



Description

Application

In the suction line of pumps of hydraulic or lubricating circuits.

Performance features

Protection against malfunction:

By full-flow filtration in the suction line, particularly the pumps are protected from coarse dirt particles that have remained in the system after manufacture or repair, or enter the system when it is filled with oil.

Special features

The robust construction with end caps, inner core, and mesh screen material, all out of metal, offers the following advantages:

- Maximum reliability at increased operating temperatures
- Enormous shock and vibration resistance

Selection Chart

Construction

Flow direction from outside to centre. The star-shaped pleating of the filter material results in:

- large filter surfaces
- low pressure drop
- long service life

Filter maintenance

- Cleaning in ultrasonic bath for a few minutes. As an alternative, put suction filter in cleaning agent for approx. 15 minutes and remove dirt from the outside using a brush.
- Then flush with fresh cleaning fluid from the inside to the outside.
- Blow out with compressed air from the inside to the outside.

In any case, be careful that no dirt enters the inner side (clean oil side) of the suction filter.

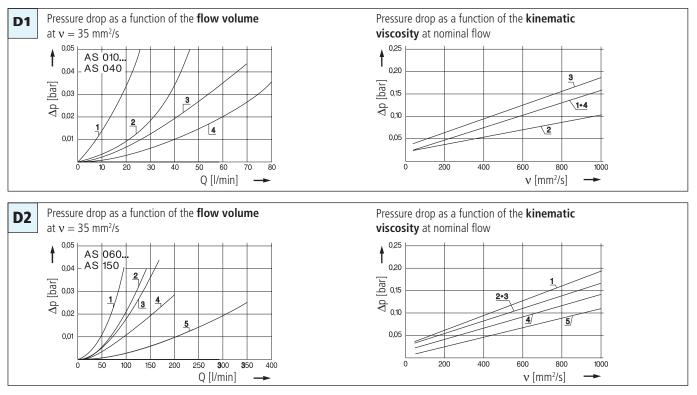
			/		,		/	55					
		ominal flow pressure	drop see	Icurve no.	Hace	a pre	ssure of by	par p			ion¥		
Parth	40. N	ominal flow	Diagrann	curve meness iter fineness	er surface	acking .	onnecci Di	ameter D	noth	ingth L2 Di	mensionK	mbol W	eight Remarks
	l/min		μm	CM ²	bar		mm	mm	mm	mm		kg	
1	2	3	4	5	6	7	8	9	10	11	12	13	14
AS 010-00	15	D1 /1	100 S	155	-	G1⁄2	45	82	60	27	1	0,13	-
AS 025-01	35	D1 /2	100 S	420	-	G¾	69,5	91	75	36	1	0,24	-
AS 040-01	60	D1 /4	100 S	650	-	G1	69,5	133	117	41	1	0,30	-
AS 040-71	60	D1 /3	100 S	650	- 0,3	G1	69,5	133	117	41	2	0,30	-
AS 060-01	90	D2 /1	100 S	1030	-	G1¼	69,5	205	185	50	1	0,42	-
AS 080-01	120	D2 /2	100 S	1320	-	G1½	100	182	165	70	1	0,50	_
AS 080-01 AS 080-81	120	D2 /2	100 S	1400	- 0,3	G1½	100	182	165	70	2	0,50	-
					-,-							-,	
AS 100-01	200	D2 /4	100 S	2300	-	G2	100	213	196	70	1	0,60	-
AS 100-81	150	D2 /3	100 S	1750	- 0,3	G2	100	213	196	70	2	0,60	-
AS 150-01	350	D2 /5	100 S	2300	-	G2½	150	191	165	ø 82	1	1.40	_
A3 130-01	550	DZ /3	100.5	2500	-	GZ 72	150	191	105	2002		1,40	-

Remarks:

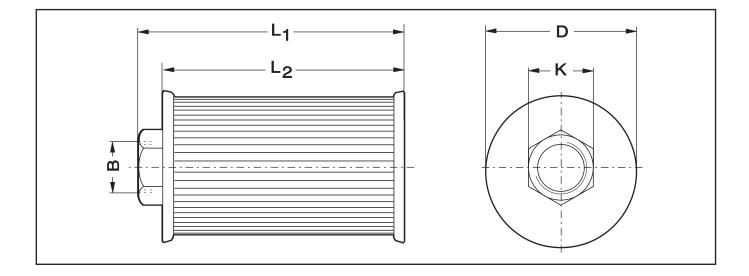
The filter listed in this chart are standard filters. Other designs, e.g. other filter finenesses or magnetic system, available on request.

Diagrams

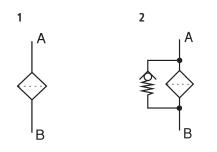
$\Delta p\text{-curves}$ for filters in Selection Chart, column 3



Dimensions



Symbols



Characteristics

Nominal flow rate

Up to 350 l/min (see Selection Chart, column 2) The nominal flow rates indicated by ARGO-HYTOS are based on the following features:

- Pressure drop $\Delta p < 0,035$ bar at $\nu = 35$ mm²/s
- closed by-pass valve at $\nu \leq 200 \text{ mm}^2/\text{s}$
- flow velocity in the connection lines \leq 1,5 m/s

Connection

Threaded ports according to ISO 228 or DIN 13. Sizes see Selection Chart, column 7 (other port threads on request).

Filter fineness

100 µm

Hydraulic fluids

Mineral oil and biodegradable fluids (HEES or HETG, see info-sheet 00.20)

Temperature range

- 30 °C ... + 100 °C (temporary - 40 °C ... + 120 °C)

Materials

- AS 010-00 / AS 025-01 / AS 040-01 / AS 150-01 End caps out of steel, support mesh out of steel, zinc plated, filter mesh out of stainless steel (1.4301)
- AS 060-01 / AS 080-01 / AS 100-01 End cap with hexagon out of aluminum, bottom end cap out of steel, support mesh out of steel, zinc plated, filter mesh out of stainless steel (1.4301)

- AS 040-71
- End caps out of steel, filter mesh out of stainless steel (1.4301)
- AS 080-81 / AS 100-81 End cap with hexagon out of aluminum, bottom end cap out of steel, filter mesh out of stainless steel (1.4301)

Viscosity at nominal flow rate

- at operating temperature: $v < 60 \text{ mm}^2/\text{s}$
 - v_{max} equivalent to the permitted pump inlet pressure (refer to diagram D), Δp to be determined as a function of the viscosity (take pressure loss in connection lines into account!)
- during initial operation of units equipped with by-pass valve:

• start-up viscosity:

The recommended starting viscosity can be read from the Diagram D (pressure drop as a function of the kinematic viscosity) as follows: Find the 70% Δp of the cracking pressure of the by-pass valve on the vertical axis. Draw a horizontal line so that it intersects the Δp curve at a point. Read this point on the horizontal axis for the viscosity.

Mounting position

Optional; versions equipped with bypass valve preferably in horizontal position. Under all operating conditions (min. oil level, max. inclination) the suction must occur under the oil level.

Quality Assurance

Quality management according to DIN EN ISO 9001

To ensure constant quality in production and operation, ARGO-HYTOS filter elements undergo strict controls and tests according to the following DIN and ISO standards:

DIN ISO 2941	Verification of collapse/burst resistance
DIN ISO 2943	Verification of material compatibility with fluids
DIN ISO 3724	Verification of flow fatigue characteristics

ISO 2942 ISO 3968 ISO 16889 Verification of fabrication integrity (Bubble Point Test) Evaluation of pressure drop versus flow characteristics Multi-Pass-Test (evaluation of filter fineness and dirt-holding capacity)

Various quality controls during the production process guarantee the leakfree function and solidity of our filters.

Our engineers will be glad to advice you in questions concerning filter application, selection as well as the cleanliness class of the filtered medium attainable under practical operating conditions.

Illustrations may sometimes differ from the original. ARGO-HYTOS is not responsible for any unintentional mistake in this specification sheet.



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Return Filters



D 023 · D 043

- Tank top mounting / In-line mounting
- Connection G¹/₂
- Nominal flow rate up to 45 l/min

Description

Application

In the return line circuits of hydraulic systems.

Performance features Protection

against wear: By means of filter elements that, in full-flow filtration, meet even the highest demands regarding cleanliness classes. Protection against

malfunction: By means of full-flow filtration in the system return, the pumps above all are protected from dirt particles remaining in the system after assembly, repairs, or which are generated by wear or enter the system from outside.

Special features

By-pass valve:	The location close to the inlet port prevents dirt partic-
	les retained by the filter element from entering into the
	clean oil side.
Dirt collecting bowl	: Prevents back-flushing of collected dirt particles during
	element replacement.
Connection:	A female thread in the bowl outlet makes in-line
	mounting possible.

Filter elements

Flow direction from outside to centre. The star-shaped pleating of the filter material results in:

- large filter surfaces
- low pressure drop
- high dirt-holding capacities
- long service life

In filters with a magnetic system, the ferromagnetic particles in the fluid pass first through a strong magnetic field and are separated.

Ventilating Filter

Ventilation of the reservoir by an integral star-shape pleated filter element:

- removable (replace annually!)
- splash-proof
- fineness 2 µm

Some versions are also available with galvanized steel wool.

Filter maintenance

By using a clogging indicator the correct moment for maintenance is stated and guarantees the optimum utilization of the filter life.

Materials

Screw-on cap:	Polyamide, GF reinforced
Housing:	Aluminium alloy
Seals:	NBR (Viton on request)
Filter media:	EXAPOR [®] MAX - inorganic microfibre web
	Paper - cellulose web, impregnated with resin
	Stainless steel wire mesh (1.4301)
	with mesh size 40 and 60 µm,
	bronce screen (2.1020) is used with 100 µm

Accessories

An optional oil separator (Part No. D 023.1702) prevents oil splashing through the ventilating filter at mobile applications. Electrical and optical clogging indicators are available. Dimensions and technical data see catalogue sheet 60.20.

Characteristics

Nominal flow rate

Up to 45 l/min (see Selection Chart, column 2) The nominal flow rates indicated by ARGO-HYTOS are based on the following features:

• closed by-pass valve at $\nu \leq 200 \text{ mm}^2/\text{s}$

- element service life > 1000 operating hours at an average fluid contamination of 0,07 g per l/min flow volume
- flow velocity in the connection lines \leq 4,5 m/s

Connection

Threaded ports according to ISO 228 or DIN 13. Sizes see Selection Chart, column 6 (other port threads on request)

Filter fineness

12 μm(c) ... 100 μm(c) β-values according to ISO 16889 (see Selection Chart, column 4 and Diagram Dx)

Dirt-holding capacity

Values in g test dust ISO MTD according to ISO 16889 (see Selection Chart, column 5)

Hydraulic fluids

Mineral oil and biodegradable fluids (HEES or HETG, see info-sheet 00.20) With high filling conditions we recommend an electrical conductivity \geq 500 pS/m at 20 °C.

Temperature range

- 30 °C ... + 100 °C (temporary - 40 °C ... + 120 °C)

Viscosity at nominal flow rate

- at operating temperature: $v < 60 \text{ mm}^2/\text{s}$
- as starting viscosity: $v_{max} = 1200 \text{ mm}^2/\text{s}$
- at first operation:
- The recommended starting viscosity can be read from the Diagram D (pressure drop as a function of the kinematic viscosity) as follows: Find the 70% Δp of the cracking pressure of the by-pass valve on the vertical axis. Draw a horizontal line so that it interects the Δp curve at a point. Read this point on the horizontal axis for the viscosity.

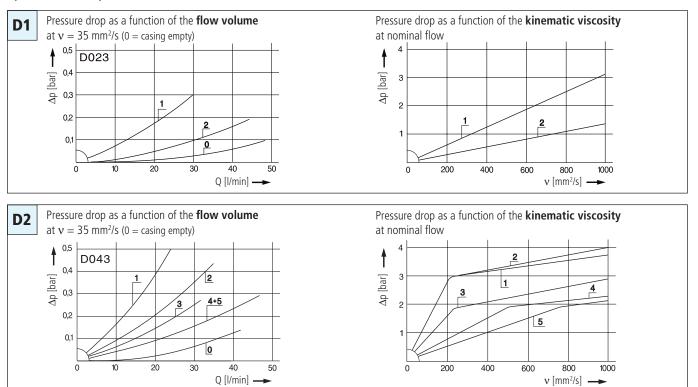
Operating pressure

Max. 16 bar

Mounting position

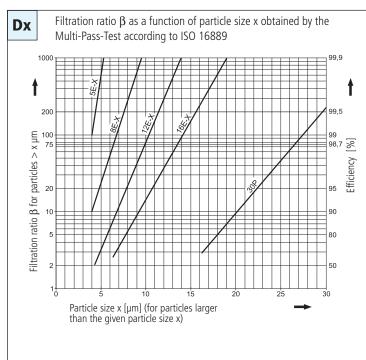
Preferably vertical, outlet downwards

Diagrams



Δp -curves for complete filters in Selection Chart, column 3

Filter fineness curves in Selection Chart, column 4



The abbreviations represent the following $\beta\mbox{-values resp.}$ finenesses:

For EXAPOR®MAX- and Paper elements:

5 E-X	=	$\overline{\beta}_{F(c)}$	= 200	EXAPOR®MAX
5 E-X 8 E-X	=	$\overline{\beta}_{8(c)}^{(0)}$	= 200	EXAPOR®MAX
12 E-X	=	$\overline{\beta}_{12(c)}$	= 200	EXAPOR®MAX
12 E-X 16 E-X	=	$\overline{\beta}_{16 (c)}^{12 (c)}$	= 200	EXAPOR®MAX
			= 200	Paper

Based on the structure of the filter media of the 30 P paper elements, deviations from the printed curves are quite probable.

For screen elements:

40	S	=	screen	material	with	mesh	size	40 um

- **60 S** = screen material with mesh size $60 \,\mu\text{m}$
- **100 S** = screen material with mesh size $100 \,\mu\text{m}$
- Tolerances for mesh size according to DIN 4189

For ventilating filter elements:

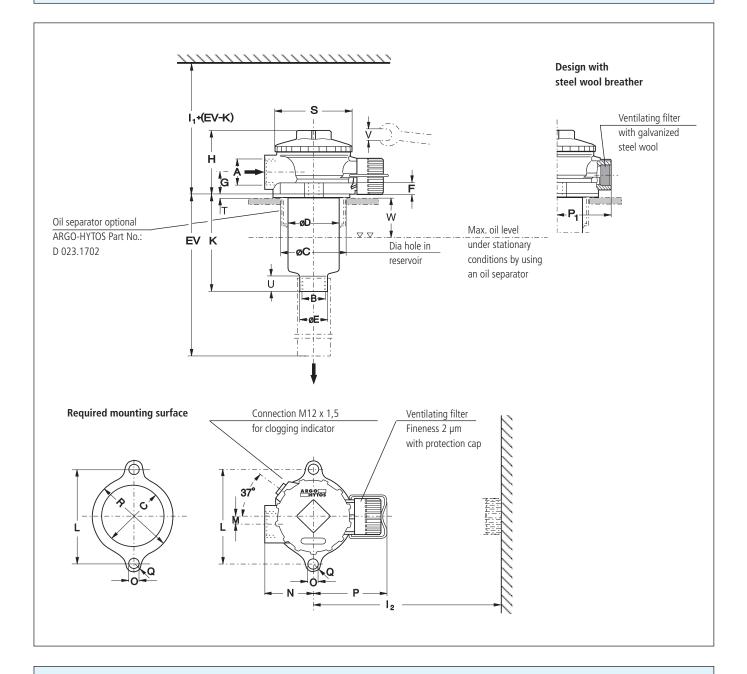
2~CL=99,5~% filter efficiency for particles of size 2 μm

For special applications, finenesses differing from these curves are also available by using special composed filter material.

Selection Chart

				uve no. erfnenesseeD Dirt-hold	201.DX	\ \		mbol Replacement		eight Replacement vention	lating filter er fineness see Diagrams) Remarks
/		IN	drop see Diagram Diagram	une no. erfineness see D Dirt-hold	1891. Ing capacit	ein () ein () onnection	AIB	ossure of D?	of filter ell	er venti	latin - ss see Die -
Parth	40.	ominal flow	re drop Dic	or fineness thold	ing surfac	onection	King	pre-	NO.	ight alacement No.	er finene
baur		Jolli Press	Digg. Eilt	e Dint F	Ine Co	JIII (iac. S	Mir Bebr bau	W	eld. Rebr barr (Fill	Remi
	l/min			g		bar			kg		
1	2	3	4	5	6	7	8	9	10	11	12
023-05	15	D1/1	40 S	(80 cm ²)	G½*	-	5	S0.0408-05	0,4	steel wool breather	with magnetic system
023-01	25	D1 /2	100 S	(80 cm ²)	G1⁄2	-	5	S0.0408-01	0,4	steel wool breather	with magnetic system
043-56	23	D2 /1	12 E-X	5,3	G1⁄2	2,5	2	V3.0510-56	0,4	L1.0406-01 (2 CL)	-
043-86	23	D2 /1	12 E-X	5,3	G1⁄2	2,5	1	V3.0510-56	0,4	-	-
043-58	35	D2 /2	16 E-X	5,7	G1⁄2	2,5	2	V3.0510-58	0,4	L1.0406-01 (2 CL)	-
043-88	35	D2 /2	16 E-X	5,7	G1⁄2	2,5	1	V3.0510-58	0,4	-	-
043-51	30	D2 /3	30 P	4,0	G1⁄2	1,5	2	P3.0510-51	0,4	L1.0406-01 (2 CL)	-
043-73	30	D2 /3	30 P	4,0	G1⁄2*	1,5	1	P3.0510-51	0,4	-	-
			10.0	(0.0.0)	6 (1)						
043-05	40	D2/4	40 S	(220 cm^2)	G½*	1,5	4	S3.0508-55	0,47	steel wool breather	with magnetic system
043-10	45	D2 /5	60 S	(220 cm ²)	G½*	1,5	4	\$3.0508-50	0,47	steel wool breather	with magnetic system
										either manometers or ele	
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Dimensions

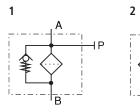


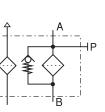
Measurements

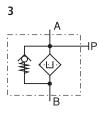
Туре	Α	В*	C min./max.	D	E	F	G	Η	I ₁	I ₂	К	L	Μ	Ν	0	Р	P ₁	Q	R	S
D 023	G1⁄2	G1⁄2	60/63	52	27,8	11,5	24	67	125	-	87,5	88	9	50	11	-	45	9,5	75,5	73,5
D 043	G1⁄2	G1⁄2	60/63	52	27,8	11,5	24	67	150	72	87,5	88	9	50	11	68,5	45	9,5	75,5	73,5
Туре	Т	U	V	W																
D 023	2	18	27	42																
D 043	2	18	27	42																

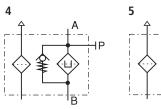
also see Selection Chart, column 6

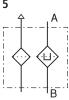
Symbols

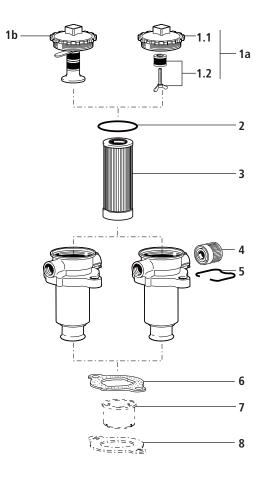












Pos.	Designation	Part No.
1a	Screw-on cap with Pos. 2 for D 043	D 043.1210
	with magnetic system	
1b	Screw-on cap with Pos. 2 for D 043	D 023.1210
	with magnetic system	
1.1	Screw-on cap	D 043.2202
1.2	Magnetic system	M0.2501-00
2	Seal	N 031.0562
3	Filter element	see Chart / col. 9
4	Ventilating filter (with Pos. 5)	L1.0406-01K7
5	Clip	N 026.0253
6	Flat gasket	D 023.0704
7	Oil separator (with Pos. 8)	D 023.1702
8	Flat gasket	D 023.0718

The functions of the complete filters as well as the outstanding features of the filter elements assured by ARGO-HYTOS can only be guaranteed if original ARGO-HYTOS spare parts are used.

Quality Assurance

Quality management according to DIN EN ISO 9001

To ensure constant quality in production and operation, ARGO-HYTOS filter elements undergo strict controls and tests according to the following DIN and ISO standards:

DIN ISO 2941	Verification of collapse/burst resistance
DIN ISO 2943	Verification of material compatibility with fluids
DIN ISO 3724	Verification of flow fatigue characteristics

ISO 2942 ISO 3968 ISO 16889 Verification of fabrication integrity (Bubble Point Test) Evaluation of pressure drop versus flow characteristics Multi-Pass-Test (evaluation of filter fineness and dirt-holding capacity)

Various quality controls during the production process guarantee the leakfree function and solidity of our filters.

Our engineers will be glad to advice you in questions concerning filter application, selection as well as the cleanliness class of the filtered medium attainable under practical operating conditions.

Illustrations may sometimes differ from the original. ARGO-HYTOS is not responsible for any unintentional mistake in this specification sheet.



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Pressure Filters

D 042 · D 062

- In-line mounting
- Operating pressure up to 100 bar
- Nominal flow rate up to 70 l/min

Description

Application

In the pressure circuits of hydraulic and lubrication systems.

Performance features

Protection

against wear: By means of filter elements that, in full-flow filtration, meet even the highest demands regarding cleanliness classes. Protection against

malfunction:

Through installation near to the control valves or other expensive components. The specific determined flow rate guarantees a closed by-pass valve even at $v \le 200 \text{ mm}^2/\text{s}$ (cold start condition).

Filter elements

Flow direction from outside to centre. The star-shaped pleating of the filter material results in:

- large filter surfaces
- low pressure drop
- high dirt-holding capacities
- long service life

Filter maintenance

By using a clogging indicator the correct moment for maintenance is stated and guarantees the optimum utilization of the filter life.

Materials

Filter head:	Aluminium alloy
Filter bowl:	Aluminium alloy
Seals:	NBR (Viton on request)
Filter media:	EXAPOR®MAX - inorganic multi-layer microfibre web
	Paper - cellulose web, impregnated with resin

Accessories

Electrical and/or optical clogging indicators are available - optionally with one or two switching points resp. temperature suppression. Dimensions and technical data see catalogue sheet 60.30.

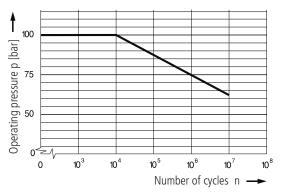
Characteristics

Operating pressure

0 ... 63 bar, min. 10⁷ pressure cycles Nominal pressure according to DIN 24550

0 ... 100 bar, min. 10^4 pressure cycles Quasi-static operating pressure

Permissible pressures for other numbers of cycles



Nominal flow rate

Up to 70 l/min (see Selection Chart, column 2) The nominal flow rates indicated by ARGO-HYTOS are based on the following features:

- closed by-pass valve at $v \le 200 \text{ mm}^2/\text{s}$
- element service life > 1000 operating hours at an average fluid contamination of 0,07 g per l/min flow volume
- flow velocity in the connection lines: up to 40 bar \leq 4,5 m/s up to 250 bar \leq 8 m/s

Filter fineness

5 μ m(c) ... 30 μ m(c) β -values according to ISO 16889 (see Selection Chart, column 4 and diagram Dx)

Dirt-holding capacity

Values in g test dust ISO MTD according to ISO 16889 (see Selection Chart, column 5)

Hydraulic fluids

Mineral oil and biodegradable fluids (HEES or HETG, see info-sheet 00.20)

Temperature range

• at initial operation:

- 30 °C ... + 100 °C (temporary - 40 °C ... + 120 °C)

Viscosity at nominal flow rate

- at operating temperature: $v < 60 \text{ mm}^2/\text{s}$
- as starting viscosity: $v_{max} = 1200 \text{ mm}^2/\text{s}$
 - The recommended starting viscosity can be read from the diagram D (pressure drop as a function of the kinematic viscosity) as follows: Find the 70% Δp of the cracking pressure of the by-pass valve on the vertical axis. Draw a horizontal line so that it intersects the Δp curve at a point. Read this point on the horizontal axis for the viscosity.

Mounting position

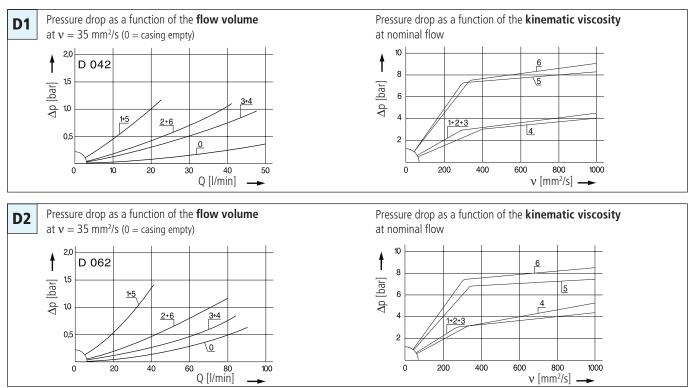
Preferably vertical, filter head on top

Connection

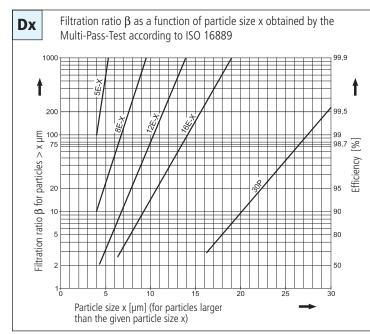
Threaded ports according to ISO 228 or DIN 13. Sizes see Selection Chart, column 6 (other port threads on request).

Diagrams

Δp -curves for complete filters in Selection Chart, column 3



Filter fineness curves in Selection Chart, column 4



The abbreviations represent the following $\beta\mbox{-values}$ resp. finenesses:

For EXAPOR[®]MAX- and Paper elements:

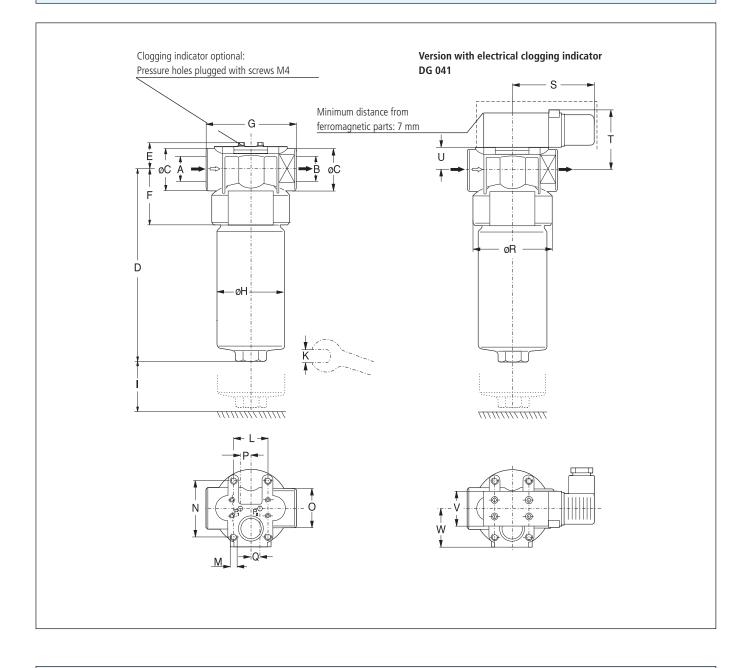
5 E-X 8 E-X 12 E-X 16 E-X	=	$\overline{\beta}_{5(c)}$	= 200	EXAPOR®MAX
8 E-X	=	$\overline{\beta}_{8(c)}^{(c)}$	= 200	EXAPOR [®] MAX
12 E-X	=	$\underline{\beta}_{12}^{(c)}$	= 200	EXAPOR [®] MAX
16 E-X	=	$\beta_{16 (c)}^{12 (c)}$	= 200	EXAPOR [®] MAX
30 P	=	$\overline{\beta}_{30 (c)}$	= 200	Paper
Dacad an +	ha	ctructu		المعادية والمعادية والمعاد

Based on the structure of the filter media of the 30 P paper elements, deviations from the printed curves are quite probable.

For special applications, finenesses differing from these curves are also available by using special composed filter media.

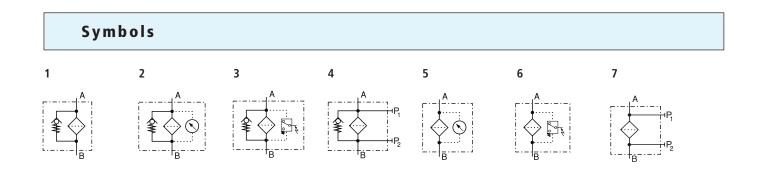
Selection Chart

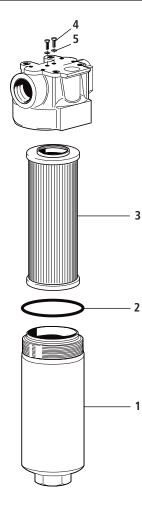
/		N	LOD SEP	curve n	0. dlass	pacity	AIB	essure of the	ot filter eld	AirCe	tor
Part NG). 	minal flow Pressu	le drop see	ter finer	o. ess see diagr nt-holding ca	pacity	acking	Upressure of bytass	erre Nei	ght cooging indice	Remarks
40	I/min	- / Y -	01- 4	g		bar		SN: Kei ba	kg		× Kc
1	2	3	4	5 5	6	7	8	9	10	11	12
D 042-153	9	D1 /1	5 E-X	3,8	G1⁄2	3,5	4	V3.0510-03	0,8	optional	-
D 042-156	15	D1 /2	12 E-X	6,1	G1⁄2	3,5	4	V3.0510-06	0,8	optional	
D 042-158	30	D1 /3	16 E-X	6,6	G1⁄2	3,5	4	V3.0510-08	0,8	optional	-
D 042-151	35	D1 /4	30 P	3,6	G1⁄2	3,5	4	P3.0510-11*	0,8	optional	-
D 042-183	20	D1 /5	5 E-X	3,8	G1⁄2	7	4	V3.0510-03	0,8	optional	-
D 042-186	35	D1 /6	12 E-X	6,1	G1⁄2	7	4	V3.0510-06	0,8	optional	-
062-153	20	D2 /1	5 E-X	7,6	G1⁄2	3,5	4	V3.0520-03	1,1	optional	-
D 062-155	30	D2 /2	12 E-X	13	G¾	3,5	4	V3.0520-06	1,1	optional	-
D 062-158	60	D2 /3	16 E-X	14	G¾	3,5	4	V3.0520-08	1,1	optional	-
D 062-151	70	D2 /4	30 P	7,1	G¾	3,5	4	P3.0520-01*	1,1	optional	-
D 062-183	40	D2 /5	5 E-X	7,6	G1⁄2	7	4	V3.0520-03	1,1	optional	-
D 062-196	70	D2 /6	12 E-X	13	G¾	7	4	V3.0520-06	1,1	optional	-
ad use the a	bbreviati le: The 1	on "M" b	ehind the	part n	umber of th be suppli d	ne indica	ator. T n opt	he printed order	acknowlee ndicator	dgements show both ite - response pressure 2	
art No. (Basi	ic unit)								L	Mo	ounted
ogging ind		clogging	indicato	ors see	catalogu	e shee	t 60.	30			
emarks:) pressur	e of the clo column 7).	ogging in	dicator	has always	to be l	ower	than the cracking	g pressure	of the by-pass valve	



Measurements

Туре	A/B	C	D	E	F	G	H	Ι	К	L	M ø∕depth	Ν	0	Р	Q	R	S	Т	U	۷	W
D 042	G1⁄2	39	148	27	45,5	80	58,5	55	27	35	M6/8	44	36	19	15	70	81	55	23	30	35,5
D 062	G1⁄2, G3⁄4	39	244	27	45,5	80	58,5	55	27	35	M6/8	44	36	19	15	70	81	55	23	30	35,5





Pos.	Designation	Part No.
1	Filter bowl D 042	D 044.0101
1	Filter bowl D 062	D 064.0101
2	O-ring 50 x 2	N 007.0501
3	Filter element (with seal)	see Chart / col. 9
4	Hexagonal head screw M4 x 8	3301051
	DIN 933-8.8	
5	Bonded seal 4,1 x 7,2 x 1	3404074

The functions of the complete filters as well as the outstanding features of the filter elements assured by ARGO-HYTOS can only be guaranteed if original ARGO-HYTOS spare parts are used.

Quality Assurance

Quality management according to DIN EN ISO 9001

To ensure constant quality in production and operation, ARGO-HYTOS filter elements undergo strict controls and tests according to the following DIN and ISO standards:

DIN ISO 2941	Verification of collapse/burst resistance
DIN ISO 2943	Verification of material compatibility with fluids
DIN ISO 3724	Verification of flow fatigue characteristics

ISO 2942 ISO 3968 ISO 16889 Verification of fabrication integrity (Bubble Point Test) Evaluation of pressure drop versus flow characteristics Multi-Pass-Test (evaluation of filter fineness and dirt-holding capacity)

Before release into the series production the filter casing is tested for fatigue strength in our pressure pulse test rig. Various quality controls during the production process guarantee the leakfree function and solidity of our filters.

Our engineers will be glad to advice you in questions concerning filter application, selection as well as the cleanliness class of the filtered medium attainable under practical operating conditions.

Illustrations may sometimes differ from the original. ARGO-HYTOS is not responsible for any unintentional mistake in this specification sheet.







Pressure Filters

D 162 · D 232 · D 332

- In-line mounting
- Operating pressure up to 63 bar
- Nominal flow rat up to 300 l/min

Description

Application

In the pressure circuits of hydraulic and lubrication systems.

Performance features

Protection

By means of filter elements that, in full-flow filtration. against wear: meet even the highest demands regarding cleanliness classes. Protection against

malfunction:

Through installation near to the control valves or other expensive components. The specific determined flow rate guarantees a closed by-pass valve even at $v \leq 200 \text{ mm}^2/\text{s}$ (cold start condition).

Filter elements

Flow direction from outside to centre. The star-shaped pleating of the filter material results in:

- large filter surfaces
- low pressure drop
- high dirt-holding capacities
- long service life

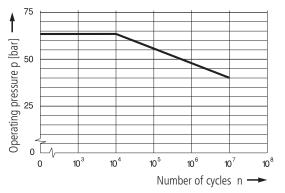
Characteristics

Operating pressure

0 ... 40 bar, min. 107 pressure cycles Nominal pressure according to DIN 24550

0 ... 63 bar, min. 10⁴ pressure cycles Quasi-static operating pressure

Permissible pressures for other numbers of cycles



Nominal flow rate

Up to 300 l/min (see Selection Chart, column 2) The nominal flow rates indicated by ARGO-HYTOS are based on the following features:

- closed by-pass valve at $v \le 200 \text{ mm}^2/\text{s}$
- element service life > 1000 operating hours at an average fluid contamination of 0,07 g per l/min flow volume
- flow velocity in the connection lines: up to 40 bar \leq 4,5 m/s up to 250 bar \leq 8 m/s

Filter fineness

5 µm(c) ... 30 µm(c) β -values according to ISO 16889 (see Selection Chart, column 4 and diagram Dx)

Filter maintenance

By using a clogging indicator the correct moment for maintenance is stated and guarantees the optimum utilization of the filter life.

Materials

Filter head:	Aluminium alloy
Filter bowl:	Aluminium alloy
Seals:	NBR (Viton on request)
Filter media:	EXAPOR [®] MAX - inorganic multi-layer microfibre web
	Paper - cellulose web, impregnated with resin

Accessories

Electrical and/or optical clogging indicators are available - optionally with one or two switching points resp. temperature suppression. Dimensions and technical data see catalogue sheet 60.30.

Dirt-holding capacity

Values in g test dust ISO MTD according to ISO 16889 (see Selection Chart, column 5)

Hydraulic fluids

Mineral oil and biodegradable fluids (HEEs or HETG, see info-sheet 00.20)

Temperature range

- 30 °C ... + 100 °C (temporary - 40 °C ... + 120 °C)

Viscosity at nominal flow rate

- - $v_{max} = 1200 \text{ mm}^2/\text{s}$
- at initial operation: read from the diagram D (pressure drop as a function of the kinematic viscosity) as follows: Find the 70% Δp of the cracking pressure of the by-pass valve on the vertical axis. Draw a horizontal line so that it intersects the Δp curve at a point. Read this point on the horizontal axis for the viscosity.

Mounting position

Preferably vertical, filter head on top

Connection

Threaded ports according to ISO 228 or DIN 13. Sizes see Selection Chart, column 6 (other port threads on request).

Electrical clogging indicator

- Switching voltage:
- Switching current: max. 0,17 A AC / 0,25 A DC
- Switching power:
- Type of contact:
- Electrical protection:

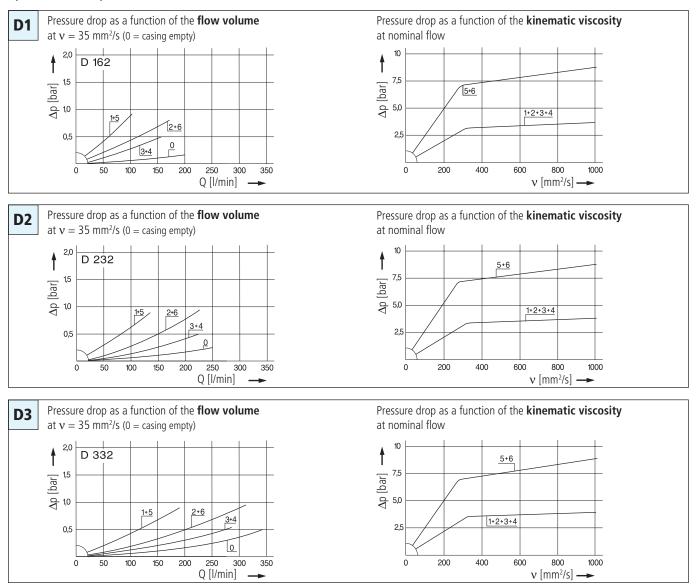
- at operating temperature: $v < 60 \text{ mm}^2/\text{s}$
- as starting viscosity:

max. 120 V AC / 175 V DC

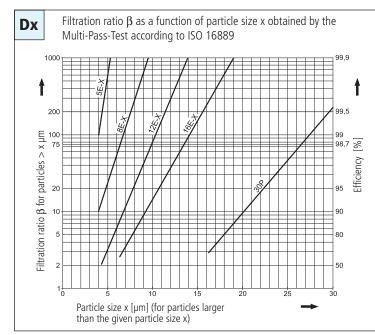
- max. 3,5 VA AC / 5 W DC
- change-over
- IP 65 (with mounted and secured socket)

Diagrams

Δp -curves for complete filters in Selection Chart, column 3



Filter fineness curves in Selection Chart, column 4



The abbreviations represent the following $\beta\mbox{-values}$ resp. finenesses:

For EXAPOR[®]MAX- and Paper elements:

5 E-X =	$\overline{\beta}_{5(c)}$	= 200	EXAPOR®MAX
8 E-X = 12 E-X =	$\overline{\beta}_{8(c)}$	= 200	EXAPOR®MAX
12 E-X =	$\overline{\beta}_{12(c)}$	= 200	EXAPOR [®] MAX
16 E-X $=$	$\overline{\beta}_{16(c)}$	= 200	EXAPOR®MAX
30 P =	$\overline{\beta}_{30 (c)}$	= 200	Paper
			filter media of the

Based on the structure of the filter media of the 30 P paper elements, deviations from the printed curves are quite probable.

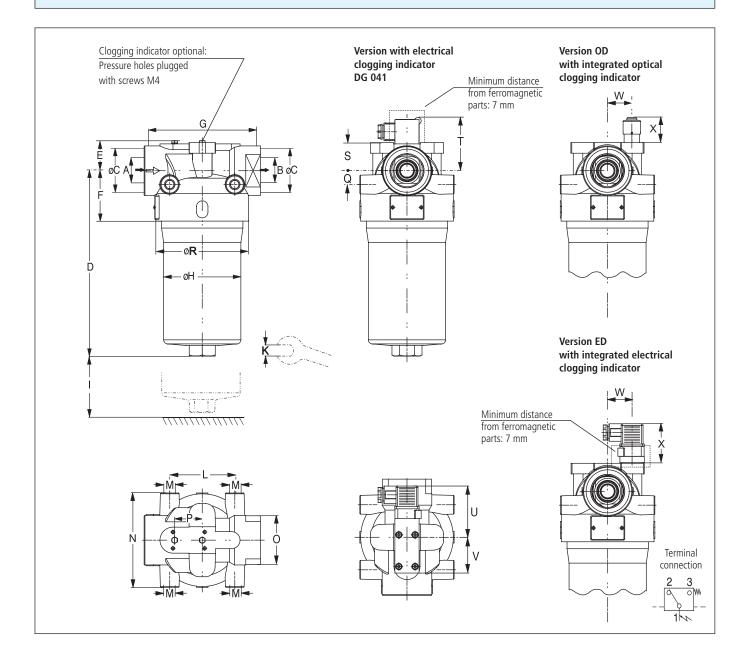
For special applications, finenesses differing from these curves are also available by using special composed filter material.

