

Return Filters

E 441 · E 451 · E 461 · E 641 · E 700

Tank mounting · Nominal flow rate up to 800 l/min / 211.4 gpm



Return Filter E 461

Description

Application

In the return line circuits of hydraulic systems.

Performance features

Protection against wear:

By means of filter elements that even in full-flow filtration meet 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

- › Installation:
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.
- › 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.
- › AirEX air separation:
Prevents impairments and damage caused by air in the hydraulic medium and enables a significant reduction in tank size.

Filter elements

Flow direction from outside to center.

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, phosphated
Housing bottom: (for E 700:	Polyamide, GF reinforced Steel, phosphated)
Seals:	NBR (FPM on request)
Filter media:	EXAPOR®MAX3 - inorganic multi-layer microfiber web Paper - cellulose web, impregnated with resin

Accessories

On request, the filters can be supplied with air separation, extension pipes or diffusers at the filter outlet. A combination of individual options is also possible on request.

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.

Electrical and optical clogging indicators are available on request. Dimensions and technical data see catalog sheet 60.20.

Characteristics

Nominal flow rate

Up to 800 l/min / 211.4 gpm (see Selection Chart, column 2).
The nominal flow rates indicated by ARGO-HYTOS are based on the following features:

- › closed by-pass valve at $v \leq 200 \text{ mm}^2/\text{s}$ / 927 SUS
- › element service life > 1000 operating hours at an average fluid contamination of 0.07 g per l/min / 0.27 g per gpm flow volume
- › flow velocity in the connection lines $\leq 4.5 \text{ m/s}$ / 14.8 ft/s

Installation

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

Filter fineness

10 $\mu\text{m(c)}$... 30 $\mu\text{m(c)}$
 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).

Connection

For installation recommendations, see info sheet 00.325.

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)
-22 °F ... +100 °F (temporary -40 °F ... +248 °F)

Viscosity at nominal flow rate

- › at operating temperature: $v < 60 \text{ mm}^2/\text{s}$ / 280 SUS
- › as starting viscosity: $v_{\text{max}} = 1200 \text{ mm}^2/\text{s}$ / 5560 SUS
- › 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.

Operating pressure

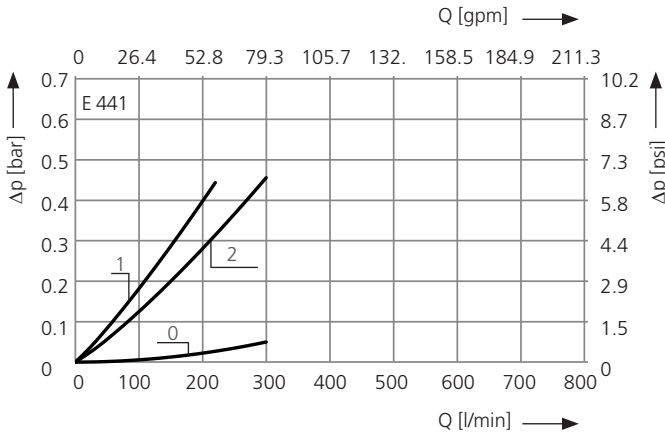
Max. 10 bar / 145 psi

Mounting position

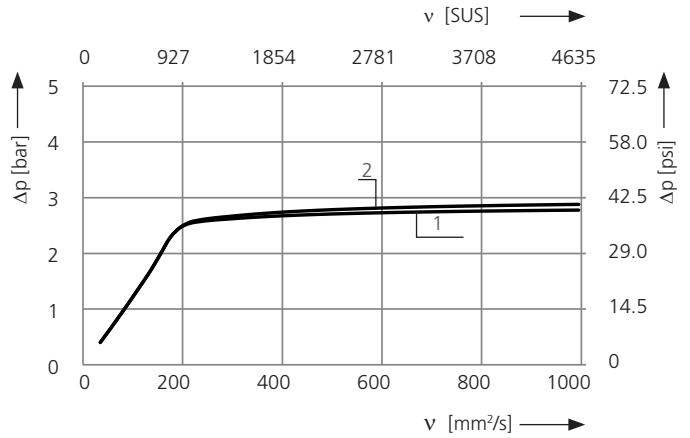
Preferably vertical, outlet downwards.

