

**Return Filters**

**E 303 · E 503 · E 703**

- Tank top mounting
- Connection up to SAE 2½
- Nominal flow rate up to 900 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

Filter head cover: Steel

Filter head: Aluminium alloy

Filter bowl: Steel

Seals: NBR (FPM on request)

Filter media: EXAPOR®MAX 2 - inorganic multi-layer microfibre web

### Accessories

Extension pipes and diffusers on the bowl outlet are available on request.

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.

Electrical and optical clogging indicators are available on request.

Dimensions and technical data see catalogue sheet 60.20.

## Characteristics

### Nominal flow

Up to 900 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  $v \leq 200 \text{ mm}^2/\text{s}$
- element service life > 1.000 operating hours at an average fluid contamination of 0,07 g per l/min flow volume
- flow velocity in the connection lines  $\leq 4,5 \text{ m/s}$

### Connection

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

### Filter fineness

5  $\mu\text{m(c)}$  ... 16  $\mu\text{m(c)}$

$\beta$ -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:  $v_{\text{max}} = 1.200 \text{ mm}^2/\text{s}$

• 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 %  $\Delta p$  of the cracking pressure of the by-pass valve on the vertical axis. Draw a horizontal line so that it intersects the  $\Delta p$  curve at a point. Read this point on the horizontal axis for the viscosity.

### Operating pressure

Max. 10 bar

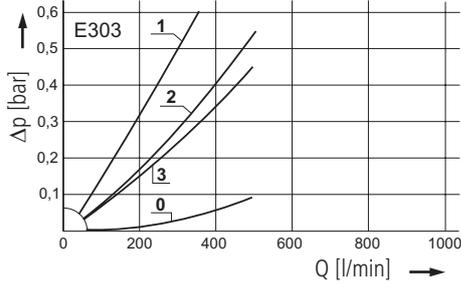
### Mounting position

Preferably vertical, outlet downwards

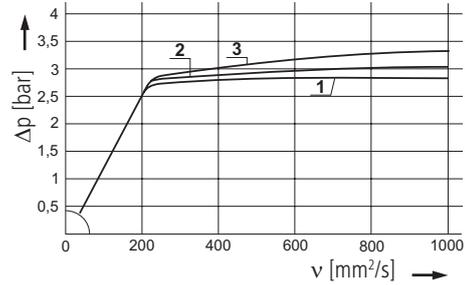
# Diagrams

## $\Delta p$ -curves for complete filters in Selection Chart, column 3

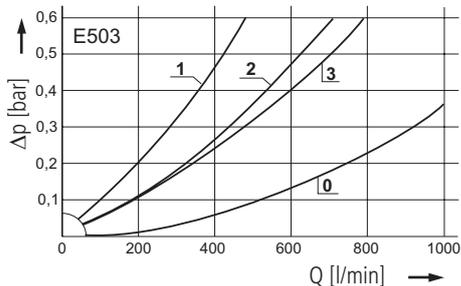
**D1** Pressure drop as a function of the **flow volume** at  $v = 35 \text{ mm}^2/\text{s}$  (0=casing empty)



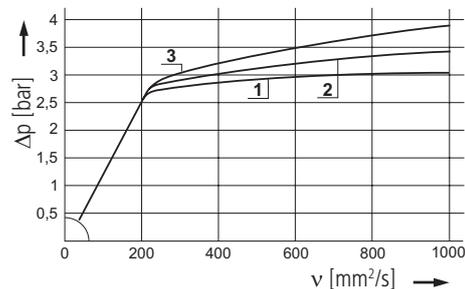
Pressure drop as a function of the **kinematic viscosity** at nominal flow



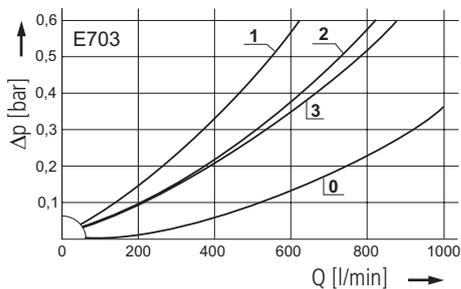
**D2** Pressure drop as a function of the **flow volume** at  $v = 35 \text{ mm}^2/\text{s}$  (0=casing empty)