Selection Chart

		, 		-0:	diagr. C	X		of by Pass	ar el	ement	
		HOW	dropsee	eno	555ee U. (2	Pacing A	B	DIESSUIE	ntfilter		ndicator
Part N		ominal flow Pressur	e drop see hagran Dicum	finence	sseediagi.	pacity Annection A	racking	Inesure of by Pass	NO. W	eight _{Clogging}	no. Remarks
1	l/min 2	3	4	g 5	6	bar 7	8	9	kg 10	11	12
D 162-253	40	D1 /1	4 5 E-X) 18	6 G1¼	3,5	o 4	9 V3.0817-03	3,2		
D 162-255 D 162-256	65	D1/1 D1/2	12 E-X	28	G1¼	3,5	4	V3.0817-03 V3.0817-06	3,2 3,2	optional optional	-
D 162-258	105	D1/2	16 E-X	30	G1¼	3,5	4	V3.0817-08	3,2	optional	-
		2110	1027		0.7.	575			572	optional	
D 162-251	130	D1 /4	30 P	18	G1¼	3,5	4	P3.0817-01*	3,2	optional	-
D 162-283	95	D1 /5	5 E-X	18	G1¼	7	4	V3.0817-03	3,2	optional	-
D 162-286	150	D1 /6	12 E-X	28	G1¼	7	4	V3.0817-06	3,2	optional	-
D 232-253	55	D2 /1	5 E-X	26	G1¼	3,5	4	V3.0823-03	3,4	optional	
D 232-255 D 232-256	90	D2/1 D2/2	12 E-X	41	G11/4	3,5	4	V3.0823-05	3,4	optional	-
D 232-258	150	D2/2	16 E-X	46	G1¼	3,5	4	V3.0823-08	3,4	optional	-
0 101 100			1027		0.7.	575		1010020 00	57.	optional	
D 232-251	180	D2 /4	30 P	26	G1¼	3,5	4	P3.0823-01*	3,4	optional	-
D 232-283	130	D2 /5	5 E-X	26	G1¼	7	4	V3.0823-03	3,4	optional	-
D 232-286	210	D2 /6	12 E-X	41	G1½	7	4	V3.0823-06	3,4	optional	-
D 332-253	00	D3 /1	5 E-X	36	G1¼	2 5	1		10	antional	
D 332-253 D 332-256	80 130	D3/1 D3/2	12 E-X	58	G1¼	3,5 3,5	4	V3.0833-03 V3.0833-06	4,0 4,0	optional optional	-
D 332-258	210	D3/2	16 E-X	67	G1¼	3,5	4	V3.0833-08	4,0	optional	_
0 332 230	210	20,3	TO L X	07	01/4	5,5		13.0033 00	1,0	optional	
D 332-251	260	D3 /4	30 P	34	G1½	3,5	4	P3.0833-01*	4,0	optional	-
D 332-283	190	D3 /5	5 E-X	36	G1¼	7	4	V3.0833-03	4,0	optional	-
D 332-286	300	D3 /6	12 E-X	58	G1½	7	4	V3.0833-06	4,0	optional	-
											eady mounted onto the fill
nead use the a	bbreviati	on "M" be	hind the pa	rt num	ber of the i	ndicator.	The p	orinted order ackr	nowledg	ements show both ite	ms separately.
		Filter D 23					-		ator -	response pressure 2	2,0 bar.
Order descri				232-2	56 /	DG	042·	-01 M			
Part No. (bas										Mounted	
Clogging ind For the appr						neet 60	30				
	-				-			r quantity - clogg	ing indi	cators integrated in th	e filter head
as listed unde	r "dimen								-	-	
Order examp	les:							rential pressure in atial prossure indi			ressure matches the re of the by-pass valve
			U	232-2	JO UU ((эриса а	merer	ntial pressure indi	calU()	J cracking pressul	e of the by-bass value
Remarks:											

• The filters listed in this chart are standard filters. Other designs available on request.

* Paper media supported with metal gauze

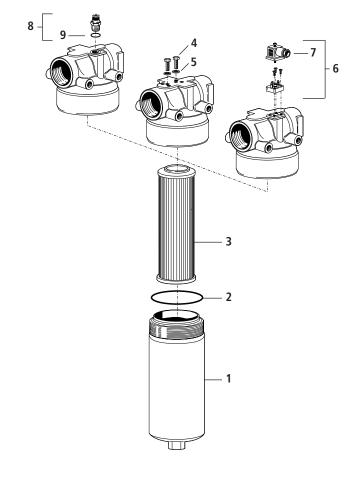


Measurements

Туре	A/B	C	D	E	F	G	Η	I	K	L	M ø/depth	Ν	0	Р	Q	R	S	Т	U	V	W	ED	(OD
D 162	G1¼	61	232	38	62	140	95	80	32	80	M12/18	116	SW 60	34	17	115	34	66	66	44	30	49	30
D 232	G1¼, G1½	61	296	38	62	140	95	80	32	80	M12/18	116	SW 60	34	17	115	34	66	66	44	30	49	30
D 332	G1¼, G1½	61	396	38	62	140	95	80	32	80	M12/18	116	SW 60	34	17	115	34	66	66	44	30	49	30

Syml	ools					
1	2	3	4	5	6	7
A B	A B	A B		A S B	A B	

Spare Parts



Pos.	Designation	Part No.
1	Filter bowl D 162	D 162.0102
1	Filter bowl D 232	D 232.0102
1	Filter bowl D 332	D 332.0102
2	O-ring 88,57 x 2,62	N 007.0886
3	Filter element (with seal)	see Chart / col. 9
4	Hexagonal head screw M4 x 8 DIN 933-8.8	3301051
5	Bonded seal 4,1 x 7,2 x 1	3404074
6	Reed switch with screws and socket (Pos. 7)	HD 049.1410
7	Socket DIN 43650 - AF3	DG 041.1220
8	Optical clogging indicator (with Pos. 9)	D 232.1400
9	O-ring 12,3 x 2,4	N 007.0124

The functions of the complete filters as well as the outstanding features of the filter elements assured by ARGO-HYTOS can only be guaranteed if original ARGO-HYTOS spare parts are used.

Quality Assurance

Quality management according to DIN EN ISO 9001

To ensure constant quality in production and operation, ARGO-HYTOS filter elements undergo strict controls and tests according to the following DIN and ISO standards:

DIN ISO 2941	Verification of collapse/burst resistance
DIN ISO 2943	Verification of material compatibility with fluids
DIN ISO 3724	Verification of flow fatigue characteristics

ISO 2942 ISO 3968 ISO 16889 Verification of fabrication integrity (Bubble Point Test) Evaluation of pressure drop versus flow characteristics Multi-Pass-Test (evaluation of filter fineness and dirt-holding capacity)

Before release into the series production the filter casing is tested for fatigue strength in our pressure pulse test rig. Various quality controls during the production process guarantee the leakfree function and solidity of our filters.

Our engineers will be glad to advice you in questions concerning filter application, selection as well as the cleanliness class of the filtered medium attainable under practical operating conditions.

Illustrations may sometimes differ from the original. ARGO-HYTOS is not responsible for any unintentional mistake in this specification sheet.



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Return Filters

E 072

- Tank top mounting
- Connection G³/₄
- Nominal flow rate up to 70 l/min

Description

Application

In the return line circuits of hydraulic systems.

Performance features

Protection

against wear: By means of filter elements that, in full-flow filtration, meet even the highest demands regarding cleanliness classes.

Protection against

malfunction: By means of full-flow filtration in the system return, the pumps above all are protected from dirt particles remaining in the system after assembly, repairs, or which are generated by wear or enter the system from outside

Special features

By-pass valve:	The location close to the inlet port prevents dirt particles
	retained by the filter element from entering into the
	clean oil side.
Removable bowl:	In case of maintenance the filter bowl is removed
	together with the filter element - therefore dirt particles
	are not flushed back into the tank.

Filter elements

Flow direction from outside to centre. The star-shaped pleating of the filter material results in:

- large filter surfaces
- low pressure drop
- high dirt-holding capacities
- long service life

Characteristics

Nominal flow rate

Up to 70 l/min (see Selection Chart, column 2) The nominal flow rates indicated by ARGO-HYTOS are based on the following features:

- closed by-pass valve at $v \le 200 \text{ mm}^2/\text{s}$
- element service life > 1000 operating hours at an average
- fluid contamination of 0,07 g per l/min flow volume • flow velocity in the connection lines \leq 4,5 m/s

Connection

Threaded ports according to ISO 228 or DIN 13. Sizes see Selection Chart, column 6 (other port threads on request)

Filter fineness

 $5~\mu m(c)$... 30 $\mu m(c)$ $\beta\mbox{-values}$ according to ISO 16889 (see Selection Chart, column 4 and Diagram Dx)

Dirt-holding capacity

Values in g test dust ISO MTD according to ISO 16889 (see Selection Chart, column 5)

Ventilating filter

Ventilation of the reservoir by an integral star-shape pleated filter element:

- removable (replace annually!)
- splash-proof
- \bullet fineness 2 μm

Filter maintenance

By using a clogging indicator the correct moment for maintenance is stated and guarantees the optimum utilization of the filter life.

Materials

Screw-on cap:	Polyamide, GF reinforced
Filter head:	Aluminium alloy
Filter bowl:	Aluminium alloy
Seals:	NBR (Viton on request)
Filter media:	EXAPOR®MAX - inorganic multi-layer microfibre web
	Paper - cellulose web, impregnated with resin

Accessories

An optional oil separator (Part No. D 023.0707) prevents oil splashing through the ventilating filter at mobile applications. Electrical and optical clogging indicators are available. Dimensions and technical data see catalogue sheet 60.20.

Hydraulic fluids

Mineral oil and biodegradable fluids (HEES or HETG, see info-sheet 00.20) With high filling conditions we recommend an electrical conductivity \geq 500 pS/m at 20 °C.

Temperature range

- 30 °C ... + 100 °C (temporary - 40 °C ... + 120 °C)

Viscosity at nominal flow rate

- at operating temperature: $\nu < 60 \text{ mm}^2/\text{s}$
 - as starting viscosity: $v_{max} = 1200 \text{ mm}^2/\text{s}$
- at first operation:

The recommended starting viscosity can be read from the Diagram D (pressure drop as a function of the kinematic viscosity) as follows: Find the 70% Δp of the cracking pressure of the by-pass valve on the vertical axis. Draw a horizontal line so that it intersects the Δp curve at a point. Read this point on the horizontal axis for the viscosity.

Operating pressure

Max. 10 bar

Mounting position

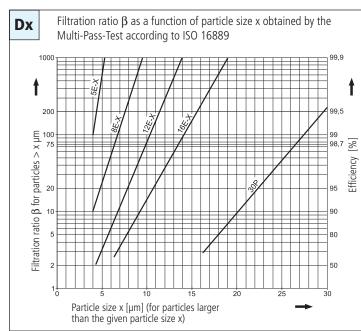
Preferably vertical, outlet downwards

Diagrams

Pressure drop as a function of the **flow volume** Pressure drop as a function of the kinematic viscosity **D1** at $v = 35 \text{ mm}^2/\text{s}$ (0 = casing empty) at nominal flow 5 0,6 ŧ Î E07[']2 <u>2+3</u> 0,5 4 1 2 з Δp [bar] [Jad] d∆ 0,3 3 4 2 3 2 0 0,2 0,1 200 1000 20 0 400 600 800 0 10 30 40 50 60 70 80 Q [l/min] $v [mm^2/s]$ –

Δp -curves for complete filters in Selection Chart, column 3

Filter fineness curves in Selection Chart, column 4



The abbreviations represent the following $\beta\mbox{-values resp.}$ finenesses:

For EXAPOR®MAX- and Paper elements:

5 E-X	$= \overline{\beta}_{5(c)}$	= 200	EXAPOR®MAX
8 E-X	$= \overline{\beta}_{8(c)}^{(c)}$	= 200	EXAPOR®MAX
12 E-X	$= \overline{\beta}_{12(c)}^{(0)}$	= 200	EXAPOR [®] MAX
16 E-X	$ = \overline{\beta}_{5 (c)} = \overline{\beta}_{8 (c)} = \overline{\beta}_{12 (c)} = \overline{\beta}_{16 (c)} $	= 200	EXAPOR®MAX
30 P	$= \overline{\beta}_{30 (c)}$	= 200	Paper

Based on the structure of the filter media of the 30 P paper elements, deviations from the printed curves are quite probable.

For screen elements:

40 S = screen material with mesh size $40 \ \mu m$

 $\textbf{60 S} \quad = \text{ screen material with mesh size } \quad 60 \ \mu\text{m}$

- **100 S** = screen material with mesh size $100 \ \mu m$
- Tolerances for mesh size according to DIN 4189

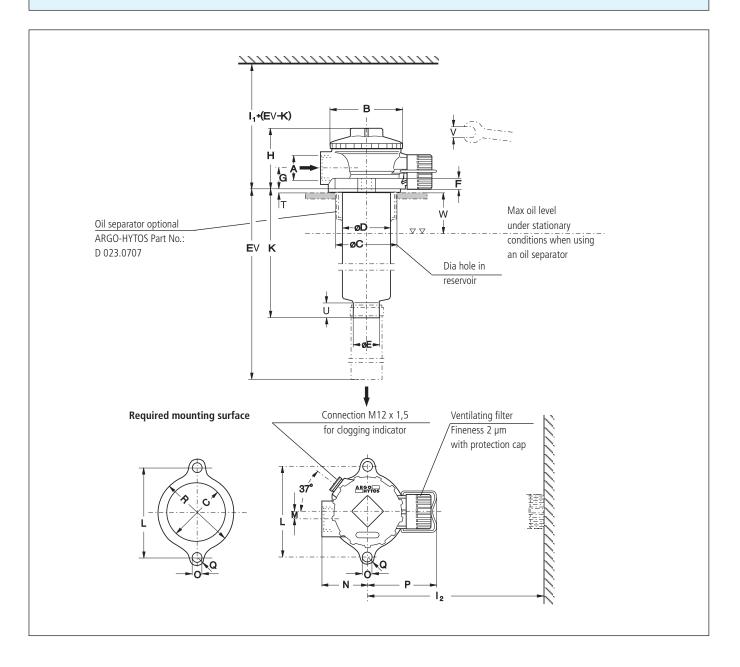
For ventilating filter elements:

2~CL=99,5 % efficiency for particles of size 2 μm

For special applications, finenesses differing from these curves are also available by using special composed filter material.

			, _			/	/	/ /.			
	No. (Basil	unit	re drop see Diagram Dic	uve no. erfineness see Dirts	Diagr. DX	pacity	A	pressure of bit pass ymbol Replaceme	nt element	ontventi	ating filter Infineness see Diagrams Remarks
Parth	40. ^{[D}	umer Jominal flow Pressu	Diagram V	er finent Dint	holding	paction	racking	bymbol Replaceme	NO. W	eight Replacemen. No. Filte	rinenes Remarks
	l/min			g		bar			kg		
1	2	3	4	5	6	7	8	9	10	11	12
072-59	25	D1 /1	5 E-X	6,7	G¾	2,5	2	V3.0520-53	0,65	L1.0406-01 (2 CL)	-
072-56	50	D1 /2	12 E-X	11	G¾	2,5	2	V3.0520-56	0,65	L1.0406-01 (2 CL)	-
072-58	70	D1 /3	16 E-X	12	G¾	2,5	2	V3.0520-58	0,65	L1.0406-01 (2 CL)	
072 50	70		TOLX	١Z	G /4	2,5	2	V5.0520 50	0,05	L1.0400 01 (2 CL)	
072-51	50	D1 /4	30 P	6,6	G¾	1,5	2	P3.0520-51*	0,63	L1.0406-01 (2 CL)	-
essure swi entioned c	tches ca odes.	an be usec	l. Optional	extension p	ipes adar	ot the fil	ter len	gth to various tar	nk depth:	rs either manometers or 5. For ordering of accesso mounting depth of 30	ories please use the below
rder desc	riptior	n:					Е	072-58 /	E	EV 300	
art No. (h	- acic un	nit) ———									
				r e availab l - 423 (see c		is and m	neasur	ements)]	
or the app	propria	ate clogg	ing indica	tors see c	atalogu	e sheet	60.20).			
(see Selec The clogg	tion Ch ing indi	art, colum cators are	n 7). optionally	l pressure s available ar ard filters. C	nd will the	en be lo	osely p	provided.	acking p	ressure of the by-pass va	alve
Paper media :	supported	with metal g	jauze								

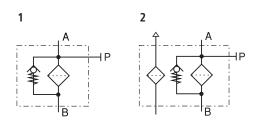
Dimensions



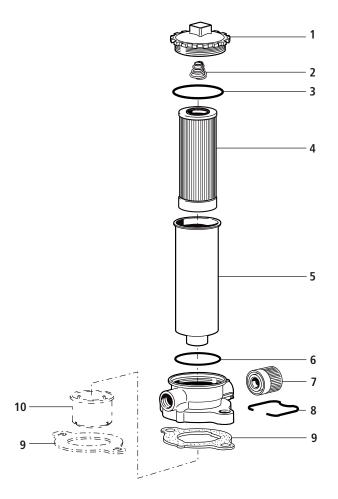
Measurements

Туре	Α	В	C min./max.	D	E	F	G	Н	I ₁	I ₂	К	L	М	Ν	0	Р	Q	R	S	Т
E 072	G¾	73,5	60/63	50,5	28	11,5	24	67	270	72	177	88	9	50	11	68,5	9,5	75,5	-	2
Туре	U	v	w																	
E 072	16	27	42																	

Symbols



Spare Parts



Pos.	Designation	Part No.
1	Screw-on cap	D 043.2202
2	Compression spring	N 015.1606
3	Seal	N 031.0562
4	Filter element	see Chart / col. 9
5	Filter bowl *	E 072.0901
6	O-ring 47 x 2	N 007.0472
7	Ventilating filter (with Pos. 8)	L1.0406-01K7
8	Clip	N 026.0253
9	Flat gasket	D 023.0708
10	Oil separator	D 023.0707

* Specify mounting depth in mm

The functions of the complete filters as well as the outstanding features of the filter elements assured by ARGO-HYTOS can only be guaranteed if original ARGO-HYTOS spare parts are used.

Quality Assurance

Quality management according to DIN EN ISO 9001

To ensure constant quality in production and operation, ARGO-HYTOS filter elements undergo strict controls and tests according to the following DIN and ISO standards:

DIN ISO 2941	Verification of collapse/burst resistance
DIN ISO 2943	Verification of material compatibility with fluids
DIN ISO 3724	Verification of flow fatigue characteristics

ISO	2942
ISO	3968
ISO	16889

Verification of fabrication integrity (Bubble Point Test) Evaluation of pressure drop versus flow characteristics Multi-Pass-Test (evaluation of filter fineness and dirt-holding capacity)

Various quality controls during the production process guarantee the leakfree function and solidity of our filters.

Our engineers will be glad to advice you in questions concerning filter application, selection as well as the cleanliness class of the filtered medium attainable under practical operating conditions.

Illustrations may sometimes differ from the original. ARGO-HYTOS is not responsible for any unintentional mistake in this specification sheet.



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Return-Suction Filters



E 084

- Tank top mounting
- Connection up to G1
- Nominal flow rate up to 80 l/min

Description

Application

For operation in units with hydrostatic drives, when the return flow is <u>under all</u> <u>operating conditions</u> higher than the oil flow of the boost pump.

Performance features

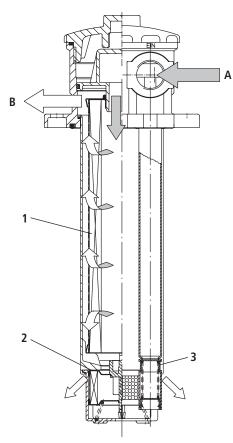
Protection	
against wear:	By means of filter elements that, in full-flow filtration, meet even the highest demands regarding cleanliness classes.
Suction filter	
function:	Because of the 100%-filtration of the suction flow,
	no dirt can get into the boost pump.
Return filter	
function:	By means of full-flow filtration in the system return,
	the pumps above all are protected from dirt particles
	remaining in the system after assembly, repairs, or which
	are generated by wear or enter the system from outside.

Functional characteristics

The hydraulic oil returning from the circuit (A) passes the filter element (1), is pressurized by a 0,5 bar check valve (2) and supplied to the boost pump (B). The surplus oil flows filtered over the integral check valve into the reservoir. As the boost pump is always feeded with pressurized oil the risk of cavitation is minimized and full performance is available even during the critical cold start phase.

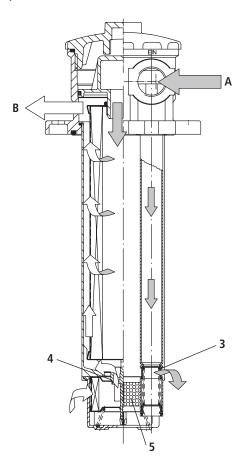
An integral pressure relief valve (3) prevents too high back pressure and protects the shaft seals against damages. As this valve leads the oil directly into the tank there is no direct connection between the return line (A) and the connection of the boost pump (B) (no bypass valve function).

Function (schematic):



The emergency-suction valve (4) with 125 µm protection strainer (5) supplies the boost pump in case of a short term of lack of oil. During normal operation, a lack of oil may definitely not occur (refer to "Design" section).

Emergency-suction (schematic):



Start up /Deaeration

For units with emergency-suction valve and protection strainer the start up set E 084.1710 can be used to de-aerate the hydraulic system at first start up or at start up after repair; hereby the immediate supply of the boost pump with hydraulic oil is guaranteed.

For all other types, deaerating instructions published by the manufacturers of hydraulic drives must be observed.

Filter maintenance

By using a clogging indicator the correct moment for maintenance is indicated and guarantees therefore the optimum utilization of the filter elements.

Filter elements

Flow direction from centre to the outside. The star-shaped pleating of the filter material results in:

- large filter surfaces
- low pressure drop
- high dirt-holding capacities
- long service life

Dirt deposits are entirely removed when the element is changed. Dirt cannot re-enter the tank.

Accessories

Electrical and optical clogging indicators are available. Dimensions and technical data see catalogue sheet 60.20.

Layout

General

In machines with a hydrostatic drive and combined working hydraulic system, suction-return filters replace the suction or pressure filters previously required for the feed pump of the closed-loop hydrostatic drive circuit as well as the return filter for the open-loop working hydraulic circuit.

While each circuit operates independently with separate filters, the combination of the two circuits via the suction-return filter causes interaction between the circuits.

If the design criteria described below are taken into account, you can take full advantage of the benefits provided by the suction-return filter concept, thus making sure that your system performs reliably even under extreme operating conditions.

Required return flow in the system

In order to maintain a precharging pressure of approx. 0,5 bar at the intake of the feed pump, the return flow must exceed the suction flow <u>under any operating condition</u>:

- Versions without hole (Ø 4 mm) in the pressurizing valve: at least 5 l/min of excess flow
- Versions with hole (Ø 4 mm) in the pressurizing valve: at least 10 l/min of excess flow

Permitted feed pump flow rate

- at operating temperature ($v < 60 \text{ mm}^2/\text{s}$, rpm=max): feed pump flow rate $\leq 0.5 \text{ x}$ rated return flow according to column 2 of selection table
- at cold start-up ($v < 1000 \text{ mm}^2/\text{s}$, rpm = 1000 min⁻¹): feed pump flow rate $\leq 0.2 \text{ x}$ rated return flow according to column of selection table

Please contact us if your system operates with higher flow rates than stated above.

Flow velocity in the connecting lines

- Flow velocity in the return lines \leq 4,5 m/s
- \bullet Flow velocity in the suction lines \leq 1,5 m/s

Permitted pressure in the suction lines

At cold start up ($v < 1000 \text{ mm}^2/\text{s}$, rpm = 1000 min⁻¹): feed pump flow rate $\leq 0.2 \text{ x}$ rated return flow. The pressure loss in the suction lines must not exceed 0.4 bar.

Backpressures in system return lines

If drain oil from the hydrostatic drive is routed across the filter in addition to the flow of the open-loop circuit, the following has to be observed in order to protect the shaft seals:

- permitted leakage oil pressure for a given viscosity and speed (manufacturer's specifications!)
- pressure loss caused by the leakage oil pipes
- pressure loss caused by the oil cooler used
- backpressure of the filter for a given flow rate or kinematic viscosity (refer to pressure loss diagrams)

Depending on the application, the use of a cooler bypass valve is recommended.

Generously sized drain oil pipes are also of advantage.

Filter fineness grades

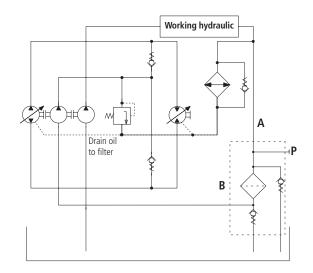
With the filter fineness grades available, the following oil cleanliness according to ISO 4406 can be achieved:

- 12 E-X: 18/15/12 ... 15/12/8
- 16 E-X: 20/17/12 ... 17/14/10

Even with the 16 E-X fineness grade, the requirements specified by manufacturers of hydrostatic drives are sometimes exceeded significantly. If components requiring a still better oil purity are used, we recommend the 12 E-X filter fineness grade.

Suggested circuit layouts

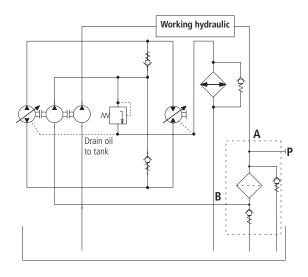
A) The leakage oil of the hydrostatic drive is routed across the filter.



The entire dirt produced in the hydrostatic drive by abrasion is filtered out immediately and is thus not taken in by the pump of the open-loop circuit.

This circuit layout is always recommended if the return flow only slightly exceeds the suction flow, i.e. if there is a risk that the 0,5 bar precharging pressure cannot be maintained.

B) The drain oil of the hydrostatic drive is not routed across the filter but is discharged directly into the tank.



This circuit layout has the advantage that drain oil pressures are comparatively low.

Characteristics

Nominal flow rate

Up to 80 l/min in return line (see Selection Chart, column 2) Up to 40 l/min Feed pump flow rate (see Layout) The nominal flow rates indicated by ARGO-HYTOS are based on the following features:

- closed by-pass valve at $\nu \leq 200 \text{ mm}^2\text{/s}$
- element service life > 1000 operating hours at an average fluid contamination of 0,07 g per l/min flow volume
- flow velocity in the return lines $\leq 4,5$ m/s
- flow velocity in the suction lines \leq 1,5 m/s

Connection

Threaded ports according to ISO 228 or DIN 13. Sizes see Selection Chart, column 6 and 7 (other port threads on request)

Filter fineness

12 μm(c) ... 16 μm(c) β-values according to ISO 16889 (see Selection Chart, column 4 and Diagram Dx)

Dirt-holding capacity

Values in g test dust ISO MTD according to ISO 16889 (see Selection Chart, column 5)

Hydraulic fluids

Mineral oil and biodegradable fluids (HEES and HETG, see info-service 00.20)

Temperature range

- 30 °C ... + 100 °C (temporary - 40 °C ... + 120 °C)

Viscosity at nominal flow rate

- at operating temperature: $\nu < 60 \text{ mm}^2/\text{s}$
- as starting viscosity: $v_{max} = 1000 \text{ mm}^2/\text{s}$
- at first operation:

The recommanded starting viscosity can be read from the Diagram D (pressure drop as a function of the kinematic viscosity) as follows: Find the 70% Δ p of the cracking pressure of the by-pass valve on the vertical axis. Draw a horizontal line so that it intersects the Δ p curve at a point. Read this point on the horizontal axis for the viscosity.

Operating pressure

Max. 10 bar

Materials

Screw-on cap:	Polyamide, GF reinforced
Filter head:	Aluminium alloy
Filter bowl:	Aluminium alloy
Seals:	NBR (Viton on request)
Filter media:	EXAPOR®MAX - inorganic multi-layer microfibre web

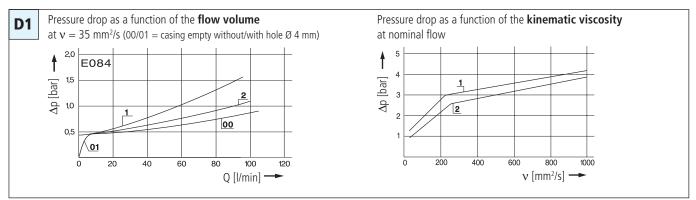
Fitting position

- Standard type no restriction, preferably vertical
- Models with emergency-suction valve can vary up to 15° from the vertical
- Models with hole \varnothing 4 mm in the check valve can vary up to 45° from the vertical

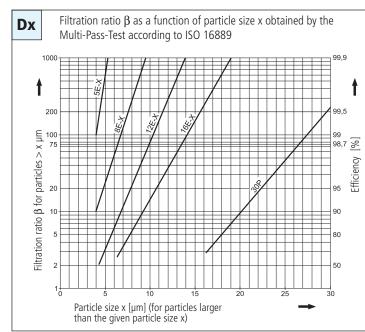
Even under unfavourable operating conditions (min. oil level, max. sloping) the oil outlet resp. emergency suction has to be below the oil level.

Diagrams

Δp -curves for complete filters in Selection Chart, column 3



Filter fineness curves in Selection Chart, column 4



The abbreviations represent the following $\beta\mbox{-values}$ resp. finenesses:

For EXAPOR[®]MAX- and Paper elements:

5 E-X	=	$\overline{\beta}_{5(c)}$	= 20	•	EXAPOR®MAX
8 E-X	=	$\overline{\beta}_{a(c)}^{(0)}$	= 20	0	EXAPOR [®] MAX
12 E-X	=	$\overline{\beta}_{12}^{(0)}$	= 20	0	EXAPOR®MAX
5 E-X 8 E-X 12 E-X 16 E-X	=	$\overline{\beta}_{16 (c)}^{12 (c)}$	= 20	0	EXAPOR®MAX
30 P	=	$\overline{\beta}_{30 (c)}$	= 20	0	Paper
Deced and		-		I.	filter merelie of the

Based on the structure of the filter media of the 30 P paper elements, deviations from the printed curves are quite probable.

For special applications, finenesses differing from these curves are also available by using special composed filter material.

Selection Chart

		in	IOW SEP	terne no. Iterfinenesser	Diagr.D	* apacity		8	sure	pressure of PRV ⁴ pressure of PRV ⁴ ymbol Replacement	itter elem	ent
Parth	NO. N	ominal return Pressur	Edrop P	curve no.	Diagr.	apacito	onnection	racking	presting	press symbol Replacement). V	leight Remarks
	l/min			g			bar	bar			5	
1	2	3	4	5	6	7	8	9	10	11	12	13
E 084-56	75	D1 /1	12 E-X	23	G1	G¾	0,5	3,0	2	V3.0723-06	1,7	3
E 084-77	80	D1 /2	16 E-X	25	G1	G¾	0,5	2,5	2	V3.0723-08	1,7	3
E 084-78	80	D1 /2	16 E-X	25	G1	G¾	0,5	2,5	1	V3.0723-08	1,7	-
E 084-87	80	D1 /2	16 E-X	25	G¾	G¾	0,5	2,5	1	V3.0723-08	1,7	-
E 084-88	80	D1 /2	16 E-X	25	G¾	G¾	0,5	2,5	2	V3.0723-08	1,7	3
E 084-277	80	D1 /2	16 E-X	25	G1	G¾	0,5	2,5	4	V3.0723-08	1,8	3+4
E 084-288	80	D1 /2	16 E-X	25	G¾	G¾	0,5	2,5	4	V3.0723-08	1,8	3+4

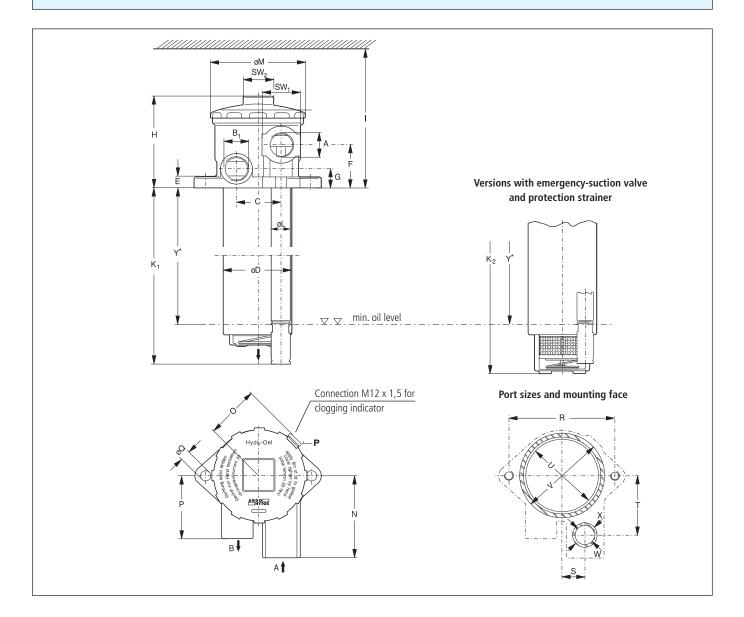
All filters are delivered with a plugged clogging indicator connection M 12 x 1,5 (at P). As clogging indicators either manometers or electrical pressure switches can be used.

For the appropriate clogging indicators see catalogue sheet 60.20.

Remarks:

- The start of the red area respectively the switching pressure of the electrical pressure switch has always to be lower than the cracking pressure of the pressure relief valve (see Selection Chart, column 9).
- The clogging indicators are optional and always delivered detached from the filter.
- The filters listed in this chart are standard filters. If modifications are required, e.g. with integrated suction valve (integrated into the pressure relief valve see section symbols, symbol no. 5) to guarantee the emergency steering feature for vehicles with official road use, we kindly ask for your request.
- For deaeration a start-up set for units with emergency-suction valve and protection strainer is available with Part No. E084.1710, for technical details see catalogue sheet 20.870.

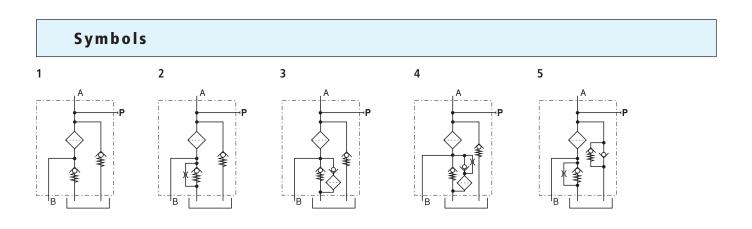
Dimensions

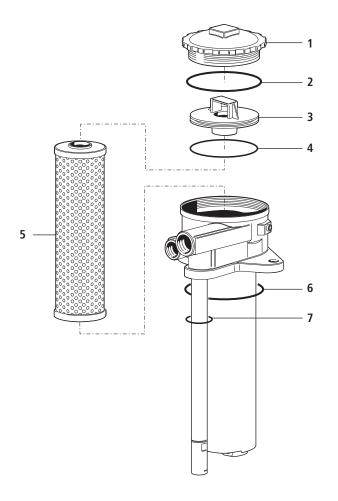


Measurements

Туре	А	В	С	D	E	F	G	Н	I	K ₁	K ₂	L	М	Ν	0	Р	Q	R	S
E 084	G¾, G1	G¾	48	73,5	12	47	21	102	315	254	268	20,5	104,5	90	60	69	11	115	25
Туре	Т	U	V	W	Х	Y*	SW ₁	SW ₂											
E 084	65	79	100	21	38	224	41	32											

* Oil outlet resp. emergency suction has to be under all operating cond. below min. oil level (given by Y)





Pos.	Designation	Part No.
1	Screw-on cap	E 103.0201
2	Seal	N 031.0841
3	Inlet neck	E 084.0103
4	O-ring 72 x 3	N 007.0723
5	Filter element	see Chart / col. 11
6	O-ring 84 x 4	N 007.0844
7	O-ring 23 x 4	N 007.0231

The functions of the complete filters as well as the outstanding features of the filter elements assured by ARGO-HYTOS can only be guaranteed if original ARGO-HYTOS spare parts are used.

Quality Assurance

Quality management according to DIN EN ISO 9001

To ensure constant quality in production and operation, ARGO-HYTOS filter elements undergo strict controls and tests according to the following DIN and ISO standards:

DIN ISO 2941	Verification of collapse/burst resistance
DIN ISO 2943	Verification of material compatibility with fluids
DIN ISO 3724	Verification of flow fatigue characteristics

ISO	2942
ISO	3968
ISO	16889
130	10009

Verification of fabrication integrity (Bubble Point Test) Evaluation of pressure drop versus flow characteristics Multi-Pass-Test (evaluation of filter fineness and dirt-holding capacity)

Various quality controls during the production process guarantee the leakfree function and solidity of our filters.

Our engineers will be glad to advice you in questions concerning filter application, selection as well as the cleanliness class of the filtered medium attainable under practical operating conditions.

Illustrations may sometimes differ from the original. ARGO-HYTOS is not responsible for any unintentional mistake in this specification sheet.







Return Filters



E 094 · E 103 · E 143

- Tank top mounting
- Connection up to G1
- Nominal flow rate up to 135 l/min

Description

Application

In the return line circuits of hydraulic systems.

Performance features

Protection against wear: By means of filter elements that, in full-flow filtration meet even the highest demands regarding cleanliness classes. Protection against malfunction: By means of full-flow filtration in the system return, the pumps above all are protected from dirt particles remaining in the system after assembly, repairs, or which

are generated by wear or enter the system from outside.

Special features

By-pass valve: The location close to the inlet port prevents dirt particles retained by the filter element from entering into the clean oil side. Removable bowl: In case of maintenance the filter bowl is removed together with the filter element - therefore dirt particles are not flushed back into the tank.

Filter elements

Flow direction from outside to centre. The star-shaped pleating of the filter material results in:

- large filter surfaces
- low pressure drop
- high dirt-holding capacities
- long service life

Characteristics

Nominal flow rate

Up to 135 l/min (see Selection Chart, column 2) The nominal flow rates indicated by ARGO-HYTOS are based on the following features:

- \bullet closed by-pass valve at $\nu \leq$ 200 mm²/s
- element service life > 1000 operating hours at an average fluid contamination of 0,07 g per l/min flow volume
- flow velocity in the connection lines $\leq 4,5$ m/s

Connection

Threaded ports according to ISO 228 or DIN 13. Sizes see Selection Chart, column 6 (other port threads on request)

Filter fineness

 $5~\mu m(c)$... 30 $\mu m(c)$ β -values according to ISO 16889 (see Selection Chart, column 4 and Diagram Dx)

Dirt-holding capacity

Values in g test dust ISO MTD according to ISO 16889 (see Selection Chart, column 5)

Ventilating Filter

Ventilation of the reservoir by an integral star-shape pleated filter element:

- removable (replace annually!)
- splash-proof
- fineness 2 µm

Filter maintenance

By using a clogging indicator the correct moment for maintenance is stated and guarantees the optimum utilization of the filter life.

Materials

Screw-on cap:	Polyamide, GF reinforced
Filter head:	Aluminium alloy
Filter bowl:	Polyamide, GF reinforced*
Seals:	NBR (Viton on request)
Filter media:	EXAPOR®MAX - inorganic multi-layer microfibre web
	Paper - cellulose web, impregnated with resin
*	

* due to the conductable plastic material no static charge can occur

Accessories

An optional oil separator (Part No. E 103.1702) prevents oil splashing through the ventilating filter at mobile applications. Electrical and optical clogging indicators are available. Dimensions and technical data see cataologue sheet 60.20.

Hydraulic fluids

Mineral oil and biodegradable fluids (HEES and HETG see info-sheet 00.20) With high filling conditions we recommend an electrical conductivity \geq 500 pS/m at 20 °C.

Temperature range

- 30° C ... + 100° C (temporary - 40 °C ... + 120 °C)

Viscosity at nominal flow rate

- at operating temperature: $v < 60 \text{ mm}^2/\text{s}$
 - as starting viscosity: $v_{max} = 1200 \text{ mm}^2/\text{s}$
- at first operation:

The recommended starting viscosity can be read from the Diagram D (pressure drop as a function of the kinematic viscosity) as follows: Find the 70% Δp of the cracking pressure of the by-pass valve on the vertical axis. Draw a horizontal line so that it intersects the Δp curve at a point. Read this point on the horizontal axis for the viscosity.

Operating pressure

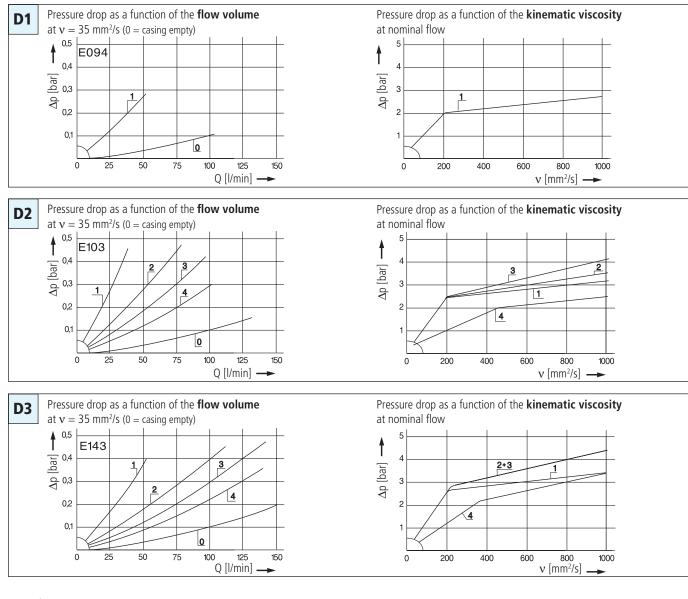
Max. 10 bar

Mounting position

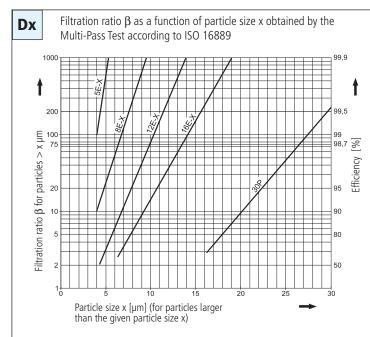
Preferably vertical, outlet downwards

Diagrams

Δp -curves for complete filters in Selection Chart, column 3



Filter fineness curves in Selection Chart, column 4



The abbreviations represent the following $\beta\mbox{-values resp.}$ finenesses:

For EXAPOR®MAX- and Paper elements:

5 E-X	=	$\overline{\beta}_{F(c)}$	= 200	EXAPOR®MAX
8 E-X	=	$\hat{\boldsymbol{\beta}}_{s(c)}^{(0)}$	= 200	EXAPOR®MAX
12 E-X	=	$\hat{\boldsymbol{\beta}}_{12}^{\circ(0)}$	= 200	EXAPOR®MAX
5 E-X 8 E-X 12 E-X 16 E-X	=	$\bar{\boldsymbol{\beta}}_{16 (c)}^{12 (c)}$	= 200	EXAPOR®MAX
30 P	=	$\overline{\beta}_{30(c)}$	= 200	Paper
		= J (C)		

Based on the structure of the filter media of the 30 P paper elements, deviations from the printed curves are quite probable.

For screen elements:

40 S = screen material with mesh size $40 \,\mu\text{m}$

60 S = screen material with mesh size $60 \,\mu\text{m}$

- **100 S** = screen material with mesh size 100 μ m
- Tolerances for mesh size accordung to DIN 4189

For ventilating filter elements:

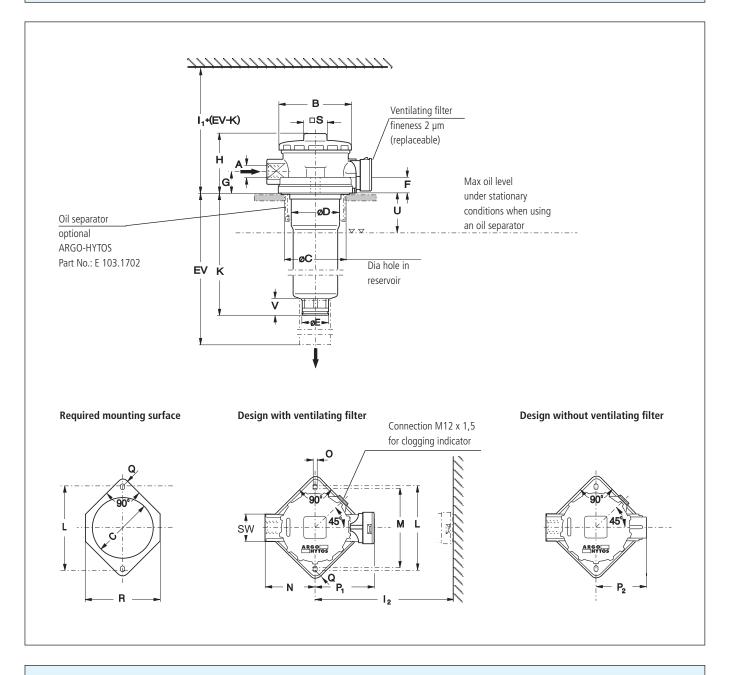
2 CL = 99,5 % efficiency for particles of size 2 μ m

For special applications, finenesses differing from these curves are also available by using special composed filter material.