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

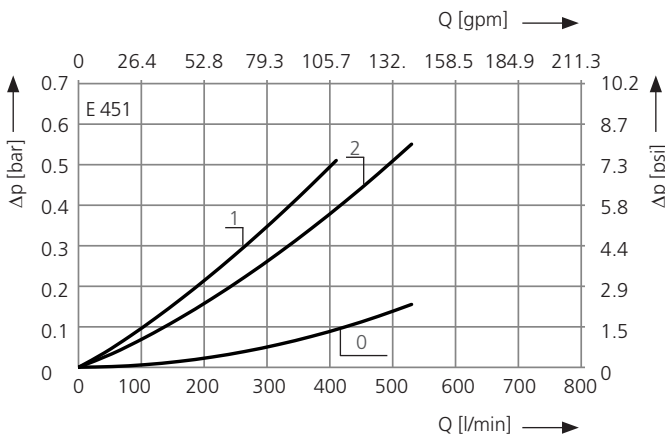
D1 Pressure drop as a function of the **flow volume**
at $v = 35 \text{ mm}^2/\text{s} / 162 \text{ SUS}$ (0 = casing empty)



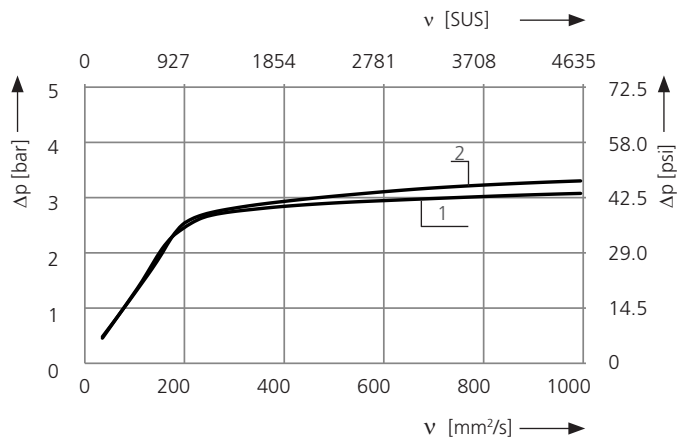
Pressure drop as a function of the **kinematic viscosity** at nominal flow



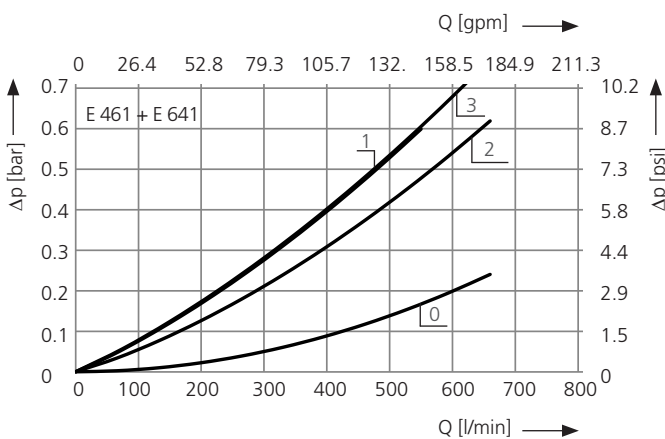
D2 Pressure drop as a function of the **flow volume**
at $v = 35 \text{ mm}^2/\text{s} / 162 \text{ SUS}$ (0 = casing empty)



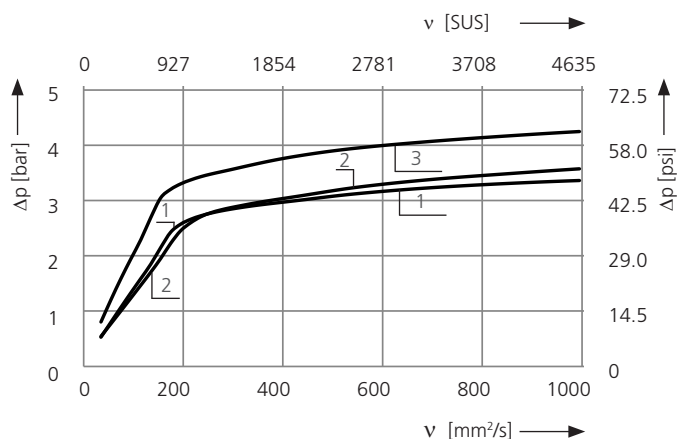
Pressure drop as a function of the **kinematic viscosity** at nominal flow



