



## 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 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

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  $v \leq 200 \text{ mm}^2/\text{s}$
- 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  $\leq 4,5 \text{ m/s}$

### 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

5  $\mu\text{m(c)}$  ... 60  $\mu\text{m(c)}$

$\beta$ -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:  $v_{\text{max}} = 1200 \text{ mm}^2/\text{s}$
- 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%  $\Delta p$  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

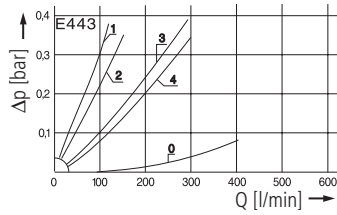
### Mounting position

Preferably vertical, outlet downwards

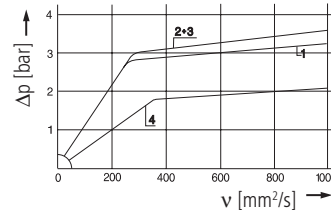
# Diagrams

## $\Delta p$ -Kennlinien für die Kompletfilter in der Auswahltabelle, Spalte 3

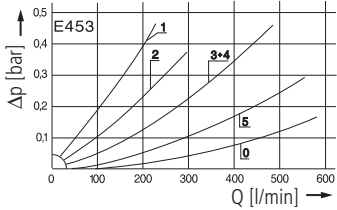
**D1** Pressure drop as a function of the **flow volume** at  $v = 35 \text{ mm}^2/\text{s}$  (0=casing empty)



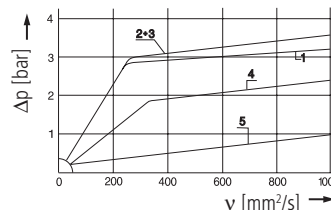
Pressure drop as a function of the **kinematic viscosity** at nominal flow



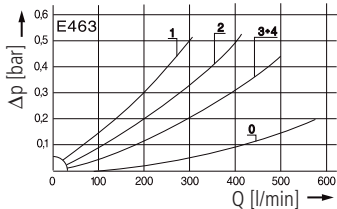
**D2** Pressure drop as a function of the **flow volume** at  $v = 35 \text{ mm}^2/\text{s}$  (0=casing empty)



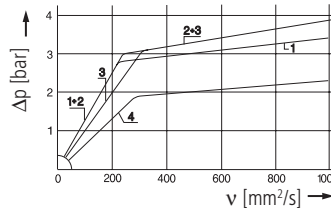
Pressure drop as a function of the **kinematic viscosity** at nominal flow



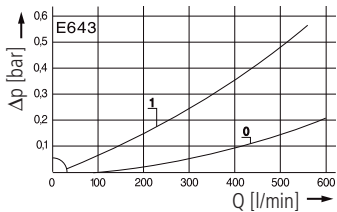
**D3** Pressure drop as a function of the **flow volume** at  $v = 35 \text{ mm}^2/\text{s}$  (0=casing empty)



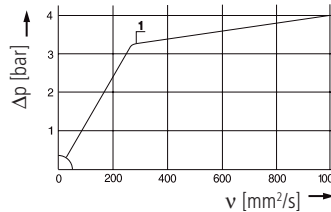
Pressure drop as a function of the **kinematic viscosity** at nominal flow



**D4** Pressure drop as a function of the **flow volume** at  $v = 35 \text{ mm}^2/\text{s}$  (0=casing empty)

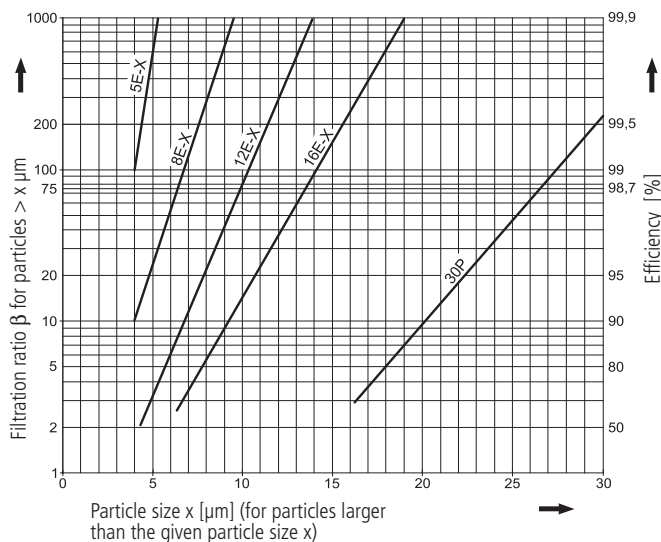


Pressure drop as a function of the **kinematic viscosity** at nominal flow



## 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- and Paper elements:**

- 5 E-X** =  $\beta_{5(c)} = 200$  EXAPOR®MAX
- 8 E-X** =  $\beta_{8(c)} = 200$  EXAPOR®MAX
- 12 E-X** =  $\beta_{12(c)} = 200$  EXAPOR®MAX
- 16 E-X** =  $\beta_{16(c)} = 200$  EXAPOR®MAX
- 30 P** =  $\beta_{30(c)} = 200$  Paper