Selection Chart

			//	_0. /	Diagt. V.	city	/	of by pas	ont		Ing III- Diagram
		I OW	VOP SEE	INP NO 55 SP	e l'acat	pacies .	~ ~ /	ressure 0.	it eleme.	nt ventile	ass see V.
PartN	o.	ominal flow pressu	redropsee Diagrampic	inve no.	Diagr. U.	paction	acking	pressure of by pass ymbol Replacemen	NO.	ight Replacement ventilation	ing filter ineness see Diagrams Remarks
	l/min	/		g		bar			kg		,
1	2	3	4	5	6	7	8	9	10	11	12
094-661	50	D1 /1	30 P	11	G ³ / ₄	1,5	2	P3.0613-51	0,8	L1.0503-03 (2 CL)	-
094-671	50	D1 /1	30 P	11	G ³ / ₄	1,5	1	P3.0613-51	0,8	-	-
103-657	35	D2 /1	5 E-X	13	G ¹ / ₂	2,5	2	V3.0620-53	1,0	L1.0503-03 (2 CL)	-
103-677	35	D2 /1	5 E-X	13	G ¹ / ₂	2,5	1	V3.0620-53	1,0	-	-
103-676	75	D2 /2	12 E-X	22	G ³ / ₄	2,5	2	V3.0620-56	1,0	L1.0503-03 (2 CL)	-
103-686	75	D2 /2	12 E-X	22	G ³ / ₄	2,5	1	V3.0620-56	1,0	-	-
103-898	95	D2 /3	16 E-X	24	G1	2,5	2	V3.0620-58	1,0	L1.0503-03 (2 CL)	-
103-888	95	D2 /3	16 E-X	24	G1	2,5	1	V3.0620-58	1,0	-	-
103-871	70	D2 /4	30 P	11	G ³ / ₄	1,5	2	P3.0620-51*	1,0	L1.0503-03 (2 CL)	-
103-861	70	D2 /4	30 P	11	G ³ / ₄	1,5	1	P3.0620-51*	1,0	-	-
143-657	55	D3 /1	5 E-X	21	G ³ / ₄	2,5	2	V3.0730-53	1,2	L1.0503-03 (2 CL)	-
143-667	55	D3 /1	5 E-X	21	G ³ / ₄	2,5	1	V3.0730-53	1,2	-	-
143-676	115	D3 /2	12 E-X	32	G1	2,5	2	V3.0730-56	1,2	L1.0503-03 (2 CL)	-
143-686	115	D3 /2	12 E-X	32	G1	2,5	1	V3.0730-56	1,2	-	-
143-888	135	D3 /3	16 E-X	36	G1	2,5	2	V3.0730-58	1,2	L1.0503-03 (2 CL)	-
143-688	135	D3 /3	16 E-X	36	G1	2,5	1	V3.0730-58	1,2	-	-
	120	D2/4	20.0	47	64	4.5	2		1.2		
143-851	120	D3/4	30 P	17	G1	1,5	2	P3.0730-51*	1,2	L1.0503-03 (2 CL)	-
143-861	120	D3 /4	30 P	17	G1	1,5	1	P3.0730-51*	1,2	-	-
										ither manometers or electronic or electronic or electronic ories please use the below	
der examp	le: The	filter E 1	03-676 ha	as to be s	upplied	with ar	ı exte	nsion pipe for 3	300 mm	length.	
der descri	otion:			I	E 103-67	6	1	EV 300			
rt No. (bas	ic unit)										
t ension pij ' = K (Bowl l								m (see dimension	s and me	easurements)	
r the suitable	e cloggir	ng indicato	ors please s	ee catalogi	ue sheet 6	50.20.					
marks: The switchin	a pressu	re of the e	lectrical pre	ossure swite	h has alw	avs to h	e lowe	r than the crackin	a pressu	e of the by-pass valve	

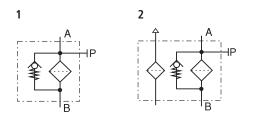
The clogging indicators are always delivered detached from the filter.
The filters listed in this chart are standard filters. Other designs available on request.



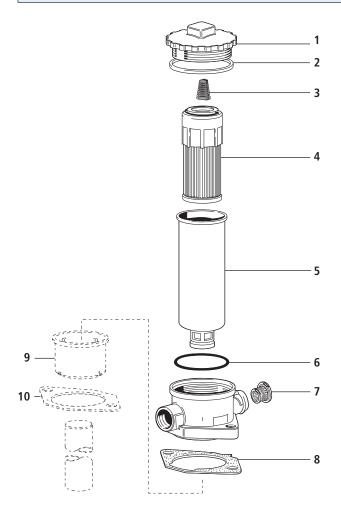
Measurements

Туре	А	В	C min./max.	D	E	F	G	H	I ₁	I ₂	К	L	М	Ν	0	P ₁	P ₂	Q	R	S	SW	U	V
E 094	G¾	105	87 / 91	73,5	38	20,5	30	88,5	235	95	111	115	110	70	11	82	69	13,5	107,5	32	41	50	23
E 103	G½, G¾, G1	105	87 / 91	73,5	38	20,5	30	88,5	300	95	177	115	110	70	11	82	69	13,5	107,5	32	41	50	23
E 143	G¾, G1	105	87 / 91	73,5	38	20,5	30	88,5	400	95	278	115	110	70	11	82	69	13,5	107,5	32	41	50	23
For calculatio	n of EV use data in :	Selectio	n Chart																				

Symbols



Spare Parts



Pos.	Designation	Part No.
1	Screw-on cap	E 103.0201
2	Seal	N 031.0841
3	Compression spring	N015.3703
4	Filter element	see Chart / col. 9
5	Filter bowl E094 *	E 094.0903
5	Filter bowl E103 *	E 103.0912
5	Filter bowl E143 *	E 143.0903
6	O-ring 69,5 x 3,5	N 007.0703
7	Ventilating filter	L1.0503-03K
8	Seal (for versions	E 103.0147
	without oil separator)	
9	Oil separator with Pos. 10	E 103.1702
10	Seal (for versions	E 103.0148
	with oil separator)	

* Specify mounting depth in mm

The functions of the complete filters as well as the outstanding features of the filter elements assured by ARGO-HYTOS can only be guaranteed if original ARGO-HYTOS spare parts are used.

Quality Assurance

Quality management according to DIN EN ISO 9001

To ensure constant quality in production and operation, ARGO-HYTOS filter elements undergo strict controls and tests according to the following DIN and ISO standards:

DIN ISO 2941	Verification of collapse/burst resistance
DIN ISO 2943	Verification of material compatibility with fluids
DIN ISO 3724	Verification of flow fatigue characteristics

ISO 2942 ISO 3968 ISO 16889 Verification of fabrication integrity (Bubble Point Test) Evaluation of pressure drop versus flow characteristics Multi-Pass-Test (evaluation of filter fineness and dirt-holding capacity)

Various quality controls during the production process guarantee the leakfree function and solidity of our filters.

Our engineers will be glad to advice you in questions concerning filter application, selection as well as the cleanliness class of the filtered medium attainable under practical operating conditions.

Illustrations may sometimes differ from the original. ARGO-HYTOS is not responsible for any unintentional mistake in this specification sheet.



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Return-Suction Filters



E 158 · E 198 · E 248

- Tank top mounting
- Connection up to G1¹/₄
- Nominal flow rate up to 250 l/min

Description

Application

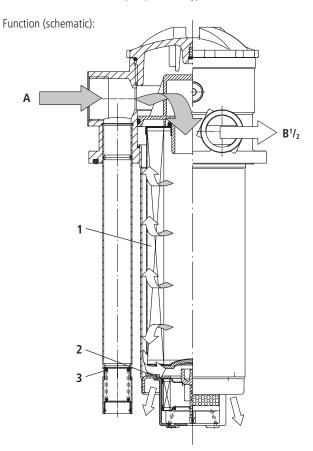
For operation in units with hydrostatic drives, when the return flow is <u>under all</u> <u>operating conditions</u> higher than the oil flow of the boost pump.

Performance features Protection By means of filter elements that, in full-flow filtration, against wear: meet even the highest demands regarding cleanliness classes. Suction filter function: Because of the 100%-filtration of the suction flow, no dirt can get into the boost pump. Return filter By means of full-flow filtration in the system return, the function: pumps above all are protected from dirt particles remainning in the system after assembly, repairs, or which are generated by wear or enter the system from outside.

Functional characteristics

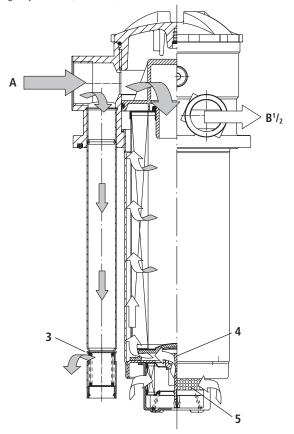
The hydraulic oil returning from the circuit (A) passes the filter element (1), is pressurized by a 0,5 bar check valve (2) and supplied to the boost pump (B). The surplus oil flows filtered over the integral check valve into the reservoir. As the boost pump is always feeded with pressurized oil the risk of cavitation is minimized and full performance is available even during the critical cold start phase.

An integral pressure relief valve (3) prevents too high back pressure and protects the shaft seals against damages. As this valve leads the oil directly into the tank there is no direct connection between the return line (A) and the connection of the boost pump (B) (no bypass valve function).



The emergency-suction valve (4) with 125 µm protection strainer (5) supplies the boost pump in case of a short term of lack of oil. During normal operation, a lack of oil may definitely not occur (refer to "Design" section).

Emergency-suction (schematic):



Start up /Deaeration

For units with emergency-suction valve and protection strainer the start up set E 198.1710 can be used to de-aerate the hydraulic system at first start up or at start up after repair; hereby the immediate supply of the boost pump with hydraulic oil is guaranteed.

For all other types, deaerating instructions published by the manufacturers of hydraulic drives must be observed.

Filter maintenance

By using a clogging indicator the correct moment for maintenance is indicated and guarantees therefore the optimum utilization of the filter elements.

Filter elements

Flow direction from centre to the outside. The star-shaped pleating of the filter material results in:

- large filter surfaces
- low pressure drop
- high dirt-holding capacities
- long service life

Dirt deposits are entirely removed when the element is changed. Dirt cannot re-enter the tank.

Accessories

Electrical and optical clogging indicators are available. Dimensions and technical data see catalogue sheet 60.20.

Layout

General

In machines with a hydrostatic drive and combined working hydraulic system, suction-return filters replace the suction or pressure filters previously required for the feed pump of the closed-loop hydrostatic drive circuit as well as the return filter for the open-loop working hydraulic circuit.

While each circuit operates independently with separate filters, the combination of the two circuits via the suction-return filter causes interaction between the circuits.

If the design criteria described below are taken into account, you can take full advantage of the benefits provided by the suction-return filter concept, thus making sure that your system performs reliably even under extreme operating conditions.

Required return flow in the system

In order to maintain a precharging pressure of approx. 0,5 bar at the intake of the feed pump, the return flow must exceed the suction flow <u>under any operating condition</u>:

- Versions without hole (Ø 4 mm) in the pressurizing valve: at least 10 l/min of excess flow
- Versions with hole (Ø 4 mm) in the pressurizing valve: at least 20 l/min of excess flow

Permitted feed pump flow rate

- at operating temperature (v < 60 mm2/s, rpm=max): feed pump flow rate $\leq 0.5 \text{ x}$ rated return flow according to column 2 of selection table
- at cold start-up (v < 1000 mm2/s, rpm = 1000 min⁻¹): feed pump flow rate $\leq 0.2 \text{ x}$ rated return flow according to column of selection table

Please contact us if your system operates with higher flow rates than stated above.

Flow velocity in the connecting lines

- Flow velocity in the return lines \leq 4,5 m/s
- Flow velocity in the suction lines \leq 1,5 m/s

Permitted pressure in the suction lines

At cold start up (v < 1000 mm2/s, rpm = 1000 min⁻¹): feed pump flow rate $\leq 0.2 \text{ x}$ rated return flow. The pressure loss in the suction lines must not exceed 0.4 bar.

Backpressures in system return lines

If drain oil from the hydrostatic drive is routed across the filter in addition to the flow of the open-loop circuit, the following has to be observed in order to protect the shaft seals:

- permitted leakage oil pressure for a given viscosity and speed (manufacturer's specifications!)
- pressure loss caused by the leakage oil pipes
- pressure loss caused by the oil cooler used
- backpressure of the filter for a given flow rate or
- kinematic viscosity (refer to pressure loss diagrams)

Depending on the application, the use of a cooler bypass valve is recommended.

Generously sized drain oil pipes are also of advantage.

Filter fineness grades

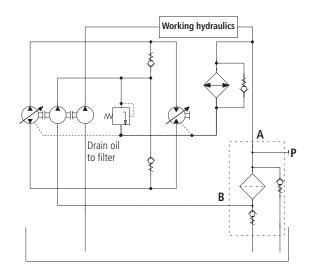
With the filter fineness grades available, the following oil cleanliness according to ISO 4406 can be achieved:

- 12 E-X: 18/15/12 ... 15/12/8
- 16 E-X: 20/17/12 ... 17/14/10

Even with the 16 E-X filter fineness grade, the requirements specified by manufacturers of hydrostatic drives are sometimes exceeded significantly. If components requiring a still better oil purity are used, we recommend the 12 E-X filter fineness grade.

Suggested circuit layouts

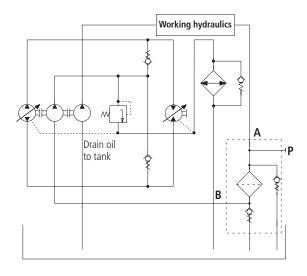
A) The leakage oil of the hydrostatic drive is routed across the filter.



The entire dirt produced in the hydrostatic drive by abrasion is filtered out immediately and is thus not taken in by the pump of the open-loop circuit.

This circuit layout is always recommended if the return flow only slightly exceeds the suction flow, i.e. if there is a risk that the 0,5 bar precharging pressure cannot be maintained.

B) The drain oil of the hydrostatic drive is not routed across the filter but is discharged directly into the tank.



This circuit layout has the advantage that drain oil pressures are comparatively low.

Characteristics

Nominal flow rate

Up to 250 l/min in return line (see Selection Chart, column 2) Up to 125 l/min Feed pump flow rate (see Layout) The nominal flow rates indicated by ARGO-HYTOS are based on the following features:

- closed by-pass valve at $\nu \leq$ 200 mm²/s
- element service life > 1000 operating hours at an average fluid contamination of 0,07 g per l/min flow volume
- flow velocity in the return lines \leq 4,5 m/s
- flow velocity in the suction lines \leq 1,5 m/s

Connection

Threaded ports according to ISO 228 or DIN 13. Sizes see Selection Chart, column 6 and 7 (other port threads on request)

Filter fineness

12 μm(c) ... 16 μm(c) β-values according to ISO 16889 (see Selection Chart, column 4 and Diagram Dx)

Dirt-holding capacity

Values in g test dust ISO MTD according to ISO 16889 (see Selection Chart, column 5)

Hydraulic fluids

Mineral oil and biodegradable fluids (HEES and HETG, see info-service 00.20)

Temperature range

- 30 °C ... + 100 °C (temporary - 40 °C ... + 120 °C)

Viscosity at nominal flow rate

- at operating temperature: $v < 60 \text{ mm}^2/\text{s}$
- as starting viscosity: $v_{max} = 1000 \text{ mm}^2/\text{s}$
- at first operation:

The recommanded starting viscosity can be read from the Diagram D (pressure drop as a function of the kinematic viscosity) as follows: Find the 70% Δ p of the cracking pressure of the by-pass valve on the vertical axis. Draw a horizontal line so that it intersects the Δ p curve at a point. Read this point on the horizontal axis for the viscosity.

Operating pressure

Max. 10 bar

Materials

Screw-on cap:	Polyester, GF reinforced
Filter head:	Aluminium alloy
Filter bowl:	Steel (E248), aluminium (E158, E198)
Seals:	NBR (Viton on request)
Filter media:	EXAPOR®MAX - inorganic multi-layer microfibre web

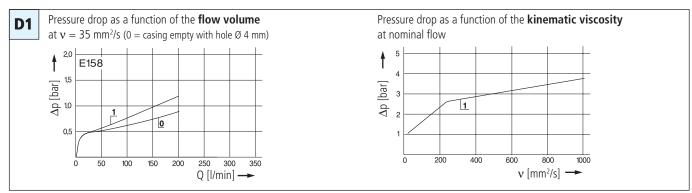
Fitting position

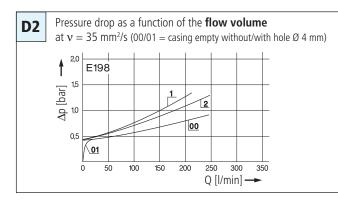
- Standard type no restriction, preferably vertical
- Models with emergency-suction valve can vary up to 15° from the vertical
- Models with hole Ø 4 mm in the check valve can vary up to 45° from the vertical

Even under unfavourable operating conditions (min. oil level, max. sloping) the oil outlet resp. emergency suction has to be below the oil level.

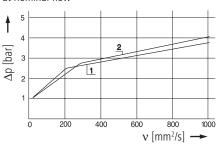
Diagrams

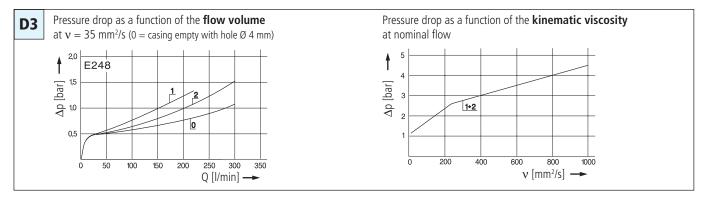
$\Delta p\text{-curves}$ for complete filters in Selection Chart, column 3



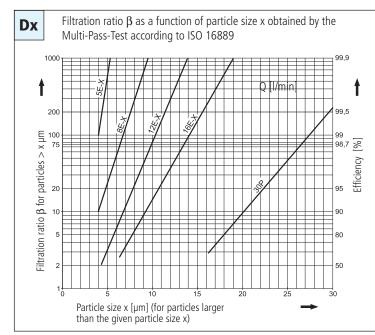


Pressure drop as a function of the $\ensuremath{\textit{kinematic viscosity}}$ at nominal flow





Filter fineness curves in Selection Chart, column 4



The abbreviations represent the following $\beta\mbox{-values}$ resp. finenesses:

For EXAPOR®MAX- and Paper elements:

г г у		\overline{O}	= 200	EXAPOR [®] MAX
5 E-X	=	$\mathbf{p}_{5(c)}$	200	
8 E-X	=	$\overline{\beta}_{8(c)}^{(c)}$	= 200	EXAPOR [®] MAX
12 E-X	=	$\overline{\beta}_{12}^{(c)}$	= 200	EXAPOR [®] MAX
5 E-X 8 E-X 12 E-X 16 E-X	=	$\overline{\beta}_{16 (c)}^{12 (c)}$	= 200	EXAPOR®MAX
30 P	=	$\overline{\beta}_{30 (c)}$	= 200	Paper
				بالغمير سمماني مقاطه

Based on the structure of the filter media of the 30 P paper elements, deviations from the printed curves are quite probable.

For special applications, finenesses differing from these curves are also available by using special composed filter material.

Selection Chart

			HOW	n ^{0.}	e Diagr.D	*	/			of CVT of PRV2	wer elen	hent
Parth	40. N	ominal return Pressur	flow edrop see Diagram Fi	Icurve no.	e Diagr.	apac	onectin	ins Bilba	pressure racking	of CV ¹ of PRV ⁴ pressure of PRV ⁴ m ^{h01} Replacement	filter	leight Remarks
	l/min			g			bar	bar			kg	ĺ
1	2	3	4	5	6	7	8	9	10	11	12	13
E 158-168	150	D1 /1	16 E-X	45	G1¼	G1	0,5	2,5	4	V3.0923-08	3,0	3 + 4
E 198-156	150	D2 /1	12 E-X	58	G1¼	G1	0,5	2,5	1	V3.0933-06	3,7	-
E 198-158	200	D2 /2	16 E-X	64	G1¼	G1	0,5	2,5	1	V3.0933-08	3,7	-
E 198-168	200	D2 /2	16 E-X	64	G1¼	G1	0,5	2,5	2	V3.0933-08	3,7	3
E 198-188	200	D2 /2	16 E-X	64	G1¼	G1	0,5	2,5	4	V3.0933-08	3,8	3 + 4
			10 5 14									2.4
E 248-156	190	D3 /1	12 E-X	70	G1¼	G1	0,5	2,5	4	V3.0940-06	4,3	3 + 4
E 248-158	250	D3 /2	16 E-X	77	G1¼	G1	0,5	2,5	4	V3.0940-08	4,3	3 + 4
E 248-258	250	D3 /2	16 E-X	77	G1¼	G1	0,5	2,5	1	V3.0940-08	4,2	-

All filters are delivered with three plugged clogging indicator connections M 12 x 1,5. As clogging indicators on the return side (P_1) either manometers or electrical pressure switches can be used. The monitoring of the vacuum on the suction side (P_2) is additionally possible.

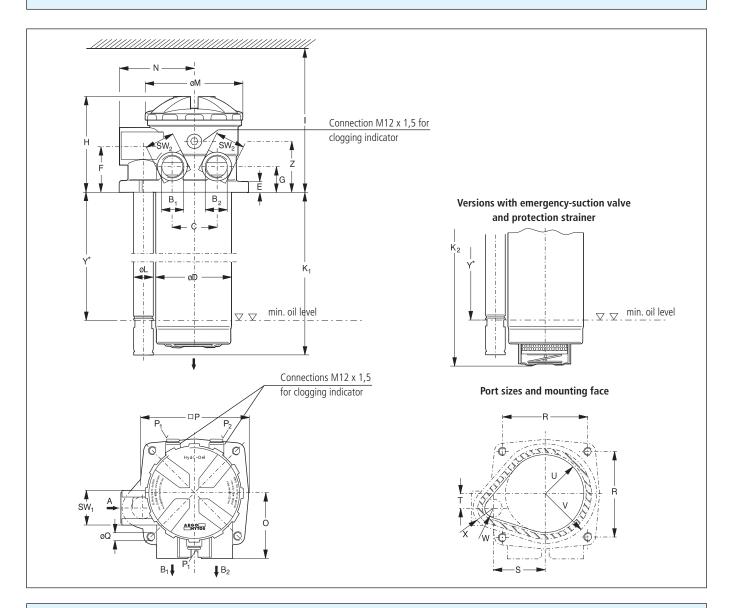
For the appropriate clogging indicators see catalogue sheet 60.20.

Remarks:

- The start of the red area respectively the switching pressure of the electrical pressure switch has always to be lower than the cracking pressure of the pressure relief valve (see Selection Chart, column 9).
- The clogging indicators are optional and always delivered detached from the filter.
- The filters listed in this chart are standard filters. If modifications are required, e.g. with integrated suction valve (integrated into the pressure relief valve) to guarantee the emergency steering feature for vehicles with official road use, we kindly ask for your request.
- For deaeration a start-up set for units with emergency-suction valve and protection strainer is available with Part No. E084.1710, for technical details see catalogue sheet 20.870.

 3 With hole Ø 4 mm in the check valve for oil drain when opening the filter cover 4 With emergency-suction valve and protection strainer (125 $\mu m)$

Dimensions

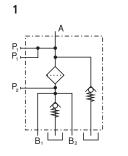


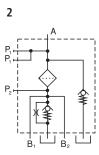
Measurements

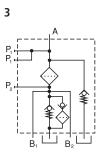
Туре	А	B _{1/2}	С	D	E	F	G	Н	I	K ₁	K ₂	L	М	Ν	0	Р	Q	R	S
E 158	G1¼	G1	56	100	11,5	61,5	30,5	130	430	244	254	28,5	126,5	97	85,5	141	11	116,5	68
E 198	G1¼	G1	56	100	11,5	61,5	30,5	130	530	340	355	28,5	126,5	97	85,5	141	11	116,5	68
E 248	G1¼	G1	56	100	11,5	61,5	30,5	130	600	410	420	28,5	126,5	97	85,5	141	11	116,5	68
Туре	Т	U	V	W	Х	Y*	Z	SW ₁	SW ₂										
E 158	19,5	51	64	14,5	27	197	68	55	41										
E 198	19,5	51	64	14,5	27	298	68	55	41										
E 248	19,5	51	64	14,5	27	363	68	55	41										

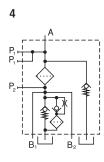
* Oil outlet resp. emergency suction has to be under all operating cond. below min. oil level (given by Y)

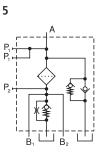
Symbols



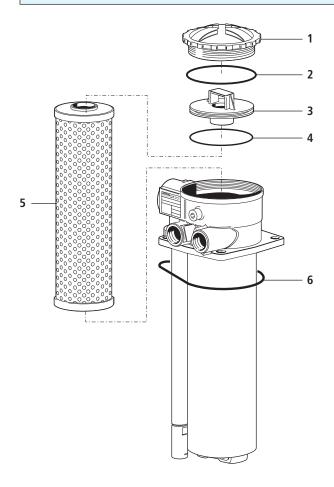








Spare Parts



Pos.	Designation	Part No.
1	Screw-on cap	ES 074.0206
2	O-ring 100 x 4	N 007.1004
3	Inlet neck	E 198.0104
4	O-ring 98 x 3	N 007.0983
5	Filter element	see Chart / col. 11
6	O-ring 124 x 4,5	N 007.1245

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Quality Assurance

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DIN ISO 2943	Verification of material compatibility with fluids
DIN ISO 3724	Verification of flow fatigue characteristics

ISO	2942
ISO	3968
ISO	16889

Verification of fabrication integrity (Bubble Point Test) Evaluation of pressure drop versus flow characteristics Multi-Pass-Test (evaluation of filter fineness and dirt-holding capacity)

Various quality controls during the production process guarantee the leakfree function and solidity of our filters.

Our engineers will be glad to advice you in questions concerning filter application, selection as well as the cleanliness class of the filtered medium attainable under practical operating conditions.

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Return Filters



E 210 · E 211 · E 221

- Tank top mounting
- Connection up to G1¼
- Nominal flow rate up to 210 l/min

Description

Application

In the return line circuits of hydraulic systems.

Performance features

Protection

against wear: By means of filter elements that, in full-flow filtration, meet even the highest demands regarding cleanliness classes.

Protection against

malfunction: By means of full-flow filtration in the system return, the pumps above all are protected from dirt particles remaining in the system after assembly, repairs, or which are generated by wear or enter the system from outside.

Special features

By-pass valve: The location close to the inlet port prevents dirt particles retained by the filter element from entering into the clear oil side. Removable bowl: In case of maintenance the filter bowl is removed

together with the filter element - therefore dirt particles are not flushed back into the tank.

Filter elements

Flow direction from outside to centre. The star-shaped pleating of the filter material results in:

- large filter surfaces
- low pressure drop
- high dirt-holding capacities
- long service life

Filter maintenance

By using a clogging indicator the correct moment for maintenance is stated and guarantees the optimum utilization of the filter life.

Materials

Screw-on cap:	Polyester, GF reinforced
Filter head:	Aluminium alloy
Filter bowl:	Steel
Seals:	NBR (Viton on request)
Filter media:	EXAPOR [®] MAX - inorganic multi-layer microfibre web
	Paper - cellulose web, impregnated with resin

Accessories

Electrical and optical clogging indicators are available. Dimensions and technical data see catalogue sheet 60.20.

Characteristics

Nominal flow rate

Up to 210 l/min (see Selection Chart, column 2) The nominal flow rates indicated by ARGO-HYTOS are based on the following features:

- closed by-pass valve at $\nu \leq 200 \text{ mm}^2/\text{s}$
- element service life > 1000 operating hours at an average fluid contamination of 0,07 g per l/min flow volume
- flow velocity in the connection lines $\leq 4,5$ m/s

Connection

Threaded ports according to ISO 228 or DIN 13. Sizes see Selection Chart, column 6 (other port threads on request)

Filter fineness

 $5~\mu m(c)$... 30 $\mu m(c)$ β -values according to ISO 16889 (see Selection Chart, column 4 and Diagram Dx)

Dirt-holding capacity

Values in g test dust ISO MTD according to ISO 16889 (see Selection Chart, column 5)

Hydraulic fluids

Mineral oil and biodegradable fluids (HEES or HETG, see info-sheet 00.20)

Temperature range

- 30 °C ... + 100 °C (temporary - 40 °C ... + 120 °C)

Viscosity at nominal flow rate

- at operating temperature: $v < 60 \text{ mm}^2/\text{s}$
 - as starting viscosity: $v_{max} = 1200 \text{ mm}^2/\text{s}$
- at first operation:

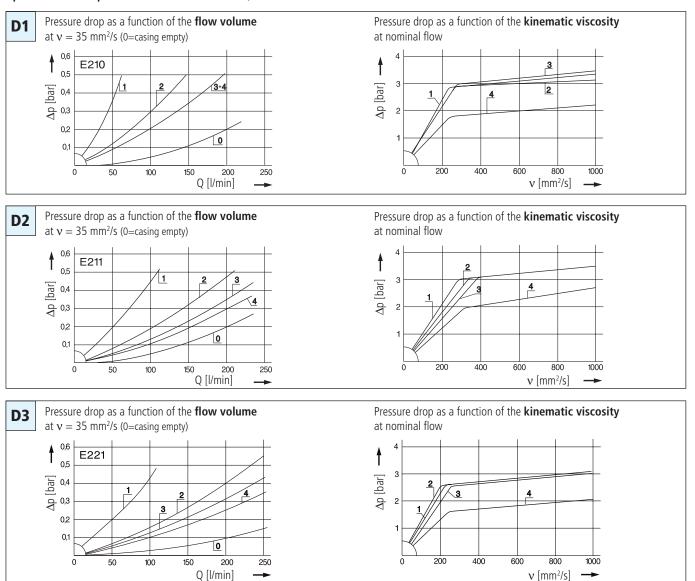
The recommanded starting viscosity can be read from the Diagram D (pressure drop as a function of the kinematic viscosity) as follows: Find the 70% Δp of the cracking pressure of the by-pass valve on the vertical axis. Draw a horizontal line so that it intersects the Δp curve at a point. Read this point on the horizontal axis for the viscosity.

Operating pressure Max. 10 bar

Mounting position

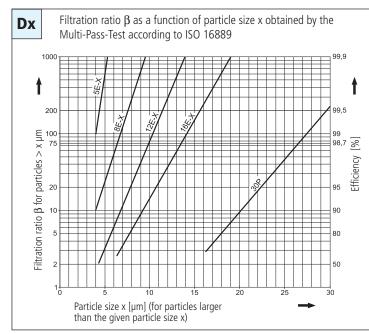
Preferably vertical, outlet downwards

Diagrams



Δp -curves for complete filters in Selection Chart, column 3





The abbreviations represent the following $\beta\mbox{-values}$ resp. finenesses:

For EXAPOR[®] MAX- and Paper elements:

5 E-X	=	$\overline{\beta}_{5(c)}$	= 200	EXAPOR [®] MAX
8 E-X	=	$\bar{\beta}_{s(c)}^{(c)}$	= 200	EXAPOR®MAX
12 E-X	=	$\overline{\beta}_{12}^{\circ(0)}$	= 200	EXAPOR®MAX
5 E-X 8 E-X 12 E-X 16 E-X	=	$\overline{\beta}_{16 (c)}^{12 (c)}$	= 200	EXAPOR [®] MAX
30 P	=	$\overline{\beta}_{30 (c)}$	= 200	Paper
Pacad on t	ho	ctructi	ira of tha	filter modia of th

Based on the structure of the filter media of the 30 P paper elements, deviations from the printed curves are quite probable.

For special applications, finenesses differing from these curves are also available by using special composed filter media.

Selection Chart

Part N	.0. N	minal flow Pressure	edrop see Diagram Dicut	ve no. Infineness see	Diagi. L.	nection A crac	KING PIE-	ntol Replacement No	Wein	Int Remarks
	l/min			g		bar			kg	
1	2	3	4	5	6	7	8	9	10	11
E 210-59	60	D1 /1	5 E-X	25	G1	2,5	1	V2.0920-03	2,3	-
E 210-66	130	D1 /2	12 E-X	40	G1	2,5	1	V2.0920-06	2,3	-
E 210-58	180	D1 /3	16 E-X	47	G1¼	2,5	1	V2.0920-08	2,3	-
E 210-51	120	D1 /4	30 P	22	G1¼	1,5	1	P2.0920-11*	2,3	-
E 211-59	110	D2 /1	5 E-X	50	G1	2,5	1	2 x V2.0920-03	3,4	
E 211-56	210	D2 /2	12 E-X	80	G1¼	2,5	1	2 x V2.0920-06	3,4	-
E 211-58	210	D2 /3	16 E-X	94	G1¼	2,5	1	2 x V2.0920-08	3,4	-
E 211-51	210	D2 /4	30 P	44	G1¼	1,5	1	2 x P2.0920-11*	3,4	-
E 221-59	100	D3 /1	5 E-X	36	G1	2,5	1	V2.0833-03	3,3	-
E 221-56	210	D3 /2	12 E-X	58	G1¼	2,5	1	V2.0833-06	3,3	-
E 221-58	210	D3 /3	16 E-X	67	G1¼	2,5	1	V2.0833-08	3,3	-
E 221-51	210	D3 /4	30 P	36	G1¼	1,5	1	P2.0833-01*	3,3	-
						, -				

All filters are delivered with a plugged clogging indicator connection M 12 x 1,5. As clogging indicators either manometers or electrical pressure switches can be used. Optional extension pipes adapt the filter length to various tank depths. For ordering of accessories please use the below mentioned codes.

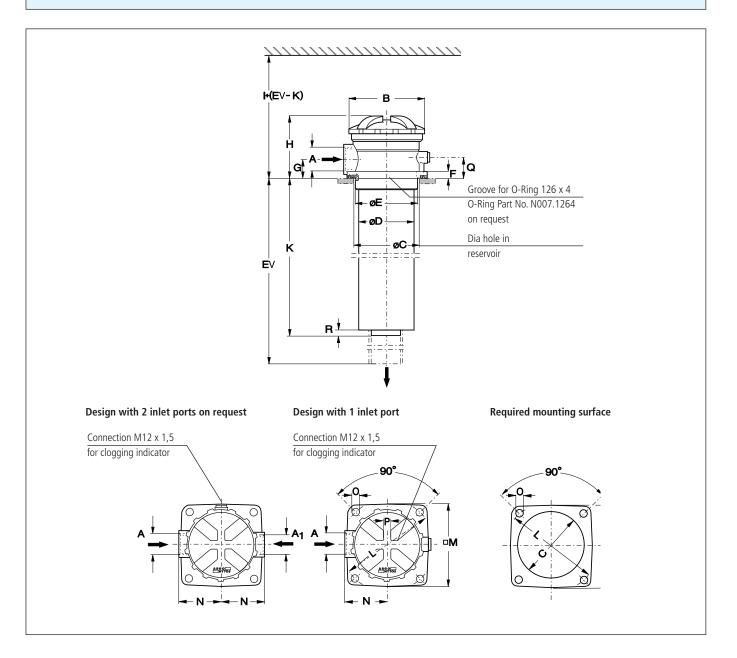
EV 300

Order example: The filter E 210-66 has to be supplied with an extension pipe (EV) for a mounting depth of 300 mm.

Order descriptio	E 210-66	1	
Part No. (Basic u	nit) —————		
E 210 / E 211:	EV = K + 139 / + 239 / + 339 / + 439		
For the appropri	ate clogging indicators see catalogue she	et 60.20.	
Remarks:			

- The switching pressure of the electrical pressure switch has always to be lower than the cracking pressure of the by-pass valve (see Selection Chart, column 7).
- The clogging indicators are optionally available and will then be loosely provided.
- The filters listed in this chart are standard filters. Other designs available on request.

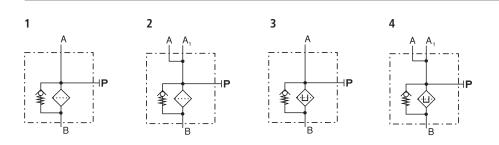
Dimensions



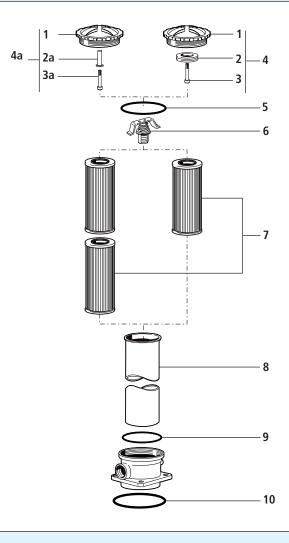
Measurements

Туре	А	В	C min./max.	D	E	F	G	H	I	К	L	М	Ν	0	Р	Q	R
E 210	G1, G1¼	126,5	111/121	95,5	110	11,5	32	106	325	205	165	141	76	11	13	35	-
E 211	G1, G1¼	126,5	111/121	95,5	110	11,5	32	106	525	405	165	141	76	11	13	35	-
E 221	G1, G1¼	126,5	111/121	95,5	110	11,5	32	106	465	361	165	141	76	11	13	35	15

Symbols



Spare Parts



Pos.	Designation	Part No.
1	Screw-on cap with Pos. 5	ES 074.1212
2	Magnetic system	D 020.1401
2a	Hollow rivet A 8 x 0,75 x 25	3309059
	DIN 7340-St	
3	Cylinder screw assy	E 210.1201
3a	Cylinder screw M6x35	3302006
	DIN 912-8.8	
4	Screw-on cap assy with Pos. 5	E 210.1210
4a	Screw-on cap assy with Pos. 5	E 210.1200
5	O-ring 100 x 4	N 007.1004
6	By-pass E 210/E 211 (1,5 bar)	E 210.1903
6	By-pass E 210/E 211 (2,5 bar)	E 210.1905
6	By-pass E 221 (1,5 bar)	E 221.1903
6	By-pass E 221 (2,5 bar)	E 210.1905
7	Filter element	see Chart / col. 9
8	Filter bowl E 210 *	E 210.1901
8	Filter bowl E 211 *	E 211.1901
8	Filter bowl E 221 *	E 221.1901
9	O-ring 90 x 4	N 007.0904
10	O-ring 126 x 4 **	N 007.1264

¹ Specify mounting depth in mm

² Not included in basic equipment

The functions of the complete filters as well as the outstanding features of the filter elements assured by ARGO-HYTOS can only be guaranteed if original ARGO-HYTOS spare parts are used.

Quality Assurance

Quality management according to DIN EN ISO 9001

To ensure constant quality in production and operation, ARGO-HYTOS filter elements undergo strict controls and tests according to the following DIN and ISO standards:

DIN ISO 2941	Verification of collapse/burst resistance
DIN ISO 2943	Verification of material compatibility with fluids
DIN ISO 3724	Verification of flow fatigue characteristics

ISO	2942
ISO	3968
ISO	16889

Verification of fabrication integrity (Bubble Point Test) Evaluation of pressure drop versus flow characteristics Multi-Pass-Test (evaluation of filter fineness and dirt-holding capacity)

Various quality controls during the production process guarantee the leakfree function and solidity of our filters.

Our engineers will be glad to advice you in questions concerning filter application, selection as well as the cleanliness class of the filtered medium attainable under practical operating conditions.

Illustrations may sometimes differ from the original. ARGO-HYTOS is not responsible for any unintentional mistake in this specification sheet.



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- Tank top mounting
- Connection up to SAE 21/2
- Nominal flow rate up to 780 l/min

Description

Application

In the return line circuits of hydraulic systems.

Performance features

Protection	
against wear:	By means of filter elements that, in full-flow filtration, meet even the highest demands regarding cleanliness classes.
Protection against	
malfunction:	By means of full-flow filtration in the system return, the pumps above all are protected from dirt particles remaining in the system after assembly, repairs, or which are generated by wear or enter the system from outside.
Special features	The location close to the inlet port prevents dirt

By-pass valve:	The location close to the inlet port prevents dirt
	particles retained by the filter element from entering
	into the clear oil side.
Removable bowl:	In case of maintenance the filter bowl is removed
	together with the filter element - therefore dirt particles
	are not flushed back into the tank.

Filter elements

Flow direction from outside to centre. The star-shaped pleating of the filter material results in:

- large filter surfaces
- low pressure drop
- high dirt-holding capacities
- long service life

Filter maintenance

By using a clogging indicator the correct moment for maintenance is stated and guarantees the optimum utilization of the filter life.

Materials

Filter head cover:	Steel
Filter head:	Aluminium alloy
Filter bowl:	Steel
Seals:	NBR (Viton on request)
Filter media:	EXAPOR®MAX - inorganic multi-layer microfibre web

Accessories

Accessories	
Extension pipes of	or diffusers are available on the bowl outlet.
Extension pipe:	A correct extension pipe length ensures oil outlet below minimum oil level and prevents foaming.
Diffuser:	Diffusers reduce oil velocity and direct the oil to 90° outlet flow. This function prevents also oil foaming and whirling up of solid particles settled at the tank bottom. The mesh screen element filters the oil in case of an open by-pass valve. Electrical and optical clogging indicators are available. Dimensions and technical data see catalogue sheet 60.20.

