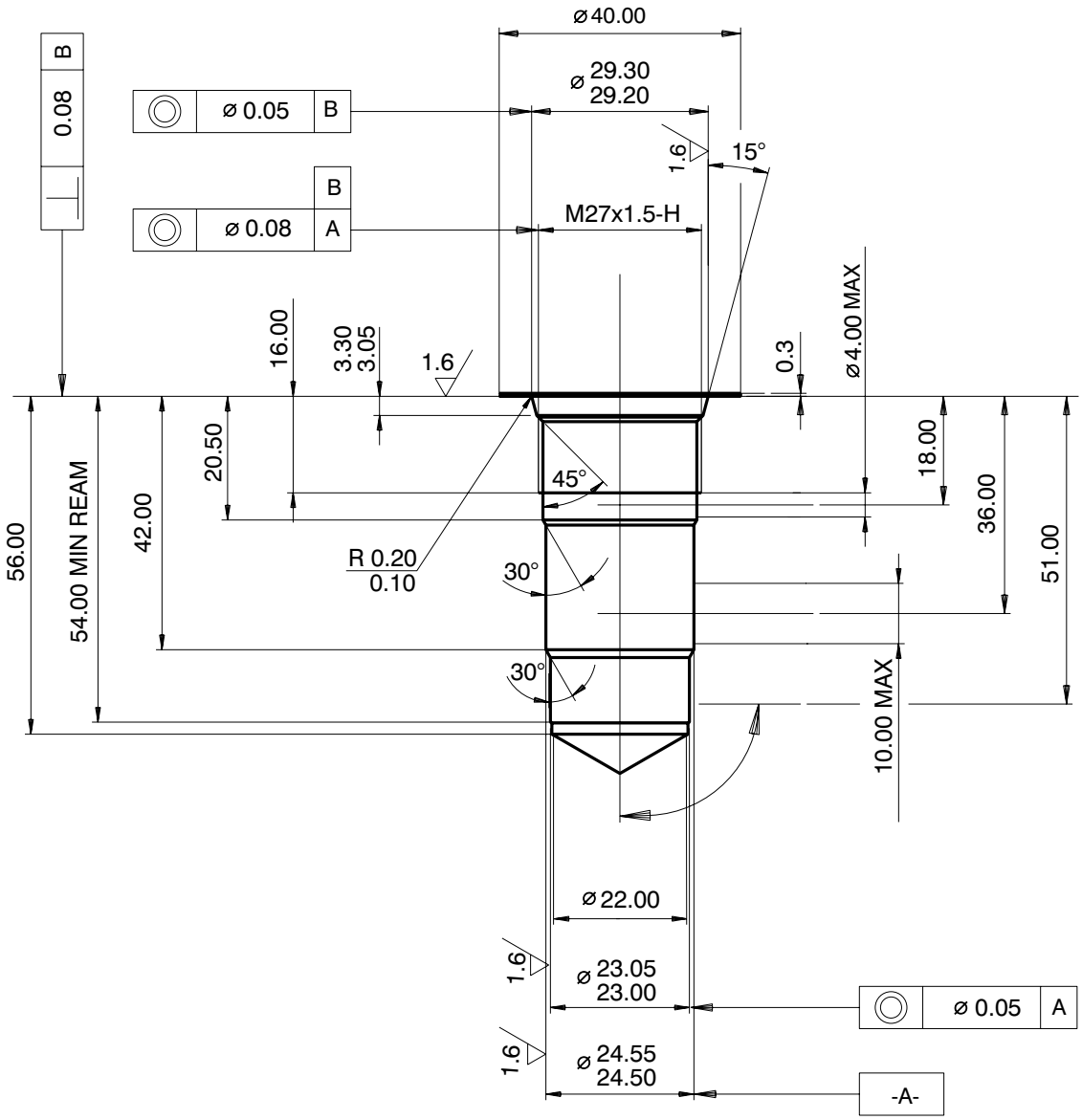
Dimensions

Measurements in millimeters



Cavity

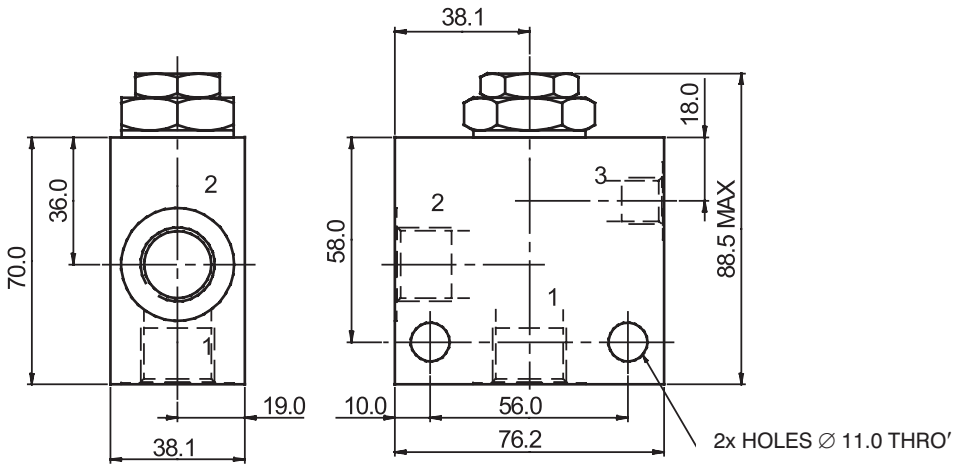
Measurements in millimeters



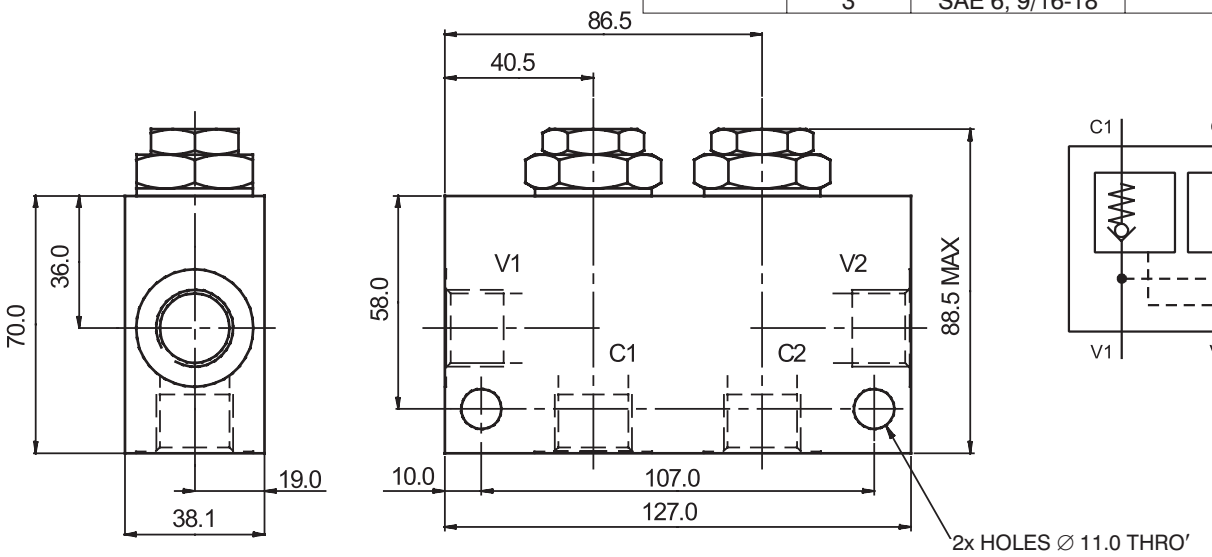
Valve Bodies

Measurements in millimeters

ISO A



Body without valve			
Material	**Ports**	**Port size**	**Type code**
Aluminium	1, 2	G1/2	SB-R3-0105AL
	3	G1/4	
	1, 2	SAE 10, 7/8-14	SB-R3-0106AL
	3	SAE 6, 9/16-18	
Steel	1, 2	G1/2	SB-R3-0105ST
	3	G1/4	
	1, 2	SAE 10, 7/8-14	SB-R3-0106ST
	3	SAE 6, 9/16-18	



Dual body without valve			
Material	**Ports**	**Port size**	**Type code**
Aluminium	C1, C2, V1, V2	G1/2	SB-R4-0205AL
	C1, C2, V1, V2	SAE 10, 7/8-14	SB-R4-0206AL
Steel	C1, C2, V1, V2	G1/2	SB-R4-0205ST
	C1, C2, V1, V2	SAE 10, 7/8-14	SB-R4-0206ST

The use of aluminium bodies is limited to a maximum operating pressure of 210 bar.

Spare Parts

Seal kits on request.

Caution!

- The packing foil is recyclable.
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law.

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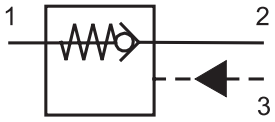
Pilot Operated Check Valve

SC5H-S3/I

1-5/16-12 UN-2A • p_{max} 350 bar • Q 120 L/min

HA 5220
9/2006

Replaces
HA 5220 8/2005

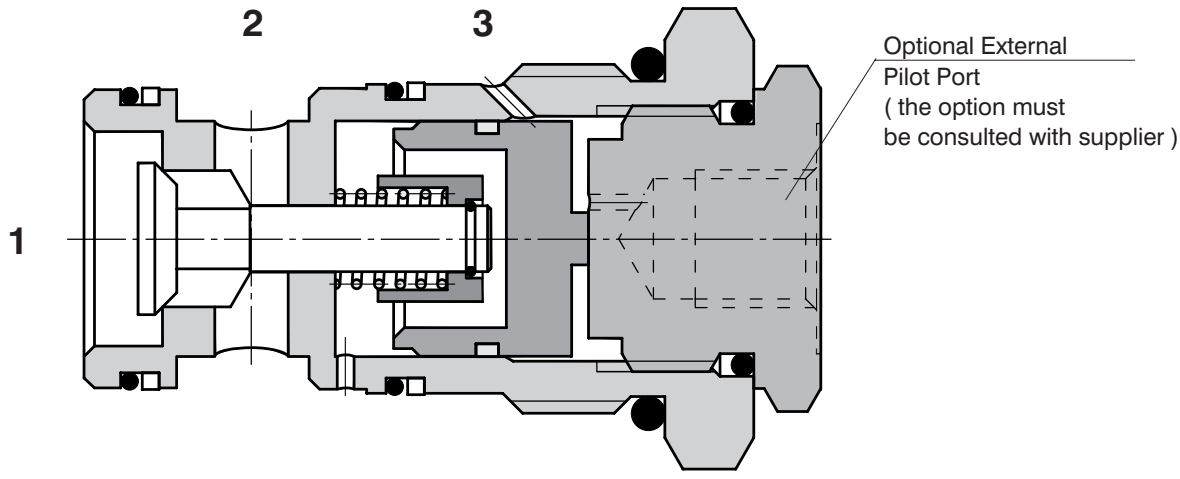


- **Load-holding without leakage**
- **Low pressure drop**
- **Optional pilot seal**
- **The valve should be mounted as close as possible to the actuator**

Functional Description

The design of the valve fitted with conical seat ensures hermetical closing in one direction and in the other direction of flow with a small pressure drop. The valve remains shut off closely if the pressure in channel (1) is equal to or higher than the pressure in channel (2) and no pressure and / or insufficient pressure only is exerted in the channel (3). As soon as the pressure in the channel (2) exceeds the pressure in the channel (1) including pressure caused by the spring the valve opens the flow from (2) to (1). If the liquid has to flow through the valve from (1) to (2) the control pressure should be introduced in the channel (3). As soon as this pressure attains a necessary value the control gate valve is shifted against the spring and moves the valve cone out of the seat. At calculating the control pressure it is necessary to take into consideration that pressure in the channel (2) will increase the control pressure by the same value multiplied by an effective differential area. This effective differential area has a value of 1 – 1/3 at a rate of control areas of 3:1.

As for appropriate basic surface finish the external parts are zinc coated.



Ordering Code

SC5H-S3/I □ □

Pilot Operated Check Valve

Pilot ratio		
Standard	3:1	**3**

NBR	**No designation**

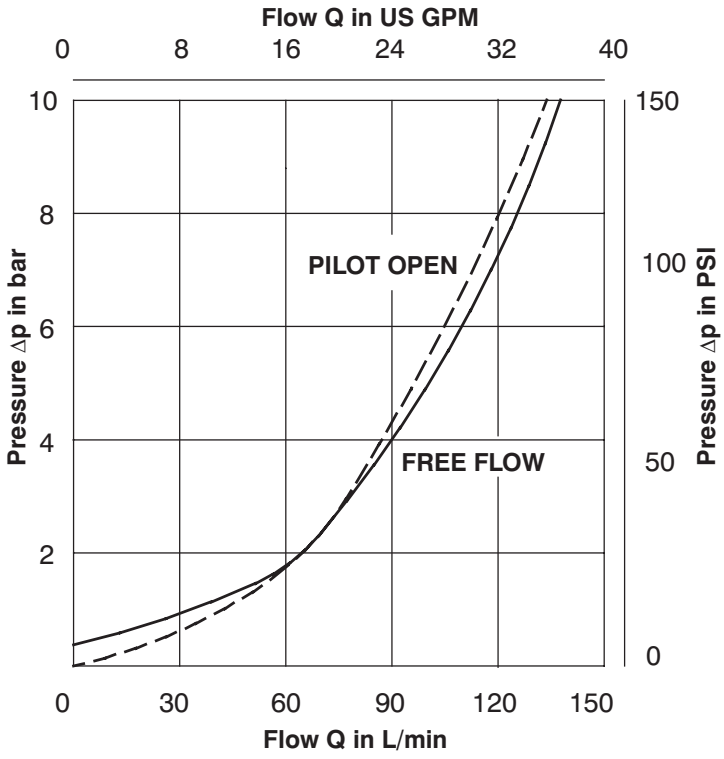
Technical Data

Figures based on: Oil Temp = 40 °C / Viscosity = 40 mm^2/s

Cavity		1-5/16-12 UN-2A
Maximum flow	L/min	120
Max. pressure	bar	350
Pilot ratio		3:1
Pressure drops	bar	see Δp - Q characteristics
Hydraulic fluid		Hydraulic oil (HM, HV) according to DIN 51254
Fluid temperature range	°C	-20 to +80
Ambient temperature	°C	-20 to +80
Viscosity	mm^2/s	10 to 500
Maximum degree of fluid contamination		according to ISO 4406 (1999), Class 21/18/15
Weight	kg	0.28
Maximum valve tightening torque in valve body or in control block	Nm	100^{+2}
Mounting position		any

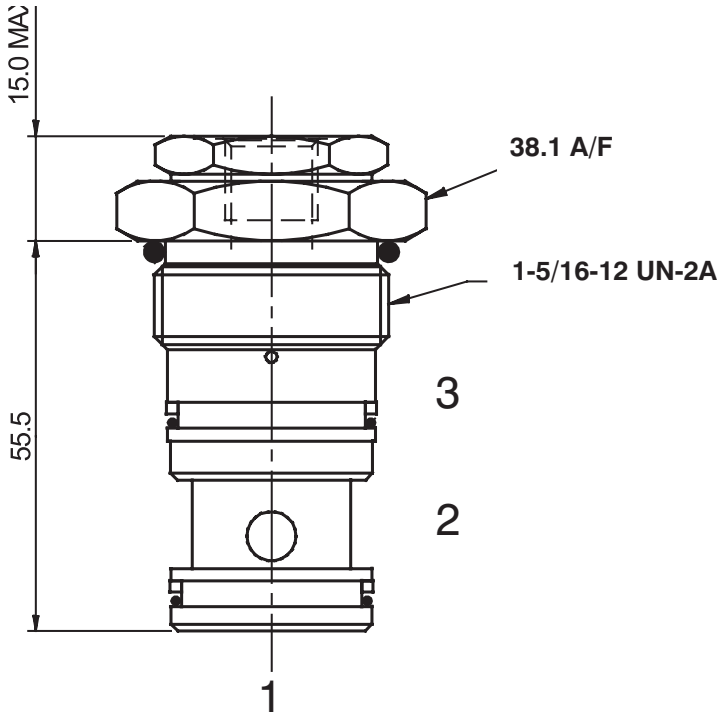
Δp-Q Characteristics

characteristics determined at n = 35 mm^2/s and t = 40 °C



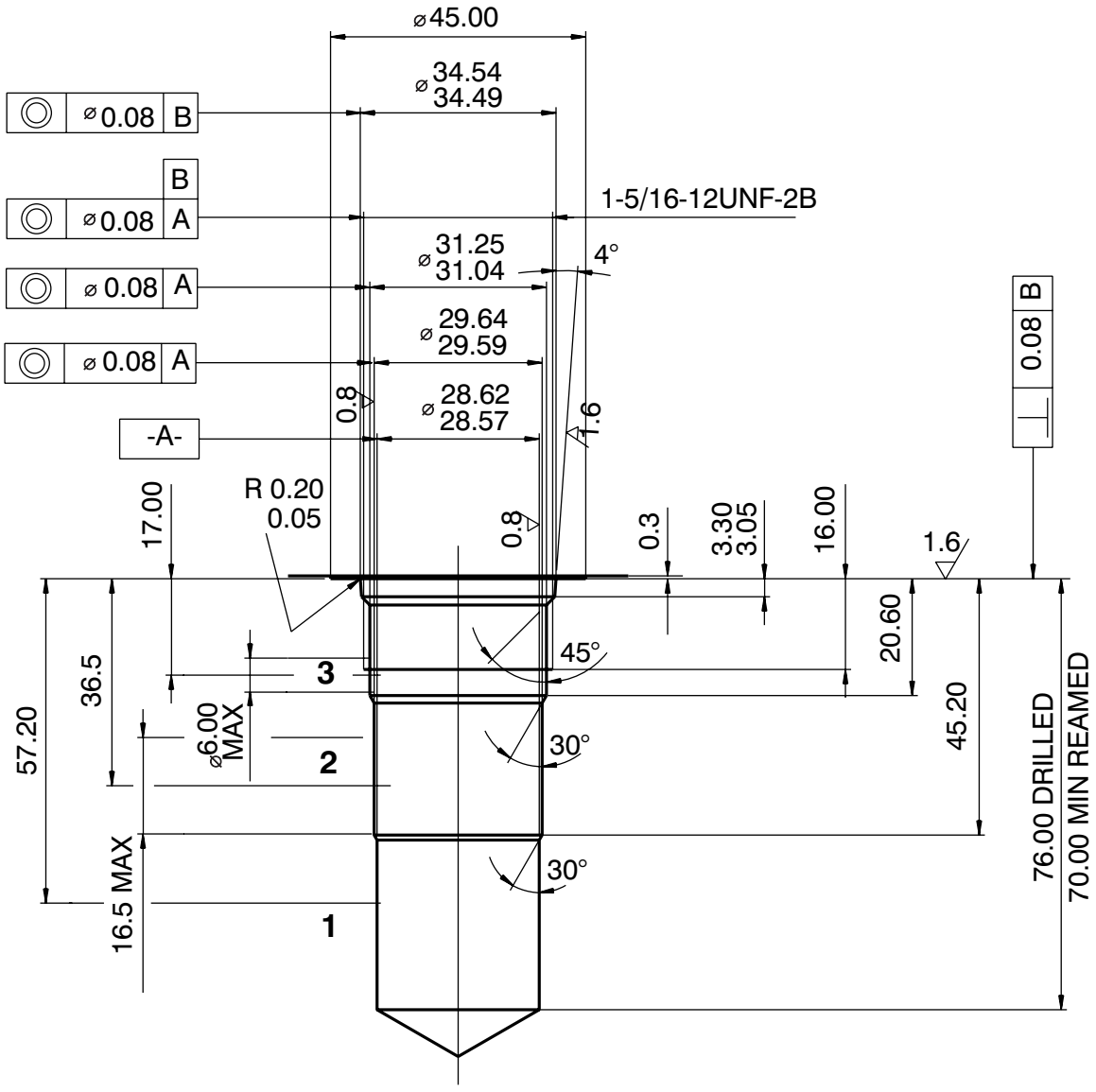
Dimensions

Measurements in millimeters



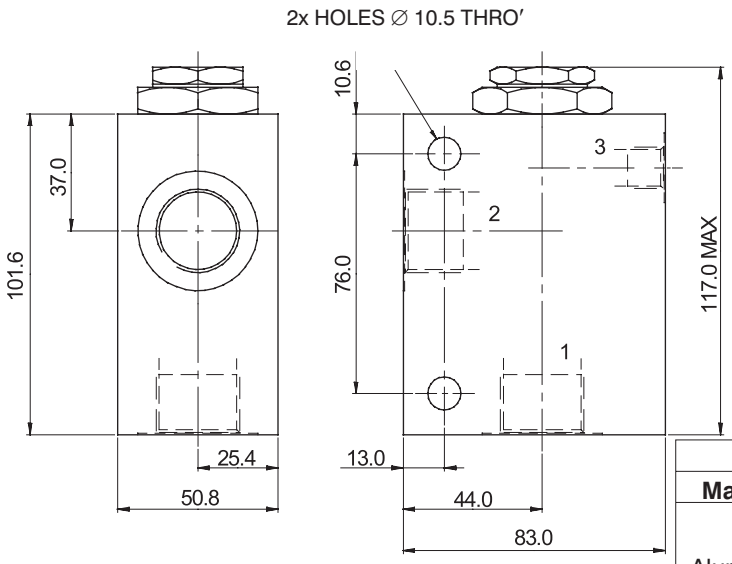
Cavity

Measurements in millimeters

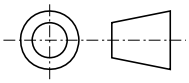


Valve Bodies

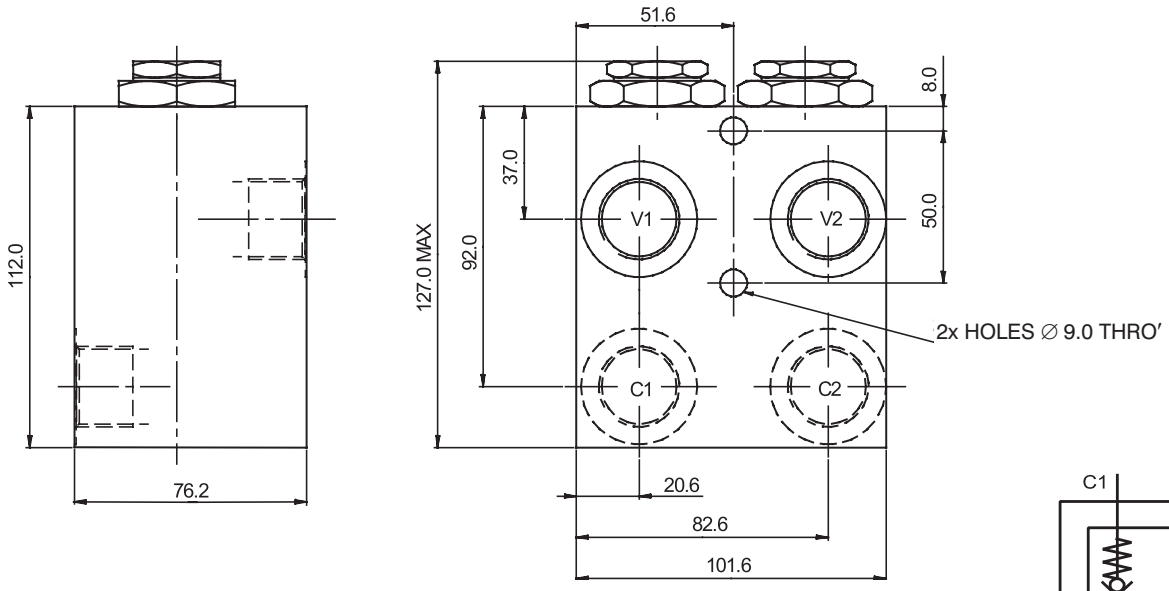
Measurements in millimeters

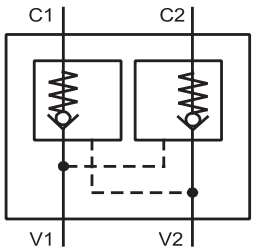


ISO A



Body without valve			
Material	**Ports**	**Port size**	**Type code**
Aluminium	1, 2	G3/4	SB-S3-0107AL
	3	G1/4	
	1, 2	SAE 12, 1-1/16-12	SB-S3-0108AL
	3	SAE 6, 9/16-18	
Steel	1, 2	G3/4	SB-S3-0107ST
	3	G1/4	
	1, 2	SAE 12, 1-1/16-12	SB-S3-0108ST
	3	SAE 6, 9/16-18	





Dual body without valve			
Material	**Ports**	**Port size**	**Type code**
Aluminium	C1, C2, V1, V2	G3/4	SB-S4-0207AL
	C1, C2, V1, V2	SAE 12, 1-1/16-12	SB-S4-0208AL
Steel	C1, C2, V1, V2	G3/4	SB-S4-0207ST
	C1, C2, V1, V2	SAE 12, 1-1/16-12	SB-S4-0208ST

The use of aluminium bodies is limited to a maximum operating pressure of 210 bar.

Spare Parts

Seal kits on request.

Caution!

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Pilot Cperated Check Valve SCC5H-Q3/I

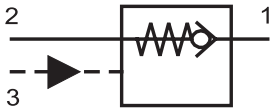
Pilot to Close

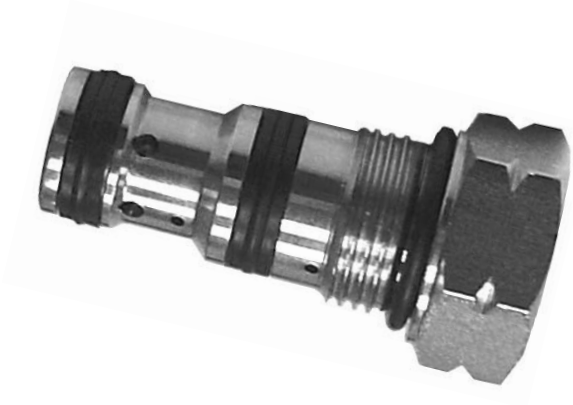
M20 x 1,5 • p_{max} 350 bar • Q 30 L/min

HA 5221
9/2006

Replaces
HA 5221 8/2005

- ❑ **Load-holding without leakage**
- ❑ **Low pressure drop**
- ❑ **Pilot seal**





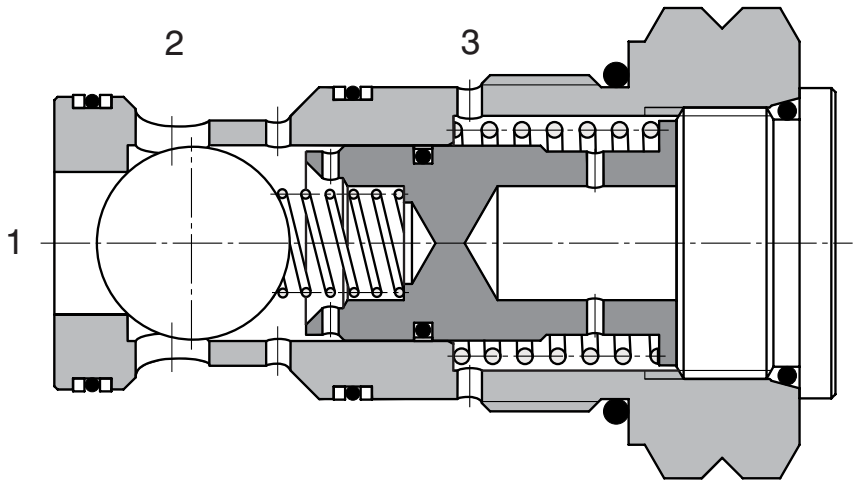
Functional Description

The one-way control valves make the flow possible in one direction with a low pressure drop and prevent from the flow in opposite direction.
The pressure in channel (1) causes a lifting of the valve ball from the seat against the spring. In this way it is released the flow from (1) into (2). The flow in the direction from (2) to (1) is not possible because the spring action and pressure in channel (2) result in pressure exerted to the valve ball in the seat.
The control pressure in channel (3) acts to the control gate valve pressing the valve ball in the appropriate valve seat. In this way the flow is shut off closely in both the directions.

$$\text{Control pressure for shutting off the valve} = \frac{\text{Pressure of channel (1)}}{2}$$

At computing the control pressure it is necessary to take into consideration that the pressure in channel (2) increases the necessary control pressure by the same value multiplied by an efficient differential area having a value of 1-1/2 at a ratio of control areas of 2:1.

As for basic surface treatment the external part of the valve are zinc coated.



Ordering Code

SC5H-R3/I □ □

Pilot Operated Check Valve
Pilot to close

Pilot ratio

Standard	2:1	**2**

NBR	**No designation**

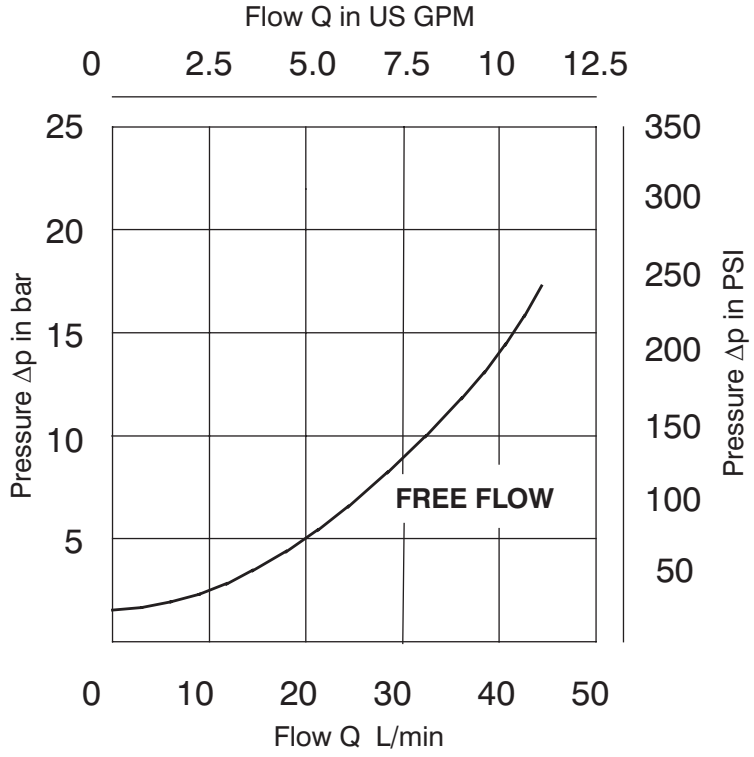
Technical Data

Figures based on: Oil Temp = 40 °C / Viscosity = 40 mm^2/s

Cavity		M20 x 1.5
Maximum flow	L/min	30
Max. pressure	bar	350
Pilot ratio		2:1
Pressure drops	bar	see Δp - Q characteristics
Hydraulic fluid		Hydraulic oil (HM, HV) according to DIN 51254
Fluid temperature range	°C	-20 to +80
Ambient temperature	°C	-20 to +80
Viscosity	mm^2/s	10 to 500
Maximum degree of fluid contamination		according to ISO 4406 (1999), Class 21/18/15
Weight	kg	0.08
Maximum valve tightening torque in valve body or in control block	Nm	45^{+2}
Mounting position		any

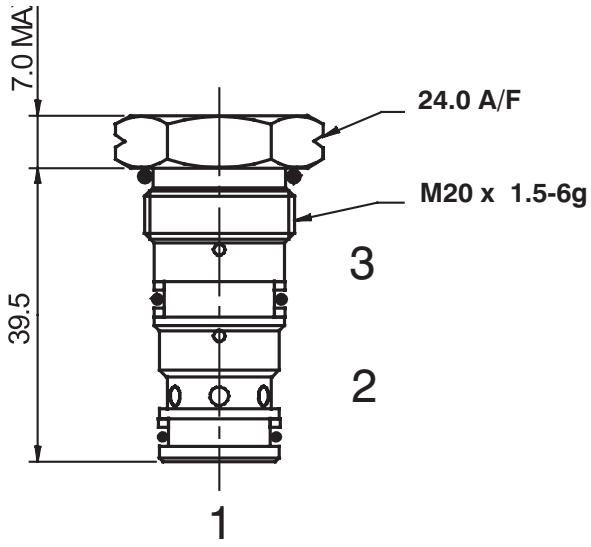
Δp-Q Characteristics

characteristics determined at n = 35 mm^2/s and t = 40 °C



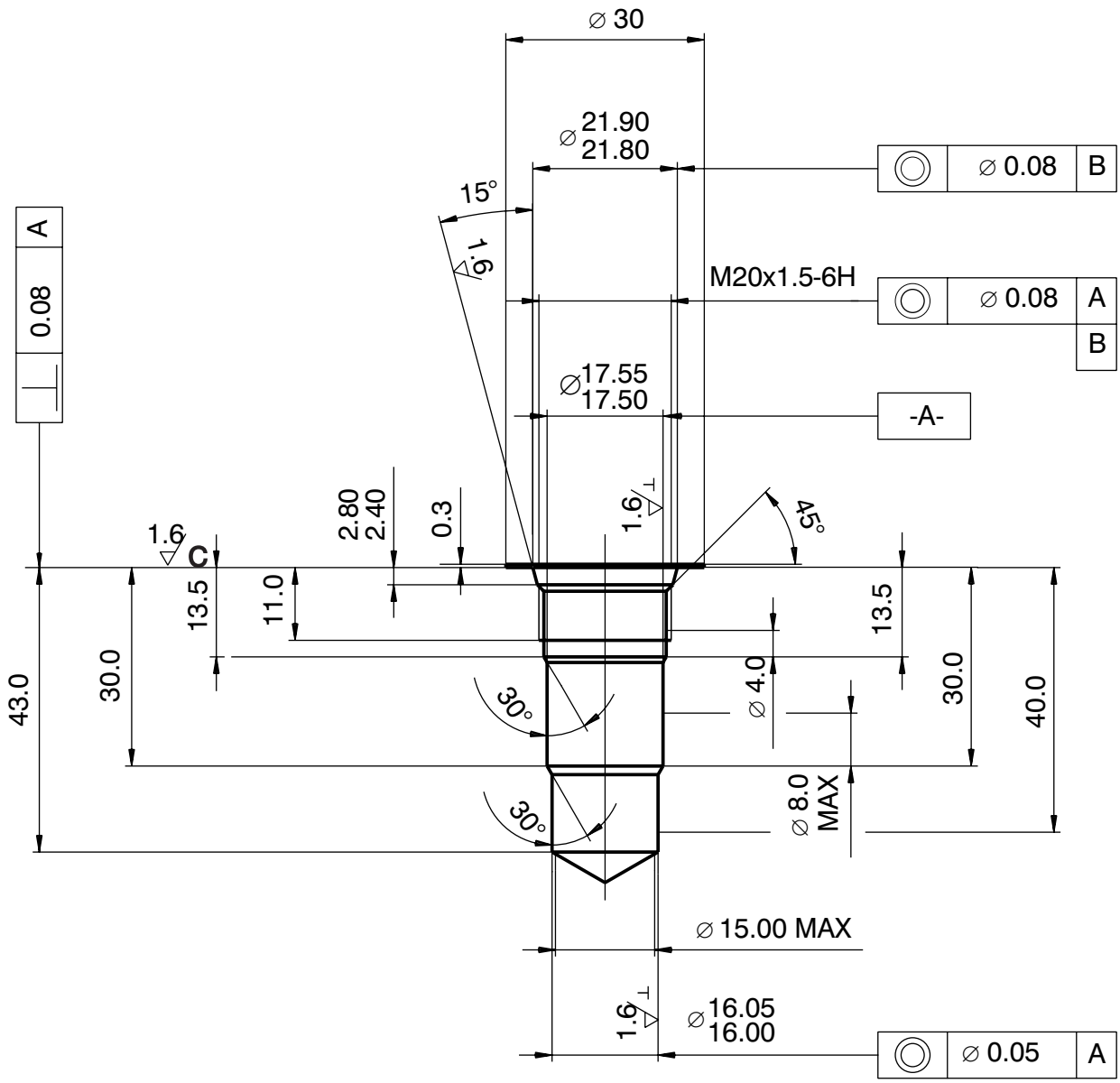
Dimensions

Measurements in millimeters



Cavity

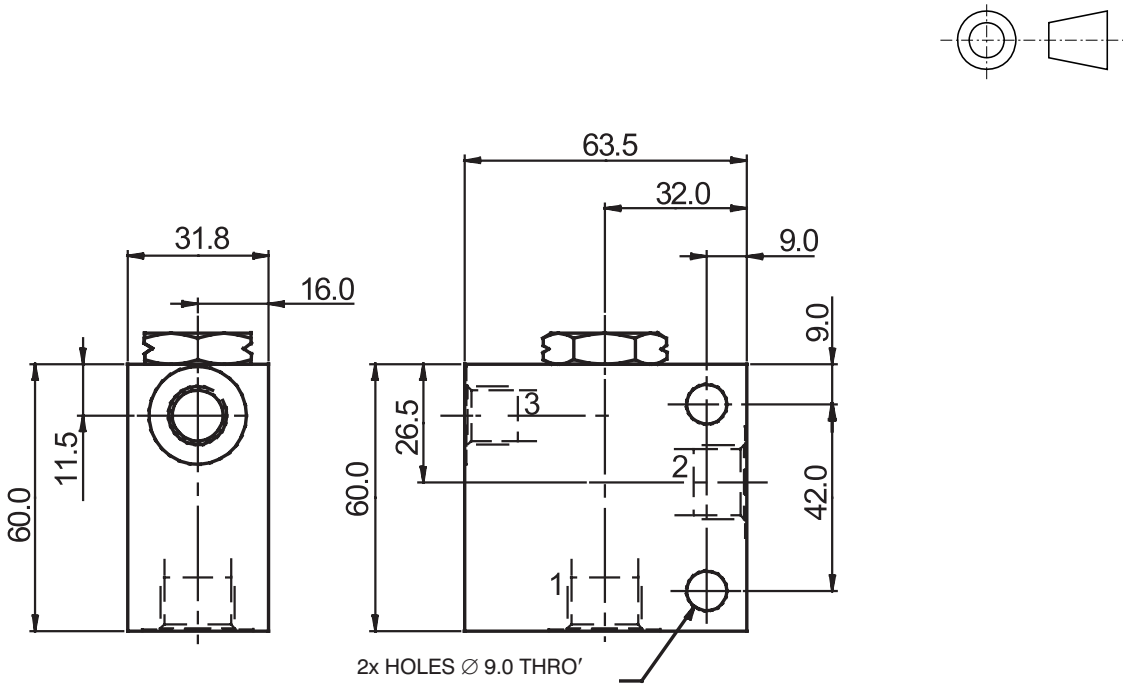
Measurements in millimeters



Valve Bodies

Measurements in millimeters

ISO A



Body without valve			
Material	**Ports**	**Port size**	**Type code**
Aluminium	1, 2	G3/8	SB-R3-0105AL
	3	G1/4	
	1, 2	SAE 8, 3/4-16	SB-R3-0106AL
	3	SAE 6, 9/16-18	
Steel	1, 2	G3/8	SB-R3-0105ST
	3	G1/4	
	1, 2	SAE 8, 3/4-16	SB-R3-0106ST
	3	SAE 6, 9/16-18	

The use of aluminium bodies is limited to a maximum operating pressure of 210 bar.

Spare Parts

Seal kits on request.

Caution!

- The packing foil is recyclable.
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law.

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www.argo-hytos.com

Pilot Cperated Check Valve SCC5H-S3/I

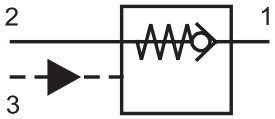
Pilot to Close

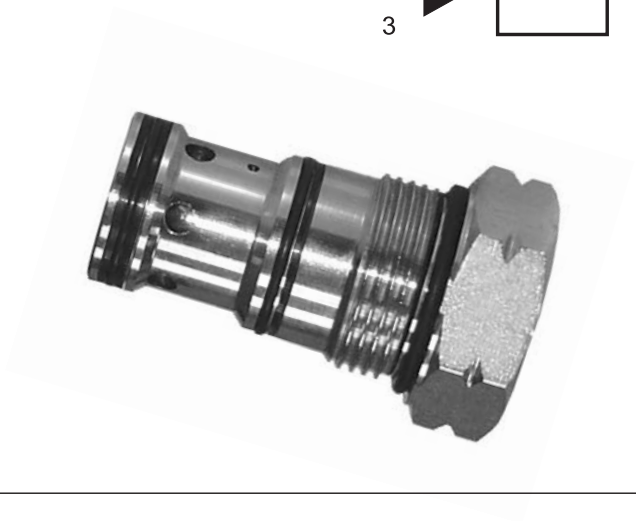
1-5/16-12 UN-2A • p_{max} 350 bar • Q 120 L/min

HA 5222
9/2006

Replaces
HA 5222 8/2005

- ❑ **Load-holding without leakage**
- ❑ **Low pressure drop**
- ❑ **Pilot seal**





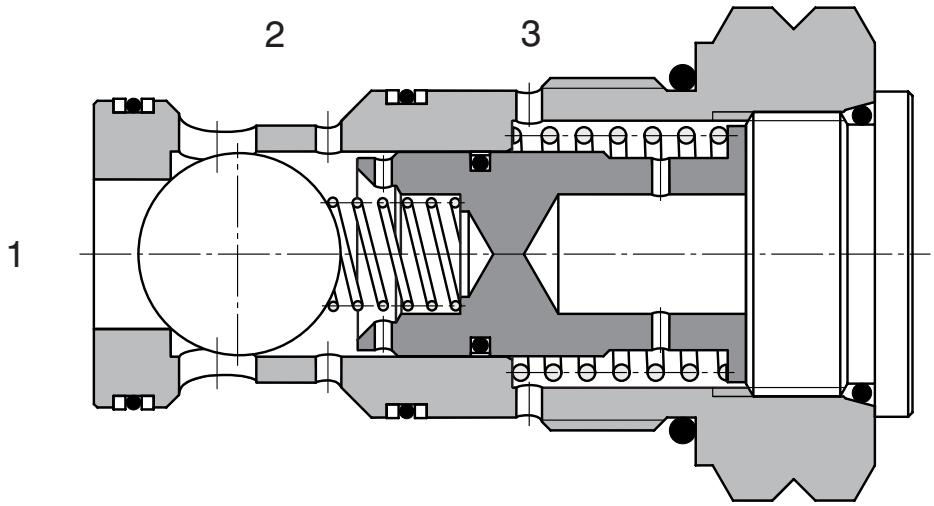
Functional Description

The one-way control valves make the flow possible in one direction with a low pressure drop and prevent from the flow in opposite direction.
The pressure in channel (1) causes a lifting of the valve ball from the seat against the spring. In this way it is released the flow from (1) into (2). The flow in the direction from (2) to (1) is not possible because the spring action and pressure in channel (2) result in pressure exerted to the valve ball in the seat.
The control pressure in channel (3) acts to the control gate valve pressing the valve ball in the appropriate valve seat. In this way the flow is shut off closely in both the directions.

$$\text{Control pressure for shutting off the valve} = \frac{\text{Pressure of channel (1)}}{2}$$

At computing the control pressure it is necessary to take into consideration that the pressure in channel (2) increases the necessary control pressure by the same value multiplied by an efficient differential area having a value of 1-1/2 at a ratio of control areas of 2:1.

As for basic surface treatment the external part of the valve are zinc coated.



Ordering Code

SCC5H-S3/I [ ] [ ]

Pilot Operated Check Valve
Pilot to close

Pilot ratio

Standard	2:1	**2**

NBR	**No designation**

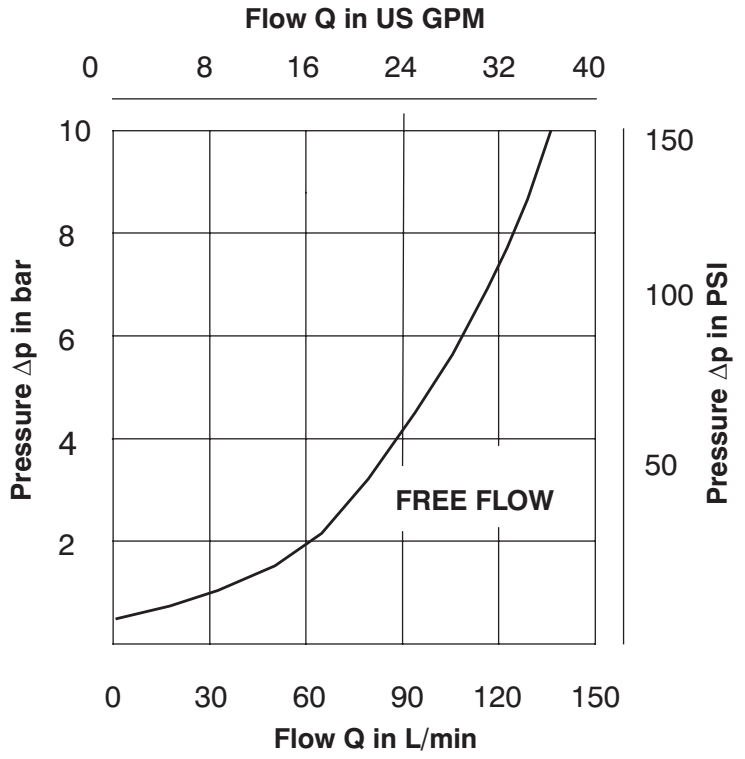
Technical Data

Figures based on: Oil Temp = 40 °C / Viscosity = 40 mm^2/s

Cavity		1-5/16-12 UN-2A
Maximum flow	L/min	120
Max. pressure	bar	350
Pilot ratio		2:1
Pressure drops	bar	see Δp - Q characteristics
Hydraulic fluid		Hydraulic oil (HM, HV) according to DIN 51254
Fluid temperature range	°C	-20 to +80
Ambient temperature	°C	-20 to +80
Viscosity	mm^2/s	10 to 500
Maximum degree of fluid contamination		according to ISO 4406 (1999), Class 21/18/15
Weight	kg	0.28
Maximum valve tightening torque in valve body or in control block	Nm	100^{+2}
Mounting position		any

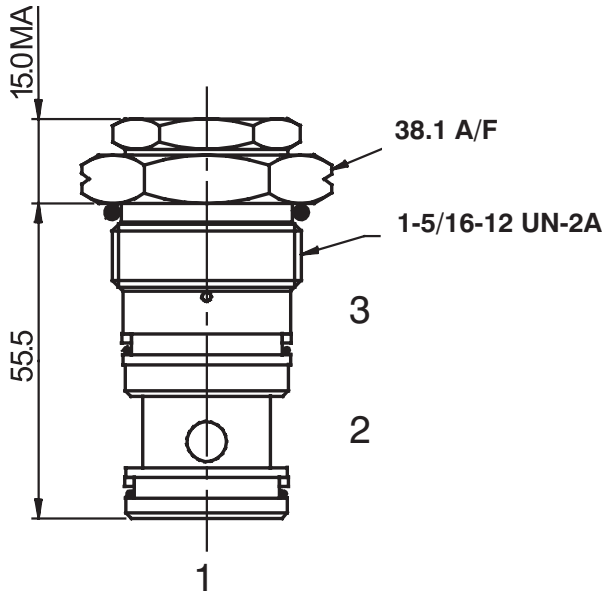
Δp-Q Characteristics

characteristics determined at n = 35 mm^2/s and t = 40 °C



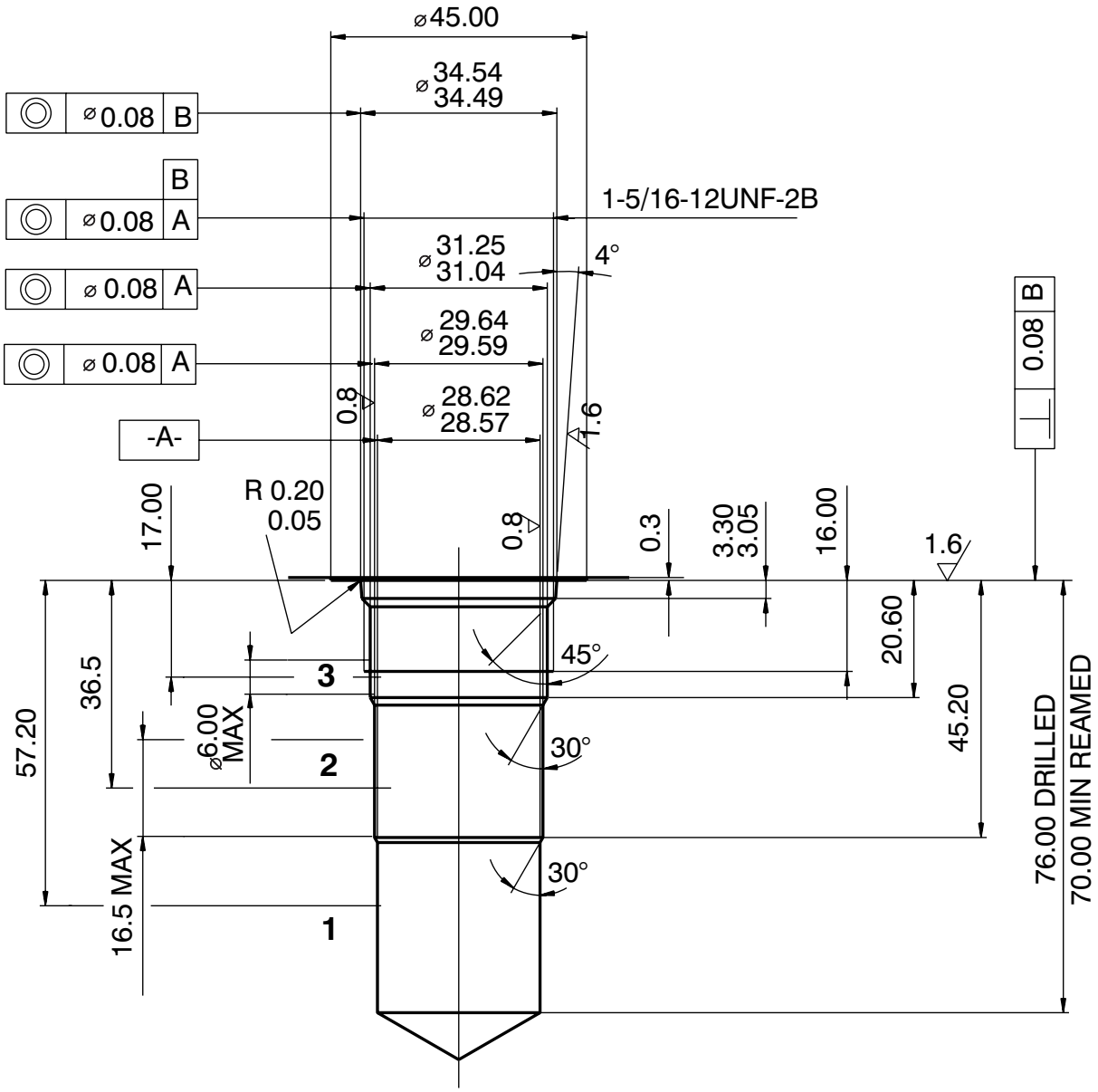
Dimensions

Measurements in millimeters



Cavity

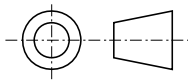
Measurements in millimeters

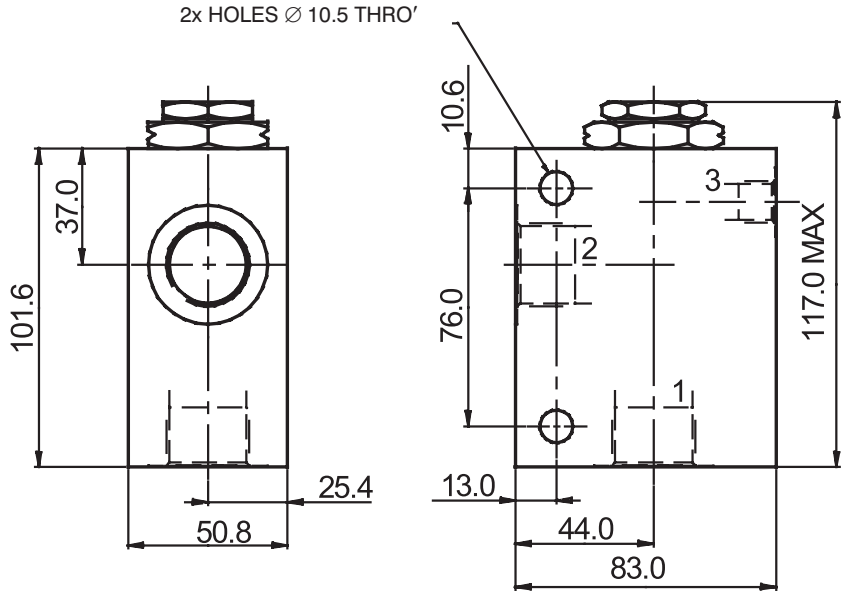


Valve Bodies

Measurements in millimeters

ISO A





Body without valve			
Material	**Ports**	**Port size**	**Type code**
Aluminium	1, 2	G3/4	SB-S3-0107AL
	3	G1/4	
	1, 2	SAE 12, 1-1/16-12	SB-S3-0108AL
	3	SAE 6, 9/16-18	
Steel	1, 2	G3/4	SB-S3-0107ST
	3	G1/4	
	1, 2	SAE 12, 1-1/16-12	SB-S3-0108ST
	3	SAE 6, 9/16-18	

The use of aluminium bodies is limited to a maximum operating pressure of 210 bar.

Spare Parts

Seal kits on request.

Caution!

- The packing foil is recyclable.
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law.

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Pilot Operated Unloading Valve

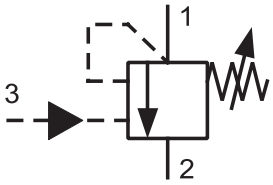
SU6A-U3/I

1-1/8-12 UNF-2A • p_{max} 350 bar • Q 60 L/min

HA 5224
9/2006

Replaces
HA 5224 8/2005

- ❑ **May be used as accumulator charging valve**
- ❑ **For unloading a high flow – low pressure pump to tank.**

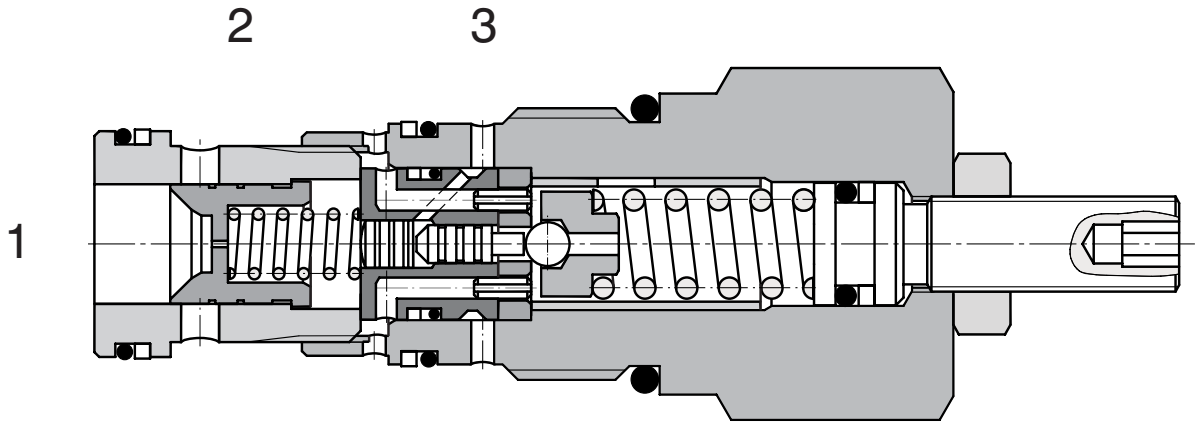


Functional Description

The valve consists of a ball control stage with a common drain into the storage tank, a main stage with a gate valve and a switching stage consisting of a bushing and a control gate valve. It is built-in in a secondary line in view of the feeding line. At the same time connections (1) and (3) are connected to the feeding line however they are separated mutually with the use of a one-way valve. For channel (1) on the side of the pump and channel (3) on the side of the system see page No 4.
The pressure in channel (1) acts through the nozzle hole in the longitudinal axis of the main gate valve also on its side loaded by the spring and through another nozzle hole in the switching stage to the control valve ball. As soon as this pressure exceeds a preset value of the spring force the ball is lifted from its seat and the control oil flows out to the storage tank. As a result of pressure difference the main gate valve is shifted against weak spring and the flow into the side channel (2) is released in this way.