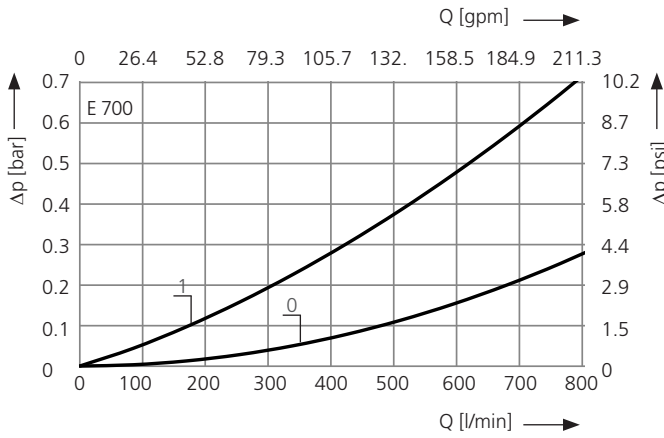
D3 Pressure drop as a function of the **flow volume**
at $v = 35 \text{ mm}^2/\text{s} / 162 \text{ SUS}$ (0 = casing empty)



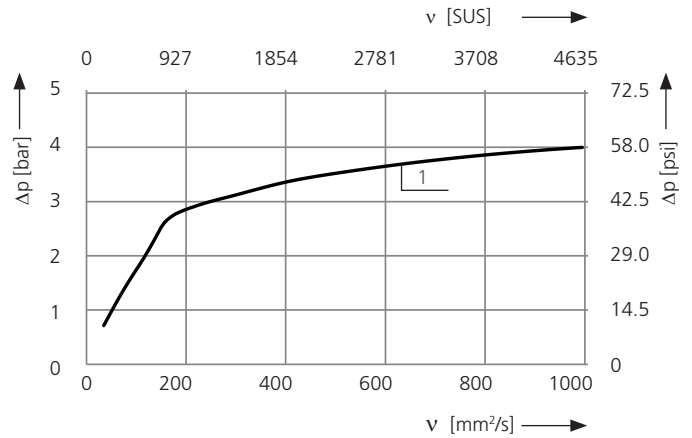
Pressure drop as a function of the **kinematic viscosity** at nominal flow



D4 Pressure drop as a function of the **flow volume**
at $v = 35 \text{ mm}^2/\text{s}$ / 162 SUS (0 = casing empty)

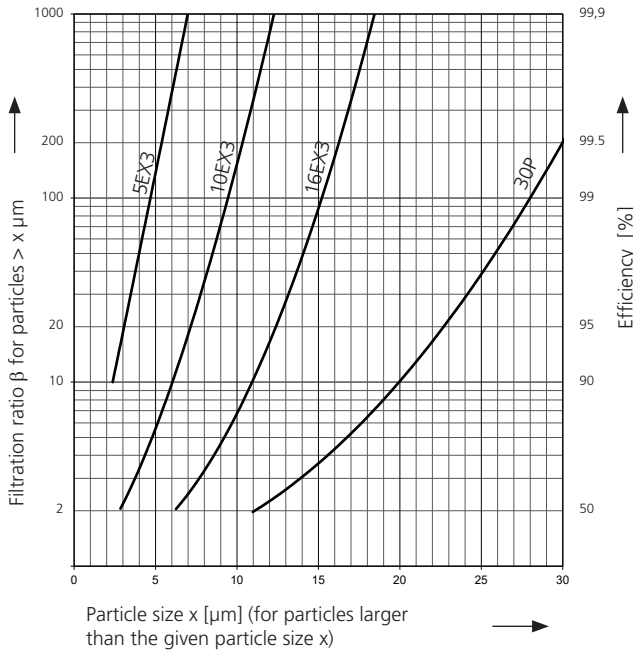


Pressure drop as a function of the **kinematic viscosity** at nominal flow



Filter fineness curves in Selection Chart, column 4

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



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

For EXAPOR®MAX 3 and Paper elements:

5EX3 = $\beta_{5(c)}$ = 200	EXAPOR®MAX 3
10EX3 = $\beta_{10(c)}$ = 200	EXAPOR®MAX 3
16EX3 = $\beta_{16(c)}$ = 200	EXAPOR®MAX 3
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 μm
60S = screen material with mesh size	60 μm
100S = 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 Charts

Part No.	Nominal flow rate		Pressure drop see diagram D1 /curve no.	Filter fineness see Dx	Dirt-holding capacity	Connection A		Cracking pressure of by-pass	Symbol	Replacement filter element Part No.	Weight		Remarks
	l/min	gpm				bar	psi				g	kg	
1	2	3	4	5	6	7	8	9	10	11			
E 441-156¹	200	53	D1/1	10EX3	71	-	2.5	36	1	V2.1217-56	2.4	5.3	-
E 441-168¹	270	71	D1/2	16EX3	77	-	2.5	36	1	V2.1217-58	2.4	5.3	-
E 451-156¹	375	99	D2/1	10EX3	150	-	2.5	36	1	V2.1234-26	4.1	9.0	-
E 451-168¹	480	127	D2/2	16EX3	150	-	2.5	36	1	V2.1234-28	4.1	9.0	-
E 461-156¹	500	132	D3/1	10EX3	230	-	2.5	36	1	V2.1250-06	5.8	12.8	-
E 461-168¹	600	180	D3/2	16EX3	240	-	2.5	36	1	V2.1250-08	5.8	12.8	-
E 641-76¹	680	180	D3/3	10EX3	290	-	3.0	43	1	V2.1260-46	7.5	16.5	-
E 700-156¹	800	211	D4/1	10EX3	350	-	2.5	36	1	V2.1460-26	12.4	27.3	-

¹ Preferred type, no minimum order quantity required

² Paper media supported with metal gauze

As clogging indicators either manometers or electrical pressure switches can be used. All filters are available with or without an outlet diffuser or air separation. 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 451-156 has to be supplied with an outlet diffuser and an extension pipe (EV) for 580 mm (22.83 inch) length.

Order description: **E 451-156** / **VD** / **EV 580**
Part No. (Basic unit) _____

Accessories bowl outlet: ³

3 options are available

VD: Outlet diffuser, RV: Extension pipe, AE - air separation AirEX _____

Extension pipes:

5 various lengths are available _____

E 441 / E 451 / E 461 / E 641:

EV = K + 87 (3.43 inch) / + 142 (5.59 inch) / + 202 (7.95 inch) / + 237 (9.33 inch) / + 362 (14.25 inch) (see sect. dimensions / measurements)

E 700: EV on request.

For the appropriate clogging indicators see catalog sheet 60.20.