Characteristics

Nominal flow

Up to 780 l/min (see Selection Chart, column 2) The nominal flow rates indicated by ARGO-HYTOS are based on the following features:

- closed by-pass valve at $\nu \leq 200 \text{ mm}^2\text{/s}$
- element service life > 1000 operating hours at an average fluid contamination of 0,07 g per l/min flow volume
- flow velocity in the connection lines \leq 4,5 m/s

Connection

SAE-flange (3000 psi). Sizes see Selection Chart, column 6 (other port threads on request)

Filter fineness

 $5\ \mu\text{m}(c)$... 16 $\mu\text{m}(c)$ $\beta\text{-values}$ according to ISO 16889 (see Selection Chart, column 4 and Diagram Dx)

Dirt-holding capacity

Values in g test dust ACFTD according to ISO 16889 (see Selection Chart, column 5)

Hydraulic fluids

Mineral oil and biodegradable fluids (HEES and HETG, see info-sheet 00.20)

Temperature range

- 30 °C ... + 100 °C (temporary - 40 °C ... + 120 °C)

Viscosity at nominal flow rate

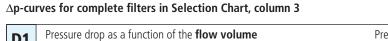
- at operating temperature: $v < 60 \text{ mm}^2/\text{s}$
- as starting viscosity:
- at first operation:
- $v_{max} = 1200 \text{ mm}^2/\text{s}$ The recommended starting viscosity can be read from the Diagram D (pressure drop as a function of the kinematic viscosity) as follows: Find the 70% Δp of the cracking pressure of the by-pass valve on the vertical axis. Draw a horizontal line so that it intersects the Δp curve at a point. Read this point on the horizontal axis for the viscosity.

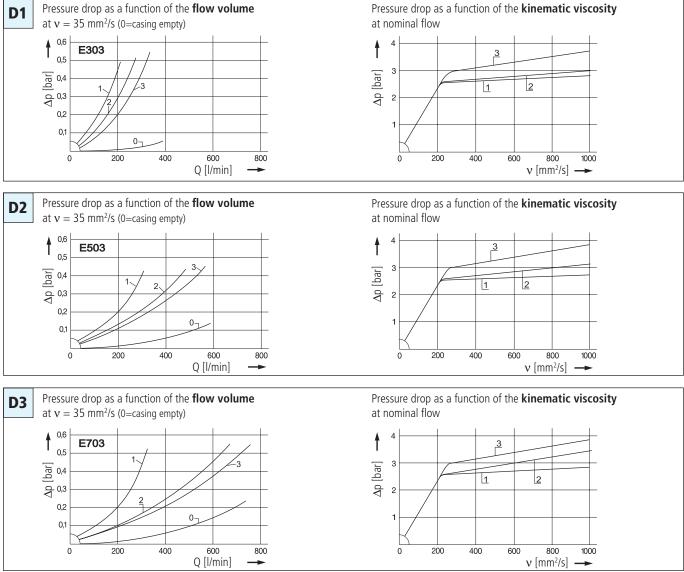
Operating pressure Max. 10 bar

Mounting position

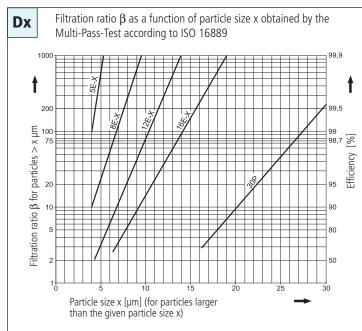
Preferably vertical, outlet downwards

Diagrams





Filter fineness curves in Selection Chart, column 4



The abbreviations represent the following $\beta\mbox{-values resp.}$ finenesses:

For EXAPOR®MAX- and Paper elements:

5 E-X =	$\overline{\beta}_{5(c)}$	= 200	EXAPOR [®] MAX
8 E-X =	$\bar{\boldsymbol{\beta}}_{s(c)}^{(c)}$	= 200	EXAPOR®MAX
12 E-X =	$\hat{\boldsymbol{\beta}}_{12(c)}^{(0)}$	= 200	EXAPOR®MAX
5 E-X = 8 E-X = 12 E-X = 16 E-X =	$\bar{\beta}_{16 (c)}^{12 (c)}$	= 200	EXAPOR®MAX
	$\overline{\beta}_{30 (c)}$	= 200	Paper
Racad on the	structu	re of the	filter media of the

Based on the structure of the filter media of the 30 P paper elements, deviations from the printed curves are quite probable.

For screen elements:

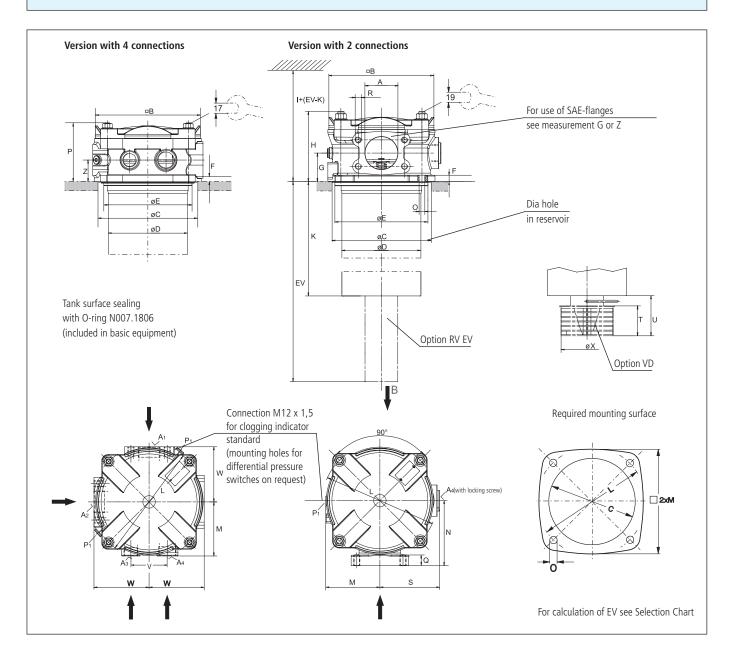
40 S	=	screen material with mesh size 40 µm	
60 S	=	screen material with mesh size 60 µm	
100 S	=	screen material with mesh size 100 µm	
Tolerances		r mesh size according to DIN 4189.	

For special applications, finenesses differing from these curves are also available by using special composed filter media.

Selection Chart

				//			/		/ /	/	
			iate ne drop o ld Diagram Filt	uve no. er finenesseen Dirt.h	101. DX			neofbirpass Replaceme	nt filter element		
		ominal flow Pressure	ate	UNP NO. SEP	olding apacity Connection A	000 PSI	TP55	JIE OI	ot filter en		
PartN	.o.	minalfio	ie dron Dr	erfinene	olding capacity of Connection A	000 F	cking pro	nbol solaceme	no. Weigh	nt Remark	5
6.9,	1 1	or ples a	DIO3 FIII		CO. SAU		SW	Ret par	Wers	Rer.	
4	l/min		4	g 5	6	bar 7		9	kg		
1 E 303-253	2	3 D1/1	4 5 E-X	5 68	b SAE2½ + G1	2,5	8	9 V2.1425-23	10 8,9	11	
E 303-255 E 303-256	280	D1/1 D1/2	12 E-X	110	SAE2 1/2 + G1 SAE2 1/2 + G1	2,5	1	V2.1425-25 V2.1425-26	8,9	-	
E 303-258	340	D1/3	16 E-X	115	SAE21/2 + G1	2,5	1	V2.1425-28	8,9	-	
E 503-253	260	D2 /1	5 E-X	110	SAE21/2 + G1	2,5	1	V2.1440-23	11,7	-	
E 503-256 E 503-258	450 550	D2 /2 D2 /3	12 E-X 16 E-X	180 190	SAE2½ + G1 SAE2½ + G1	2,5 2,5	1	V2.1440-26 V2.1440-28	11,7	-	
E 303-236	550	DZ /5	10 E-X	190	5AEZ /2 + 01	2,5		VZ.1440-20	11,7	-	
E 703-253	390	D3 /1	5 E-X	170	SAE21/2 + G1	2,5	1	V2.1460-23	15,4	-	
E 703-256	680	D3 /2	12 E-X	270	SAE2½ + G1	2,5	1	V2.1460-26	15,4	-	
E 703-258	780	D3 /3	16 E-X	290	SAE21/2 + G1	2,5	1	V2.1460-28	15,4	-	
dicators eithe I filters can a ease use the	er manor Iso be su below m e: The	neters or e applied with entioned of	electrical p th an outle codes. 03-256 ha	ressure switc et diffuser. Op	connection M 12x1,5 hes can be used. Two tional extension pipe plied with 4 connect	o different es adapt th	head piec ne filter ler	es with three varion ngth to various tan	ous connectin k depths. For	ig options are a ordering of acc	availab
rder descrip	otion:						E 703- 4	456 /	RV	/ EV 80	00
onnections:											
ur various op o connectior				CAE21/ and	G1		ſ				
					GT						
owl outlet: vo various op	tions are	available									
D - Outlet diff		- Only ext	ension pip	e							
<pre>ctension pip ur various ler / = K (Bowl let)</pre>	igths are			/ + 454 mm	(see section dimensio	ons and me	easuremer	nts)			
or the appro	priate	clogging	indicato	s see catal	ogue sheet 60.20.						
(see Selectio The clogging	n Chart, indicato	column 7) ors are opt	ional and	always delive	n has always to be lo red detached from th designs available on	ne filter.	he crackin	g pressure of the b	y-pass valve		

Dimensions

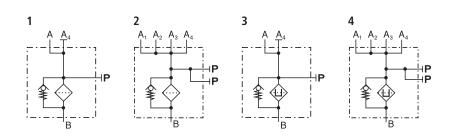


Measurements

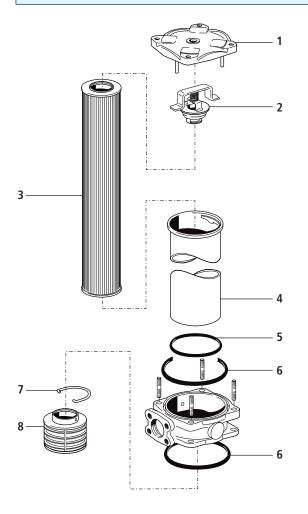
Туре	A	В	С	D	E	F	G	H	I	К	L	М	Ν	0	Р	Q	R	S	т	U	v	W	х	Z
E 303	see	182	180	152	179	12	55	133	400	276	220	104	125	11,5*	113	20	M12	115	58	79	70	106	100	41,5
E 503 S	Selection	182	180	152	179	12	55	133	550	430	220	104	125	11,5*	113	20	M12	115	58	79	70	106	100	41,5
E 703	Chart	182	180	152	179	12	55	133	810	636	220	104	125	11,5*	113	20	M12	115	58	79	70	106	100	41,5

for M10

Symbols



Spare Parts



Pos.	Designation	Part No.
1	Cover assy (2 connections)	E 303.1200
1	Cover (4 connections)	E 703.2202
2	By-pass assy (2,5 bar)	E 703.1510
3	Filter elements	see Chart / col. 9
4	Filter bowl E 303*	E 303.1900
4	Filter bowl E 503*	E 503.1910
4	Filter bowl E 703*	E 703.1900
5	O-ring 145,42 x 5,33	N007.1455
6	O-ring 180 x 6	N007.1806
7	Clip (only option VD)	N026.0311
8	Diffuser (only option VD)	E 703.0701

* Please indicate options (VD, VDEV resp. RVEV)

The functions of the complete filters as well as the outstanding features of the filter elements assured by ARGO-HYTOS can only be guaranteed if original ARGO-HYTOS spare parts are used.

Quality Assurance

Quality management according to DIN EN ISO 9001

To ensure constant quality in production and operation, ARGO-HYTOS filter elements undergo strict controls and tests according to the following DIN and ISO standards:

DIN ISO 2941	Verification of collapse/burst resistance
DIN ISO 2943	Verification of material compatibility with fluids
DIN ISO 3724	Verification of flow fatigue characteristics

ISO 2942 ISO 3968 ISO 16889 Verification of fabrication integrity (Bubble Point Test) Evaluation of pressure drop versus flow characteristics Multi-Pass-Test (evaluation of filter fineness and dirt-holding capacity)

Various quality controls during the production process guarantee the leakfree function and solidity of our filters.

Our engineers will be glad to advice you in questions concerning filter application, selection as well as the cleanliness class of the filtered medium attainable under practical operating conditions.

Illustrations may sometimes differ from the original. ARGO-HYTOS is not responsible for any unintentional mistake in this specification sheet.



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Return-Suction Filters



- Tank top mounting
- Connection up to G1¹/₂ and SAE 2
- Nominal flow rate up to 600 l/min

Description

Application

For operation in units with hydrostatic drives, when the return flow is <u>under</u> <u>all operating conditions</u> higher than the oil flow of the boost pump.

Performance features

Protection	
against wear:	By means of filter elements that, in fullflow filtration, meet even the highest demands regarding cleanliness classes.
Suction filter	
function:	Because of the 100%-filtration of the suction flow, no dirt can get into the boost pump.
Return filter	
function:	By means of full-flow filtration in the system return, the pumps above all are protected from dirt particles remaining in the system after assembly, repairs, or which are generated by wear or enter the system from outside.

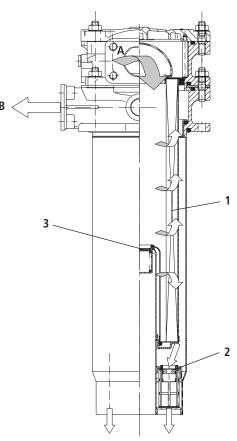
Functional characteristics

The hydraulic oil returning from the circuit (A) passes the filter element (1), is pressurized by a 0,5 bar check valve (2) and supplied to the boost pump (B). The surplus oil flows filtered over the integral check valve into the reservoir.

As the boost pump is always feeded with pressurized oil the risk of cavitation is minimized and full performance is available even during the critical cold start phase.

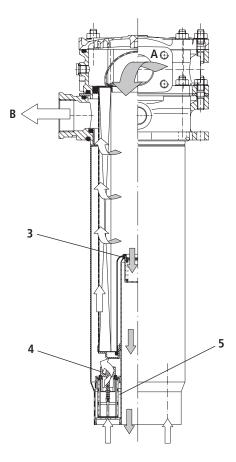
An integral pressure relief valve (3) prevents too high back pressure and protects the shaft seals against damages. As this valve leads the oil directly into the tank there is no direct connection between the return line (A) and the connection of the boost pump (B) (no bypass valve function).

Function (schematic):



The emergency-suction valve (4) with 300 µm protection strainer (5) supplies the boost pump in case of a short term of lack of oil. During normal operation, a lack of oil may definitely not occur (refer to "Design" section).

Emergency-suction (schematic):



Start up / Deaeration

For units with emergency-suction valve and protection strainer the start up set E 328.1700 can be used to de-aerate the hydraulic system at first start up or at start up after repair; hereby the immediate supply of the boost pump with hydraulic oil is guaranteed.

For all other types, deaerating instructions published by the manufacturers of hydraulic drives must be observed.

Filter maintenance

By using a clogging indicator the correct moment for maintenance is indicated and guarantees therefore the optimum utilization of the filter elements.

Filter elements

Flow direction from centre to the outside. The star-shaped pleating of the filter material results in:

- large filter surfaces
- low pressure drop
- high dirt-holding capacities
- long service life

Dirt deposits are entirely removed when the element is changed. Dirt cannot re-enter the tank.

Accessories

Electrical and optical clogging indicators are available. Dimensions and technical data see catalogue sheet 60.20.

Layout

General

In machines with a hydrostatic drive and combined working hydraulic system, suction-return filters replace the suction or pressure filters previously required for the feed pump of the closed-loop hydrostatic drive circuit as well as the return filter for the open-loop working hydraulic circuit. While each circuit operates independently with separate filters, the combination of the two circuits via the suction-return filter causes interaction between the circuits. If the design criteria described below are taken into account, you can take full advantage of the benefits provided by the suction-return filter concept, thus making sure that your system performs reliably even under extreme operat-ing conditions.

Required return flow in the system

- must exceed the suction flow <u>under any operating conditions:</u>
- Versions with hole (Ø 8 mm) in the pressurizing valve: at least 30 l/min of excess flow

Permitted feed pump flow rate

- at operating temperature ($v < 60 \text{ mm}^2/\text{s}$, rpm = max): feed pump flow rate < 0.5 x rated return flow according to column 2 of selection table
- at cold start-up ($v < 1000 \text{ mm}^2/\text{s}$, rpm=1000 min⁻¹): feed pump flow rate < 0.2 x rated return flow according to column 2 of selection table

Please contact us if your system operates with higher flow rates than stated above.

Flow velocity in the connecting lines

- Flow velocity in the return lines \leq 4,5 m/s
- Flow velocity in the suction lines \leq 1,5 m/s

Permitted pressure in the suction lines

At cold start up (v < 1000 mm²/s, rpm = 1000 min⁻¹): feed pump flow rate \leq 0,2 x rated return flow. The pressure loss in the suction lines must not exceed 0,4 bar.

Backpressures in system return lines

If drain oil from the hydrostatic drive is routed across the filter in addition to the flow of the open-loop circuit, the following has to be observed in order to protect the shaft seals:

- permitted leakage oil pressure for a given viscosity and speed (manufacturer's specifications!)
- pressure loss caused by the leakage oil pipes
- pressure loss caused by the oil cooler used
- backpressure of the filter for a given flow rate or kinematic viscosity (refer to pressure loss diagrams)

Depending on the application, the use of a cooler bypass valve is recommended.

Generously sized drain oil pipes are also of advantage.

Filter fineness grades

With the filter fineness grades available, the following oil cleanliness according to ISO 4406 can be achieved:

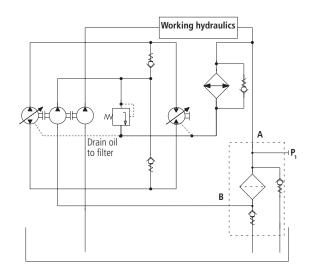
- 12 E-X: 18/15/12 ... 15/12/8
- 16 E-X: 20/17/12 ... 17/14/10

Even with the 16 E-X filter fineness grade, the requirements specified by manufacturers of hydrostatic drives are sometimes exceeded significantly.

If components requiring a still better oil purity are used, we recommend the 12 E-X filter fineness grade.

Suggested circuit layouts

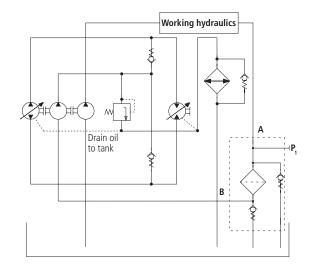
A) The leakage oil of the hydrostatic drive is routed across the filter.



The entire dirt produced in the hydrostatic drive by abrasion is filtered out immediately and is thus not taken in by the pump of the open-loop circuit. This circuit layout is always recommended if the return flow only slightly exceeds the suction flow, i.e. if there is

a risk that the 0,5 bar precharging pressure cannot be maintained.

B) The drain oil of the hydrostatic drive is not routed across the filter but is discharged directly into the tank.



This circuit layout has the advantage that drain oil pressures are comparatively low.

Characteristics

Nominal flow rate

Up to 600 l/min in return line (see Selection Chart, column 2) Up to 300 l/min feed pump flow rate (see Layout) The nominal flow rates indicated by ARGO-HYTOS are based on the following features:

- closed by-pass valve at $\nu \leq$ 200 mm²/s
- element service life > 1000 operating hours at an average fluid contamination of 0,07 g per l/min flow volume
- flow velocity in the return lines \leq 4,5 m/s
- flow velocity in the suction lines \leq 1,5 m/s

Connection

Threaded ports according to ISO 228 or DIN 13 and SAE flange (3000 psi). Sizes see Selection Chart, column 6 (other port threads on request)

Filter fineness

 $\begin{array}{l} 12 \ \mu m(c) \ ... \ 16 \ \mu m(c) \\ \beta \ \ values \ according \ to \ ISO \ 16889 \\ (see \ Selection \ Chart, \ column \ 4 \ and \ Diagram \ Dx) \end{array}$

Dirt-holding capacity

Values in g test dust ISO MTD according to ISO 16889 (see Selection Chart, column 5)

Hydraulic fluids

Mineral oil and biodegradable fluids (HEES or HETG, see info sheet 00.20)

Temperature range

- 30 °C ... + 100 °C (temporary - 40 °C ... + 120 °C)

Viscosity at nominal flow rate

- at operating temperature: $\nu < 60 \text{ mm}^2/\text{s}$
- as starting viscosity: $v_{max} = 1200 \text{ mm}^2/\text{s}$
- at first operation:

The recommanded starting viscosity can be read from the Diagram D (pressure drop as a function of the kinematic viscosity) as follows: Find the 70% Δp of the cracking pressure of the by-pass valve on the vertical axis. Draw a horizontal line so that it intersects the Δp curve at a point. Read this point on the horizontal axis for the viscosity.

Operating pressure

Max. 10 bar

Materials

Screw-on cap:	Aluminium alloy
Filter head:	Aluminium alloy
Filter bowl:	Steel
Seals:	NBR (Viton on request)
Filter media:	EXAPOR®MAX - inorganic multi-layer microfibre web

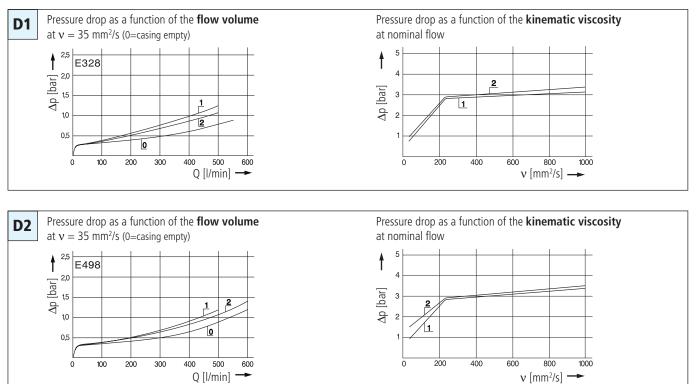
Fitting position

Up to 15° from the vertical, preferably vertical

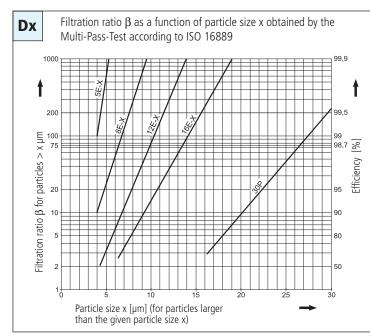
Even under unfavourable operating conditions (min. oil level, max. sloping) the oil outlet resp. emergency suction has to be below the oil level.

Diagrams

Δp -curves for complete filters in Selection Chart, column 3



Filter fineness curves in Selection Chart, column 4



The abbreviations represent the following $\beta\mbox{-values}$ resp. finenesses:

For EXAPOR®MAX- and Paper elements:

5 E-X	=	$\overline{\beta}_{5(c)}$	= 200	EXAPOR®MAX
8 E-X	=	$\overline{\beta}_{s(c)}^{(c)}$	= 200	EXAPOR®MAX
12 E-X	=	$\overline{\beta}_{12}^{(c)}$	= 200	EXAPOR®MAX
5 E-X 8 E-X 12 E-X 16 E-X	=	$\overline{\beta}_{16 (c)}^{12 (c)}$	= 200	EXAPOR®MAX
30 P	=	$\overline{\beta}_{30 (c)}$	= 200	Paper
Dacad an t	ha	ctructu		filter media of th

Based on the structure of the filter media of the 30 P paper elements, deviations from the printed curves are quite propable.

For special applications, finenesses differing from these curves are also available by using special composed filter material.

Selection Chart

					4						
		/	ION	n ^{0.}	polding capacity Connections AL	-			of CV ¹ of PRV ² pressure of PRV ² pressure of PRV ² pressure of PRV ²	ar el	lement
		Ireturn	drop see	UNP 11 SE	iding capat	B psil		pressure	pressure	nt filter	
Part N	,0. N	ominal return Pressur	How edropsee Diagram DIC	er fine Dirt	noting capacity	,0 (racking	racking	ymbol Replacen	NO.	veight Remarks
	l/min	/		g		bar	bar			kg	
1	2	3	4	5	6	7	8	9	10	11	12
E 328-156	300	D1 /1	12 E-X	110	G1½ / SAE2 + G1	0,5	2,5	1	V5.1240-06	8,6	3 + 4
E 328-158	450	D1 /2	16 E-X	110	G1½ / SAE2 + G1	0,5	2,5	1	V5.1240-07	8,6	3+4
E 498-156	450	D2 /1	12 E-X	160	G1½ / SAE2 + G1	0,5	2,5	1	V5.1260-06	10,4	3 + 4
E 498-158	600	D2 /2	16 E-X	180	G1½ / SAE2 + G1	0,5	2,5	1	V5.1260-07	10,4	3+4

All filters are delivered with plugged clogging indicator connections M 12 x 1,5 (Mounting holes for differential pressure switches on request). As clogging indicators on the return side (P_1) either manometers or electrical pressure switches can be used. The monitoring of the vacuum on the suction side (P_2) is additionally possible.

Order example: The filter E 328-256 has to be supplied with 2 x 4 connections ($A_1 \dots A_4$, $B_1 \dots B_4$).

Order description:E 328- 2 56Connections:2 various options are available:2 various options are available:2 x 2 connections (A and A_4 , B and B_4) - G 1½/SAE 2 + G 1 (with locking screw) — 12 x 4 connections ($A_1 \dots A_4$, $B_1 \dots B_4$)- 2 x G 1¼ / SAE 1½, G 3¼ + G 1 _ 2 _ _ _(SAE 2 on request)2 _ _ _ _

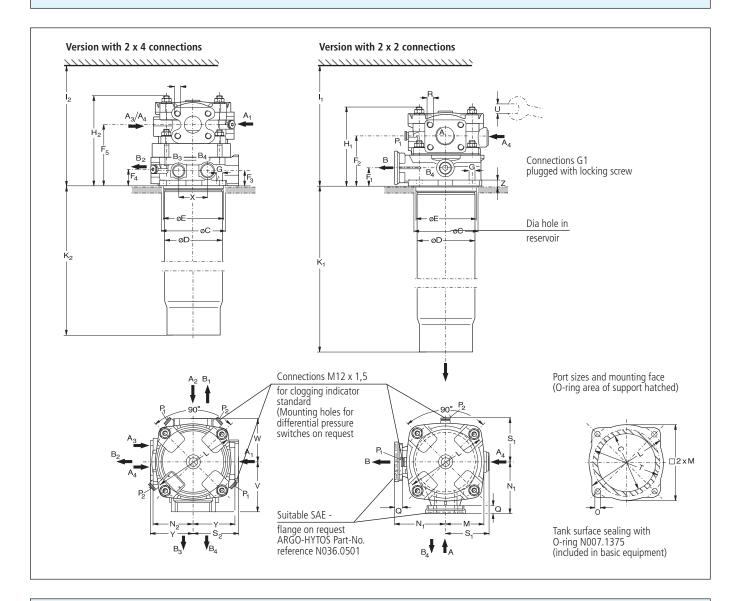
For the appropriate clogging indicator see catalogue sheet 60.20.

Remarks:

- The start of the red area respectively the switching pressure of the electrical pressure switch has always to be lower than the cracking pressure of the pressure relief valve (see Selection Chart, column 9).
- The clogging indicators are optional and always delivered detached from the filter.
- The filters listed in this chart are standard filters. If modifications are required, we kindly ask for your request.
- For deaeration a start up set is available with Part-No. E 328.1700, technical details see catalogue sheet 20.890.

¹ Cracking pressure of check valve	$^{\rm 3}$ with hole Ø 8 mm in the check valve for oil drain when opening the filter cover
² Cracking pressure of pressure relief valve	4 with emergency-suction valve and protection strainer (300 $\mu\text{m})$

Dimensions

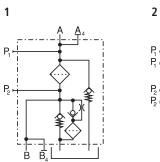


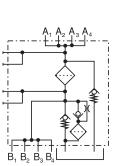
Measurements

Туре		Α			В		С	D	E	F ₁	F ₂ *	$\mathbf{F_3}^*$	\mathbf{F}_4	F ₅	G	H ₁	H ₂	I ₁	I ₂
E 328	s. Se	lection (Chart	s. Se	s. Selection Chart		140,5	138	139,9	36	104,5	32	35	126	11,5	165	185	540	565
E 498	s. Se	lection (Chart	s. Se	lection (Chart	140,5	138	139,9	36	104,5	32	35	126	11,5	165	185	750	780
Туре	K ₁	K ₂	L	М	N ₁	N ₂	0	Q	R	S ₁	S ₂	Т	U	V	W	Х	Y	Z	
E 328	425	403	185	86,5	116	89	M10	18	M12	99	109	160	17	106	102	70	98	12	
E 498	630	605	185	86,5	116	89	M10	18	M12	99	109	160	17	106	102	70	98	12	

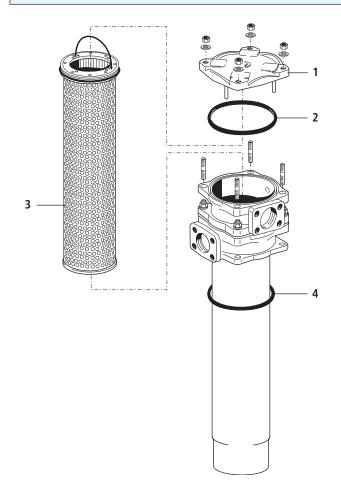
*For use of SAE-flanges see this measurement

Symbols





Spare Parts



Pos.	Designation	Part No.
1	Cover assy	E 443.1225
2	O-ring 151,76 x 5,33	N 007.1525
3	Filter elements	see Chart / col. 10
4	O-ring 136,5 x 5,34	N 007.1375

The functions of the complete filters as well as the outstanding features of the filter elements assured by ARGO-HYTOS can only be guaranteed if original ARGO-HYTOS spare parts are used.

Quality Assurance

Quality management according to DIN EN ISO 9001

To ensure constant quality in production and operation, ARGO-HYTOS filter elements undergo strict controls and tests according to the following DIN and ISO standards:

DIN ISO 2941	Verification of collapse/burst resistance
DIN ISO 2943	Verification of material compatibility with fluids
DIN ISO 3724	Verification of flow fatigue characteristics

Verification of fabrication integrity (Bubble Point Test) Evaluation of pressure drop versus flow characteristics Multi-Pass-Test (evaluation of filter fineness and dirt-holding capacity)

Various quality controls during the production process guarantee the leakfree function and solidity of our filters.

Our engineers will be glad to advice you in questions concerning filter application, selection as well as the cleanliness class of the filtered medium attainable under practical operating conditions.

Illustrations may sometimes differ from the original. ARGO-HYTOS is not responsible for any unintentional mistake in this specification sheet.







Return Filters



E 440 · E 450 · E 460 E 640 · E 700

- Tank mounting
- Nominal flow rate up to 680 l/min

Description

Application

In the return line circuits of hydraulic systems.

Performance features

	enormance rea	itures
P	rotection	
a	gainst wear:	By means of filter elements that, in full-flow filtration meet even the highest demands regarding cleanliness classes.
P	rotection against	
	nalfunction:	By means of full-flow filtration in the system return, the pumps above all are protected from dirt particles remaining in the system after assembly, repairs, or which are generated by wear or enter the system from outside.
S	pecial features	
lr	istallation:	Installation directly into a separate tank section for the return oil. This solution allows a number of return line connections and does not show any restriction by a filter head.
B	y-pass valve:	The location close to the inlet port prevents dirt particles retained by the filter element from entering into the clear oil side.
R	emovable bowl:	In case of maintenance the filter bowl is removed together with the filter element - therefore dirt particles are not flushed back into the tank.

Filter elements

Flow direction from outside to centre. The star-shaped pleating of the filter material results in:

- large filter surfaces
- high dirt-holding capacities
- low pressure drop
- long service life

Filter maintenance

By using a clogging indicator the correct moment for maintenance is stated and guarantees the optimum utilization of the filter life.

Materials

Filter bowl:	Steel
Seals:	NBR (Viton on request)
Filter media:	EXAPOR [®] MAX - inorganic multi-layer microfibre web
	Paper - cellulose web, impregnated with resin

Accessories

Extension pipes and diffusers are available on the bowl outlet.

- Extension pipe: A correct extension pipe length ensures oil outlet below minimum oil level and prevents foaming. Diffusers: Diffusers reduce oil velocity and direct the oil to 90°
 - outlet flow. This function prevents also oil foaming and whirling up of solid particles settled at the tank bottom. The mesh screen element filters the oil in case of an open by-pass valve.

Electrical and optical clogging indicators are available. Dimensions and technical data see catalogue sheet 60.20.

Characteristics

Nominal flow rate

Up to 680 l/min (see Selection Chart, column 2) The nominal flow rates indicated by ARGO-HYTOS are based on the following features:

- closed by-pass value at $\nu \leq$ 200 mm²/s
- element service life > 1000 operating hours at an average fluid contamination of 0,07 g per l/min flow volume
- flow velocity in the connection lines \leq 4,5 m/s

Installation

Tank immersed installation in a separate return oil chamber of the reservoir.

Filter fineness

12 μm(c) ... 30 μm(c) β-values according to ISO 16889 (see Selection Chart, column 4 and Diagram Dx)

Dirt-holding capacity

Values in g test dust ISO MTD according to ISO 16889 (see Selection Chart, column 5)

Hydraulic fluids

Mineral oil and biodegradable fluids (HEES and HETG, see info-sheet 00.20)

Temperature range

- 30 °C ... + 100 °C (temporary - 40 °C ... + 120 °C)

Viscosity at nominal flow rate

- at operating temperature: $\nu < 60 \text{ mm}^2/\text{s}$
 - as starting viscosity: $v_{max} = 1200 \text{ mm}^2/\text{s}$
- at first operation:

The recommanded starting viscosity can be read from the Diagram D (pressure drop as a function of the kinematic viscosity) as follows: Find the 70% Δp of the cracking pressure of the by-pass valve on the vertical axis. Draw a horizontal line so that it intersects the Δp curve at a point. Read this point on the horizontal axis for the viscosity.

Operating pressure

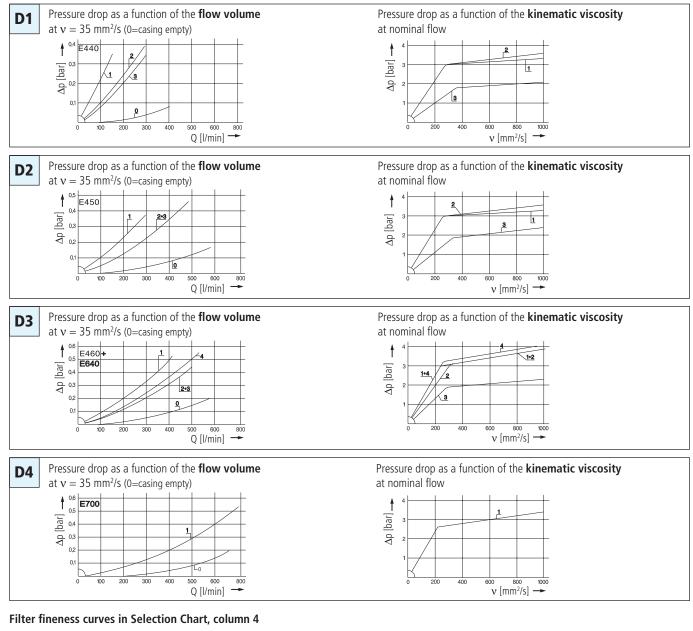
Max. 10 bar

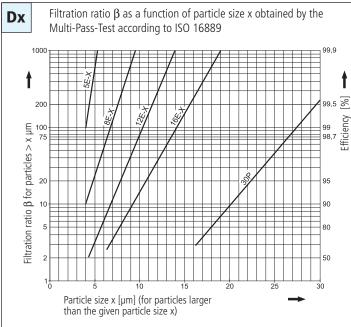
Mounting position

Preferably vertical, outlet downwards

Diagrams

∆p-curves for complete filters in Selection Chart, column 3





The abbreviations represent the following β -values resp. finenesses:

For EXAPOR®MAX- and Paper elements:

$\begin{array}{rcl} \textbf{5} \ \textbf{E-X} &=& \overline{\beta}_{5(c)}\\ \textbf{8} \ \textbf{E-X} &=& \beta_{8(c)}\\ \textbf{12} \ \textbf{E-X} &=& \beta_{12(c)}\\ \textbf{16} \ \textbf{E-X} &=& \beta_{16(c)} \end{array}$	= 200 = 200 = 200 = 200	EXAPOR®MAX EXAPOR®MAX EXAPOR®MAX EXAPOR®MAX				
ID E-X = P ₁₆₍₀	$_{c)} = 200$	EXAPOR				
30 P = $\overline{\beta}_{30}$	_{c)} = 200	Paper				
Rased on the structure of the filter media of the						

Based on the structure of the filter media of the 30 \mbox{P} paper elements, deviations from the printed curves are quite probable.

For screen elements:

101 00100		i ci i c
40 S		screen material with mesh size 40 µm
60 S	=	screen material with mesh size 60 µm
100 S	=	screen material with mesh size 100 µm
Tolerances	for	mesh size according to DIN 4189.

For special applications, finenesses differing from these curves are also available by using special composed filter material.

Selection Charts

/

/

/

PartN		oninal flow Pressu	e drop see Diagram D	curve no. Let fineness see	biag. DX biding capacity connection	nA (12	tking press	nbol Replacement	filter eleme	iont John Remarks
,	l/min			g		bar			kg	
1	2	3	4	5	6	7	8	9	10	11
E 440-156	130	D1 /1	12 E-X	53	-	2,5	1	V2.1217-36	2,4	-
E 440-168	210	D1 /2	16 E-X	57	-	2,5	1	V2.1217-08	2,4	-
E 440-153	175	D1 /3	30 P	29	-	1,5	1	P2.1217-21*	2,4	-
E 450-156	260	D2 /1	12 E-X	106	-	2,5	1	2 x V2.1217-36	4,1	-
E 450-168	410	D2 /2	16 E-X	114	-	2,5	1	2 x V2.1217-08	4,1	-
				50						
E 450-153	350	D2 /3	30 P	58	-	1,5	1	2 x P2.1217-21*	4,1	-
E 460-156	390	D3 /1	12 E-X	159		25	1	3 x V2.1217-36	5,8	
E 460-156 E 460-168	500	D3/1 D3/2	12 E-X	159	-	2,5 2,5	1	3 x V2.1217-36 3 x V2.1217-08	5,8 5,8	-
E 400-100	500	D3/Z	10 E-X	171	-	2,5	I	5 X V2.1217-00	5,6	-
E 460-153	480	D3 /3	30 P	87	-	1,5	1	3 x P2.1217-21*	5,8	-
L 400 155	400		501	07		1,5	1	5 X 1 2.12 17 21	5,0	
E 640-76	550	D3 /4	12 E-X	210	-	3,0	1	V2.1260-26	7,5	-
E 700-156	680	D4 /1	12 E-X	270	-	2,5	1	V2.1460-26	12,4	-

As clogging indicators either manometers or electrical pressure switches can be used. Filters can also be supplied with an outlet diffuser. Optional extension pipes adapt the filter length to various tank depths. For ordering of accessories please use the below mentioned codes.

Order example: The filter E 450-156 has to be supplied with an outlet diffuser and an extension pipe for 580 mm length.

Order description:	E 450-156	1	VD	1	EV 580
Part No. (Basic unit)					
Options Two various options are available VD: Outlet diffuser, RV: Extension pipe					
Extension pipes: 7 various lengths are available E 440 / E 450 / E 460 / E 640 EV = K + 81 / + 136 / + 196 / + 231 / + 356 / + 4 E 700 EV on reguest.	46 / + 626 mm (see	e section dim	ensions and me	easureme	nts)

For the appropriate clogging indicators see catalogue sheet 60.20.

Remarks:

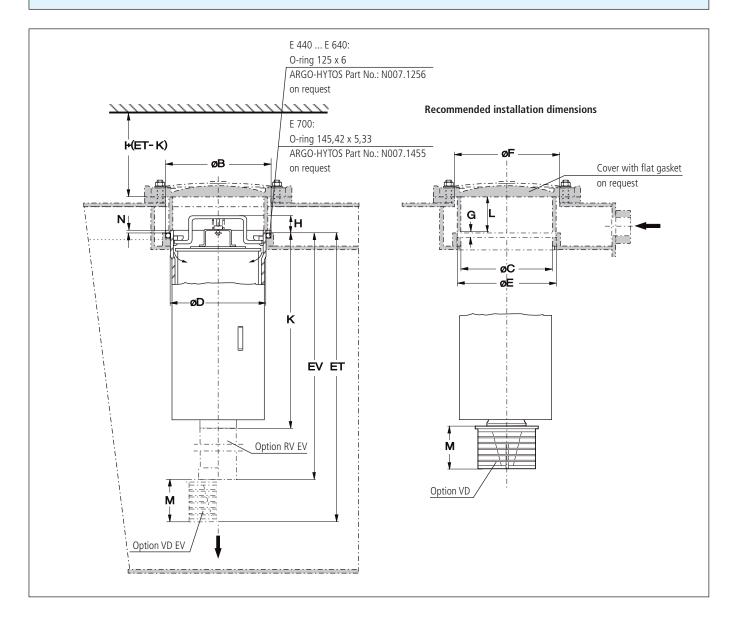
• The switching pressure of the electrical pressure switch has always to be lower than the cracking pressure of the by-pass valve (see Selection Chart, column 7).

• The clogging indicators are optional and always delivered detached from the filter.

• The filters listed in this chart are standard filters. Other designs e.g. with screen elements (mesh size 450 µm) at the bowl outlet, are available on request.

* Paper media supported with metal gauze

Dimensions



Measurements

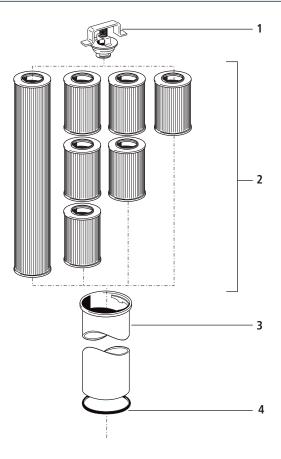
Туре	Α	В	C	D	E	F	G	Н	I	К	L	М	Ν
E 440	-	142+2	132	130,5	145	>145	6,5	26	250	217	48	58	1,5
E 450	-	142+2	132	130,5	145	>145	6,5	26	410	384	48	58	1,5
E 460	-	142+2	132	130,5	145	>145	6,5	26	580	552	48	58	1,5
E 640	-	142 ⁺²	132	130,5	145	>145	6,5	26	680	650	48	58	1,5
E 700	-	167+2	156,5	155	170	>170	6,5	27	700	651	82	58	1,5

For calculation of EV use data in Selection Chart

Symbols



Spare Parts



Pos.	Designation	Part No.
1	By-pass assy (1,5 bar)	E 440.1500
1	By-pass assy (2,5 bar)	E 460.1520
1	By-pass assy (3,0 bar)	E 640.1510
1	By-pass assy (2,5 bar) for E 700	E 703.1510
2	Filter elements	see Chart. / col. 9
3	Filter bowl E 440 ¹	E 440.1960
3	Filter bowl E 450 ¹	E 450.1906
3	Filter bowl E 460 ¹	E 460.1915
3	Filter bowl E 640 ¹	E 640.1910
3	Filter bowl E 700	E 700.1900
4.1	O-ring 125 x 6 ²	N 007.1256
4.2	O-ring 145,42 x 5,33 ² for E 700	N 007.1455

¹ Please indicate options (VD, VDEV resp. RVEV)

² Not included in basic equipment

The functions of the complete filters as well as the outstanding features of the filter elements assured by ARGO-HYTOS can only be guaranteed if original ARGO-HYTOS spare parts are used.