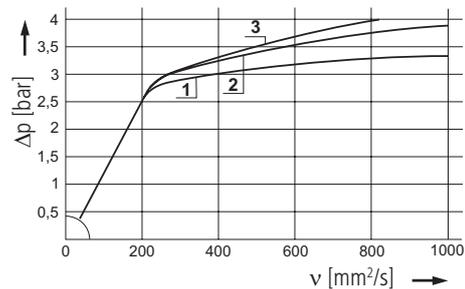
Pressure drop as a function of the **kinematic viscosity** at nominal flow



**D3** Pressure drop as a function of the **flow volume** at  $v = 35 \text{ mm}^2/\text{s}$  (0=casing empty)

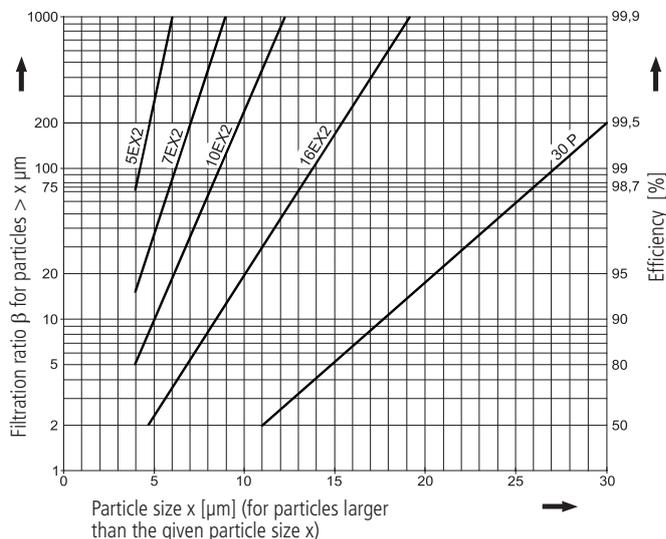


Pressure drop as a function of the **kinematic viscosity** at nominal flow



## Filter fineness curves in Selection Chart, column 4

**Dx** Filtration ratio  $\beta$  as a function of particle size  $x$  obtained by the Multi-Pass-Test according to ISO 16889



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

**For EXAPOR®MAX 2- and Paper elements:**

**5EX2** =  $\beta_{5(c)} = 200$  EXAPOR®MAX 2

**7EX2** =  $\beta_{7(c)} = 200$  EXAPOR®MAX 2

**10EX2** =  $\beta_{10(c)} = 200$  EXAPOR®MAX 2

**16EX2** =  $\beta_{16(c)} = 200$  EXAPOR®MAX 2

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

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

**For screen elements:**

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

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

**100S** = screen material with mesh size 100  $\mu\text{m}$

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

Part No.	Nominal flow rate <sup>1</sup> Pressure drop diagram <b>D1</b>	Filter fineness no. <b>Dx</b>	Dirt-holding capacity see Diagr. <b>Dx</b>	Connection A SAE (3000 psi)	Cracking pressure of by-pass Symbol	Replacement filter element Part no.	Weight	Remarks		
1	l/min	3	g	6	bar	8	9	10	11	
E 303-453	220	<b>D1/1</b>	5EX2	91	2xG1¼/SAE1½,G¾+G1	2,5	2	V2.1425-23	8,9	-
E 303-456	350	<b>D1/2</b>	10EX2	120	2xG1¼/SAE1½,G¾+G1	2,5	2	V2.1425-26	8,9	-
E 303-458	500	<b>D1/3</b>	16EX2	130	2xG1¼/SAE1½,G¾+G1	2,5	2	V2.1425-28	8,9	-
E 503-453	350	<b>D2/1</b>	5EX2	150	2xG1¼/SAE1½,G¾+G1	2,5	2	V2.1440-23	11,7	-
E 503-456	540	<b>D2/2</b>	10EX2	200	2xG1¼/SAE1½,G¾+G1	2,5	2	V2.1440-26	11,7	-
E 503-458	750	<b>D2/3</b>	16EX2	200	2xG1¼/SAE1½,G¾+G1	2,5	2	V2.1440-28	11,7	-
E 703-453	500	<b>D3/1</b>	5EX2	230	2xG1¼/SAE1½,G¾+G1	2,5	2	V2.1460-23	15,4	-
E 703-456	740	<b>D3/2</b>	10EX2	300	2xG1¼/SAE1½,G¾+G1	2,5	2	V2.1460-26	15,4	-
E 703-458	900	<b>D3/3</b>	16EX2	310	2xG1¼/SAE1½,G¾+G1	2,5	2	V2.1460-28	15,4	-