The system pressure in channel (3) acting through the nozzle hole to the control gate valve prevents the control, stage from being shut off. The action of this pressure results in shifting the control gate valve in the direction against the ball of the control stage and in maintaining the ball in the lifted position from the seat. As soon as the system pressure drops to a value of 85% corresponding to the percentage to a ratio of areas of the control stage valve ball seat and the control gate valve the control stage and the main stage are shut off again and a new cycle can start.

As for appropriate basic surface finish the external parts are zinc coated.



Ordering Code

SU6A-U3/I [ ] [ ]

Pilot Operated Unloading Valve

Adjustable pressure

40 - 100 bar	**10**
70 - 200 bar	**20**
150 - 350 bar	**35**

NBR — **No designation**

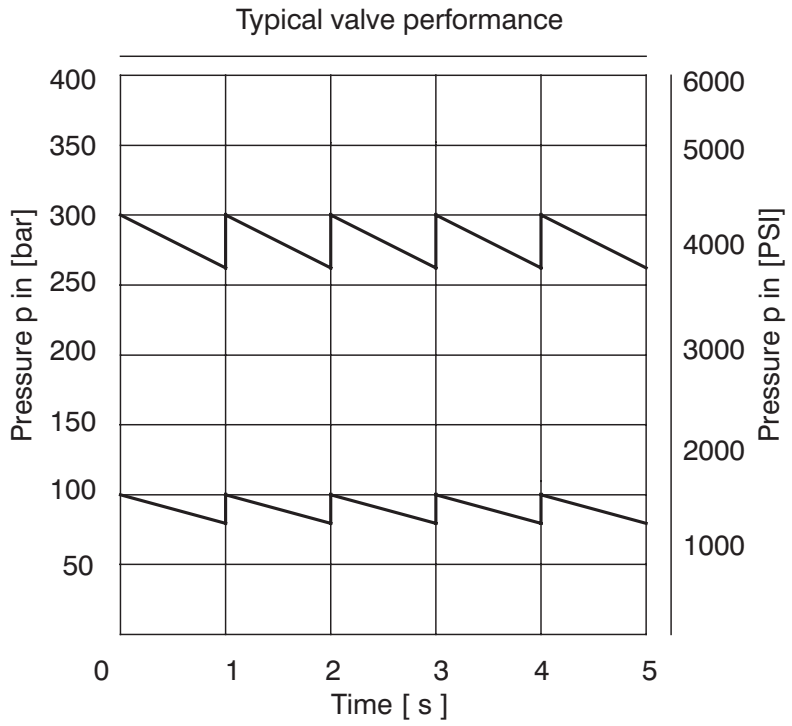
Technical Data

Figures based on: Oil Temp = 40 °C / Viscosity = 40 mm^2/s

Cavity		1-1/8-12 UNF-2A
Maximum flow	L/min	60
Max. pressure	bar	350
Differntial unload/reload	%	10 - 15
Hydraulic fluid		Hydraulic oil (HM, HV) according to DIN 51254
Fluid temperature range	°C	-20 to +80
Ambient temperature	°C	-20 to +80
Viscosity	mm^2/s	10 to 500
Maximum degree of fluid contamination		according to ISO 4406 (1999), Class 21/18/15
Weight	kg	0.46
Maximum valve tightening torque in valve body or in control block	Nm	75^{+2}
Mounting position		any

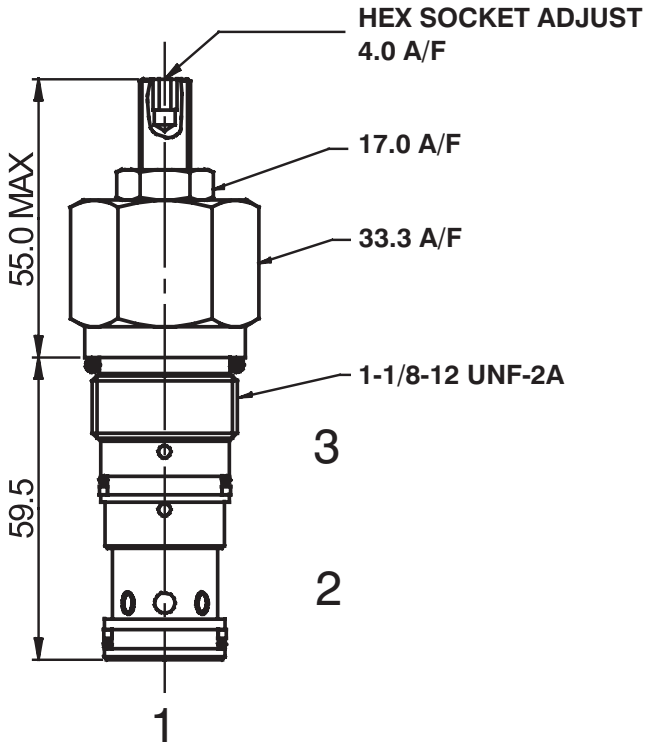
p-Q Characteristics

characteristics determined at n = 35 mm^2/s and t = 40 °C



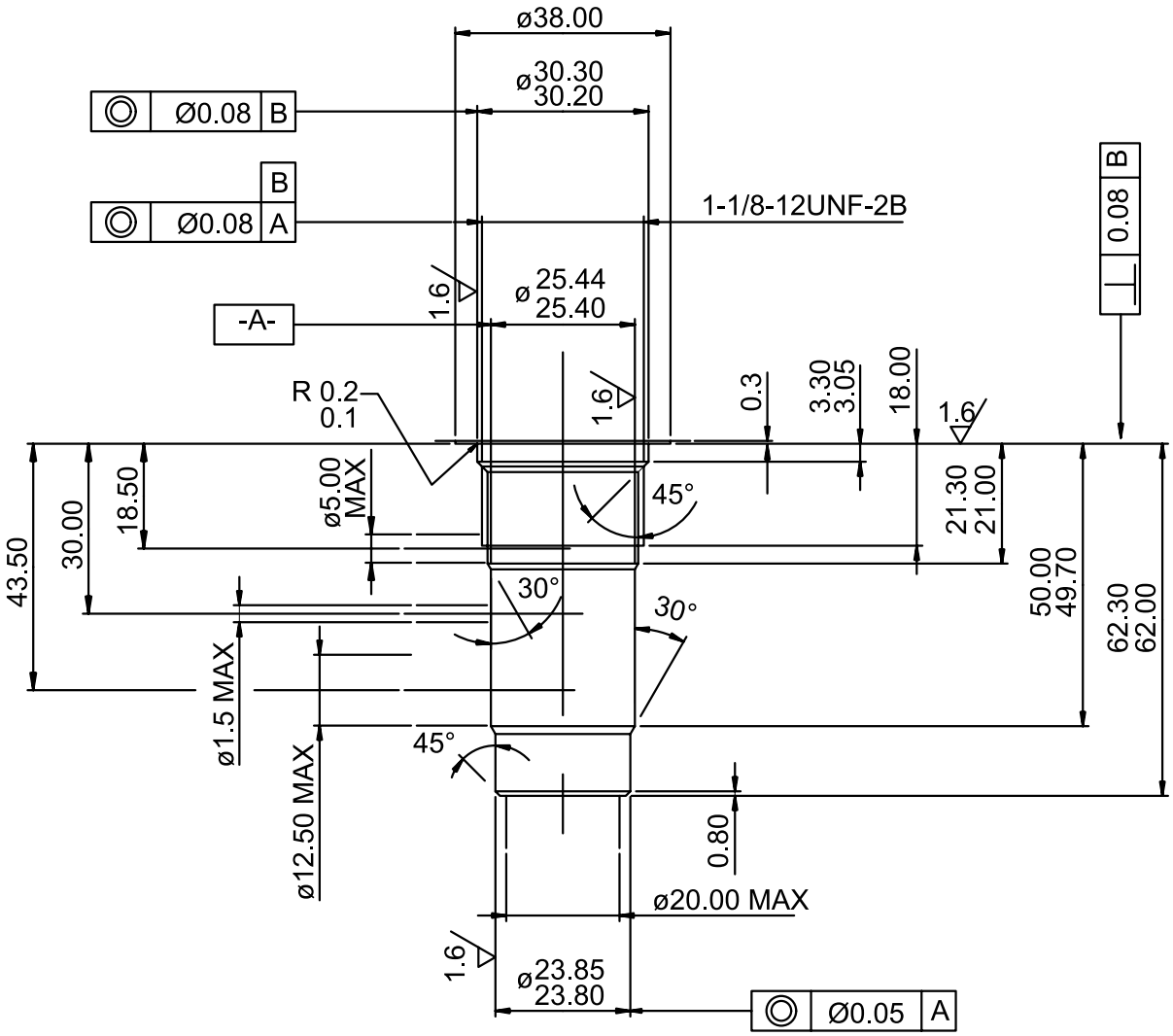
Dimensions

Measurements in millimeters



Cavity

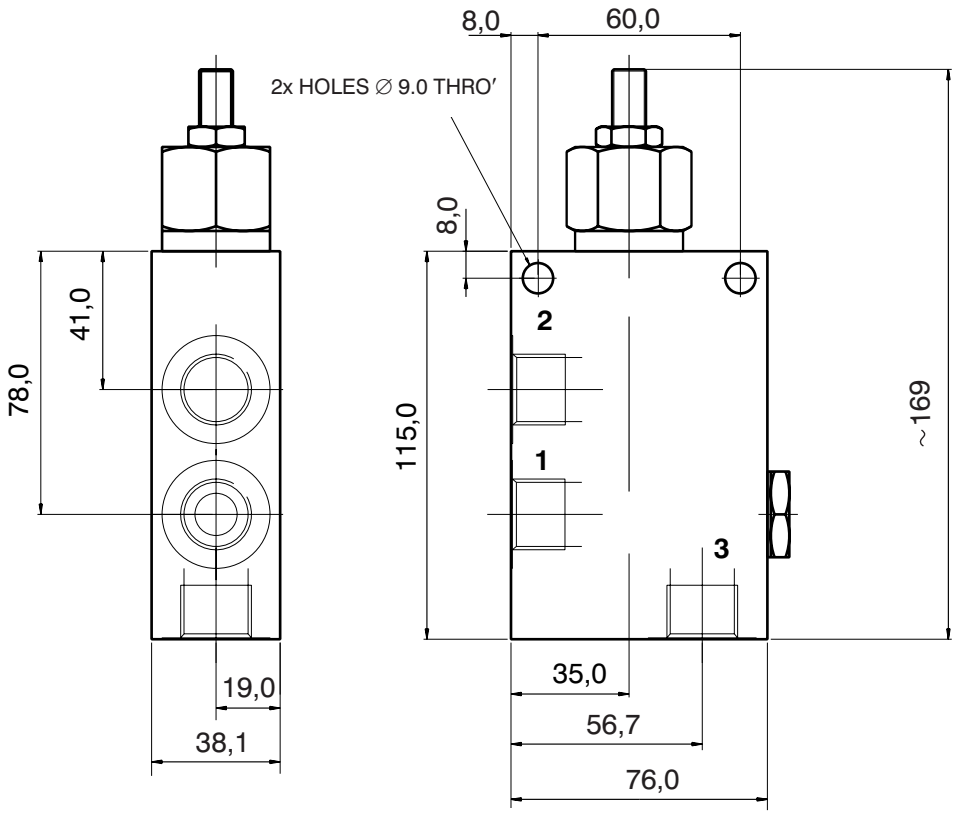
Measurements in millimeters

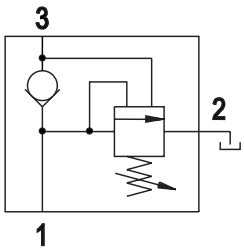


Valve Bodies

Measurements in millimeters

ISO A





Body without valve			
Material	**Ports**	**Port size**	**Type code**
Aluminium	1, 2, 3	G1/2	SB-U3-0105AL
	1, 2, 3	SAE10, 7/8-14	SB-U3-0106AL
Steel	1, 2, 3	G1/2	SB-U3-0105ST
	1, 2, 3	SAE10, 7/8-14	SB-U3-0106ST

The use of aluminium bodies is limited to a maximum operating pressure of 210 bar.

Spare Parts

Seal kits on request.

Caution!

- The packing foil is recyclable.
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law.

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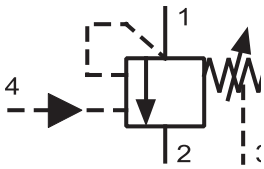
Pilot Operated Priority Unloading Valve

SUD6A-V4/I

1-5/16-12 UNS • p_{max} 350 bar • Q 200 L/min

HA 5225
9/2006

Replaces
HA 5225 8/2005



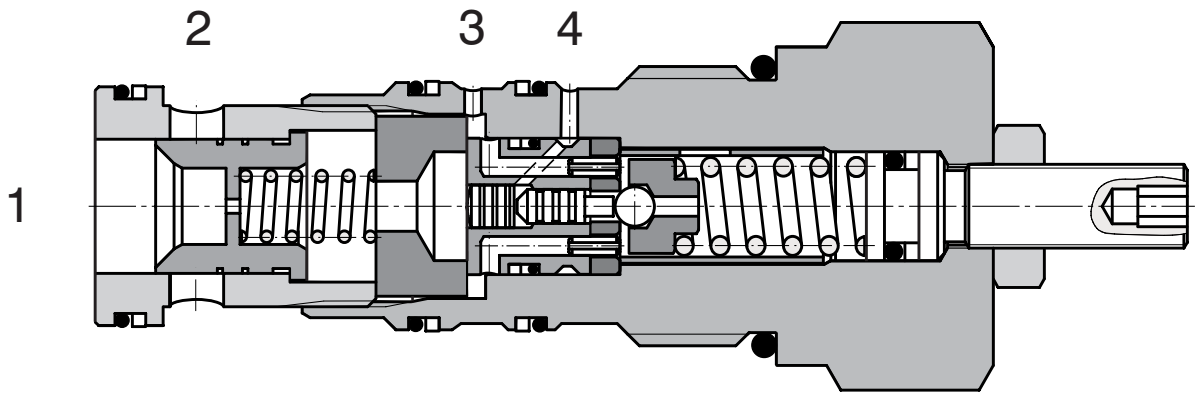
- **May be used as accumulator charging valve**
- **For unloading a high flow – low pressure pump to tank.**

Functional Description

The valve consists of a ball control stage with a common drain into the storage tank, a main stage with a gate valve and a switching stage consisting of a bushing and a control gate valve. It is built-in in a secondary line in view of the feeding line. At the same time connections (1) and (4) are connected to the feeding line however they are separated mutually with the use of a one-way valve. For channel (1) on the side of the pump and channel (4) on the side of the system see page No 4.
The pressure in channel (1) acts through the nozzle hole in the longitudinal axis of the main gate valve also on its side loaded by the spring and through another nozzle hole in the switching stage to the control valve ball. As soon as this pressure exceeds a preset value of the spring force the ball is lifted from its seat and the control oil flows out to the storage tank. As a result of pressure difference the main gate valve is shifted against weak spring and the flow into the side channel (2) is released in this way.

The system pressure in channel (4) acting through the nozzle hole to the control gate valve prevents the control, stage from being shut off. The action of this pressure results in shifting the control gate valve in the direction against the ball of the control stage and in maintaining the ball in the lifted position from the seat. As soon as the system pressure drops to a value of 85% corresponding to the percentage to a ratio of areas of the control stage valve ball seat and the control gate valve the control stage and the main stage are shut off again and a new cycle can start.

As for appropriate basic surface finish the external parts are zinc coated.



Ordering Code

SUD6A-V4/I [ ] [ ]

Pilot Operated Priority
Unloading Valve

Adjustable pressure

30 - 200 bar	**20**
150 - 350 bar	**35**

NBR	**No designation**

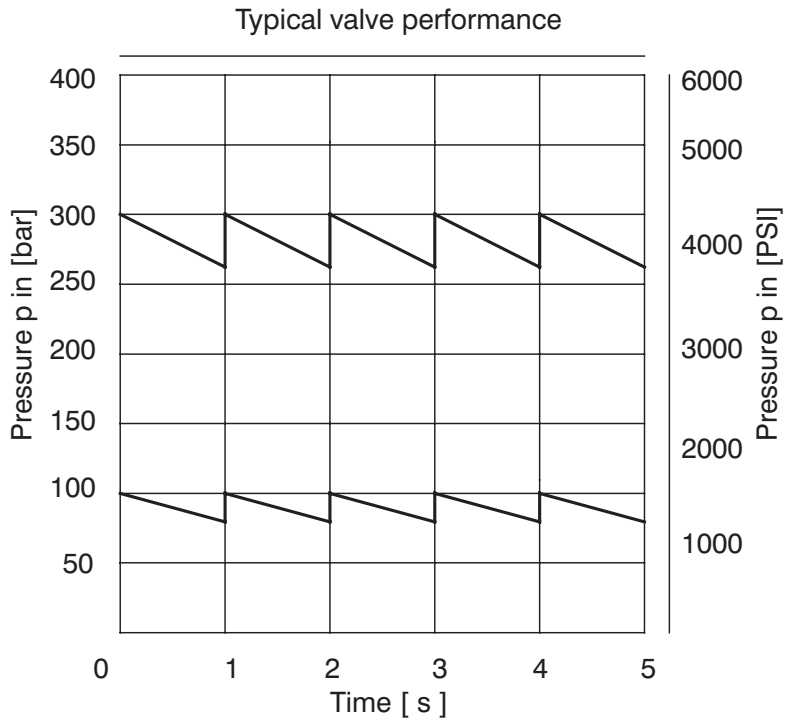
Technical Data

Figures based on: Oil Temp = 40 °C / Viscosity = 40 mm^2/s

Cavity		1-5/16-12 UNS
Maximum flow	L/min	200
Max. pressure	bar	350
Differntial unload/reload	%	10 - 15
Hydraulic fluid		Hydraulic oil (HM, HV) according to DIN 51254
Fluid temperature range	°C	-20 to +80
Ambient temperature	°C	-20 to +80
Viscosity	mm^2/s	10 to 500
Maximum degree of fluid contamination		according to ISO 4406 (1999), Class 21/18/15
Weight	kg	0.74
Maximum valve tightening torque in valve body or in control block	Nm	100^{+2}
Mounting position		any

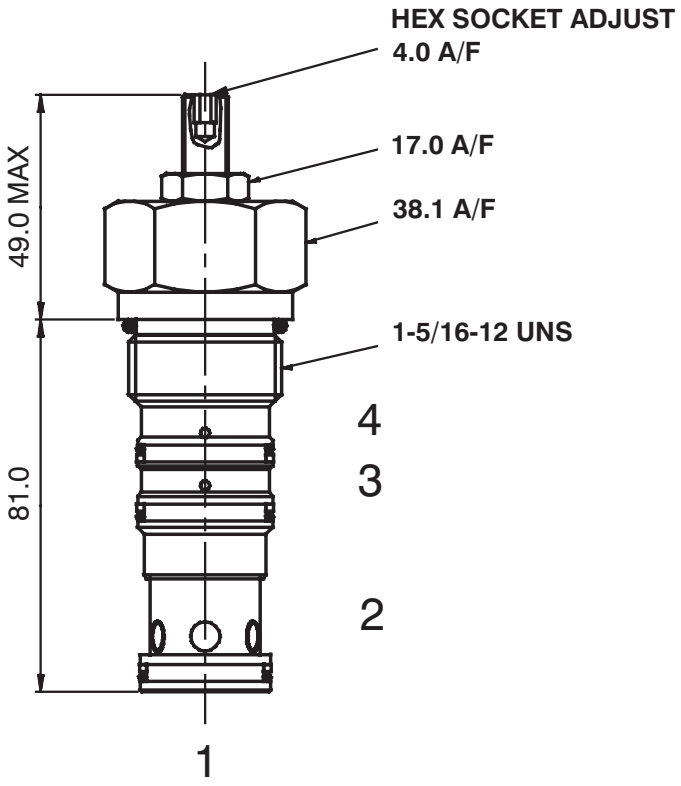
p-Q Characteristics

characteristics determined at n = 35 mm^2/s and t = 40 °C



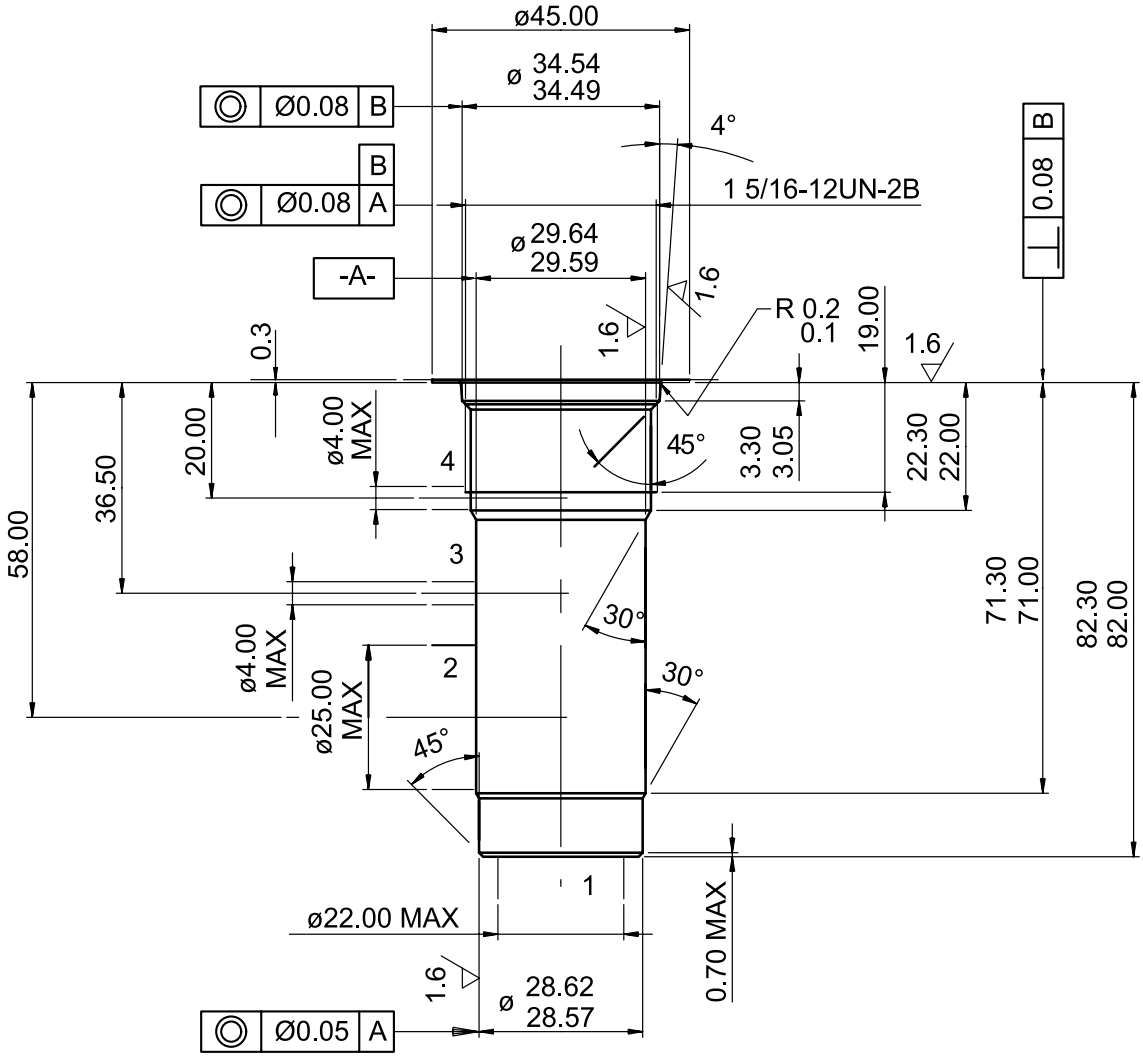
Dimensions

Measurements in millimeters



Cavity

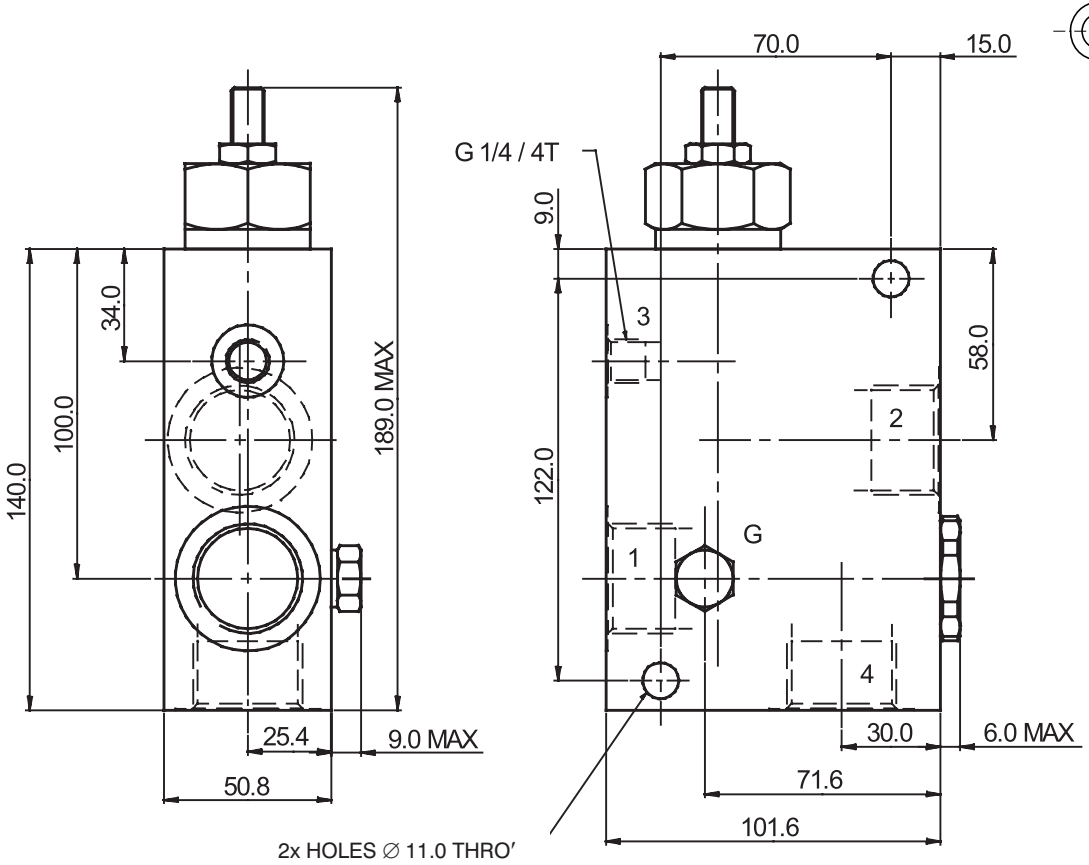
Measurements in millimeters

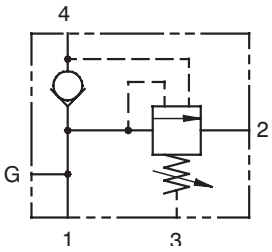


Valve Bodies

Measurements in millimeters

ISO A





Body without valve			
Material	**Ports**	**Port size**	**Type code**
Aluminium	1, 2, 4	G1	SB-V4-0109AL
	3	G1/4	
	1, 2, 4	SAE 16, 1-5/16-12	SB-V4-0110AL
	3	SAE 6, 9/16-18	
Steel	1, 2, 4	G1/2	SB-V4-0109ST
	3	G1/4	
	1, 2, 4	SAE 16, 1-5/16-12	SB-V4-0110ST
	3	SAE 6, 9/16-18	

The use of aluminium bodies is limited to a maximum operating pressure of 210 bar.

Spare Parts

Seal kits on request.

Caution!

- The packing foil is recyclable.
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Pilot Operated Unloading Valve

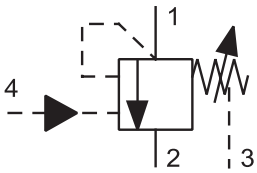
SUD6A-U4/I

1-1/8-12 UNF-2A • p_{max} 350 bar • Q 60 L/min

HA 5226
9/2006

Replaces
HA 5226 8/2005

- ❑ **May be used as accumulator charging valve**
- ❑ **For unloading a high flow – low pressure pump to tank**
- ❑ **May be used as priority circuit for steering and braking circuits**
- ❑ **Unloads to secondary system**

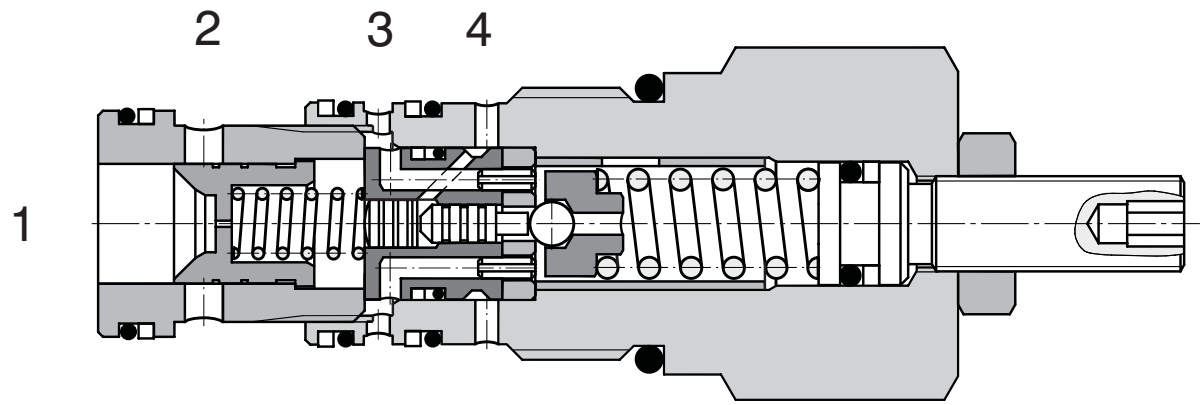


Functional Description

The valve consists of a ball control stage with a common drain into the storage tank, a main stage with a gate valve and a switching stage consisting of a bushing and a control gate valve. It is built-in in a secondary line in view of the feeding line. At the same time connections (1) and (4) are connected to the feeding line however they are separated mutually with the use of a one-way valve. For channel (1) on the side of the pump and channel (4) on the side of the system see page No 4.
The pressure in channel (1) acts through the nozzle hole in the longitudinal axis of the main gate valve also on its side loaded by the spring and through another nozzle hole in the switching stage to the control valve ball. As soon as this pressure exceeds a preset value of the spring force the ball is lifted from its seat and the control oil flows out to the storage tank. As a result of pressure difference the main gate valve is shifted against weak spring and the flow into the side channel (2) is released in this way.

The system pressure in channel (4) acting through the nozzle hole to the control gate valve prevents the control, stage from being shut off. The action of this pressure results in shifting the control gate valve in the direction against the ball of the control stage and in maintaining the ball in the lifted position from the seat. As soon as the system pressure drops to a value of 85% corresponding to the percentage to a ratio of areas of the control stage valve ball seat and the control gate valve the control stage and the main stage are shut off again and a new cycle can start.

As for appropriate basic surface finish the external parts are zinc coated.



Ordering Code

SUD6A-U4/I [ ] [ ]

Pilot Operated Unloading Valve

Adjustable pressure

40 - 100 bar	**10**
70 - 200 bar	**20**
150 - 350 bar	**35**

NBR

No designation

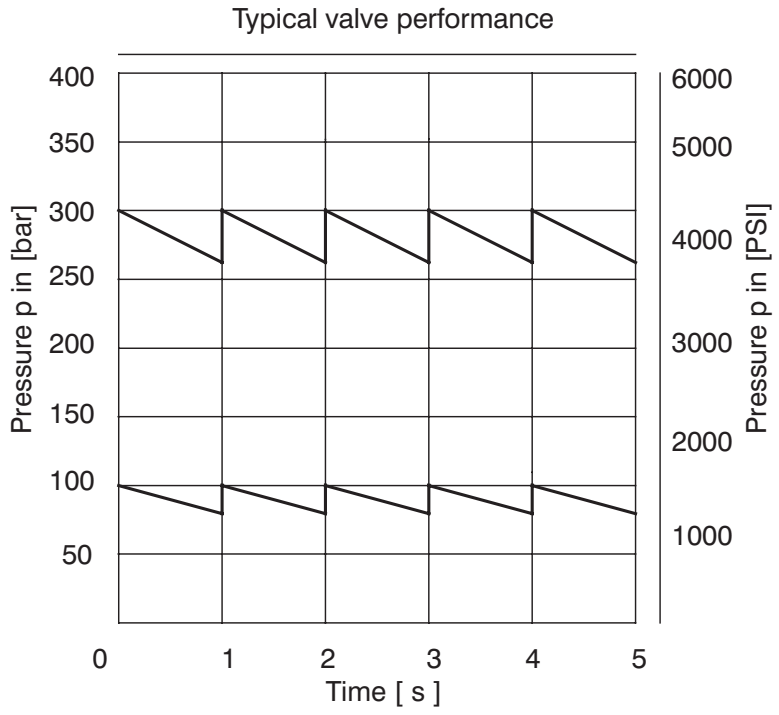
Technical Data

Figures based on: Oil Temp = 40 °C / Viscosity = 40 mm^2/s

Cavity		1-1/8-12 UNF-2A
Maximum flow	L/min	60
Max. pressure	bar	350
Differntial unload/reload	%	10 - 15
Hydraulic fluid		Hydraulic oil (HM, HV) according to DIN 51254
Fluid temperature range	°C	-20 to +80
Ambient temperature	°C	-20 to +80
Viscosity	mm^2/s	10 to 500
Maximum degree of fluid contamination		according to ISO 4406 (1999), Class 21/18/15
Weight	kg	0.46
Maximum valve tightening torque in valve body or in control block	Nm	75^{+2}
Mounting position		any

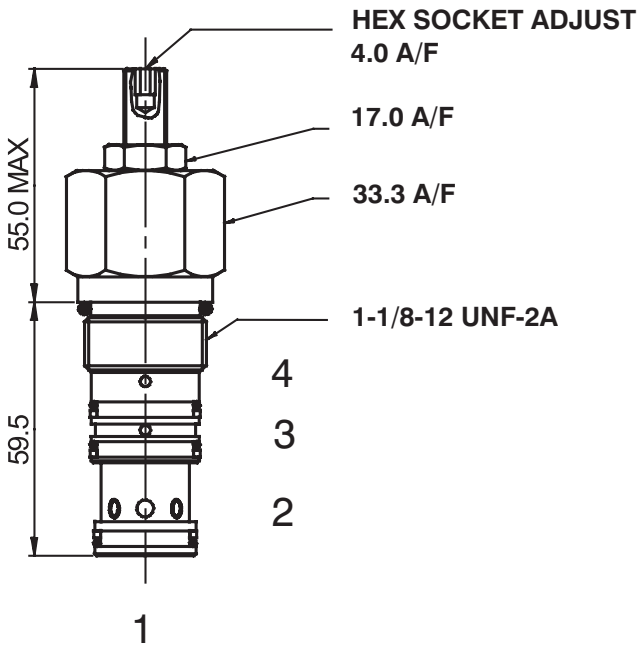
p-Q Characteristics

characteristics determined at n = 35 mm^2/s and t = 40 °C



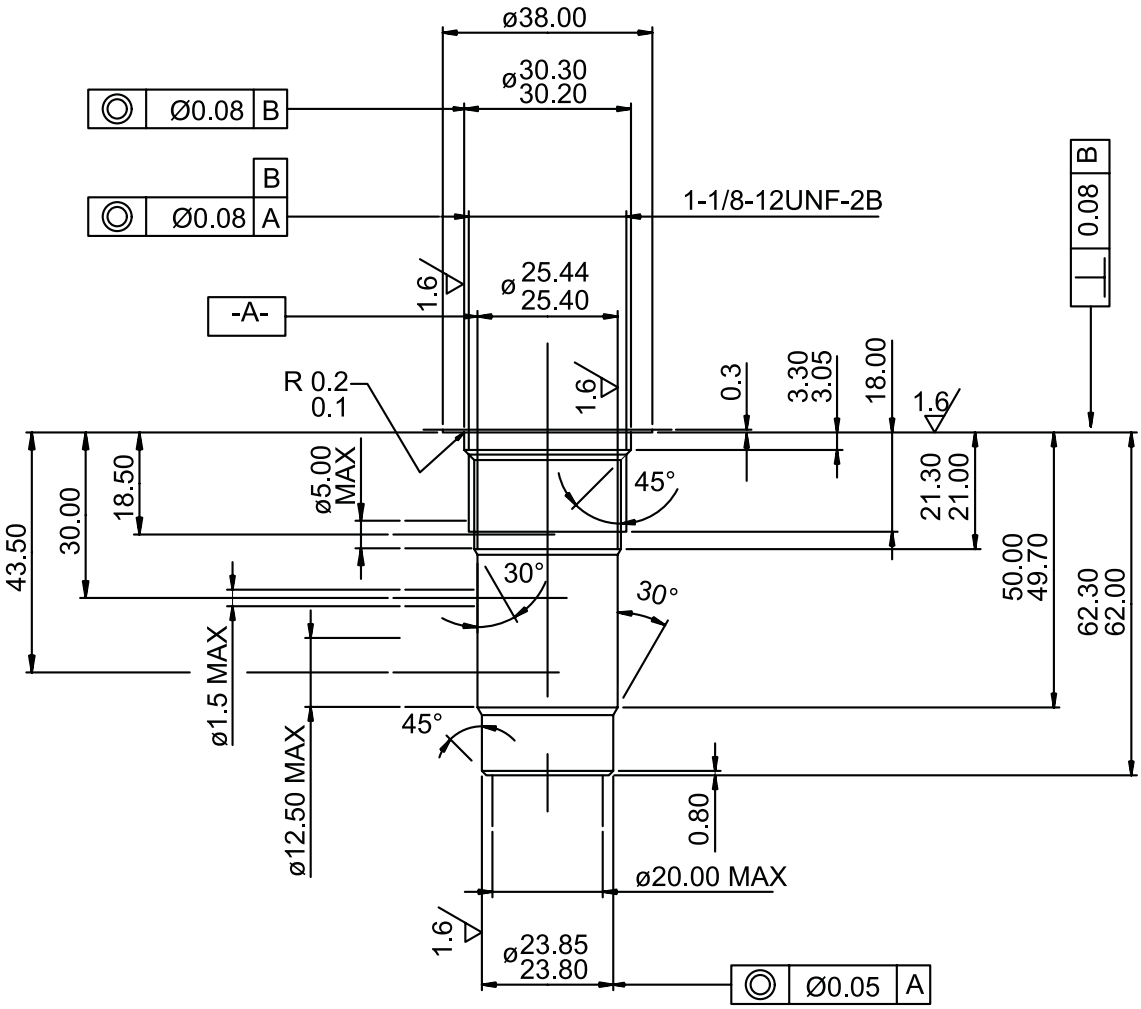
Dimensions

Measurements in millimeters



Cavity

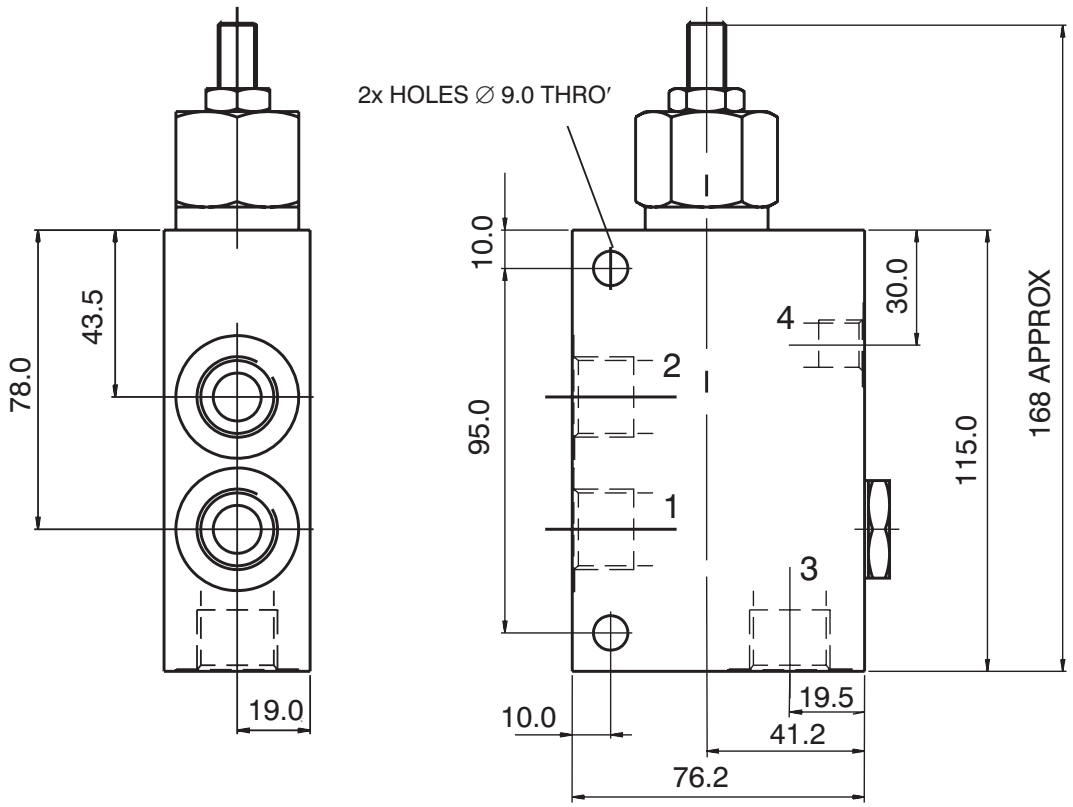
Measurements in millimeters

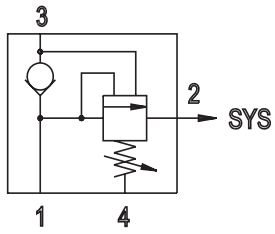


Valve Bodies

Measurements in millimeters

ISO A





Body without valve			
Material	**Ports**	**Port size**	**Type code**
Aluminium	1, 2, 3	G1/2	SB-U4-0105AL
	4	G1/4	
	1, 2, 3	SAE 10, 7/8-14	SB-U4-0106AL
	4	SAE 6, 3/4-16	
Steel	1, 2, 3	G1/2	SB-U4-0105ST
	4	G1/4	
	1, 2, 3	SAE 10, 7/8-14	SB-U4-0106ST
	4	SAE 6, 3/4-16	

The use of aluminium bodies is limited to a maximum operating pressure of 210 bar.

Spare Parts

Seal kits on request.

Caution!

- The packing foil is recyclable.
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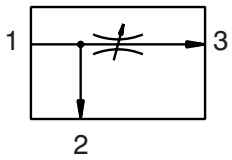
3-way Flow Control Valve

SF32A-K3/I

M27 x 2 • p_{max} 350 bar • Q 60 L/min

HA 5227 9/2006

Replaces HA 5227 9/2005

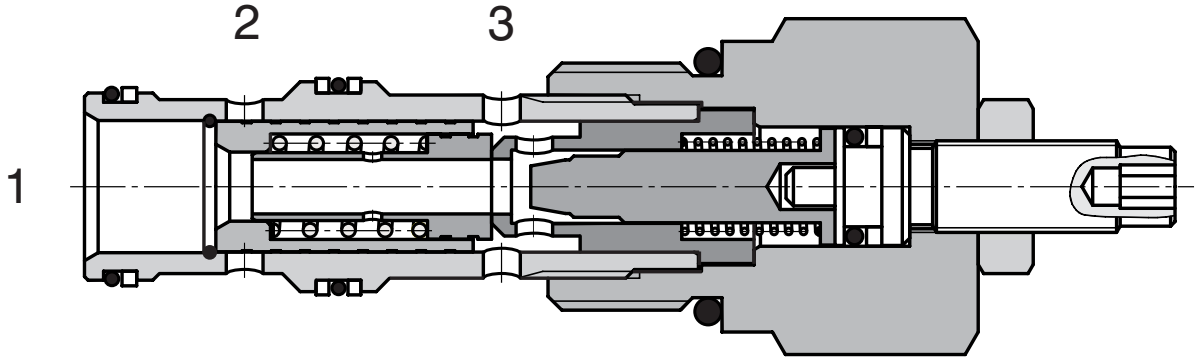


- ❑ **Priority style**
- ❑ **Constant flow largely independent to load and viscosity**
- ❑ **Port 2 can be pressurized**
- ❑ **Various flow ranges available**

Functional Description

The valve consists of an adjustable measuring orifice plate after which it is installed a stabilizer of pressure drop. During the flow from (1) to (3) the liquid flows through the centre of the stabilizer slide valve and then through radial orifices to the side channel (3). The stabilizer has been designed to serve for maintaining a pressure difference arisen on the measuring orifice plate at a constant level of approximately of 12 bar given by the spring force so as to ensure a constant rate of flow through the channel (3). The excessive flow of the liquid cause a dynamic pressure in channel (1) by means of which the slide valve of the stabilizer is shifted against the spring and opens the flow cross section to the channel (2) through which the excessive liquid flows out either to the drain or to another consumer. The channel (2) can be loaded by pressure. Due to permanent equalizing the forces the position of the stabilizer gate valve changes with each change of pressure before and after the measuring orifice plate and in this way it results in appropriate decreasing or eventually appropriate increasing the flow cross section of channels.
The liquid can flow through the valve also in opposite direction from (3) to (1), however, in a limited extent taking into consideration the fact that the liquid shall flow through the throttling cross section.

As for appropriate basic surface finish the external parts are zinc coated.



Ordering Code

SF32A-K3/I □ □

3-way Flow Control Valve

Adjustable flow range

4 - 40 L/min	**4**
6 - 60 L/min	**6**

NBR — **No designation**

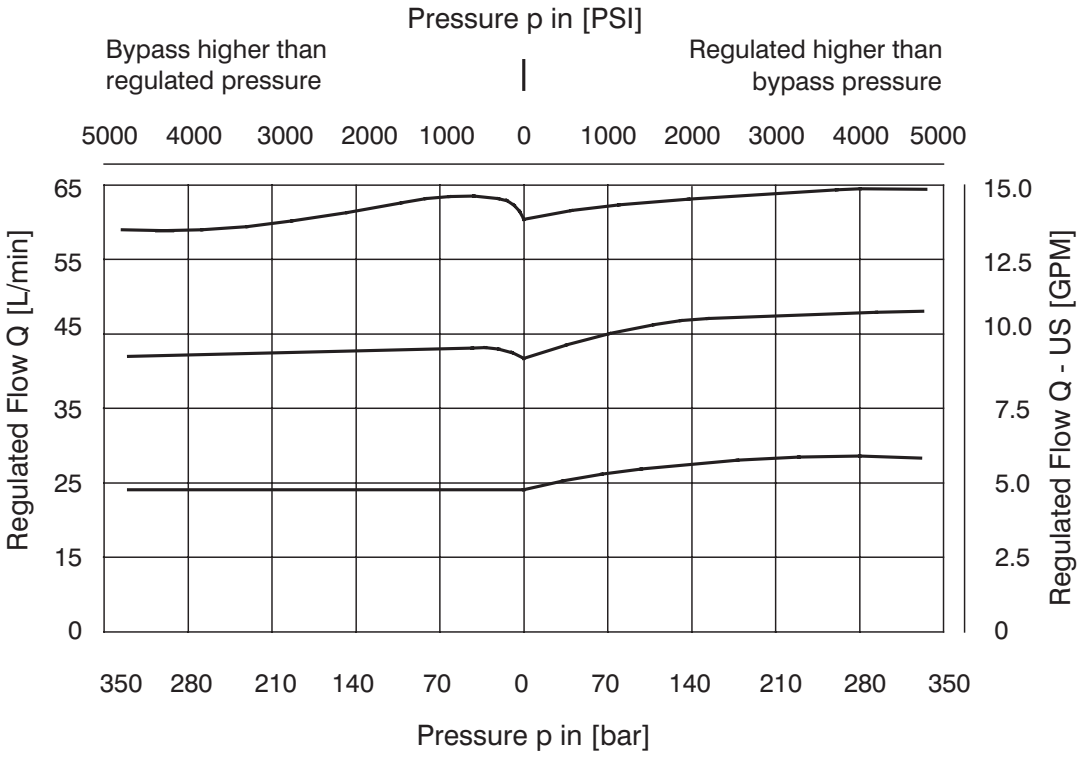
Technical Data

Figures based on: Oil Temp = 40 °C / Viscosity = 40 mm^2/s

Cavity		M27 x 2
Adjustment range	L/min	4 - 60
Max. pressure	bar	350
Hydraulic fluid		Hydraulic oil (HM, HV) according to DIN 51254
Fluid temperature range	°C	-20 to +80
Ambient temperature	°C	-20 to +80
Viscosity	mm^2/s	10 to 500
Maximum degree of fluid contamination		according to ISO 4406 (1999), Class 21/18/15
Weight	kg	0.16
Maximum valve tightening torque in valve body or in control block	Nm	75^{+2}
Mounting position		any

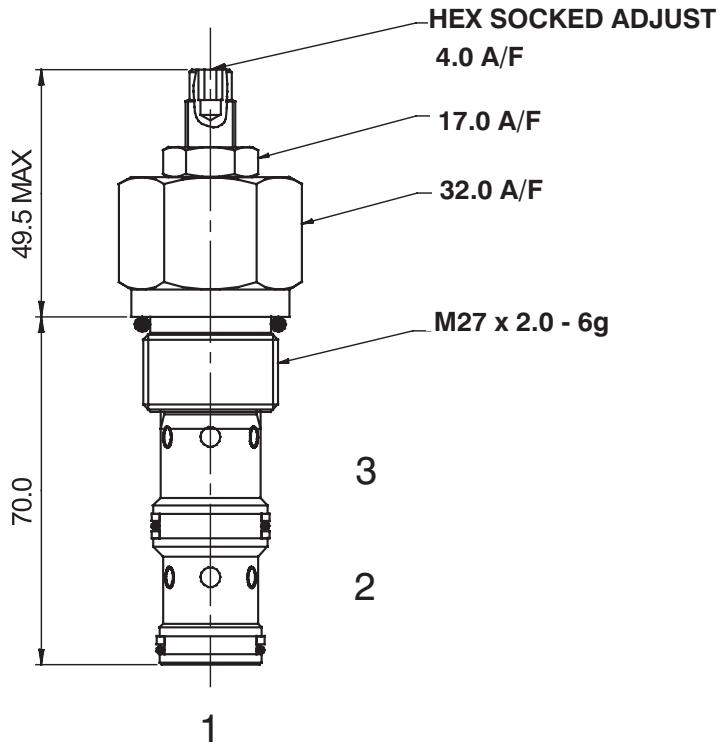
p-Q Characteristics

characteristics determined at n = 35 mm^2/s and t = 40 °C



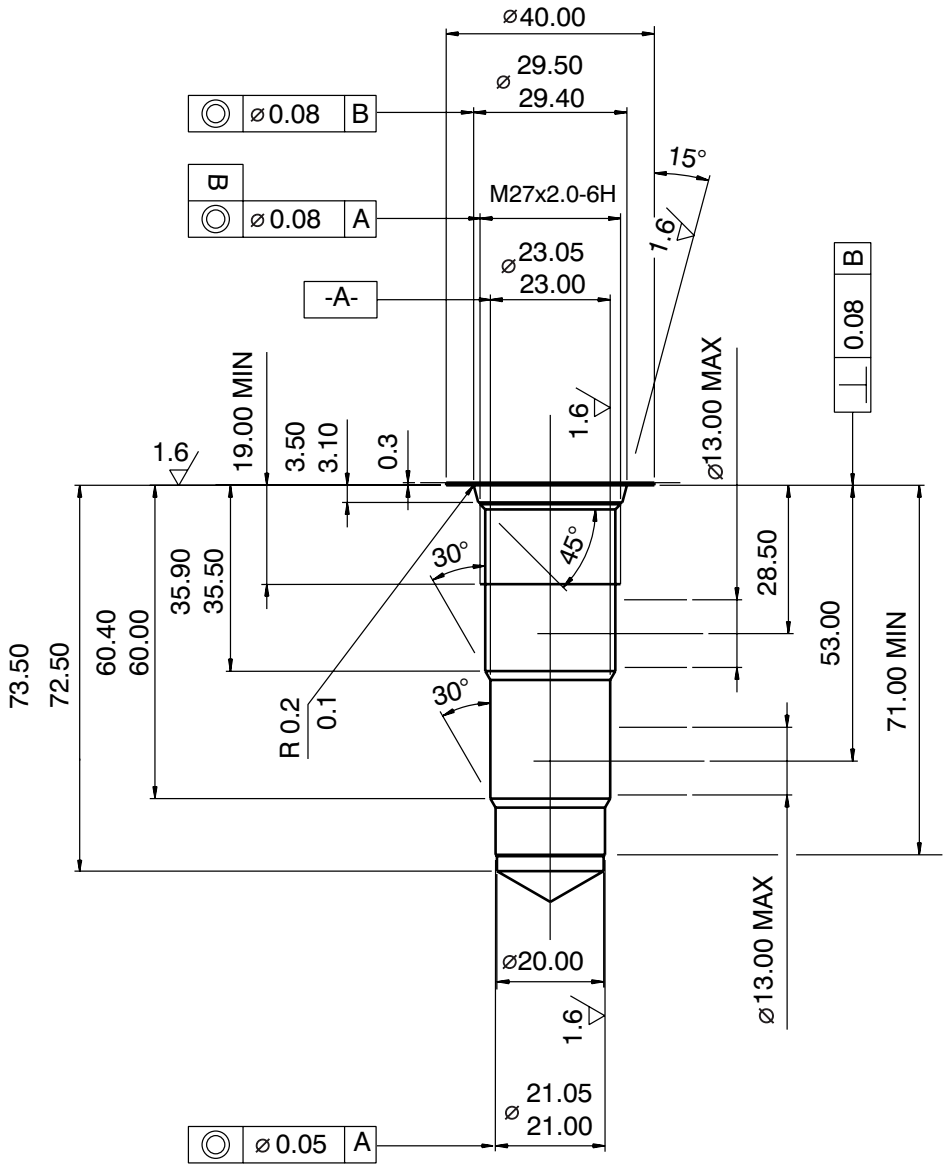
Dimensions

Measurements in millimeters



Cavity

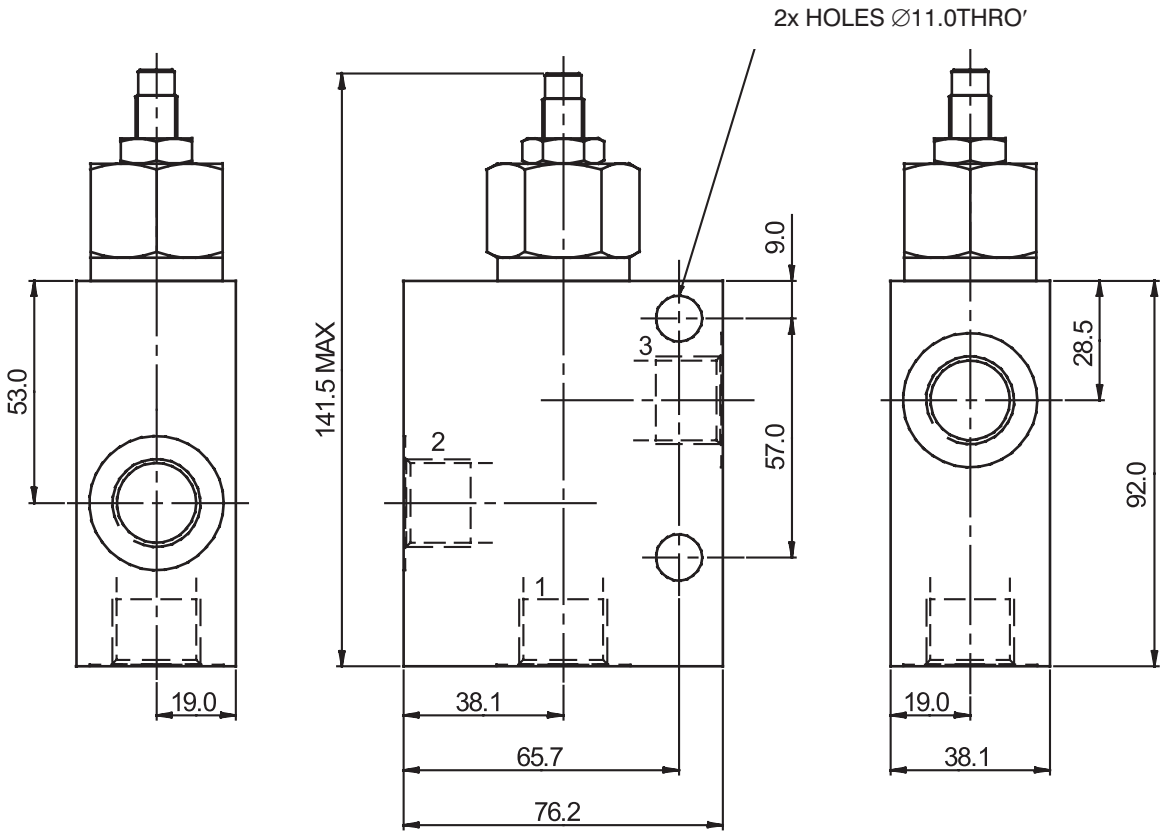
Measurements in millimeters



Valve Bodies

Measurements in millimeters

ISO A



Body without valve			
Material	**Ports**	**Port size**	**Type code**
Aluminium	1, 2, 3	G1/2	SB-K3-0105AL
	1, 2, 3	SAE 10, 7/8-14	SB-K3-0106AL
Steel	1, 2, 3	G1/2	SB-K3-0105ST
	1, 2, 3	SAE 10, 7/8-14	SB-K3-0106ST

The use of aluminium bodies is limited to a maximum operating pressure of 210 bar.