Quality Assurance

Quality management according to DIN EN ISO 9001

To ensure constant quality in production and operation, ARGO-HYTOS filter elements undergo strict controls and tests according to the following DIN and ISO standards:

DIN ISO 2941	Verification of collapse/burst resistance
DIN ISO 2943	Verification of material compatibility with fluids
DIN ISO 3724	Verification of flow fatigue characteristics

ISO	2942
ISO	3968
ISO	16889

Verification of fabrication integrity (Bubble Point Test) Evaluation of pressure drop versus flow characteristics Multi-Pass-Test (evaluation of filter fineness and dirt-holding capacity)

Various quality controls during the production process guarantee the leakfree function and solidity of our filters.

Our engineers will be glad to advice you in questions concerning filter application, selection as well as the cleanliness class of the filtered medium attainable under practical operating conditions.

Illustrations may sometimes differ from the original. ARGO-HYTOS is not responsible for any unintentional mistake in this specification sheet.



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Return Filters



E 443 · E 453 · E 463 E 643

- Tank top mounting
- Connection up to SAE 2
- Nominal flow rate up to 550 l/min

Description

Application

In the return line circuits of hydraulic systems.

Performance features

Protection	By means of filter elements that, in full-flow filtration,
against wear:	meet even the highest demands regarding cleanliness classes.
Protection against malfunction:	By means of full-flow filtration in the system return, the pumps above all are protected from dirt particles remaining in the system after assembly, repairs, or which are generated by wear or enter the system from outside.

Special features

By-pass valve:	The location close to the inlet port prevents dirt
	particles retained by the filter element from entering
	into the clear oil side.
Removable bowl:	In case of maintenance the filter bowl is removed
	together with the filter element - therefore dirt particles
	are not flushed back into the tank.

Filter elements

Flow direction from outside to centre. The star-shaped pleating of the filter material results in:

- large filter surfaces
- low pressure drop
- high dirt-holding capacities
- long service life

In filters with a magnetic system, the ferromagnetic particles in the fluid pass first through a strong magnetic field and are separated.

Filter maintenance

By using a clogging indicator the correct moment for maintenance is stated and guarantees the optimum utilization of the filter life.

Materials

Filter head cover:	Aluminium alloy
Filter head:	Aluminium alloy
Filter bowl:	Steel
Seals:	NBR (Viton on request)
Filter media:	EXAPOR®MAX - inorganic multi-layer microfibre web
	Paper - cellulose web, impregnated with resin
	Stainless steel wire mesh (1.4301)

Accessories

Extension pipes and diffusers are available on the bowl outlet.

- Extension pipe: A correct extension pipe length ensures oil outlet below minimum oil level and prevents foaming.
- Diffuser: Diffusers reduce oil velocity and direct the oil to 90° outlet flow. This function prevents also oil foaming and whirling up of solid particles settled at the tank bottom. The mesh screen element filters the oil in case of an open by-pass valve. Electrical and optical clogging indicators are available.

Dimensions and technical data see catalogue sheet 60.20.

Characteristics

Nominal flow rate

Up to 550 l/min (see Selection Chart, column 2) The nominal flow rates indicated by ARGO-HYTOS are based on the following features:

- closed by-pass valve at $\nu \leq 200 \text{ mm}^2/\text{s}$
- element service life > 1000 operating hours at an average fluid contamination of 0,07 g per l/min flow volume
- flow velocity in the connection lines $\leq 4,5$ m/s

Connection

Threaded ports according to ISO 228 or DIN 13 and SAE-flange (3000 psi). Sizes see Selection Chart, column 6 (other port threads on request)

Filter fineness

 $\begin{array}{l} 5 \ \mu m(c) \ ... \ 60 \ \mu m(c) \\ \beta \ values \ according \ to \ ISO \ 16889 \\ (see \ Selection \ Chart, \ column \ 4 \ and \ Diagram \ Dx) \end{array}$

Dirt-holding capacity

Values in g test dust ISO MTD according to ISO 16889 (see Selection Chart, column 5)

Hydraulic fluids

Mineral oil and biodegradable fluids (HEES and HETG, see info-sheet 00.20)

Temperature range

- 30 °C ... + 100 °C (temporary - 40 °C ... + 120 °C)

Viscosity at nominal flow rate

- at operating temperature: $v < 60 \text{ mm}^2/\text{s}$
- as starting viscosity: $v_{max} =$
- at first operation:

$$\label{eq:v_max} \begin{split} & \nu_{max} = 1200 \mbox{ mm}^2/\mbox{s} \\ & The recommanded starting viscosity can be read from the Diagram D (pressure drop as a function of the kinematic viscosity) as follows: Find the 70% <math>\Delta p$$
 of the cracking pressure of the by-pass valve on the vertical axis. Draw a horizontal line so that it intersects the Δp curve at a point. Read this point on the horizontal axis for the viscosity.

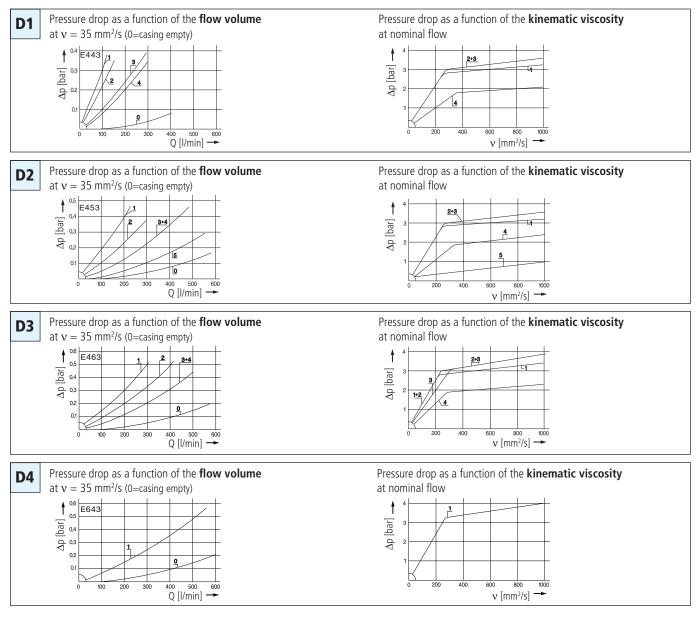
Operating pressure Max. 10 bar

Mounting position

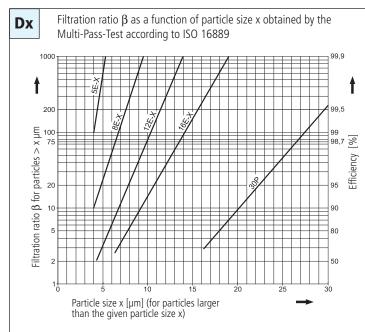
Preferably vertical, outlet downwards

Diagrams

∆p-Kennlinien für die Komplettfilter in der Auswahltabelle, Spalte 3



Filter fineness curves in Selection Chart, column 4



The abbreviations represent the following $\beta\mbox{-values resp.}$ finenesses:

For EXAPOR®MAX- and Paper elements:

5 E-X = 8 E-X = 12 E-X = 16 E-X =	$= \overline{\beta}_{5(c)}$	= 200 = 200	EXAPOR®MAX EXAPOR®MAX			
12 E-X =	$= \vec{B}_{12(c)}^{8(c)}$	= 200	EXAPOR®MAX			
16 E-X =	$= \underline{\beta}_{16 (c)}^{12 (c)}$	= 200	EXAPOR®MAX			
30 P =	= β _{30 (c)}	= 200	Paper			
Rased on the structure of the filter media of the						

Based on the structure of the filter media of the 30 P paper elements, deviations from the printed curves are quite probable.

screen elements:

40 S	=	screen material with mesh size 40 µm	
60 S	=	screen material with mesh size 60 µm	
100 S	=	screen material with mesh size 100 µm	
Tolerances	for	mesh size according to DIN 4189	

For special applications, finenesses differing from these curves are also available by using special composed filter media.

Selection Chart

				cune no. cune no. ter fineness see f Dirt-hold	1201.01			ure of by tass nbol Replacement	Jem	ent
		FION	dropsee	CUIVE NO. SEE	ng capacity ()	o psil	oress	oure of	filter ere	
PartNo). 	ominal flow pressure	e drop see	curve no. curve no. ter fineness see Dirt hold	iagt. La connection A ter surface in 1) ter surface in 1) connection A	000 PSII	tking P SV	mbol Replacement	10. W	eight Remarks
	l/min	/		g		bar			kg	
1	2	3	4	5	6	7	8	9	10	11
E 443-159	85	D1 /1	5 E-X	34	G1½ / SAE2	2,5	1	V2.1217-03	4,4	-
E 443-156	130	D1 /2	12 E-X	53	G1½ / SAE2	2,5	1	V2.1217-36	4,4	-
E 443-168	210	D1 /3	16 E-X	57	G1½ / SAE2	2,5	1	V2.1217-08	4,4	-
E 443-181	175	D1 /4	30 P	29	G1½ / SAE2	1,5	1	P2.1217-21*	4,4	-
E 453-159	170	D2 /1	5 E-X	68	G1½ / SAE2	2,5	1	2 x V2.1217-03	6,1	-
E 453-156	260	D2 /2	12 E-X	106	G1½ / SAE2	2,5	1	2 x V2.1217-36	6,1	-
E 453-168	410	D2 /3	16 E-X	114	G1½ / SAE2	2,5	1	2 x V2.1217-08	6,1	-
E 453-153	350	D2 /4	30 P	58	G1½ / SAE2	1,5	1	2 x P2.1217-21*	6,1	-
E 453-100	525	D2 /5	60 S	(3600 cm ²)	G1½ / SAE2	1,5	4	2 x S2.1217-00	6,4	with magnetic system
E 463-159	250	D3 /1	5 E-X	102	G1½ / SAE2	2,5	1	3 x V2.1217-03	7,8	-
E 463-156	390	D3 /2	12 E-X	159	G1½ / SAE2	2,5	1	3 x V2.1217-36	7,8	-
E 463-168	500	D3 /3	16 E-X	171	G1½ / SAE2	2,5	1	3 x V2.1217-08	7,8	-
E 463-153	480	D3 /4	30 P	87	G1½ / SAE2	1,5	1	3 x P2.1217-21*	7,8	-
E 643-176	550	D4 /1	12 E-X	210	G1½ / SAE2	3,0	1	V2.1260-26	9,5	-

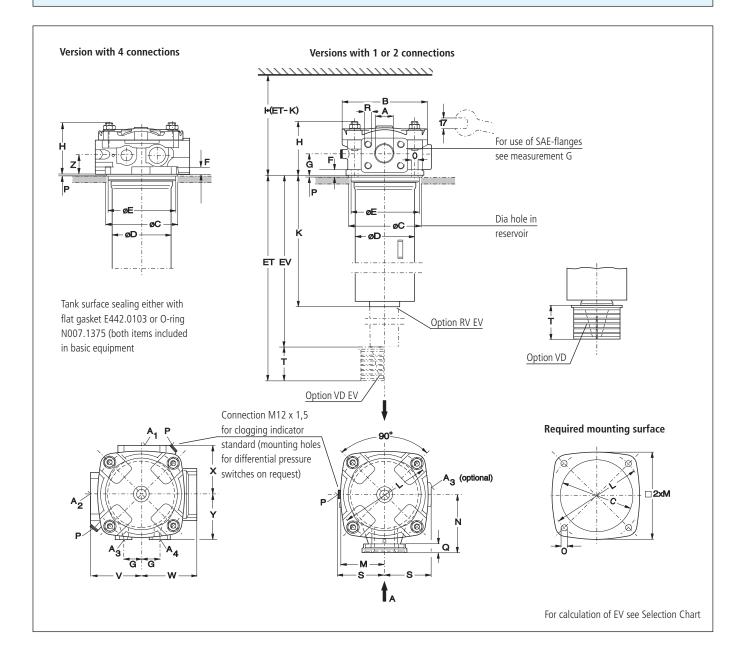
All filters are delivered with a plugged clogging indicator connection M12 x 1,5. (Mounting holes for differential pressure switches on request). As clogging indicators either manometers or electrical pressure switches can be used. Two different head pieces with three various connecting options are available. All filters can also be supplied with an outlet diffuser. Optional extension pipes adapt the filter length to various tank depths. For ordering of accessories please use the below mentioned codes.

Order example: The filter E 453-156 has to be supplied with 2 connections (A and A3), an outlet diffuser and an extension pipe for 564 mm length.

Order description:		E 453-2 56	1	VD	1	EV ₅	64
Connections: 3 various options are available one connection (A) two connections (A and A3) four connections (A1, A2, A3 and A4)	- G1½ / SAE 21 - G1½ / SAE 2 and G¾2 - 2 x G1¼ / SAE 1½, G¾ and G14						
Options: 2 various options are available ——— VD: Outlet diffuser, RV: Extension pipe							
Extension pipe: 7 various lengths are available EV = K (Bowl length) + 81 / + 136 / + 19	16 / + 231 / + 356 / + 446 / + 626 mm (see secti	ion dimension	s and measure	ements)			
For the appropriate clogging indicat	ors see catalogue sheet 60.20.						

Remarks:

- The switching pressure of the electrical pressure switch has always to be lower than the cracking pressure of the by-pass valve (see Selection Chart, column 7).
- The clogging indicators are optional and always delivered detached from the filter.
- The filters listed in this chart are standard filters. Other designs, e.g. with screen elements (mesh size 450 µm) at the bowl outlet, are available on request.

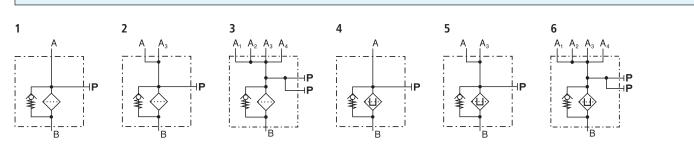


Measurements

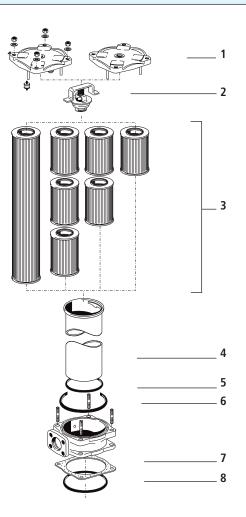
Туре	A	В	C	D	E	F	G	Η	I	к	L	М	Ν	0	Р	Q	R	S	т	v	W	х	Y	Z
E 443	G1½/SAE 2	174	141	131	139,9	12	36/35*	97	370	201	185	86,5	116	11,5	2	18	M12	92	58	96	106	96	89	32,5
E 453	G1½/SAE 2	174	141	131	139,9	12	36/35*	97	540	368	185	86,5	116	11,5	2	18	M12	92	58	96	106	96	89	32,5
E 463	G1½/SAE 2	174	141	131	139,9	12	36/35*	97	710	536	185	86,5	116	11,5	2	18	M12	92	58	96	106	96	89	32,5
E 643	G1½/SAE 2	174	141	131	139,9	12	36/35*	97	840	634	185	86,5	116	11,5	2	18	M12	92	58	96	106	96	89	32,5

for design with 4 connections

Symbols



Spare Parts



Pos.	Designation	Part No.
1	Cover assy	E 443.1200
1a	cover with magnetic system	E 443.1210
2	By-pass assy (1,5 bar)	E 440.1500
2	By-pass assy (2,5 bar)	E 460.1520
2	By-pass assy (3,0 bar)	E 640.1510
3	Filter elements	see Chart / col. 9
4	Filter bowl E 443 *	E 440.1960
4	Filter bowl E 453 *	E 450.1906
4	Filter bowl E 463 *	E 460.1915
4	Filter bowl E 643 *	E 640.1910
5	O-ring 125 x 6	N 007.1256
6	O-ring 151,76 x 5,33	N 007.1525
7	Flat gasket	E 442.0103
8	O-ring 136,5 x 5,34	N 007.1375

* Please indicate options (VD, VDEV, resp. RVEV)

The functions of the complete filters as well as the outstanding features of the filter elements assured by ARGO-HYTOS can only be guaranteed if original ARGO-HYTOS spare parts are used.

Quality Assurance

Quality management according to DIN EN ISO 9001

To ensure constant quality in production and operation, ARGO-HYTOS filter elements undergo strict controls and tests according to the following DIN and ISO standards:

DIN ISO 2941	Verification of collapse/burst resistance
DIN ISO 2943	Verification of material compatibility with fluids
DIN ISO 3724	Verification of flow fatigue characteristics

ISO 2942 ISO 3968 ISO 16889 Verification of fabrication integrity (Bubble Point Test) Evaluation of pressure drop versus flow characteristics Multi-Pass-Test (evaluation of filter fineness and dirt-holding capacity)

Various quality controls during the production process guarantee the leakfree function and solidity of our filters.

Our engineers will be glad to advice you in questions concerning filter application, selection as well as the cleanliness class of the filtered medium attainable under practical operating conditions.

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Suction Filters



ES 074 · ES 094

- Tank top mounting
- Connection up to G1¼
- Nominal flow rate up to 80 l/min

Description

Application

To be installed in the suction line of the pumps of hydraulic systems resp. upstream of the charge pumps of hydrostatic drives.

Performance features

renormance reature	
Protection against wear:	By means of filter elements that, in full-flow filtration, meet even the highest demands regarding cleanliness classes.
Protection against	
malfunction:	By means of full-flow filtration in the system return, the pumps above all are protected from dirt particles remaining in the system after assembly, repairs, or which are generated by wear or enter the system from outside.
Special features	
By-pass valve:	The location close to the suction inlet prevents dirt particles retained by the filter element from entering into the clear oil side.
Filter element	
locking valve:	Ensures that dirt accumulated in the filter element is removed together with the element and cannot return to the tank.
Foot valve:	When the screw-on cap is removed for maintenance, the foot valve closes automatically. This makes it possible to service the filter even if it is submerged below the oil level in a full tank.

Characteristics

Nominal flow rate

Up to 80 l/min (see Selection Chart, column 2) The nominal flow rates indicated by ARGO-HYTOS are based on the following features:

- closed by-pass valve at $\nu \leq 200 \text{ mm}^2/\text{s}$
- element service life > 1000 operating hours at an average fluid contamination of 0,07 g per l/min flow volume
- flow velocity in the connection lines ≤ 1,5 m/s If units not equipped with a bypass valve are used in hydrostatic drives, the recommendations regarding their technical application given on catalogue sheet 10.310 should be observed.

Connection

Threaded ports according to ISO 228 or DIN 13. Sizes see Selection Chart, column 6 (other port threads on request)

Filter fineness

16 μm(c) ... 60 μm(c) β-values according ISO 16889 (see Selection Chart, column 4 and Diagram Dx)

Dirt-holding capacity

Values in g test dust ISO MTD according to ISO 16889 (see Selection Chart, column 5)

Filter elements

Flow direction from centre to outside. The star-shaped pleating of the filter material results in:

- large filter surfaces
- low pressure drop
- high dirt-holding capacities
- long service life

In filters with a magnetic system, the ferromagnetic particles in the fluid pass first through a strong magnetic field and are separated.

Filter maintenance

By using a clogging indicator the correct moment for maintenance is stated and guarantees the optimum utilization of the filter life.

Materials

Screw-on cap:	Polyester, GF reinforced
Filter head:	Aluminium alloy
Filter bowl:	Steel
Seals:	NBR (Viton on request)
	EXAPOR [®] -inorganic microfibre web
Filter media:	Paper-cellulose web, impregnated with resin
	Stainless steel wire mesh (1.4301)

Accessories

Electrical and optical clogging indicators are available. Dimensions and technical data see catalogue sheet 60.20.

Hydraulic fluids

Mineral oil and biodegradable fluids (HEES or HETG, see info-sheet 00.20)

Temperature range

• start-up viscosity:

- 30 °C ... + 100 °C (temporary - 40 °C ... + 120 °C)

Viscosity at nominal flow rate

- at operating temperature: $\nu < 60 \text{ mm}^2/\text{s}$
 - determine $v_{max'}$ observing the permissible pressure at the pump inlet according to diagram D; determine Δp as a function of the viscosity (take into account the pressure loss in the connecting lines!)
- on initial operation of units equipped with a bypass valve:

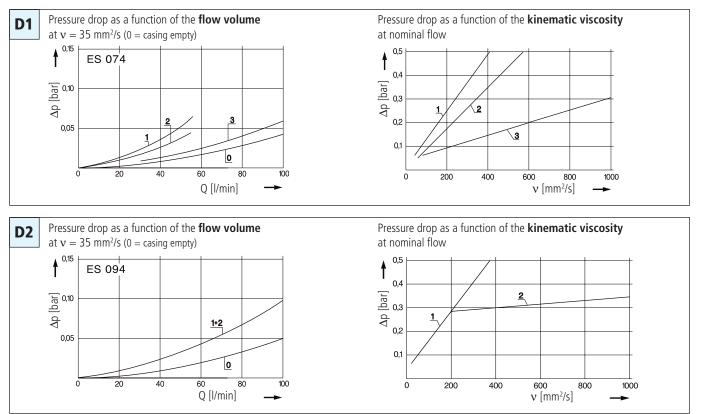
The recommended starting viscosity can be read from the Diagram D (pressure drop as a function of the kinematic viscosity) as follows: Find the 70% Δp of the cracking pressure of the by-pass valve on the vertical axis. Draw a horizontal line so that it intersects the Δp curve at a point. Read this point on the horizontal axis for the viscosity.

Mounting position

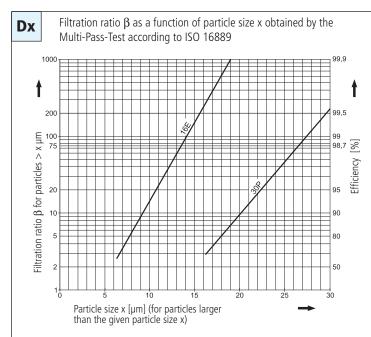
Vertical mounting to be preferred, suction opening pointing downwards, versions equipped with foot valve for horizontal mounting also.

Diagrams

Δp -curves for complete filters in Selection Chart, column 3



Filter fineness curves in Selection Chart, column 4



The abbreviations represent the following $\beta\mbox{-values}$ resp. finenesses:

For EXAPOR®- and Paper elements:

16 $\mathbf{E} = \overline{\beta}_{16(c)} = 200 \text{ EXAPOR}^{\otimes}$

30 P =
$$\overline{\beta}_{30 (c)}^{10 (c)} = 200$$
 Paper

Based on the structure of the filter media of the 30 P paper elements, deviations from the printed curves are quite probable.

For screen elements:

40 S =	screen materia	l with mesh	size	40 µm
60 S =	screen materia	l with mesh	size	60 µm
100 S =	screen materia	l with mesh	size	100 µm
Tolerances	for mesh size a	ccording to	DIN 4189	9.

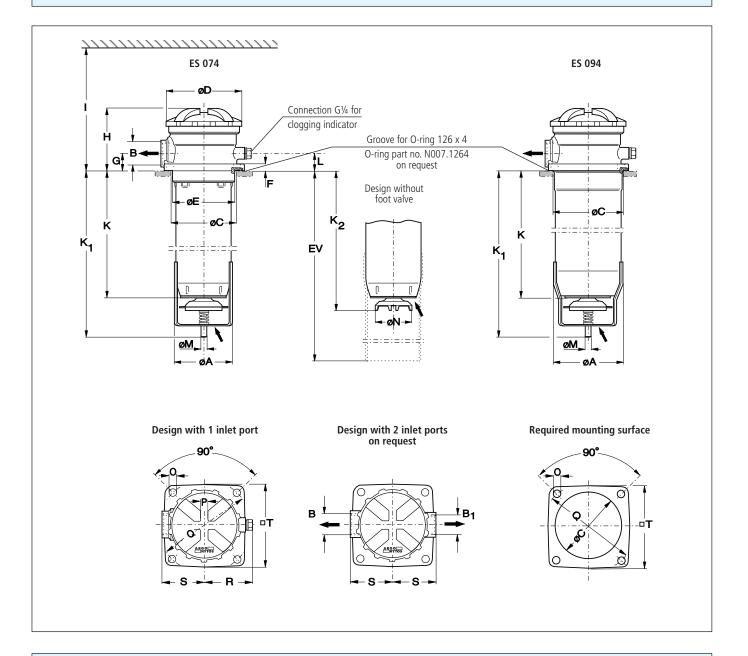
For special applications, finenesses differing from these curves are also available by using special composed filter material.

Selection Chart

			ne drop see	leune no. see Dir ter fineness see Dir ter fineness see Dir ter fineness see	ocapacity ocapacity ersurface in ()		/	SUIP	Intol Replacement	, filter	ue.
01/1		:Dal flow	e drop r	fineness coldin	19 certace II	octionb	1 Priv	resialve	e al ceme	NO.	bit offs
Part No	N	ominal flow Pressu	Diagla Fi	ter i Dirt-ho	erse conn	ection B	ackin F	ootvos	hupp. Beblac bal	C NU W	eight Remarks
	 /min	<u>.</u>	Í	g		bar				kg	
1	2	3	4	5	6	7	8	9	10	11	12
074-6801	35*	D1 /1	16 E	18	G1¼	-	•	2	V2.0923-07	2,4	
074-6110	45*	D1 /1	30 P	23	G1	-	-	1	P2.0923-01	2,2	-
074-6120	45*	D1 /2	30 P	23	G1¼	-	-	1	P2.0923-01	2,2	-
074-6121	45*	D1 /1	30 P	23	G1	-	•	2	P2.0923-01	2,4	-
074-6141	45*	D1 /2	30 P	23	G1¼	-	•	2	P2.0923-01	2,4	-
074-0001	80	D1 /3	60 S	(1540 cm ²)	G1¼	-0,25	•	6	S2.0920-10	2,4	with magnetic system
094-6801	55*	D2 /1	16 E	26	G1¼	-	•	2	V2.0933-08	3,2	_
094-6110	70*	D2/1	30 P	34	G1¼	-	-	1	P2.0933-01	3,0	_
094-6111	70*	D2/1	30 P	34	G1¼	-	•	2	P2.0933-01	3,2	_
094-6121	70	D2 /2	30 P	34	G1¼	-0,25	•	4	P2.0933-01	3,2	-
rder example rder descripti art No. (Basic xtension pipe V = 400 / 500 n	on: unit) - (2 vari	ous lengt	hs are a	ES 0	blied with ar			pe (EV) for a mountin	g dept	h of 400 mm.
				see catalogue	sheet 60.20).					

* Those values apply when used in hydrostatic drives and instructions in catalogue sheet 10.310 have to be observed

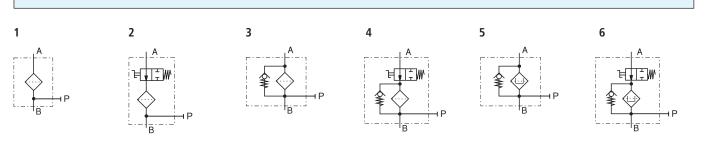
Dimensions



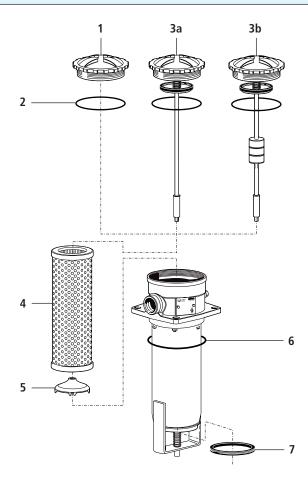
Measurements

Туре	Α	В	C min./max.	D	E	F	G	Н	Ι	К	K ₁	K ₂	L	М	Ν	0	Р
ES 074	100	G1, G1¼	111/121	126,5	110	11,5	32	106	400	198	256	218	35	10	62,5	11	13
ES 094	115	G1¼	119/121	126,5	-	11,5	32	106	525	305	364	325	35	10	62,5	11	13
Туре	Q	R	S	Т													
ES 074	165	82,5	76	141													
ES 094	165	76,5	76	141													

Symbols



Spare Parts



Pos.	Designation	Part No.
1	Screw-on cap with Pos. 2	ES 074.1212
2	O-ring 100 x 4	N 007.1004
3a 3b	Screw-on cap with Pos. 2 ES 074 (without by-pass) ES 094 (without by-pass) ES 094 (with by-pass) Screw-on cap with Pos. 2	ES 074.1213 ES 094.1212 ES 094.1213
	including magnetic system ES 074 (with by-pass)	ES 074.1205
4	Filter element	see Chart / col. 10
5	Valve cone	ES 074.0202
6	O-ring 126 x 4 *	N 007.1264
7	Rubber ring	N 042.7401

* not included in basic equipment

The functions of the complete filters as well as the outstanding features of the filter elements assured by ARGO-HYTOS can only be guaranteed if original ARGO-HYTOS spare parts are used.

Quality Assurance

Quality management according to DIN EN ISO 9001

To ensure constant quality in production and operation, ARGO-HYTOS filter elements undergo strict controls and tests according to the following DIN and ISO standards:

DIN ISO 2941	Verification of collapse/burst resistance
DIN ISO 2943	Verification of material compatibility with fluids
DIN ISO 3724	Verification of flow fatigue characteristics

ISO 2942 ISO 3968 ISO 16889 Verification of fabrication integrity (Bubble Point Test) Evaluation of pressure drop versus flow characteristics Multi-Pass-Test (evaluation of filter fineness and dirt-holding capacity)

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Suction Filters



ES 134 · ES 144

- Tank top mounting
- Connection up to SAE 11/2
- Nominal flow rate up to 130 l/min

Description

Application

To be installed in the suction line of the pumps of hydraulic systems resp.

upstream of the ch	arge pumps of hydrostatic drives.
Performance fea Protection	tures
against wear:	By means of filter elements that, in full-flow filtration, meet even the highest demands regarding cleanliness classes.
Protection against	
malfunction:	By means of full-flow filtration in the system return, the pumps above all are protected from dirt particles remaining in the system after assembly, repairs, or which are generated by wear or enter the system from outside.
Special features	
By-pass valve:	The location close to the suction inlet prevents dirt particles retained by the filter element from entering into the clear oil side.
Filter element	
locking valve:	Ensures that dirt accumulated in the filter element is removed together with the element and cannot return to the tank.
Foot valve:	When the screw-on cap is removed for maintenance, the foot valve closes automatically. This makes it possible to service the filter even if it is submerged below the oil

Filter elements

Flow direction from centre to outside. The star-shaped pleating of the filter material results in:

- large filter surfaces
- low pressure drop
- high dirt-holding capacities
- long service life

In filters with a magnetic system, the ferromagnetic particles in the fluid pass first through a strong magnetic field and are separated.

Filter maintenance

By using a clogging indicator the correct moment for maintenance is stated and guarantees the optimum utilization of the filter life.

Materials

Screw-on cap:	Polyester, GF reinforced
Filter head:	Aluminium alloy
Filter bowl:	Steel
Seals:	NBR (Viton on request)
Filter media:	Paper - cellulose web, impregnated with resin
	Stainless steel wire mesh (1.4301)

Accessories

Electrical and optical clogging indicators are available. Dimensions and technical data see catalogue sheet 60.20.

Characteristics

level in a full tank.

Nominal flow rate

Up to 130 l/min (see Selection Chart, column 2) The nominal flow rates indicated by ARGO-HYTOS are based on the following features:

- closed by-pass valve at $v \le 200 \text{ mm}^2/\text{s}$
- element service life > 1000 operating hours at an average fluid contamination of 0,07 g per l/min flow volume
- flow velocity in the connection lines $\leq 1,5$ m/s If units not equipped with a bypass valve are used in hydrostatic drives, the recommendations regarding their technical application given on catalogue sheet 10.310 should be observed.

Connection

Threaded ports according to ISO 228 or DIN 13 or SAE-flanges (3000 psi) Sizes see Selection Chart, column 6 (other port threads on request)

Filter fineness

30 µm(c) ... 60 µm(c) β -values according to ISO 16889 (see Selection Chart, column 4 and Diagram Dx)

Dirt-holding capacity

Values in g test dust ISO MTD according to ISO 16889 (see Selection Chart, column 5)

Hydraulic fluids

Mineral oil and biodegradable fluids (HEES or HETG, see info-sheet 00.20)

Temperature range

• start-up viscosity:

- 30 °C ... + 100 °C (temporary - 40 °C ... + 120 °C)

Viscosity at nominal flow rate

- at operating temperature: $v < 60 \text{ mm}^2/\text{s}$
 - determine $\nu_{_{\mbox{\scriptsize max}\prime}}$ observing the permissible pressure at the pump inlet according to diagram D; determine Δp as a function of the viscosity (take into account the pressure loss in the connecting lines!)
- on initial operation of units equipped with a bypass valve:

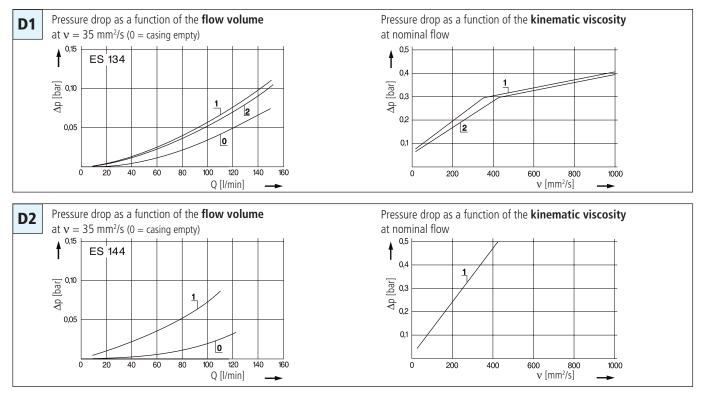
The recommended starting viscosity can be read from the Diagram D (pressure drop as a function of the kinematic viscosity) as follows: Find the 70% Δp of the cracking pressure of the by-pass valve on the vertical axis. Draw a horizontal line so that it intersects the Δp curve at a point. Read this point on the horizontal axis for the viscosity.

Mounting position

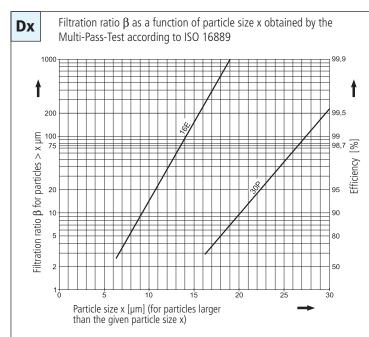
Vertical mounting to be preferred, suction opening pointing downwards, versions equipped with foot valve for horizontal mounting also.

Diagrams





Filter fineness curves in Selection Chart, column 4



The abbreviations represent the following -values resp. finenesses:

For EXAPOR®- and Paper elements:

16
$$\mathbf{E} = \overline{\beta}_{16(c)} = 200 \text{ EXAPOR}^{\otimes}$$

30 P =
$$\beta_{30 (c)} = 200$$
 Papier

Based on the structure of the filter media of the 30 P paper elements, deviations from the printed curves are quite probable.

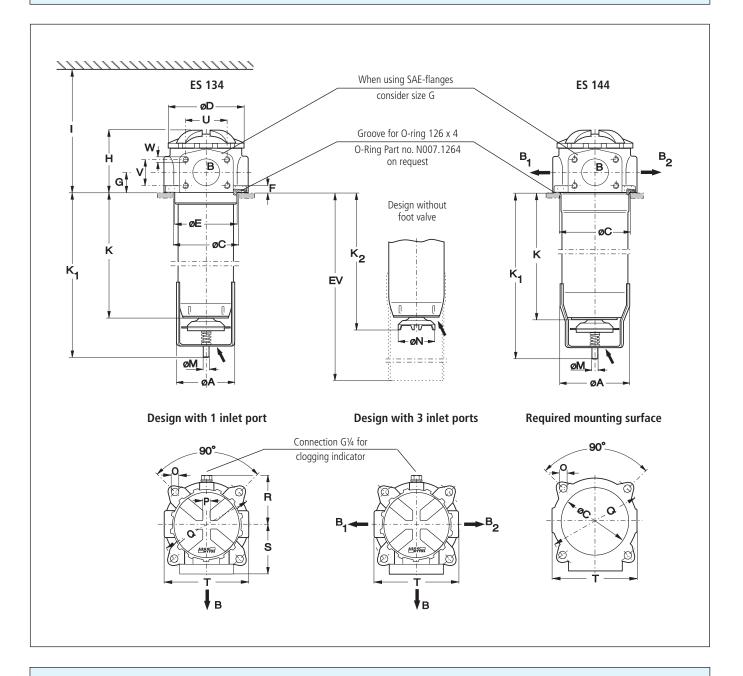
For screen elements:

40 S =	screen material with mesh size	40 µm
60 S =	screen material with mesh size	60 µm
100 S =	screen material with mesh size	100 µm
Tolerances	for mesh size according to DIN 4	4189. [.]

For special applications, finenesses differing from these curves are also available by using special composed filter material.

Selection Chart

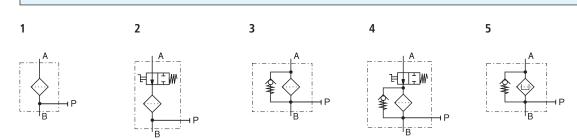
			/		ot		/		2855		
PartNo		Joninal How	edrop ser	ter finenessee D	agi. De capacity () ng capacity () er surface in () connection	mB Cr	acking	oot valve	St by Pass	ent filter	lemen. Neight Remarks
	l/min			g	/	bar				kg	
1	2	3	4	5	6	7	8	9	10	11	12
5 134-0501	130	D1 /1	40S	(1540 cm ²)	SAE 11/2	-0,25	•	6	S2.0920-05	3,0	with magnetic system
134-0001	130	D1 /2	605	(1540 cm ²)	SAE 1½	-0,25	•	6	S2.0920-10	3,0	with magnetic system
144-6110	70*	D2 /1	30 P	34	2 x G1 + G1¼	-	-	1	P2.0933-01	3,5	-
rder example rder descripti art No. (Basic	: The fi ion: unit) -	lter ES 13	4-0501		ank depths. For orde pplied with an ext ES 134-050	ension p		V) for			
V = 400 / 500 r					nents) I e sheet 60.20.						
emarks: The start of the valve (see Sele	e red are	nart, colum	n 7).		ure of the vacuum sv then be loosely provi		always	to be h	nigher than the cr	acking	pressure of the by-pass



Measurements

Туре	Α	В	B1	B2	C min./max.	D	Ε	F	G	Η	Ι	K	K1	K2	L	М	Ν
ES 134	100	SAE 11/2	-	-	111/121	126,5	110	12	32	106	400	198	256	218	-	10	62,5
ES 144	115	G1¼	G1	G1	119/121	126,5	-	12	32	106	525	305	364	325	-	10	62,5
Туре	0	Р	Q	R	S	Т	U	V	W								
ES 134	11,5	13	165	81	82	144	69,8	35,7	M 12								
ES 144	11,5	13	165	81	82	144	69,8	35,7	M 12								

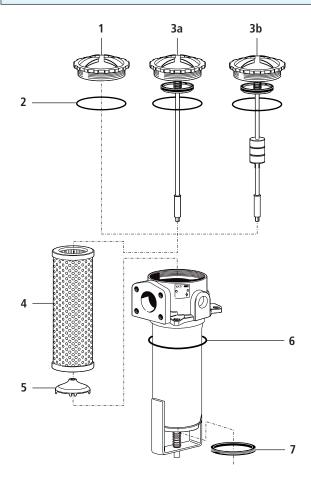
Symbols





6

Spare Parts



Pos.	Designation	Part No.
1	Screw-on cap with Pos. 2	ES 074.1212
2	O-ring 100 x 4	N 007.1004
3a	Screw-on cap assy with Pos. 2 ES 134 (without by-pass) ES 144 (without by-pass)	ES 074.1213 ES 094.1212
3b	Screw-on cap wiht Pos. 2 magnetic system ES 134 (with by-pass)	ES 074.1205
4	Filter element	see Chart / col. 10
5	Valve cone	ES 074.0202
6	O-ring 126 x 4 *	N 007.1264
7	Rubber ring	N 042.7401

* not included in basic equipment

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DIN ISO 2943	Verification of material compatibility with fluids
DIN ISO 3724	Verification of flow fatigue characteristics

ISO 2942 ISO 3968 ISO 16889 Verification of fabrication integrity (Bubble Point Test) Evaluation of pressure drop versus flow characteristics Multi-Pass-Test (evaluation of filter fineness and dirt-holding capacity)

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Our engineers will be glad to advice you in questions concerning filter application, selection as well as the cleanliness class of the filtered medium attainable under practical operating conditions.

Illustrations may sometimes differ from the original. ARGO-HYTOS is not responsible for any unintentional mistake in this specification sheet...



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Return Filters - lightline



FR 043 · FR 072

- Tank top mounting / In-line mounting
- Hose connection up to ID 19 mm
- Nominal flow rate up to 70 l/min

Description

Application

In the return line circuits of hydraulic systems.

Performance features

Protection against wear: By means of filter elements that, in full-flow filtration, meet even the highest demands regarding cleanliness classes. Protection against malfunction: By means of full-flow filtration in the system return, the

> pumps above all are protected from dirt particles remaining in the system after assembly, repairs, or which are generated by wear or enter the system from outside.

Special features

Connection:	Hose nipple
By-pass valve:	The location close to the inlet port prevents dirt particles retained by the filter element from entering into the clean oil side.
Removable bowl:	In case of maintenance the filter bowl is removed
	together with the filter element - therefore dirt particles are not flushed back into the tank.
Oil separator:	Prevents oil splashing through the breather on mobile
	application.
Extension pipe:	Easy and fast adaption to various lengths.

Filter elements

Flow direction from outside to centre. The star-shaped pleating of the filter material results in:

- large filter surfaces
- low pressure drop
- high dirt-holding capacities
- long service life

Characteristics

Nominal flow rate

Up to 70 l/min (see Selection Chart, column 2) The nominal flow rates indicated by ARGO-HYTOS are based on the following features:

- closed by-pass valve at $v \le 200 \text{ mm}^2/\text{s}$
- element service life > 1000 operating hours at an average fluid contamination of 0,07 g per l/min flow volume
- flow velocity in the connection lines \leq 4,5 m/s

Connection

Hose nipple for hose up to ID 19 mm. Sizes see Selection Chart, column 6 (other connections on request)

Filter fineness

12 μm(c) ... 30 μm(c) β-values according to ISO 16889 (see Selection Chart, column 4 and Diagram Dx)

Dirt-holding capacity

Values in g test dust ISO MTD according to ISO 16889 (see Selection Chart, column 5)

Ventilating Filter

Ventilation of the reservoir by an integral star-shape pleated filter element:

- removable (replace annually!)
- splash-proof
- fineness 2 µm

Filter maintenance

By using a clogging indicator the correct moment for maintenance is stated and guarantees the optimum utilization of the filter life.