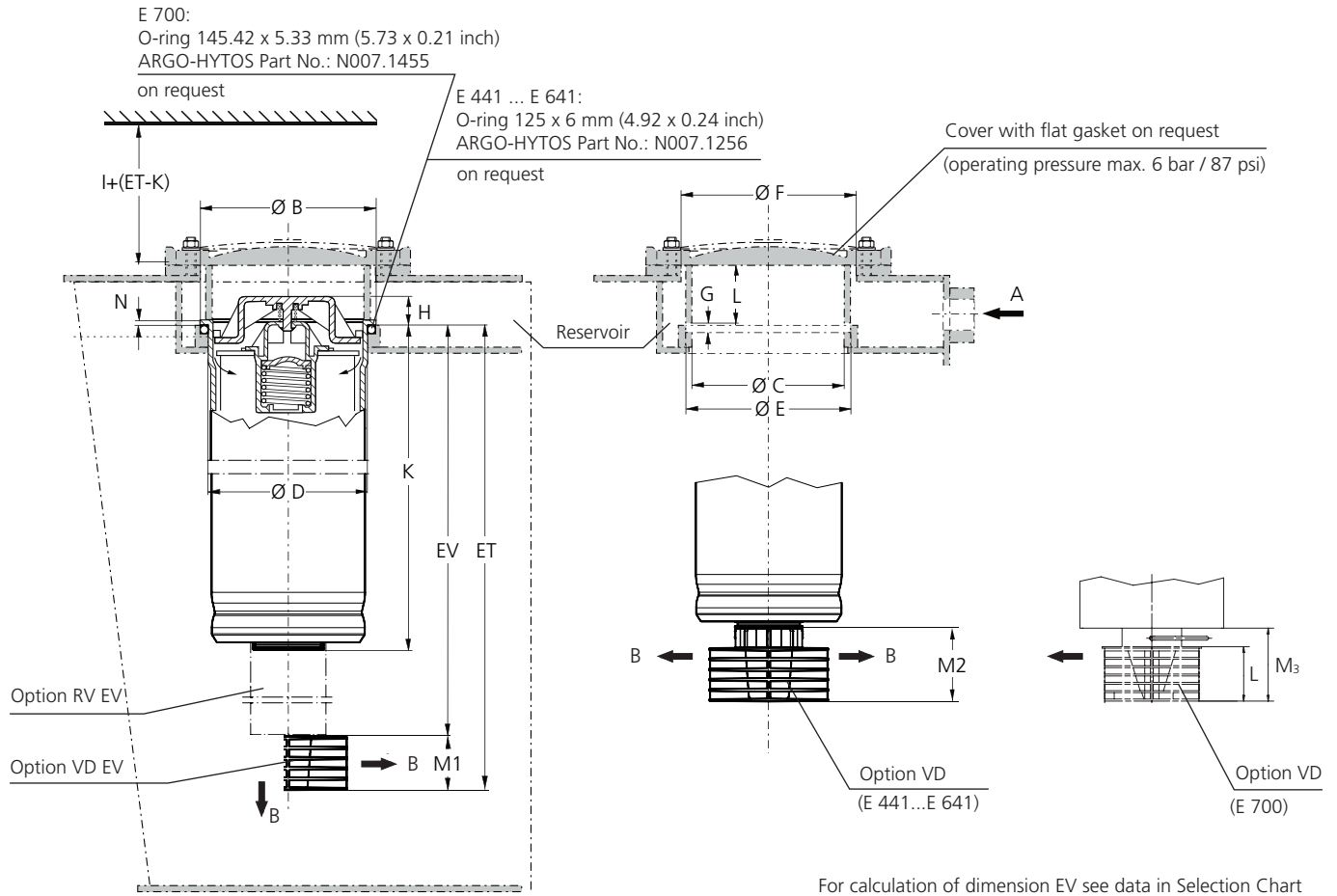
Remarks:

- › 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).
- › Clogging indicators are optional and always delivered detached from the filter.
- › The filters listed in this chart are standard filters. Other designs are available on request.

³ On request, the air separation can be combined with an extension pipe.

⁴ AirEX air separation is not available for E 700.

Dimensions



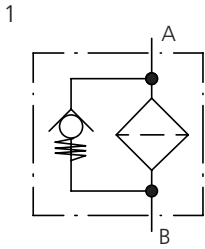
Measurements in mm

Type	A	B	C	D	E	F	G	H	I	K	L	M ₁	M ₂	M ₃	N
E 441	-	142 ^{+2/-0,5}	132	131	145	>145	6.5	26	250	211	48	47.5	62	-	1.5
E 451	-	142 ^{+2/-0,5}	132	131	145	>145	6.5	26	410	378	48	47.5	62	-	1.5
E 461	-	142 ^{+2/-0,5}	132	131	145	>145	6.5	26	580	546	48	47.5	62	-	1.5
E 641	-	142 ^{+2/-0,5}	132	131	145	>145	6.5	26	680	644	48	47.5	62	-	1.5
E 700	-	167 ⁺²	155	155	170	>170	6.5	27	700	651	82	-	-	69	1.5