All filters are delivered with a plugged clogging indicator connection M 12 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 703-256 has to be supplied with 2 connections (A and A4) and an extension pipe for 800 mm length.**

**Order description:**

**E 703- 256 / RV / EV 800**

**Connections:**

two various options are available

two connections<sup>1</sup> (A und A4)<sup>2</sup>

- SAE2½ and G1 ————— 2 —————

four connections<sup>1</sup> (A1, A2, A3 and A4)

- 2 x G1¼ / SAE1½, G¾ and G1 ————— 4

**Bowl outlet<sup>2</sup>:**

two various options are available

VD - Outlet diffuser, RV - extension pipe

**Extension pipe<sup>3</sup>:**

four various lengths are available

EV = K (Bowl length) + 64 / + 164 / + 264 / + 454 mm (see section dimensions and measurements)

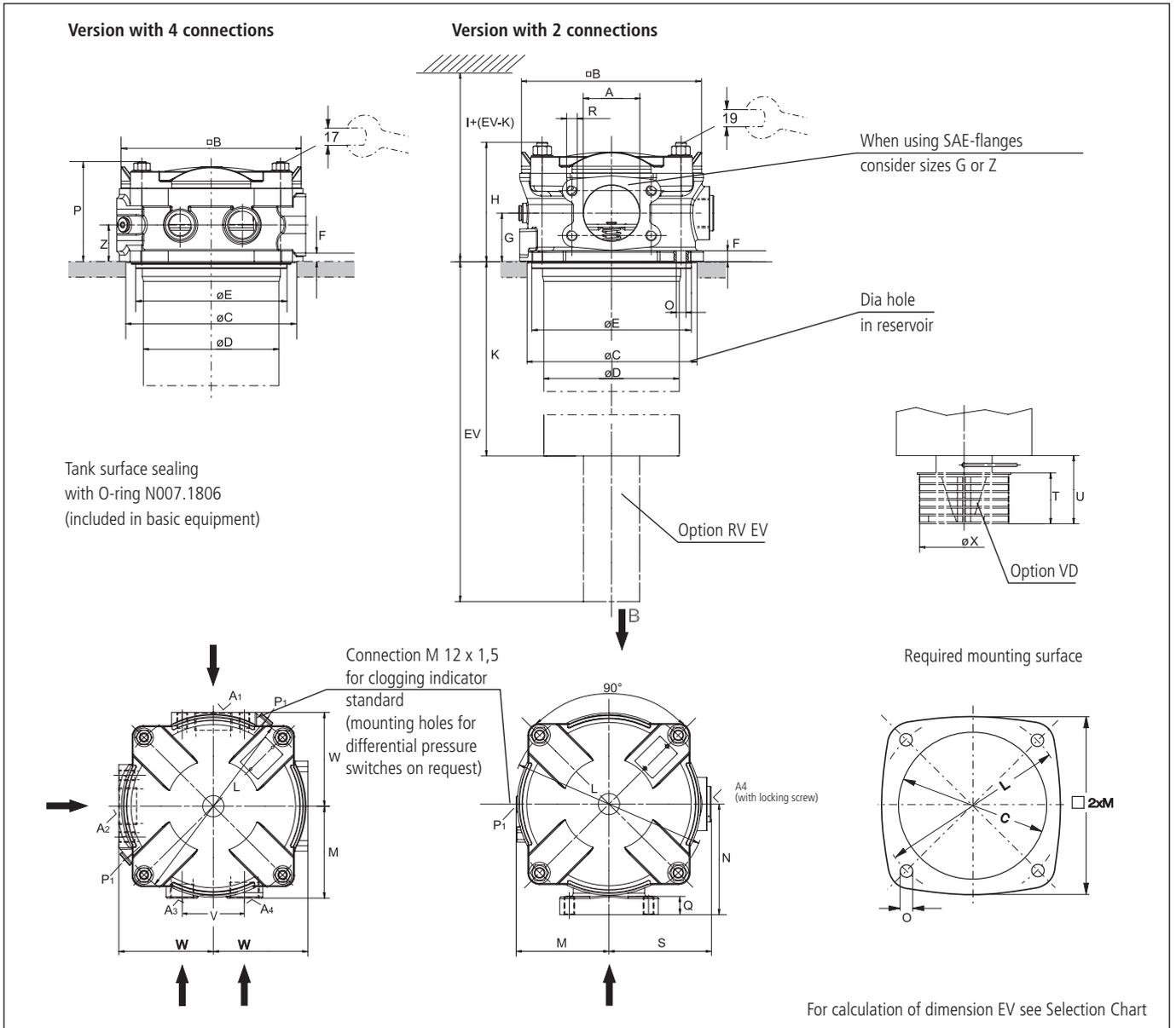
**For the appropriate clogging indicators see catalogue sheet 60.20.**