Materials

 Screw-on cap:
 Polyester, GF reinforced

 Housing:
 Polyamide, GF reinforced*

 Seals:
 NBR (Viton on request)

 Filter media:
 EXAPOR®MAX - inorganic multi-layer microfibre web Paper - cellulose web, impregnated with resin

 * due to the conductable plastic material no static charge can occur

Accessories

Electrical and optical clogging indicators are available. Dimensions and technical data see catalogue sheet 60.20.

Recommended hose clamps according to DIN 3017 Part 2 or equivalent for hose OD 23 mm or 26 mm. For orders use ARGO-HYTOS Part No. 332 70 03 or 332 70 04.

For mounting of extension pipes following parts are needed:

Aluminium pipe (Length xxx in mm)Part No. FR 043.LxxxO-ringPart No. N 007.0203Crimping toolPart No. FR 043.1770

Hydraulic fluids

Mineral oil and biodegradable fluids (HEES or HETG, see info-sheet 00.20) With high filling conditions we recommend an electrical conductivity \geq 500 pS/m at 20 °C.

Temperature range

- 30 °C ... + 80 °C (short intervals to + 100 °C)

Viscosity at nominal flow rate

- at operating temperature: $v < 60 \text{ mm}^2/\text{s}$
- as starting viscosity: $v_{max} = 1200 \text{ mm}^2/\text{s}$
- at first operation:
- The recommended starting viscosity can be read from the Diagram D (pressure drop as a function of the kinematic viscosity) as follows: Find the 70% Δp of the cracking pressure of the by-pass valve on the vertical axis. Draw a horizontal line so that it intersects the Δp curve at a point. Read this point on the horizontal axis for the viscosity.

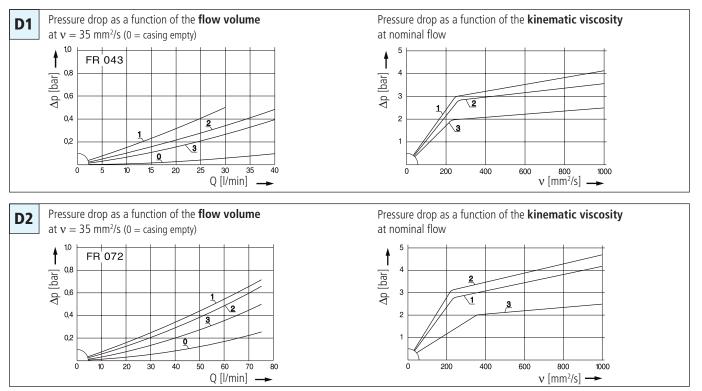
Operating pressure Max. 6 bar

Mounting position

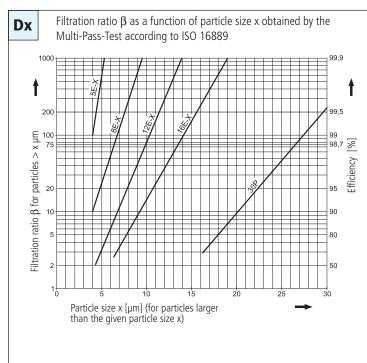
Preferably vertical, outlet downwards

Diagrams

Δp -curves for complete filters in Selection Chart, column 3



Filter fineness curves in Selection Chart, column 4



The abbreviations represent the following $\beta\mbox{-values resp.}$ finenesses:

For EXAPOR®MAX- and Paper elements:

5 E-X 8 E-X 12 E-X 16 E-X	=	$\overline{\beta}_{5(c)}$	= 200	EXAPOR®MAX
8 E-X	=	$\overline{\beta}_{8(c)}^{(c)}$	= 200	EXAPOR®MAX
12 E-X	=	$\bar{\beta}_{12(c)}$	= 200	EXAPOR®MAX
16 E-X	=	$\overline{\beta}_{16 (c)}^{12 (c)}$	= 200	EXAPOR®MAX
30 P	=	$\overline{\beta}_{30 (c)}$	= 200	Paper

Based on the structure of the filter media of the 30 P paper elements, deviations from the printed curves are quite probable.

For screen elements:

40 S = screen material with mesh size 40 µ	40 S =	screen	material	with	mesh	n size	40 µ
---------------------------------------------------	--------	--------	----------	------	------	--------	------

60 S = screen material with mesh size $60 \,\mu\text{m}$

100 S = screen material with mesh size $100 \ \mu m$

Tolerances for mesh size according to DIN 4189

For ventilating filter elements:

2 CL = 99,5 % filter efficiency for particles of size 2 μ m

For special applications, finenesses differing from these curves are also available by using special composed filter material.

Selection Chart

PartN). N	ominal flow	le drop see Diagram Di	une no. erfineness see Dirt-	Diagr. U.	paction	racking	pressure of bit pass minol Replacement	NO. WE	inent ight Replacement ventil	ating filter In fineness see Diagrams Remarks
	l/min	<u>, </u>		g		bar			kg		
1	2	3	4	5	6	7	8	9	10	11	12
FR 043-156	25	D1 /1	12 E-X	5,3	17,5	2,5	1	V3.0510-56	0,42	L1.0403-51 (2 CL)	-
FR 043-166	25	D1 /1	12 E-X	5,3	17,5	2,5	2	V3.0510-56	0,42	L1.0403-51 (2 CL)	M12 x 1,5 for indicate
FR 043-158	35	D1 /2	16 E-X	5,7	17,5	2,5	1	V3.0510-58	0,42	L1.0403-51 (2 CL)	-
FR 043-178	35	D1 /2	16 E-X	5,7	17,5	2,5	2	V3.0510-58	0,42	L1.0403-51 (2 CL)	M12 x 1,5 for indicato
FR 043-151	30	D1 /3	30 P	4,0	17,5	1,5	1	P3.0510-51	0,42	L1.0403-51 (2 CL)	-
FR 043-161	30	D1 /3	30 P	4,0	17,5	1,5	2	P3.0510-51	0,42	L1.0403-51 (2 CL)	M12 x 1,5 for indicate
FR 072-156	50	D2 /1	12 E-X	11	20,5	2,5	1	V3.0520-56	0,58	L1.0403-51 (2 CL)	-
FR 072-166	50	D2 /1	12 E-X	11	20,5	2,5	2	V3.0520-56	0,58	L1.0403-51 (2 CL)	M12 x 1,5 for indicate
FR 072-158	70	D2 /2	16 E-X	12	20,5	2,5	1	V3.0520-58	0,58	L1.0403-51 (2 CL)	-
FR 072-168	70	D2 /2	16 E-X	12	20,5	2,5	2	V3.0520-58	0,58	L1.0403-51 (2 CL)	M12 x 1,5 for indicate
FR 072-151	50	D2 /3	30 P	6,6	20,5	1,5	1	P3.0520-51*	0,58	L1.0403-51 (2 CL)	-
FR 072-171	50	D2 /3	30 P	6,6	20,5	1,5	2	P3.0520-51*	0,58	L1.0403-51 (2 CL)	M12 x 1,5 for indicate

/

/

/

/ /

Order example: The filter FR 043-166 has to be supplied with an extension pipe (EV) for a mounting depth of 300 mm.

Order descript	tion:
----------------	-------

Part No. (Basic unit) -

FR 043-166	1	EV 300

Extension pipe (5 various lengths are available) EV = K + 65 / + 115 / + 215 / + 315 / + 415 (see dimensions and measurements)

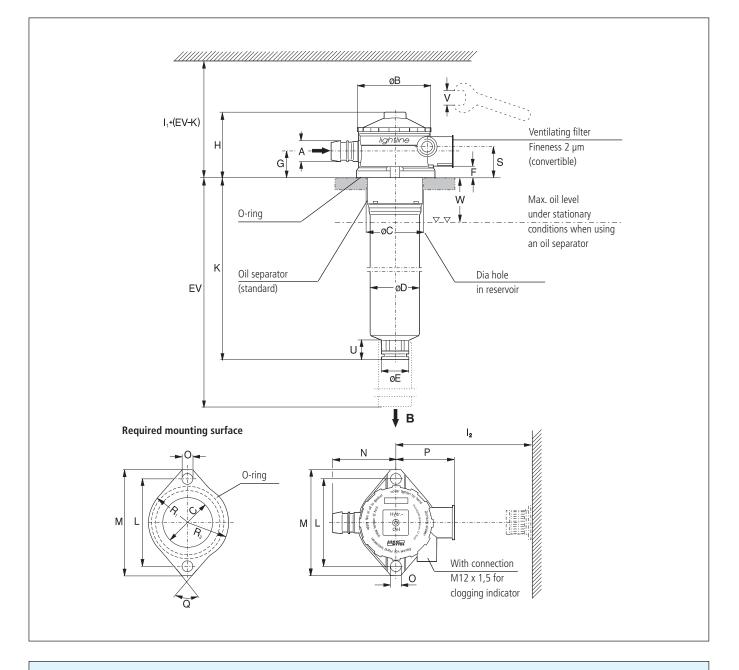
For the appropriate clogging indicator see data sheet 60.20.

When using pressure switches of series DG 813 sealing by means of an O-ring (order no. N 007.0103, to be ordered separately) has to be guaranteed (torque 4 Nm). When using manometers of series DG 200 variants with preformed sealing ring are to be used.

Remarks:

- The switching pressure of the electrical pressure switch has always to be lower than the cracking pressure of the by-pass valve (see Selection Chart, column 7).
- The clogging indicators are optionally available and will then be loosely provided.
- For fastening the filter the enclosed spring washers have to be used. Mounting force 15⁺⁵ Nm.
- The filters listed in this chart are standard filters. Other designs available on request.

* Paper media supported with metal gauze

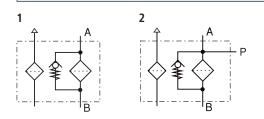


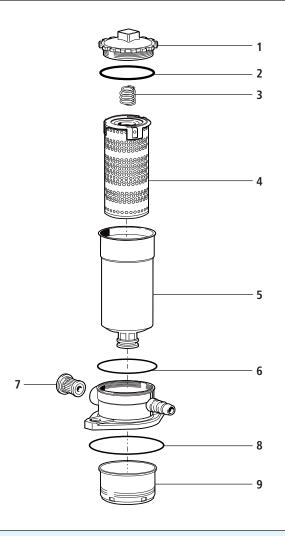
Measurements

80°			
	39	42	27
80°	39	42	27

* including the enclosed spring washers Ø10, DIN 137 shape B, corruga

Symbols





Pos.	Designation	Part No.
1	Screw-on cap	FR 043.0201
2	O-ring 57 x 3	N 007.0573
3	Compression spring	N 015.1606
4	Filter element	s. Chart / col. 9
5	Filter bowl FR 043 *	FR 043.0107
5	Filter bowl FR 072 *	FR 072.0104
6	O-ring 50 x 2	N 007.0501
7	Ventilating filter	L1.0403-51
8	O-ring 69 x 4	N 007.0704
9	Oil separator	FR 043.0701

* Specify mounting depth in mm

The functions of the complete filters as well as the outstanding features of the filter elements assured by ARGO-HYTOS can only be guaranteed if original ARGO-HYTOS spare parts are used.

Quality Assurance

Quality management according to DIN EN ISO 9001

To ensure constant quality in production and operation, ARGO-HYTOS filter elements undergo strict controls and tests according to the following DIN and ISO standards:

DIN ISO 2941	Verification of collapse/burst resistance
DIN ISO 2943	Verification of material compatibility with fluids
DIN ISO 3724	Verification of flow fatigue characteristics

ISO 2942	
ISO 3968	
ISO 16889	

Verification of fabrication integrity (Bubble Point Test) Evaluation of pressure drop versus flow characteristics Multi-Pass-Test (evaluation of filter fineness and dirt-holding capacity)

Various quality controls during the production process guarantee the leakfree function and solidity of our filters.

Our engineers will be glad to advice you in questions concerning filter application, selection as well as the cleanliness class of the filtered medium attainable under practical operating conditions.

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High-Pressure Safety Filters



HD 040 · HD 081 HD 150

- In-line mounting
- Operating pressure up to 315 bar
- Nominal flow rate up to 100 l/min

Description

Application

In the high-pressure circuits of hydraulic systems.

Performance features

Functional	
protection:	The high-pressure safety filter retains residues remaining in the system due to installation or after repairs, and intake chips from pumps (especially gear pumps). This prevents functional failures or faults on downstream components, particularly control/regulation or throttle valves.
Protection	
against wear:	For wear protection, a fine filter should be installed elsewhere in the system.

Filter elements

Flow direction from outside to centre. The star-shaped pleating of the filter material provides:

- large filter surfaces
- low pressure drop high dirt-holding capacities
- long service life

Materials

Housing:	steel, zinc plated
Seals:	NBR (Viton on request)
Filter media:	stainless steel wire mesh (1.4301)

Selection Chart

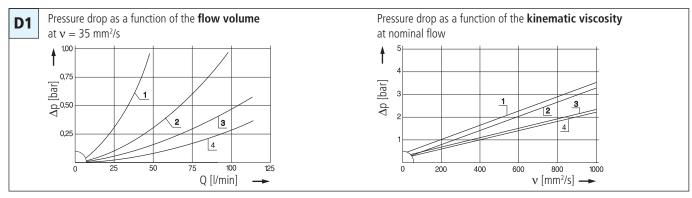
¹ Filter element differential pressure stable up to 160 bar

PartN). N	uminal flow Pressure	e drop diagr	am Dicur am Dicur interfiner Fi	ess Itersufat	ce acting pressure cont	nection	A/B Jimensio	nC imension	In Dension	intension Dimension	Infension H	nension L Wit	uth acros	s flats SM	eight Remain
	l/min		μm	cm²	bar		mm	mm	mm	mm	mm	mm			kg	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
ID 040-110	40	D1 /1	100 ¹	60	-	M22 x 1,5	12	-	7	15	63	97	36/36	1	0,45	2
ID 081-111	80	D1 /2	100 ¹	125	-	M26 x 1,5	12	52	7,5	18	11	130	46/46	1	1,10	2
ID 150-01	100	D1 /3	100 ¹	300	-	G3/4	12	65	10,5	-	-	142,5	55/36	1	2,00	-
ID 150-50	100	D1 /4	60	320	3,5	G3/4	12	65	10,5	-	-	142,5	55/36	2	1,90	-
Remark:																

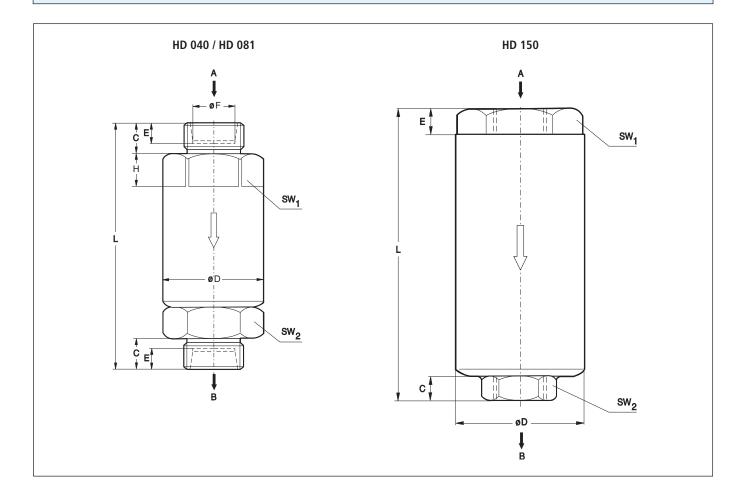
² Connection according to DIN 3861

Diagrams

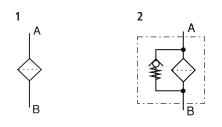
$\Delta p\text{-curves}$ for the filters in Selection Chart, column 3



Dimensions



Symbols



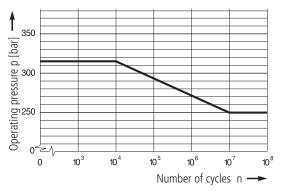
Characteristics

Operating pressure

0 ... 250 bar, min. 10⁷ pressure cycles Nominal pressure according to DIN 24550

0 ... 315 bar, min. 10⁴ pressure cycles Quasi-static operating pressure

Permissible pressure for other numbers of cycles



Nominal flow rate

Up to 100 l/min (see Selection Chart, column 2) The nominal flow rates indicated by ARGO-HYTOS are based on the following features:

- closed by-pass valve at $\nu \leq$ 200 mm²/s
- flow velocity in the connection lines:

up to 250	bar ≤ 8 m/s
up to 450	$bar \le 12 \text{ m/s}$

Filter fineness

60 μm, 100 μm (see Selection Chart, column 4)

Hydraulic fluids

Mineral oil and biodegradable fluids (HEES and HETG, see info-sheet 00.20)

Temperature range

- 30 °C ... + 100 °C (temporary - 40° C ... + 120 °C)

Viscosity at nominal flow rate

- at operating temperature: $v < 60 \text{ mm}^2/\text{s}$
- as starting viscosity: $v_{max} = 1200 \text{ mm}^2/\text{s}$
- at initial operation:
- The recommended starting viscosity can be read from the diagram D (pressure drop as a function of the kinematic viscosity) as follows: Find the 70% Δp of the cracking pressure of the by-pass valve on the vertical axis. Draw a horizontal line so that it intersects the Δp curve at a point. Read this point on the horizontal axis for the viscosity.

Mounting position

As desired

Connection

Threaded ports according to ISO 228, DIN 13 and/or DIN 3861. Sizes see Selection Chart, column 7 (other port threads on request).

Quality Assurance

Quality management according to DIN EN ISO 9001

To ensure constant quality in production and operation, ARGO-HYTOS filter elements undergo strict controls and tests according to the following DIN and ISO standards:

DIN ISO 2941	Verification of collapse/burst resistance
DIN ISO 2943	Verification of material compatibility with fluids
DIN ISO 3724	Verification of flow fatigue characteristics

ISO 2942	2
ISO 3968	3
ISO 1688	9

Verification of fabrication integrity (Bubble Point Test) Evaluation of pressure drop versus flow characteristics Multi-Pass-Test (evaluation of filter fineness and dirt-holding capacity)

Before release into the series production the filter casing is tested for fatigue strength in our pressure pulse test rig. Various quality controls during the production process guarantee the leakfree function and solidity of our filters.

Our engineers will be glad to advice you in questions concerning filter application, selection as well as the cleanliness class of the filtered medium attainable under practical operating conditions.

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High Pressure Filters

HD 044 · HD 064

- Flange mounting
- Operating pressure up to 350 bar
- Nominal flow rate up to 80 l/min

Description

Application

In the high pressure circuits of hydraulic systems.

Performance features

Protection

against wear:	By means of filter elements that, in full-flow filtration,
	meet even the highest demands regarding cleanliness
	classes.
Protection against	

malfunction:

Through installation near to the control valves or other expensive components. The specific determined flow rate guarantees a closed by-pass valve even at $v \le 200 \text{ mm}^2/\text{s}$ (cold start condition).

Filter elements

Flow direction from outside to centre. The star-shaped pleating of the filter material results in:

- large filter surfaces
- low pressure drop
- high dirt-holding capacities
- long service life

Filter maintenance

By using a clogging indicator the correct moment for maintenance is stated and guarantees the optimum utilization of the filter life.

Materials

Filter head:	Spheroidal graphite cast iron (SGI)
Filter bowl:	Cold extruded steel
Coating:	Powder paint
Seals:	NBR (Viton on request)
Filter media:	EXAPOR®MAX - inorganic multi-layer microfibre web

Accessories

Electrical and/or optical clogging indicators are available - optionally with one or two switching points resp. temperature suppression. Dimensions and technical data see catalogue sheet 60.30.

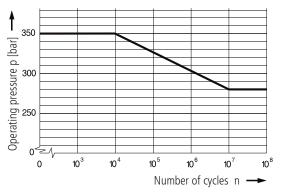
Characteristics

Operating pressure

0 ... 280 bar, min. 10⁷ pressure cycles Nominal pressure according to DIN 24550

0 ... 350 bar, min. $10^4\ pressure\ cycles$ Quasi-static operating pressure

Permissible pressures for other numbers of cycles



Nominal flow rate

Up to 80 l/min (see Selection Chart, column 2) The nominal flow rates indicated by ARGO-HYTOS are based on the following features:

- closed by-pass valve at $\nu \leq 200 \text{ mm}^2/\text{s}$
- element service life > 1000 operating hours at an average fluid contamination of 0,07 g per l/min flow volume

 flow velocity in the connection lines: up to 250 bar ≤ 8 m/s up to 450 bar ≤ 12 m/s

Filter fineness

 5μ m(c) ... 16 μm(c) β-values according to ISO 16889 (see Selection Chart, column 4 and diagram Dx)

Dirt-holding capacity

Values in g test dust ISO MTD according to ISO16889 (see Selection Chart, column 5)

Hydraulic fluids

Mineral oil and biodegradable fluids (HEES and HETG, see info-sheet 00.20)

Temperature range

- 30 °C ... + 100 °C (temporary - 40 °C ... + 120 °C)

Viscosity at nominal flow rate

- at operating temperature: < 60 mm²/s
 - as starting viscosity: $v_{max} = 1200 \text{ mm}^2/\text{s}$
- at initial operation:

The recommended starting viscosity can be read from the diagram D (pressure drop as a function of the kinematic viscosity) as follows: Find the 70% Δp of the cracking pressure of the by-pass valve on the vertical axis. Draw a horizontal line so that it intersects the Δp curve at a point. Read this point on the horizontal axis for the viscosity.

Mounting position

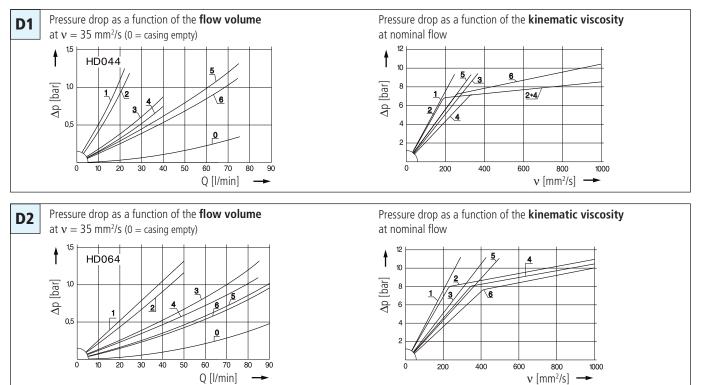
Preferably vertical, filter head on top

Connection

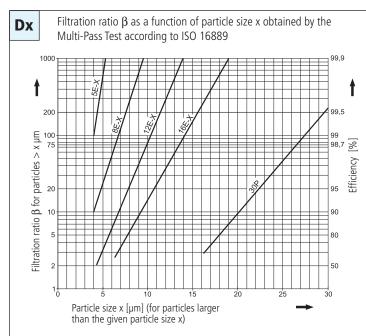
2 x Ø 15 mm on plain flange

Diagrams

Δp -curves for complete filters in Selection Chart, column 3



Filter fineness curves in Selection Chart, column 4



The abbreviations represent the following $\beta\mbox{-values}$ resp. finenesses:

For EXAPOR[®]MAX- and Paper elements:

	200	
5 E-X = $\beta_{5(c)}$	= 200	EXAPOR®MAX
8 E-X = $\overline{\beta}_{B(c)}^{S(c)}$	= 200	EXAPOR [®] MAX
12 E-X = $\overline{\beta}_{12}^{(c)}$	= 200	EXAPOR [®] MAX
$\begin{array}{rcl} \textbf{5 E-X} &=& \overline{\beta}_{5(c)} \\ \textbf{8 E-X} &=& \underline{\beta}_{8(c)} \\ \textbf{12 E-X} &=& \underline{\beta}_{12(c)} \\ \textbf{16 E-X} &=& \underline{\beta}_{16(c)} \end{array}$	= 200	EXAPOR®MAX
30 P = $\overline{\beta}_{30 (c)}$	= 200	Paper
Pacad on the structu	ira of tha	filter modia of the

Based on the structure of the filter media of the 30 P paper elements, deviations from the printed curves are quite probable.

For screen elements:

40 S	=	screen material with mesh size	40 µm
60 S		screen material with mesh size	60 µm
			100 µm
Tolerances	foi	mesh size according to DIN 4189)

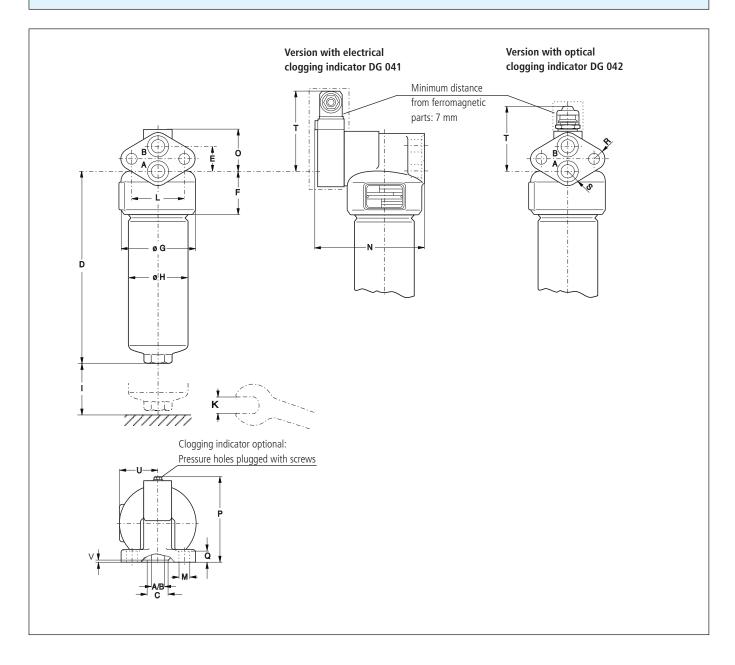
For special applications, finenesses differing from these curves are also available by using special composed filter media.

Selection Chart

Part NC		ominal flow press	Jie drop see	terfine	nessee diagr	Pacity A	acking	Unessue of bit pass	erre	ight clogging indi	Remarks
6.91	I/min	0. 610	diaz Fi	g)ii/ (0.	bar		Hi. Bet bs	kg	CO	Re'
1	2	3	4	9 5	6	7	8	9	10	11	12
ID 044-183	20	D1 /1	5 E-X	3,4	Ø 15	-	7	V3.0510-13 ¹	3,4	optional	2
ID 044-153	25	D1 /2	5 E-X	3,8	Ø 15	7	4	V3.0510-03	3,4	optional	-
ID 044-186	30	D1 /3	12 E-X	5,0	Ø 15	-	7	V3.0510-16 ¹	3,4	optional	2
D 044-156	35	D1 /4	12 E-X		Ø 15	7	4	V3.0510-06	3,4	optional	-
										·	
D 044-178	55	D1/5	16 E-X		Ø 15	-	7	V3.0510-18 ¹	3,4	optional	2
D 044-158	63	D1 /6	16 E-X	6,6	Ø 15	7	4	V3.0510-08	3,4	optional	-
D 064-183	43	D2 /1	5 E-X	6,9	Ø 15	-	7	V3.0520-13 ¹	4,6	optional	2
D 064-153	50	D2 /2	5 E-X	7,6	Ø 15	7	4	V3.0520-03	4,5	optional	-
ID 064-196	63	D2 /3	12 E-X	11	Ø 15	-	7	V3.0520-16 ¹	4,6	optional	2
ID 064-156	70	D2 /4	12 E-X	13	Ø 15	7	4	V3.0520-06	4,5	optional	-
							_				
ID 064-178 ID 064-158	80 80	D2 /5 D2 /6	16 E-X 16 E-X	12 14	Ø 15 Ø 15	- 7	7	V3.0520-18 ¹ V3.0520-08	4,6	optional optional	2
D 004-158	80	DZ /0	10 E-X	14	015		4	V3.0520-08	4,5	ориона	-
ead use the al	obreviat le: The	ion "M" b	ehind the	part r	umber of th	e indica	ator. T I th op	he printed order	acknowle	dgements show both it or - response pressur	
art No. (Basi	c unit)										
ogging indi	cator –									n	nounted
or the appro	priate	clogging	indicato	ors se	e catalogu	e shee	t 60.	30.			
emarks: Filter versions	withou							ogging indicator) P, we kindly ask for yo	

 $^{^{\}rm 1}$ Element differential pressure stable up to 160 bar $^{\rm 2}$ Clogging indicator is obligatory

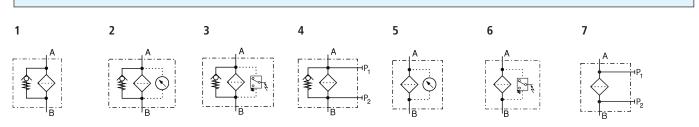
Dimensions



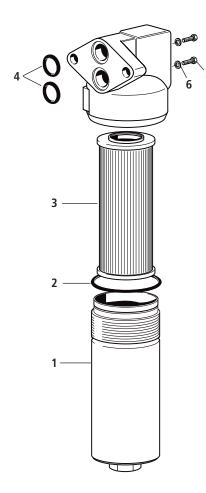
Measurements

Туре	A/B	C	D	E	F	G	Н	I	К	L	М	Ν	0	Р	Q	R	S	T electr. / opt.	U	V
HD 044	Ø 15	23,5	145	26	49	83	66	70	36	58	12,5	118,5	48	90	17	13	16	106 / 79	45	2
HD 064	Ø 15	23,5	241	26	49	83	66	70	36	58	12,5	118,5	48	90	17	13	16	106 / 79	45	2





Spare Parts



Pos.	Designation	Part No.
1	Filter bowl HD 044	HD 052.0101
1	Filter bowl HD 064	HD 072.0101
2	O-ring 53,57 x 3,53	N 007.0543/1
3	Filter element (with seal)	s. Chart / col. 9
4	O-ring 18,72 x 2,62 *	N 007.0193
5	Hexagonal head screw M4x8 DIN 933-8.8	3301051
6	Bonded Seal 4,1 x 7,2 x 1	3404074

*Not supplied with filter - has to be ordered separately

The functions of the complete filters as well as the outstanding features of the filter elements assured by ARGO-HYTOS can only be guaranteed if original ARGO-HYTOS spare parts are used.

Quality Assurance

Quality management according to DIN EN ISO 9001

To ensure constant quality in production and operation, ARGO-HYTOS filter elements undergo strict controls and tests according to the following DIN and ISO standards:

DIN ISO 2941	Verification of collapse/burst resistance
DIN ISO 2943	Verification of material compatibility with fluids
DIN ISO 3724	Verification of flow fatigue characteristics

ISO 2942 ISO 3968 ISO 16889 Verification of fabrication integrity (Bubble Point Test) Evaluation of pressure drop versus flow characteristics Multi-Pass-Test (evaluation of filter fineness and dirt-holding capacity)

Before release into the series production the filter casing is tested for fatigue strength in our pressure pulse test rig. Various quality controls during the production process guarantee the leakfree function and solidity of our filters.

Our engineers will be glad to advice you in questions concerning filter application, selection as well as the cleanliness class of the filtered medium attainable under practical operating conditions.

Illustrations may sometimes differ from the original. ARGO-HYTOS is not responsible for any unintentional mistake in this specification sheet.







High Pressure Filters - Worldline 100



HD 049 · HD 069

- In-line mounting
- Operating pressure up to 450 bar
- Nominal flow rate up to 80 l/min

Description

Application

In the high pressure circuits of hydraulic systems.

classes.

Performance features

Protection against wear:

Filter maintenance

By using a clogging indicator the correct moment for maintenance is stated and guarantees the optimum utilization of the filter life.

Materials Fil

Filter head:	Spheroidal graphite cast iron (SGI)
Filter bowl:	Cold extruded steel
Coating:	Powder paint resp. phosphate coating
Seals:	NBR (Viton on request)
Filter media:	EXAPOR [®] MAX - inorganic multi-layer microfibre web
	Paper - cellulose web, impregnated with resin

Accessories

If an electrical indicator is used a transparent socket with LED for optical indication is also available with Part No. DG 041.1200.

Filter elements

Protection against

malfunction:

Flow direction from outside to centre. The star-shaped pleating of the filter material results in:

(cold start condition).

By means of filter elements that, in full-flow filtration.

meet even the highest demands regarding cleanliness

Through installation near to the control valves or other

expensive components. The specific determined flow rate guarantees a closed by-pass valve even at \leq 200 mm²/s

- large filter surfaces
- low pressure drop
- high dirt-holding capacities
- long service life

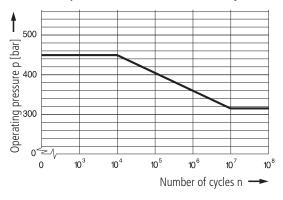
Characteristics

Operating pressure

 $0 \dots 315$ bar, min. 10^7 pressure cycles Nominal pressure according to DIN 24550

 $0 \dots 450$ bar, min. 10^4 pressure cycles Quasi-static operating pressure

Permissible pressures for other numbers of cycles



Nominal flow rate

Up to 80 l/min (see Selection Chart, column 2) The nominal flow rates indicated by ARGO-HYTOS are based on the following features:

- closed by-pass valve at $v \le 200 \text{ mm}^2/\text{s}$
- element service life > 1000 operating hours at an average fluid contamination of 0,07 g per l/min flow volume
- flow velocity in the connection lines: up to 250 bar \leq 8 m/s up to 450 bar \leq 12 m/s

Filter fineness

5 µm(c) ... 30 µm(c) β -values according to ISO 16889 (see Selection Chart, column 4 and diagram Dx)

Dirt-holding capacity

Values in g test dust ISO MTD according to ISO 16889 (see Selection Chart, column 5)

Hvdraulic fluids

Mineral oil and biodegradable fluids (HEES and HETG, see info-sheet 00.20)

Temperature range

- 30 °C ... + 100 °C (temporary - 40 °C ... + 120 °C)

Viscosity at nominal flow rate

- at operating temperature: $v < 60 \text{ mm}^2/\text{s}$
- as starting viscosity: $v_{max} = 1200 \text{ mm}^2/\text{s}$
- at initial operation:

The recommended starting viscosity can be read from the diagram D (pressure drop as a function of the kinematic viscosity) as follows: Find the 70% Δp of the cracking pressure of the by-pass valve on the vertical axis. Draw a horizontal line so that it intersects the Δp curve at a point. Read this point on the horizontal axis for the viscosity.

Mounting position

Preferably vertical, filter head on top

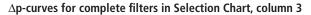
Connection

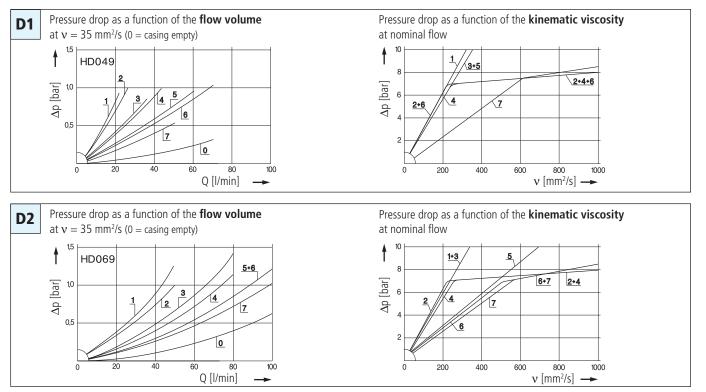
Threaded ports according to ISO 228 or DIN 13. Sizes see Selection Chart, column 6 (other port threads on request)

Electrical clogging indicator

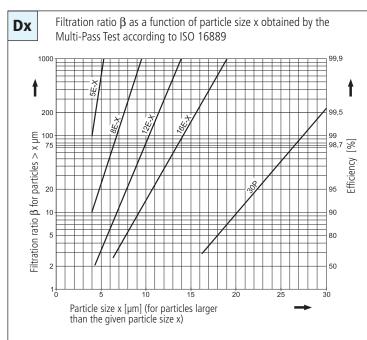
 Switching voltage: 	max. 120 V AC / 175 V DC
 Switching current: 	max. 0,17 A AC / 0,25 A DC
 Switching power: 	max. 3,5 VA AC / 5 W DC
• Type of contact:	Change-over
Electrical protection:	IP 65 (with mounted and secured socket)

Diagrams





Filter fineness curves in Selection Chart, column 4



The abbreviations represent the following $\beta\mbox{-values}$ resp. finenesses:

For EXAPOR®MAX- and Paper elements:

5 E-X 8 E-X 12 E-X 16 E-X	=	$\overline{\beta}_{5(c)}$	= 200	EXAPOR®MAX
8 E-X	=	$\overline{\beta}_{8(c)}^{(c)}$	= 200	EXAPOR [®] MAX
12 E-X	=	$\overline{\beta}_{12}^{(c)}$	= 200	EXAPOR [®] MAX
16 E-X	=	$\overline{\beta}_{16(c)}^{12(c)}$	= 200	EXAPOR®MAX
30 P	=	$\overline{\beta}_{30 (c)}$	= 200	Paper
Pacad on t	ho	ctructu	iro of tho	filter modia of th

Based on the structure of the filter media of the 30 P paper elements, deviations from the printed curves are quite probable.

For screen elements:

40 S	=	screen material with mesh size	40 µm
		screen material with mesh size	60 µm
100 S	=	screen material with mesh size	100 µm
Tolerances	for	mesh size according to DIN 4189	

For special applications, finenesses differing from these curves are also available by using special composed filter media.

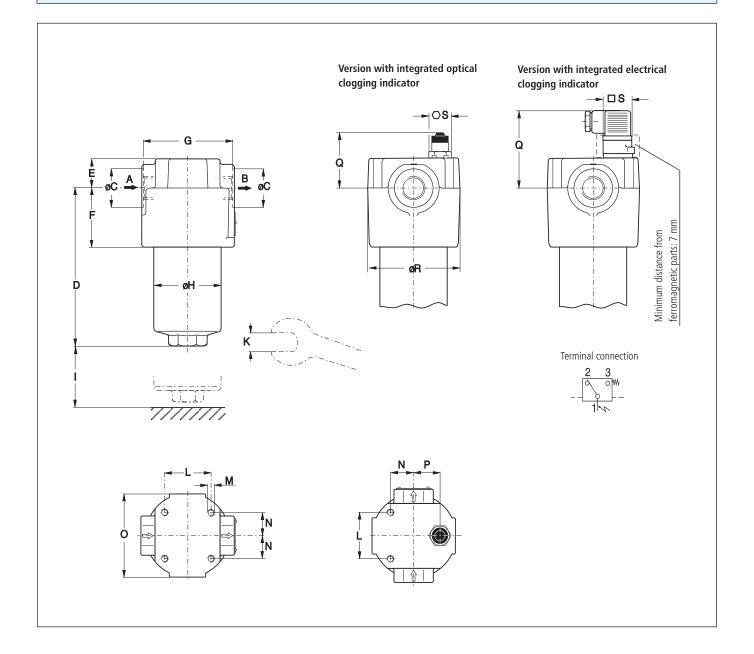
Selection Chart

		/		/	no. sress see diagr. Dirt. holding car	64	/	Jpressure of by Pass Jpressure of by Pass Simbol Replacem		at /		or esure in () gpressure in () Remarks
		ominal flow Pressure	e drop see	INP	no. eness see diad. Dirt-holding.com	Pacity	રુ	JPRESSURE OF DV P23.	at eleme	leight cloggin	1103	IOT RESULTE IN
, NO		ominal flow Pressure	e drop D	ico. fin	eness holding	ection	kin	J pre-	NO.	inth off	ig inon-	gpie- Remarks
PartNo	N	onin pressed	Higgle Fi	iter .	Dint-1- Court		1300	SYMU Replupat	I N	leight cloggin	Clar,	Remo
	l/min			g		bar			kg	bar		
1	2	3	4	5	6	7	8	9	10	11		12
HD 049-189	20	D1 /1	5 E-X	3,4	G1⁄2	-	6	V3.0510-13 ¹	3,9	electrical	(5)	change-over
HD 049-169	25	D1 /2	5 E-X	3,8	G1⁄2	7	1	V3.0510-03	3,8	-		-
HD 049-179	25	D1 /2	5 E-X	3,8	G1⁄2	7	2	V3.0510-03	3,9	optical	(5)	-
HD 049-159	25	D1 /2	5 E-X	3,8	G1⁄2	7	3	V3.0510-03	3,9	electrical	(5)	change-over
HD 049-186	30	D1 /3	12 E-X	5	G1⁄2	-	6	V3.0510-16 ¹	3,9	electrical	(5)	change-over
HD 049-166	35	D1 /4	12 E-X	6,1	G1⁄2	7	1	V3.0510-06	3,8	-		-
HD 049-176	35	D1 /4	12 E-X	6,1	G1⁄2	7	2	V3.0510-06	3,9	optical	(5)	-
HD 049-156	35	D1 /4	12 E-X	6,1	G1⁄2	7	3	V3.0510-06	3,9	electrical	(5)	change-over
HD 049-188	55	D1 /5	16 E-X	5,5	G1⁄2	-	6	V3.0510-18 ¹	3,9	electrical	(5)	change-over
HD 049-268	63	D1 /6	16 E-X	6,6	M18 x 1,5	7	1	V3.0510-08	3,8	-		casing phosphated
HD 049-168	63	D1 /6	16 E-X	6,6	G1⁄2	7	1	V3.0510-08	3,8	-		-
HD 049-178	63	D1 /6	16 E-X	6,6	G1⁄2	7	2	V3.0510-08	3,9	optical	(5)	-
HD 049-158	63	D1 /6	16 E-X	6,6	G1⁄2	7	3	V3.0510-08	3,9	electrical	(5)	change-over
HD 049-151	55	D1 /7	30 P	3,6	G1⁄2	7	1	P3.0510-11 ²	3,8	-		-
HD 049-161	55	D1 /7	30 P	3,6	G1⁄2	7	2	P3.0510-11 ²	3,9	optical	(5)	-
HD 049-171	55	D1 /7	30 P	3,6	G1⁄2	7	3	P3.0510-11 ²	3,9	electrical	(5)	change-over
HD 069-189	43	D2 /1	5 E-X	6,9	G1⁄2	-	6	V3.0520-13 ¹	5,1	electrical	(5)	change-over
HD 069-169	50	D2 /2	5 E-X	7,6	G1⁄2	7	1	V3.0520-03	4,9	-		-
HD 069-179	50	D2 /2	5 E-X	7,6	G1⁄2	7	2	V3.0520-03	5,0	optical	(5)	-
HD 069-159	50	D2 /2	5 E-X	7,6	G1⁄2	7	3	V3.0520-03	5,0	electrical	(5)	change-over
HD 069-186	63	D2 /3	12 E-X		G¾	-	6	V3.0520-16 ¹	5,1	electrical	(5)	change-over
HD 069-166	70	D2 /4	12 E-X		G¾	7	1	V3.0520-06	4,9	-		-
HD 069-176	70	D2 /4	12 E-X		G¾	7	2	V3.0520-06	5,0	optical	(5)	-
HD 069-156	70	D2 /4	12 E-X	13	G¾	7	3	V3.0520-06	5,0	electrical	(5)	change-over
HD 069-188	80	D2 /5	16 E-X		G¾	-	6	V3.0520-18 ¹	5,1	electrical	(5)	change-over
HD 069-268	80	D2 /6	16 E-X		G¾	7	1	V3.0520-08	4,9	-		casing phosphated
HD 069-168	80	D2 /6	16 E-X		G¾	7	1	V3.0520-08	4,9	-		-
HD 069-178	80	D2 /6	16 E-X		G¾	7	2	V3.0520-08	5,0	optical	(5)	-
HD 069-158	80	D2 /6	16 E-X	14	G¾	7	3	V3.0520-08	5,0	electrical	(5)	change-over
HD 069-151	80	D2 /7	30 P	7,1	G¾	7	1	P3.0520-01 ²	4,9	-		-
HD 069-161	80	D2 /7	30 P	7,1	G¾	7	2	P3.0520-01 ²	5,0	optical	(5)	-
HD 069-171	80	D2 /7	30 P	7,1	G¾	7	3	P3.0520-01 ²	5,0	electrical	(5)	change-over

Remarks:

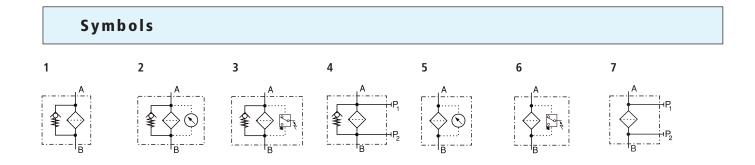
• The filters listed in this chart are standard filters. If modifications are required, e.g. bolt mounted indicators according to catalogue sheet 60.30, we kindly ask for your request.