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

**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  $\mu\text{m}$
- 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 l/min	Pressure drop see Diagram <b>D</b> /curve no.	Filter fineness see Diagr. <b>Dx</b>	Dirt-holding capacity Filter surface in ( )	Connection A SAE (3000 psi)	Cracking pressure of by-pass bar	Symbol	Replacement filter element Part No.	Weight kg	Remarks
1	2	3	4	5	6	7	8	9	10	11
E 443-159	85	<b>D1/1</b>	5 E-X	34	G1½ / SAE2	2,5	1	V2.1217-03	4,4	-
E 443-156	130	<b>D1/2</b>	12 E-X	53	G1½ / SAE2	2,5	1	V2.1217-36	4,4	-
E 443-168	210	<b>D1/3</b>	16 E-X	57	G1½ / SAE2	2,5	1	V2.1217-08	4,4	-
E 443-181	175	<b>D1/4</b>	30 P	29	G1½ / SAE2	1,5	1	P2.1217-21*	4,4	-
E 453-159	170	<b>D2/1</b>	5 E-X	68	G1½ / SAE2	2,5	1	2 x V2.1217-03	6,1	-
E 453-156	260	<b>D2/2</b>	12 E-X	106	G1½ / SAE2	2,5	1	2 x V2.1217-36	6,1	-
E 453-168	410	<b>D2/3</b>	16 E-X	114	G1½ / SAE2	2,5	1	2 x V2.1217-08	6,1	-
E 453-153	350	<b>D2/4</b>	30 P	58	G1½ / SAE2	1,5	1	2 x P2.1217-21*	6,1	-
E 453-100	525	<b>D2/5</b>	60 S	(3600 cm <sup>2</sup> )	G1½ / SAE2	1,5	4	2 x S2.1217-00	6,4	with magnetic system
E 463-159	250	<b>D3/1</b>	5 E-X	102	G1½ / SAE2	2,5	1	3 x V2.1217-03	7,8	-
E 463-156	390	<b>D3/2</b>	12 E-X	159	G1½ / SAE2	2,5	1	3 x V2.1217-36	7,8	-
E 463-168	500	<b>D3/3</b>	16 E-X	171	G1½ / SAE2	2,5	1	3 x V2.1217-08	7,8	-
E 463-153	480	<b>D3/4</b>	30 P	87	G1½ / SAE2	1,5	1	3 x P2.1217-21*	7,8	-
E 643-176	550	<b>D4/1</b>	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 / VD / EV 564**

**Connections:**

**3 various options are available**

one connection (A)

- G1½ / SAE 2 ————— 1

two connections (A and A3)

- G1½ / SAE 2 and G¾ ————— 2

four connections (A1, A2, A3 and A4)

- 2 x G1¼ / SAE 1½, G¾ and G1 ————— 4

**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 / + 196 / + 231 / + 356 / + 446 / + 626 mm (see section dimensions and measurements)

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

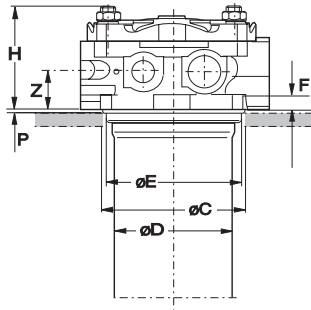
**Remarks:**

- 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, e.g. with screen elements (mesh size 450 µm) at the bowl outlet, are available on request.