Spare Parts

Seal kits on request.

Caution!

- The packing foil is recyclable.
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law.

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www.argo-hytos.com

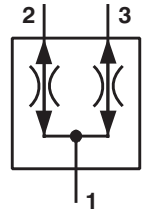
Flow Divider/Combiner SFD2F-B3/I

7/8-14 UNF-2A • p_{max} 350 bar • Q 40 L/min

HA 5234
9/2006

Replaces
HA 5234 1/2005

- ❑ **Divert flows largely independent to the load**
- ❑ **Combine flows largely independent to the load**
- ❑ **May be used for synchronisation controls**
- ❑ **May be used as differential lock**

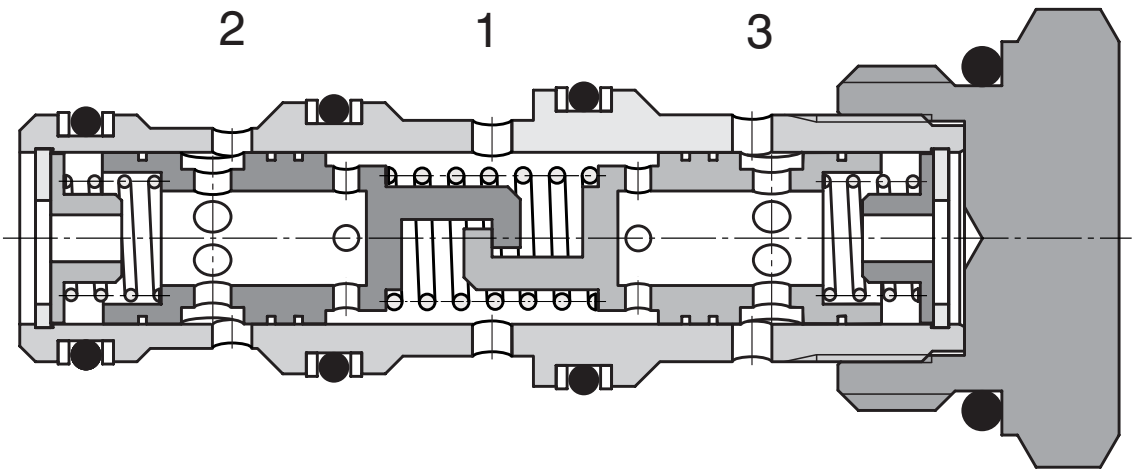


Functional Description

The valve consists of a valve body, two regulating slide valves mutually connected with a defined stroke and with a fixed measuring orifice plate and three centring springs.
The liquid flows from the channel (1) through the measuring orifice plates to the channels (2) and (3). At the same time the regulating slide valves are pressed by the pressure difference one from the other against the outer centring springs. If the load of the channels (2) and (3) is the same the regulating slide valves are held symmetrically to both the channels. At a different load the slide valve on the side of the lower load shifted by an increased pressure drop so far against the spring located behind the slide valve as a new force balance is created caused by changed cross sections of both the regulating slide valves. By this regulating course it is ensured the ratio of division is maintained also at a different load and it is compensated in essence also at a variation of load pressures.

If the liquid cannot flow through one of the channels (2) and (3) the increased dynamic pressure in this channel causes the displacement of both the slide valves to the opposite side and it results in the fact that the other channel is closed. Then, a negligible rate of flow of the liquid only can flow through the released orifice of the nozzle enabling for example the balance of end positions of two consumers.
In the opposite direction of flow both the regulating slide valves are pressed one to the other. Also in this case different load pressures or eventually their changes by changing the position of the regulating slide valves cause a change of throttling cross sections, therefore, the combining the flows occurs also in the same ratio of division.

As for appropriate basic surface finish the external parts are zinc coated.



Ordering Code

SFD2F-B3/I □ □

Flow Divider / Combiner

Capacity (input)

2 - 5 L/min	**5**
3,3 - 10 L/min	**10**
7 - 20 L/min	**20**
15 - 40 L/min	**40**

NBR — **No designation**

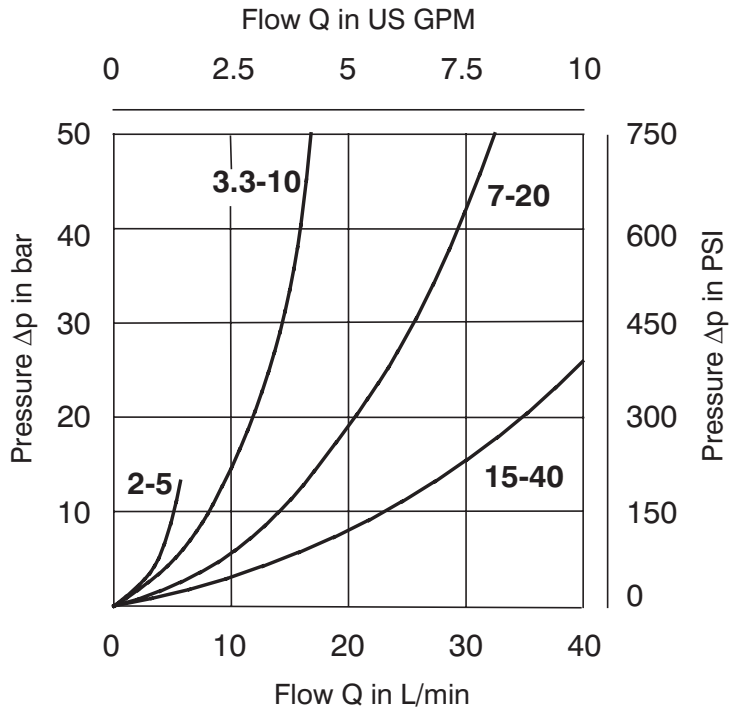
Technical Data

Figures based on: Oil Temp = 40 °C / Viscosity = 40 mm^2/s

Cavity		7/8-14 UNF-2A
Maximum flow	L/min	40
Max. pressure	bar	350
Division ratio	%	50 - 50
Maximum variation of flow	%	± 10
Pressure drops		see ΔDp - Q characteristics
Hydraulic fluid		Hydraulic oil (HM, HV) according to DIN 51254
Fluid temperature range	°C	-20 to +80
Ambient temperature	°C	-20 to +80
Viscosity	mm^2/s	10 to 500
Maximum degree of fluid contamination		according to ISO 4406 (1999), Class 21/18/15
Weight	kg	0.10
Maximum valve tightening torque in valve body or in control block	Nm	34^{+2}
Mounting position		any

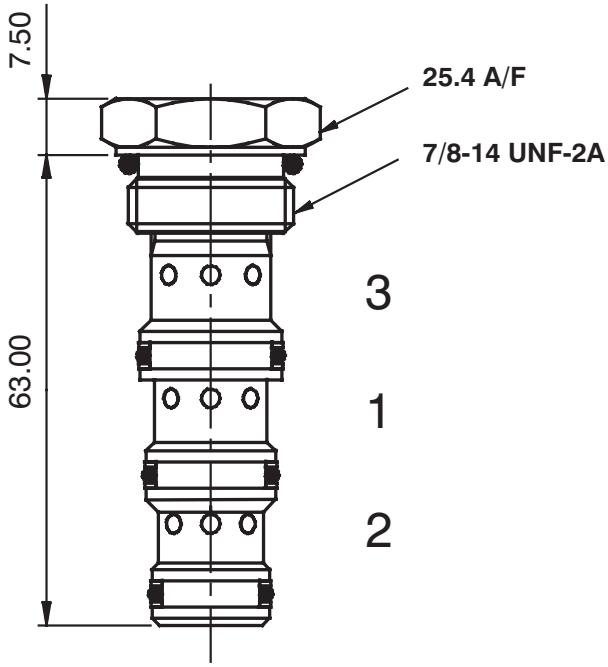
p-Q Characteristics

characteristics determined at n = 35 mm^2/s and t = 40 °C



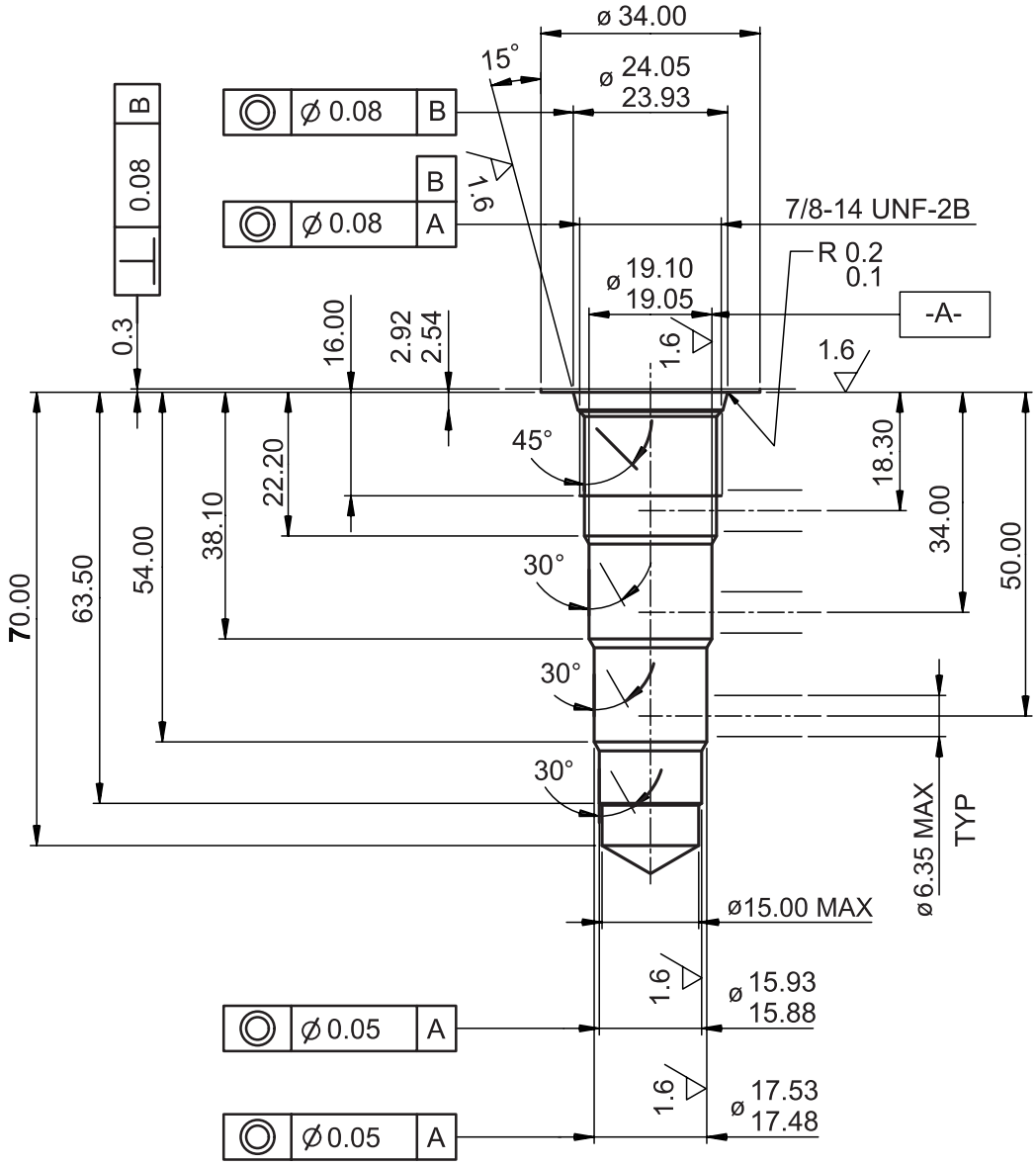
Dimensions

Measurements in millimeters



Cavity

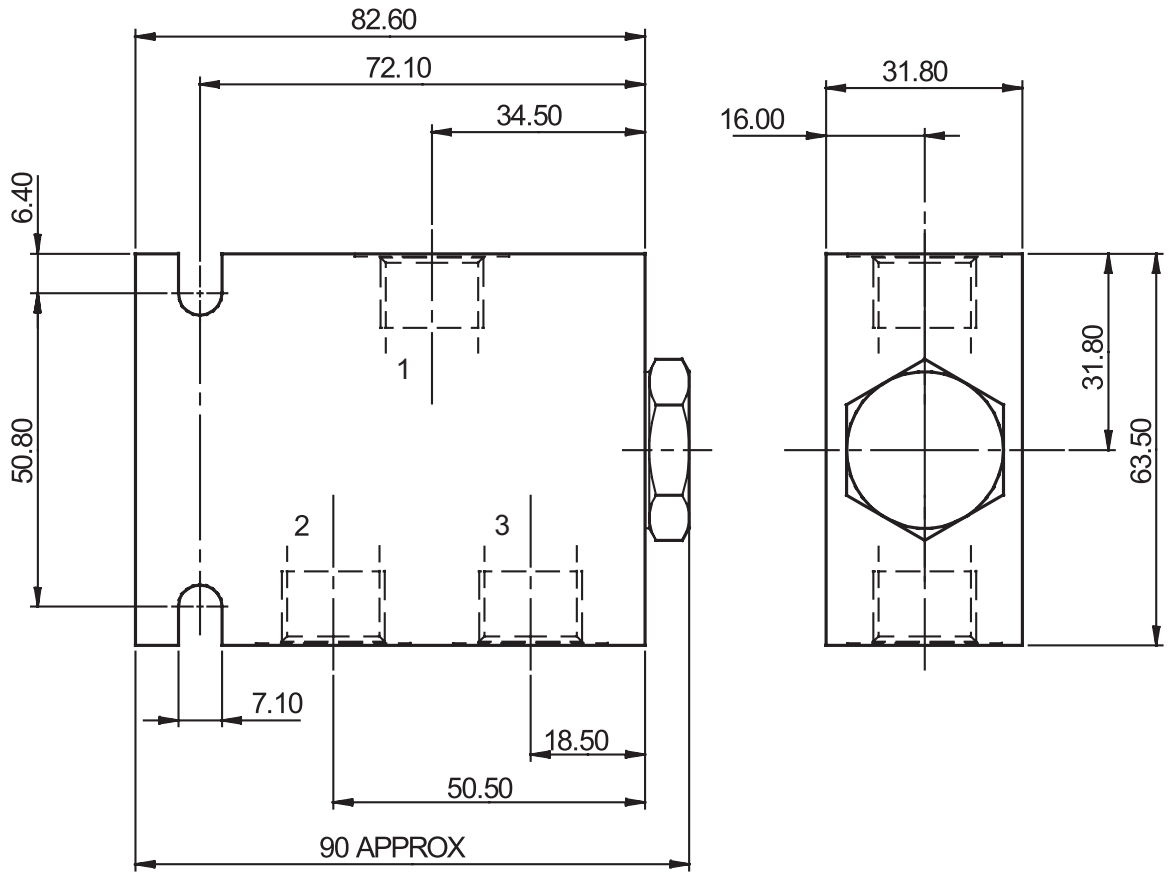
Measurements in millimeters



Valve Bodies

Measurements in millimeters

ISO A



Body without valve			
Material	**Ports**	**Port size**	**Type code**
Aluminium	1, 2, 3	G3/8	SB-B3-0103AL
	1, 2, 3	SAE 8, 3/4-16	SB-B3-0104AL
Steel	1, 2, 3	G3/8	SB-B3-0103ST
	1, 2, 3	SAE 8, 3/4-16	SB-B3-0104ST

The use of aluminium bodies is limited to a maximum operating pressure of 210 bar.

Spare Parts

Seal kits on request.

Caution!

- The packing foil is recyclable.
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Flow Divider/Combiner SFD2F-D3/I

1-5/16-12 UN-2A • p_{max} 350 bar • Q 150 L/min

HA 5235
9/2006

Replaces
HA 5235 1/2005

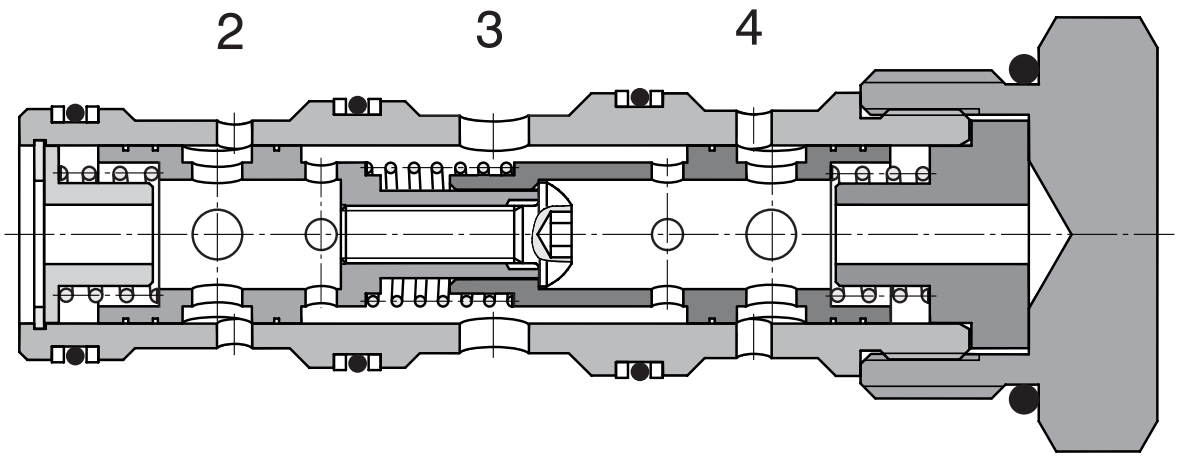
- ❑ **Divert flows largely independent to the load**
- ❑ **Combine flows largely independent to the load**
- ❑ **May be used for synchronisation controls**
- ❑ **May be used as differential lock**

Functional Description

The valve consists of a valve body, two regulating slide valves mutually connected with a defined stroke and with a fixed measuring orifice plate and three centring springs.
The liquid flows from the channel (3) through the measuring orifice plates to the channels (2) and (4). At the same time the regulating slide valves are pressed by the pressure difference one from the other against the outer centring springs. If the load of the channels (2) and (4) is the same the regulating slide valves are held symmetrically to both the channels. At a different load the slide valve on the side of the lower load shifted by an increased pressure drop so far against the spring located behind the slide valve as a new force balance is created caused by changed cross sections of both the regulating slide valves. By this regulating course it is ensured the ratio of division is maintained also at a different load and it is compensated in essence also at a variation of load pressures.

If the liquid cannot flow through one of the channels (2) and (4) the increased dynamic pressure in this channel causes the displacement of both the slide valves to the opposite side and it results in the fact that the other channel is closed. Then, a negligible rate of flow of the liquid only can flow through the released orifice of the nozzle enabling for example the balance of end positions of two consumers.
In the opposite direction of flow both the regulating slide valves are pressed one to the other. Also in this case different load pressures or eventually their changes by changing the position of the regulating slide valves cause a change of throttling cross sections, therefore, the combining the flows occurs also in the same ratio of division.

As for appropriate basic surface finish the external parts are zinc coated.



Ordering Code

SFD2F-D3/I □ □

Flow Divider / Combiner

Capacity (input)

33 - 100 L/min	**100**
50 - 150 L/min	**150**

NBR — **No designation**

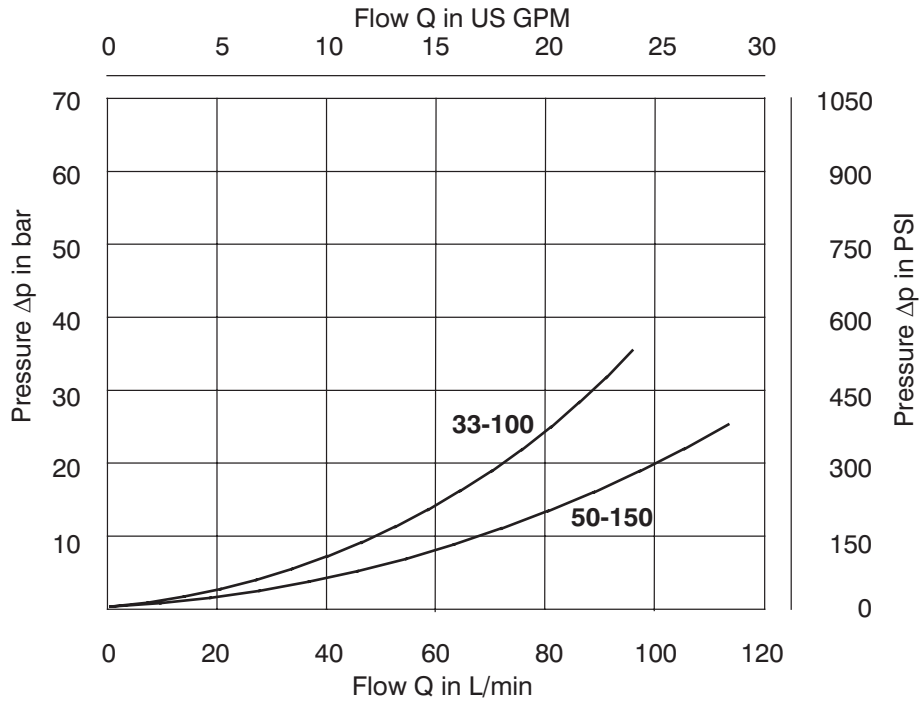
Technical Data

Figures based on: Oil Temp = 40 °C / Viscosity = 40 mm^2/s

Cavity		1-5/16-12 UN-2A
Maximum flow	L/min	150
Max. pressure	bar	350
Division ratio	%	50 - 50
Maximum variation of flow	%	± 10
Pressure drops		see ΔDp - Q characteristics
Hydraulic fluid		Hydraulic oil (HM, HV) according to DIN 51254
Fluid temperature range	°C	-20 to +80
Ambient temperature	°C	-20 to +80
Viscosity	mm^2/s	10 to 500
Maximum degree of fluid contamination		according to ISO 4406 (1999), Class 21/18/15
Weight	kg	0.36
Maximum valve tightening torque in valve body or in control block	Nm	70^{+2}
Mounting position		any

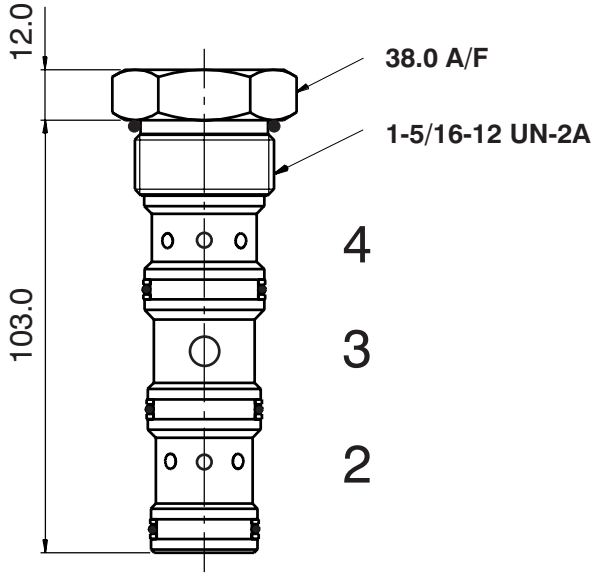
p-Q Characteristics

characteristics determined at n = 35 mm^2/s and t = 40 °C



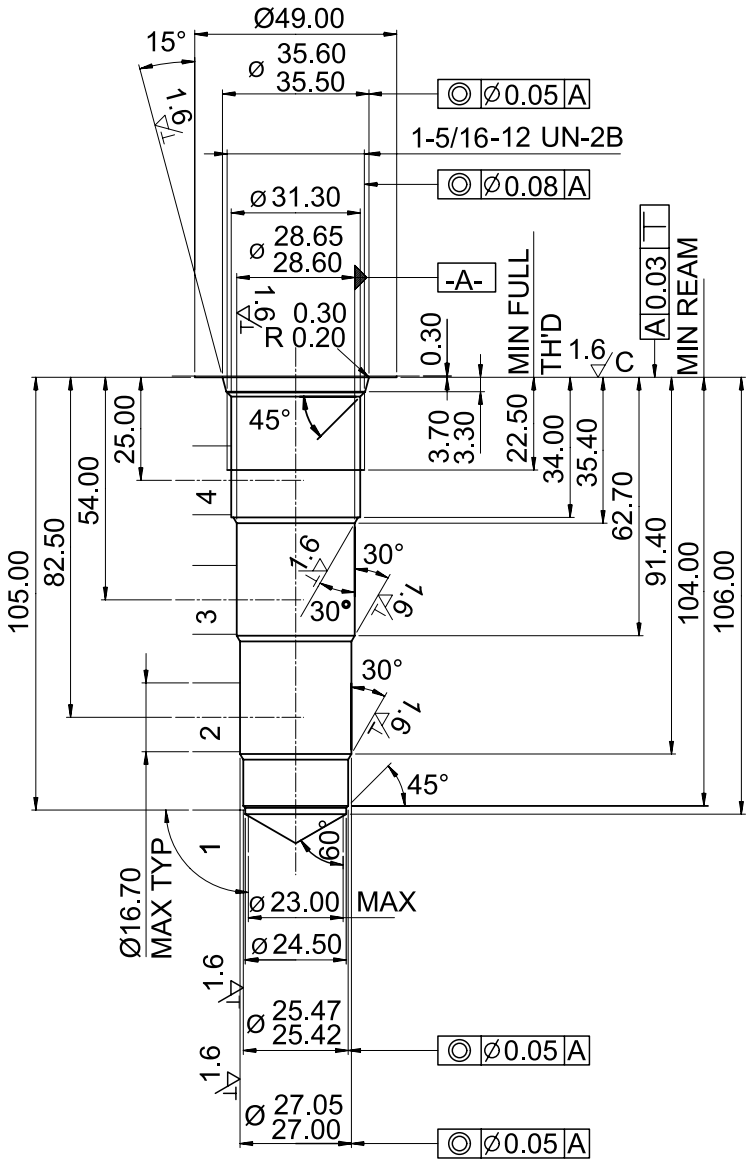
Dimensions

Measurements in millimeters



Cavity

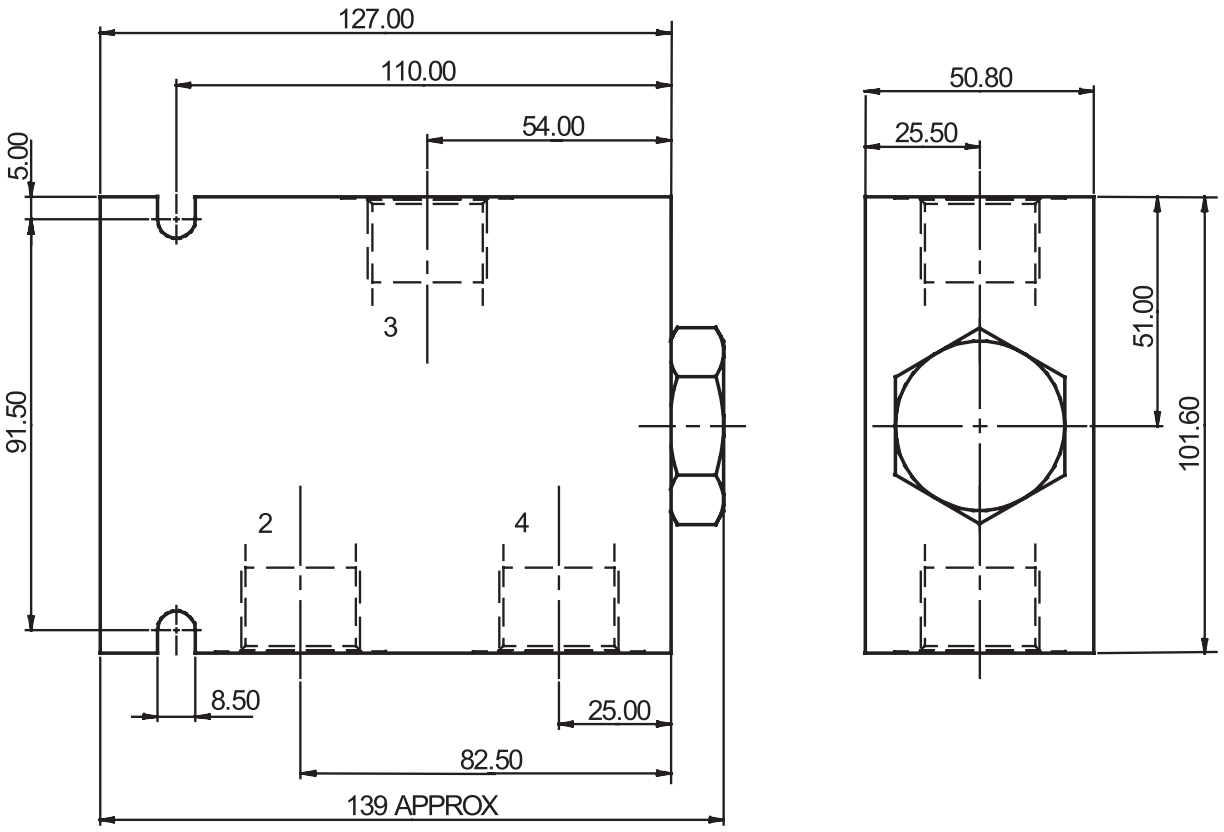
Measurements in millimeters



Valve Bodies

Measurements in millimeters

ISO A



Body without valve			
Material	**Ports**	**Port size**	**Type code**
Aluminium	2, 3, 4	G1/2	SB-D3-0105AL
	2, 3, 4	SAE 10, 7/8-14	SB-D3-0106AL
Steel	2, 3, 4	G1/2	SB-D3-0105ST
	2, 3, 4	SAE 10, 7/8-14	SB-D3-0106ST

The use of aluminium bodies is limited to a maximum operating pressure of 210 bar.

Spare Parts

Seal kits on request.

Caution!

- The packing foil is recyclable.
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law.

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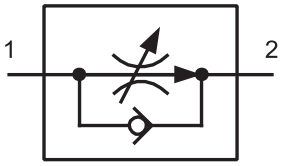
2-way Flow Control Valve
with Free Flow Check Valve

SF2C2A-K2/I

M27 x 2 • p_{max} 350 bar • Q 60 L/min

HA 5236
9/2006

Replaces
HA 5236 1/2005

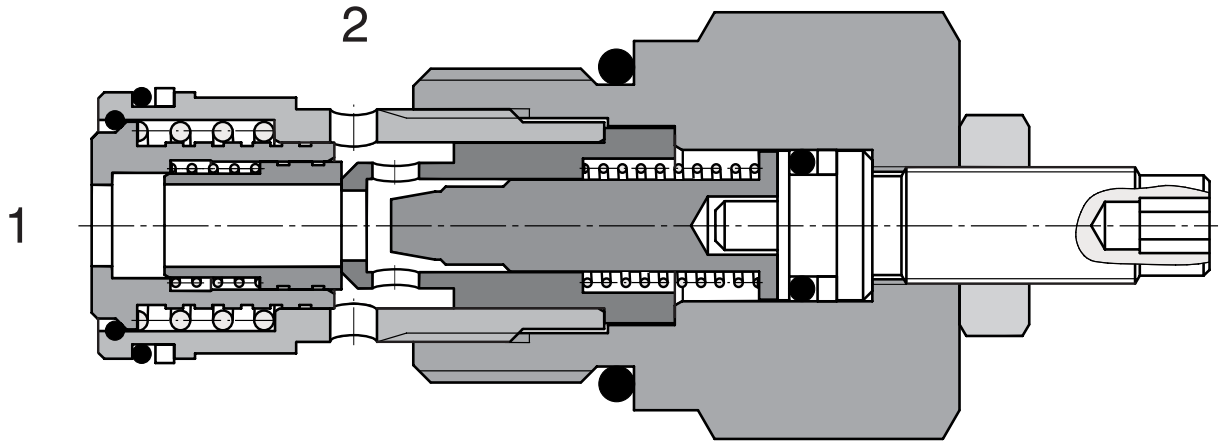


- ❑ **Volumetric flow control independent to the load**
- ❑ **Volumetric flow control independent to the viscosity**
- ❑ **Large flow range**

Functional Description

The valve consists of an adjustable measuring orifice plate after which it is installed a stabilizer of pressure drop and of an by-pass unidirectional valve formed by a bushing of the stabilizer gate valve fitted with a seat on the front surface.
During the flow from (1) to (2) the liquid flows through the centre of the stabilizer gate valve and applies pressure at the same time to the gate valve of the unidirectional valve to press it in the seat and then continues to flow through the throttling cross section to the side channel (2). The stabilizer has been designed to serve for maintaining a pressure difference arisen in front of the measuring orifice plate and after the measuring orifice plate at a constant level of approximately of 1.2 MPa given by the spring force so as to ensure a constant rate of flow through the channel (2). The pressure in front of the throttling orifice plate acts to the side part of the stabilizer gate valve and the pressure in the channel (2) acts to back side of the stabilizer gate valve. Due to permanent equalizing the forces the position of the stabilizer gate valve changes with each change of pressure before and after the measuring orifice plate and in this way it results in appropriate decreasing or eventually appropriate increasing the flow cross section in the channel (2).
In the direction from (2) to (1) the liquid flows through the unidirectional valve with a small pressure drop.

As for appropriate basic surface finish the external parts are zinc coated.



Ordering Code

SF2C2A-K2/I □ □

2-way flow control valve
with free flow check valve

Adjustable flow range

4 - 40 L/min	**4**
6 - 60 L/min	**6**

NBR — **No designation**

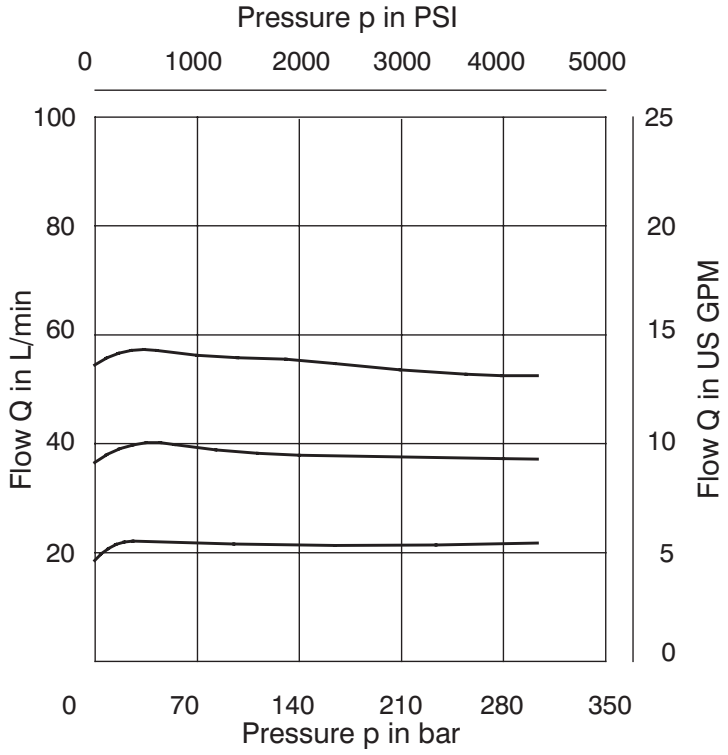
Technical Data

Figures based on: Oil Temp = 40 °C / Viscosity = 40 mm^2/s

Cavity		M27 x 2
Adjustment range	L/min	4 - 60
Max. pressure	bar	350
Hydraulic fluid		Hydraulic oil (HM, HV) according to DIN 51254
Fluid temperature range	°C	-20 to +80
Ambient temperature	°C	-20 to +80
Viscosity	mm^2/s	10 to 500
Maximum degree of fluid contamination		according to ISO 4406 (1999), Class 21/18/15
Weight	kg	0.29
Maximum valve tightening torque in valve body or in control block	Nm	75^{+2}
Mounting position		any

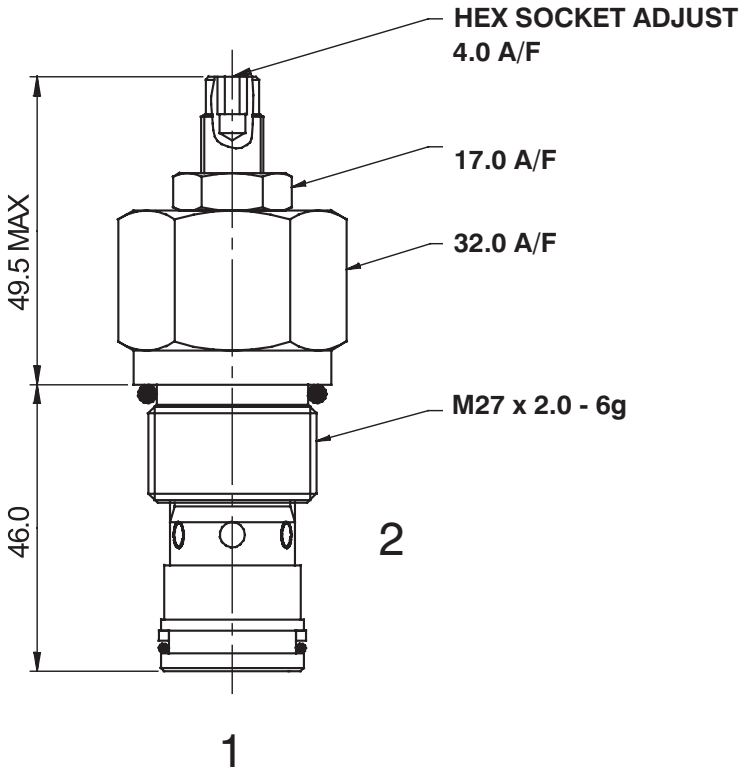
p-Q Characteristics

characteristics determined at n = 35 mm^2/s and t = 40 °C



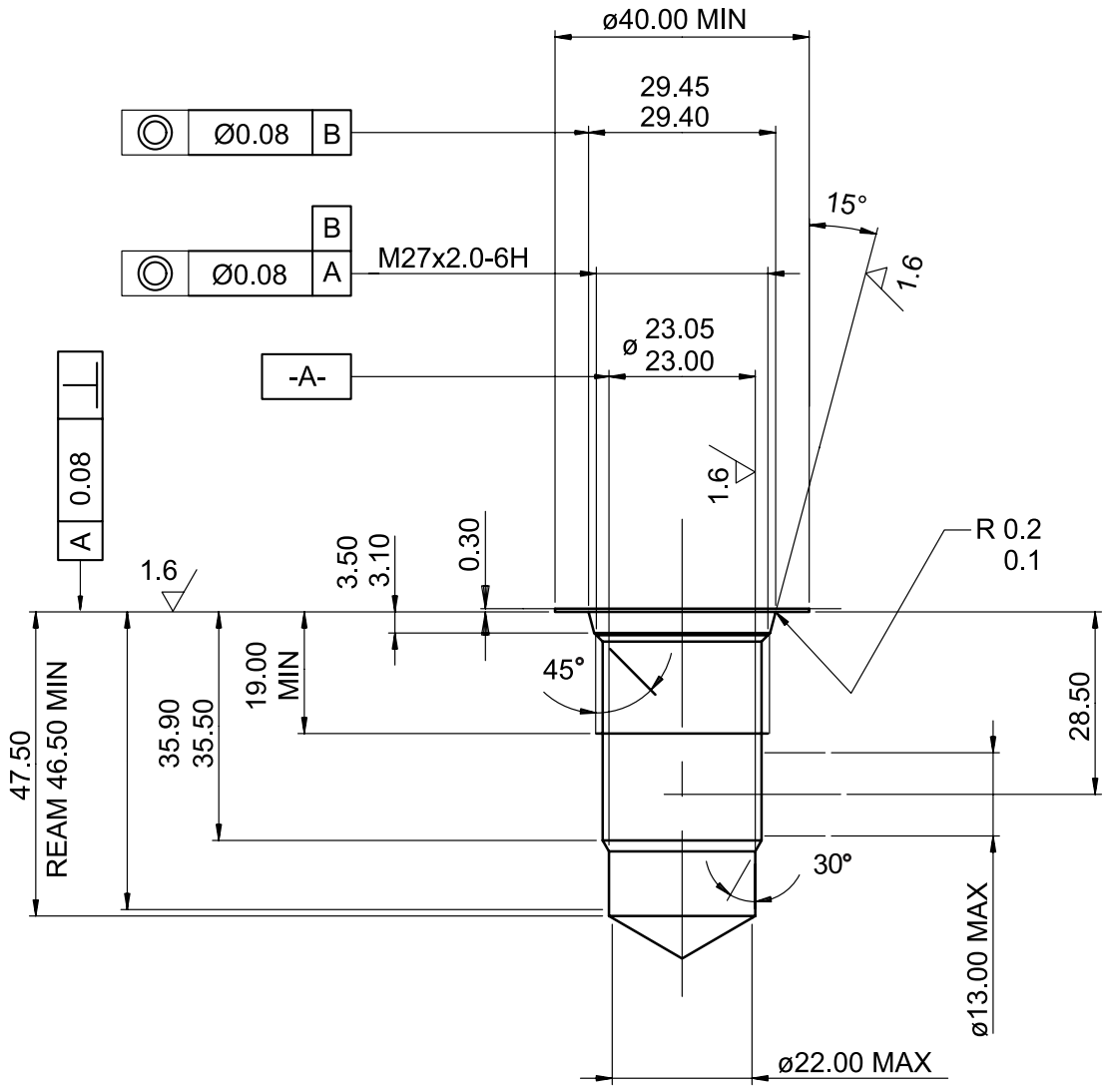
Dimensions

Measurements in millimeters



Cavity

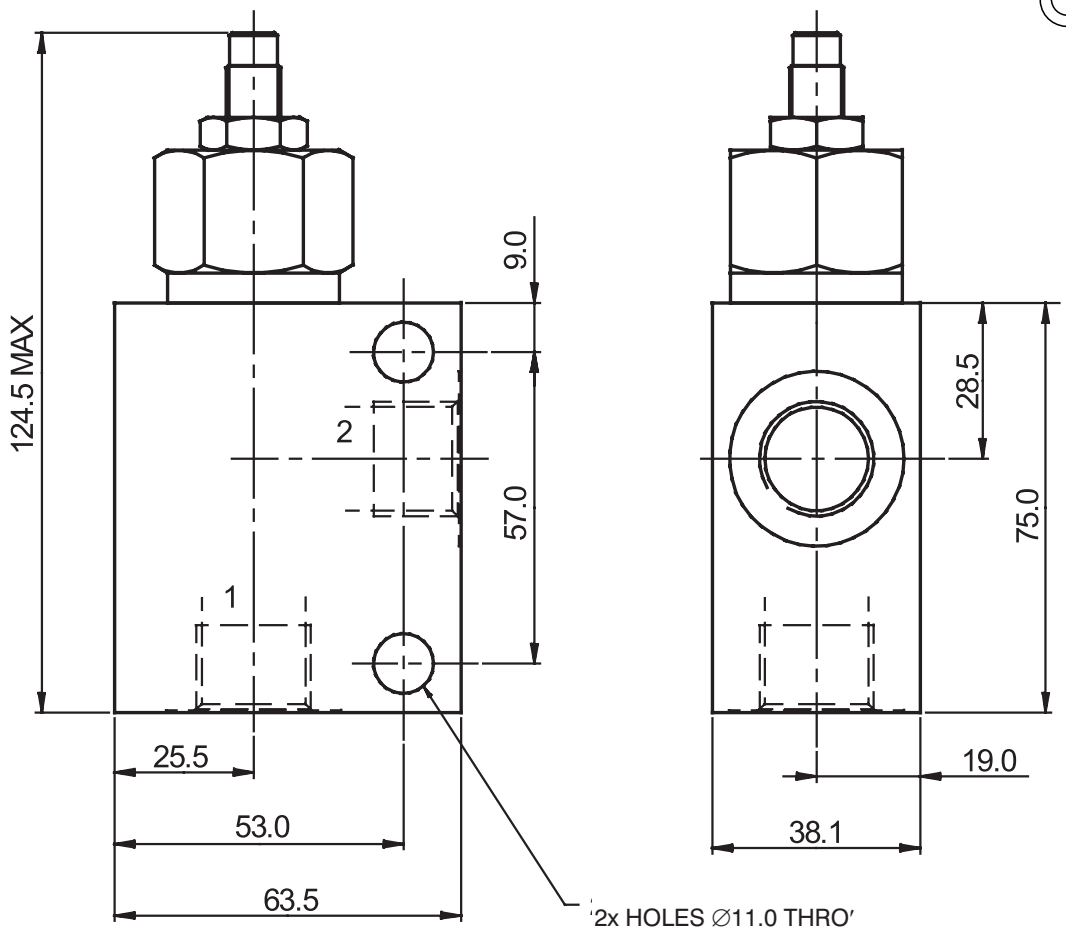
Measurements in millimeters



Valve Bodies

Measurements in millimeters

ISO A



Body without valve			
Material	**Ports**	**Port size**	**Type code**
Aluminium	1, 2	G1/2	SB-K2-0105AL
	1, 2	SAE 10, 7/8-14	SB-K2-0106AL
Steel	1, 2	G1/2	SB-K2-0105ST
	1, 2	SAE 10, 7/8-14	SB-K2-0106ST

The use of aluminium bodies is limited to a maximum operating pressure of 210 bar.

Spare Parts

Seal kits on request.

Caution!

- The packing foil is recyclable.
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ARGO HYTOS

Coils for Solenoid Operated Valves

C-04, C-51

HA 8007
12/2004

- ❑ **Robust design**
- ❑ **Two power classes**
- ❑ **Big selection of voltages**

Ordering Code

For more detailed selection of coils refer to table bellow

C □ - □ □ - □

Solenoid coil

Coil groups available
(Size – power class, see tab.)

04-20
51-26

E.. electric connection

DC
AC voltage type

See table voltage

The coil classes are defined in the data sheet of the particular valve.

Ordering Data

Coil	-	Voltage [V]	Voltage type		Nominal Current [A] t	-	Electric connection								
Cxx-xx	-	xxx	AC	DC	xxx	-	E1	E2	E3	E4	E5	E8	E9	E12	E13
C04-20	-	012		x	1.70	-	x	x	x	x		x	x		
C04-20	-	024		x	0.83	-	x	x	x	x		x	x		
C04-20	-	120	x		0.21	-					x				
C04-20	-	230	x		0.11	-					x				
C04-20	-	106*		x	0.20	-	x								
C04-20	-	205*		x	0.10	-	x								
C51-26	-	012		x	2.26	-	x	x	x	x		x	x	x	x
C51-26	-	024		x	1.14	-	x	x	x	x		x	x	x	x
C51-26	-	106*		x	0.25	-	x								
C51-26	-	205*		x	0.12	-	x								

Note: only marked combinations are available

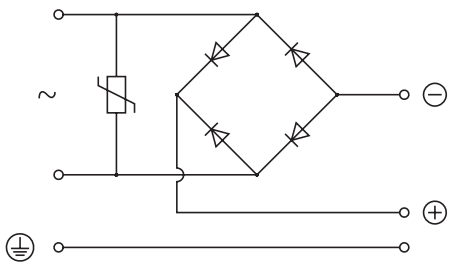
* Coil variants 106 or 205 are suitable for rectified voltages of 120V / 60 Hz and 230V / 50 Hz. Other voltages on request.

Technical Data

		C51-26	C04-20
Wire insulation class		Class H to IEC 85 max 180 °C (356 °F)	Class 200 to IEC 85 max 200 °C (392 °F)
Voltage Duty cycle tolerance	%	AC, DC ±10	AC, DC ±15
Enclosure type to EN 60529		IP 65 (IP67) see the valve dimensions Attainable with mounted terminal box	
Quenching diode	12V	P6KE22Ca	BZW06-19B
Quenching diode	24V	P6KE27Ca	BZW06-33B
Duty cycle	%	100	

Rectifier in C04-20-xxxAC-E5 (wiring)

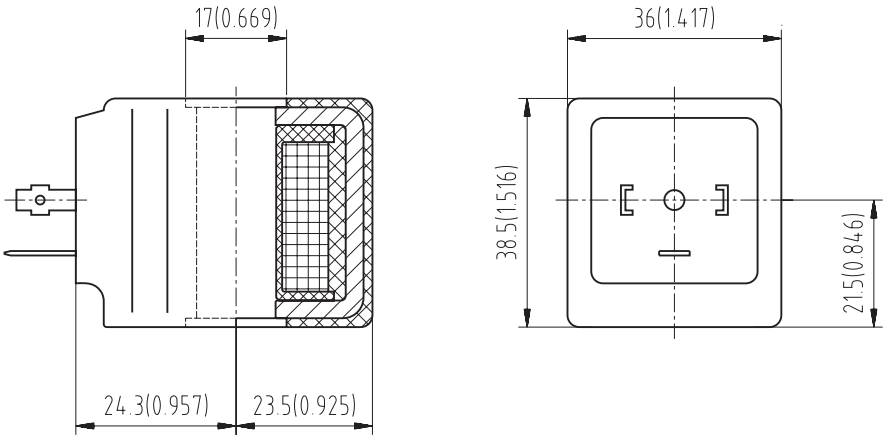
Build in bridge rectifier, input voltage max. 253 V_{rms}.
Voltage frequency 50-60 Hz. Varistor for 275 V_{rms}.



Dimensions of C51 Coils

Dimensions in millimeters (inches)

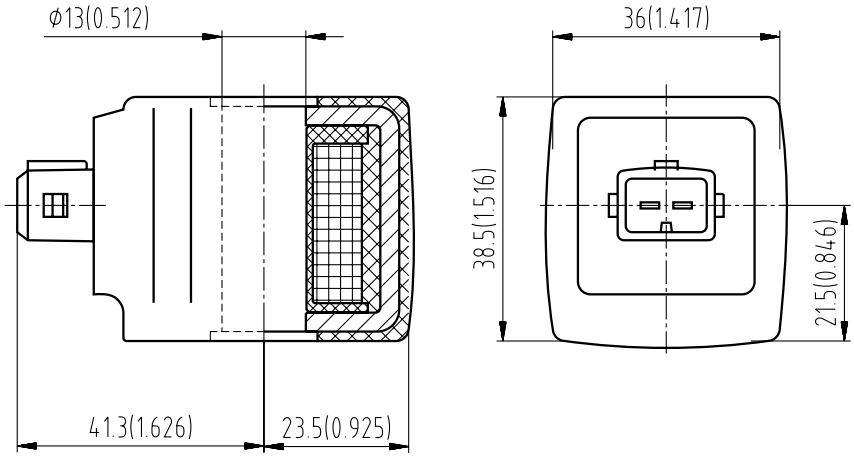
C51-26xxxDC-E1 (E1=EN 175301-803-A (DIN 43 650))
C51-26xxxDC-E2 (E2=E1 with quenching diode)
Enclosure type IP65



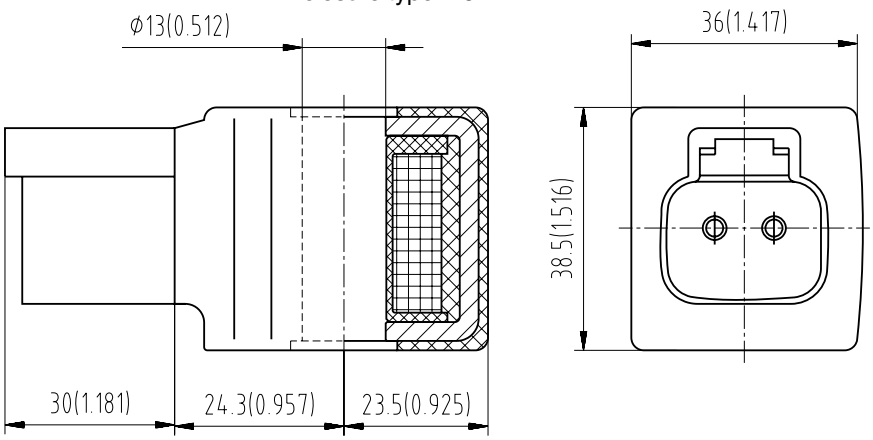
Dimensions of C51 Coils

Dimensions in millimeters (inches)

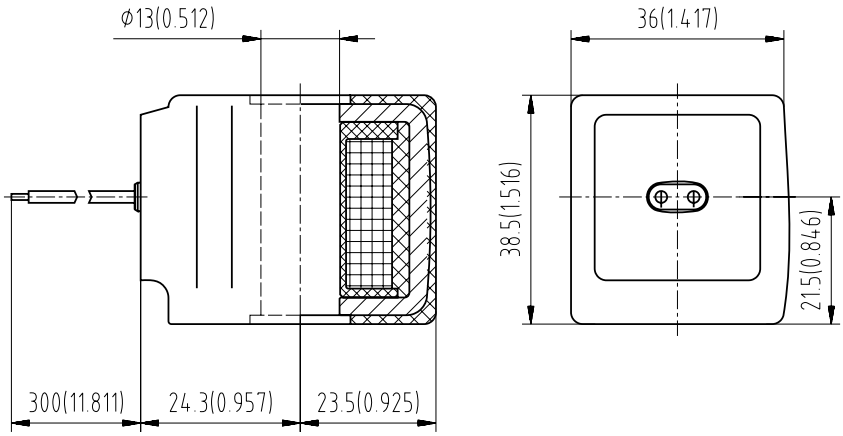
C51-26-xxxDC-E3 (E3=AMP Junior Timer)
C51-26-xxxDC-E4 (E4=AMP Junior Timer with quenching diode)
Enclosure type IP67



C51-26-xxxDC-E12 (E12=Deutsch DT04-2P)
C51-26-xxxDC-E13 (E13=E12 with quenching diode)
Enclosure type IP67



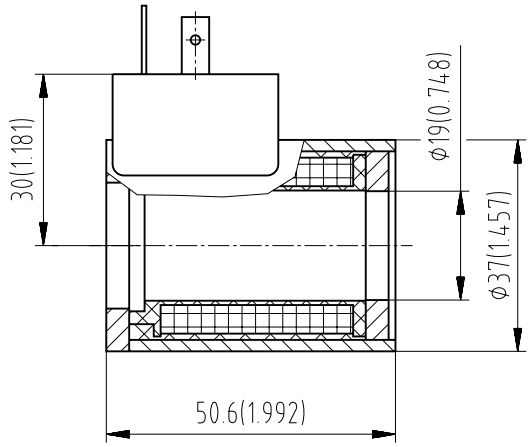
C51-26-xxxDC-E8 (E8= flying leads)
C51-26-xxxDC-E9 (E9=E8 with quenching diode)



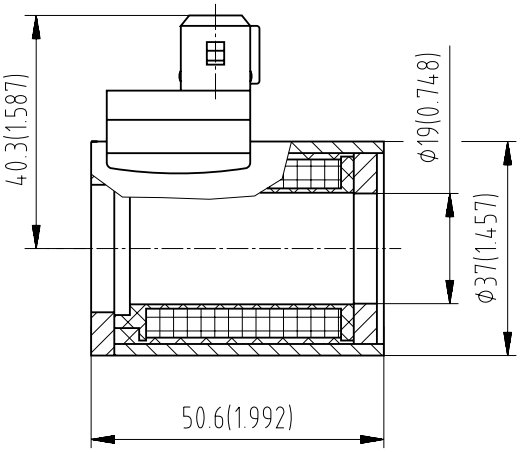
Dimensions of C04 Coils

Dimensions in millimeters (inches)

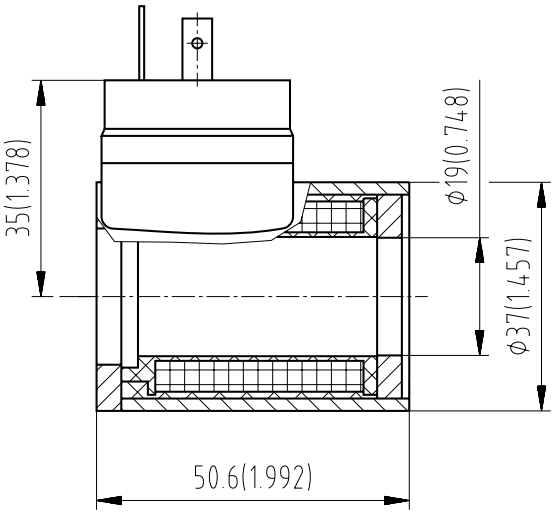
C04-20-xxxDC-E1 (E1=EN 175301-803-A (DIN 43 650))
C04-20-xxxDC-E2 (E2=E1 with quenching diode)



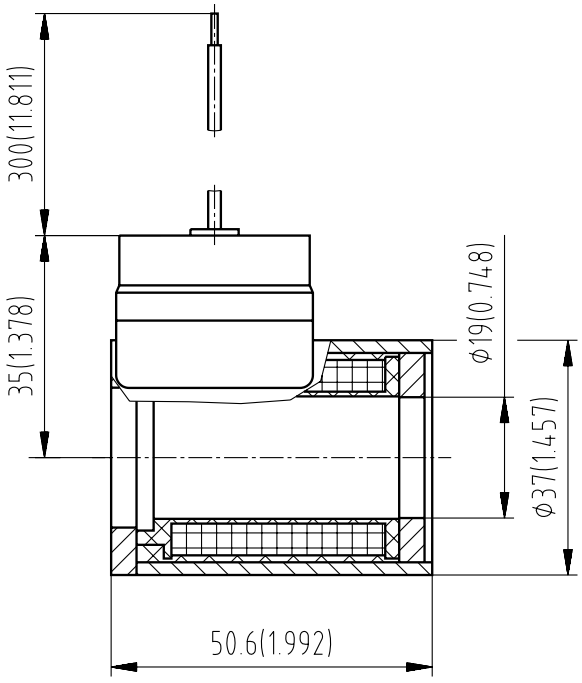
C04-20-xxxDC-E3 (E3=AMP Junior Timer)
C04-20-xxxDC-E4 (E4=E3 with quenching diode)
Enclosure type IP67



C04-20-xxxAC-E5
(E5=EN 175301-803-A (DIN 43 650) with rectifier)



C04-20-xxxDC-E8 (E8 =flying leads)
C04-20-xxxDC-E9 (E9=E8 with quenching diode)



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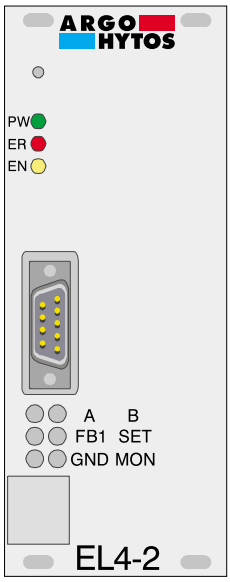
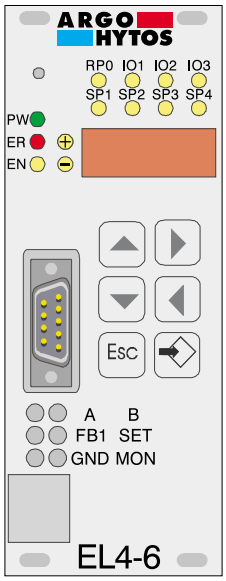
Digital amplifier and controller for proportional and servo valves

EL4

HA 9140
4/2004

Replaces
HA 9140 4/2000





General Applications

The amplifier card EL4 is used for:

- With or without electrical feedback transducers:
  - proportional directional valves direct and pilot operated
  - proportional flow control valves
  - proportional pressure reducing valves
  - proportional pressure regulating valves
  - cartridge valves
  - servo valves with torque motors

- Controlling of hydraulic motors, installations and systems, e.g.:
  - position
  - speed
  - pressure
  - revolutions per minute
  - torque
  - power etc.