**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 available on request.

<sup>1</sup> The individual flow rates must be matched to the connections. <sup>2</sup> Connection G1 (A4) with locking screw <sup>3</sup> On request an outlet diffuser can be combined with an extension pipe

# Dimensions

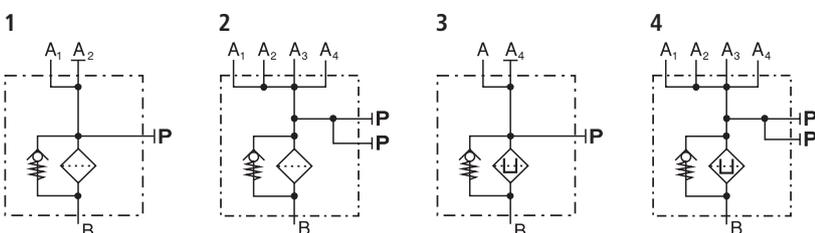


# Measurements

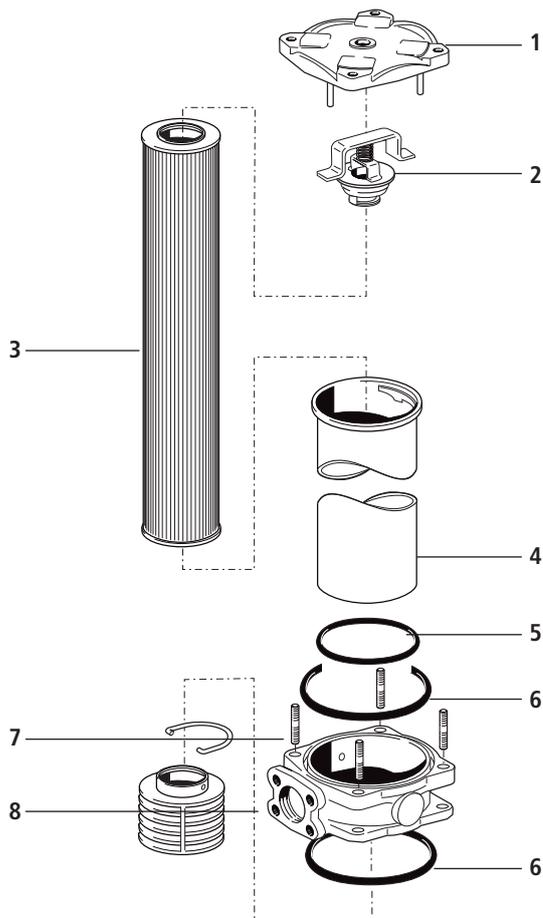
Type	A	B	C	D	E	F	G	H	I	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Z
E 303	see	182	180	152	179	12	55	133	400	276	220	104	125	11,5*	113	20	M12	115	58	79	70	106	100	41,5
E 503	Selection	182	180	152	179	12	55	133	550	430	220	104	125	11,5*	113	20	M12	115	58	79	70	106	100	41,5
E 703	Chart	182	180	152	179	12	55	133	810	636	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 (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 and RVEV respectively)

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 ISO standards:

<b>ISO 2941</b>	Verification of collapse/burst pressure rating
<b>ISO 2942</b>	Verification of fabrication integrity (Bubble Point Test)
<b>ISO 2943</b>	Verification of material compatibility with fluids

<b>ISO 3968</b>	Evaluation of pressure drop versus flow characteristics
<b>ISO 16889</b>	Multi-Pass-Test (evaluation of filter fineness and dirt-holding capacity)
<b>ISO 23181</b>	Determination of resistance to flow fatigue using high viscosity fluid

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

Our engineers will be glad to advise 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**

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