

**Return Filter****FR 043 · FR 072**

Tank top mounting · Hose connection up to ID 19 mm / ¾ inch · Nominal flow rate up to 70 l/min / 18.5 gpm



Return Filter FR 072

**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 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:  
A correct extension pipe length ensures oil outlet below minimum oil level and prevents foaming.

**Filter elements**

Flow direction from outside to center.

The star-shaped pleating of the filter material results in:

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

**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, CF-reinforced, electrically conducting
Seals:	NBR (FPM on request)
Filter media:	EXAPOR®MAX 2 - inorganic multi-layer Microfiber web Paper - cellulose web, impregnated with resin

### Accessories

Electrical and / or optical clogging indicators are available on request. 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 / 0.91 inch or 1.03 inch. For orders use ARGO-HYTOS Part No. 11889400 or 13195600.

Extension pipes on the bowl outlet are available in several lengths on request.

## Characteristics

### Nominal flow rate

Up to 70 l/min / 18.5 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

### Connection

Hose nipple for hose up to ID 19 mm / ¾ inch  
Sizes see Selection Chart, column 6,  
(other connections on request).

### Filter fineness

10  $\mu\text{m(c)}$  ... 30  $\mu\text{m(c)}$   
 $\beta$ -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).  
With high filling conditions we recommend an electrical conductivity  $\geq 500 \text{ pS/m}$  at 20 °C / 68 °F.

### Temperature range

-30 °C ... +80 °C (temporary +100 °C)  
-22 °F ... +176 °F (temporary +212 °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%  $\Delta p$  of the cracking pressure of the by-pass valve on the vertical axis. Draw a horizontal line so that it inter-sects the  $\Delta p$  curve at a point. Read this point on the horizontal axis for the viscosity.

### Operating pressure

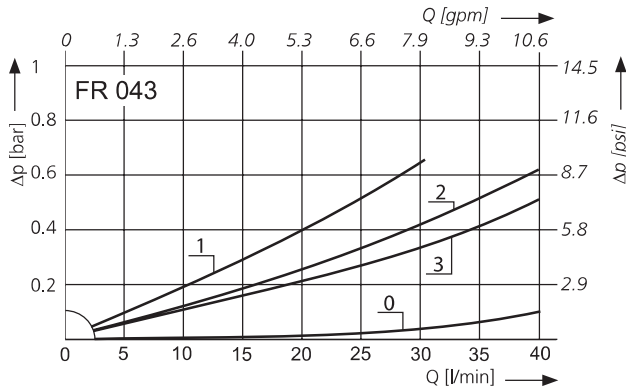
Max. 6 bar / 87 psi

### Mounting position

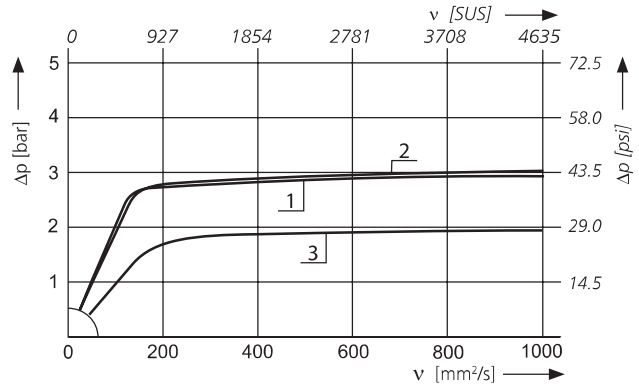
Preferably vertical, outlet downwards.

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

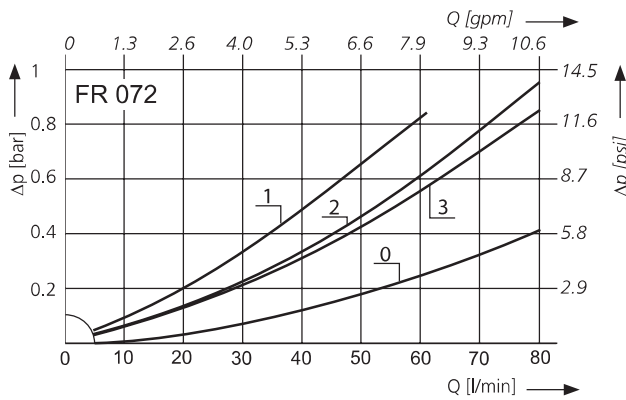
**D1** Pressure drop as a function of the **flow volume** at  $v = 35 \text{ mm}^2/\text{s} / 162 \text{ SUS}$  (0 = casing empty)