- Volume flow control and pressure control of pumps (if the occasion arrives: limitation in weight, controlling valve spool position)

- Controlling of different process values:
  - P/Q controlling
  - pump controlling
  - controlling of pressures
  - controlling of pilot- and main stage
  - cascade controlling of components etc.

Features

- Fully digitized amplifier and controller with the advantage of:
  - no on-board potentiometer
  - no jumpers settings required
  - digital setting and display of all parameters
  - user safety when programming
  - no potentiometer adjustment for measurement of solenoid current

- Flexible and reliable system:
  - use of a modern 16 Bit µC
  - high power reserve
  - hardware and software extensions available following client's needs (e.g. bus interface, special output stages like H-bridges for servo valves or direct current motors, optional RAM on request)
  - easy software update by use of a Flash-EPROM; adaptations and extensions can be made without change to EPROM (download from PC via RS232)
  - high reliability and safety through the use of a hardware watch-dog and reset module
  - variable settings for magnetic systems and sensor signals making high flexibility possible

- Functional use of the interface (partly still in development):
  - change of selected parameters "on-the-fly" without interference or interrupting the controller
  - analyzation of system performance through selection of display parameters with the PC
  - a monitoring program allows direct access to amplifier with the use of external system controllers (e.g. programmable logic controllers / PLC)
  - in development: accessing different amplifiers from a PC or a controller by addressing them (using option RS485) and sending data from amplifier to amplifier (copy parameter settings)

Ordering Code

EL4- □ **-** □ **-** □ **-S000**

Amplifier card

Board Version

no display	**2**
with display	**6**

Operation mode

one valve, open loop (2 solenoids)	**01**
two valves, open loop (1 solenoid each)	**02**
one valve (spool position feedback), (2 solenoids)	**03**
one process control loop system (2 solenoids)	**04**
reserved	**05**
one valve with one spool and one process control loop system (2 solenoids)	**06**
two valves with spool position feedback each (1 solenoid each)	**07**
two valves with 1 process control loop each (2 solenoids)	**08**
reserved	**09**
single process controller without valve	**10**
cascade controller without valve	**11**

Solenoid type

004	size 04
006	size 06
010	size 10

Specific options

Technical Data

Parameters	**Range, characteristics**
Supply voltage	DC (12) 18 ... 30 V, residual ripple < 10 %, (12 V on request)
Solenoid systems selection	0.8 A / 1.1A / 1.3 A / 1.6 A / 2.4 A / 2.7 A / 3.5 A (others on request)
Power input	Max. 50 VA
Applicable fuse (quick)	3.15 A
Auxiliary voltage	± 10 V, max. load 10 mA.
Control voltage for external recallable set point	24 V ± 10 %, residual ripple ≤ 10 % current input ≤ 20 mA each
Ambient temperature	32 °F ... 122 °F (0 °C ... 50 °C) (other range on request)
Storage temperature	-4 °F ... 140 °F (- 20 °C ... 60 °C)
Plug connection	DIN 41 612, 48 pol. form F gold plated
EMC	
Protection	Burst on wires as per EN 61000-4-4 HF-Field as per EN 61000-4-3 ESD as per EN 61000-4-2
Emissions	Emissions depending on power as per EN 50011 Radiated emissions as per EN 55011
Dimensions	
Front panel/ PCB	1.988 x 5.055 in. (50.5 x 128.4 mm); 10 TE / 3 HE / 3.937 x 6.299 in. (100 x 160 mm) Euro format

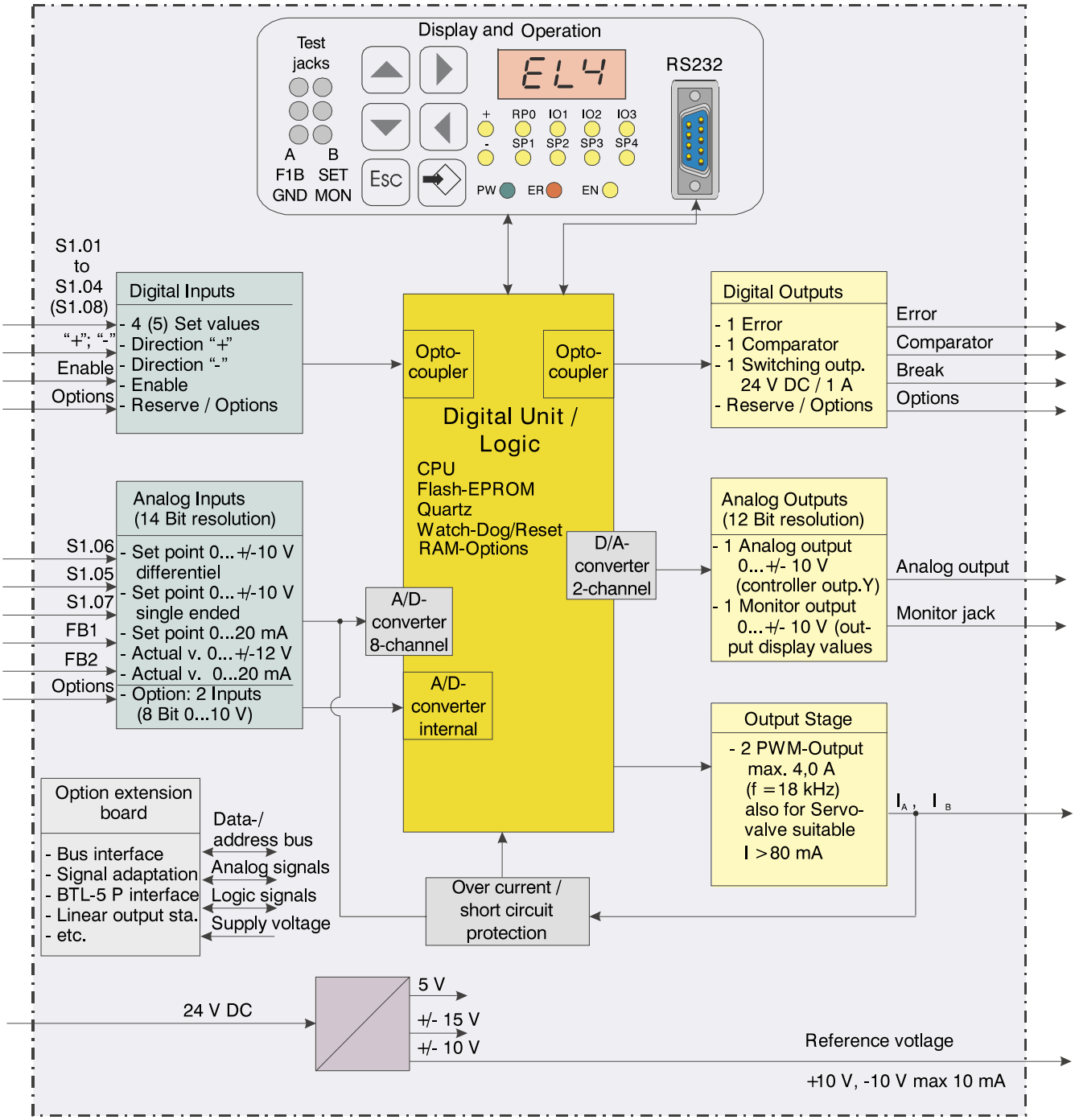
Technical Data

Parameters	Range, characteristics
Input signals	
Analogue set values	1 input, differential 14 Bit resolution, 0 ... ± 10 V 1 input, single ended 14 Bit resolution, 0 ... ± 10 V 1 input, single ended 14 Bit resolution, 0 or 4 ... 20 mA (R = 250 Ohm)
Analogue feedback (sensor input)	1 input, 14 Bit resolution, 0 ... ± 12 V, 0 ... 20 mA / 4 ... 20 mA, Offset: 3 ... 10 V, Gain: ca. 0 ...14 (R=100 Ohm) 1 input, 14 Bit resolution, 0 ... ± 10 V
Digital inputs	8 inputs, voltage level 0 V / 24 V, 10 mA (Set point 1 ... 4, ENABLE, RAMP, SIGN +, SIGN -)
Output signals	
Solenoid current	2 output stages for up to 3.5 A; with over-energization and quick de-energization
Analog output	1 output, 12 Bit resolution, 0 ... ± 10 V; for controlling of subsequent electronic
Monitor output	1 output, 12 Bit resolution, 0 ... ± 10 V; for monitoring of internal values
Digital outputs	2 outputs, voltage level 0 V / 24 V, 10 mA (Error, Comparator)
Test jacks	Solenoid current, sensor 1, set value, Monitor and GND
Auxiliary voltage	± 10 V, max. load 10 mA
Optional I/O signals	3 in or outputs, output level 24 V, input level 5 V or 24 V (5 V level for incremental sensors on request)
Interface	RS232 or RS485 with 9-pol Sub-D connector at front panel; RS485 also at back connector available (RS485 functions in preparation)
Display and operation	
Only at EL4-6	4 digit display, 6 buttons (up, down, left, right, enter and Esc) Status-LED's: PW (Power), ER (Error), EN (Enable), SP1 ... SP4 (S1.01 ... S1.04), RP0 (Ramp = 0), IO1 ... IO3
Only at EL4-2	Status-LED's: PW (Power), ER (Error), EN (Enable)
Frequencies and cycle times	
PWM Frequency	18 kHz
Cycle times	Current controller ca. 0.22 msec, inner closed loop controller ca. 0.22 msec (for valve feedback), external closed loop controller 2 ca. 0.44 msec

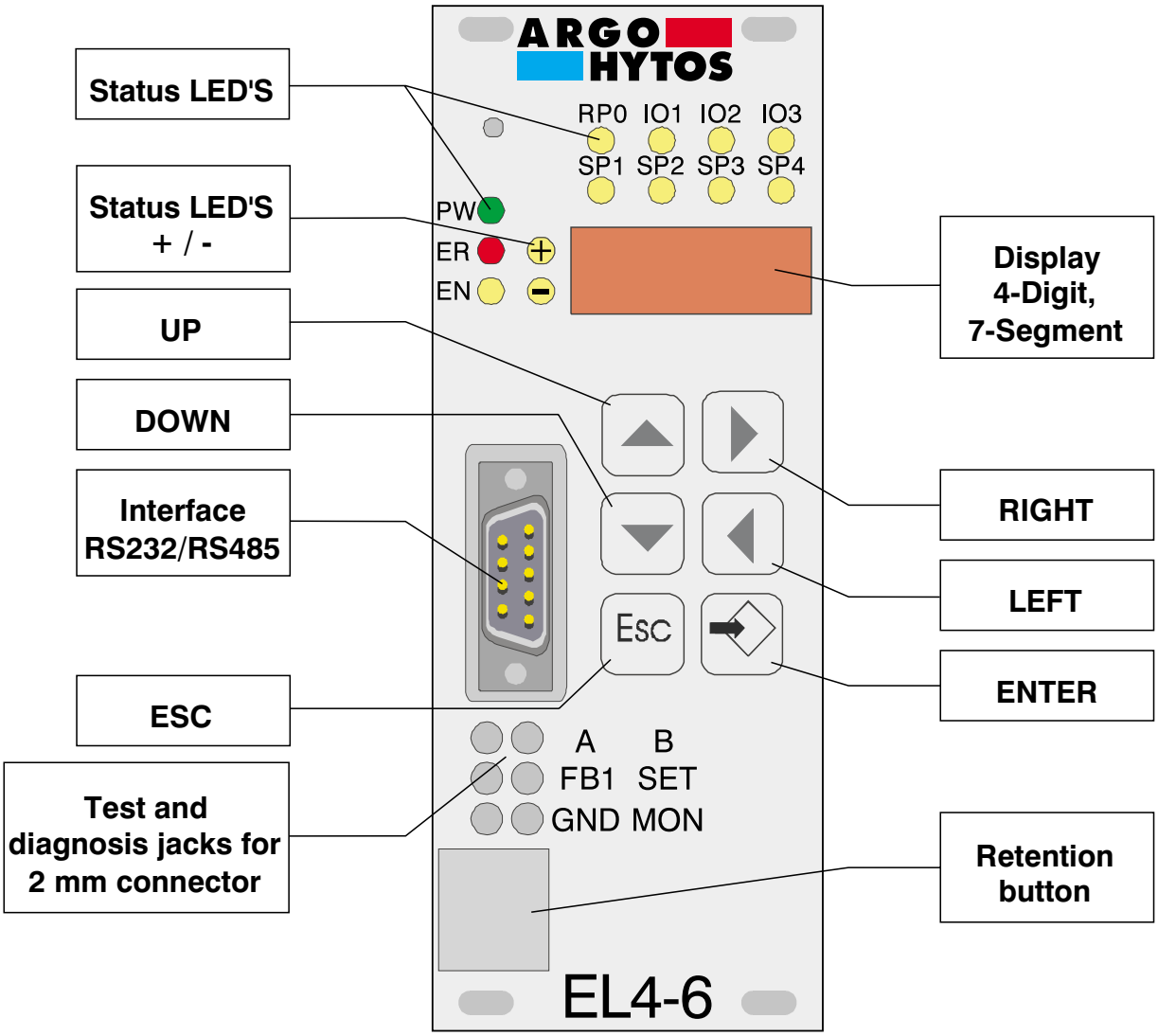
Accessories

Ordering number	Content
625-0463	Connecting cable to PC and EL4 (2,5 m)
625-0464	Connecting cable to PC and EL4 (5 m)
625-0462	CD - ROM with software and manual (hd, ha version), connecting cable (5 m)

Hardware-Block Diagram

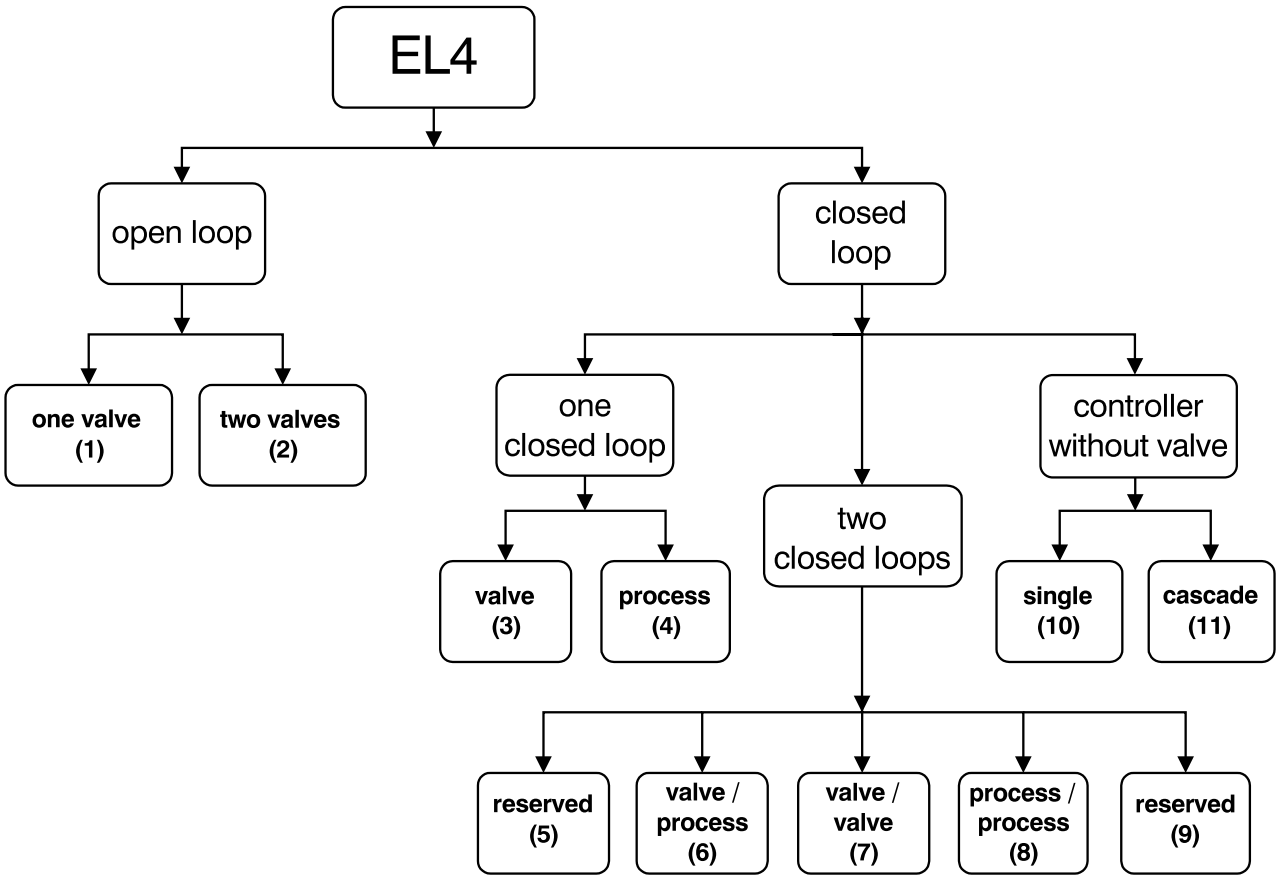


Display and Keypad



Element	Function
Status LED's	display of status and signals at the digital inputs and outputs
Status LED's + / -	display of set point direction through polarity signs for parameters and measured values
Display	4-digit display of parameters and measured values
Buttons UP, DOWN, LEFT, RIGHT, ESC and ENTER	all operating, programming and saving may be performed with the buttons UP, DOWN, LEFT, RIGHT, ESC and ENTER
Serial interface	RS232/RS485 (optional), trough which programming and accessing parameters via PC or communications to machine, or from amplifier to amplifier
Measuring and test jacks	direct measurement of set point, actual value, solenoid currents and internal values via the monitor output. Use 2 mm sockets (S1.06, FB1, A, B, d1.01 ... d2.13)

Diagram of Operation Modes

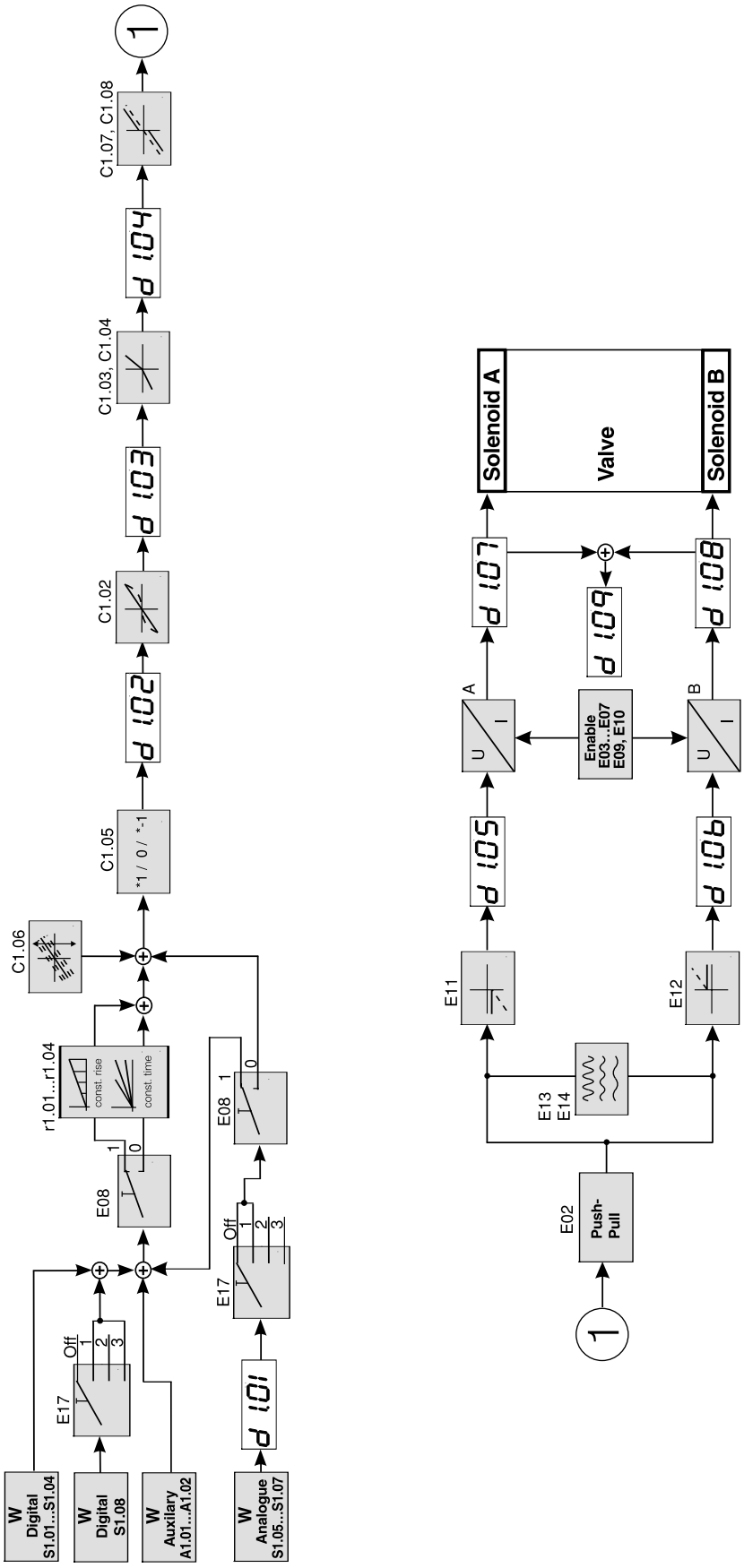


Mode	Description
1	Open loop, 1 proportional valve with 2 solenoids without feedback
2	Open loop, 2 proportional valves with 1 solenoid each without feedback
3	Closed loop valve, single, 1 proportional valve with 2 solenoids and feedback of spool position
4	Closed loop process, single, 1 proportional valve with 2 solenoids and feedback of process value (position, velocity, pressure, force, torque etc.)
5	Reserved
6	Closed loop valve and process, double, 1 proportional valve with 2 solenoids and feedback of spool position and additional feedback of process value (cascaded controller)
7	Closed loop valves, double, 2 independent proportional valve with 1 solenoid each and feedback of spool position of each valve
8	Closed loop processes, double, 2 independent proportional valve with 1 solenoid each and feedback of two independent process values (e.g. two pressure control systems)
9	Reserved
10	Controller function without valve, control of 1 process value; provide set value to follow up electronics (e.g. valve with integrated electronics, frequency converter for AC motor etc.)
11	Controller function without valve, control of 2 process values (cascaded controller, e.g. position and velocity controller); provide set value to follow up electronics (e.g. valve with integrated electronics, frequency converter for AC motor etc.)

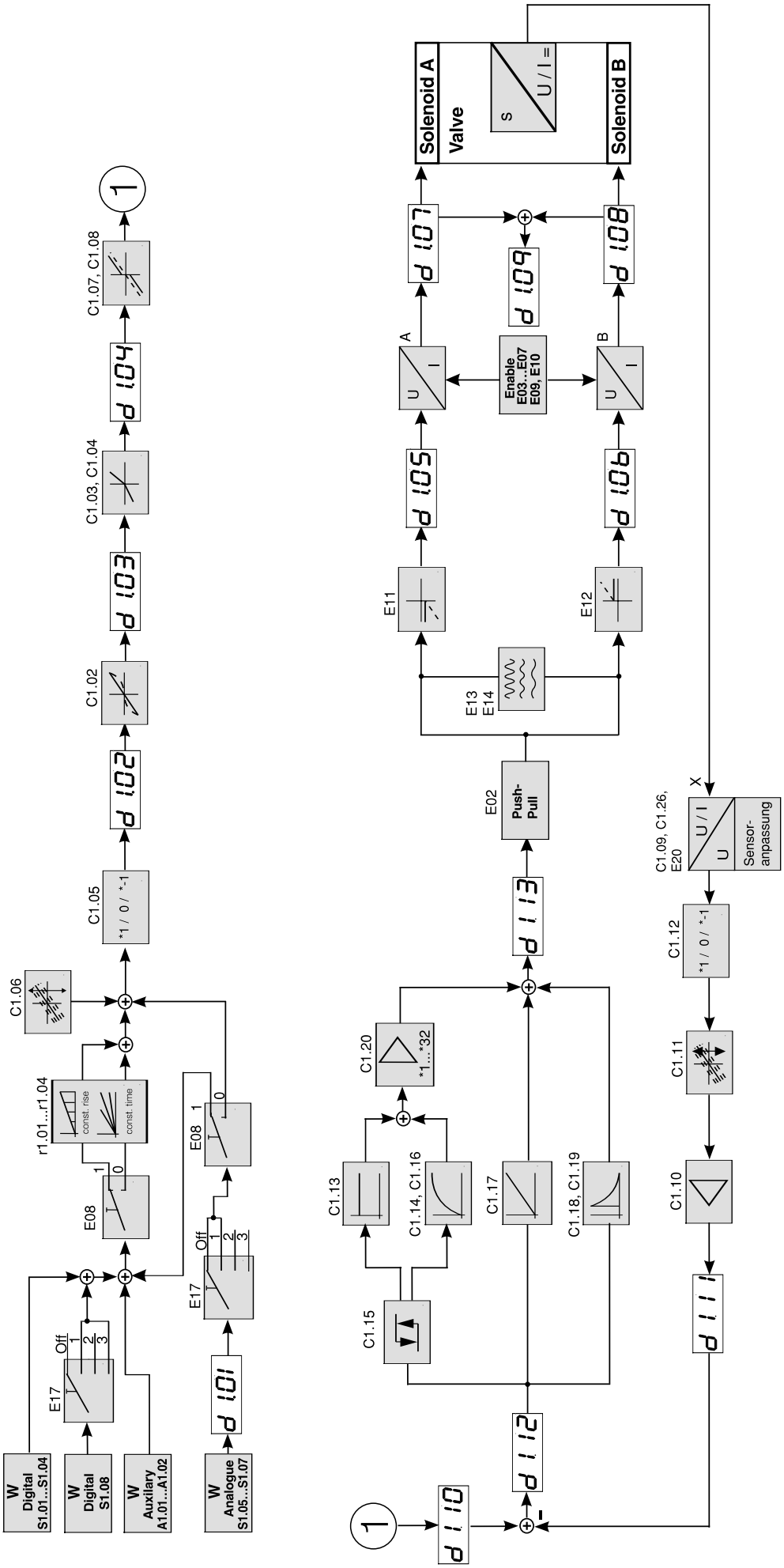
Software Structure Diagrams

Parameter setting	
d *.** : **d**isplay	A *.** : **A**uxiliary
S *.** : **S**et point	C *.** : **C**ontroller
r *.** : **r**amps	E ** : **E**xtended

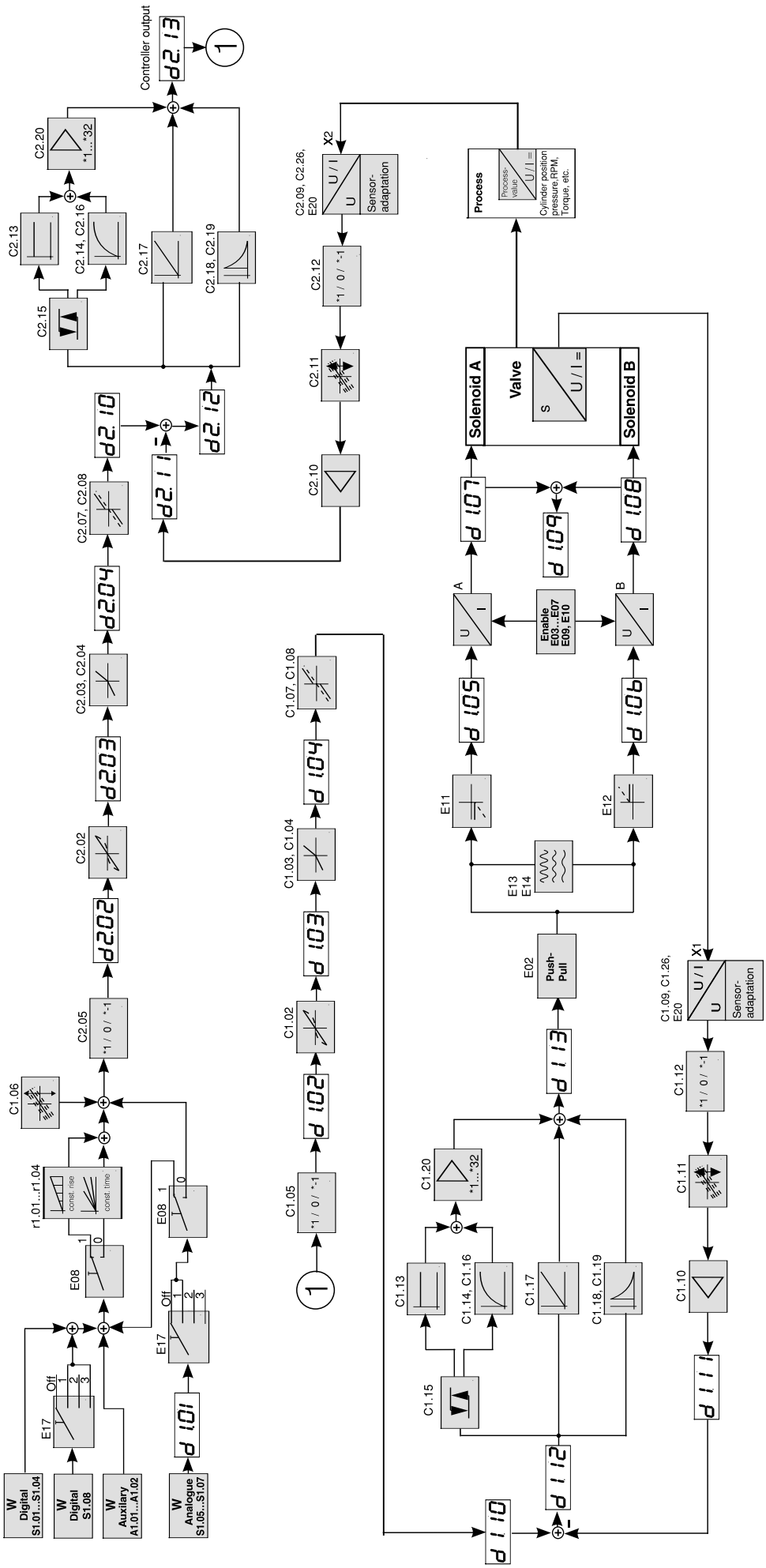
Mode 1; open loop, one valve



Mode 3, single closed loop, valve feedback (spool position feedback)



Mode 6, double closed loop, one spool and one process control loop system



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HYTOS

EXTERNAL ANALOQUE ELECTRONICS FOR CONTROLLING PRM2

EL3E-12 EL3E-24

HA 9145 3/2003

Preliminary technical information

- **Electronic control units developed to control proportional valves PRM2**
- **Nominal size 04, 06,10 of proportional valves**
- **Compact units mounted on a strip 35/7.5 to DIN 50 022**
- **Enclosure type - IP20**

EL3E-24A **EL3E-24AB**

Functional Description

The external model of the analogue electronics EL3E-12 and EL3E-24 have been developed for controlling the proportional directional valves of the series PRM2 with one solenoid (EL3E-xxA) or two solenoids (EL3E-xxAB). The electronics performs the function of an amplifier and former of the input control signals with the defined transfer characteristic. The main advantages of the external electronics model are the possibility of its mounting, together with the other electronic components, on a strip 35,7x7, 5mm to DIN 50 022 and situating into a determined space, the reduction of the necessary mounting space thanks to the absence of the box with the integrated electronics and protection of the electronics against undesirable vibrations.
The easy accessibility of the electronics setting elements (trims) enables a more operative changing of the adjustable parameters of the controlled proportional directional valves.
The electric design of the external electronics is identical with the design of the integrated electronics situated directly on the solenoid coil. The arrangement of the setting elements and the electric connection is adapted for building into a standardized box to DIN 50 022.

Order Code

EL3E- ☐ ☐

External analoque electronics

Rated supply voltage

12V	**12**
24V	**24**

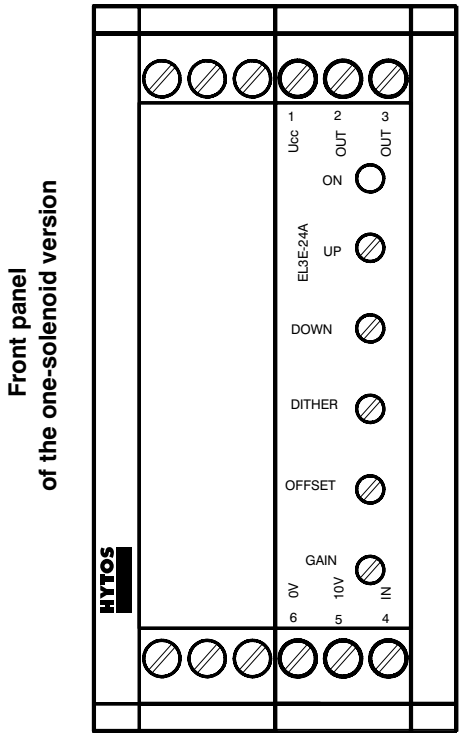
Type

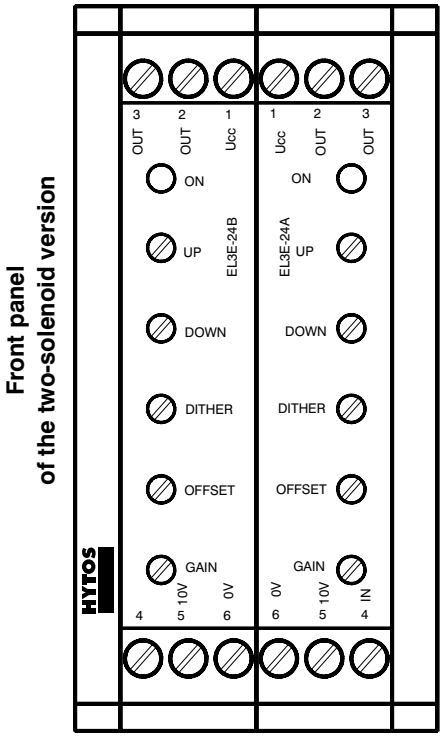
A	External electronics for proportional directional valves with one solenoid
AB	External electronics for proportional directional valves with two solenoid

Technical parameters

Technical parameters EL3E-12	Specification
Nominal supply voltage	12 V DC
Range of the supply voltage	11,2...14,7 V DC
Maximum output current	2,4 A for R<4 Ω
Input power	max. 25 W
Stabilized voltage for potentiometer control	5 V DC/100 mA
Control signal type	0...20 mA 4...20 mA +/-5 V 0...+5 V $U_{cc}/2 \pm 5$ V
Setting range of ramp functions	0,05...3 s
Dither frequency	60/90 Hz
Dither amplitude	0...30 %
Enclosure type	IP 20
Operating ambient temperature	-20 °C...+50 °C
External dimensions	40 x 79 x 85,5 mm
Attachment	On a strip 35,7x7,5 mm to DIN 50 022
Weight	125 g
Technical parameters EL3E- 24	**Specification**
Nominal supply voltage	24 V DC
Range of the supply voltage	20...30 V DC
Maximum output current	1,5 A for R<10 Ω
Input power	max. 25 W
Stabilized voltage for potentiometer control	10 V DC/100 mA
Control signal type	0...20 mA 4...20 mA +/-10 V 0...+10 V 0...+5 V $U_{cc}/2 \pm 10$ V
Setting range of ramp functions	0,05...3 s
Dither frequency	60/90 Hz
Dither amplitude	0...30 %
Enclosure type	IP 20
Operating ambient temperature	-20 °C...+50 °C
External dimensions	40 x 79 x 85,5 mm
Attachment	On a strip 35,7x7,5 mm to DIN 50 022
Weight	125 g

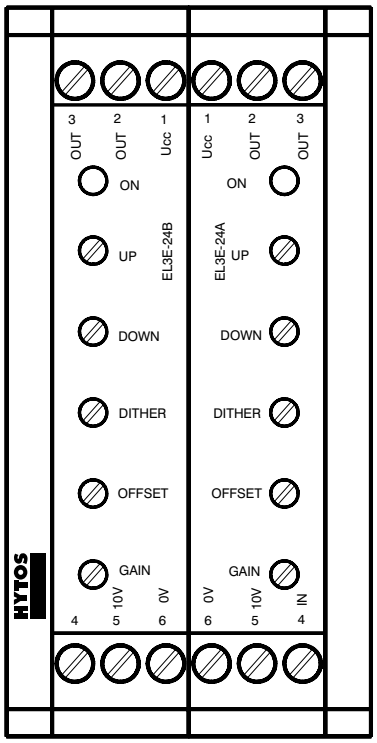
Design models





The external electronics EL3E is built into a standard plastic box of dimensions 85,5x79x40mm enabling the grouping on a strip 35,7x7,5 mm and providing the IP 20 electric enclosure. Situated on the front panel are the trims for setting the individual parameters of the electronics and a control LED signaling the presence of the power supply as well as the connection of the electronics output to the solenoid coil of the directional valve controlled.
Two models of the electronics with one or two solenoids are available. The models differ in the inner electric circuitry and in arrangement of the setting elements situated on the front panel as well as in wiring the terminal strips.

Electronics for controlling the directional valves with two solenoids



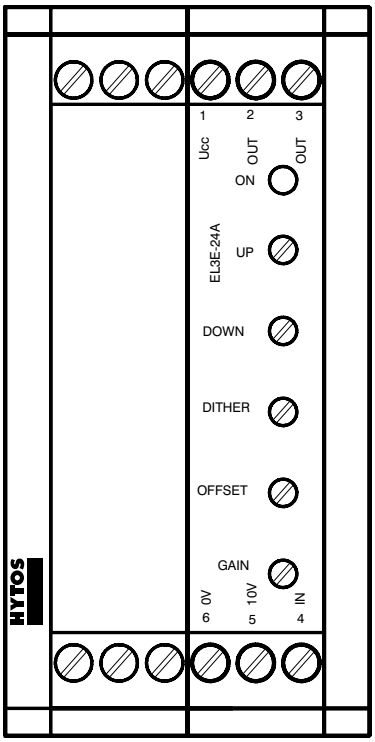
Wiring of connection clamps

Clamp	Description	
	Card MASTER EL3E-XXA	**Card SLAVE EL3E-XXB**
1	$+U_{CC}$ 24 V (12 V)*	$+U_{CC}$ 24 V (12 V)*
2	Output to the solenoid coil	Output to the solenoid coil
3		
4	Control signal input	-
5	Output of the stabilized voltage +10V/100mA (+5V/100mA)*	Output of the stabilized voltage +10V/100mA (+5V/100mA)*
6	0 V	0 V

*Values in parenthesis are valid for the supply voltage 12 V

The electronics for directional valves with two solenoids consists of two identical electronic cards mutually interconnected. The card designated at its specification end with character A (EL3E-xxA) works as the so-called MASTER; the other card designated with character B (EL3E-xxB) works as the so-called SLAVE. The distinction of the cards is necessary because of the different setting of the changeover switches on both cards serving the configuration of the selected operational parameters, such as the type of the control signal and the dither frequency.

Electronic for controlling the proportional valves with one solenoid



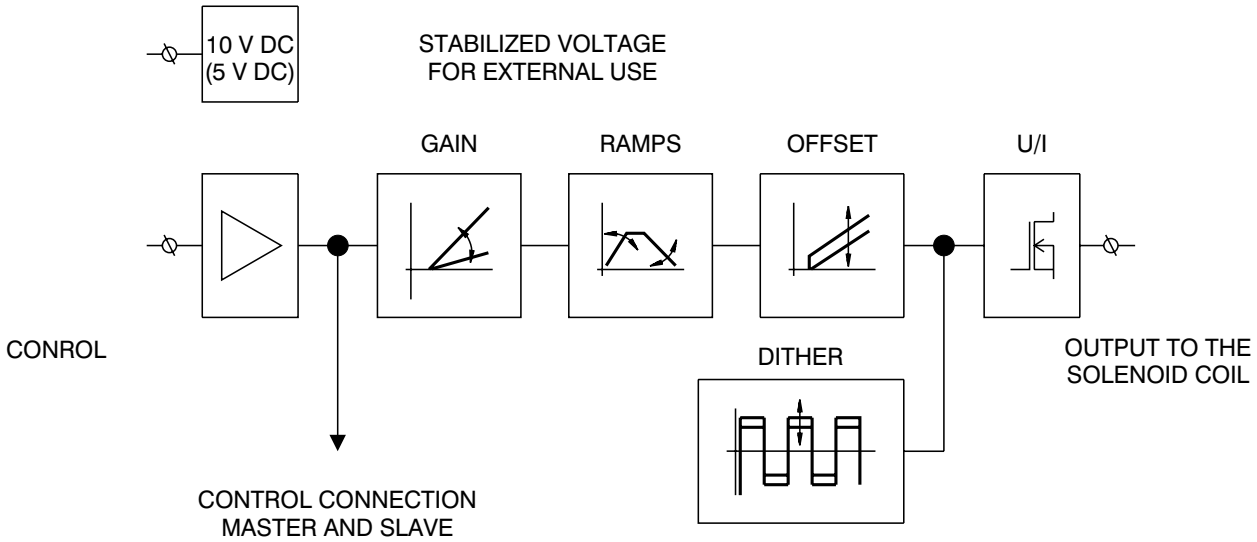
Wiring of connection clamps

Clamp	Description
	Card MASTER EL3E-XXA
1	$+U_{cc}$ 24 V (12 V)*
2	Output to the solenoid coil
3	
4	Control signal input
5	Output of the stabilized voltage +10V/100mA (+5V/100mA)*
6	0 V

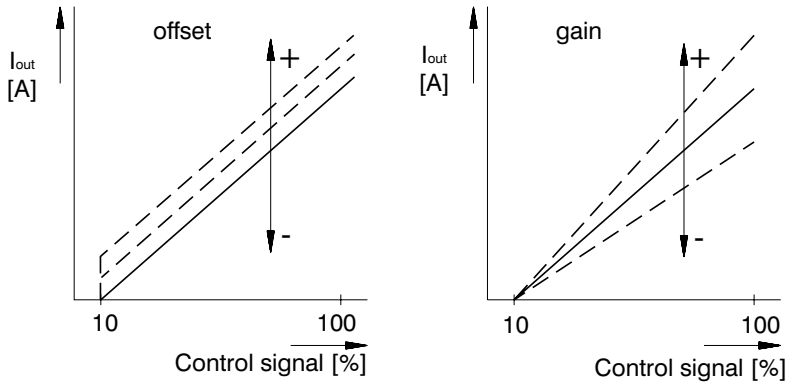
*Values in parenthesis are valid for the supply voltage 12 V

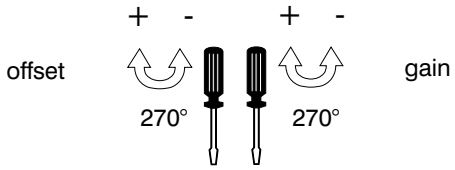
The electronics for controlling the proportional directional valves with one solenoid is built into a box with dimensions corresponding with the previous configuration, but only a part of the electronic is fitted with components. The electric wiring of the clamps is identical with the arrangement of the MASTER card in the previous two-magnet configuration.

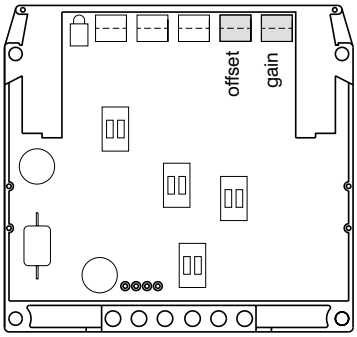
Block Diagram



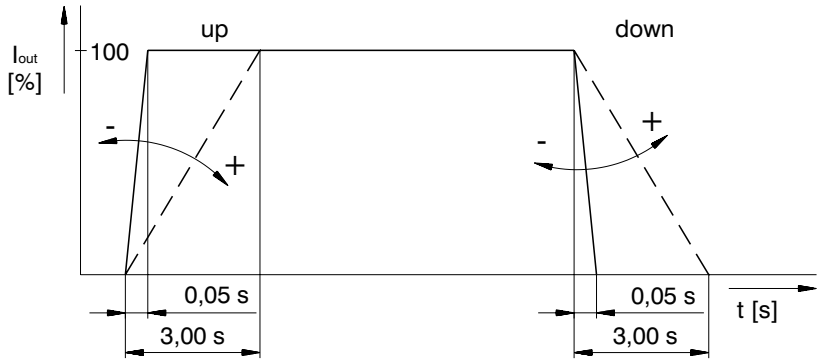
Adjustment of Offset, Gain Parameters

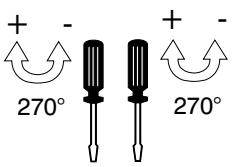


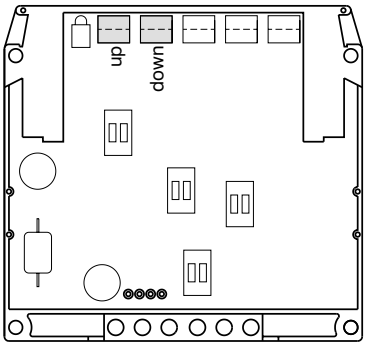




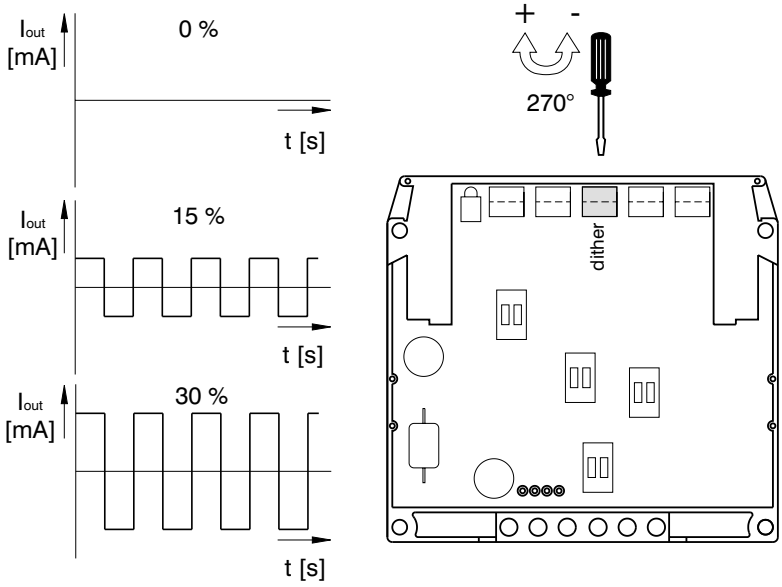
Ramp Adjustment (up,down)

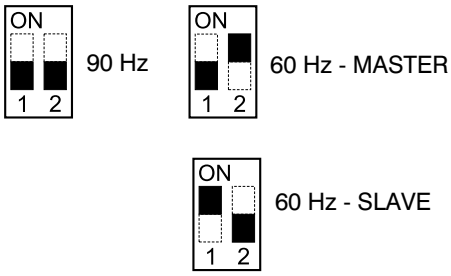






Dither Adjustment





Frequency - dither switch

Limit coil exciting current of proportional directional valves HYTOS

Valve nominal size	Nominal supply voltage			
	12 V		24 V	
	Coil type	I_{lim} [A]*	Coil type	I_{lim} [A]*
NG04	936-0033	1,7	936-0034	0,8
NG06	936-0107	1,6	936-0067	1,0
NG10	936-4614	1,9	936-4629	1,1

*for load factor 100 %. Values must not exceed 5 %.

Table of the Switch Configuration for the Control Signal Choices

		PRM2-062				PRM2-063	
		0 ... 5 V	0 ... 10 V (0 ... 5 V)*	0 ... 20 mA	4 ... 20 mA	$U_{cc}/2$ ± 10 V (± 5 V)*	± 10 V (± 5 V)*
MASTER M	SW1	ON 1 2	ON 1 2	ON 1 2	ON 1 2	ON 1 2	ON 1 2
	SW2	ON 1 2	ON 1 2	ON 1 2	ON 1 2	ON 1 2	ON 1 2
	SW3	ON 1 2	ON 1 2	ON 1 2	ON 1 2	ON 1 2	ON 1 2
	SW4	90 Hz ON 1 2			60 Hz ON 1 2		
SLAVE S	SW1					ON 1 2	ON 1 2
	SW2					ON 1 2	ON 1 2
	SW3					ON 1 2	ON 1 2
	SW4	90 Hz ON 1 2			60 Hz ON 1 2		

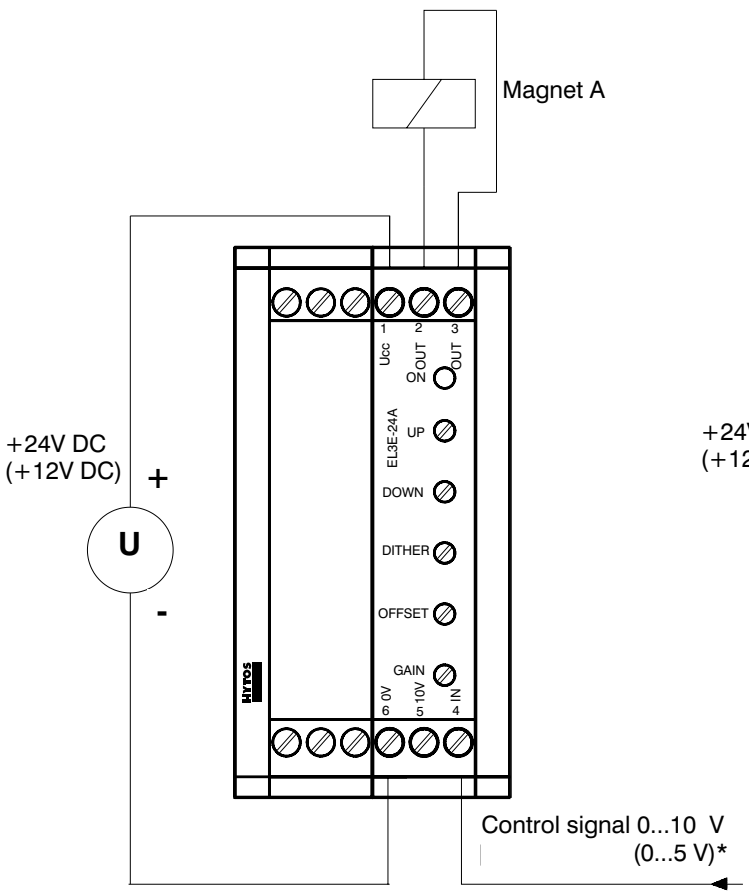
Designation of the basic manufacture setting.