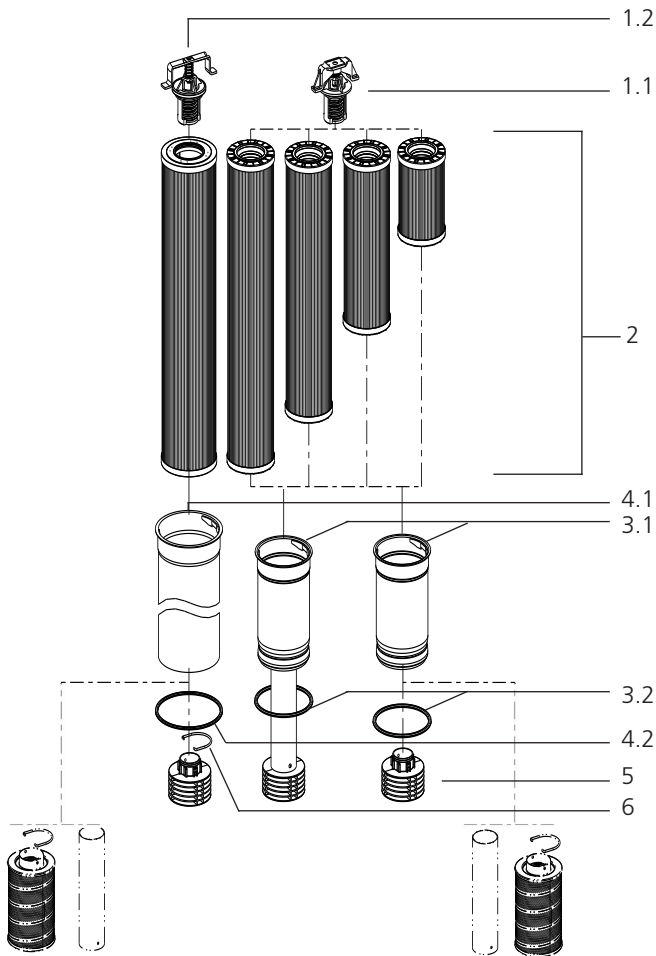
Measurements in inch

Type	A	B	C	D	E	F	G	H	I	K	L	M ₁	M ₂	M ₃	N
E 441	-	5.59 ^{+0.08}	5.20	5.16	5.71	>5.71	0.26	1.02	9.84	8.31	1.89	1.87	2.44	-	0.06
E 451	-	5.59 ^{+0.08}	5.20	5.16	5.71	>5.71	0.26	1.02	16.14	14.88	1.89	1.87	2.44	-	0.06
E 461	-	5.59 ^{+0.08}	5.20	5.16	5.71	>5.71	0.26	1.02	22.83	21.50	1.89	1.87	2.44	-	0.06
E 641	-	5.59 ^{+0.08}	5.20	5.16	5.71	>5.71	0.26	1.02	26.77	25.35	1.89	1.87	2.44	-	0.06
E 700	-	6.57 ^{+0.08}	6.10	6.10	6.69	>6.69	0.26	1.06	27.56	25.63	3.23	-	-	2.72	0.06

Symbol



Spare Parts



Pos.	Designation	Part No.
1.1	By-pass (1.5 bar / 22 psi)	E 440.1500
1.1	By-pass (2.5 bar / 36 psi)	E 460.1520
1.1	By-pass (3.0 bar / 43 psi)	E 640.1510
1.2	By-pass (2.5 bar / 36 psi) for E 700	E 703.1510
2	Replacement filter elements	s. Chart / col. 9
3.1	Filter bowl E 441 ¹	E 441.1900
3.1	Filter bowl E 451 ¹	E 451.1900
3.1	Filter bowl E 461 ¹	E 461.1900
3.1	Filter bowl E 641 ¹	E 641.1900
3.2	O-ring ² 125 x 6 mm 4.92 x 0.24 inch	N007.1256
4.1	Filter bowl E 700	E 700.1900
4.2	O-ring ² 145.42 x 5.33 mm (for E 700) 5.73 x 0.21 inch (for E 700)	N007.1455
5	Diffusor	E 441.0701
6	Clip (version VD for E 700)	N 026.0311

¹ Please indicate options (VD, VDEV and RVEV respectively)

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 ISO standards:

- ISO 2941 Verification of collapse / burst pressure rating
- ISO 2942 Verification of fabrication integrity (Bubble Point Test)
- ISO 2943 Verification of material compatibility with fluids
- ISO 3968 Evaluation of pressure drop versus flow characteristics
- ISO 16889 Multi-Pass-Test (evaluation of filter fineness and dirt-holding capacity)
- ISO 23181 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.

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