• If an electrical indicator is used a transparent socket with LED for optical indication is also available with Part No. DG 041.1200.

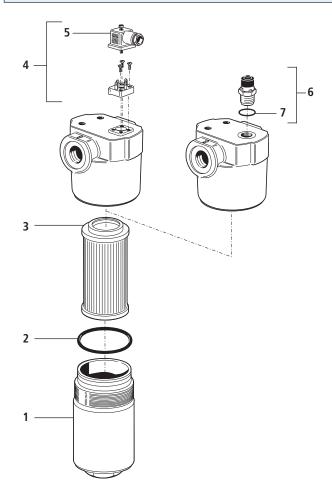


Measurements

																	-
Туре	A/B	С	D	E	F	G	Н		К	L	М	Ν	0	Р	Q	R	S
,,											ø/depth				opt./electr.		opt./electr.
HD 049	M18 x 1,5 , G½	24, 33	158	24,5	61	84	65	55	36	40	M8/12	25	89	27,5	55/72	85	24/30
HD 069	G1⁄2, G3⁄4	33, 36	254	24,5	61	84	65	55	36	40	M8/12	25	89	27,5	55/72	85	24/30



Spare Parts



Pos.	Designation	Part No.
1	Filter bowl HD 049	HD 052.0101
1	Filter bowl HD 069	HD 072.0101
2	O-ring 53,57 x 3,53	N 007.0543/1
3	Filter element (with seal)	s. Chart / col. 9
4	Reed switch with screws and socket (Pos. 5)	HD 049.1410
5	Socket DIN 43650 - AF3	DG 041.1220
6	Optical indicator (with Pos. 7)	HD 049.1400
7	O-ring 17 x 2	N 007.0172

The functions of the complete filters as well as the outstanding features of the filter elements assured by ARGO-HYTOS can only be guaranteed if original ARGO-HYTOS spare parts are used.

Quality Assurance

Quality management according to DIN EN ISO 9001

To ensure constant quality in production and operation, ARGO-HYTOS filter elements undergo strict controls and tests according to the following DIN and ISO standards:

DIN ISO 2941	Verification of collapse/burst resistance
DIN ISO 2943	Verification of material compatibility with fluids
DIN ISO 3724	Verification of flow fatigue characteristics

ISO 2942 ISO 3968 ISO 16889 Verification of fabrication integrity (Bubble Point Test) Evaluation of pressure drop versus flow characteristics Multi-Pass-Test (evaluation of filter fineness and dirt-holding capacity)

Before release into the series production the filter casing is tested for fatigue strength in our pressure pulse test rig. Various quality controls during the production process guarantee the leakfree function and solidity of our filters.

Our engineers will be glad to advice you in questions concerning filter application, selection as well as the cleanliness class of the filtered medium attainable under practical operating conditions.

Illustrations may sometimes differ from the original. ARGO-HYTOS is not responsible for any unintentional mistake in this specification sheet.



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High Pressure Filters - Worldline 200

HD 152 · HD 172

- In-line mounting
- Operating pressure up to 450 bar
- Nominal flow rate up to 150 l/min

Description

Application

In the high pressure circuits of hydraulic systems.

Performance features

Protection

By means of filter elements that, in full-flow filtration. against wear: meet even the highest demands regarding cleanliness classes.

Protection against

malfunction:

Through installation near to the control valves or other expensive components. The specific determined flow rate guarantees a closed by-pass valve even at $\nu \leq 200 \text{ mm}^2/\text{s}$ (cold start condition).

Filter elements

Flow direction from outside to centre. The star-shaped pleating of the filter material results in:

- large filter surfaces
- low pressure drop
- high dirt-holding capacities
- long service life

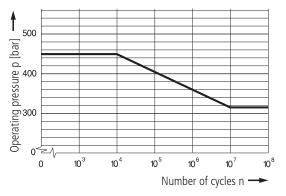
Characteristics

Operating pressure

0 ... 315 bar, min. 10⁷ pressure cycles Nominal pressure according to DIN 24550

0 ... 450 bar, min. 10⁴ pressure cycles Quasi-static operating pressure

Permissible pressures for other numbers of cycles



Nominal flow rate

Up to 150 l/min (see Selection Chart, column 2) The nominal flow rates indicated by ARGO-HYTOS are based on the following features:

- closed by-pass valve at $v \le 200 \text{ mm}^2/\text{s}$
- element service life > 1000 operating hours at an average fluid contamination of 0,07 g per l/min flow volume
- flow velocity in the connection lines: up to 250 bar \leq 8 m/s up to 450 bar \leq 12 m/s

Filter fineness

5 µm(c) ... 30 µm(c) β-values according to ISO 16889 (see Selection Chart, column 4 and diagram Dx)

Filter maintenance

By using a clogging indicator the correct moment for maintenance is stated and guarantees the optimum utilization of the filter life.

Materials

Filter head:	Spheroidal graphite cast iron (SGI)
Filter bowl:	Cold extruded steel
Coating:	Powder paint
Seals:	NBR (Viton on request)
Filter media:	EXAPOR®MAX - inorganic multi-layer microfibre web
	Paper - cellulose web, impregnated with resin

Accessories

If an electrical indicator is used a transparent socket with LED for optical indication is also available with Part No. DG 041.1200.

Dirt-holding capacity

Values in g test dust ISO MTD according to ISO 16889 (see Selection Chart, column 5)

Hvdraulic fluids

Mineral oil and biodegradable fluids (HEES and HETG, see info-sheet 00.20)

Temperature range

- 30 °C ... + 100 °C (temporary - 40 °C ... + 120 °C)

Viscosity at nominal flow rate

- at operating temperature: $v < 60 \text{ mm}^2/\text{s}$
- as starting viscosity: $v_{max} = 1200 \text{ mm}^2/\text{s}$
- at initial operation:

The recommended starting viscosity can be read from the diagram D (pressure drop as a function of the kinematic viscosity) as follows: Find the 70% Δp of the cracking pressure of the by-pass valve on the vertical axis. Draw a horizontal line so that it intersects the Δp curve at a point. Read this point on the horizontal axis for the viscosity.

Mounting position

Preferably vertical, filter head on top

Connection

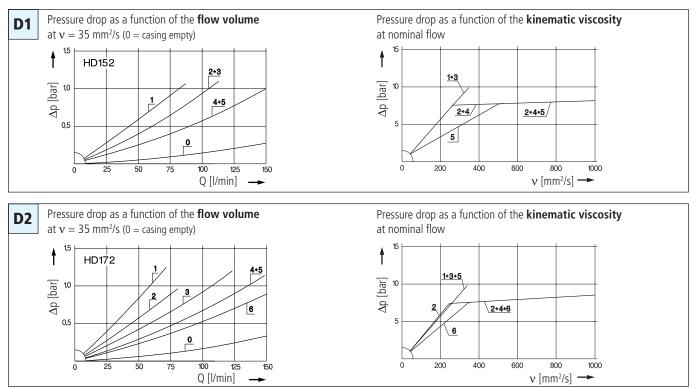
Threaded ports according to ISO 228 or DIN 13. Sizes see Selection Chart, column 6 (other port threads on request)

Electrical clogging indicator

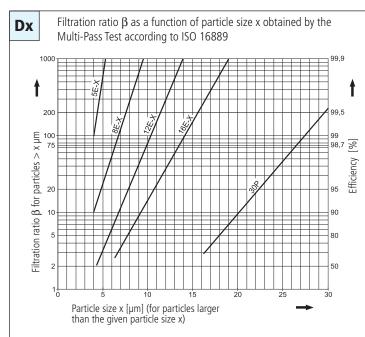
- Switching voltage:
- max. 120 V AC / 175 V DC max. 0.17 A AC / 0.25 A DC
- Switching current: • Switching power: max. 3,5 VA AC / 5 W DC
 - Change-over
- Type of contact:
 - IP 65 (with mounted and secured socket)
- Electrical protection:

Diagrams

Δp -curves for complete filters in Selection Chart, column 3



Filter fineness curves in Selection Chart, column 4



The abbreviations represent the following $\beta\mbox{-values}$ resp. finenesses:

For EXAPOR®MAX- and Paper elements:

5 E-X = $\overline{\beta}_{\Gamma(x)}$	= 200	EXAPOR®MAX	
8 E-X = $\overline{\beta}_{\alpha(c)}^{\beta(c)}$	= 200	EXAPOR [®] MAX	
12 E-X = $\overline{\beta}_{12}^{\circ(0)}$	= 200	EXAPOR®MAX	
$ \begin{array}{rcl} {\bf 5} \ {\bf E-X} &=& \overline{\beta}_{5(c)} \\ {\bf 8} \ {\bf E-X} &=& \overline{\beta}_{8(c)} \\ {\bf 12} \ {\bf E-X} &=& \overline{\beta}_{12(c)} \\ {\bf 16} \ {\bf E-X} &=& \overline{\beta}_{16(c)} \end{array} $	$\frac{1}{2} = 200$	EXAPOR [®] MAX	
30 P = $\overline{\beta}_{30}$ (c)	= 200	Paper	
		<u> </u>	

Based on the structure of the filter media of the 30 P paper elements, deviations from the printed curves are quite probable.

For screen elements:

40 S	=	screen material with mesh size	40 µm
60 S		screen material with mesh size	60 µm
100 S	=	screen material with mesh size	100 µm
Tolerances	for	mesh size according to DIN 418	9

For special applications, finenesses differing from these curves are also available by using special composed filter media.

Selection Charts

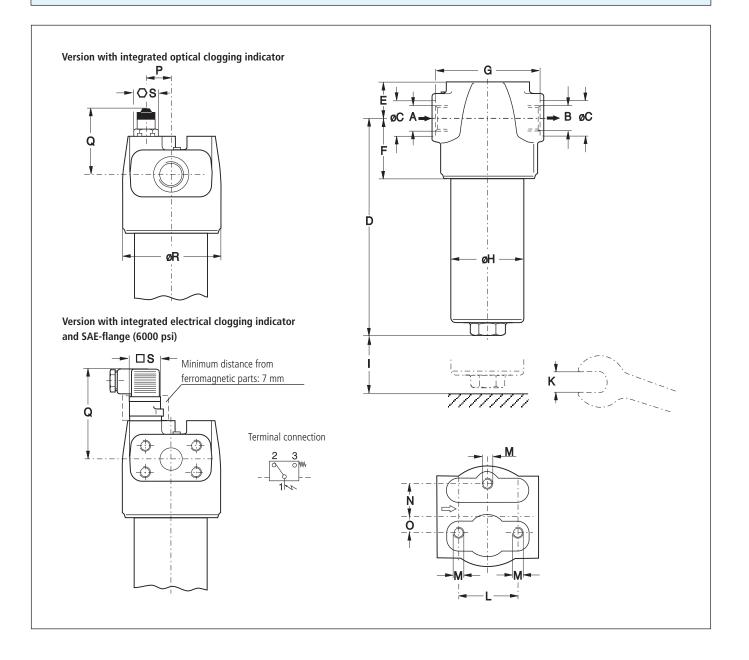
		/		/	1:201	DX XO	//	5 64-6855		ement		
NO	. ,	ominal flow pressur	e drop see diagram p	CUIVE FIN	no. eness see diagr. Dirt-holding car	pacity pacity action All	B	pressue of by pass	ent filter e	, nt	ringin	ldicator Remarks
PartNO		omir pressu	diagra Fi	Iter .	Dint-It- Conti		ISCK.	Symbe Replanpar	I IN M	eigh Ch	2001.	Remarks
	l/min			g		bar			kg			
1	2	3	4	5	6	7	8	9	10	11	(=)	12
HD 152-186	60	D1 /1	12 E-X	12	G¾	-	6	V3.0617-26 ¹	7,1	electrical	(5)	change-over
HD 152-166	95	D1/2	12 E-X	14	G¾	7	1	V3.0617-06	6,9	-		-
HD 152-276	95	D1/2	12 E-X	14	G¾	7	2	V3.0617-06	7,0	optical	(5)	-
HD 152-156	95	D1 /2	12 E-X	14	G¾	7	3	V3.0617-06	7,0	electrical	(5)	change-over
HD 152-188	90	D1 /3	16 E-X	13	G1	-	6	V3.0617-18 ¹	7,1	electrical	(5)	change-over
HD 152-168	150	D1 /4	16 E-X	15	G1	7	1	V3.0617-08	6,9	-		-
HD 152-278	150	D1 /4	16 E-X	15	G1	7	2	V3.0617-08	7,0	optical	(5)	-
HD 152-158	150	D1 /4	16 E-X		G1	7	3	V3.0617-08	7,0	electrical	(5)	change-over
											. ,	5
HD 152-151	130	D1 /5	30 P	8,7	G1	7	1	P3.0617-01 ²	6,9	-		-
HD 152-261	130	D1 /5	30 P	8,7	G1	7	2	P3.0617-01 ²	7,0	optical	(5)	-
HD 172-189	55	D2 /1	5 E-X	11	G1	-	6	V3.0623-131	8,4	electrical	(5)	change-over
HD 172-163	80	D2 /2	5 E-X	14	G1	7	1	V3.0623-03	8,0	-		-
HD 172-273	80	D2 /2	5 E-X	14	G1	7	2	V3.0623-03	8,1	optical	(5)	-
HD 172-153	80	D2 /2	5 E-X	14	G1	7	3	V3.0623-03	8,1	electrical	(5)	change-over
HD 172-186	100	D2 /3	12 E-X	17	G1		G	V3.0623-26 ¹	0.4	alactrical	(E)	change over
	100			22	G1	-	6		8,4	electrical	(5)	change-over
HD 172-166 HD 172-276	150 150	D2 /4 D2 /4	12 E-X 12 E-X	22	G1	7	1	V3.0623-06 V3.0623-06	8,0	- ontical	(E)	-
HD 172-276 HD 172-156	150	D2/4 D2/4	12 E-X		G1	7	2	V3.0623-06	8,1	optical electrical	(5) (5)	- change-over
HU 172-100	150	DZ /4	IZ E-A	22	GI	/	5	V3.0023-00	8,1	electrical	(כ)	change-over
HD 172-188	150	D2 /5	16 E-X	18	G1	-	6	V3.0623-181	8,4	electrical	(5)	change-over
HD 172-168	150	D2 /6	16 E-X	24	G1	7	1	V3.0623-08	8,0	-	. ,	-
HD 172-278	150	D2 /6	16 E-X		G1	7	2	V3.0623-08	8,1	optical	(5)	-
HD 172-158	150	D2 /6	16 E-X		G1	7	3	V3.0623-08	8,1	electrical	(5)	change-over
HD 172-151	150	D2 /6	30 P	14	G1	7	1	P3.0623-11 ²	8,0	-		-
HD 172-261	150	D2 /6	30 P	14	G1	7	2	P3.0623-11 ²	8,1	optical	(5)	-

Remarks:

• The filters listed in this chart are standard filters. If modifications are required, e.g. connections SAE ³/₄ resp. SAE 1 (6000 psi), we kindly ask for your request.

• If an electrical indicator is used a transparent socket with LED for optical indication is also available with Part No. DG 041.1200.

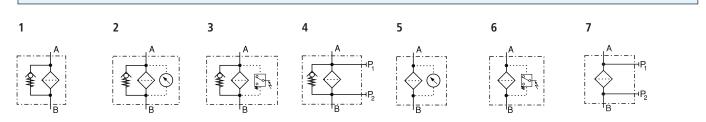
Dimensions



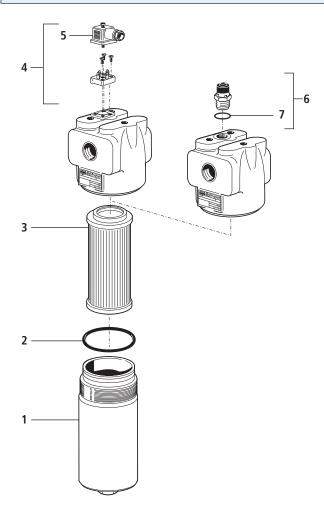
Measurements

Туре	A/B	C	D	E	F	G	H	I	K	L	M ø/depth	Ν	0	Р	Q opt./electr.	R	S opt./electr.
HD 152	G¾, G1	36, 45	224	39	66	104	75	70	27	60	M10/12	35	17,5	30	69/86	102	24/30
HD 172	G1	45	285	39	66	104	75	70	27	60	M10/12	35	17,5	30	69/86	102	24/30

Symbols



Spare Parts



Pos.	Designation	Part No.
1	Filter bowl HD 152	HD 152.0102
1	Filter bowl HD 172	HD 171.0101
2	O-ring 63 x 3,5	N 007.0634
3	Filter element (with seal)	see Chart/col. 9
4	Reed switch with screws and socket (Pos. 5)	HD 049.1410
5	Socket DIN 43650 - AF3	DG 041.1220
6	Optical indicator (with Pos. 7)	HD 049.1400
7	O-ring 17 x 2	N 007.0172

The functions of the complete filters as well as the outstanding features of the filter elements assured by ARGO-HYTOS can only be guaranteed if original ARGO-HYTOS spare parts are used.

Quality Assurance

Quality management according to DIN EN ISO 9001

To ensure constant quality in production and operation, ARGO-HYTOS filter elements undergo strict controls and tests according to the following DIN and ISO standards:

DIN ISO 2941	Verification of collapse/burst resistance
DIN ISO 2943	Verification of material compatibility with fluids
DIN ISO 3724	Verification of flow fatigue characteristics

ISO 2942 ISO 3968 ISO 16889 Verification of fabrication integrity (Bubble Point Test) Evaluation of pressure drop versus flow characteristics Multi-Pass-Test (evaluation of filter fineness and dirt-holding capacity)

Before release into the series production the filter casing is tested for fatigue strength in our pressure pulse test rig. Various quality controls during the production process guarantee the leakfree function and solidity of our filters.

Our engineers will be glad to advice you in questions concerning filter application, selection as well as the cleanliness class of the filtered medium attainable under practical operating conditions.

Illustrations may sometimes differ from the original. ARGO-HYTOS is not responsible for any unintentional mistake in this specification sheet.



We produce fluid power solutions ARGO-HYTOS GMBH · Industriestraße 9 · D-76703 Kraichtal Tel: +49 7250 76-0 · Fax: +49 7250 76-199 · info.de@argo-hytos.com · www.argo-hytos.com





High Pressure Filters

HD 314 · HD 414 HD 614

- Flange mounting
- Operating pressure up to 350 bar
- Nominal flow rate up to 400 l/min

Description

Application

In the high pressure circuits of hydraulic systems.

Performance features

Protection

against wear: By means of filter elements that, in full-flow filtration, meet even the highest demands regarding cleanliness classes.

Protection against

malfunction:

Through installation near to the control valves or other expensive components. The specific determined flow rate guarantees a closed by-pass valve even at \leq 200 mm²/s (cold start condition).

Filter elements

Flow direction from outside to centre. The star-shaped pleating of the filter material results in:

- large filter surfaces
- low pressure drop
- high dirt-holding capacities
- long service life

Filter maintenance

By using a clogging indicator the correct moment for maintenance is stated and guarantees the optimum utilization of the filter life.

Materials

Filter head:	Spheroidal graphite cast iron (SGI)
Filter bowl:	Cold extruded steel
Coating:	Powder paint
Seals:	NBR (Viton on request)
Filter media:	EXAPOR [®] MAX - inorganic multi-layer microfibre web
	Paper - cellulose web, impregnated with resin

Accessories

Electrical and/or optical clogging indicators are available - optionally with one or two switching points resp. temperature suppression. Dimensions and technical data see catalogue sheet 60.30.

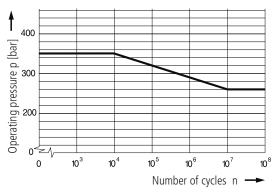
Characteristics

Operating pressure

0 ... 260 bar, min. 10⁷ pressure cycles Nominal pressure according to DIN 24550

0 ... 350 bar, min. $10^4 \ pressure \ cycles$ Quasi-static operating pressure

Permissible pressures for other numbers of cycles



Nominal flow rate

Up to 400 l/min (see Selection Chart, column 2) The nominal flow rates indicated by ARGO-HYTOS are based on the following features:

- closed by-pass valve at $\nu \leq$ 200 mm²/s
- element service life > 1000 operating hours at an average fluid contamination of 0,07 g per l/min flow volume

• flow velocity in the connection lines: up to 250 bar \le 8 m/s up to 450 bar \le 12 m/s

Filter fineness

 5μ m(c) ... 16 μm(c) β-values according to ISO 16889 (see Selection Chart, column 4 and diagram Dx)

Dirt-holding capacity

Values in g test dust ISO MTD according to ISO 16889 (see Selection Chart, column 5)

Hydraulic fluids

Mineral oil and biodegradable fluids (HEES and HETG, see info-sheet 00.20)

Temperature range

- 30 °C ... + 100 °C (temporary - 40 °C ... + 120 °C)

Viscosity at nominal flow rate

- at operating temperature: $\nu < 60 \text{ mm}^2/\text{s}$
 - as starting viscosity: $v_{max} = 1200 \text{ mm}^2/\text{s}$
- at initial operation:
- The recommended starting viscosity can be read from the diagram D (pressure drop as a function of the kinematic viscosity) as follows: Find the 70% Δp of the cracking pressure of the by-pass valve on the vertical axis. Draw a horizontal line so that it intersects the Δp curve at a point. Read this point

on the horizontal axis for the viscosity.

Mounting position

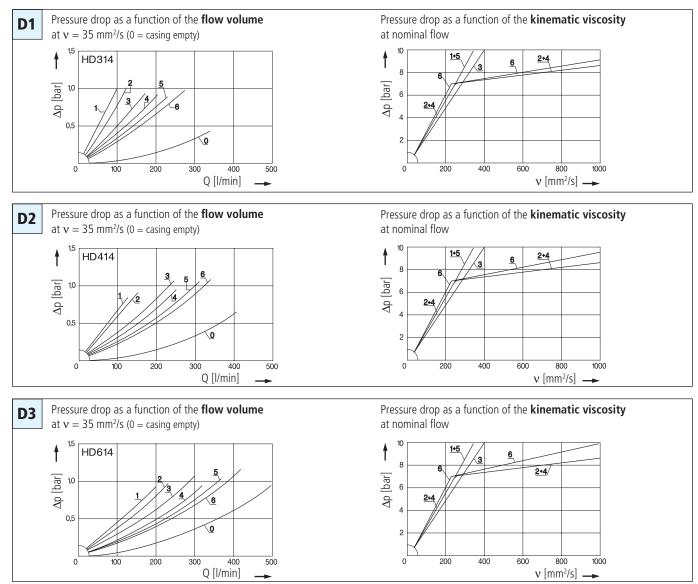
Preferably vertical, filter head on top

Connection

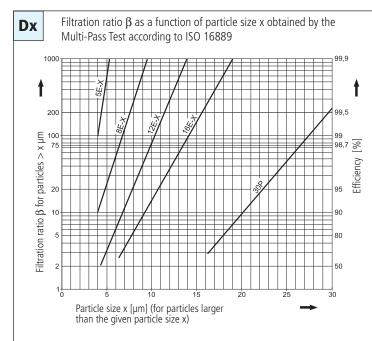
2 x Ø 31 mm on plain flange

Diagrams

Δp -curves for complete filters in Selection Chart, column 3



Filter fineness curves in Selection Chart, column 4



The abbreviations represent the following $\beta\mbox{-values}$ resp. finenesses:

For EXAPOR®MAX- and Paper elements:

5 E-X 8 E-X 12 E-X 16 E-X	=	$\overline{\beta}_{F(c)}$	= 200	EXAPOR®MAX
8 E-X	=	$\bar{\beta}_{\alpha}^{(c)}$	= 200	EXAPOR®MAX
12 E-X	=	$\bar{\boldsymbol{\beta}}_{12}^{\circ(c)}$	= 200	EXAPOR®MAX
16 E-X	=	$\overline{\beta}_{16(c)}^{12(c)}$	= 200	EXAPOR [®] MAX
30 P	=	$\overline{\beta}_{30 (c)}$	= 200	Paper
Pacad on t	ha	ctructu	ira of tha	filter modia of the

Based on the structure of the filter media of the 30 P paper elements, deviations from the printed curves are quite probable.

For screen elements:

1

40 S	=	screen material with mesh size	40 µm
60 S		screen material with mesh size	60 µm
00 S	=	screen material with mesh size	100 µm
1	r		-

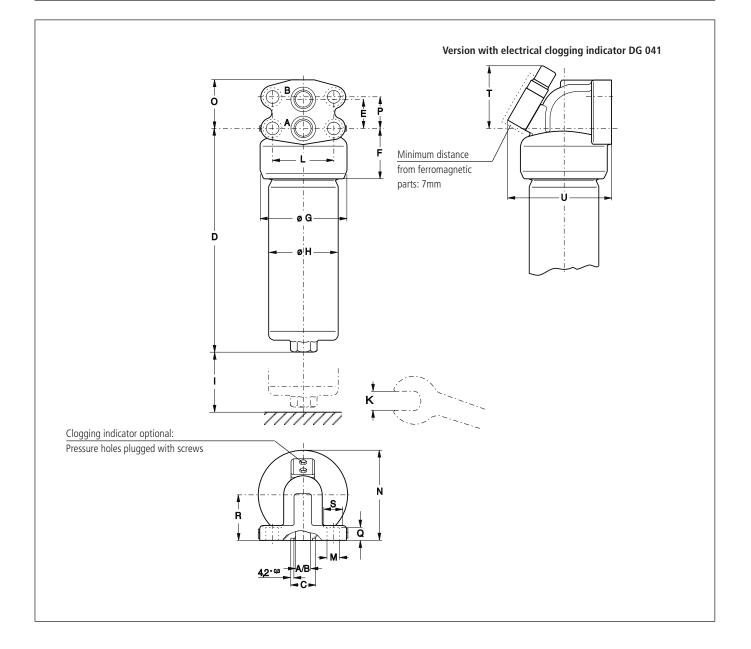
Tolerances for mesh size according to DIN 4189

For special applications, finenesses differing from these curves are also available by using special composed filter media.

Selection Chart

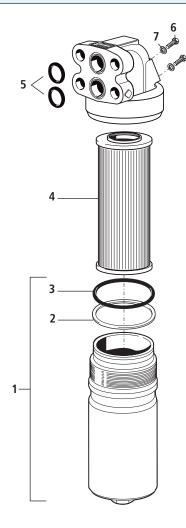
Part NO	I/min	ominal flow pressu	re drop see	g	no. see diago. ness see diago. jint holding can	Pacity Pacity All Paciton All Paciton All Control Control Cont		a pressure of by Pass	kg	ight cogging indi	Remarks
1	2	3	4	5	6	7	8	9	10	11	12
ID 314-279	85	D1 /1	5 E-X	14	Ø 31	-	7	V3.0817-13*	14,2	optional	-
ID 314-259	95	D1 /2	5 E-X	18	Ø 31	7	4	V3.0817-03	13,8	optional	-
D 314-246	135	D1 /3	12 E-X	22	Ø 31	-	7	V3.0817-16*	14,2	optional	-
D 314-256	160	D1 /4	12 E-X	28	Ø 31	7	4	V3.0817-06	13,8	optional	-
D 314-248	240	D1 /5	16 E-X	24	Ø 31	-	7	V3.0817-18*	14,2	optional	-
D 314-258	270	D1 /6	16 E-X	30	Ø 31	7	4	V3.0817-08	13,8	optional	-
D 444 070	445	55/4		2.0	~ ~ ~ ~		_		45.7		
D 414-279	115	D2 /1	5 E-X	20	Ø 31	-	7	V3.0823-13*	15,7	optional	-
D 414-259	130	D2 /2	5 E-X	26	Ø 31	7	4	V3.0823-03	15,1	optional	-
D 414-296	180	D2 /3	12 E-X	32	Ø 31	-	7	V3.0823-16*	15,7	optional	-
D 414-256 D 414-298	210 300	D2 /4 D2 /5	12 E-X 16 E-X	41 34	Ø 31 Ø 31	7	4	V3.0823-06 V3.0823-18*	15,1	optional	-
D 414-298 D 414-258	300	D2/5 D2/6	16 E-X	34 46	Ø 31	- 7	4	V3.0823-18 V3.0823-08	15,7	optional optional	-
D 414-258	340	D2 /0	10 E-X	40	031		4	V3.0823-08	15,1	optional	-
D 614-279	170	D3 /1	5 E-X	29	Ø 31	_	7	V3.0833-13*	18,5	optional	-
D 614-259	190	D3 /2	5 E-X	36	Ø 31	7	4	V3.0833-03	17,8	optional	-
D 614-246	270	D3 /3	12 E-X	46	Ø 31	-	7	V3.0833-16*	18,5	optional	-
D 614-256	300	D3 /4	12 E-X	58	Ø 31	7	4	V3.0833-06	17,8	optional	-
D 614-288	400	D3 /5	16 E-X	50	Ø 31	-	7	V3.0833-18*	18,5	optional	-
D 614-258	400	D3 /6	16 E-X	67	Ø 31	7	4	V3.0833-08	17,8	optional	-
ead use the at	obreviat	ion "M" be	ehind the	part ı	number of th	ne indica	ator. T	he printed order a	acknowl	e indicator should be a edgements show both it cator - response pre	
rder descrip	tion:				HD 31	4-279		/ DG 042-0	02 I	/	
art No. (Basi										m	ounted
logging indi	cator										
or the appro	priate	clogging	indicato	ors se	e catalogu	e shee	t 60.3	30.			
								clogging indicator quired, e.g. filter f		30 P, we kindly ask for y	our request.

 * Element differential pressure stable up to 160 bar, clogging indicator is obligatory



Measurements

Туре	A/B	C	D	E	F	G	Η	I	K	L	М	Ν	0	Р	Q	R	S	Т	U
HD 314	Ø 31	44,4	263	52	82	138	109	80	32	95	21,5	150	83	58	25	80	34	93	165
HD 414	Ø 31	44,4	325	52	82	138	109	80	32	95	21,5	150	83	58	25	80	34	93	165
HD 614	Ø 31	44,4	426	52	82	138	109	80	32	95	21,5	150	83	58	25	80	34	93	165



Pos.	Designation	Part No.
1	Filter bowl HD 314	HD 250.0701
	(with Pos. 2 and 3)	
1	Filter bowl HD 414	HD 451.0702
	(with Pos. 2 and 3)	
1	Filter bowl HD 614	HD 619.0701
	(with Pos. 2 and 3)	
2	Back-ring	HD 255.0102
3	O-ring 94,84 x 3,53	N 007.0953
4	Filter element (with seal)	s. Chart / col. 9
5	O-ring 37,69 x 3,53 *	N 007.0384
6	Hexagonal head screw M4 x 8	3301051
	DIN 933-8.8	
7	Bonded Seal 4,1 x 7,2 x 1	3404074

* Not supplied with filter - has to be ordered separately

The functions of the complete filters as well as the outstanding features of the filter elements assured by ARGO-HYTOS can only be guaranteed if original ARGO-HYTOS spare parts are used.

Quality Assurance

Quality management according to DIN EN ISO 9001

To ensure constant quality in production and operation, ARGO-HYTOS filter elements undergo strict controls and tests according to the following DIN and ISO standards:

DIN ISO 2941	Verification of collapse/burst resistance
DIN ISO 2943	Verification of material compatibility with fluids
DIN ISO 3724	Verification of flow fatigue characteristics

ISO 2942 ISO 3968 ISO 16889 Verification of fabrication integrity (Bubble Point Test) Evaluation of pressure drop versus flow characteristics Multi-Pass-Test (evaluation of filter fineness and dirt-holding capacity)

Before release into the series production the filter casing is tested for fatigue strength in our pressure pulse test rig. Various quality controls during the production process guarantee the leakfree function and solidity of our filters.

Our engineers will be glad to advice you in questions concerning filter application, selection as well as the cleanliness class of the filtered medium attainable under practical operating conditions.

Illustrations may sometimes differ from the original. ARGO-HYTOS is not responsible for any unintentional mistake in this specification sheet.



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High Pressure Filters - Worldline 300

HD 319 · HD 419 HD 619

- In-line mounting/Flange mounting
- Operating pressure up to 600 bar
- Nominal flow rate up to 450 l/min

Description

Application

In the high pressure circuits of hydraulic systems.

Performance features

Protection		Ma
against wear:	By means of filter elements that, in full-flow filtration,	Filte
5	meet even the highest demands regarding cleanliness	Filte
	classes.	Coa
Protection against		Seal
malfunction:	Through installation near to the control valves or other	Filte
	expensive components. The specific determined flow	
	rate guarantees a closed by-pass valve even at	Acc

Filter elements

Flow direction from outside to centre. The star-shaped pleating of the filter material results in:

 $\nu \leq 200 \text{ mm}^2/\text{s}$ (cold start condition).

- large filter surfaces
- low pressure drop
- high dirt-holding capacities
- long service life

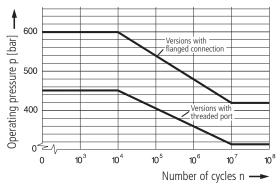
Characteristics

Operating pressure

0 ... 315 bar, min. 10⁷ pressure cycles (threaded port) 0 ... 420 bar, min. 10⁷ pressure cycles (flanged connection) Nominal pressure according to DIN 24550

0 ... 450 bar, min. 10⁴ pressure cycles (threaded port) 0 ... 600 bar, min. 10⁴ pressure cycles (flanged connection) Quasi-static operating pressure

Permissible pressures for other numbers of cycles



Nominal flow rate

Up to 450 l/min (see Selection Chart, column 2) The nominal flow rates indicated by ARGO-HYTOS are based on the following features:

- closed by-pass valve at $v \le 200 \text{ mm}^2/\text{s}$
- element service life > 1000 operating hours at an average fluid contamination of 0,07 g per l/min flow volume
- flow velocity in the connection lines: up to 250 bar \leq 8 m/s up to 450 bar \leq 12 m/s

Filter fineness

5 µm(c) ... 16 µm(c) β -values according to ISO 16889 (see Selection Chart, column 4 and diagram Dx)

Filter maintenance

By using a clogging indicator the correct moment for maintenance is stated and guarantees the optimum utilization of the filter life.

Materials Filte

Filter head:	Spheroidal graphite cast iron (SGI)
Filter bowl:	Cold extruded steel
Coating:	Powder paint
Seals:	NBR (Viton on request)
Filter media:	EXAPOR®MAX - inorganic multi-layer microfibre web

Accessories

If an electrical indicator is used, a transparent socket with LED for optical indication is also available with Part No. DG 041.1200.

Dirt-holding capacity

Values in g test dust ISO MTD according to ISO 16889 (see Selection Chart, column 5)

Hydraulic fluids

Mineral oil and biodegradable fluids (HEES and HETG, see info-sheet 00.20)

Temperature range

- 30 °C ... + 100 °C (temporary - 40 °C ... + 120 °C)

Viscosity at nominal flow rate

- at operating temperature: $v < 60 \text{ mm}^2/\text{s}$
- as starting viscosity:
- $v_{max} = 1200 \text{ mm}^2/\text{s}$
- at initial operation:

The recommended starting viscosity can be read from the diagram D (pressure drop as a function of the kinematic viscosity) as follows: Find the 70% Δp of the cracking pressure of the by-pass valve on the vertical axis. Draw a horizontal line so that it intersects the Δp curve at a point. Read this point on the horizontal axis for the viscosity.

Mounting position

Preferably vertical, filter head on top

Connection

- Threaded ports according to ISO 228 or DIN 13.
- SAE-flange (6000 psi)

Sizes see Selection Chart, column 6 and ordering example (other connections on request).

Electrical clogging indicator

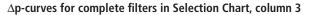
55 5	
 Switching voltage: 	max. 120 V AC / 175 V DC
 Switching current: 	max. 0,17 A AC / 0,25 A DC
 Switching power: 	max 2 E V/A AC / E W/DC

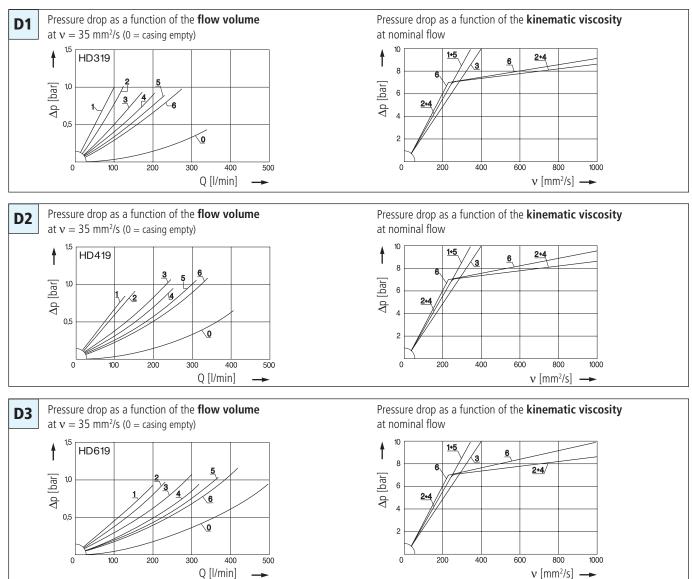
- Switching power:
- Type of contact:
- Electrical protection:

max. 3,5 VA AC / 5 W DC Change-over

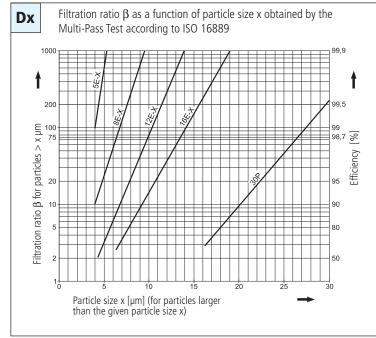
IP 65 (with mounted and secured socket)

Diagrams





Filter fineness curves in Selection Chart, column 4



The abbreviations represent the following $\beta\mbox{-values}$ resp. finenesses:

For EXAPOR®MAX- and Paper elements:

5 E-X	=	$\overline{\beta}_{5(c)}$	= 200	EXAPOR®MAX
8 E-X	=	$\overline{\beta}_{\alpha}^{\beta}$	= 200	EXAPOR®MAX
12 E-X	=	$\overline{\beta}_{12}^{\circ}(c)$	= 200	EXAPOR [®] MAX
5 E-X 8 E-X 12 E-X 16 E-X	=	$\overline{\boldsymbol{\beta}}_{16 (c)}^{12 (c)}$	= 200	EXAPOR [®] MAX
30 P	=	$\overline{\beta}_{30 (c)}$	= 200	Paper
			ire of the	filter media of the

Based on the structure of the filter media of the 30 P paper elements, deviations from the printed curves are quite probable.

For screen elements:

40 S	= screen material with mesh size	40 µm
60 S	= screen material with mesh size	60 µm
	a second second second all second	100

100 S = screen material with mesh size 100 μ m

Tolerances for mesh size according to DIN 4189

For special applications, finenesses differing from these curves are also available by using special composed filter media.