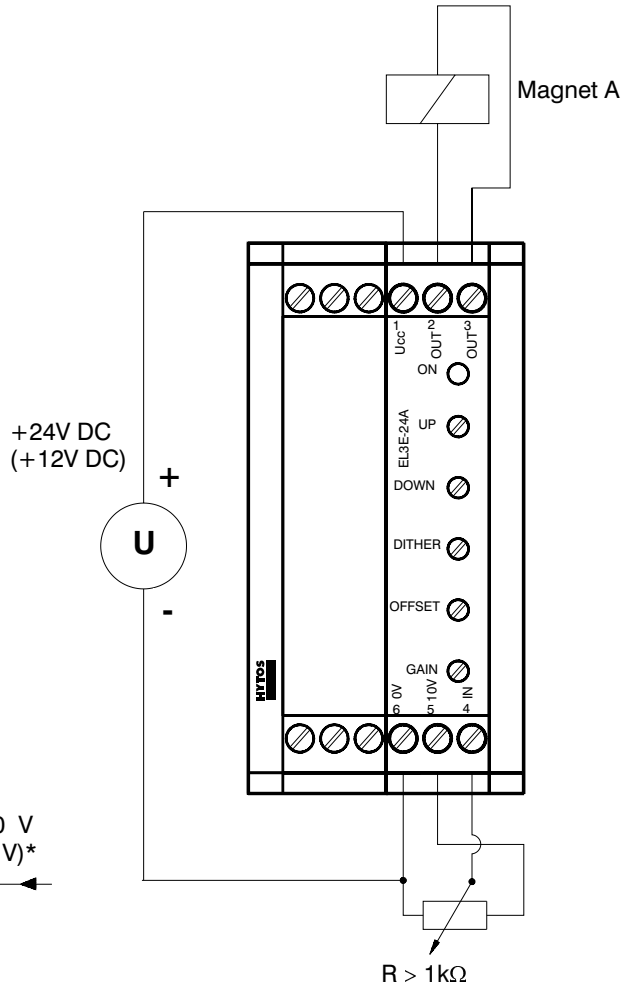
*Values in parenthesis are valid for the supply voltage 12 V

Configuration of changeover switches on the electronics card according to the proportional valve model and the control signal type used

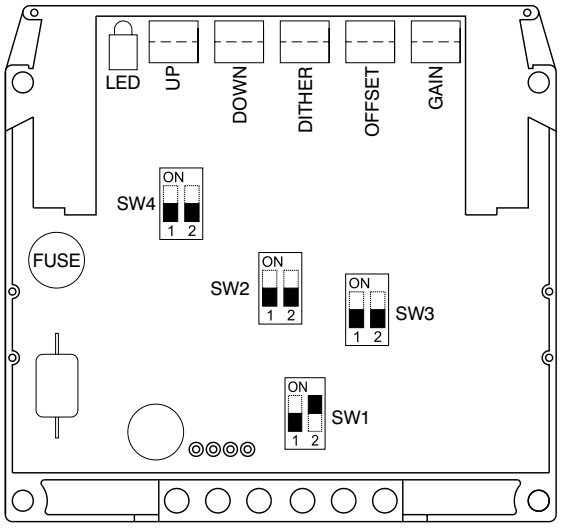
The null potential of the control signal must be the same as the null potential of the supply voltage

Proportional directional valve with one solenoid, control signal 0...10V (0…5V)* or controlling by an external potentiometer R > 1kΩ



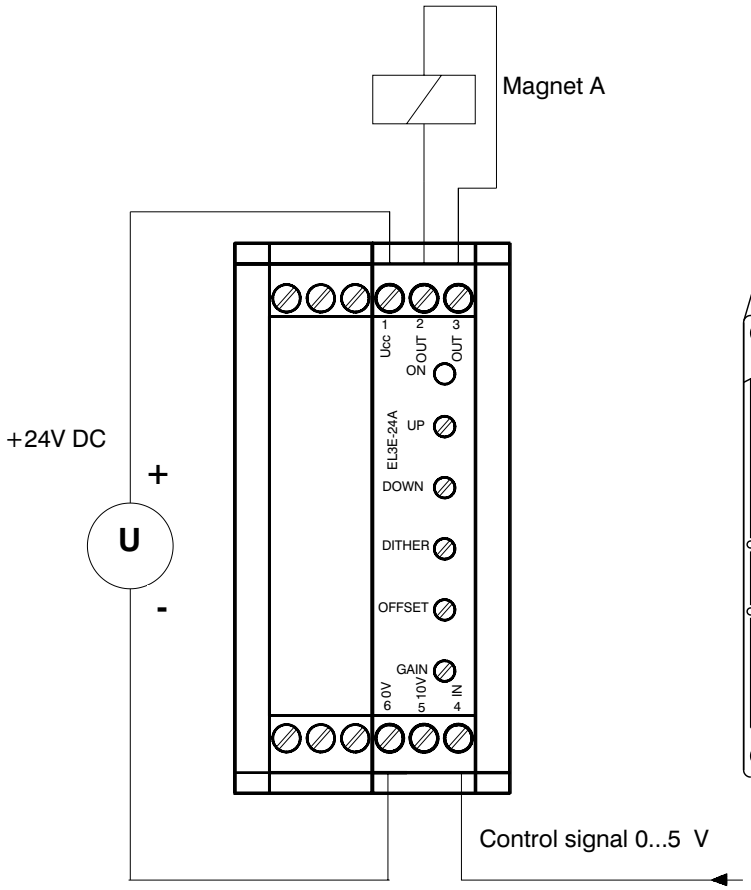


MASTER card for solenoid A



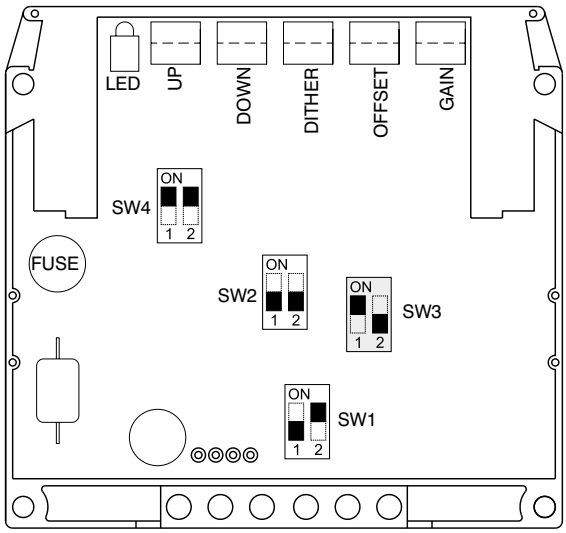
SW1 - Control signal choice
SW2 - Control signal choice
SW3 - Control signal choice
SW4 - Dither frequency

Proportional directional valve with one solenoid, control signal 0..5V (external)

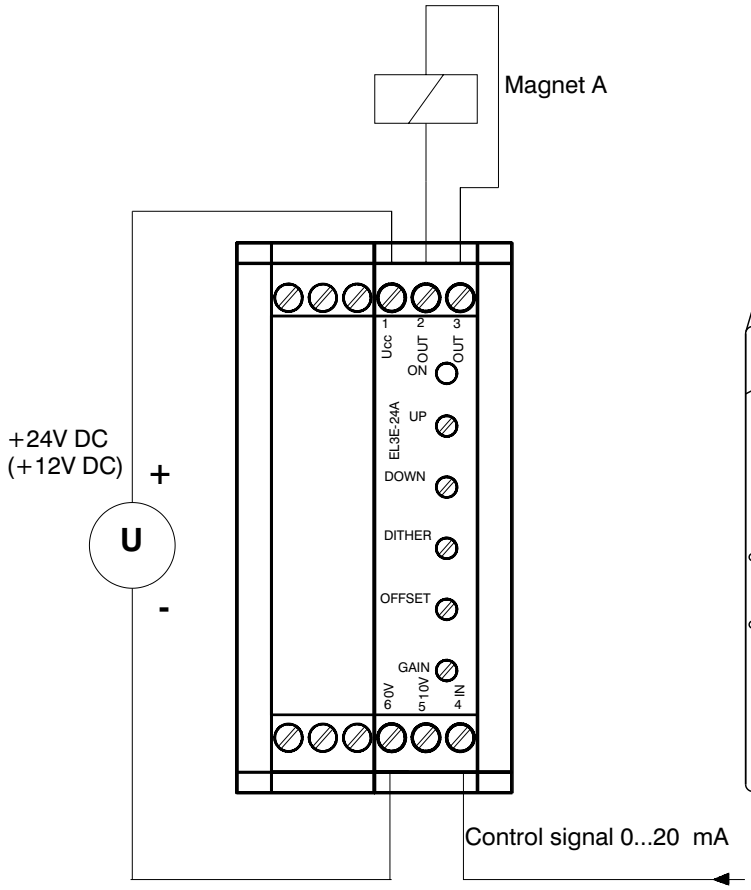


MASTER card for solenoid A

SW1 - Control signal choice
SW2 - Control signal choice
SW3 - Control signal choice
SW4 - Dither frequency

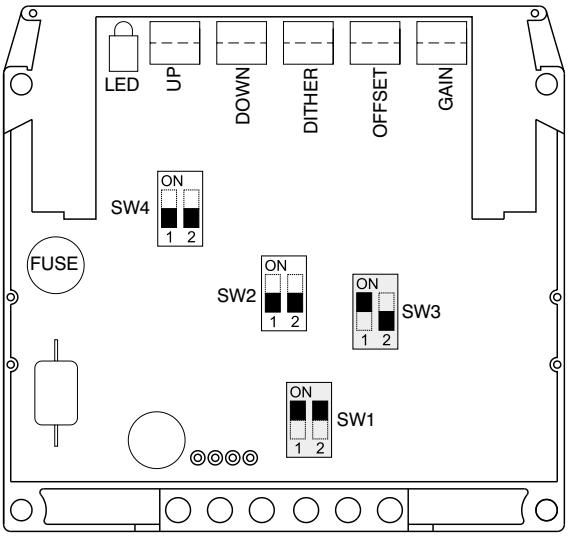


Proportional directional valve with one solenoid, control signal 0…20mA

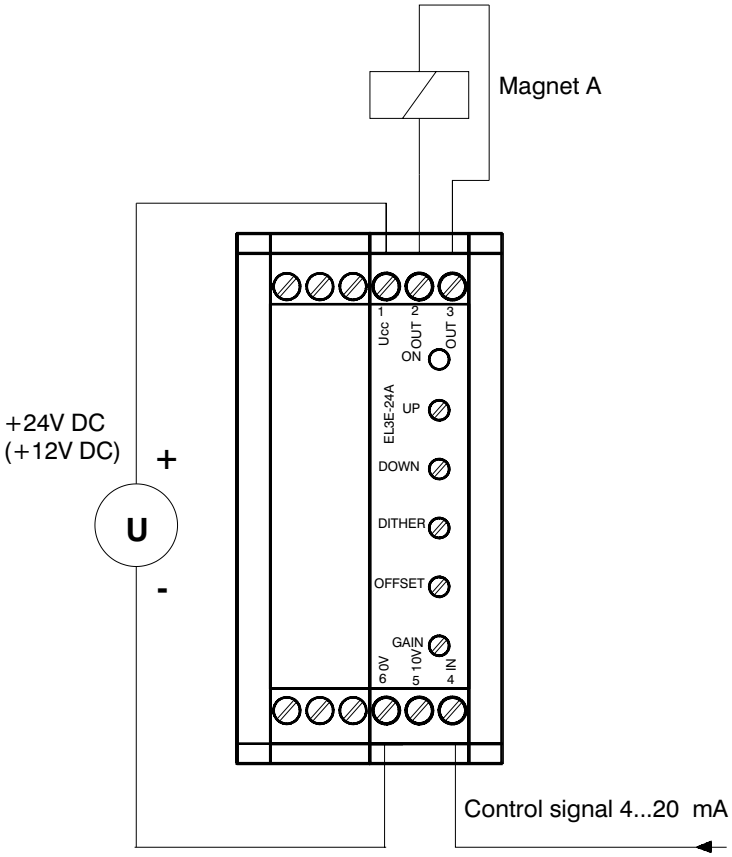


MASTER card for solenoid A

SW1 - Control signal choice
SW2 - Control signal choice
SW3 - Control signal choice
SW4 - Dither frequency

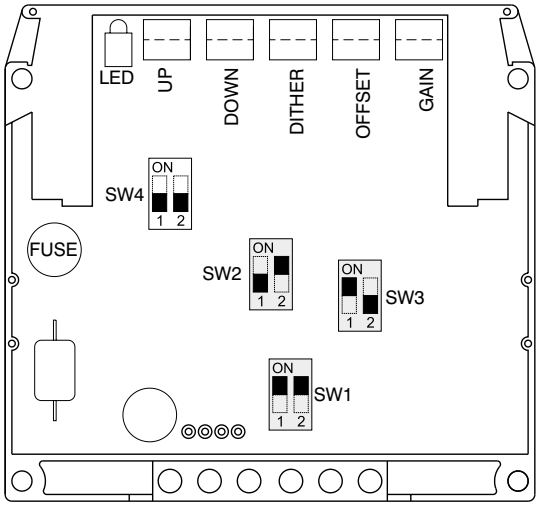


Proportional directional valve with one solenoid, control signal 4…20mA

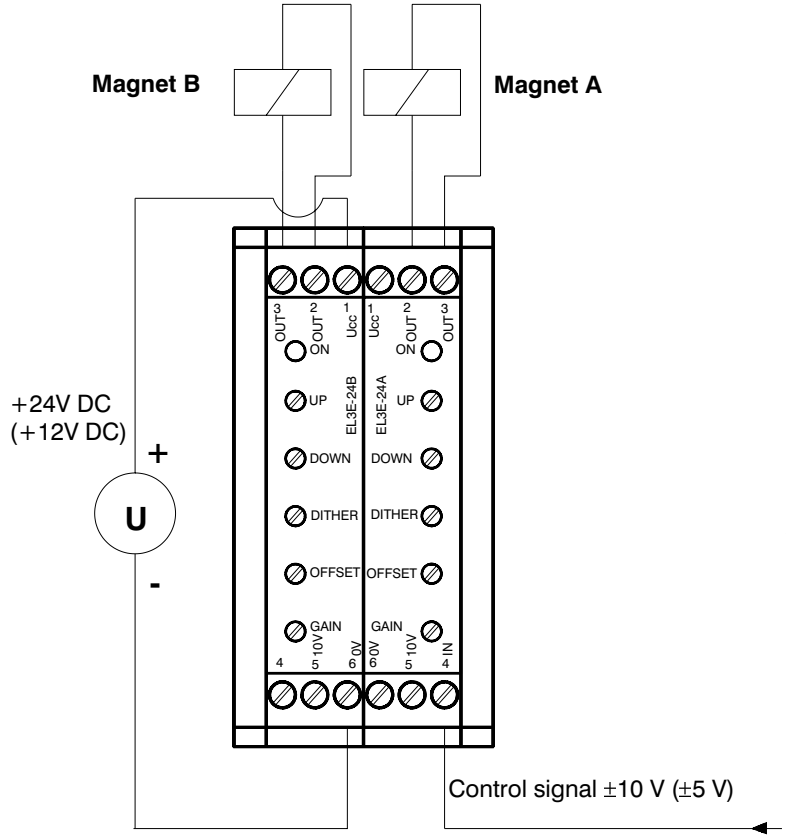


MASTER card for solenoid A

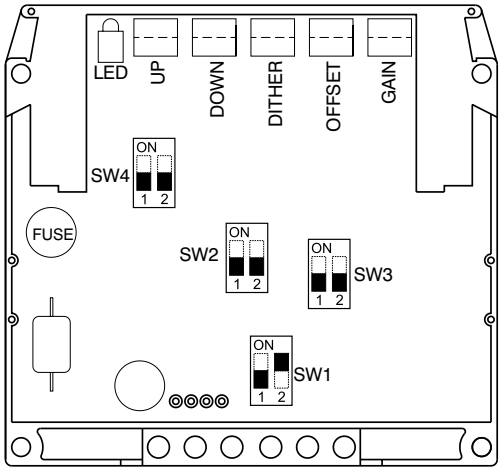
SW1 - Control signal choice
SW2 - Control signal choice
SW3 - Control signal choice
SW4 - Dither frequency



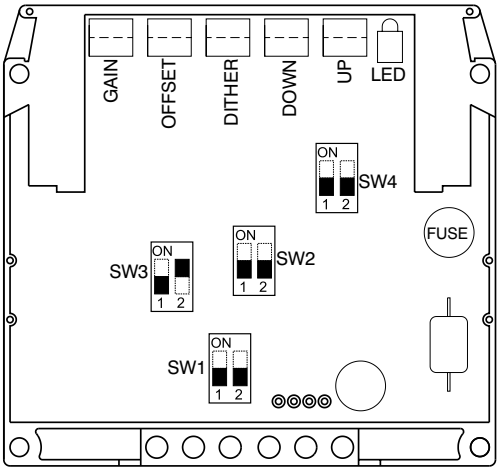
Proportional directional valve with two solenoids, control signal ±10V (±5V)*



MASTER card for solenoid A

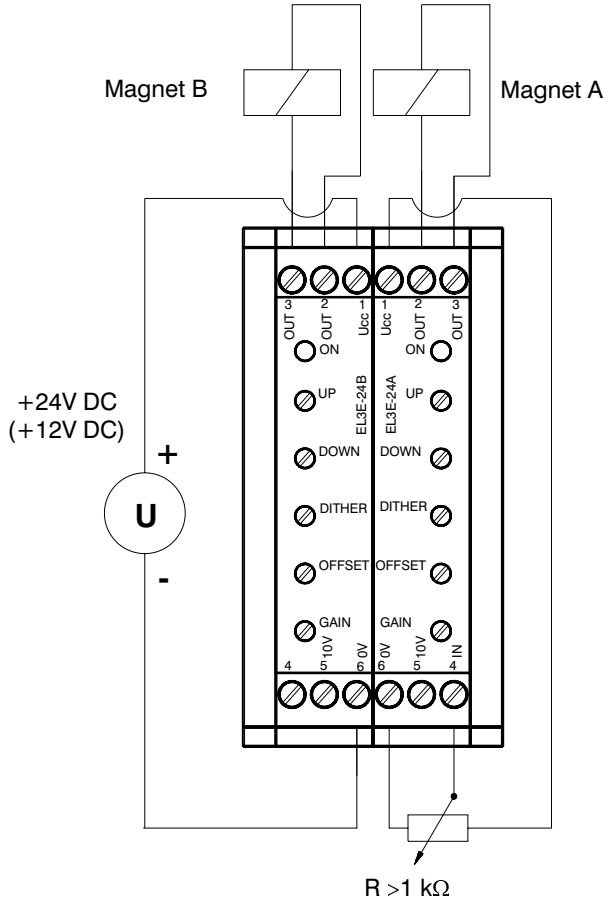


SLAVE card for solenoid B



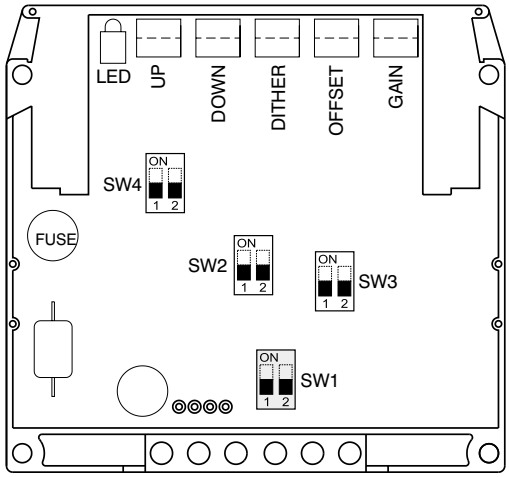
SW1 - Control signal choice
SW2 - Control signal choice
SW3 - Control signal choice
SW4 - Dither frequency

Proportional directional valve with two solenoids, control signal $U_{cc}/2 \pm 10V$ ($U_{cc}/2 \pm 5V$)* with an external potentiometer R > 1kΩ

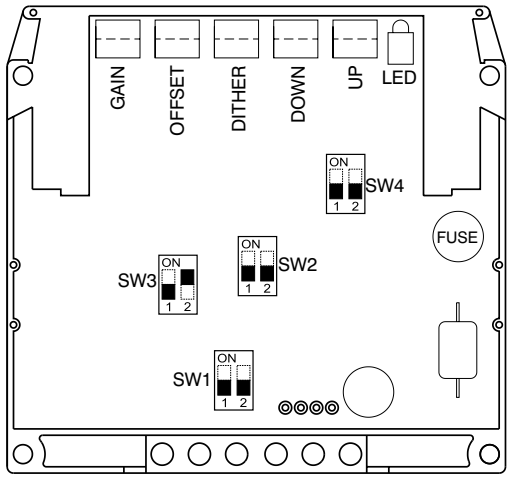


SW1 - Control signal choice
SW2 - Control signal choice
SW3 - Control signal choice
SW4 - Dither frequency

MASTER card for solenoid A



SLAVE card for solenoid B



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HYTOS a.s. CZ - 543 15 Vrchlabí

Tel.: +420-499-403111, Fax: +420-499-403421, e-mail: sales@hytos.cz

ARGO HYTOS

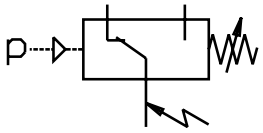
Pressure switch

...4700 PSI (320 bar)

TS1
MTS1

HA 9200
1/2003

Replaces
HA 9200 12/98



- ❑ **Piston sensing system with soft sealing**
- ❑ **Leakage free**
- ❑ **Mechanical service life 10 millions of switching operations**
- ❑ **Micro switches UL and CSA approved**
- ❑ **Gold plated contacts in micro switch**
- ❑ **Basic model for flange mounting**

Functional Description

Pressure switch consists of an aluminum housing, a piston, a prestressed spring and a microswitch.
When the pressure corresponding with the spring setting is reached, the switch closes or opens the respective electric circuit.

The pressure switch is being supplied with a connector and with three bolts.
When delivered with a sandwich plate, the switch can be turned around its length axes by 90°.
The subplate can be ordered separately or with the switch.

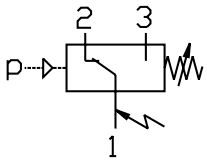
Ordering Code

TS1 - 00 / ☐ - ☐

Pressure switch

Pressure range	
up to 2320.6 psi (160 bar)	**16**
up to 4641.2 psi (320 bar)	**32**

	Type of subplate
0	without subplate
1	subplate type DP3-TS1-1
2	subplate type DP3-TS1-2



Switching function:
One single-pole micro switch (change-over switch)
Terminals 1 - 3: at pressure increase contact closes
Terminals 1 - 3: at pressure increase contact opens

FOR PREFERRED TYPES SEE BOLD TYPING IN ORDERING CODE AND TABLE OF PREFERRED TYPES ON PAGE 3

Technical data

Switching pressure range	psi (bar)	174 ... 2300 (12 ... 160)	290 ... 4700 (20...320)
Switching pressure . . . . . at the range beginning difference ca.[1] . . . . . at the range end	psi (bar)	116 (8) 232 (16)	87 (6) 362 (25)
Limit value[2]	psi (bar)	3600 (250)	7250 (500)
Number of switching max.	1/min	100	
Material of the housing		zinc pressure casting (2.2141)	
Materials in the sensing element		POM[3]	
Viscosity range	SUS (mm^2/s)	up to ..... (1000)	
Repeatability	%	± 2 from range end value[4]	
Electrical connection		plug connector to DIN 43 650	
Switching element		micro switch	
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP - - RP91H in viscosity classes ISO VG 32, 46 and 68.	
Ambient temperature range	°F (°C)	-4 ... +176 (-20 ... +80)	
Fluid temperature range	°F (°C)	-4 ... +176 (-20 ... +80)	
Max. temperature at the switching element	°F (°C)	+176 (+80)	
Maximum degree of fluid contamination		Class 21/18/15 to ISO 4406 (1999).	
Max. vibration	g	15	
Mounting position		optional	
Weight	lb (kg)	1.05 (0.476)	

1) Operating data at 3.5 million switching operations.
2) Also short pressure peaks during the operation must not exceed this limit value. Limit value corresponds with the max. testing pressure.
3) POM - Delrin
4) Related to pressure control at constant fluid and ambient conditions.

Electric Data of the Microswitch

Enclosure type to DIN 40 050		IP 65
Voltage min.	V	no limit
Current min.	mA	no limit
Voltage max.[5]	V	ca. 48
Current max.[5]	mA	ca. 20

5) When operating the pressure switch at voltages U>48 V or currents I>20 mA, the gold layer on the pressure switch contacts can be damaged. Therefore, when using the pressure switch above the values given, it can only be used for currents above 20 mA as a switch with silver contacts. For the respective technical data refer to the following table:

Current type	Nominal loading	Switching voltage U_S [V]			
		24	60	110	220
		Maximum switching current I [A]			
AC	ohmic	15	12	7	7
AC	inductive (cos φ ≈ 0,7)	12	9	5	5
DC	ohmic	10	1,5	0,65	0,25
DC	inductive (L/R ≈ 10 ms)	5	0,5	0,06	0,03
DC	inductive (with quenching diode)	8	1	0,4	0,15

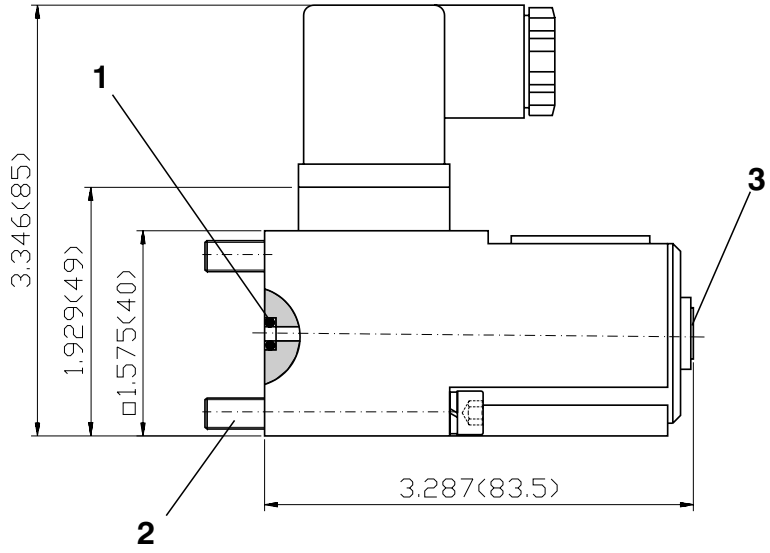
Number of switching	1/min	60
Service life - number of cycles . . max. I . . . . . 50% max. I		$1 \cdot 10^6$ $3 \cdot 10^6$

AC = alternating current
DC = direct current

Pressure Switch Dimensions

Dimensions in inches and millimetres (in brackets)

Model TS1 - 00/XX - 0

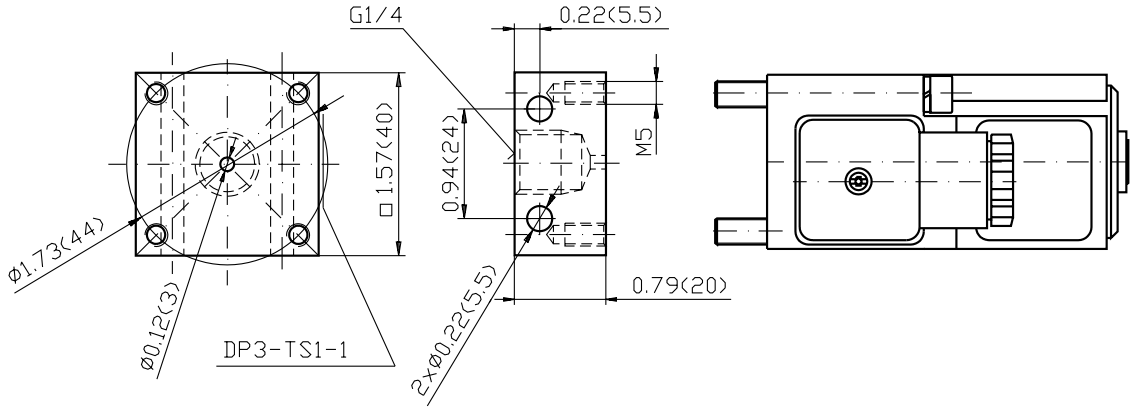


1 O-ring 6 x 1.78 supplied witch each switch

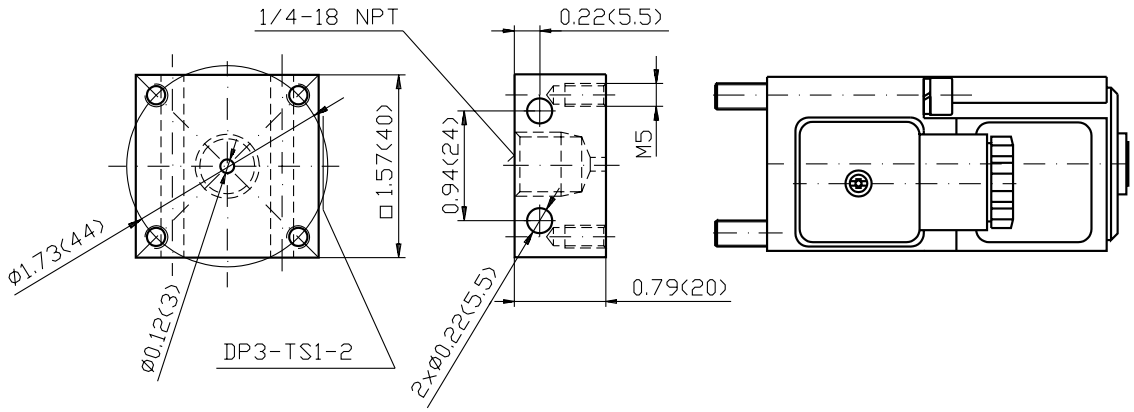
2 3 mounting bolts M5x45 [tightening torque 3.7 lb.ft (5 Nm)] supplied with each switch

3 Setting of the switch point (inside hexagon 6 mm)

Model TS1 - 00/XX - 1



Model TS1 - 00/XX - 2



Preferred Types

Type	Ordering Number
TS1-00/16	952-0011
TS1-00/32	952-0010

Ordering Code of Sandwich Plates

MTS1 - ☐ / ☐

Sandwich plate of the pressure switch

Nominal size of the sandwich plate

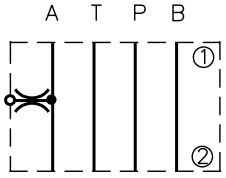
06	**06**
10	**10**

Model

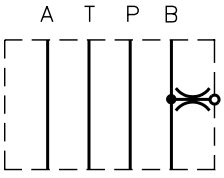
A	connection in port A
B	connection in port B
C	connections in ports A and B
P	connection in port P

FOR PREFERRED TYPES SEE BOLD TYPING IN ORDERING CODE

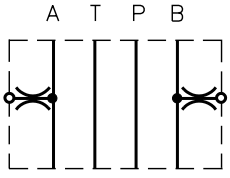
Models of sandwich plates size 06



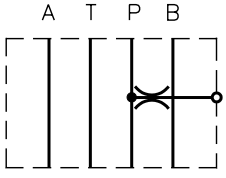
MTS1–06/A



MTS1–06/B

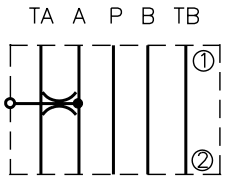


MTS1–06/C

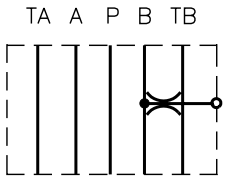


MTS1–06/P

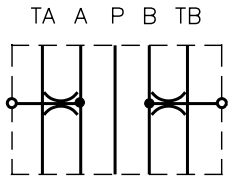
Models of sandwich plates size 10



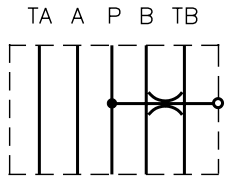
MTS1–10/A



MTS1–10/B



MTS1–10/C



MTS1–10/P

① valve side
② subplate side

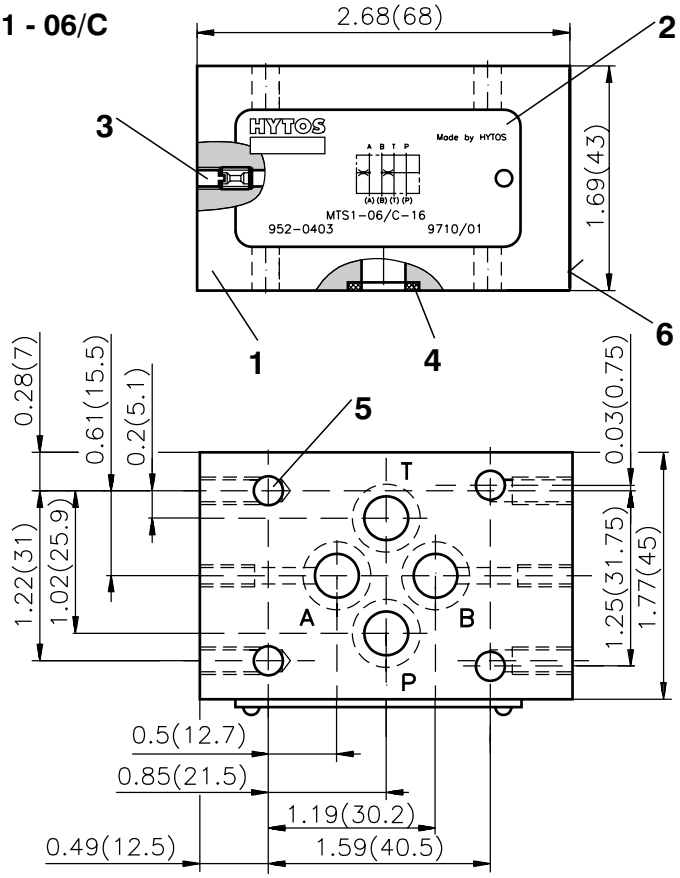
Preferred Types

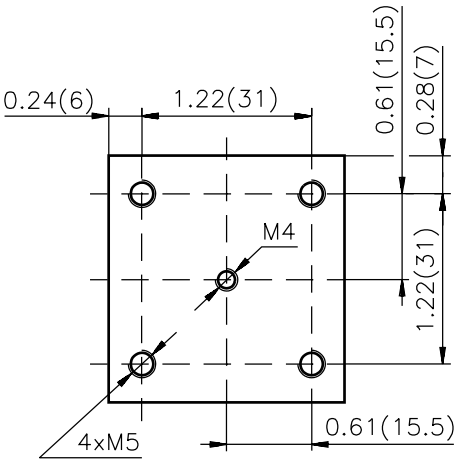
Type	Ordering Number
MTS1-06/P	952-0103
MTS1-10/P	952-0203
MTS1-06/C	952-0102
MTS1-10/C	952-0202

Sandwich Plate Dimensions

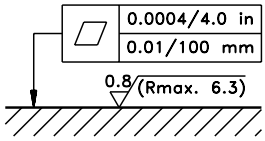
Dimensions in inches and millimetres (in brackets)

MTS1 - 06/C



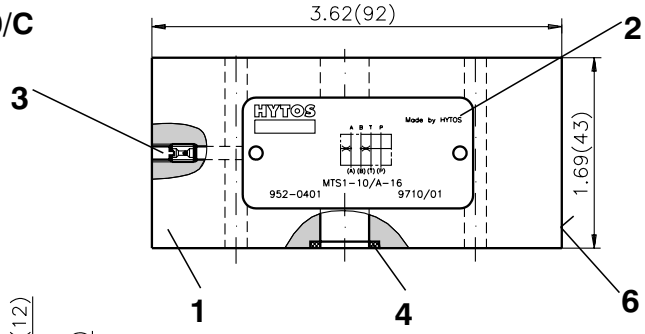


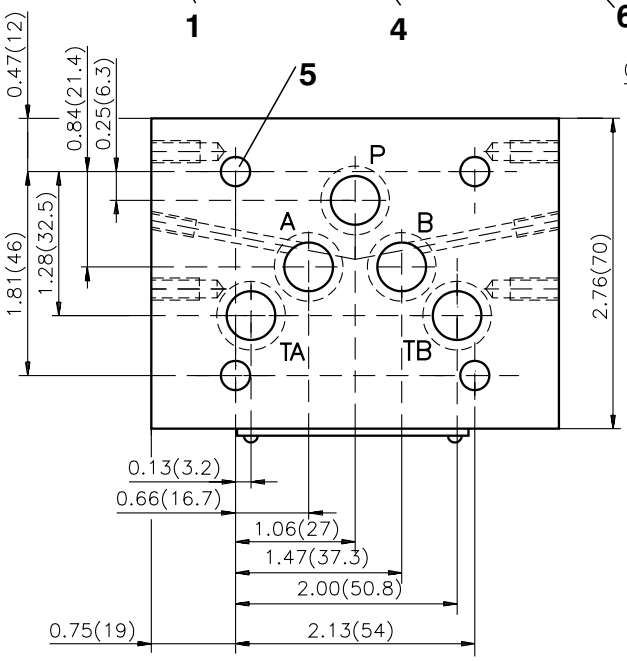
1 Sandwich plate
2 Name plate
3 Damping orifice M4x∅0.4
4 Square ring 9.25 x 1.68 (4 pcs) supplied with each plate
5 4 mounting holes
6 Mounting surface for TS1

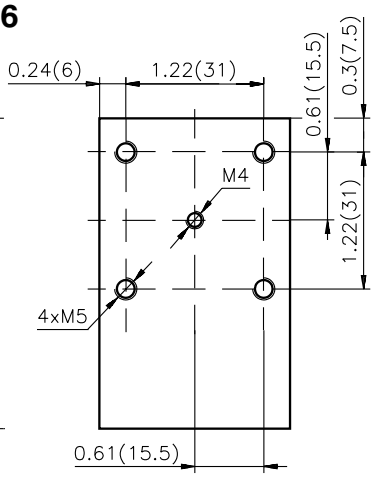


Required surface finish of interface

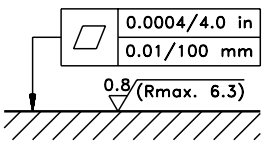
MTS1 - 10/C







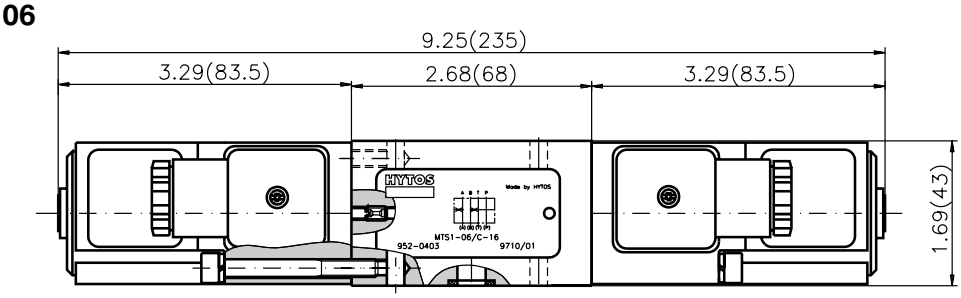
1 Sandwich plate
2 Name plate
3 Damping orifice M4x∅0.4
4 Square ring 12.42 x 1.68 (5 pcs) supplied with each plate
5 4 mounting holes
6 Mounting surface for TS1

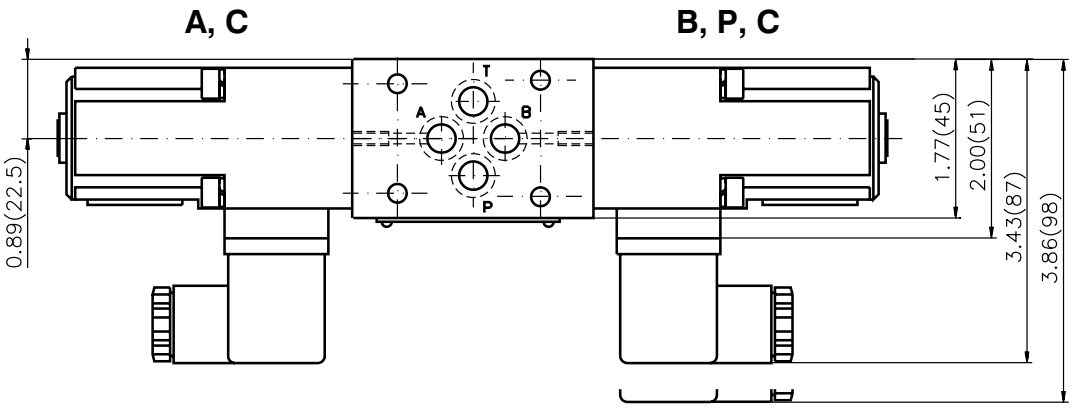


Required surface finish of interface

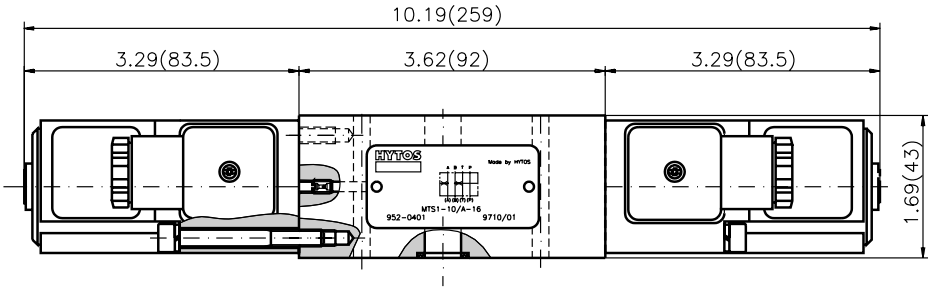
Mounting Instructions for MTS1

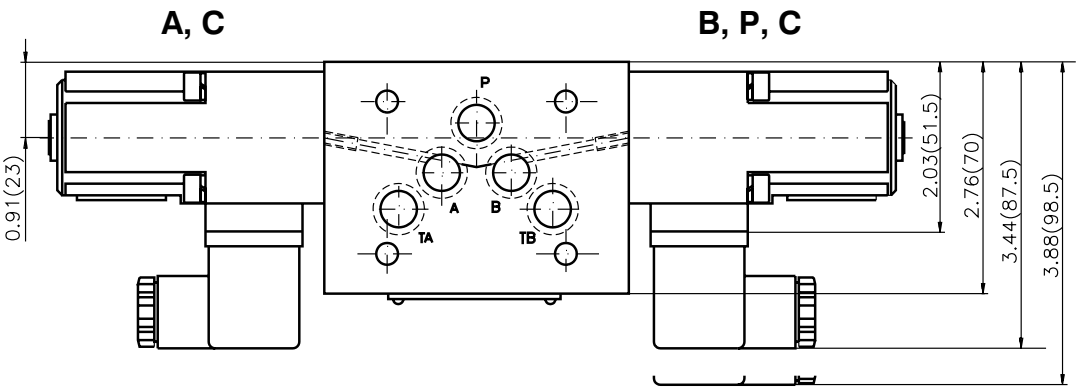
MTS1 - 06





MTS1 - 10





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ARGO-HYTOS a. s. CZ - 543 15 Vrchlabí
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www.argo-hytos.com

ARGO HYTOS

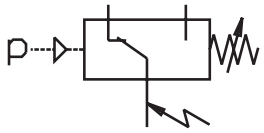
Pressure Switch

p_{max} to 350 bar

TS2
MTS2

HA 9201
6/2005

Replaces
HA 9201 1/2005



- ❑ **Piston sensing system with soft sealing**
- ❑ **Leakage free**
- ❑ **Mechanical service life 10 millions of switching operations**
- ❑ **Micro switches UL and approved**
- ❑ **Silver plated contacts in micro switch**
- ❑ **Basic model for flange mounting**

Functional Description

Pressure switch consists of an aluminum housing, a piston, a prestressed spring and a microswitch.
When the pressure corresponding with the spring setting is reached, the switch closes or opens the respective electric circuit.

The pressure switch is being supplied with a connector and with two bolts.
When delivered with a sandwich plate, the switch can be turned around its length axes by 90°.
The subplate can be ordered separately or with the switch.

Ordering Code

TS2 - □ - □

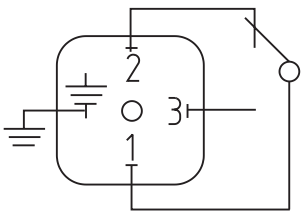
Pressure switch

Type of subplate

0	without subplate
1	subplate type DP3-TS2-1 G1/4
3	subplate type DP3-TS2-3 SAE 6

Pressure range

18	Adjustable pressure 5... 180 bar
35	Adjustable pressure 50... 350 bar



Switching function:
One single-pole micro switch (change-over switch)
The pressure increase closes contacts on terminalss 1 - 3 and opens contacts on terminals 1 - 2

Technical Data

Switching pressure ranges	bar	5 ... 180	50...350
Switching pressure . . . . . at the range beginning difference ca.[1] · · · · · · · · · · at the range end	bar	8 16	6 25
Limit value[2]	bar	250	600
Adjustable range (Falling pressure)	bar	3 ... 160	40 ... 300
Adjustable range (Rising pressure)	bar	5 ... 180	50 ... 350
Max. Hysteresis (At the end of the range)	%	15	
Number of switching max.	1/min	60	
Material of the housing		Aluminium 230	
Materials in the sensing element		Stainless Steel, Turcon and NBR	
Viscosity range	mm^2/s	up to 1000	
Repeatability	%	± 1 from range end value[3]	
Electrical connection		plug connector to DIN 43 650	
Switching element		micro switch	
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP - - RP91H in viscosity classes ISO VG 32, 46 and 68.	
Ambient temperature range	°C	-40 ... +80	
Max. temperature at the switching element	°C	+80	
Maximum degree of fluid contamination		Class 21/18/15 to ISO 4406 (1999).	
Max. vibration	g	15	
Mounting position		optional	
Weight	kg	0.350	

1) Operating data at 3.5 million switching operations.
2) Also short pressure peaks during the operation must not exceed this limit value.
Limit value corresponds with the max. testing pressure.
3) Related to pressure control at constant fluid and ambient conditions.

Electric Data of the Microswitch

Enclosure type		IP 65 (Connector DIN 43 650 A, Pg9)
Voltage max.	V	250 AC
Current max.	A	5

Silver plated contacts		
Voltage	Inductive endurance	Resistance endurance
30 V	3,0 A	4,0 A
250 V	0,2 A	0,2 A
250 V~	2,0 A	3,0 A
125 V~	3,0 A	5,0 A

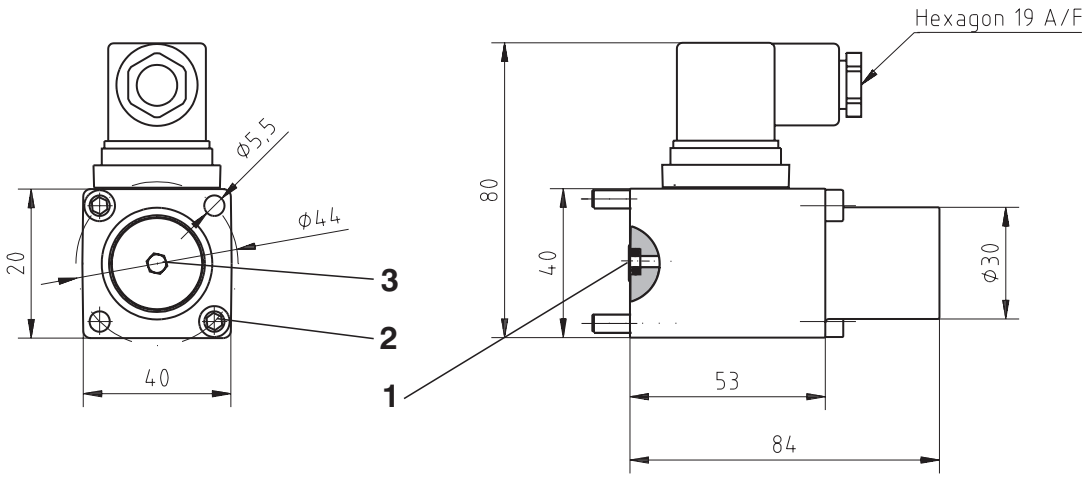
Minimum endurance 160 mA by 5 V DC

Pressure Switch Dimensions

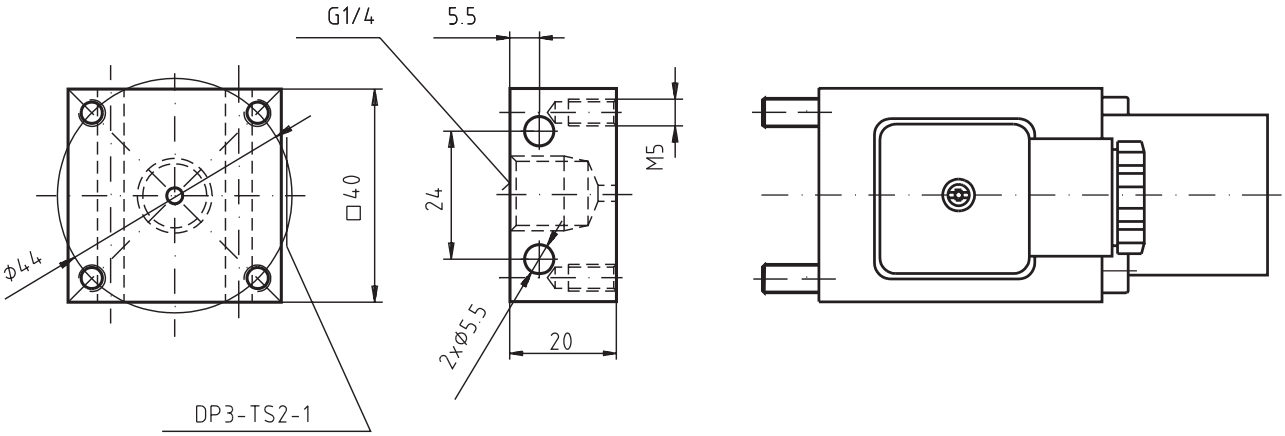
Dimensions in millimetres

Model TS2 - XX - 0

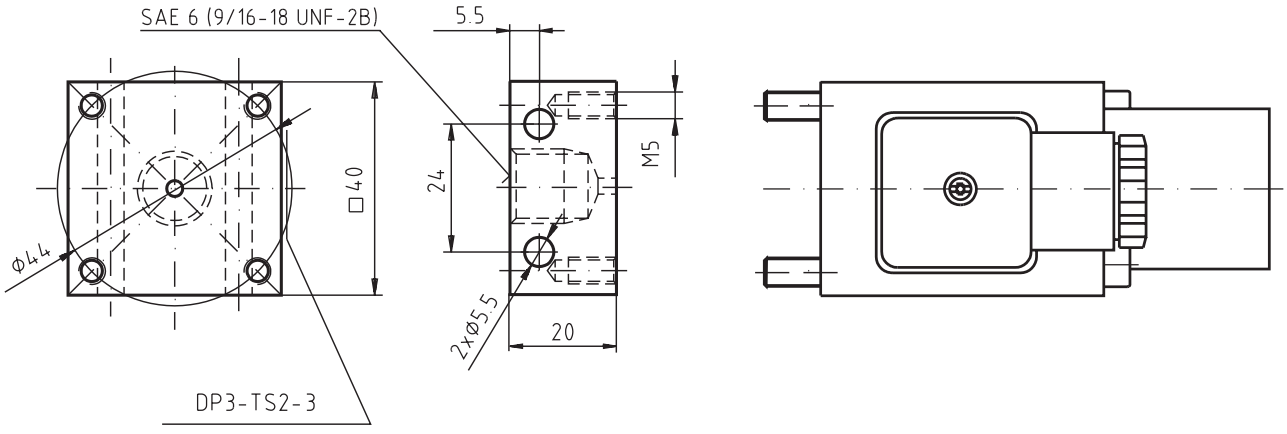
1 O-ring 8 x 1 supplied witch each switch
2 2 mounting bolts M5x60 (tightening torque 5 Nm) supplied with each switch
3 Setting of the switch point (inside hexagon 5 mm)



Model TS2 - XX - 1



Model TS2 - XX - 3



Ordering Code of Sandwich Plates

MTS2 - □ / □

Sandwich plate of the pressure switch

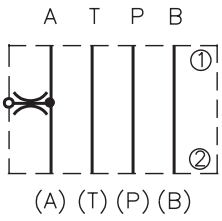
Nominal size of the sandwich plate

06	**06**
10	**10**

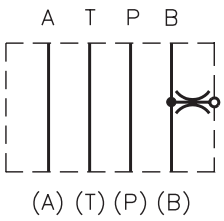
Model

A	connection in port A
B	connection in port B
C	connections in ports A and B
P	connection in port P

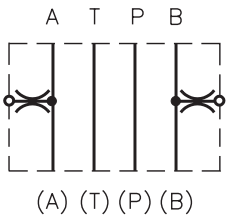
Models of sandwich plates size 06



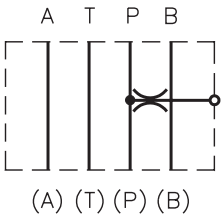
MTS2–06/A



MTS2–06/B

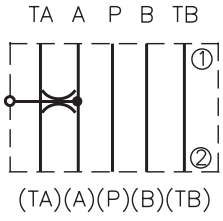


MTS2–06/C

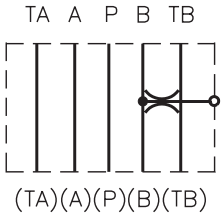


MTS2–06/P

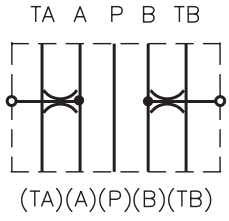
Models of sandwich plates size 10



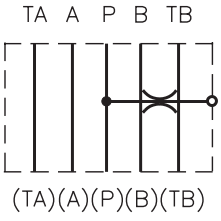
MTS2–10/A



MTS2–10/B



MTS2–10/C



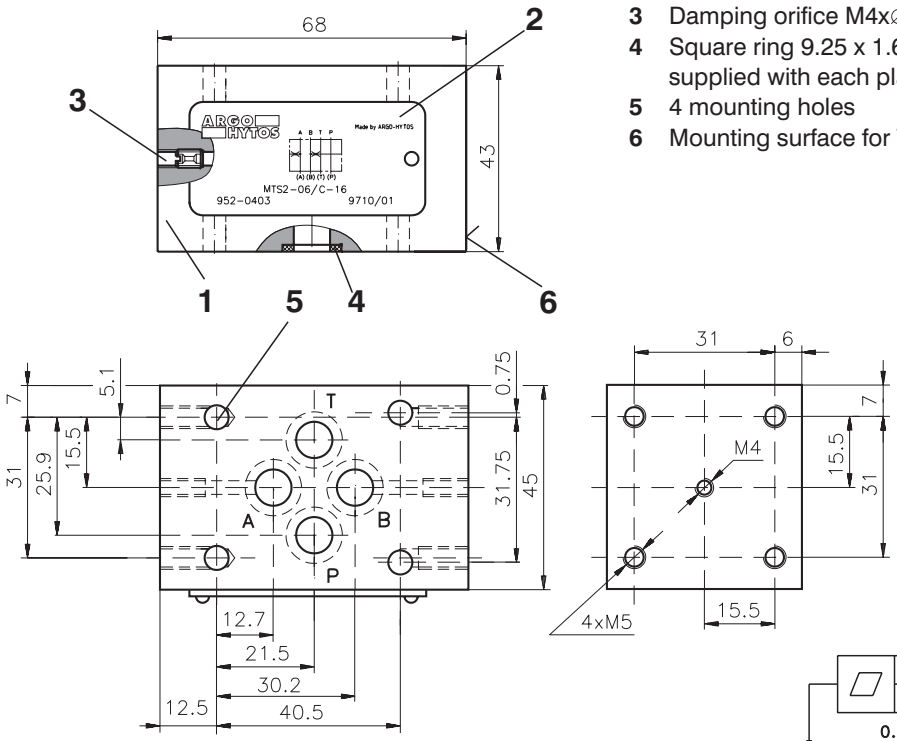
MTS2–10/P

① valve side
② subplate side

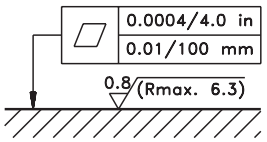
Sandwich Plate Dimensions

Dimensions in millimetres

MTS2 - 06/C

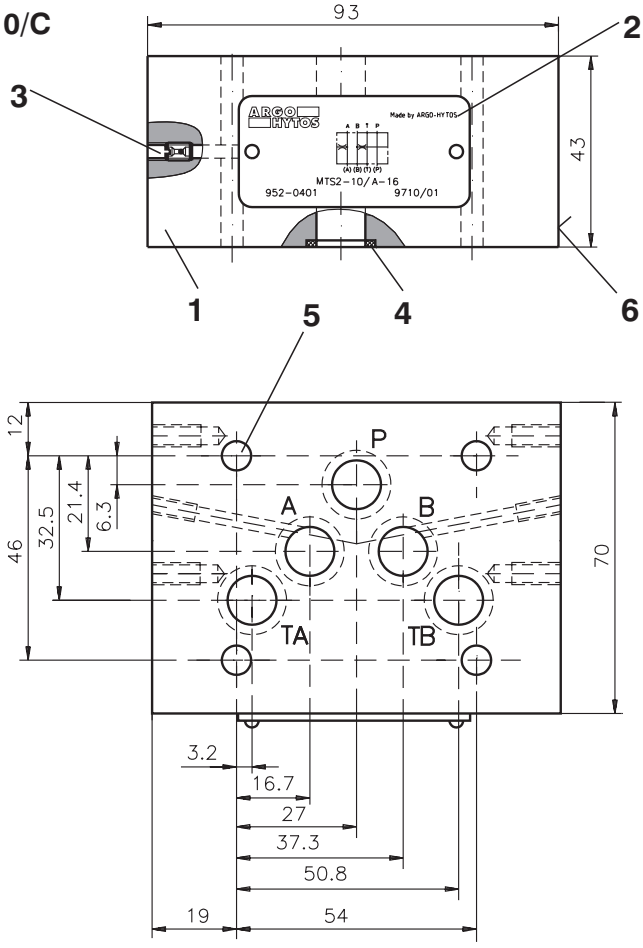


1 Sandwich plate
2 Name plate
3 Damping orifice M4x∅0.4
4 Square ring 9.25 x 1.68 (4 purchase) supplied with each plate
5 4 mounting holes
6 Mounting surface for TS

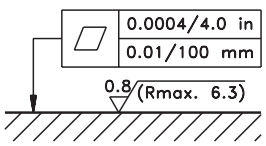


Required surface finish of interface

MTS2 - 10/C



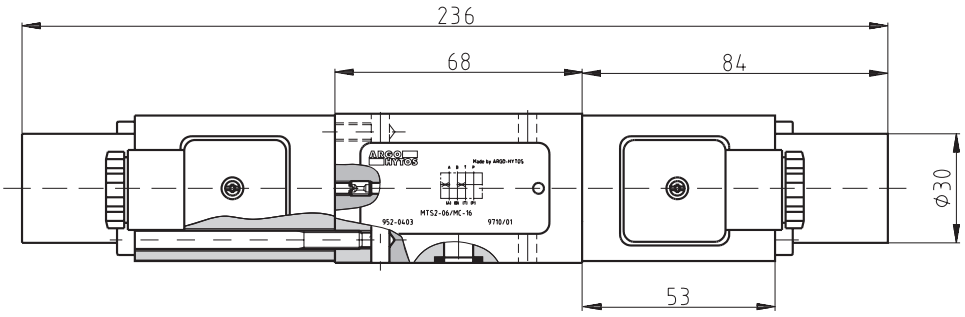
1 Sandwich plate
2 Name plate
3 Damping orifice M4x∅0.4
4 Square ring 12.42 x 1.68 (5 purchase) supplied with each plate
5 4 mounting holes
6 Mounting surface for TS



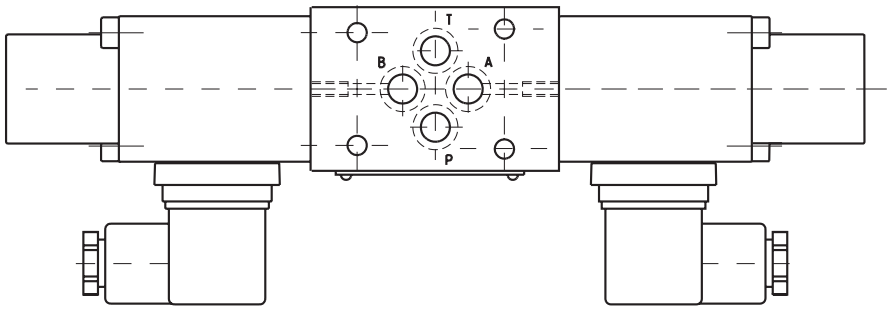
Required surface finish of interface

Mounting Instructions for MTS2

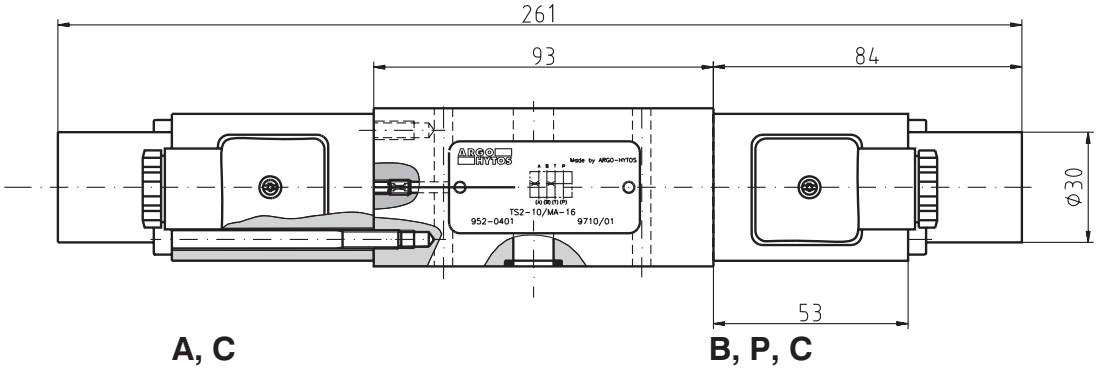
MTS2 - 06



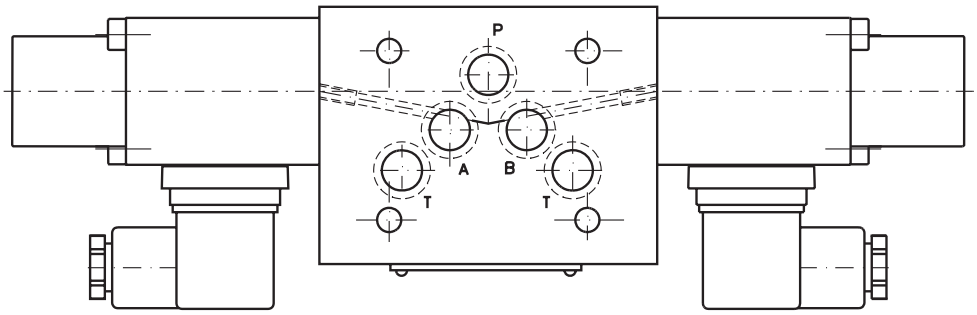
A, C **B, P, C**



MTS2 - 10



A, C **B, P, C**



Caution!