\* Paper media supported with metal gauze

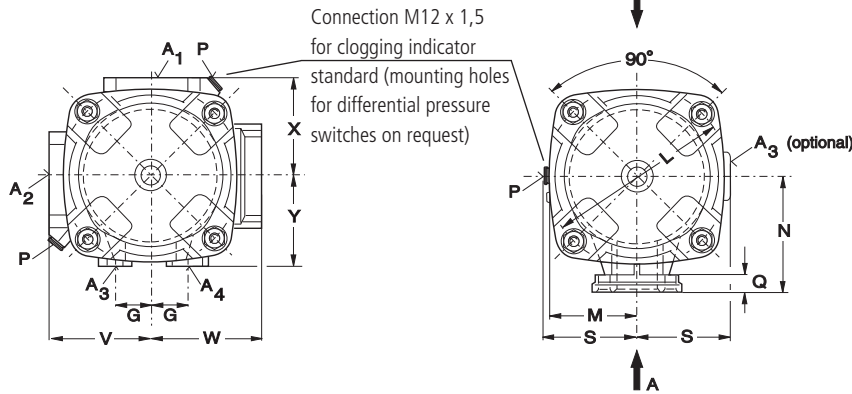
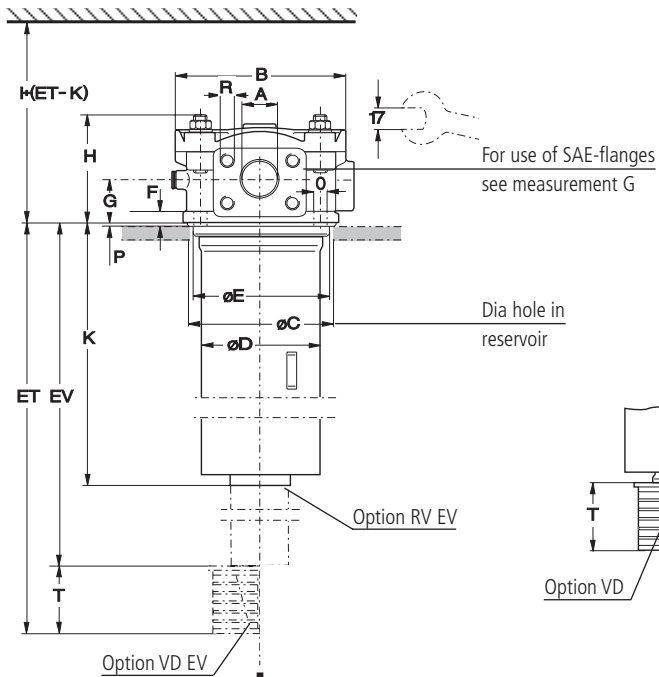
## Dimensions

Version with 4 connections

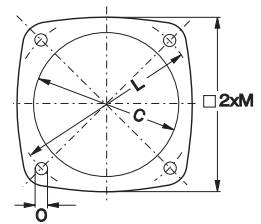


Tank surface sealing either with flat gasket E442.0103 or O-ring N007.1375 (both items included in basic equipment)

Versions with 1 or 2 connections



Required mounting surface



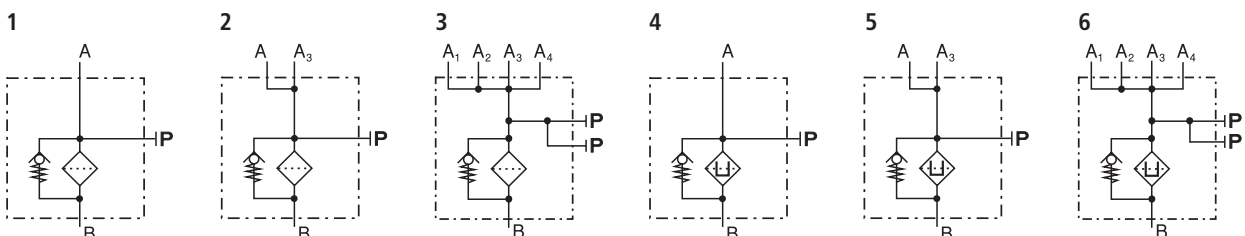
For calculation of EV see Selection Chart

## Measurements

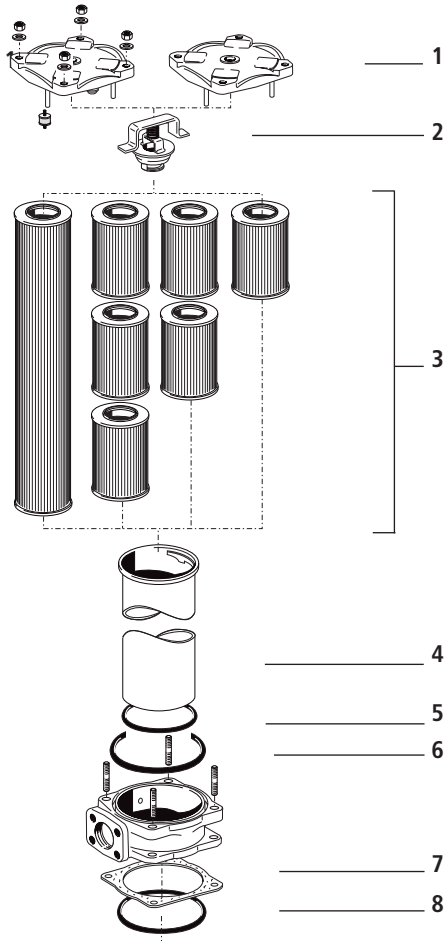
Type	A	B	C	D	E	F	G	H	I	K	L	M	N	O	P	Q	R	S	T	V	W	X	Y	Z
E 443	G1½/SAE 2	174	141	131	139,9	12	36/35*	97	370	201	185	86,5	116	11,5	2	18	M12	92	58	96	106	96	89	32,5
E 453	G1½/SAE 2	174	141	131	139,9	12	36/35*	97	540	368	185	86,5	116	11,5	2	18	M12	92	58	96	106	96	89	32,5
E 463	G1½/SAE 2	174	141	131	139,9	12	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:

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

<b>ISO 2942</b>	Verification of fabrication integrity (Bubble Point Test)
<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)

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**

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