Selection Chart

		/	/	/ /	/ /	/			/ /	//		
					D	* /		1-Dass	\sim	ment		
/		/	Lee	e no.	oe diagi.	acity	~	ure of by !	citere	Jen		tor wein()
		HOW	drop picun	10 one	ess see wing cal	tion A	IB	pressui	ent fills		indic	a pressur
part NO	Part NO. Noninal flow ediopsee diagram pressure of by Pass of by Pass part NO. Noninal flow ediopsee diagram pressure in Ling pressure of by Pass part NO. Weight Coopging indicator pressure in Ling pressure in											
	I/min		, <u> </u>	g	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	bar	<i>.</i>		kg		bar	
1	2	3	4	9 5	6	7	8	9	10	11	bui	12
HD 319-289	85	D1 /1	5 E-X	14	G1¼	-	6	V3.0817-13 ¹	16,3	electrical	(5)	change-over
HD 319-279	95	D1 /2	5 E-X	18	G1¼	7	2	V3.0817-03	15,9	optical	(5)	-
HD 319-259	95	D1 /2	5 E-X	18	G1¼	7	3	V3.0817-03	15,9	electrical	(5)	change-over
HD 319-286	135	D1 /3	12 E-X	22	G1¼	-	6	V3.0817-16 ¹	16,3	electrical	(5)	change-over
HD 319-276	160	D1 /4	12 E-X	28	G1¼	7	2	V3.0817-06	15,9	optical	(5)	-
HD 319-256	160	D1 /4	12 E-X	28	G1¼	7	3	V3.0817-06	15,9	electrical	(5)	change-over
HD 319-288	240	D1 /5	16 E-X	24	G1¼	-	6	V3.0817-18 ¹	16,3	electrical	(5)	change-over
HD 319-278	270	D1 /6	16 E-X	30	G1¼	7	2	V3.0817-08	15,9	optical	(5)	-
HD 319-258	270	D1 /6	16 E-X	30	G1¼	7	3	V3.0817-08	15,9	electrical	(5)	change-over
HD 419-289	115	D2 /1	5 E-X	20	G1¼	-	6	V3.0823-13 ¹	17,8	electrical	(5)	change-over
HD 419-279	130	D2 /2	5 E-X	26	G1¼	7	2	V3.0823-03	17,2	optical	(5)	-
HD 419-259	130	D2 /2	5 E-X	26	G1¼	7	3	V3.0823-03	17,2	electrical	(5)	change-over
HD 419-286	180	D2 /3	12 E-X	32	G1¼	-	6	V3.0823-16 ¹	17,8	electrical	(5)	change-over
HD 419-276	210	D2 /4	12 E-X	41	G1¼	7	2	V3.0823-06	17,2	optical	(5)	-
HD 419-256	210	D2 /4	12 E-X	41	G1¼	7	3	V3.0823-06	17,2	electrical	(5)	change-over
HD 419-288	300	D2 /5	16 E-X	34	G1¼	-	6	V3.0823-18 ¹	17,8	electrical	(5)	change-over
HD 419-278	340	D2 /6	16 E-X	46	G1¼	7	2	V3.0823-08	17,2	optical	(5)	-
HD 419-258	340	D2 /6	16 E-X	46	G1¼	7	3	V3.0823-08	17,2	electrical	(5)	change-over
HD 619-289	170	D3 /1	5 E-X	29	G1½	-	6	V3.0833-13 ¹	20,6	electrical	(5)	change-over
HD 619-279	190	D3 /2	5 E-X	36	G1½	7	2	V3.0833-03	19,9	optical	(5)	-
HD 619-259	190	D3 /2	5 E-X	36	G1½	7	3	V3.0833-03	19,9	electrical	(5)	change-over
HD 619-286	270	D3 /3	12 E-X	46	G1½	-	6	V3.0833-16 ¹	20,6	electrical	(5)	change-over
HD 619-276	300	D3 /4	12 E-X	58	G1½	7	2	V3.0833-06	19,9	optical	(5)	-
HD 619-256	300	D3 /4	12 E-X	58	G1½	7	3	V3.0833-06	19,9	electrical	(5)	change-over
HD 619-288	450	D3 /5	16 E-X	50	G1½	-	6	V3.0833-18 ¹	20,6	electrical	(5)	change-over
HD 619-278	450	D3 /6	16 E-X	67	G1½	7	2	V3.0833-08	19,9	optical	(5)	-
HD 619-258	450	D3 /6	16 E-X	67	G1½	7	3	V3.0833-08	19,9	electrical	(5)	change-over

Two different head pieces with two various connecting options are available.

Order example: The Filter HD 319-289 has to be supplied with SAE11/4 flanged connection.

Order description:

Connections:

2 various options are	available	
Flanged connection	(A/B) SAE11/4 (6000 psi)	 1
Threaded port	(A/B) G11/4 or G11/22	 2

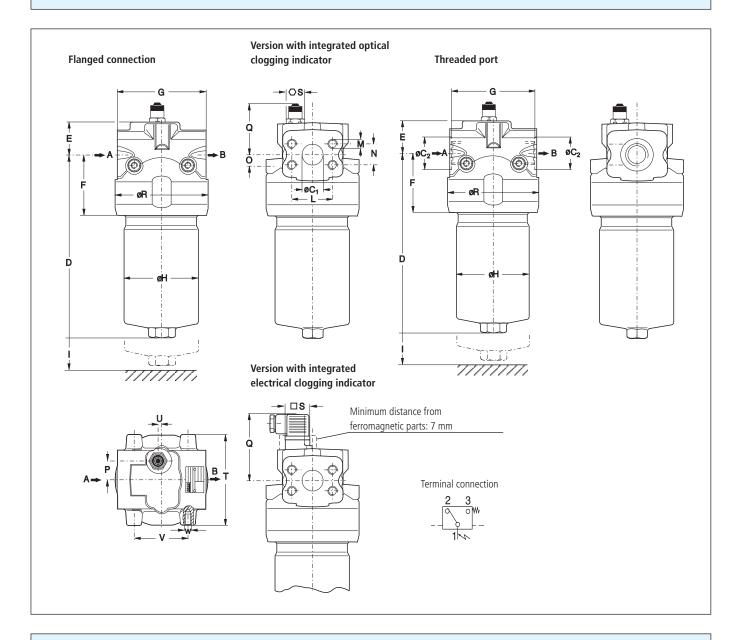
Remarks:

• The filters listed in this chart are standard filters. If modifications are required, e.g. bolt mounted indicators according to catalogue sheet 60.30, we kindly ask for your request.

HD 319-189

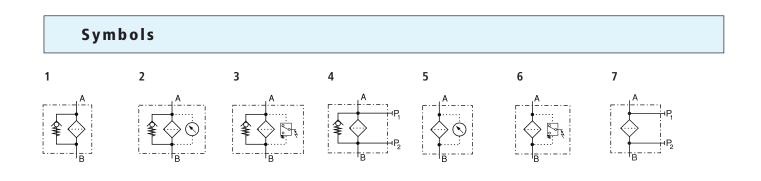
• If an electrical indicator is used, a transparent socket with LED for optical indication is also available with Part No. DG 041.1200.

Dimensions

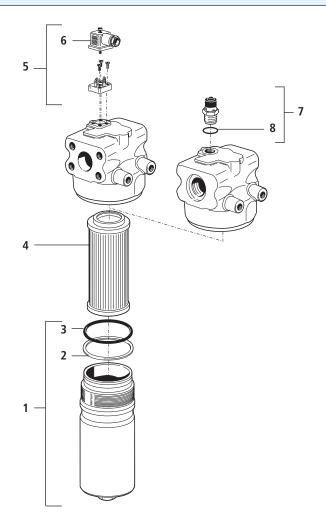


Measurements

Туре	A/B	C ₁	C ₂	D	Ε	F	G	Η	Ι	К	L	M Ø/depth	Ν	0	Р	Q opt./electr.	R	S opt./electr.	Т	U	V	W Ø/depth
HD 319	see	31	65	255	45	86	145	109	80	32	66,7	M14/22	31,8	18,5	33	75/92	152	24/30	148	8	80	M12/18
HD 419	Selection	31	65	319	45	86	145	109	80	32	66,7	M14/22	31,8	18,5	33	75/92	152	24/30	148	8	80	M12/18
HD 619	Chart	31	65	420	45	86	145	109	80	32	66,7	M14/22	31,8	18,5	33	75/92	152	24/30	148	8	80	M12/18



Spare Parts



Qua	lity	Assurance
-----	------	-----------

Quality management according to DIN EN ISO 9001

To ensure constant quality in production and operation, ARGO-HYTOS filter elements undergo strict controls and tests according to the following DIN and ISO standards:

DIN ISO 2941	Verification of collapse/burst resistance
DIN ISO 2943	Verification of material compatibility with fluids
DIN ISO 3724	Verification of flow fatigue characteristics

ISO 2942 ISO 3968 ISO 16889 Verification of fabrication integrity (Bubble Point Test) Evaluation of pressure drop versus flow characteristics Multi-Pass-Test (evaluation of filter fineness and dirt-holding capacity)

Before release into the series production the filter casing is tested for fatigue strength in our pressure pulse test rig. Various quality controls during the production process guarantee the leakfree function and solidity of our filters.

Our engineers will be glad to advice you in questions concerning filter application, selection as well as the cleanliness class of the filtered medium attainable under practical operating conditions.

Illustrations may sometimes differ from the original. ARGO-HYTOS is not responsible for any unintentional mistake in this specification sheet.



We produce fluid power solutions ARGO-HYTOS GMBH · Industriestraße 9 · D-76703 Kraichtal Tel: +49 7250 76-0 · Fax: +49 7250 76-199 · info.de@argo-hytos.com · www.argo-hytos.com

Pos.	Designation	Part No.
1	Filter bowl HD 319	HD 250.0701
	(with Pos. 2 and 3)	
1	Filter bowl HD 419	HD 451.0702
	(with Pos. 2 and 3)	
1	Filter bowl HD 619	HD 619.0701
	(with Pos. 2 and 3)	
2	Back-ring	HD 255.0102
3	O-ring 94,84 x 3,53	N 007.0953
4	Filter element (with seal)	see Chart / col. 9
5	Reed switch	HD 049.1410
	with screws	
	and socket (Pos. 6)	
6	Reed switch with screws	DG 041.1220
	DIN 43650 - AF3	
7	Optical indicator (with Pos. 8)	HD 049.1400
8	O-ring 17 x 2	N 007.0172

The functions of the complete filters as well as the outstanding features of the filter elements assured by ARGO-HYTOS can only be guaranteed if original ARGO-HYTOS spare parts are used.





High Pressure Filters

HD 417 · HD 617

- Bi-directional flow
- In-line mounting
- Operating pressure up to 450 bar
- Nominal flow rate up to 300 l/min

Description

Application

In the high pressure circuits of hydraulic systems with changing flow direction.

Performance features

Protection

By means of filter elements that, in full-flow filtration, against wear: meet even the highest demands regarding cleanliness classes.

Protection against

malfunction:

Through installation near to the control valves or other expensive components. The specific determined flow rate guarantees a closed by-pass valve even at $v \leq 200 \text{ mm}^2/\text{s}$ (cold start condition).

Special features

Reverse flow

valves:

The "Graetz" system (see Symbols) integrated into the head piece ensures the filtration of the hydraulic fluid in both flow directions.

Filter elements

Flow direction from outside to centre. The star-shaped pleating of the filter material results in:

- large filter surfaces
- low pressure drop
- high dirt-holding capacities
- long service life

Filter maintenance

By using a clogging indicator the correct moment for maintenance is stated and guarantees the optimum utilization of the filter life.

Materials

Filter head:	Spheroidal graphite cast iron (SGI)
Filter bowl:	Cold extruded steel
Coating:	Powder paint
Seals:	NBR (Viton on request)
Filter media:	EXAPOR [®] MAX - inorganic multi-layer microfibre web
	Paper - cellulose web, impregnated with resin

Accessories

Electrical and/or optical clogging indicators are available - optionally with one or two switching points resp. temperature suppression. Dimensions and technical data see catalogue sheet 60.30.

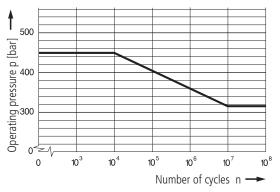
Characteristics

Operating pressure

0 ... 315 bar, min. 10⁷ pressure cycles Nominal pressure according to DIN 24550

0 ... 450 bar, min. 10⁴ pressure cycles Quasi-static operating pressure

Permissible pressures for other numbers of cycles



Nominal flow rate

Up to 300 l/min (see Selection Chart, column 2) The nominal flow rates indicated by ARGO-HYTOS are based on the following features:

- closed by-pass value at $v \le 200 \text{ mm}^2/\text{s}$
- element service life > 1000 operating hours at an average fluid contamination of 0,07 g per l/min flow volume

• flow velocity in the connection lines: up to 250 bar \leq 8 m/s up to 450 bar \leq 12 m/s

Filter fineness

5 µm(c) ... 30 µm(c) β -values according to ISO 16889 (see Selection Chart, column 4 and diagram Dx)

Dirt-holding capacity

Values in g test dust ISO MTD according to ISO 16889 (see Selection Chart, column 5)

Hydraulic fluids

Mineral oil and biodegradable fluids (HEES and HETG, see info-sheet 00.20)

Temperature range

- 30 °C ... + 100 °C (temporary - 40 °C ... + 120 °C)

Viscosity at nominal flow rate

- at operating temperature: $v < 60 \text{ mm}^2/\text{s}$
- as starting viscosity: $v_{max} = 1200 \text{ mm}^2/\text{s}$
- at initial operation:

The recommended starting viscosity can be read from the diagram D (pressure drop as a function of the kinematic viscosity) as follows: Find the 70% Δp of the cracking pressure of the by-pass valve on the vertical axis. Draw a horizontal line so that it intersects the Δp curve at a point. Read this point on the horizontal axis for the viscosity.

Mounting position

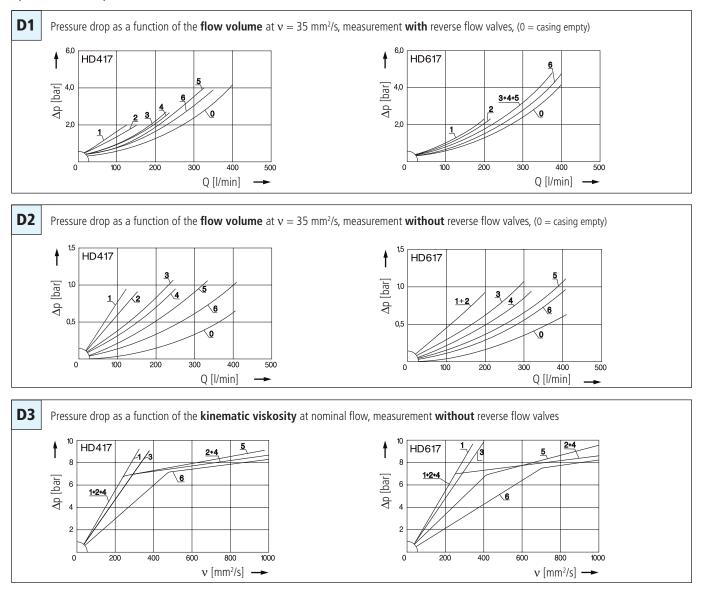
Preferably vertical, filter head on top

Connection

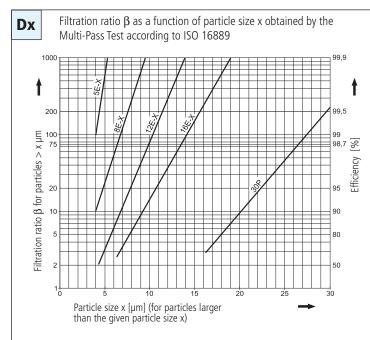
SAE-flange (6000 psi). Sizes see Selection Chart, column 6

Diagrams

Δp -curves for complete filters in Selection Chart, column 3



Filter fineness curves in Selection Chart, column 4



The abbreviations represent the following β -values resp. finenesses:

For EXAPOR®MAX- and Paper elements:

5 E-X	=	B	= 200	EXAPOR®MAX
8 E-X	=	$\vec{\beta}_{a}^{5(c)}$	= 200	EXAPOR®MAX
12 E-X	=	$\bar{\boldsymbol{\beta}}_{12}^{(c)}$	= 200	EXAPOR [®] MAX
5 E-X 8 E-X 12 E-X 16 E-X	=	$\bar{\boldsymbol{\beta}}_{16(c)}^{12(c)}$	= 200	EXAPOR®MAX
30 P	=	$\overline{\beta}_{30 (c)}$	= 200	Paper
			ura of tha	filter modia of the

Based on the structure of the filter media of the 30 \mbox{P} paper elements, deviations from the printed curves are quite probable.

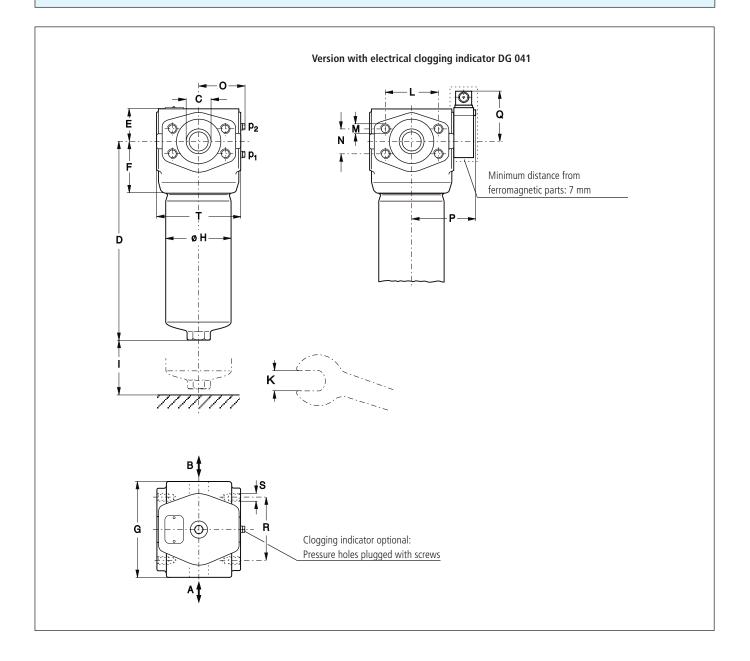
For screen elements:

40 S	=	screen material with mesh size	40 µm
		screen material with mesh size	60 µm
100 S	=	screen material with mesh size	100 µm
Tolerances	for	mesh size according to DIN 4189	9

For special applications, finenesses differing from these curves are also available by using special composed filter media.

Selection Chart

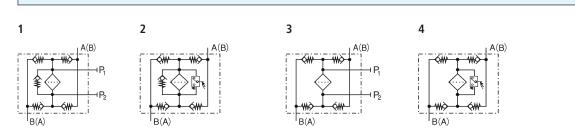
PartNo	l/min	Jonina Row Pressu	e drop see	g	no. see diagr.	pacity pacity pection All bar		gpressure of by participation of the participation	kg		gindicator Remarks
1	2	3	4	5	6	7	8	9	10	11	12
HD 417-149	115	D1,2,3 /1	5 E-X	20	SAE 11/4	-	3	V3.0823-131	20,3	optional	2
HD 417-179	130	D1,2,3 /2	5 E-X	26	SAE 1¼	7	1	V3.0823-03	19,7	optional	-
HD 417-146	180	D1,2,3 /3	12 E-X	32	SAE 1¼	-	3	V3.0823-16 ¹	20,3	optional	2
ID 417-176	210	D1,2,3 /4	12 E-X	41	SAE 11⁄4	7	1	V3.0823-06	19,7	optional	-
ID 447 460	200	D4 2 2/5		10	CAE 41/	7		1/2 0022 00	10.7		
ID 417-168	300	D1,2,3 /5	16 E-X	46	SAE 1¼	7	1	V3.0823-08	19,7	optional	-
ID 417-161	300	D1,2,3 /6	30 P	26	SAE 1¼	7	1	P3.0823-01 ³	19,7	optional	-
ID 617-149 ID 617-179	170	D1,2,3/1	5 E-X	29	SAE 11/2	- 7	3	V3.0833-13 ¹	23,1	optional	2
10017-179	190	D1,2,3 /2	5 E-X	36	SAE 1½		1	V3.0833-03	22,4	optional	-
ID 617-146	270	D1,2,3 /3	12 E-X	46	SAE 1½	-	3	V3.0833-16 ¹	23,1	optional	2
ID 617-176	300	D1,2,3 /4	12 E-X	58	SAE 1½	7	1	V3.0833-06	22,4	optional	-
ID C17 170	200	D1 2 2/5		67	CAE 11/	-	1		22.4	antional	
ID 617-178	300	D1,2,3 /5	16 E-X	67	SAE 1½	7	1	V3.0833-08	22,4	optional	-
ID 617-161	300	D1,2,3 /6	30 P	34	SAE 1½	7	1	P3.0833-01 ³	22,4	optional	-
		P									
ead use the a	bbrevia	tion "M" be	hind the	part	number of th	e indica	ator. T	he printed order	acknowl	edgements show bo	be already mounted onto the fil th items separately.
rder examp	le: The	filter HD 4	17-149	has	to be suppl	ied wi	th el	ectrical cloggi	ing indic	ator - cracking p	ressure 5,0 bar
rder descrip	otion:				HD 41	7-149		/ DG 041	-33	M	
art No. (Basi	ic unit))									- mounted
logging indi	icator										
logging ind	cator										
or the appro	priate	clogging i	indicato	ors se	e catalogue	e sheet	t 60.	30.			
								clogging indicato e on request.	or.		



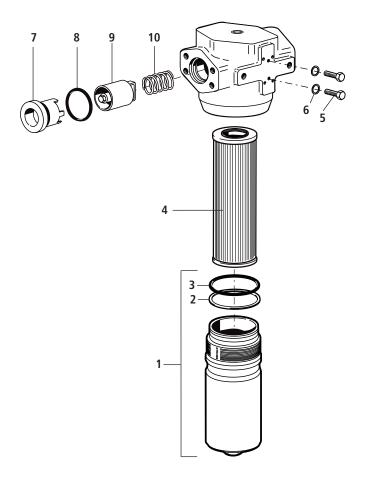
Measurements

Туре	A/B	C	D	E	F	G	Η	I	К	L	M ø/depth	N	0	Р	Q	R	S ø/depth	Т
HD 417	SAE 11/4	31,5	328	58	87,5	156	108	80	32	66,7	M14/22	31,8	73	102	87	100	M12/18	138
HD 617	SAE 1½	31,5	428	58	87,5	156	108	80	32	79,4	M16/24	36,5	73	102	87	100	M12/18	138

Symbols



Spare Parts



Pos.	Designation	Part No.
1	Filter bowl HD 417	HD 451.0702
	(with Pos. 2 and 3)	
1	Filter bowl HD 617	HD 619.0701
	(with Pos. 2 and 3)	
2	Back-ring	HD 255.0102
3	O-ring 94,84 x 3,53	N 007.0953
4	Filter element (with seal)	see Chart / col. 9
5	Hexagonal head screw M4 x 8	3301051
	DIN 933-8.8	
6	Bonded seal 4,1 x 7,2 x 1	3404074
7	Sleeve	HD 417.0505
8	O-ring 42,52 x 2,62	N 007.0433
9	Reverse flow valve	HD 417.1520
10	Spring DM 38	N 015.3801

The functions of the complete filters as well as the outstanding features of the filter elements assured by ARGO-HYTOS can only be guaranteed if original ARGO-HYTOS spare parts are used.

Quality Assurance

Quality management according to DIN EN ISO 9001

To ensure constant quality in production and operation, ARGO-HYTOS filter elements undergo strict controls and tests according to the following DIN and ISO standards:

DIN ISO 2941	Verification of collapse/burst resistance
DIN ISO 2943	Verification of material compatibility with fluids
DIN ISO 3724	Verification of flow fatigue characteristics

ISO 2942 ISO 3968 ISO 16889 Verification of fabrication integrity (Bubble Point Test) Evaluation of pressure drop versus flow characteristics Multi-Pass-Test (evaluation of filter fineness and dirt-holding capacity)

Before release into the series production the filter casing is tested for fatigue strength in our pressure pulse test rig. Various quality controls during the production process guarantee the leakfree function and solidity of our filters.

Our engineers will be glad to advice you in questions concerning filter application, selection as well as the cleanliness class of the filtered medium attainable under practical operating conditions.

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High Pressure Filter Kits

HD 049 · HD 069 HD 172 · HD 319 HD 419 · HD 619

- Operating pressure up to 600 bar
- Nominal flow rate up to 450 l/min

Description

Application

In the high pressure circuits of hydraulic systems.

Performance features

Protection

By means of filter elements that, in full-flow filtration, against wear: meet even the highest demands regarding cleanliness classes.

Protection against malfunction:

Through installation near to the control valves or other expensive components. The specific determined flow rate guarantees a closed by-pass valve even at $\nu \leq 200$ mm²/s (cold start condition).

Filter elements

Flow direction from outside to centre. The star-shaped pleating of the filter material results in:

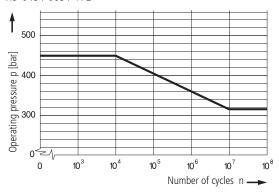
- large filter surfaces
- low pressure drop
- high dirt-holding capacities
- long service life

Characteristics

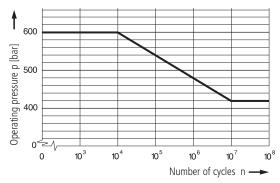
Operating pressure

- HD 049 / 069 / 172: 0 ... 315 bar, min. 107 pressure cycles Nominal pressure according to DIN 24550 0 ... 450 bar, min. 10⁴ pressure cycles Quasi-static operating pressure
- HD 319 / 419 / 619: 0 ... 420 bar, min. 107 pressure cycles Nominal pressure according to DIN 24550 0 ... 600 bar, min. 10⁴ pressure cycles Quasi-static operating pressure

Permissible pressures for other numbers of cycles HD 049 / 069 / 172



HD 319 / 419 / 619



Filter maintenance

By using a clogging indicator the correct moment for maintenance is stated and guarantees the optimum utilization of the filter life.

Materials

Filter bowl:	Cold extruded steel
Coating:	Powder paint
Seals:	NBR (Viton on request)
Filter media:	EXAPOR®MAX - inorganic multi-layer microfibre web

Accessories

To monitor the clogging, screw-in (see section Dimensions) or flange-mounted differential pressure switches are available. Flange-mounted clogging indicators optionally with one or two switching points resp. temperature suppression - Dimensions and technical data see catalogue sheet 60.30.

Nominal flow rate

Up to 450 l/min (see Selection Chart, column 2) The nominal flow rates indicated by ARGO-HYTOS are based on the following features:

- closed by-pass valve at $\nu \leq 200 \text{ mm}^2/\text{s}$
- element service life > 1000 operating hours at an average fluid contamination of 0,07 g per l/min flow volume
- flow velocity in the connection lines: up to 250 bar \leq 8 m/s up to 450 bar \leq 12 m/s

Filter fineness

5 µm(c) ... 16 µm(c) β -values according to ISO 16889 (see Selection Chart, column 4 and diagram Dx)

Dirt-holding capacity

Values in g test dust ISO MTD according to ISO 16889 (see Selection Chart, column 5)

Hydraulic fluids

Mineral oil and biodegradable fluids (HEES and HETG, see info-sheet 00.20)

Temperature range

- 30 °C ... + 100 °C (temporary - 40 °C ... + 120 °C)

Viscosity at nominal flow rate

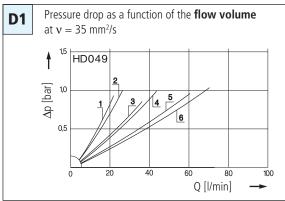
- at operating temperature: $v < 60 \text{ mm}^2/\text{s}$
 - as starting viscosity $v_{max} = 1200 \text{ mm}^2/\text{s}$
- at initial operation:

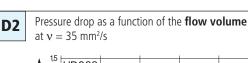
The recommended starting viscosity can be read from the diagram D (pressure drop as a function of the kinematic viscosity) as follows: Find the 70% Δp of the cracking pressure of the by-pass valve on the vertical axis. Draw a horizontal line so that it intersects the Δp curve at a point. Read this point on the horizontal axis for the viscosity.

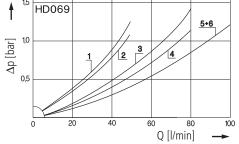
Mounting position Preferably vertical

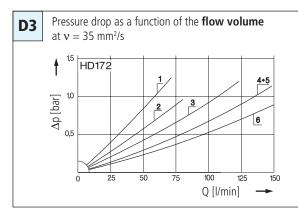
Diagrams

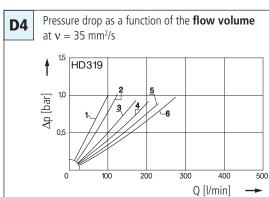
Δp -curves for complete filters in Selection Chart, column 3



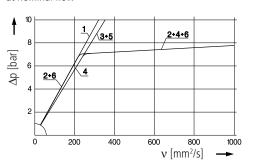


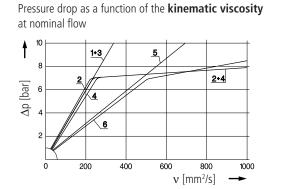




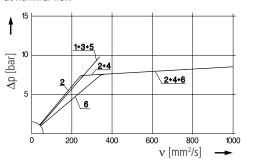


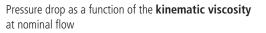
Pressure drop as a function of the **kinematic viscosity** at nominal flow

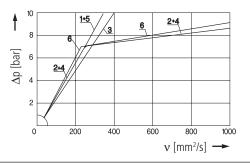




Pressure drop as a function of the **kinematic viscosity** at nominal flow

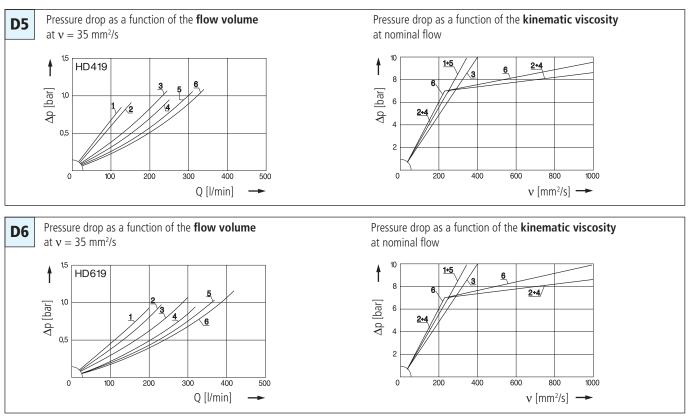




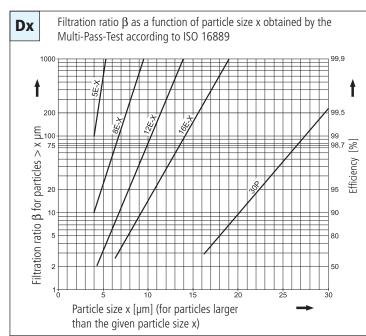


Diagrams

Δp -curves for complete filters in Selection Chart, column 3



Filter fineness curves in Selection Chart, column 4



The abbreviations represent the following $\beta\mbox{-values}$ resp. finenesses:

For EXAPOR[®]MAX and paper elements:

5 E-X	$= \overline{\beta}_{5(c)}$	= 200	EXAPOR®MAX
8 E-X	$= \bar{\beta}_{8(c)}^{5(c)}$	= 200	EXAPOR [®] MAX
12 E-X	$= \overline{\beta}_{12(c)}^{(0)}$	= 200	EXAPOR [®] MAX
16 E-X	$ = \overline{\beta}_{5(c)} $ $ = \overline{\beta}_{8(c)} $ $ = \overline{\beta}_{12(c)} $ $ = \overline{\beta}_{16(c)} $	= 200	EXAPOR®MAX
30 P	$= \overline{\beta}_{30 (c)}$	= 200	Paper

Based on the structure of the filter media of the 30 P paper elements, deviations from the printed curves are quite probable.

For screen elements:

40 S	=	screen material with mesh size	40 µm
		screen material with mesh size	60 µm
		screen material with mesh size	100 µm
Tolerances	for	mesh size according to DIN 4189)

For special applications, finenesses differing from these curves are also available by using special composed filter media.

Selection Chart

	/				at		4	/ /	
				00.	ilagi. Dr	d 🗸	of by pass	eler	nent
		NON	drop see	Ve li sess see	Capac	Less .	JIED	nt filter	
PartNo	N	uminal flow Pressu	te drop see	ve no.	holding capacit	king pr	mbol Repacement	NO. WE	ight Remarks
	l/min	/	, 	g	bar			kg	
1	2	3	4	5	6	7	8	9	10
HD 049-0213	20	D1 /1	5 E-X	3,4	-	5	V3.0510-13*	1,6	with screw-in bushing
HD 049-1503	25	D1 /2	5 E-X	3,8	7	1	V3.0510-03	1,5	-
HD 049-0216	30	D1 /3	12 E-X	5	-	5	V3.0510-16*	1,6	with screw-in bushing
HD 049-1506	35	D1 /4	12 E-X	6,1	7	1	V3.0510-06	1,5	-
HD 049-0218	55	D1 /5	16 E-X	5,5	-	5	V3.0510-18*	1,6	with screw-in bushing
HD 049-1508	63	D1 /6	16 E-X	6,6	7	1	V3.0510-08	1,5	-
HD 069-0213	43	D2 /1	5 E-X	6,9	-	5	V3.0520-13*	2,7	with screw-in bushing
HD 069-1503	50	D2 /2	5 E-X	7,6	7	1	V3.0520-03	2,6	-
HD 069-0216	63	D2 /3	12 E-X	11	-	5	V3.0520-16*	2,7	with screw-in bushing
HD 069-1506	70	D2 /4	12 E-X	13	7	1	V3.0520-06	2,6	-
HD 069-0218	80	D2 /5	16 E-X	12	-	5	V3.0520-18*	2,7	with screw-in bushing
HD 069-1508	80	D2 /6	16 E-X	14	7	1	V3.0520-08	2,6	-
HD 172-0213	55	D3 /1	5 E-X	11	-	5	V3.0623-13*	4,2	with screw-in bushing
HD 172-1503	80	D3 /2	5 E-X	14	7	1	V3.0623-03	3,9	
HD 172-0226	100	D3 /3	12 E-X	17	-	5	V3.0623-26*	4,2	with screw-in bushing
HD 172-1506	150	D3 /4	12 E-X	22	7	1	V3.0623-06	3,9	-
HD 172-0218	150	D3 /5	16 E-X	18	-	5	V3.0623-18*	4,2	with screw-in bushing
HD 172-1508	150	D3 /6	16 E-X	24	7	1	V3.0623-08	3,9	-
110 172 1900	150	2010	TOEX	21	,		13.0023 00	5,5	
HD 319-0213	85	D4 /1	5 E-X	14	-	5	V3.0817-13*	6,5	with screw-in bushing
HD 319-1503	95	D4 /2	5 E-X	18	7	1	V3.0817-03	6	
HD 319-0216	135	D4 /3	12 E-X	22	-	5	V3.0817-16*	6,5	with screw-in bushing
HD 319-1506	160	D4 /4	12 E-X	28	7	1	V3.0817-06	6	
HD 319-0218	240	D4 /5	16 E-X	24	_	5	V3.0817-18*	6,5	with screw-in bushing
HD 319-1508	270	D4 /6	16 E-X	30	7	1	V3.0817-08	6	
	27.0	2.70							
HD 419-0213	115	D5 /1	5 E-X	20	-	5	V3.0823-13*	8,8	with screw-in bushing
HD 419-1503	130	D5/2	5 E-X	26	7	1	V3.0823-03	8,2	
HD 419-0216	180	D5 /3	12 E-X	32	-	5	V3.0823-16*	8,8	with screw-in bushing
HD 419-1506	210	D5 /4	12 E X	41	7	1	V3.0823-06	8,2	-
HD 419-0218	300	D5 /5	16 E-X	34	-	5	V3.0823-18*	8,8	with screw-in bushing
HD 419-1508	340	D5 /6	16 E-X	46	7	1	V3.0823-08	8,2	-
	510	2310	19 2 7	10	,		13.0023 00	5,2	
HD 619-0213	170	D6 /1	5 E-X	29	-	5	V3.0833-13*	11,9	with screw-in bushing
HD 619-0213	190	D6/2	5 E-X	36	7	1	V3.0833-03	11,1	-
HD 619-0216	270	D6/2	12 E-X	46	-	5	V3.0833-16*	11,9	with screw-in bushing
HD 619-0210	300	D6 /3	12 E-X	58	7	1	V3.0833-06	11,9	
HD 619-1508 HD 619-0218	450	D6/4	12 E-X	50	-	5	V3.0833-18*	11,1	with screw-in bushing
HD 619-0218 HD 619-1508	450	D6 /5	16 E-X	67	7	1	V3.0833-08	11,9	
0001-1000	400	00/0	10 L-A	07	/		10.0000-00	11,1	_

Remarks:

• Filter versions without by-pass valves must be equipped with a clogging indicator.

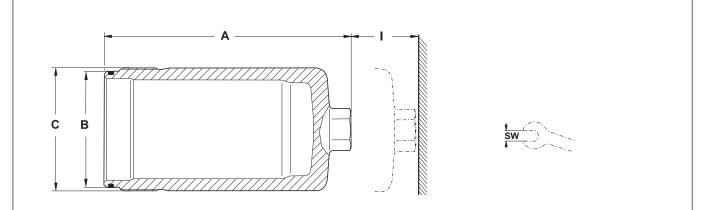
• The filter sets listed in this chart are standard filters. If modifications are required, we kindly ask for your request.

• Clogging indicators to screw into the hydraulic block see section Dimensions.

• For the appropriate, flange-mounted clogging indicators see catalogue sheet 60.30.

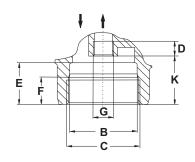
* Element differential pressure stable up to 160 bar, clogging indicator obligatory

Dimensions

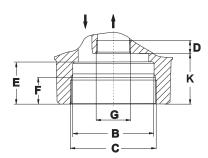


Version with by-pass valve

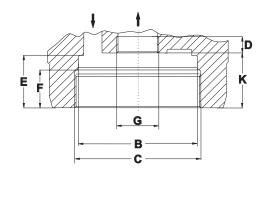
HD 049 / 069



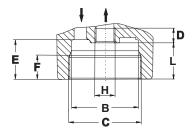
HD 172

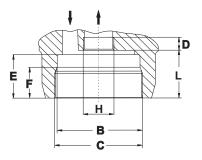


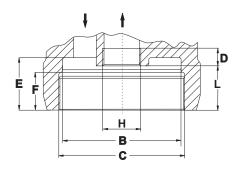
HD 319 / 419 / 619



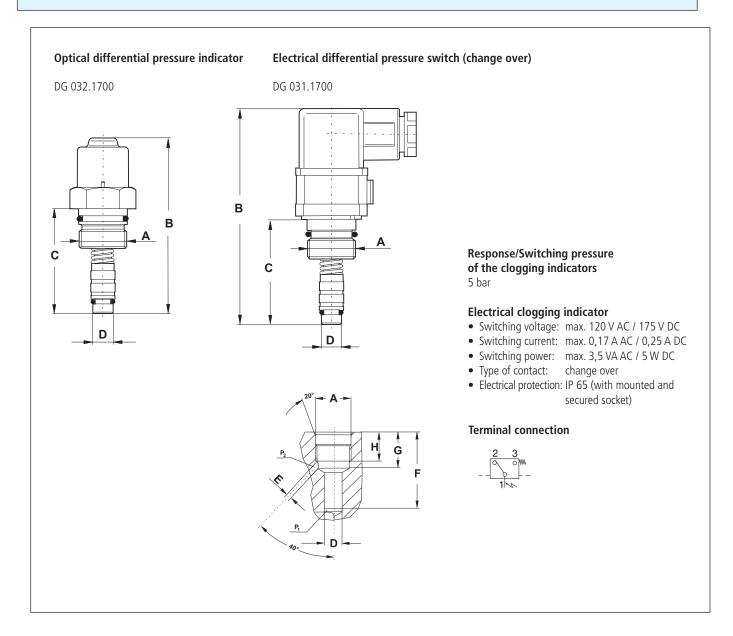
Version with screw-in bushing







Dimensions

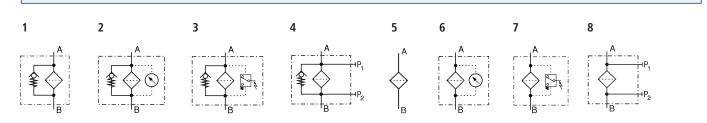


Measurements

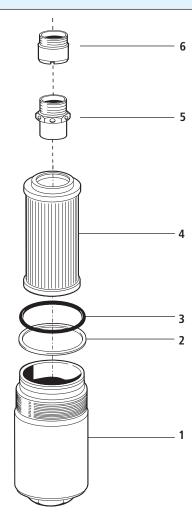
Туре	А	В	C	D	E	F	G	Н	I	К	L	SW
HD 049/069	133/227,5	60	M65 x 1,5	min. 13	35,5	22,5	M18 x 1,5	M18 x 1,5	55	42	32,5	36
HD 172	256,5	71	M75 x 1,5	min. 13	37	22,5	M30 x 1	M26 x 1,5	70	44,5	41	27
HD 319/419/619	218/282/383	102	M108 x 1,5	min. 14	45	32,5	M36 x 1	M36 x 1,5	80	47	38	32
DG 031.1700	M20 x 1,5	93	44	Ø10	Ø2,5	43,8	20,5	16,5	-	-	-	-
DG 032.1700	M20 x 1,5	74	44	Ø10	Ø2,5	43,8	20,5	16,5	-	-	-	-

All measurements and tolerances required for machining are available on request.

Symbols



Spare Parts



Pos.	Designation	Part No.
1	Filter bowl HD 049	HD 052.0102
1	Filter bowl HD 069	HD 072.0102
3	O-ring 53,57 x 3,53	N 007.0543/1
4	Filter element (with seal)	see Chart / col. 7
5	By-pass valve	HD 045.1510
6	Screw-in bushing	HD 049.0503
D 172		
Pos.	Designation	Part No.
1	Filter bowl HD 172	HD 171.0102
3	O-ring 63 x 3,5	N 007.0634
4	Filter element (with seal)	see Chart / col. 7
5	By-pass valve	HD 172.1500
6	Screw-in bushing	HD 171.0205
D 319 /	HD 419 / HD 619	
Pos.	Designation	Part No.
1	Filter bowl HD 319	HD 250.0105
1	Filter bowl HD 419	HD 411.0102
1	Filter bowl HD 619	HD 611.0102
2	Back-ring	HD 255.0102
3	O-ring 94,84 x 3,53	N 007.0953
4	Filter element (with seal)	see Chart / col. 7
5	By-pass valve	HD 319.1510

The functions of the complete filters as well as the outstanding features of the filter elements assured by ARGO-HYTOS can only be guaranteed if original ARGO-HYTOS spare parts are used.

Screw-in bushing

Quality Assurance

Quality management according to DIN EN ISO 9001

To ensure constant quality in production and operation, ARGO-HYTOS filter elements undergo strict controls and tests according to the following DIN and ISO standards:

DIN ISO 2941	Verification of collapse/burst resistance
DIN ISO 2943	Verification of material compatibility with fluids
DIN ISO 3724	Verification of flow fatigue characteristics

ISO 2942	
ISO 3968	
ISO 16889	

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Verification of fabrication integrity (Bubble Point Test) Evaluation of pressure drop versus flow characteristics Multi-Pass-Test (evaluation of filter fineness and dirt-holding capacity)

HD 411.0209

Before release into the series production the filter casing is tested for fatigue strength in our pressure pulse test rig. Various quality controls during the production process guarantee the leakfree function and solidity of our filters.

Our engineers will be glad to advice you in questions concerning filter application, selection as well as the cleanliness class of the filtered medium attainable under practical operating conditions.

Illustrations may sometimes differ from the original. ARGO-HYTOS is not responsible for any unintentional mistake in this specification sheet.



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