- The packing foil is recyclable.
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law.

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www.argo-hytos.com

ARGO HYTOS

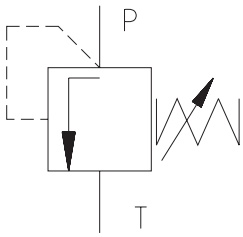
Direktgesteuerte Druckbegrenzungsventile

VPP2-06

NG 06 • p_{max} bis 320 bar • Q_{max} bis 50 l/min

HD 5062 2/99

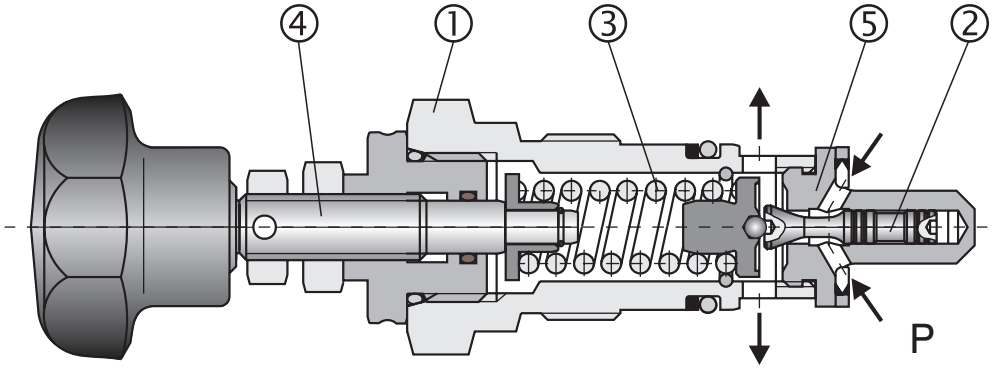
Ersetzt HD 5062 3/97



- ❑ **Für Blockeinbau**
- ❑ **Für Gewindeanschluß**
- ❑ **Für Plattenaufbau**
- ❑ **Vier Druckeinstellelemente**
- ❑ **Sechs Druckstufen**
- ❑ **Anschlußplatten - siehe Datenblatt HD 0002**

Konstruktionsbeschreibung

Die Druckbegrenzungsventile des Typs VPP2-06 sind für Einsätze in großen Volumenstrom- und Druckbereichen konzipiert.
Das Ventil besteht aus Hülse (1), Kegel mit Dämpfungskolben (2) und Feder (3). Die Druckeinstellung erfolgt von Hand durch Verstellschraube (4). Die Feder drückt den Kegel auf den Sitz (5) und hält das Ventil geschlossen. Steigt der Druck im Kanal P über den an der Feder eingestellten Wert, so öffnet der Kegel und die Druckflüssigkeit fließt aus dem Kanal P in den Kanal T.
Um das Verhalten des Ventils zu optimieren, wurde der gesamte Druckbereich in sechs Druckstufen unterteilt. Es wird empfohlen, die zum maximalen Einstelldruck nächst höhere Druckstufe zu wählen. Die Konstruktion des Ventiles ermöglicht verschiedene Einbauformen: Blockeinbau, Ventilgehäuse mit Gewindeanschluß und für Plattenaufbau. Die Ausführungen für Gewindeanschluß können mit M-Gewinden oder G-Gewinden geliefert werden. Das Gleiche gilt für die Anschlußplatten.
Die Oberfläche des Ventilkörper und die Einstellschraube sind verzinkt.



Bestellangaben

VPP2-06 ☐ ☐ / ☐

Direkgesteuertes Druckbegrenzungsventil

Nenngröße

Einstellelement

Innensechskantschraube mit Kontermutter und Schutzkappe	**S**
Drehknopf	**R**
Nichtabschließbarer zylindrischer Drehknopf	**O**
Abschließbarer zylindrischer Drehknopf	**Z**

Ausführung

V	Blockeinbau (Patrone)
M	Gewindeanschluß mit M-Gewinde
G	Gewindeanschluß mit G-Gewinde
P	Plattenaufbau

Druckstufe

2,5	Einstelldruck bis 25 bar
6,3	Einstelldruck bis 63 bar
10	Einstelldruck bis 100 bar
16	Einstelldruck bis 160 bar
25	Einstelldruck bis 250 bar
32	Einstelldruck bis 320 bar

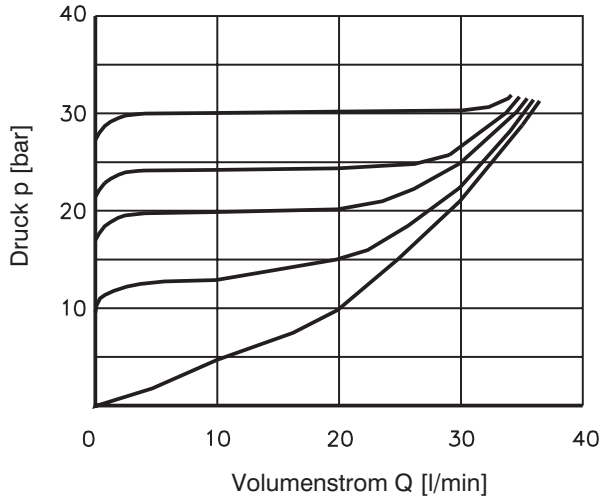
Kenngrößen

Nenngröße	mm	06						
Max. Volumenstrom	l/min	50						
Max. Betriebsdruck	bar	25	63	100	160	250	320	
Druckflüssigkeit		Mineralöl (HM, HV) nach DIN 51 254						
Flüssigkeitstemperaturbereich	°C	-30 ... +80						
Viskositätsbereich	mm^2/s	20 ... 400						
Verschmutzungsgrad		Max. zulässiger Verschmutzungsgrad der Flüssigkeit nach ISO 4406 (1999), Klasse 21/18/15.						
Masse des Ventils - Einschraubventil andere Typen	kg	0,4 1,5						
Einbaulage		beliebig						

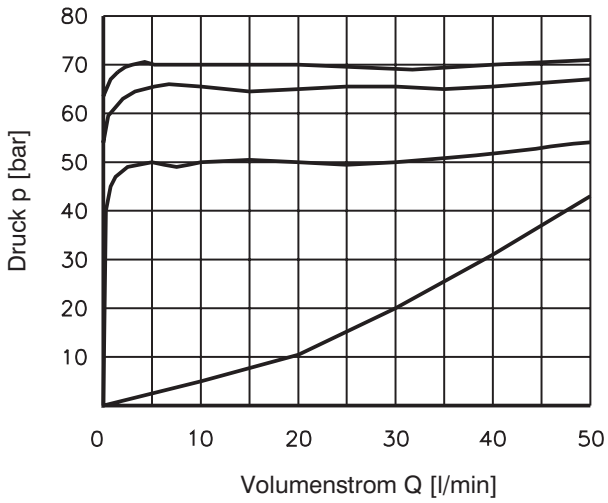
p-Q Kennlinien

gemessen bei $\nu = 35\ mm^2/s$ und $t = 40\ °C$

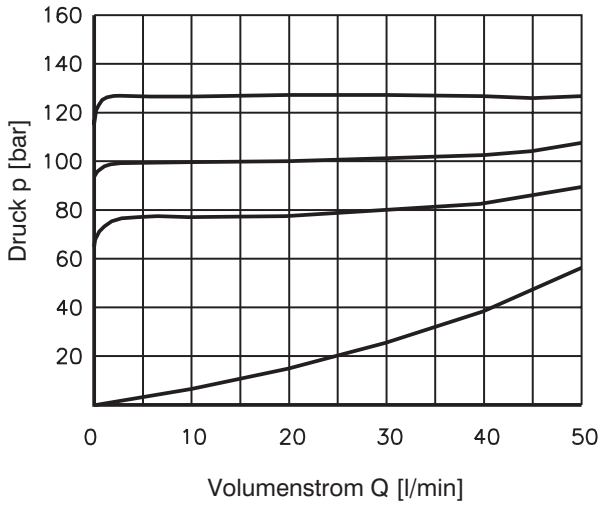
Druckstufe 25 bar



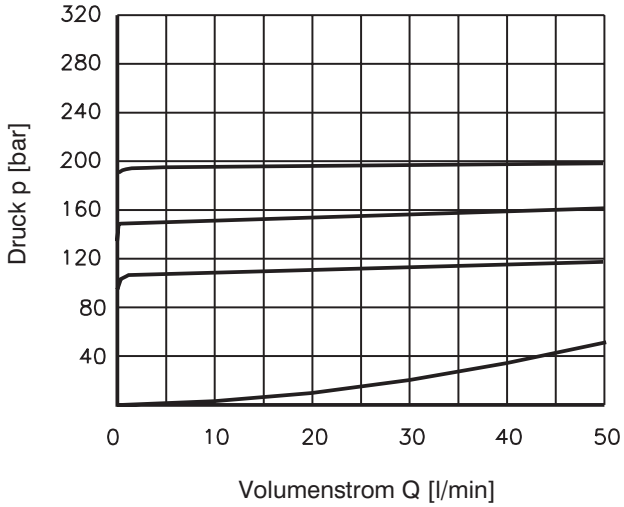
Druckstufe 63 bar



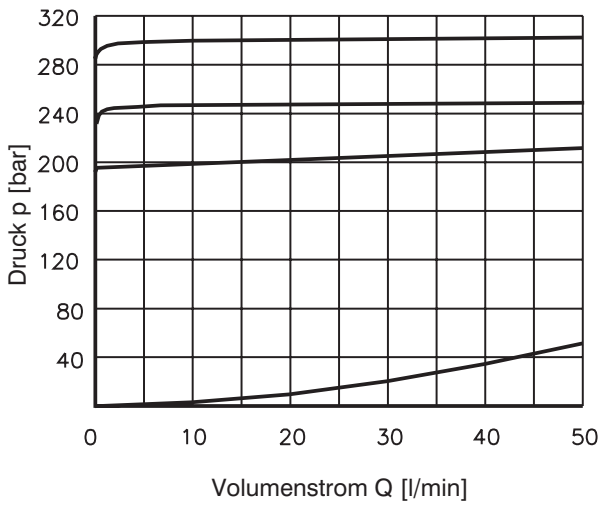
Druckstufe 100 bar



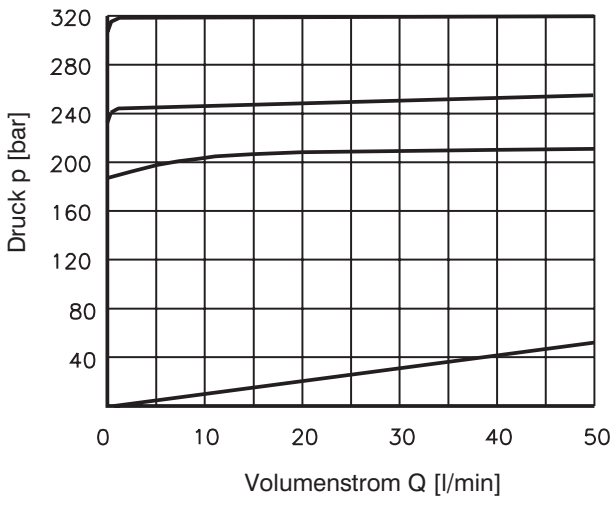
Druckstufe 160 bar



Druckstufe 250 bar



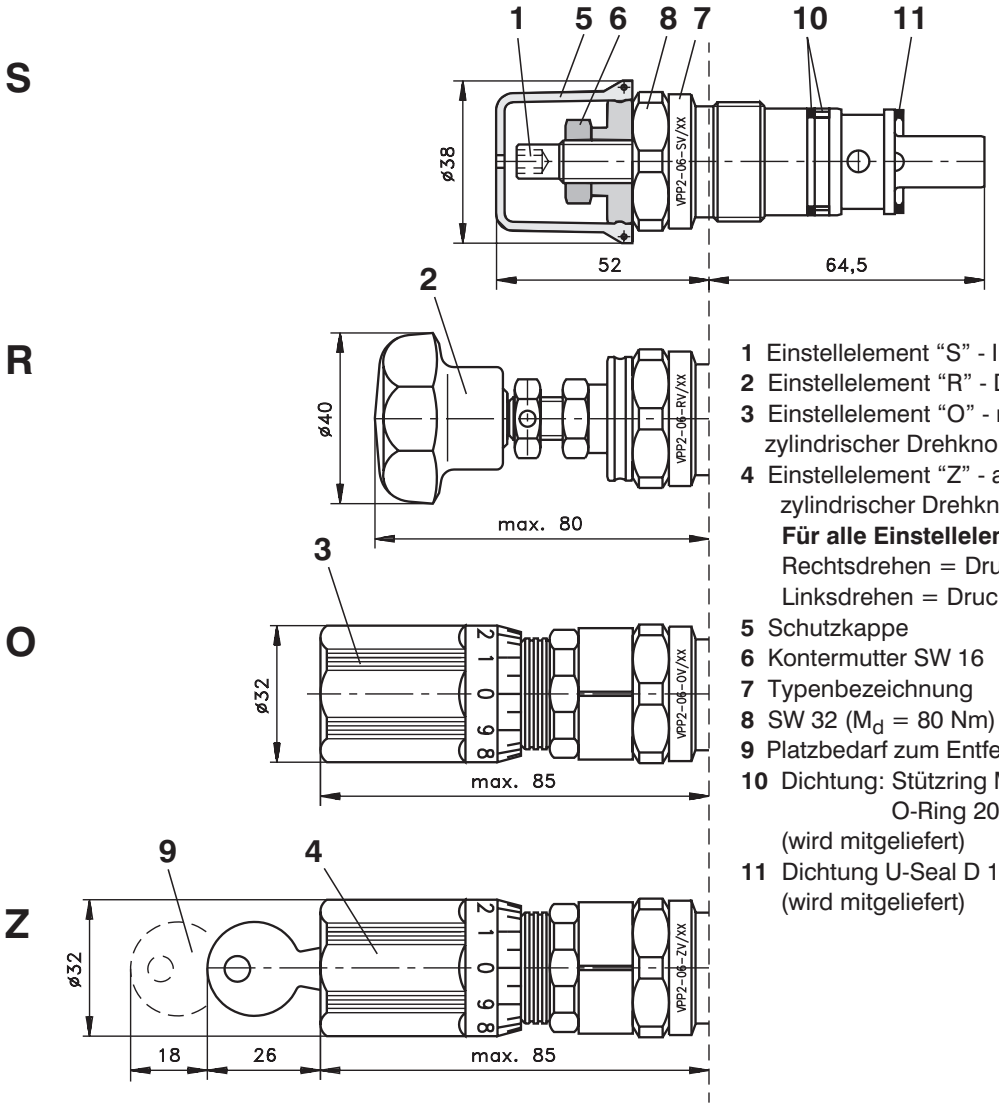
Druckstufe 320 bar



Geräteabmessungen

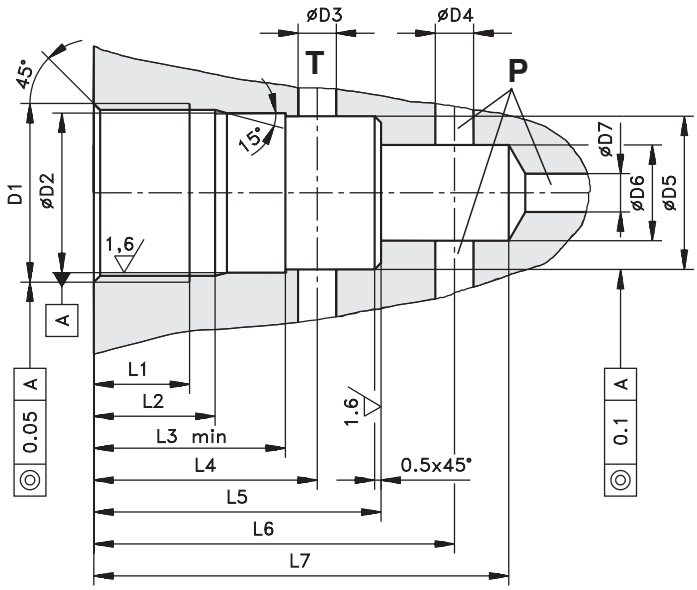
Maßangaben in mm

Ausführung Blockeinbau (Patrone) "V"



1 Einstellelement “S” - Innensechskant 5 mm
2 Einstellelement “R” - Drehknopf
3 Einstellelement “O” - nichtabschließbarer zylindrischer Drehknopf
4 Einstellelement “Z” - abschließbarer zylindrischer Drehknopf
Für alle Einstellelemente gilt:
Rechtsdrehen = Druckerhöhnung
Linksdrehen = Druckminderung
5 Schutzkappe
6 Kontermutter SW 16
7 Typenbezeichnung
8 SW 32 (M_d = 80 Nm)
9 Platzbedarf zum Entfernen des Schlüssels
10 Dichtung: Stützring M8-116
O-Ring 20 x 2,65 NBR70
(wird mitgeliefert)
11 Dichtung U-Seal D 17,4 x 24 x 1,5-NSA
(wird mitgeliefert)

Einbaubohrung

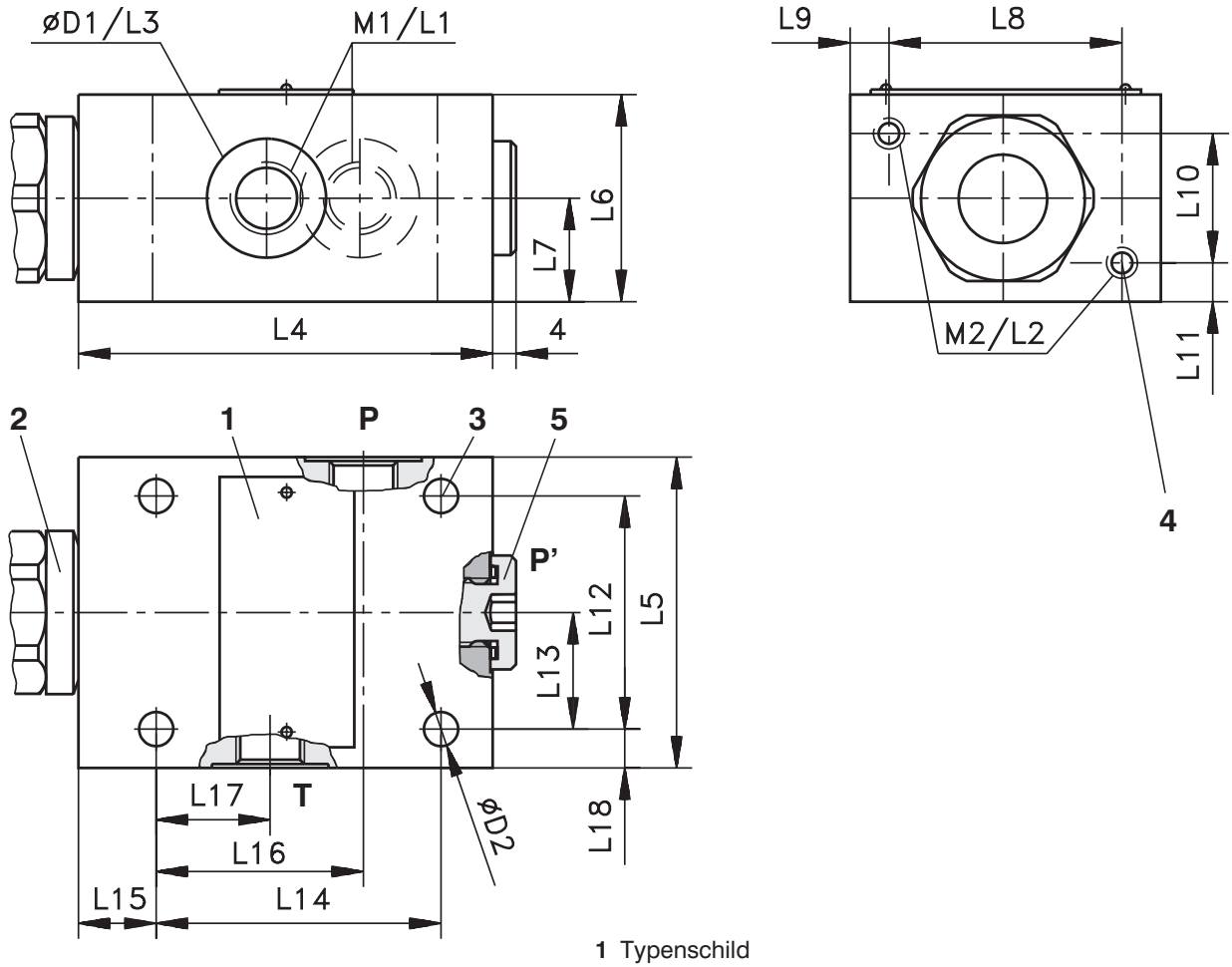


	D1	D2	D3	D4	D5	D6	D7	L1	L2	L3	L4	L5	L6	L7
NG 06	M28x1,5	25 H9	6	6	24,9	15	6	15	19	32	35	45	56,5±5,5	65

Geräteabmessungen

Maßangaben in mm

Ausführung Gewindeanschluß "M" und "G"



1 Typenschild
2 Ventil mit Einstellelemente - siehe Seite 4
3 4 Ventilbefestigungsbohrungen
4 2 Gewindebohrungen
5 Anschlußbohrung P' (als Anschluß können wahlweise P oder P' verwendet werden), Gewinde M1 / L1

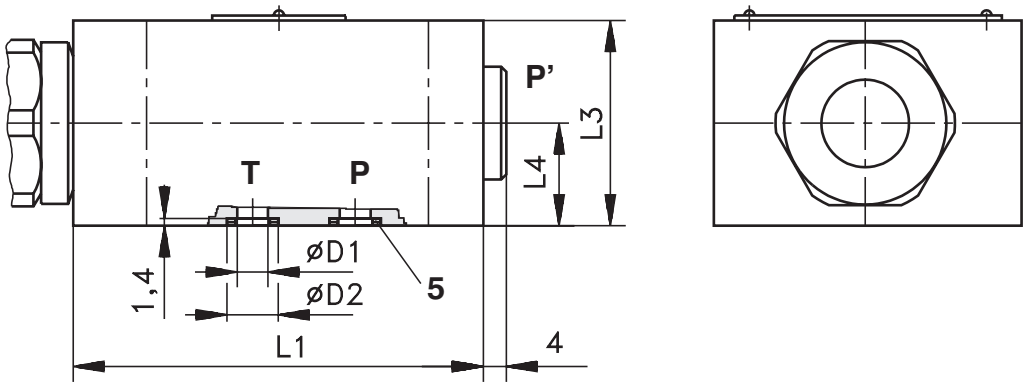
Ausführung	M1	M2	D1	D2	L1	L2	L3	L4	L5	L6	L7
VPP2-06-xM/x	M14x1,5	M6	25	6,6	12	10	0,5	80	60	40	20
VPP2-06-xG/x	G1/4										

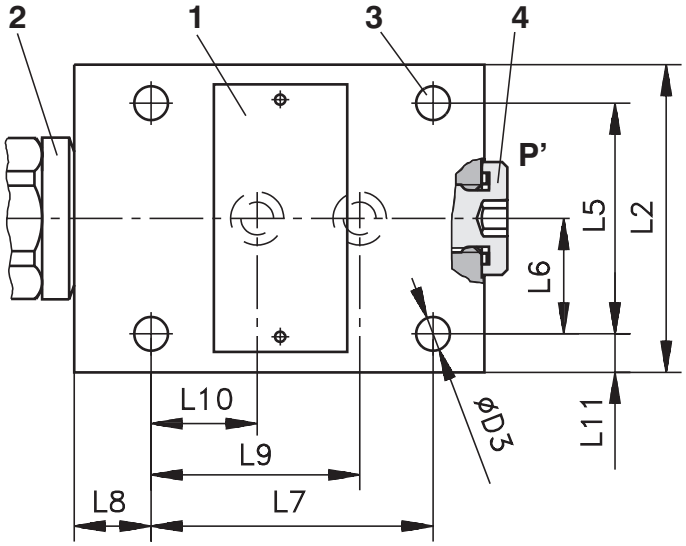
Ausführung	L8	L9	L10	L11	L12	L13	L14	L15	L16	L17	L18
VPP2-06-xM/x	45	7,5	25	7,5	45	22,5	55	15	40	20	7,5
VPP2-06-xG/x											

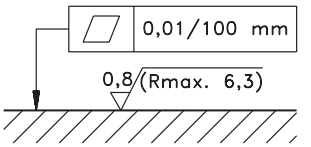
Geräteabmessungen

Maßangaben in mm

Ausführung Plattenaufbau "P"







Erforderliche Oberflächengüte des Gegenstückes

1 Typenschild
2 Ventil mit Einstellelemente - siehe Seite 4
3 4 Ventilbefestigungsbohrungen
4 Anschlußbohrung P' (z. B. für Druckmessung), Gewinde M14 x 1,5 / 12
5 Square Ring 7,65 x 1,68 (2 Stk.), wird mitgeliefert

Ausführung	D1	D2	D3	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	L11
VPP2-06-xP/x	6	10,8	6,6	80	60	40	20	45	22,5	55	15	40	20	7,5

Hinweis

- Die Verpackungsfolie ist recyclingfähig.
- Die Schutzabdeckung aus Kunststoff kann zur Entsorgung an uns zurückgesandt werden.
- Bei Ausführung "P" - Plattenaufbau die Befestigungsschrauben M6 x 50 DIN 912-10.9 (4 Stk) gehören zur Lieferung. Anzugsmoment der Schrauben ist 8,9 Nm.
- Bei Geräteeinsatz außerhalb der Kenngrössen bitte anfragen!
- Die angegebenen Daten dienen allein der Produktbeschreibung und sind nicht als zugesicherte Eigenschaften im Rechtssinne zu verstehen.

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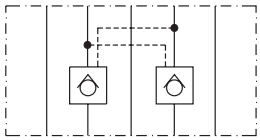
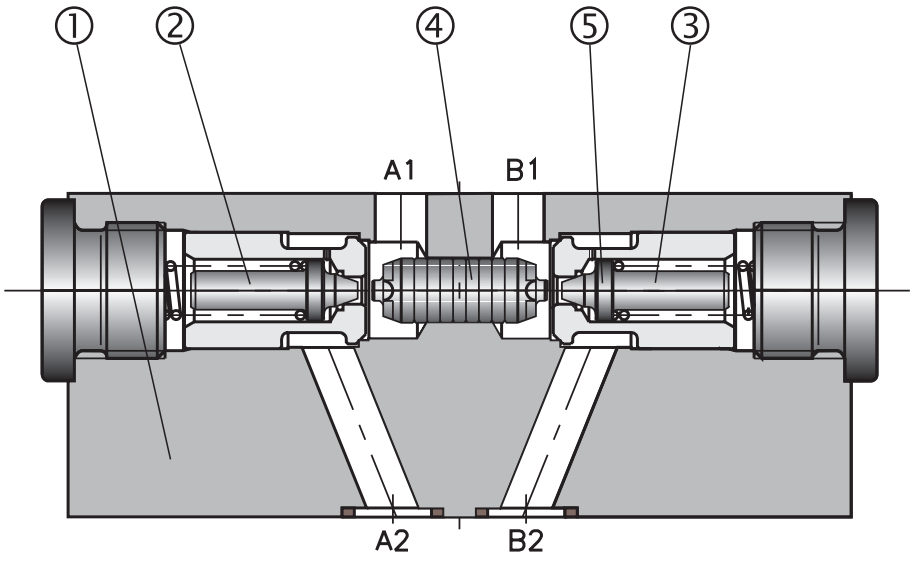


- **Pilot operated check valve sandwich plate for use in stacking assemblies**
- **3 models**
  - double valve with check valves in lines A and B
  - single valve with check valve in line A
  - single valve with check valve in line B
- **Installation dimensions to ISO 4401, DIN 24 340, NFPA T3.5.M R1 and ANSI B 93.7 D 05**

Functional Description

A pilot operated check valve closes tightly the hydraulic circuit between the valve and the actuator. The valve consists of the housing (1), one or two check valves (2), (3) and the pilot piston (4). The main poppets of the check valves are provided with pilot poppets (5) which enable opening the check valve under pressure.
When fluid flows from A1 to A2 it opens the check valve (2) and at the same time shifts the pilot piston (4) which opens by means of the pilot poppet (5) the check valve (3). When the pressure in channels A1 and B1 drops, the springs push the poppets onto the seats and the circuit between the check valve and the actuator is closed under pressure.
To ensure that the check valves close tightly, a directional valve with functional symbol Y is to be used, which connects in its middle position the ports A1 and B1 with tank T (see the typical circuit diagram).
The valve housing (1) is phosphate coated, the surfaces of the other parts are zinc coated.



Order Code

VJR2-10/M □ □

Pilot operated check valves sandwich plates

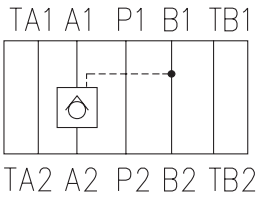
Valve size **D 05 (10)**

Modular design

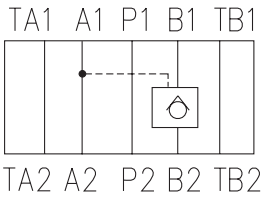
Seals
omit NBR
V Viton

Functional Symbols

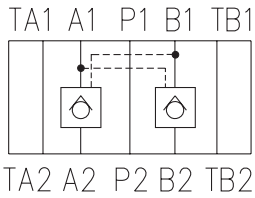
A
valve in line A



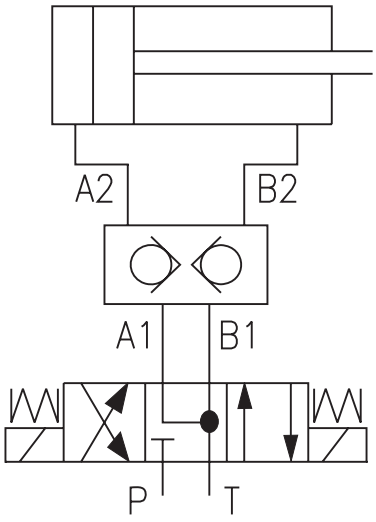
B
valve in line B



C
valves in line A and B



Typical circuit with pilot operated check valve

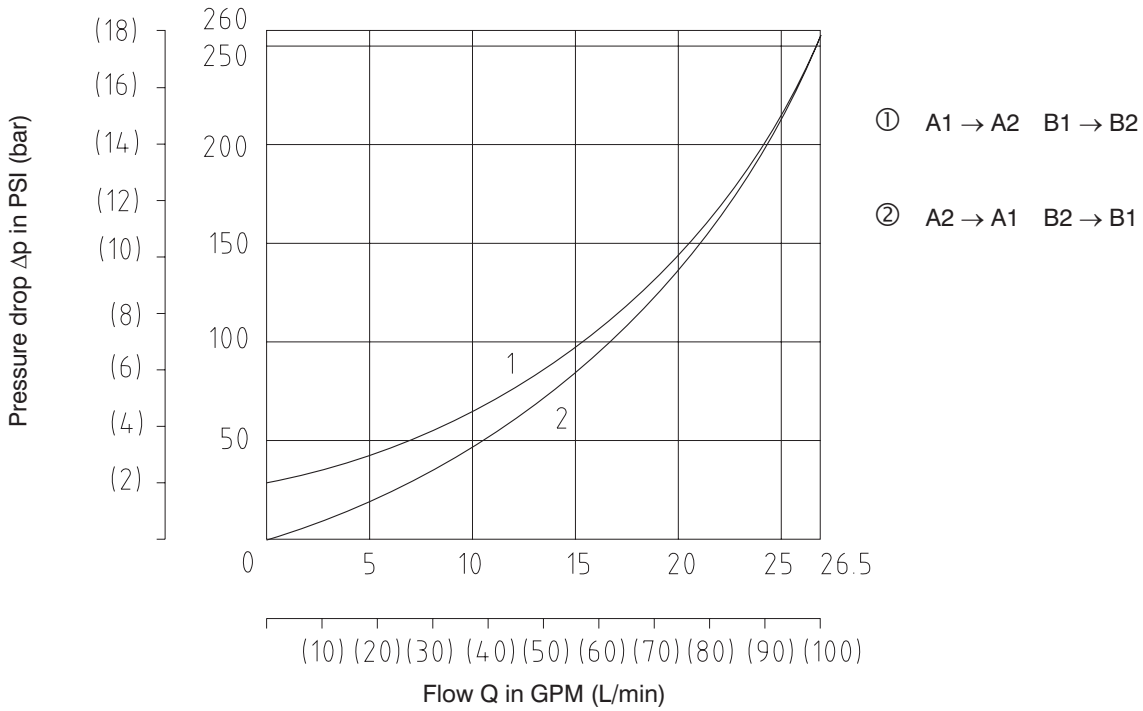


Technical Data

Valve size	US (mm)	D 05 (10)
Maximum flow	GPM (L/min)	26.42 (100)
Maximum operating pressure	PSI (bar)	5076 (350)
Cracking pressure	PSI (bar)	29 (2)
Hydraulic fluid		Petroleum oils (HM, HL, HLP) Phosphate ester fluids (HFD-R)
Fluid temperature range (NBR)	°F (°C)	-22 ... +176 (-30 ... +80)
Fluid temperature range (Viton)	°F (°C)	-4 ... +176 (-20 ... +80)
Viscosity range	SUS (mm^2/s)	98 ... 1840 (20 ... 400)
Maximum degree of fluid contamination		Class 21/18/15 to ISO 4406 (1999).
Area ration (pilot piston / seat)		5.6 : 1
Weight	lbs (kg)	6.61 (3)

Δp-Q Characteristic

Measured at ν = 166 SUS (35 mm²/s) and t = 104 °F (40 °C)

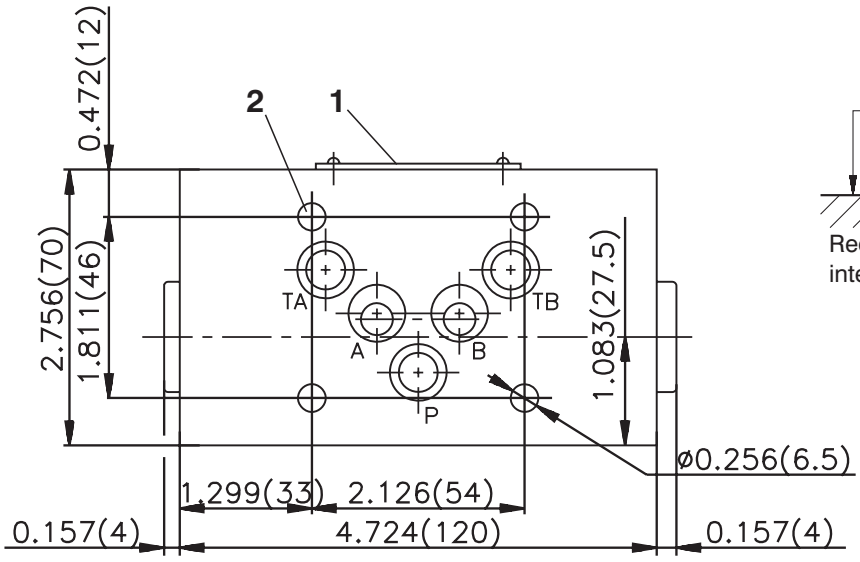


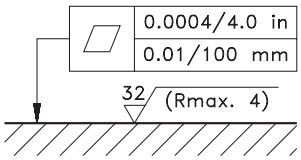
① A1 → A2 B1 → B2

② A2 → A1 B2 → B1

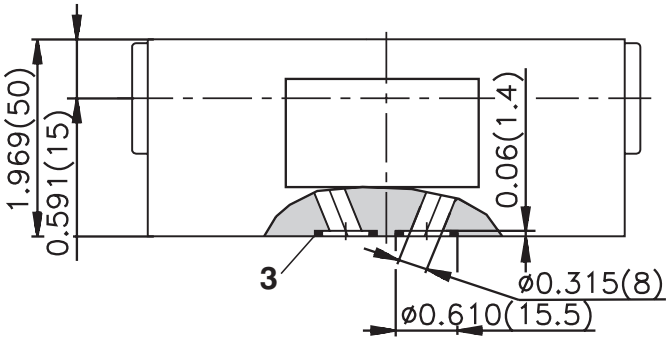
Valve Dimensions

Dimensions in inches and millimeters (in brackets)





Required surface finish of interface



Dimensions in millimeters:

1 Name plate

2 4 mounting holes

3 Seal ring (5 pcs.):
Standard (NBR) - ring NBR 70 12.42 x 1.68
Viton (FPM) - ring 12.42 x 1.78
supplied with valve

Spare Parts

Dimensions in millimeters

Seal kit

Type	Dimensions, quantity		Order number
	Square ring	O-ring	
Standard NBR 70	12.42 x 1.68 (5 pcs.)	-	535-0124
Viton	-	12.42 x 1.78 (5 pcs.)	535-0095

Caution!

- The plastic packaging is recyclable.
- Mounting studs must be ordered separately. For stud kits see HU 0040.
- Certified documentsation is available per request.

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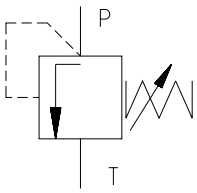
Directly operated pressure relief valves VPP1

Size to 1/4 (06), 3/8 (10) • ... 4600 PSI (320 bar) • ... 31.7 GPM (120 L/min)

HU 5061
3/2003

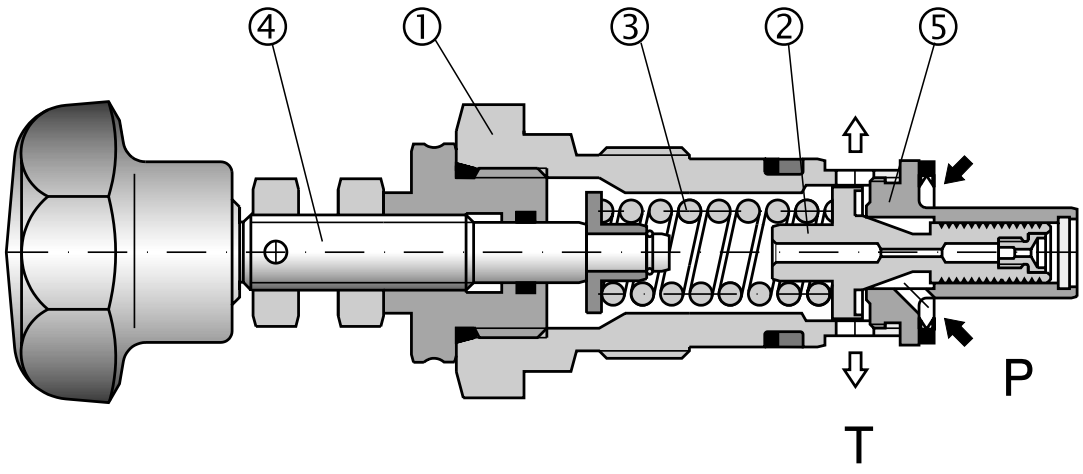
Replaces
HU 5061 3/2002



- **Single-stage pressure relief valve**
- **Cartrige in threaded housing - with metric, BSPP or SAE threads**
- **Cartrige in subplate mounted housing**
- **Four pressure adjustment options**
- **Six pressure ranges**
- **Subplates - see catalog HU 0002**

Functional Description

Pressure relief valves VPP1 were designed for applications requiring a safety valve or a pressure regulating valve working over a wide range of pressures and flow rates.
The valve consists of the valve body (1), pop- pet with damping spool (2) and compression spring (3). Pressure is manually set by an adjustment screw (4). The spring pushes the poppet into the seat (5) holding the valve in its normally closed position. When the force, caused by the pressure acting on the exposed surface area of the poppet, exceeds the spring force, the valve opens and the flow passes from port P to port T. To optimize the valve performance, five pressure ranges are available. Choosing the closest range is recommended. This valve is not recommended in case of accumulator circuits or circuits where absolute holding function is required. The design enables the valve to be used as a screw-in cartridge for manifold mounting, built into a hreaded housing or in a subplate mounted housing. Both the threaded and the subplate mounted housings can be delivered either with metric, pipe or SAE threads.



Order Code

VPP1- □ **-** □ □ **/** □ □

Direct operated pressure relief valves

Seals

omit	NBR
V	FPM (Viton)

Valve size

Size to 1/4 (06)	**1/4 (06)**
Size 08 - only models M and G valve is congruent with size 3/8 (10)	**(08)**
Size to 3/8 (10)	**3/8 (10)**

Pressure range in PSI (bar)

2.5	up to 360 (25)
6.3	up to 910 (63)
10	up to 1450 (100)
16	up to 2300 (160)
25	up to 3600 (250)
32	up to 4600 (320)

Adjustment option

Hexagon set screw locknut 0.197 in (5 mm)	**S**
Adjustable handknob	**R**
Lockable cylindrical handknob	**O**
Non-lockable cylindrical handknob	**Z**

Model

V	screw-in cartridge valve
M	cartridge in threaded housing - with metric threads
G	cartridge in threaded housing - with BSPP threads
SAE	cartridge in threaded housing - with SAE threads
PS	cartridge in subplate mounted housing

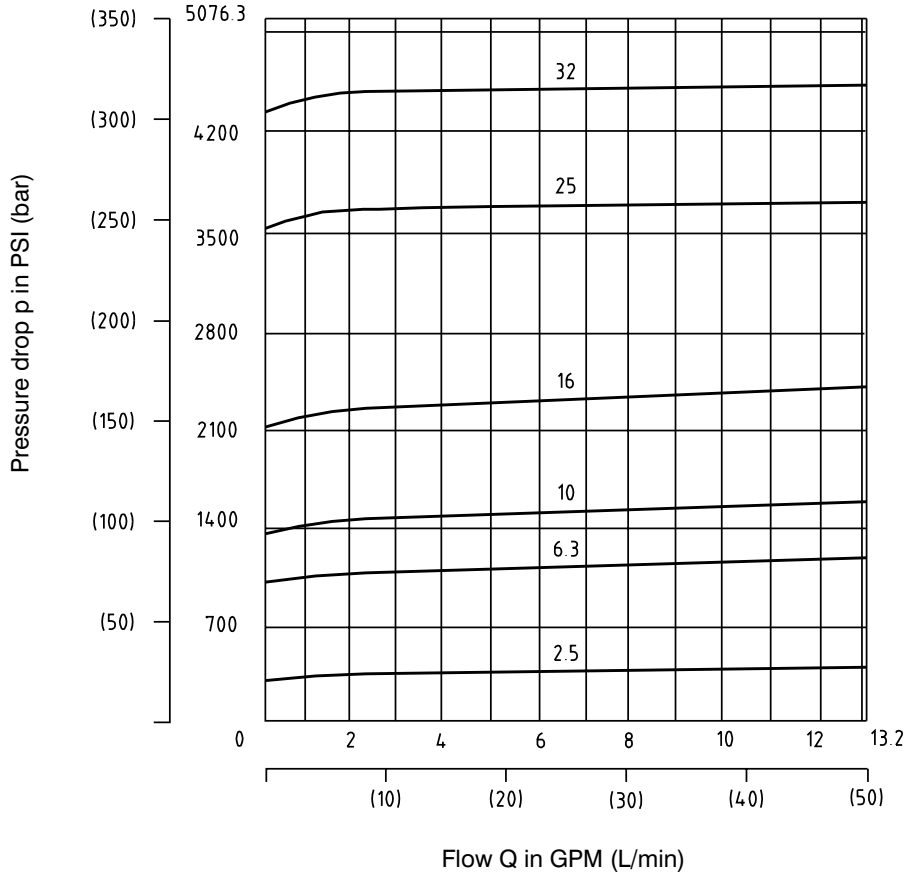
Technical Data

Valve size	US (mm)	1/4 (06)	3/8 (10)
Maximum flow	GPM (L/min)	13.2 (50)	4.7 (120)
Hydraulic fluid		Petroleum oils (HM, HL, HLP) Phosphate ester fluids (HFD-R)	
Fluid temperature range for standard sealing (NBR)	°F (°C)	-22 ... +176 (-30 ... +80)	
Fluid temperature range for Viton seals (FPM)	°F (°C)	-4 ... +176 (-20 ... +80)	
Viscosity range	SUS (mm^2/s)	98 ... 1840 (20 ... 400)	
Maximum degree of fluid contamination		Class 21/18/15 to ISO 4406 (1999).	
Weight - screw-in cartridge valve other models	lbs (kg)	0.879 (0.4) 3.297 (1.5)	1.099 (0.5) 8.132 (3.7)
Mounting position		any	

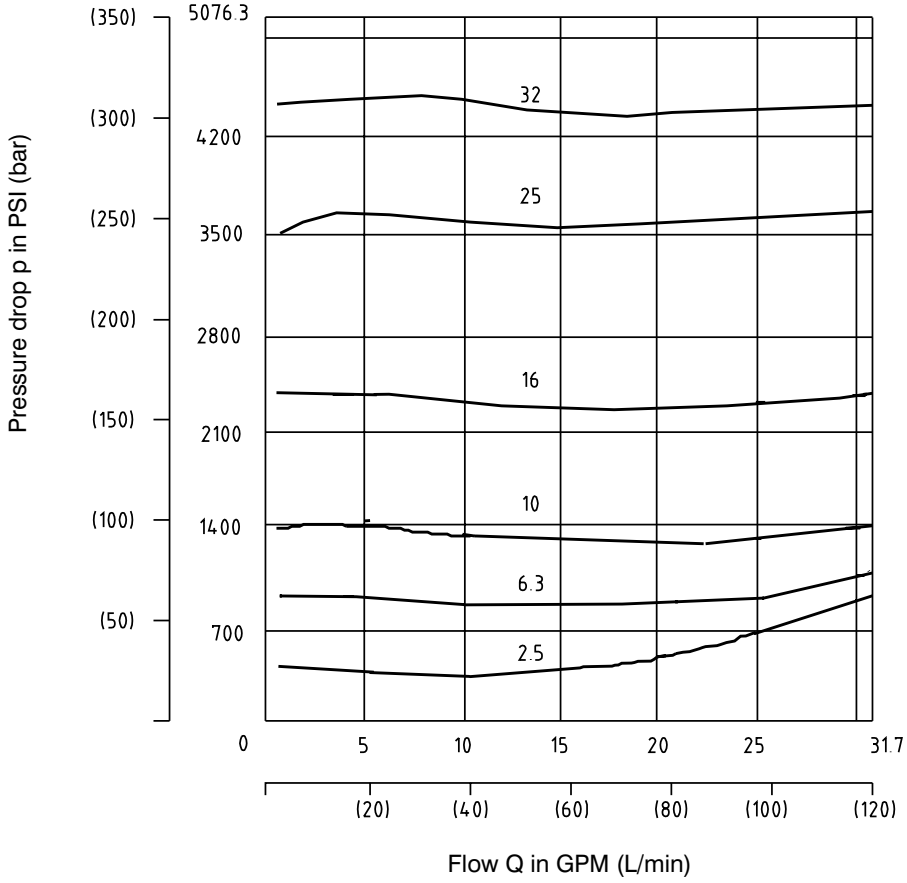
p-Q Characteristic

Measured at ν = 166 SUS (35 mm²/s) and t = 104 °F (40 °C)

Size to 1/4 (06)



Size to 3/8 (10)

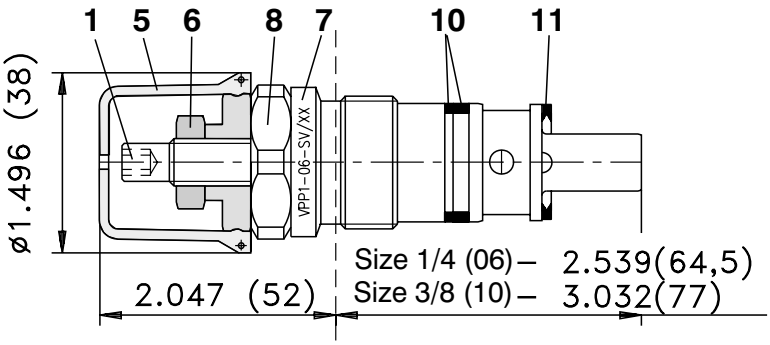


Valve Dimensions

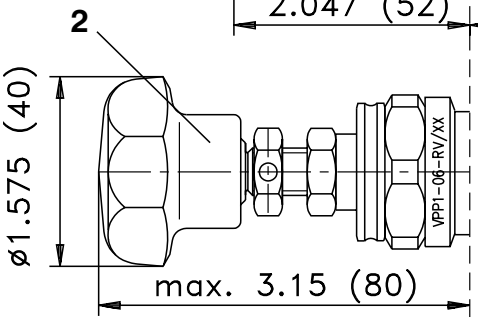
Dimensions in inches and millimeters (in brackets)

Cartridge valve - model „V“

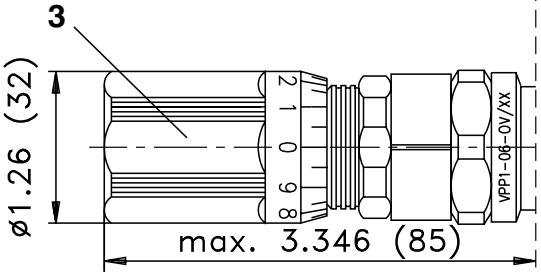
S



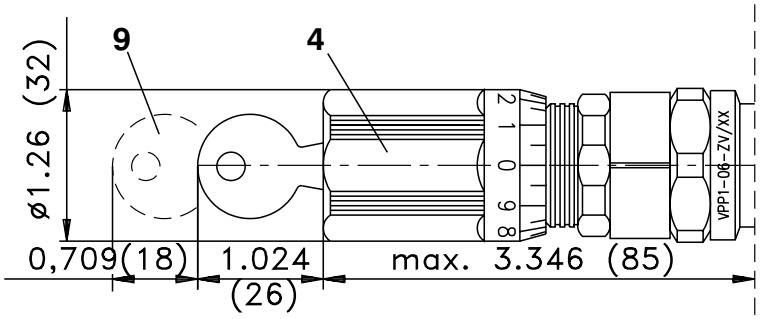
R



O



Z

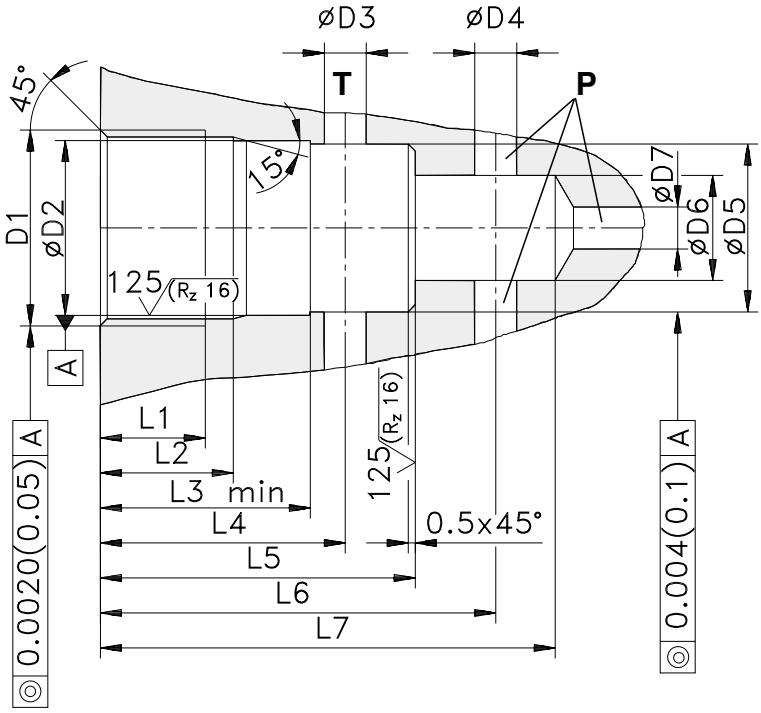


1 Screw adjustment model „S“ [inside hex. 0.197 in (5 mm)]
2 Adjustable handknob model „R“
3 Non-lockable cylindrical handknob model „O“
4 Lockable cylindrical handknob model „Z“
With all adjustmen mechanisms:
rotation = pressure decrease
rotation = pressure increase
5 Protective cap
6 Locknut [hex. 0.630 in (6HR 16)]
7 Valve model code engraved
8 Hex. 1.260 in (6HR 32),
Tightening torque 59 ft-lbs (80 Nm) for Size 1/4 (06)
Hex. 1.417 in (6HR 36),
Tightening torque 103 ft-lbs (140 Nm) for Size 3/8 (10)
9 Distance to remove the key
10 Seal:
Size to 1/4 (06): back-up ring M8-116 (1 pc.)
O-ring 20x2.65 NBR70 (1 pc.)
Size to 3/8 (10): back-up ring BBP80-B121-N9 (1 pc.)
O-ring 26.64x2.62 NBR70 (1 pc.)
11 Seal:
Size to 1/4 (06): D 17.4x24x1.5-NSA (1 pc.)
Size to 3/8 (10): D 24.7x32x2 (adapted) (1pc.)

Valve Dimensions

Dimensions in inches and millimeters (in brackets)

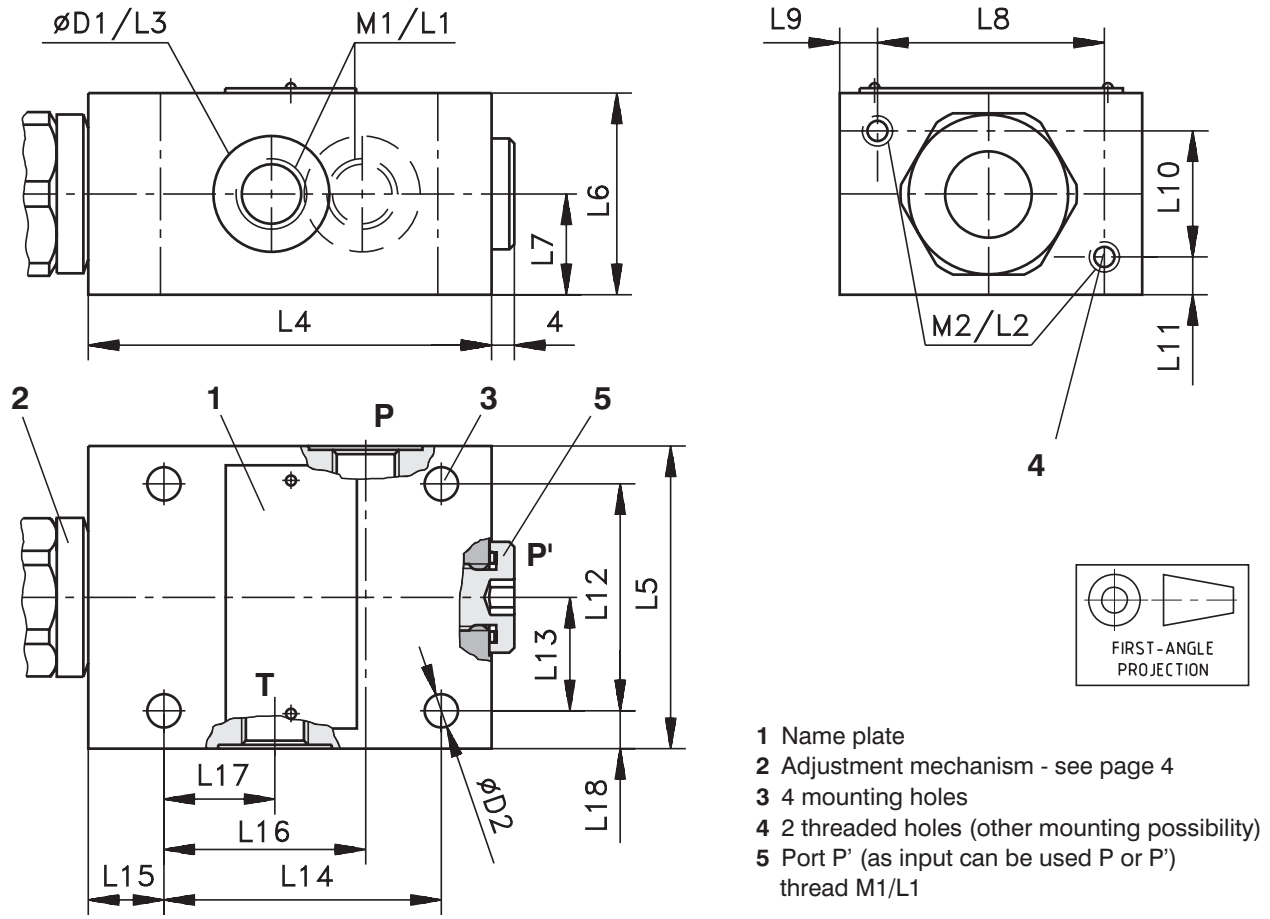
Installation Cavity



	Size to 1/4 (06)	Size to 3/8 (10)
	Dimensions in inches (millimeters)	Dimensions in inches (millimeters)
D1	M28x1.5	M35x1.5
⌀D2	0.984+0.0021 (25 H9)	1.260+0.0021 (32 H9)
⌀D3	0.236 (6)	0.394 (10)
⌀D4	0.236 (6)	0.394 (10)
⌀D5	0.980 (24.9)	1.256 (31.9)
⌀D6	0.591 (15)	0.728 (18.5)
⌀D7	0.236 (6)	0.394 (10)
L1	0.591 (15)	0.709 (18)
L2	0.748 (19)	0.906 (23)
L3	1.260 (32)	1.378 (35)
L4	1.378 (35)	1.614 (41)
L5	1.772(45)	2.047 (52)
L6	2.224±0.217 (56.5±5.5)	2.658±0.295 (67.5±7.5)
L7	2.560 (65)	3.150 (80)

Cartridge in threaded housing - models M, G and SAE

Dimensions in inches and millimeters (in brackets)



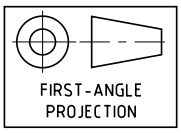
1 Name plate
2 Adjustment mechanism - see page 4
3 4 mounting holes
4 2 threaded holes (other mounting possibility)
5 Port P' (as input can be used P or P')
thread M1/L1

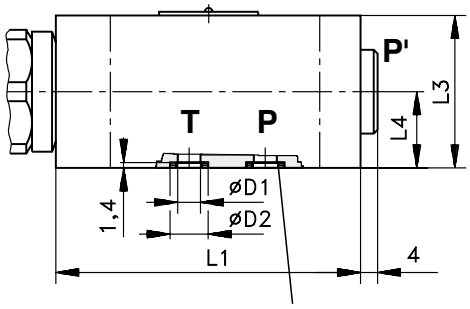
Model	M1	M2	⌀D1	⌀D2	L1	L2	L3	L4	L5	L6
VPP1-06-xM/x	M14x1.5	M6	0.984 (25)	0.260 (6.6)	0.472 (12)	0.394 (10)	0.020 (0.5)	3.150 (80)	2.362 (60)	1.575 (40)
VPP1-06-xG/x	BSPP 1/4									
VPP1-06-xSAE/x	9/16-18 UNF-2B	1/4-20 UNC-2B	0.984 (25)		0.512 (13)					
VPP1-08-xM/x	M18x1.5	M8	1.181 (30)	0.354 (9)	0.630 (16)	0.787 (20)		3.937 (100)	3.150 (80)	2.362 (60)
VPP1-08-xG/x	BSPP 3/8		1.102 (28)							
VPP1-08-xSAE/x	3/4-16 UNF-2B	5/16-18 UNC-2B	1.181 (30)		0.787 (20)					
VPP1-10-xM/x	M22x1.5	M8	1.339 (34)		0.630 (16)					
VPP1-10-xG/x	BSPP 1/2									
VPP1-10-xSAE/x	7/8-14 UNF-2B	5/16-18 UNC-2B	1.181 (30)		0.787 (20)					

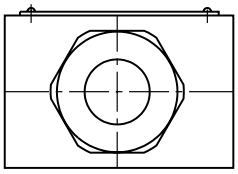
Model	L7	L8	L9	L10	L11	L12	L13	L14	L15	L16	L17	L18
VPP1-06-xM/x	0.787 (20)	1.770 (45)	0.295 (7.5)	0.984 (25)	0.295 (7.5)	1.772 (45)	0.886 (22.5)	2.165 (55)	0.591 (15)	1.575 (40)	0.787 (20)	0.295 (7.5)
VPP1-06-xG/x												
VPP1-06-xSAE/x												
VPP1-08-xM/x	1.181 (30)	2.362 (60)	0.394 (10)	1.575 (40)	0.394 (10)	2.362 (60)	1.181 (30)	2.756 (70)	0.787 (20)	1.929 (49)	0.827 (21)	0.394 (10)
VPP1-08-xG/x												
VPP1-08-xSAE/x												
VPP1-10-xM/x												
VPP1-10-xG/x												
VPP1-10-xSAE/x												

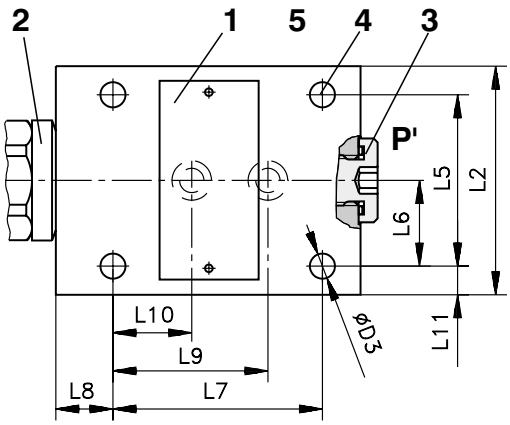
Cartridge in subplate mounted housing - model PS

Dimensions in inches and millimeters (in brackets)

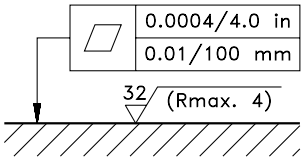








1 Name plate
2 Adjustment mechanism - see page 4
3 Port P', thread M1/H1 can be used as input pressure or for measuring
4 4 mounting holes
5 Square ring:
size 1/4 (06) - DKAR 00011 [7.65x1.68 (2 pcs.)]
size 3/8 (10) - DKAR 00014 [12.42x1.68 (2 pcs.)]

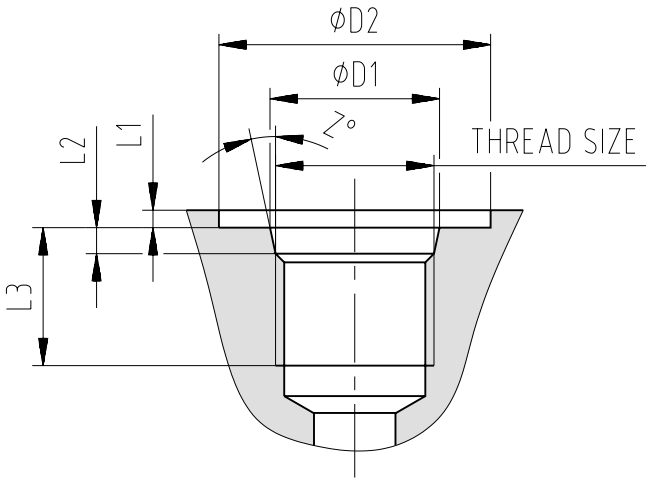


Required surface finish of interface

Model	M1	H1	⌀D1	⌀D2	⌀D3	L1	L2	L3
VPP1-06-xPS/x	7/16-20 UNF-2B	0.472 (12)	0.236 (6)	0.425 (10.8)	0.260 (6.6)	3.150 (80)	2.362 (60)	1.575 (40)
VPP1-10-xPS/x			0.394 (10)	0.614 (15.6)	0.354 (9)	3.937 (100)	3.150 (80)	2.362 (60)

Model	L4	L5	L6	L7	L8	L9	L10	L11
Vpp1-06-xPS/x	0.787 (20)	1.772 (45)	0.886 (22.5)	2.165 (55)	0.591 (15)	1.575 (40)	0.787 (20)	0.295 (7.5)
Vpp1-10-xPS/x	1.181 (30)	2.362 (60)	1.181 (30)	2.756 (70)	0.787 (20)	1 772 (45)	0.827 (21)	0.394 (10)

SAE-Port Cavities, ISO 11926, SAE J1926, MS 16142



	Thread size	⌀D1	⌀D2	L1	L2	L3	Z°
SAE-4	7/16-20 UNF-2B	0.488 (12.4)	0.827 (21)	0.020 (0.5)	0.095 (2.4)	0.472 (12)	12
SAE-6	9/16-18 UNF-2B	0.614 (15.6)	0.984 (25)	0.020 (0.5)	0.098 (2.5)	0.512 (13)	12
SAE-8	3/4-16 UNF-2B	0.811 (20.6)	1.181 (30)	0.020 (0.5)	0.098 (2.5)	0.787 (20)	15
SAE-10	7/8-14 UNF-2B	0.941+0.005 (23.9+0.13)	1.339+0.016 (34+0.4)	0.020(0.5)	0.098+0.016 (2.5+0.4)	0.67(17)	15

Spare Parts

Dimensions in millimeters

Bolt kit (delivered with subplate model PS)

	Dimensions, quantity	Bolt torque	Order number
Size to 1/4 (06)	M6x50 DIN 912-10.9 (4 pcs.)	6.6 ft-lbs (8.9 Nm)	-
	1/4-20 UNCx2 (4 pcs.)		2 000 109
Size to 3/8 (10)	M8x70 DIN 912-10.9 (4 pcs.)	11.13 (15 Nm)	-
	5/16 UNCx2.75 (4 pcs.)		2 000 110

Seal kit for cartridge valve

Type		Dimensions, quantity			Order number
		O-ring	Back-up ring	U Seal ring	
Size to 1/4 (06)	Standard NBR	8 x 1.8 (1 pc.)	19.43 x 23.79 x 1.14 (1 pc.)	17.4 x 24 x 1.5 (1 pc.)	551-0091
		20 x 2.65 (1 pc.)	-	-	
		20 x 2 (1 pc.)	-	-	
	Viton	20 x 2 (1 pc.)	19.43 x 23.79 x 1.14 (1 pc.)	17.4 x 24 x 1.5 (1 pc.)	551-0089
		20.29 x 2.62 (1 pc.)	-	-	
		7.65 x 1.78 (1 pc.)	-	-	
Size to 3/8 (10)	Standard NBR	8 x 1.8 (1 pc.)	BBP 80-B121-N9 (1 pc.)	24.7 x 32 x 2 (1 pc.)	551-0092
		20 x 2 (1 pc.)	-	-	
		26.64 x 2.62 (1 pc.)	-	-	
	Viton	20 x 2 (1 pc.)	BBP 80-B121 (1 pc.)	24.7 x 32 x 2 (1 pc.)	551-0090
		26.64 x 2.62 (1 pc.)	-	-	
		7.65 x 1.78 (1 pc.)	-	-	

Spare Parts kit

Type		Dimensions, quantity	Order number
Size to 1/4 (06)	Standard NBR	plug SAE-4 7/16-20 (1 pc.)	552-0184
		Square ring 011 7.65 x 1.68 NBR70 (2 pcs.)	
		VPP1-06-SV/ST (1 pc.)	
	Viton	plug 7/16-20 UNF (1 pc.)	552-0185
		O-ring 7.65 x 1.78 (2 pcs.)	
		VPP1-06-SV/ST-V	
Size to 3/8 (10)	Standard NBR	plug SAE-4 7/16-20 (1pc.)	552-0186
		plug 3/4-16 UNF (1 pc.)	
		Square ring 014 S 12.42 x 1.68 (2 pcs.)	
		VPP1-10-SV/ST (1 pc.)	
	Viton	plug 7/16-20 UNF (1 pc.)	552-0187
		plug 3/4-16 UNF (1pc.)	
		O-ring 12.42 x 1.78 (2 pcs.)	
		VPP1-10-SV/ST-V (1 pc.)	

Notes:

- The plastic packaging is recyclable.
- Certified documentation is available per request.

ARGO - HYTOS INC.

P.O. Box 28; Bowling Green; Ohio 43402
Phone: 419-353-6070; Fax: 419-354-3496
info.us@argo-hytos.com; www.argo-hytos.com

ARGO HYTOS

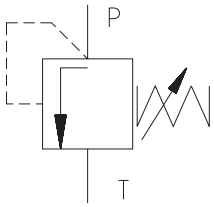
Directly operated pressure relief valves

VPP2-06

Size to 1/4 (06) • ... 4600 PSI (320 bar) • ... 13.2 GPM (50 L/min)

HU 5062
3/2002

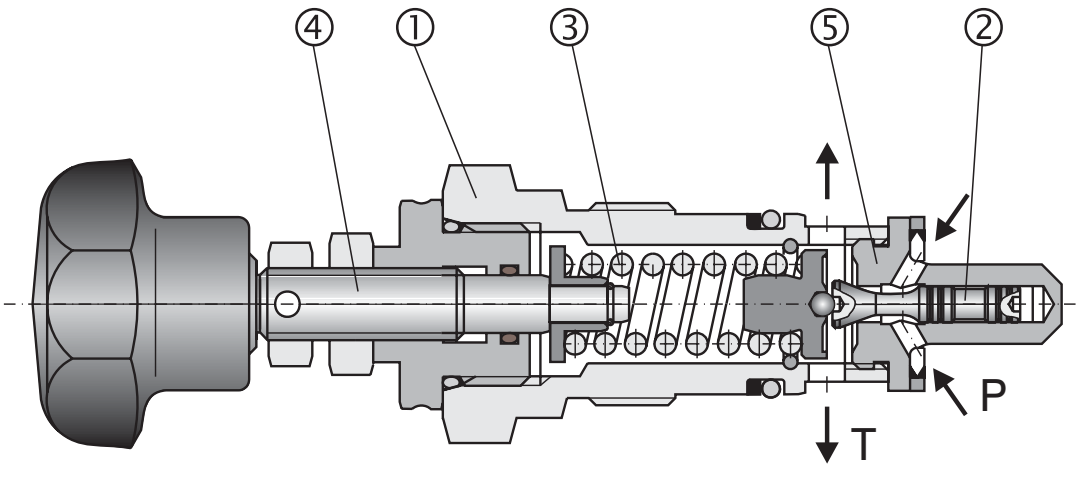
Replaces
HU 5062 6/2000



- ❑ **Single-stare pressure relief valve**
- ❑ **Cartridge in threaded housing - with metric, BSPP or SAE threads**
- ❑ **Cartridge in subplate mounted housing**
- ❑ **Four pressure adjustment options**
- ❑ **Six pressure ranges**
- ❑ **Subplates - see catalog HU 0002**

Functional Description

Pressure relief valves VPP2-06 were designed for applications requiring a safety valve or a pressure regulating valve working over a wide range of pressures and flow rates.
The valve consists of the valve body (1), poppet with damping spool (2) and compression spring (3). Pressure is manually set by an adjustment screw (4). The spring pushes the poppet into the seat (5) holding the valve in its normally closed position. When the force, caused by the pressure acting on the exposed surface area of the poppet, exceeds the spring force, the valve opens and the flow passes from port P to port T.
To optimize the valve performance, five pressure ranges are available. Choosing the closest range is recommended. The design enables the valve to be used as a screw-in cartridge for manifold mounting, built into a hreaded housing or in a subplate mounted housing. Both the threaded and the subplate mounted housings can be delivered either with metric, pipe or SAE threads.



Order Code

VPP2-06 ☐ ☐ / ☐ ☐

Directly operated relief pressure valves

Valve size — **1/4 (06)**

Adjustment option

Hexagon set screw locknut 0.197 in (5 mm)	**S**
Adjustable handknob	**R**
Lockable cylindrical handknob	**O**
Non-lockable cylindrical handknob	**Z**

Seals

omit	NBR
V	FPM (Viton)

Pressure range in PSI (bar)

2.5	up to 360 (25)
6.3	up to 910 (63)
10	up to 1450 (100)
16	up to 2300 (160)
25	up to 3600 (250)
32	up to 4600 (320)

Model

V	screw-in cartridge valve
M	cartridge in threaded housing - with metric threads
G	cartridge in threaded housing - with BSPP threaded
SAE	cartridge in threaded housing - with SAE threads
PS	cartridge in subplate mounted housing

Technical Data

Valve size	US (mm)	1/4 (06)					
Maximum flow	GPM (L/min)	13.2 (50)					
Maximum pressure	PSI (bar)	360 (25)	910 (63)	1450 (100)	2300 (160)	3600 (250)	4600 (320)
Hydraulic fluid		Petroleum oils (HM, HL, HLP) Phosphate ester fluids (HFD-R)					
Fluid temperature range for standard sealing (NBR)	°F (°C)	-22 ... +176 (-30 ... +80)					
Fluid temperature range for Viton seals (FPM)	°F (°C)	-4 ... +176 (-20 ... +80)					
Viscosity range	SUS (mm^2/s)	98 ... 1840 (20 ... 400)					
Maximum degree of fluid contamination		Class 21/18/15 to ISO 4406 (1999).					
Weight	lbs (kg)	0.879 (0.4) 3.297 (1.5)					
Mounting position		any					

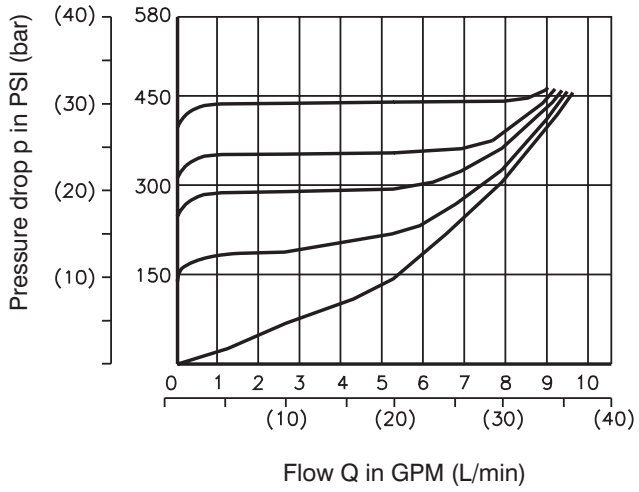
Caution!

- The plastic packaging is recyclable.
- Certified documentation is available per request.

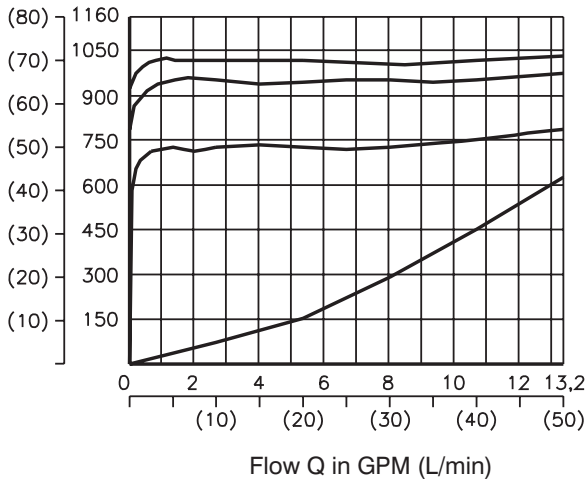
p-Q Characteristic

Measured at ν = 166 SUS (35 mm^2/s) and t = 104 °F (40 °C)

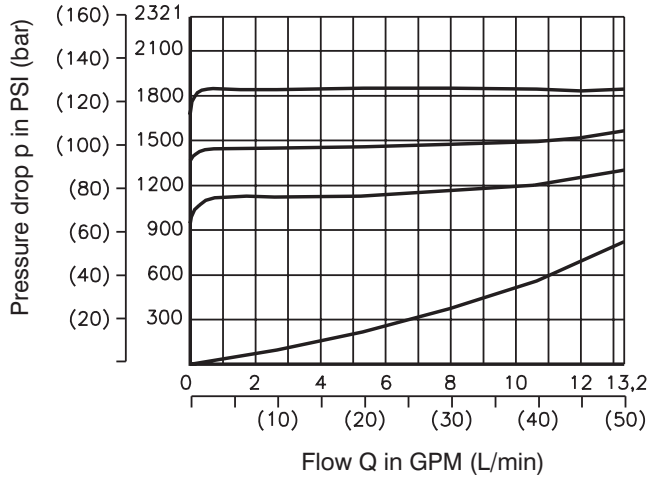
Pressure range 2.5



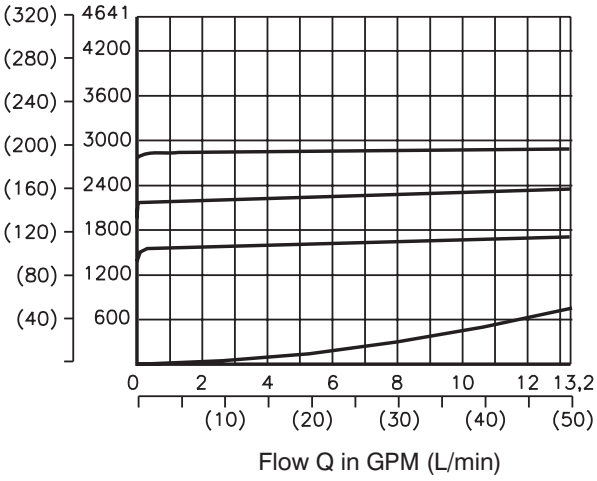
Pressure range 6.3



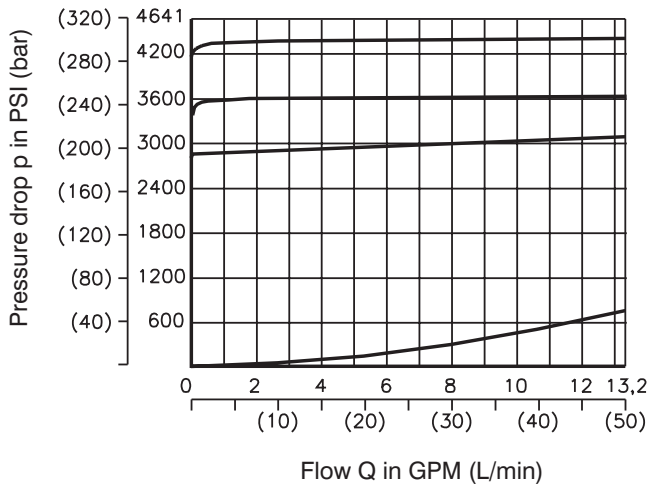
Pressure range 10



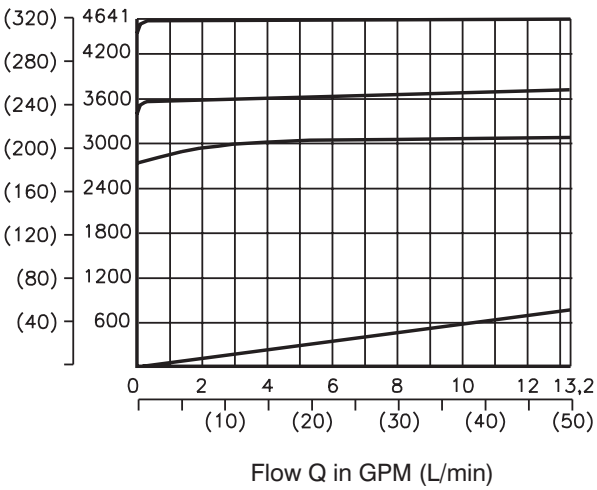
Pressure range 16



Pressure range 25



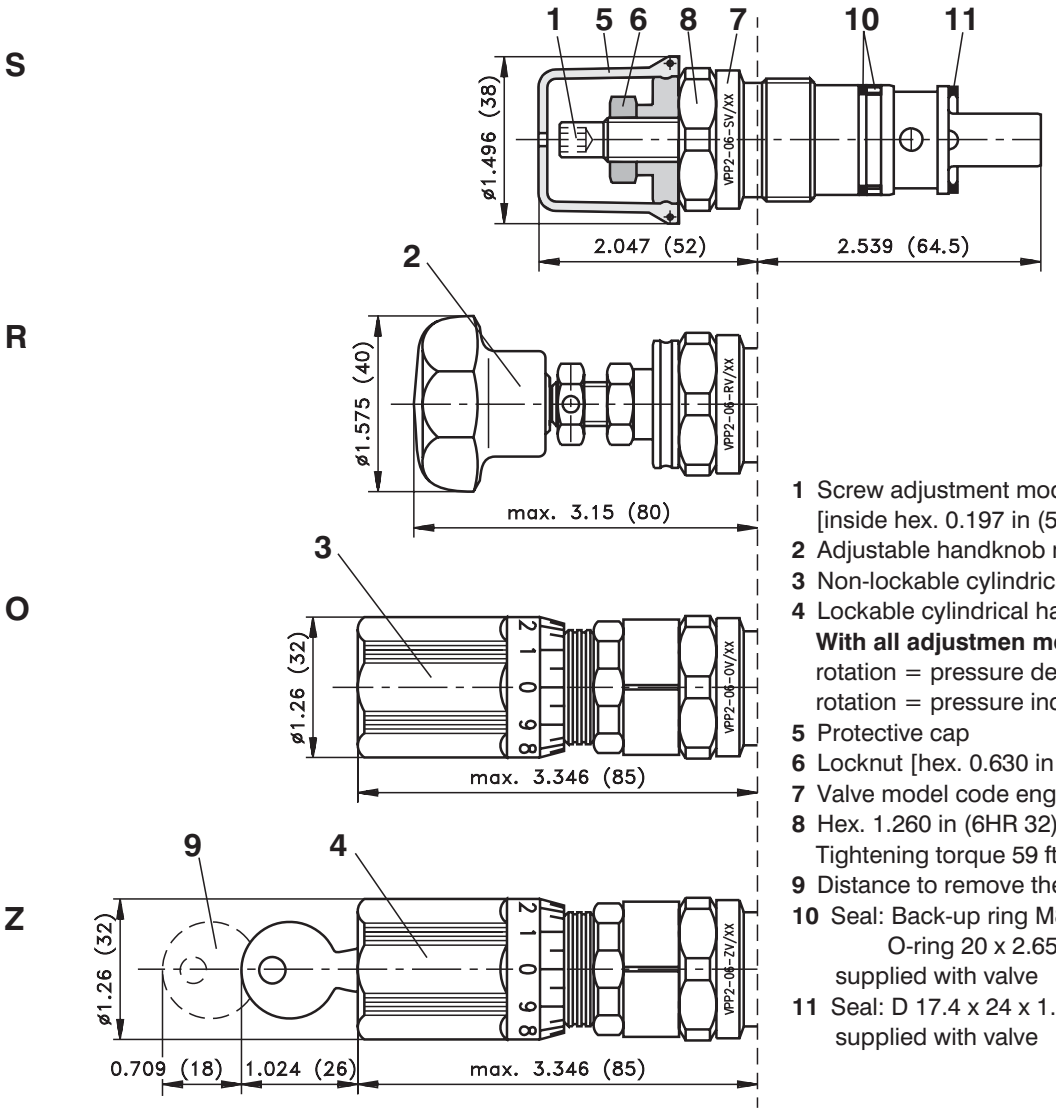
Pressure range 32



Valve Dimensions

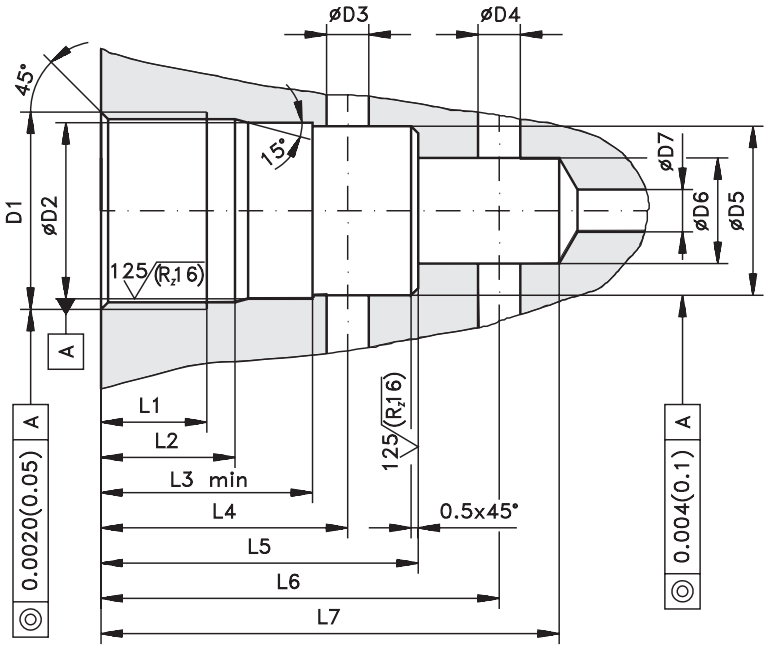
Dimensions in inches and millimeters (in brackets)

Cartridge valve - model „V“



1 Screw adjustment model „S“
[inside hex. 0.197 in (5 mm)]
2 Adjustable handknob model „R“
3 Non-lockable cylindrical handknob model „O“
4 Lockable cylindrical handknob model „Z“
With all adjustmen mechanisms:
rotation = pressure decrease
rotation = pressure increase
5 Protective cap
6 Locknut [hex. 0.630 in (6HR 16)]
7 Valve model code engraved
8 Hex. 1.260 in (6HR 32),
Tightening torque 59 ft-lbs (80 Nm)
9 Distance to remove the key
10 Seal: Back-up ring M8-116
O-ring 20 x 2.65 NBR70
supplied with valve
11 Seal: D 17.4 x 24 x 1.5-NSA
supplied with valve

Installation Cavity

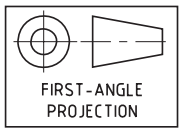


	Dimensions in inches (millimeters)
D1	M28x1.5
∅D2	0.984+0.0021 (25 H9)
∅D3	0.236 (6)
∅D4	0.236 (6)
∅D5	0.980 (24.9)
∅D6	0.591 (15)
∅D7	0.236 (6)
L1	0.591 (15)
L2	0.748 (19)
L3	1.260 (32)
L4	1.378 (35)
L5	1.772 (45)
L6	2.224±0.217 (56.5±5.5)
L7	2.560 (65)

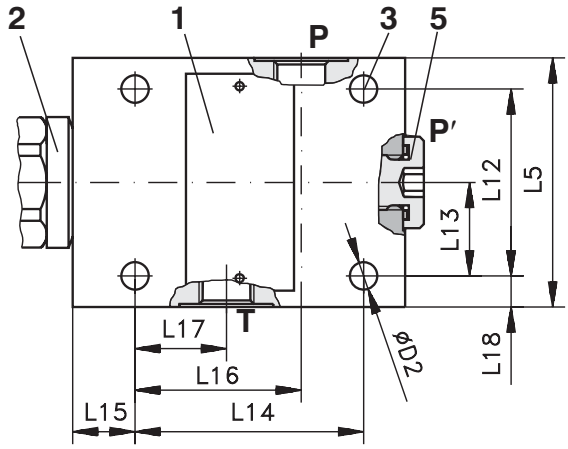
Valve Dimensions

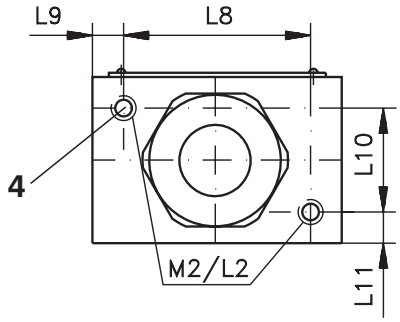
Dimensions in inches and millimeters (in brackets)

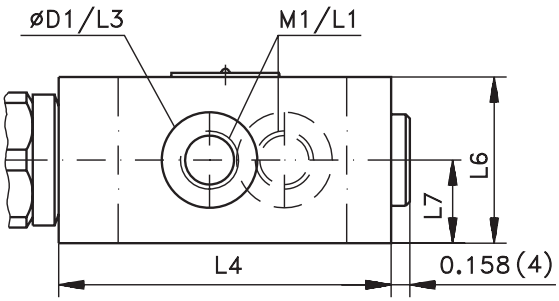
Cartridge in threaded housing - models M, G and SAE



1 Name plate
2 Adjustment mechanism - see page 4
3 4 mounting holes
4 2 threaded holes (other mounting possibility)
5 Port P′ (thread BSPP 1/4 or SAE-4) or port P (thread M1) can be used as input port





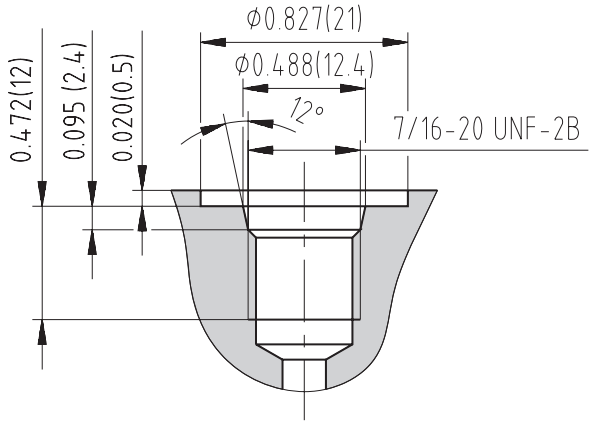


Model	M1	M2	∅D1	∅D2	L1	L2	L3	L4	L5	L6
VPP2-06-xM/x	M14x1.5	M6	0.984 (25)	0.260 (6.6)	0.472 (12)	0.394 (10)	0.020 (0.5)	3.150 (80)	2.362 (60)	1.575 (40)
VPP2-06-xG/x	BSPP 1/4									
VPP2-06-xSAE/x	9/16-18 UNF-2B	1/4-20 UNC-2B			0.512 (13)					

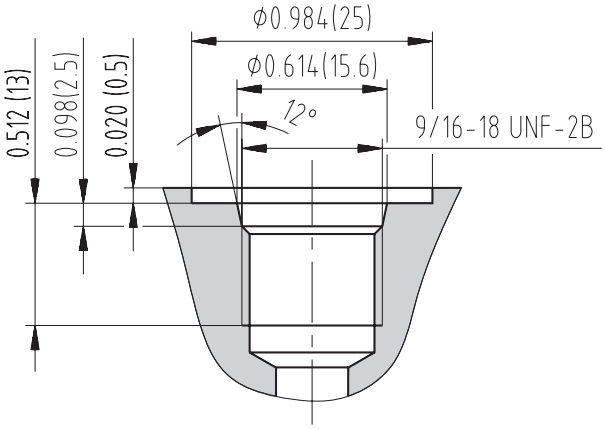
Model	L7	L8	L9	L10	L11	L12	L13	L14	L15	L16	L17	L18
VPP2-06-xM/x	0.787 (20)	1.772 (45)	0.295 (7.5)	0.984 (25)	0.295 (7.5)	1.772 (45)	0.886 (22.5)	2.165 (55)	0.591 (15)	1.575 (40)	0.787 (20)	0.295 (7.5)
VPP2-06-xG/x												
VPP2-06-xSAE/x												

SAE-Port Cavities, ISO 11926, SAE J1926, MS 16142

SAE-4



SAE-6



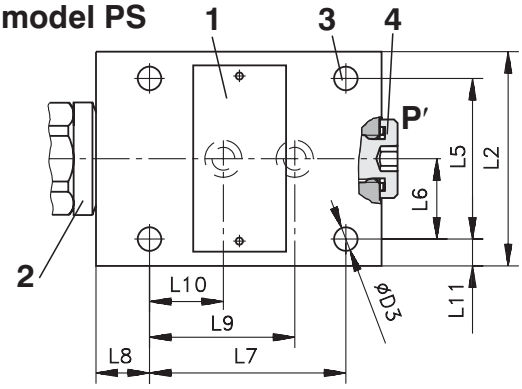
Valve Dimensions

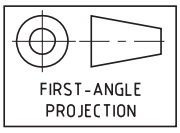
Dimensions in inches and millimeters (in brackets)

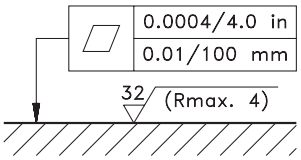
Cartridge in subplate mounted housing - model PS

1 Name plate
2 Adjustment mechanism - see page 4
3 4 mounting holes
4 Port P′ - thread M1/H1
5 Square ring 7.65 x 1.68 (2 pcs.) supplied with valve

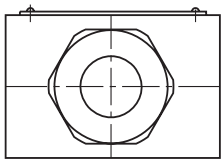
Mounting bolts M6 x 50 (4 pcs.) supplied with valve

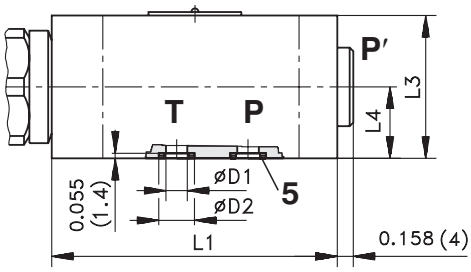






Required surface finish of interface





Model	M1	H1	∅D1	∅D2	∅D3	L1	L2	L3
VPP2-06-xPS/x	7/16-20 UNF-2B	0.472 (12)	0.236 (6)	0.425 (10.8)	0.260 (6.6)	3.150 (80)	2.362 (60)	1.575 (40)
Model	**L4**	**L5**	**L6**	**L7**	**L8**	**L9**	**L10**	**L11**
VPP2-06-xPS/x	0.787 (20)	1.772 (45)	0.886 (22.5)	2.165 (55)	0.591 (15)	1.575 (40)	0.787 (20)	0.295 (7.5)

Spare Parts

Dimensions in millimeters

Bolt kit (delivered with subplate model PS)

Dimensions, quantity	Bolt torque	Order number
M6 x 50 DIN 912-10.9 (4 pcs.)	6.6 ft-lbs (8.9 Nm)	-
1/4-20 UNCx2 (4 pcs.)		2 000 111

Seal kit for cartridge valve

Type	Dimensions, quantity			Order number
	O-ring	Back-up ring	U Seal ring	
Standard NBR	8 x 1.8 (1 pc.)	19.43 x 23.79 x 1.14 (1 pc.)	17.4 x 24 x 1.5 (1 pc.)	551-0091
	20 x 2.65 (1 pc.)	-	-	
	20 x 2 (1 pc.)	-	-	
Viton	20 x 2 (1 pc.)	19.43 x 23.79 x 1.14 (1 pc.)	17.4 x 24 x 1.5 (1 pc.)	551-0089
	20.29 x 2.62 (1 pc.)	-	-	
	7.65 x 1.78 (1 pc.)	-	-	

Spare Parts kit

Type	Dimensions, quantity	Order number
Standard NBR	SAE-4 plug 7/16-20 (1 pc.)	552-0184
	Square ring 011 7.65 x 1.68 NBR70 (2 pcs.)	
	VPP2-06-SV/ST (1 pc.)	
Viton	SAE-4 plug 7/16-20 UNF (1 pc.)	552-0185
	O-ring 7.65 x 1.78 (2 pcs.)	
	VPP2-06-SV/ST-V	

ARGO-HYTOS a. s. CZ - 543 15 Vrchlabí
Tel.: +420-499-403111, Fax: +420-499-403421
E-mail: sales.cz@argo-hytos.com
www.argo-hytos.com

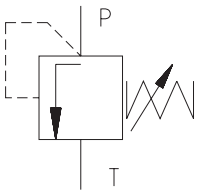
Directly Operated Pressure Relief Valves

SR1A-A2

3/4-16 UNF • p_{max} 350 bar (5076 PSI) • Q_{max} 30 L/min (7.9 GPM)

HA 5063
3/2006

Replaces
HA 5063 1/2005



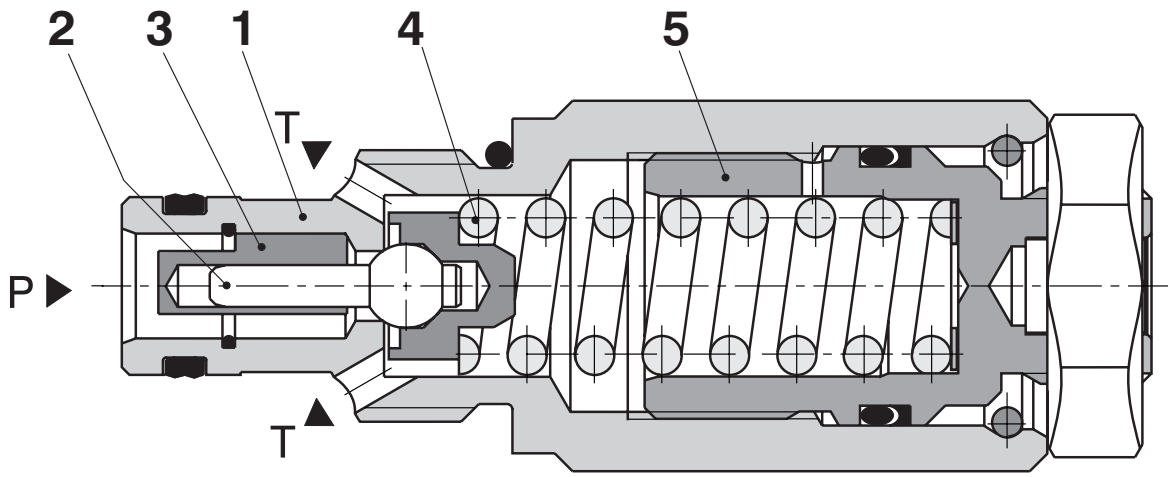
- ❑ **Screw-in cartridge design**
- ❑ **4 pressure ranges**
- ❑ **Pressure setting by hexagon socket**

Functional Description

The directly operated pressure relief valve SR1A-A2 consists basically of the valve housing (1), ball with damping spool (2), damping bush (3), spring (4) and setting screw (5). The pressure setting is accomplished by setting screw (5) with hexagon socket. The spring pushes the ball into the valve seat created directly in the valve housing and holds the valve closed. When the pressure in port P exceeds the pressure magnitude set by the setting screw, the ball is lifted up from the seat and the fluid flows out to port T. To optimize the valve performance, the whole pressure range is divided into 4 pressure ranges. Choosing the next higher pressure range is always recommended.

In basic version the valve housing and the setting screw are zinc coated.

Cartridge Valve



Ordering Code

SR1A-A2 / S □ □

Polyuretan, Viton **Without designation**
Polyuretan, NBR **V**

Directly operated pressure relief valve

Pressure range
10 up to 100 bar (1450 PSI)
16 up to 160 bar (2320 PSI)
25 up to 250 bar (3626 PSI)
35 up to 350 bar (5076 PSI)

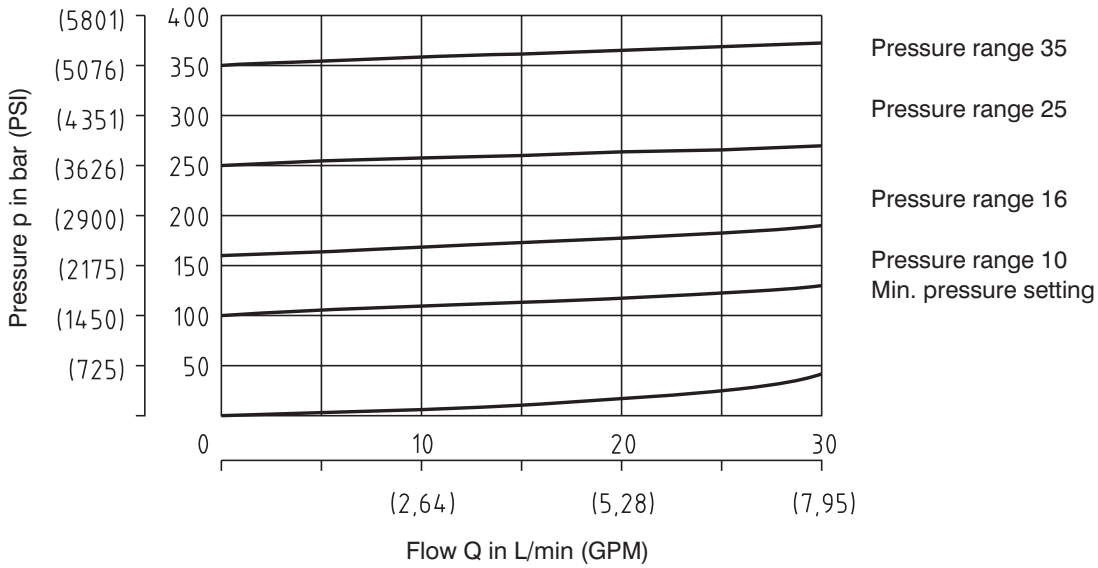
Standard **S**

Technical Data

Cartridge thread		3/4 - 16 UNF - 2B			
Max. flow rate	L/min (GPM)	30 (7.9)			
Max. input pressure (port P)	bar (PSI)	100 (1450)	160 (2320)	250 (3626)	350 (5076)
Max. output pressure (port T)	bar (PSI)	160 (2320)			
Working pressure related to flow	bar (PSI)	see p-Q characteristics			
Hydraulic fluid		Hydraulic oils of power classes HM, HV to CETOP - RP 91H in viscosity classes ISO VG 32, 46 and 68.			
Fluid temperature range for standard sealing (NBR)	°C (°F)	-20 ... +80 (-4 ... +176)			
Fluid temperature range for Viton sealing (FPM)	°C (°F)	-20 ... +80 (-4 ... +176)			
Viscosity range	mm^2/s (SUS)	20 ... 500 (98 ... 2450)			
Max. degree of fluid contamination		Class 21/18/15 according to ISO 4406 (1999).			
Weight	kg (lbs)	0.13 (2.866)			
Maximum valve tightening torque	Nm (lbf.ft)	30+2 (22.13+1.48 lbf.ft)			
Mounting position		optional			

p-Q Characteristics

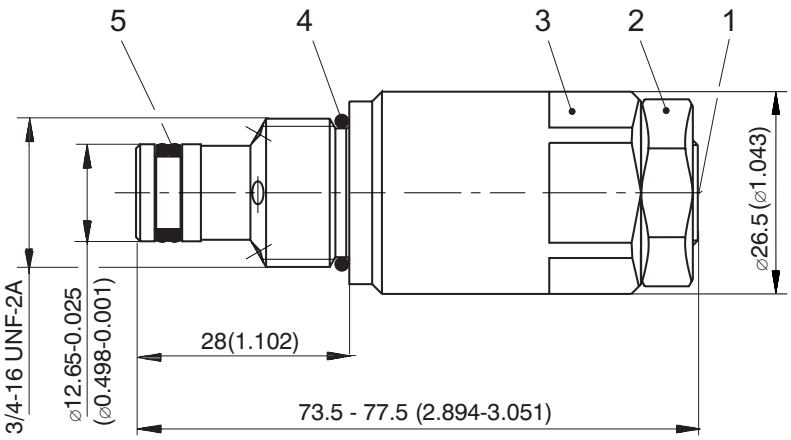
Measured at $\nu = 35\ mm^2/s$ (171 SUS)



Valve Dimensions

Dimensions in millimetres (inches)

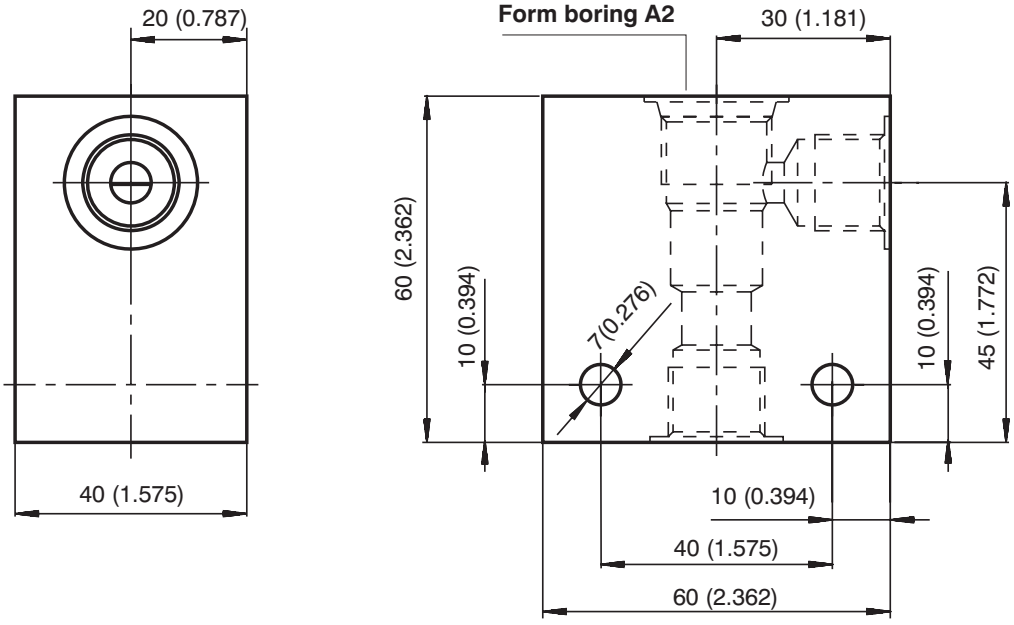
Screw-in Cartridge Design



1 Adjustment element (screw with internal hexagon 6 mm)
Clockwise rotation = pressure increase
Anticlockwise rotation = pressure decrease
2 Locknut s = 21mm (0.827 in)
- tightening torque 15 Nm
3 Wrench flats s = 24 mm (0.945 in)
- tightening torque 30 Nm
4 O-ring 17 x 1.8 (supplied with valve)
5 Combined sealing:
Dualseal DRYZ000004Z20
10.3 x 12.7 x 3.1 (supplied with valve)

Valve Body

Dimensions in millimetres (inches)

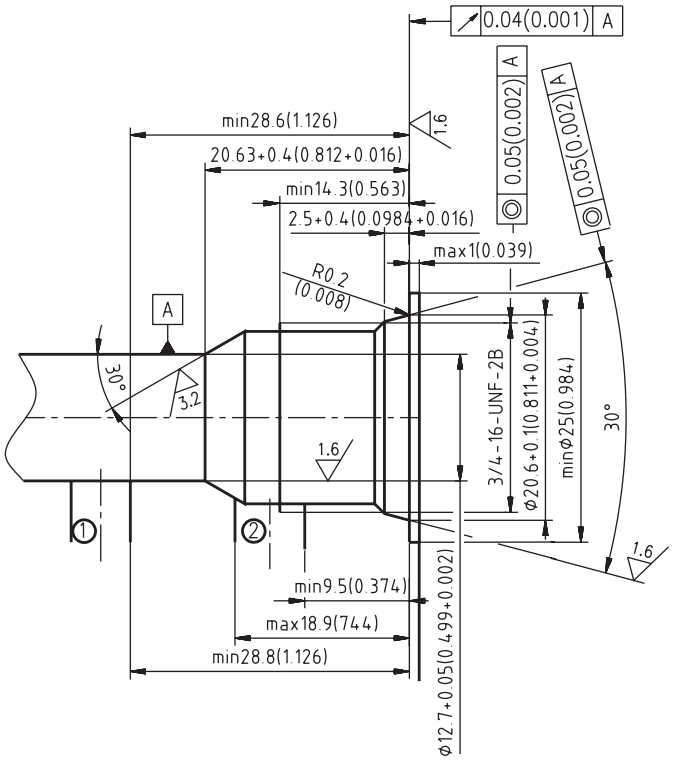


Body material	Connecting size	Type code	Operating pressures
Steel	G3/8	SB-A2-0103ST	420 bar (6092 PSI)
Steel	SAE 6	SB-A2-0102ST	420 bar (6092 PSI)
Aluminium	G3/8	SB-A2-0103AL	250 bar (3626 PSI)
Aluminium	SAE 6	SB-A2-0102AL	250 bar (3626 PSI)

Note:
- For detailed valve body ordering code refer to data sheet HA 0018

Installation Cavity

Dimensions in millimetres (inches)



Spare Parts

Seal kit				Order number
Dualseal - PU	**O-ring - NBR**	**O-ring - NBR**	**Back-up ring - NBR**	513-0604
10.3 x 12.7 x 3.1 (1pc.)	17 x 1.8 (1pc.)	17.17 x 1.78 (1pc.)	16.33 x 19.03 x 1.14 (1pc.)	
Dualseal - PU	**O-ring - Viton**		**Back-up ring - Viton**	513-0599
10.3 x 12.7 x 3.1 (1pc.)	17.17 x 1.78 (2pcs.)		16.33 x 19.03 x 1.14 (1pc.)	

Caution!

- The packing foil is recyclable.
- The technical information regarding the product presented in this catalogue is for descriptive purposes only. It should not be construed in any case as a guaranteed representation of the product properties in the sense of the law.

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ARGO HYTOS

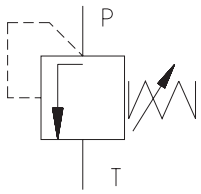
Directly operated pressure relief valves

VPP2-04

Size D 02(04), D 03(06) •4600 PSI (320 bar) • 10.6 GPM (40 L/min)

HU 5093
3/2002

Replaces
HU 5093 7/2000

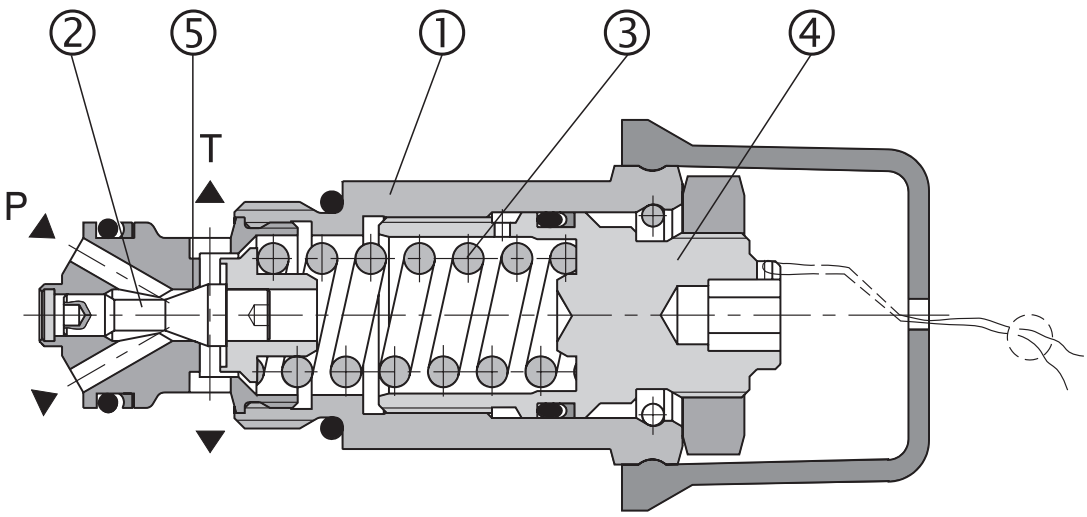


- ❑ **Cartridge, modular and in-line design**
- ❑ **Six pressure ranges**
- ❑ **Pressure adjustment option:**
  - screw with internal hexagon
- ❑ **Installation dimensions size 04 to ISO 4401, CETOP - RP 121H and NFPA T3.5.1 - D 02**
- ❑ **Installation dimensions size 06 to ISO 4401, DIN 24 340-A6, NFPA T3.5.1M R1 and ANSI B93.7 D 03**
- ❑ **Subplates see data sheet HU 0002**

Functional Description

Pressure relief valves VPP2-04 were designed for applications requiring a safely valve or a pressure regulating valve working over a wide range of pressures and flow rates.
The valve basically consists of the valve body (1), poppet with damping spool (2) and compression spring (3). The string pushes the poppet onto the seat (5) holding the valve in its normally closed position. When the force, caused by the pressure acting on the exposed surface area of the poppet, exceeds the spring force, the valve opens and and the flow passes from port P to port T.

To optimize the valve performance, six pressure ranges are available. Choosing the closest range is recommended. The design enables the valve to be used as a screw-in cartridge for manifold mounting, or in a subplate and/or in-line mounted housing. Valve is shipped with plastic cap and is drilled so it can be lock wired.
The valve body and the adjustment screw are zinc coated. With models M and R the valve bodies are phosphate coated.



Order Code

VPP2-04/ ☐ - ☐ ☐

Directly operated pressure relief valves

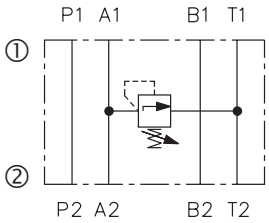
Model	
screw in cartridge	**S**
modular valve, connection A - T	**MA04**
modular valve, connection B - T	**MB04**
modular valve, connection P - T	**MP04**
modular valve, connection A - B and B - A	**MC04**
modular valve, connection A - T and B - T	**MD04**
modular valve, connection A - T	**MA06**
modular valve, connection B - T	**MB06**
modular valve, connection P - T	**MP06**
modular valve, connection A - B and B - A	**MC06**
modular valve, connection A - T and B - T	**MD06**
in-line valve, thread SAE-8, 3/4-16	**RA3**
in-line valve, thread SAE-10, 7/8-14	**RA4**
in-line valve, thread SAE-8, 3/4-16	**RB3**
in-line valve, thread SAE-10, 7/8-14	**RB4**

Seals	
omit	NBR
V	Viton

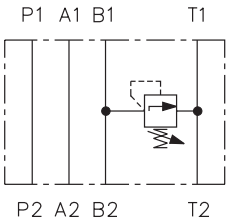
Pressure range	
2	up to 362 PSI (25 bar)
6	up to 913 PSI (63 bar)
10	up to 1450 PSI (100 bar)
16	up to 2321 PSI (160 bar)
25	up to 3623 PSI (250 bar)
32	up to 4641 PSI (320 bar)

Functional Symbols

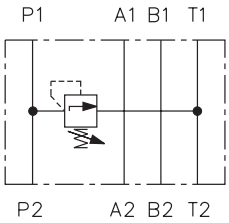
Model MA



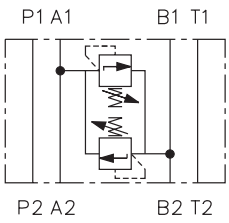
Model MB



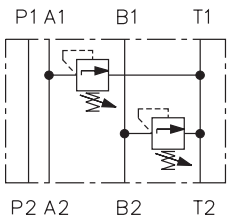
Model MP



Model MC

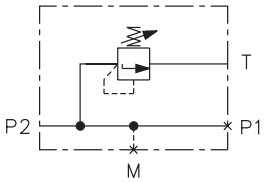


Model MD

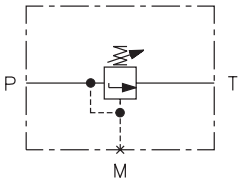


① Valve side
② Subplate side

Model RA



Model RB



Order Numbers of Sandwich / Valve Bodies (without screw-in cartridge)

Valve body for modular valve - NBR	Order number	Valve body for modular valve - Viton	Order number
MA04-VP	513-0350	MA04-VP/V	513-0360
MB04-VP	513-0351	MB04-VP/V	513-0361
MP04-VP	513-0352	MP04-VP/V	513-0362
MC04-VP	513-0353	MC04-VP/V	513-0363
MD04-VP	513-0354	MD04-VP/V	513-0364
Valve body for modular valve - NBR	**Order number**	**Valve body for modular valve - Viton**	**Order number**
MA06-VP	556-0330	MA06-VP/V	556-0430
MB06-VP	556-0331	MB06-VP/V	556-0431
MP06-VP	556-0332	MP06-VP/V	556-0432
MC06-VP	556-0333	MC06-VP/V	556-0433
MD06-VP	556-0334	MD06-VP/V	556-0434

Order Numbers of Sandwich / Valve Bodies (without screw-in cartridge)

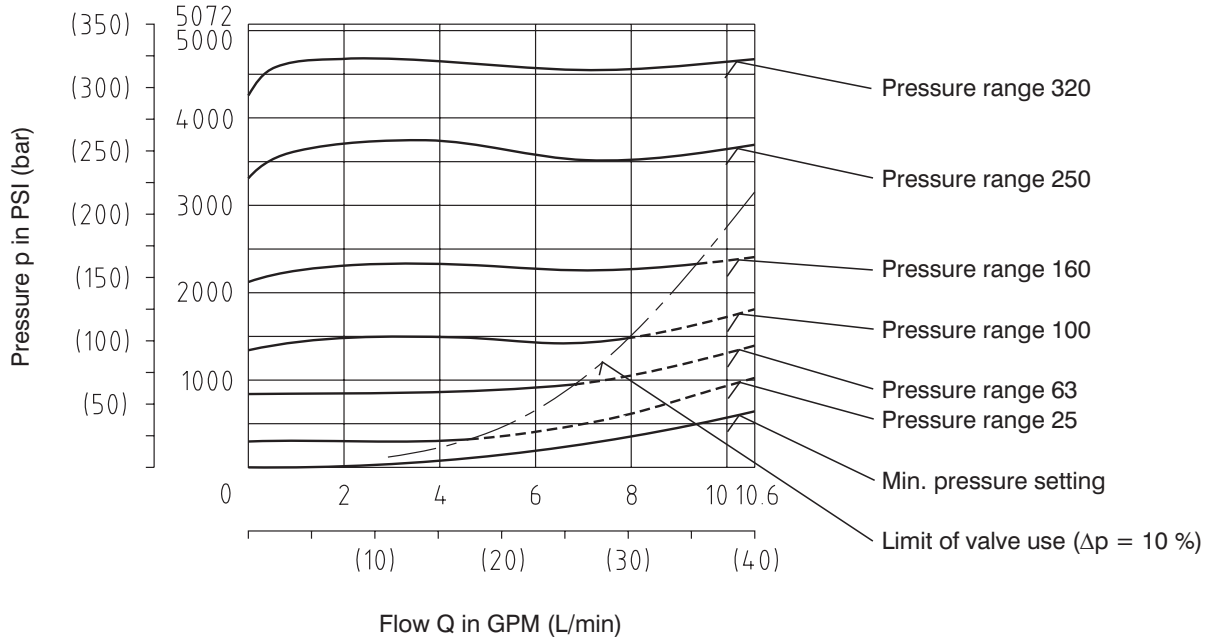
Valve body for in-line valve - NBR	Order number	Valve body for in-line valve - Viton	Order number
RA3-06-VP	556-0342	RA3-06-VP/V	556-0346
RA4-06-VP	556-0343	RA4-06-VP/V	556-0347
RB3-06-VP	556-0344	RB3-06-VP/V	556-0348
RB4-06-VP	556-0345	RB4-06-VP/V	556-0349

Technical Data for Model S

Valve size	US (mm)	3/16 (04)
Max. flow rate	GPM (L/min)	10.6 (40)
Max. input pressure (ports P, A, B)	PSI (bar)	360 (25); 910 (63); 1450 (100); 2320 (160); 3600 (250); 4600 (320)
Max. output pressure (port T)	PSI (bar)	4600 (320)
Working pressure related to flow	PSI (bar)	see p-Q characteristics
Hydraulic fluid		Petroleum oils (HM, HL, HLP) Phosphate ester fluids (HFD-R)
Fluid temperature range for standard sealing (NBR)	°F (°C)	-22 ... 176 (-30 ... +80)
Fluid temperature range for Viton sealing (FPM)	°F (°C)	-4 ... 176 (-20 ... +80)
Viscosity range	SUS (mm^2/s)	98 ... 1840 (20 ... 400)
Max. degree of fluid contamination		Class 21/18/15 according to ISO 4406 (1999).
Weight	lbs (kg)	0.4 (0.17)
Mounting position		any
Weight - models MA04, MB04, MP04	lbs (kg)	1.802 (0.82)
- models MC04, MD04		2.901 (1.32)
- models MA06, MB06, MP06		2.462 (1.12)
- models MC06, MD06		3.121 (1.42)
- models RA3, RA4, RB3, RB4		2.571 (1.17)

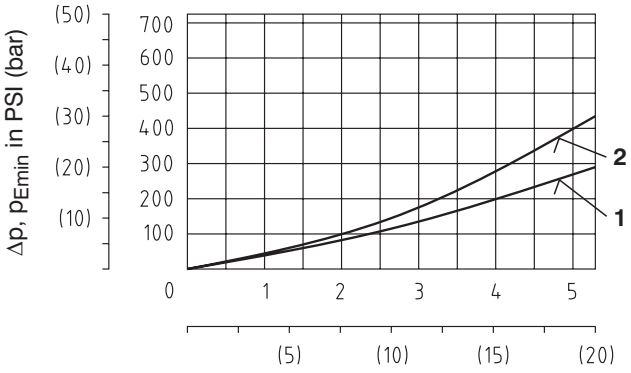
p-Q Characteristic for Model S

Measured at ν= 166 SUS (35 mm^2/s) and t = 104 °F (40 °C)



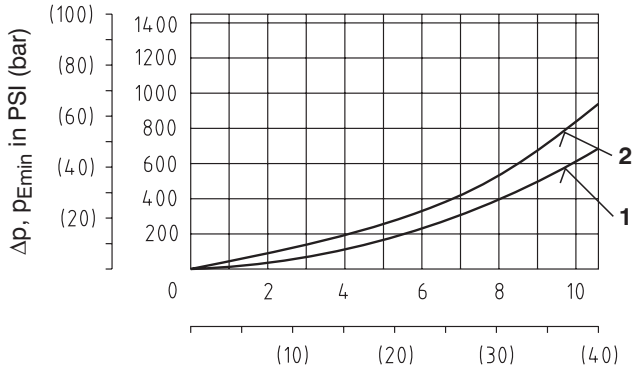
Δp-Q Characteristic, min. pressure setting

Measured at ν = 166 SUS (35 mm²/s) and t = 104 °F (40 °C)



Flow Q in GPM (L/min)

1 - MA04, MB04, MP04, MD04
2 - MC04



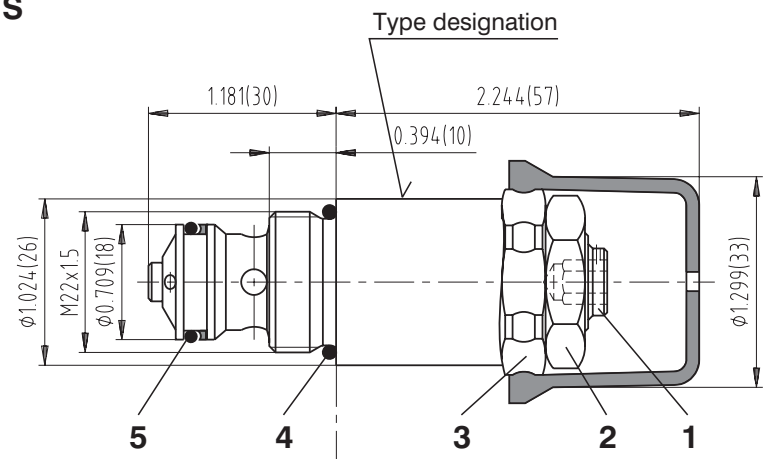
Flow Q in GPM (L/min)

1 - MA06, MB06, MP06, MD06
2 - MC06

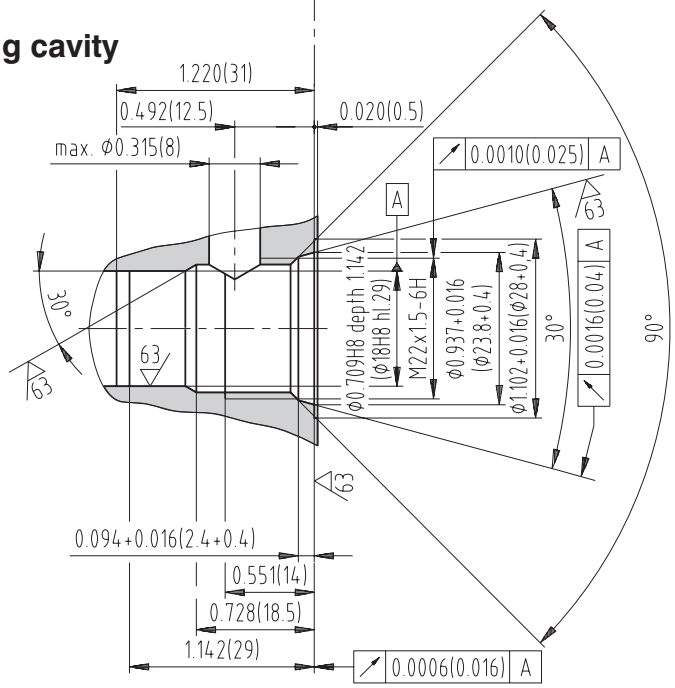
Valve Dimensions

Dimensions in inches and millimeters (in brackets)

Model S



Mounting cavity



Dimensions in millimeters:

1 Adjustment element (screw with internal hexagon 0.236 in. (6 mm))
- clockwise rotation - pressure increase
- anticlockwise rotation - pressure decrease

2 Locknut hex. 0.945 in. (24 mm)

3 Wrench flats s = 1.063 in. (27 mm) -
- tightening torque 22.1 ft-lbs (30 Nm)

4 O-ring 19.4 x 2.1 (1 pc.) supplied with valve

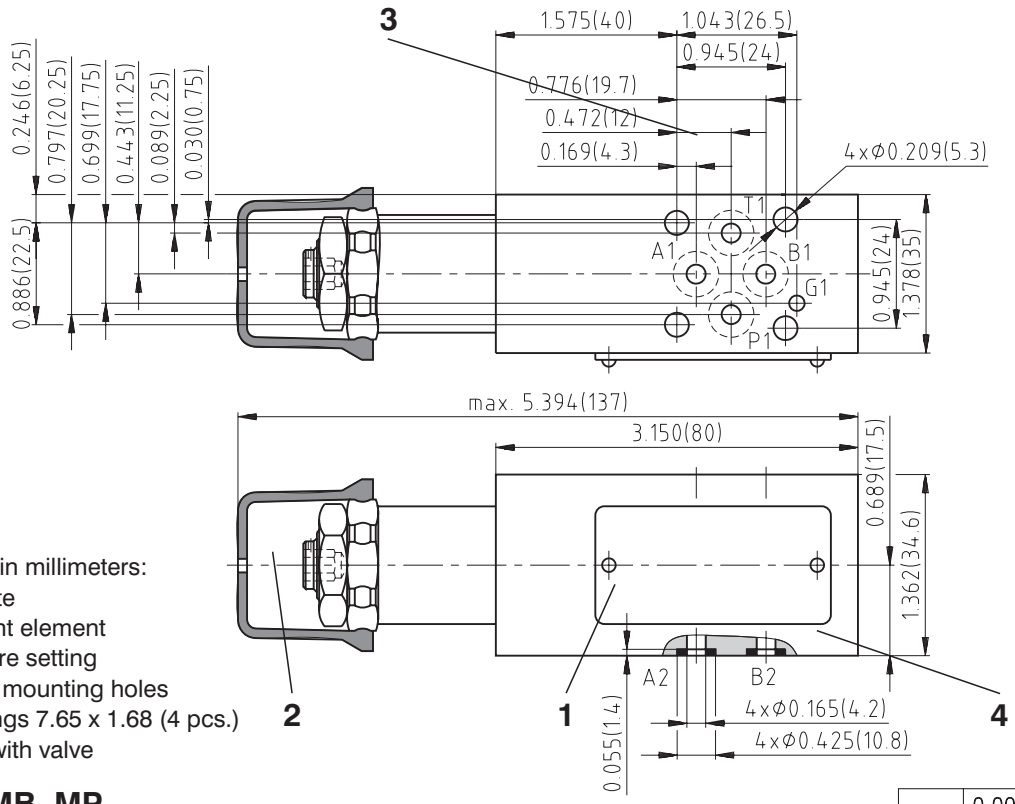
5 Combined seal:
O-ring 14 x 1.78 (1 pc.)
Back-up ring BBP80B015-N9
14.73 x 17.43 x 1.14 (1 pc.)
supplied with valve

Valve Dimensions

Dimensions in inches and millimeters (in brackets)

Size D 02 (04) - Installation dimensions to ISO 4401, CETOP - RP 121H and NFPA T3.5.1 - D 02

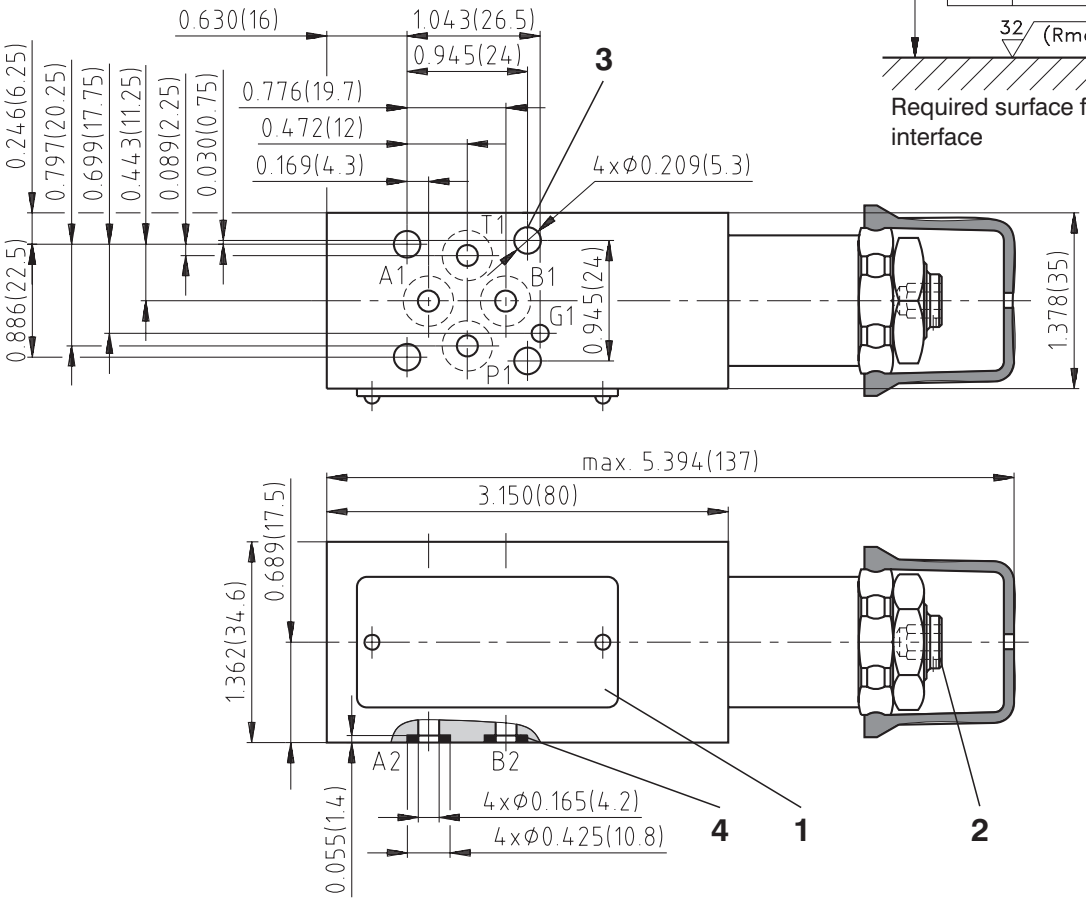
Model MA



Dimensions in millimeters:

1 Name plate
2 Adjustment element for pressure setting
3 4 through mounting holes
4 Square rings 7.65 x 1.68 (4 pcs.) supplied with valve

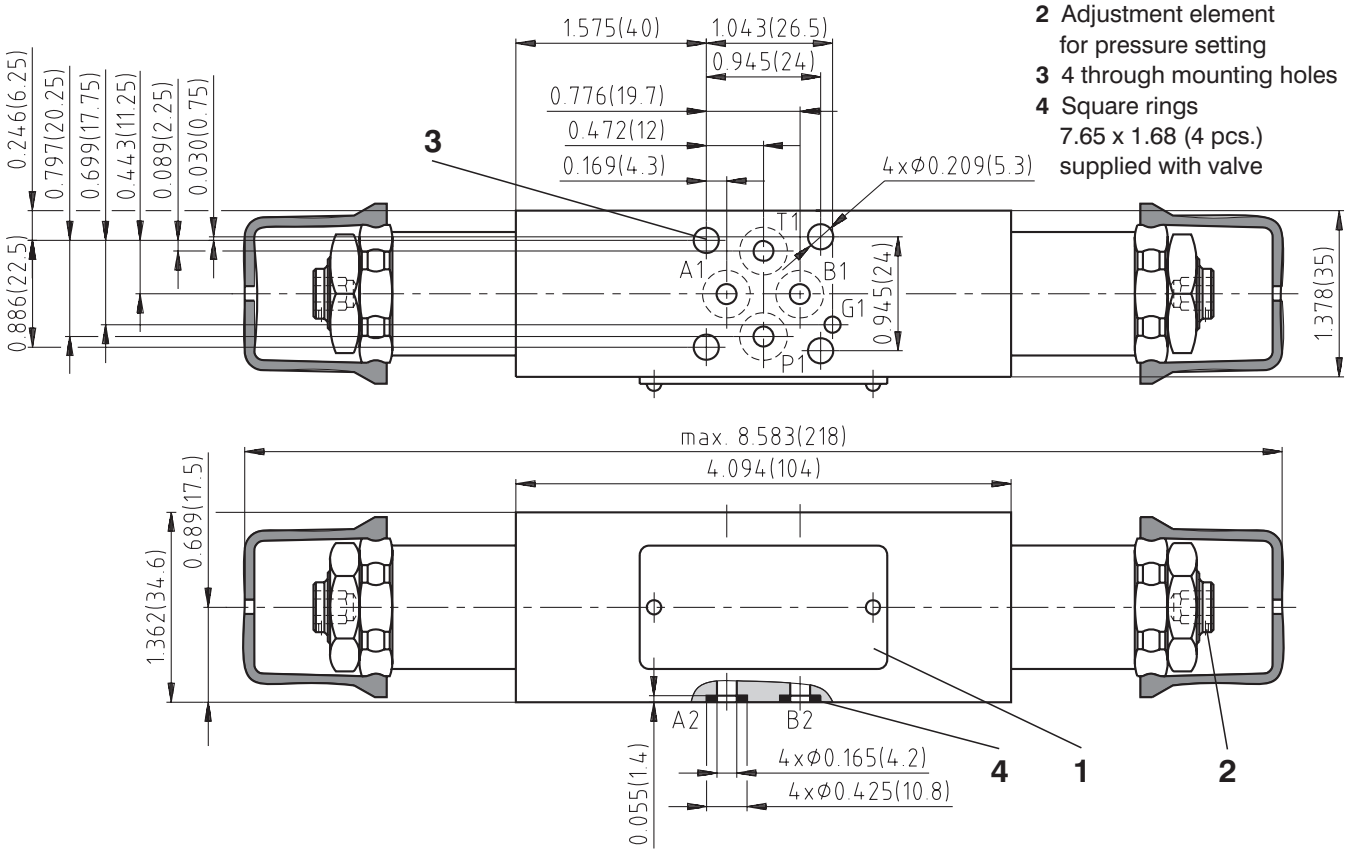
Models MB, MP



Valve Dimensions

Dimensions in inches and millimeters (in brackets)

Models MC, MD



Dimensions in millimeters:

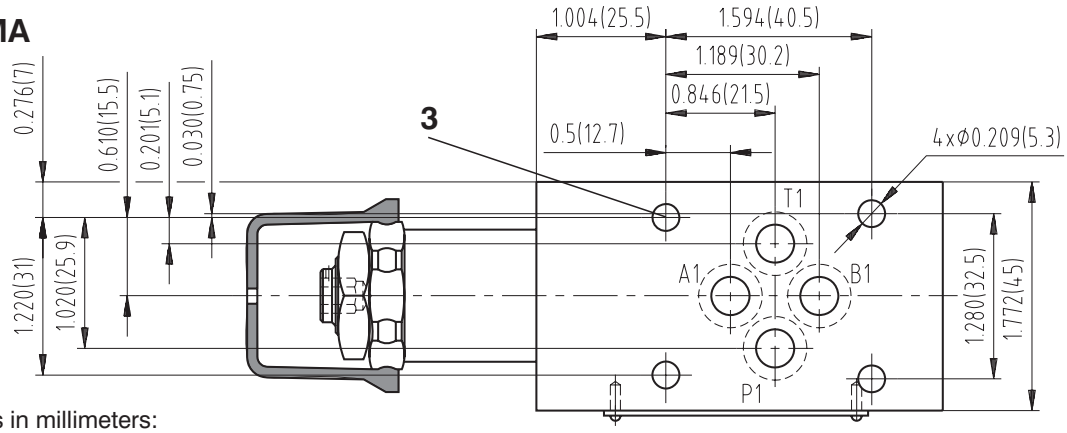
1 Name plate
2 Adjustment element for pressure setting
3 4 through mounting holes
4 Square rings 7.65 x 1.68 (4 pcs.) supplied with valve

Valve Dimensions

Dimensions in inches and millimeters (in brackets)

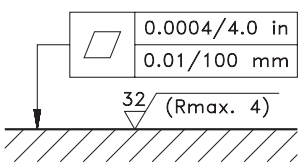
Size 06 (D 03) - Installation dimensions to ISO 4401, DIN 24 340, NFPA T3.5.1 M R1 and ANSI B 93.7 D 03

Model MA

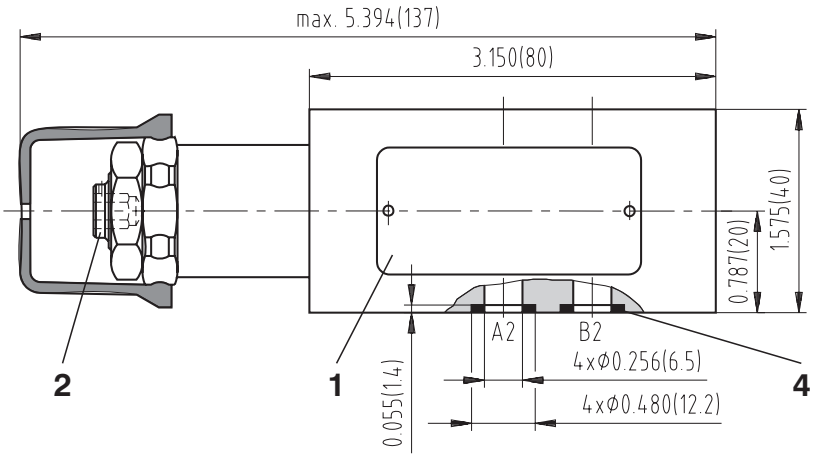


Dimensions in millimeters:

1 Name plate
2 Adjustment element for pressure setting
3 4 through mounting holes
4 Square rings 9.25 x 1.68 (4 pcs.) supplied with valve



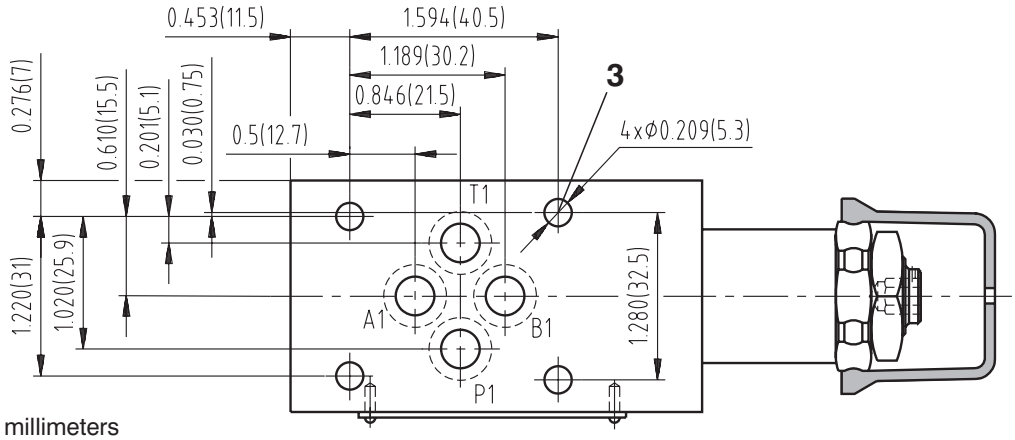
Required surface finish of interface



Valve Dimensions

Dimensions in inches and millimeters (in brackets)

Models MB, MP



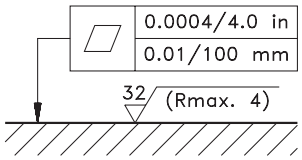
Dimensions in millimeters

1 Name plate

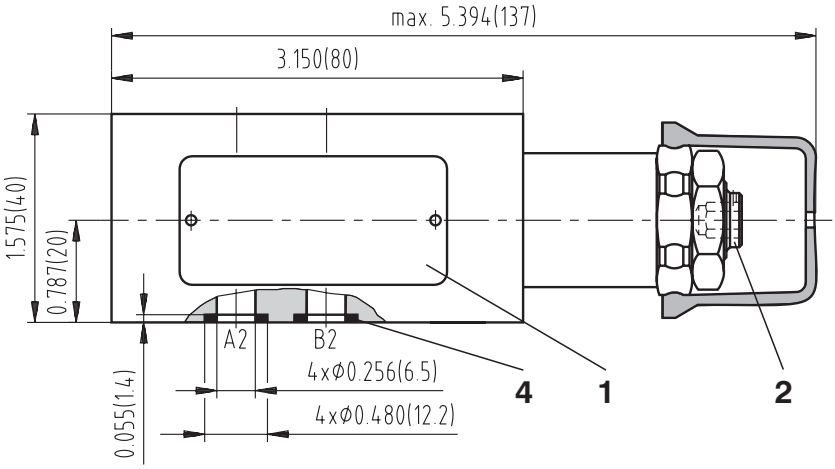
2 Adjustment element for pressure setting

3 4 through mounting holes

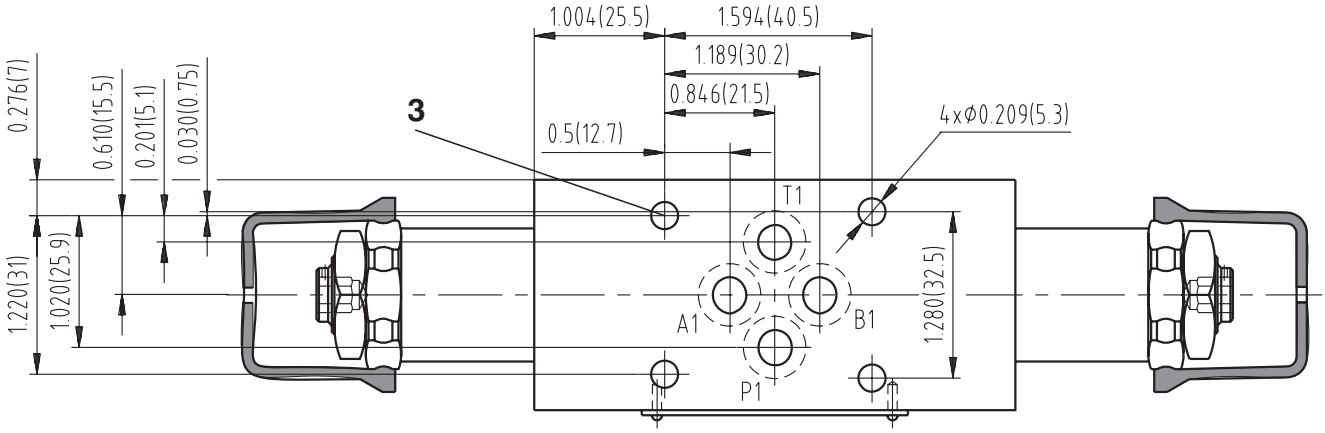
4 Square rings 9.25 x 1.68 (4 pcs.) supplied with valve

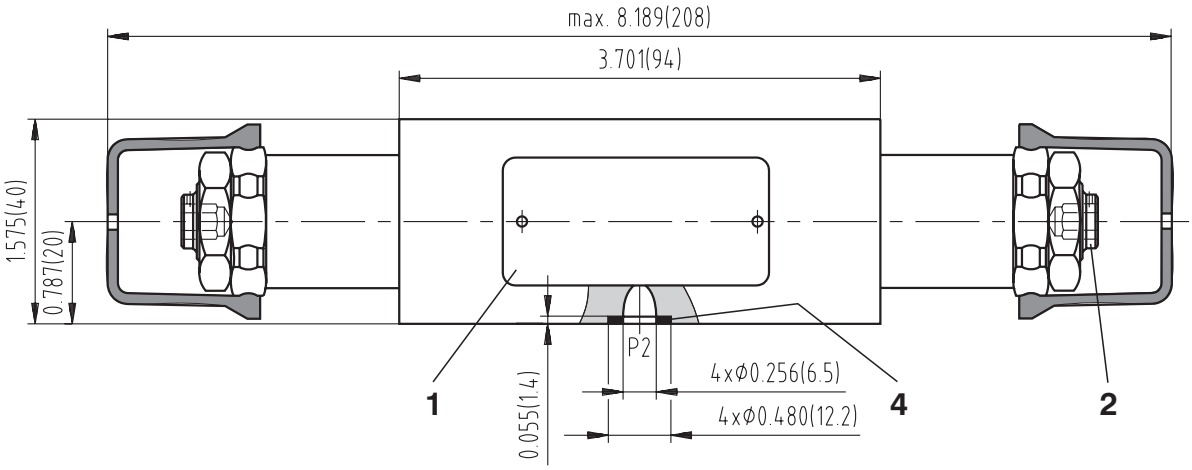


Required surface finish of interface



Models MC, MD

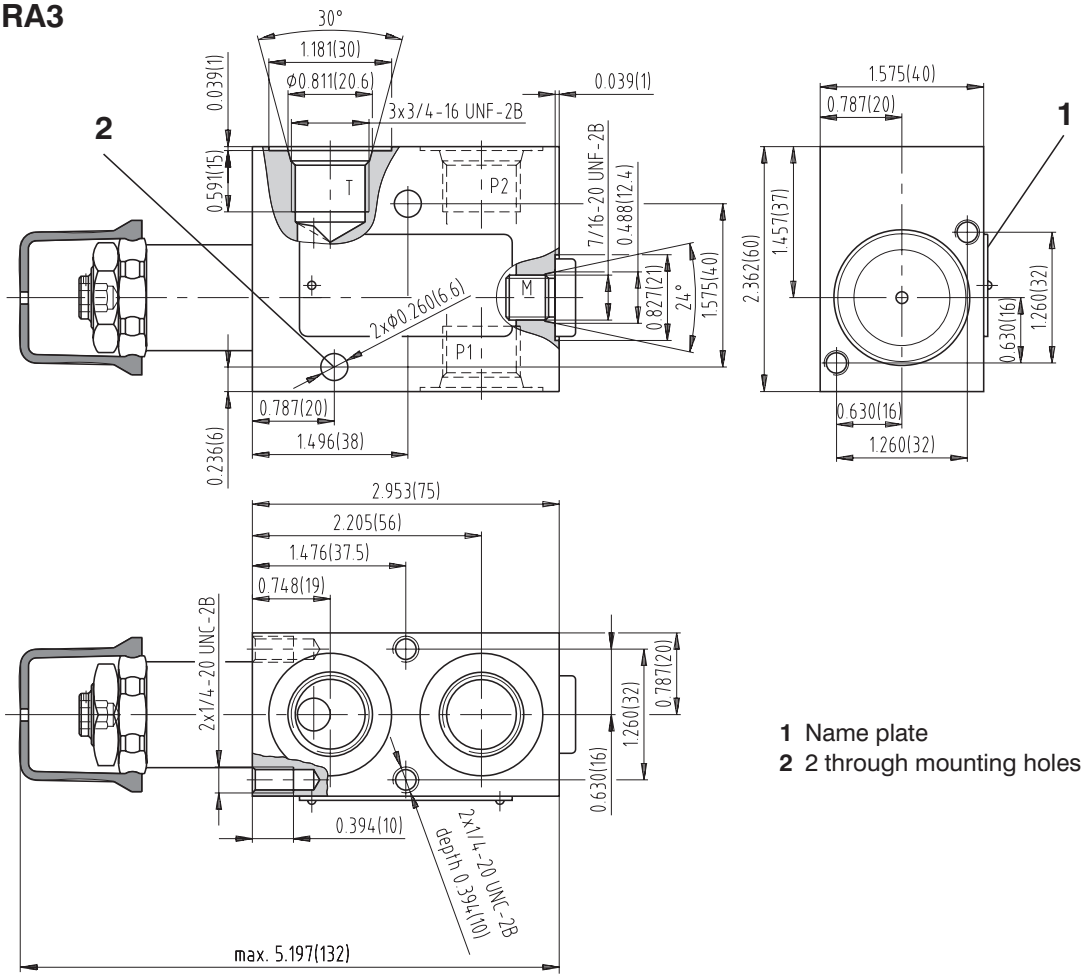




Valve Dimensions

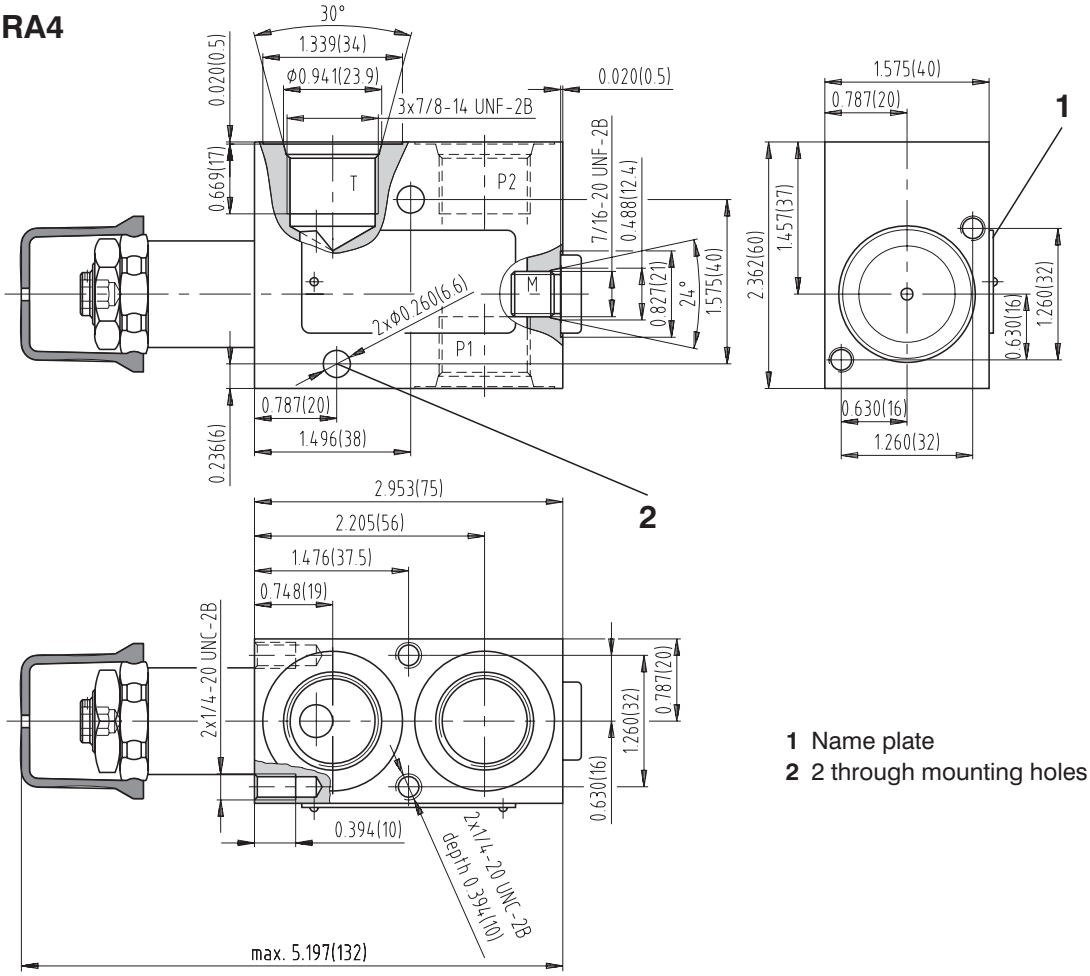
Dimensions in inches and millimeters (in brackets)

Model RA3



1 Name plate
2 2 through mounting holes

Model RA4

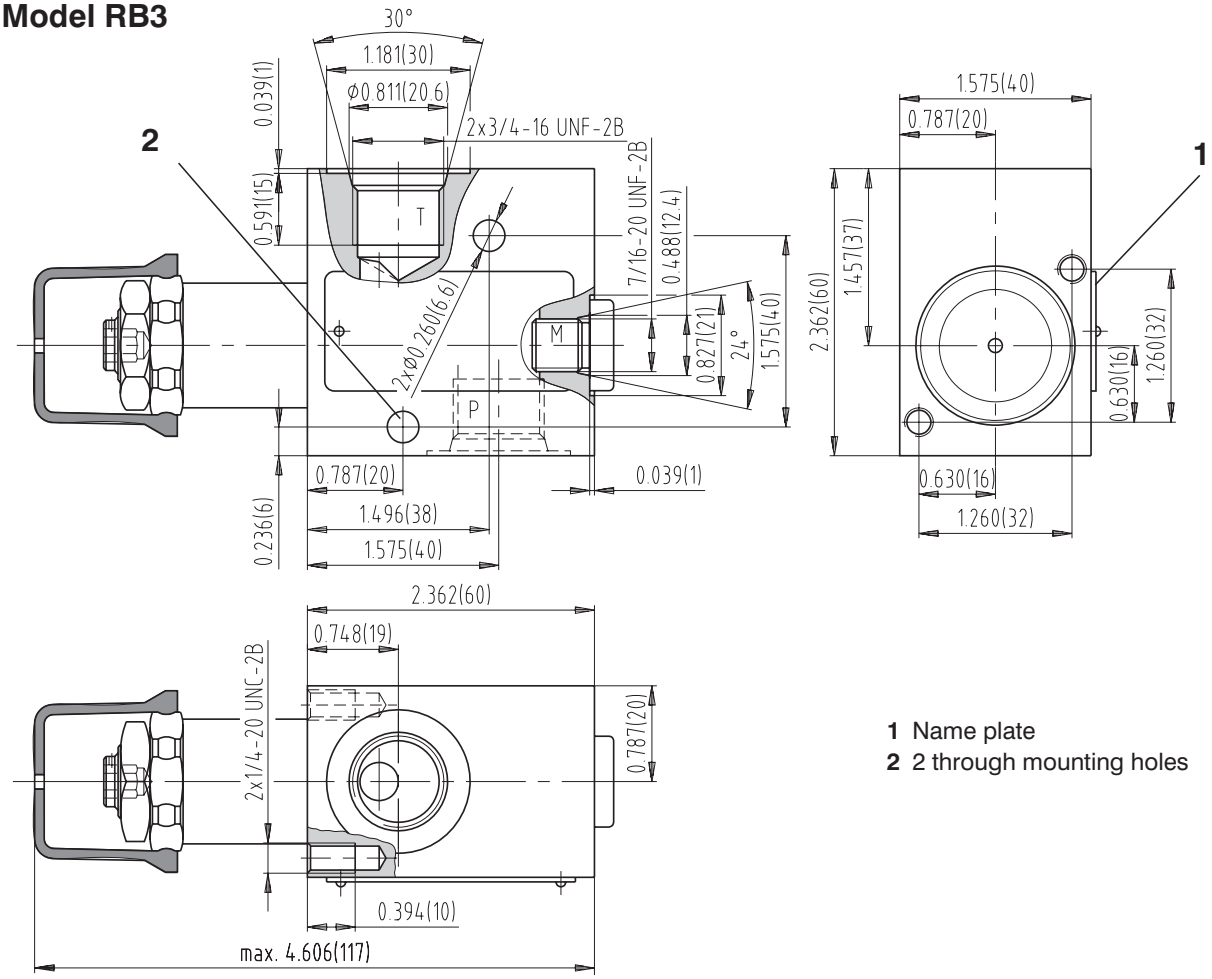


1 Name plate
2 2 through mounting holes

Valve Dimensions

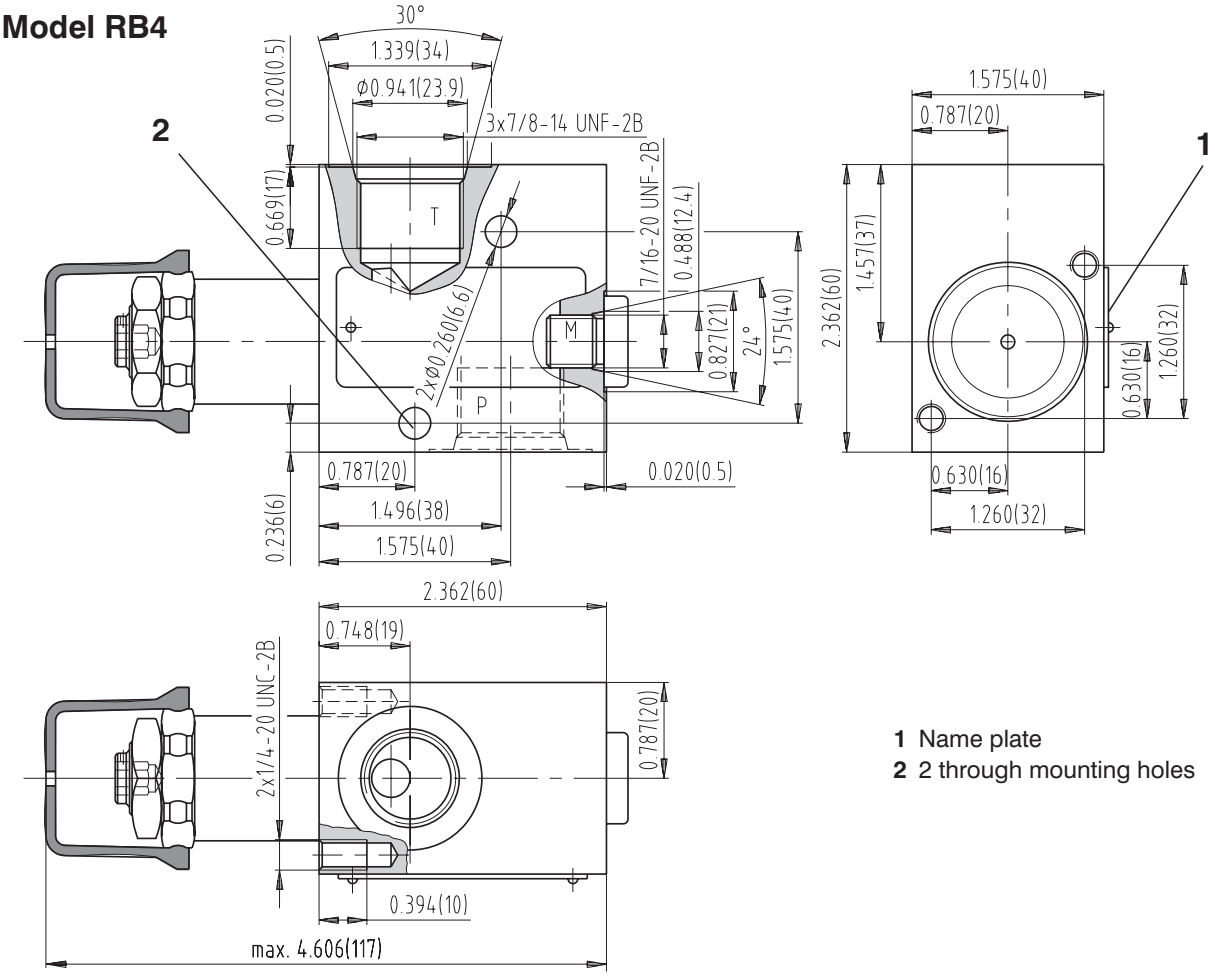
Dimensions in inches and millimeters (in brackets)

Model RB3



1 Name plate
2 2 through mounting holes

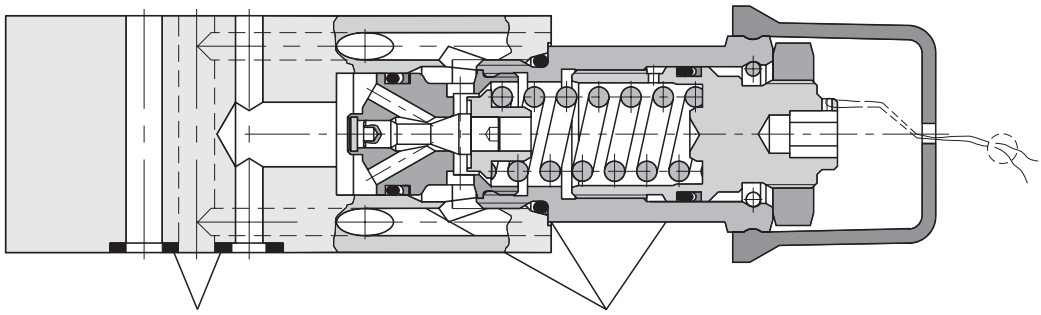
Model RB4



1 Name plate
2 2 through mounting holes

Spare Parts

Dimensions in millimeters



Model	Dimensions, quantity	Order number
Screw-in cartridge - NBR	O-ring 14 x 1.78 NBR 90 (1 pc.)	513-0396
	O-ring 17 x 1.8 NBR 70 (1 pc.)	
	O-ring 19.4 x 2.1 NBR 80 (1 pc.)	
	Back-up ring BBP80B015-N9 14.73 x 17.43 x 1.14 (1 pc.)	
	Back-up ring BBP80B016-N9 16.33 x 19.03 x 1.14 (1 pc.)	
Screw-in cartridge - Viton	O-ring 14 x 1.78 (1 pc.)	513-0397
	O-ring 17.17 x 1.78 (1 pc.)	
	O-ring 19.4 x 2.1 (1 pc.)	
	Back-up ring BBP80B015 14.73 x 17.43 x 1.14 (1 pc.)	
	Back-up ring BG1300174-PT00 17.4 x 1.3 (1 pc.)	

Model	Dimensions, quantity	Order number
Modular valve size 04 - NBR	Square ring 7.65 x 1.68 (4 pcs.)	513-0398
Modular valve size 04 - Viton	O-ring 7.65 x 1.78 (4 pcs.)	513-0399
Modular valve size 06 - NBR	Square ring 9.25 x 1.68 (4 pcs.)	556-0397
Modular valve size 06 - Viton	O-ring 9.25 x 1.78 (4 pcs.)	556-0396

Model	Typ, quantity	Order number
In-line valve RA3 - NBR	Plug SAE-4	
In-line valve RA4 - NBR		
In-line valve RB3 - NBR		
In-line valve RB4 - NBR		
In-line valve RA3 - Viton	Plug SAE-4	
In-line valve RA4 - Viton		
In-line valve RB3 - Viton		
In-line valve RB4 - Viton		

Caution!

- The packing foil is recyclable.
- Mounting studs must be ordered separately. For stud kit see data sheet HU 0020 and HU 0030.
- Certified documentation is available per request.

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ARGO HYTOS	TECHNICAL INFORMATION Coil Size 06	E3A, E4A	TI-A-04-1/2006 14.4.2006

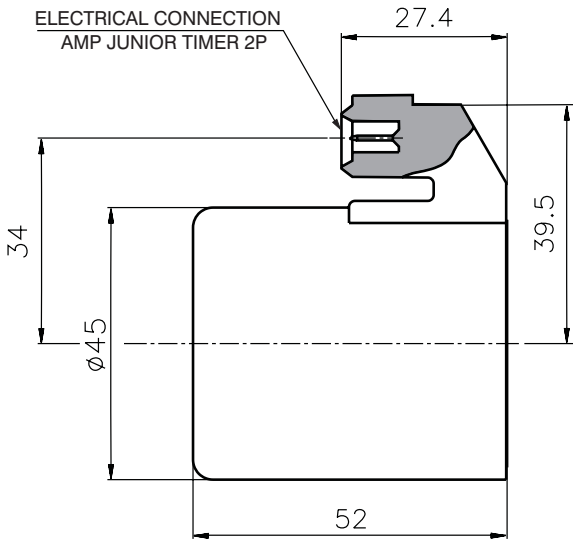
Coil	Type of the solenoid coil	Rated supply voltage of solenoids	Quenching diode
E3A	AMP Junior Timer 2P	**01200** - 12 V DC / 2,72 A	
		02400 - 24 V DC / 1,29 A	
E4A	AMP Junior Timer 2P with Quenching diode	**01200** - 12 V DC / 2,72 A	BZW06-19B
		02400 - 24 V DC / 1,29 A	BZW06-33B

Technical Data

Ambient temperature	-30....+ 50 °C
Voltage Duty cycle tolerance	±10 %
Duty cycle	100 %
Wire insulation class	Class 200 to IEC 85 max 200 °C
Corrosion resistance bei ISO 9227	240 h
Weight	0,35 kg
Enclosure type to EN 60529	IP 65 / IP 67, Mounted with terminal box.

Valve Dimensions

Dimensions in millimetres



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