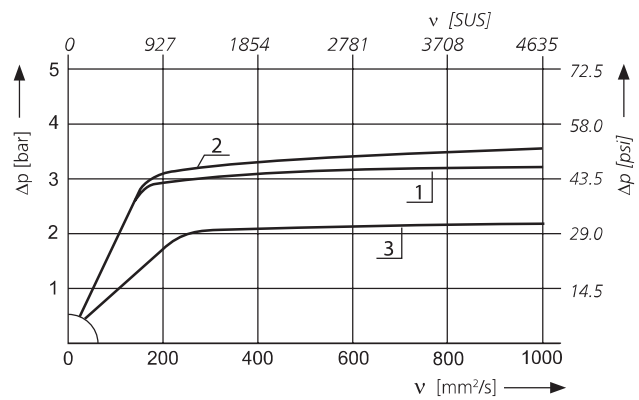
Pressure drop as a function of the **kinematic viscosity** at nominal flow



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

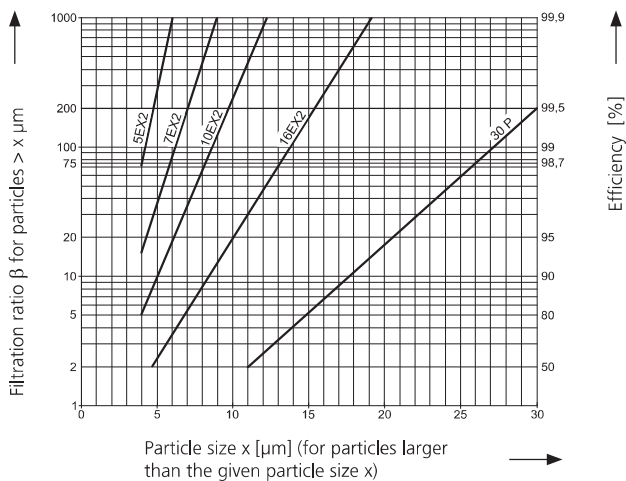


Pressure drop as a function of the **kinematic viscosity** at nominal flow



**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 ventilating filter elements:**

2CL = 99.5% filter efficiency for particles of size 2  $\mu\text{m}$

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

## Selection Chart

Part No.	Nominal flow rate	Pressure drop see Diagram D1/curve no.	Filter fineness	Dirt-holding capacity	Connection A	Cracking pressure of by-pass	Symbol	Replacement filter element Part No.	Weight	Replacement ventilating filter Part No. (Filter fineness, see diagrams)	Remarks
1	l/min	3	4	g	mm	bar	8	9	kg	11	12
<b>FR 043-156<sup>1</sup></b>	25	<b>D1/1</b>	10EX2	6.1	17.5	2.5	1	V3.0510-56	0.42	L1.0403-51 (2CL)	-
FR 043-166	25	<b>D1/1</b>	10EX2	6.1	17.5	2.5	2	V3.0510-56	0.42	L1.0403-51 (2CL)	Indicator port M12 x 1.5
<b>FR 043-158<sup>1</sup></b>	35	<b>D1/2</b>	16EX2	6.1	17.5	2.5	1	V3.0510-58	0.42	L1.0403-51 (2CL)	-
FR 043-178	35	<b>D1/2</b>	16EX2	6.1	17.5	2.5	2	V3.0510-58	0.42	L1.0403-51 (2CL)	Indicator port M12 x 1.5
FR 043-151	30	<b>D1/3</b>	30P	4.0	17.5	1.5	1	P3.0510-51	0.42	L1.0403-51 (2CL)	-
FR 043-161	30	<b>D1/3</b>	30P	4.0	17.5	1.5	2	P3.0510-51	0.42	L1.0403-51 (2CL)	Indicator port M12 x 1.5
<b>FR 072-156<sup>1</sup></b>	50	<b>D2/1</b>	10EX2	13	20.5	2.5	1	V3.0520-56	0.58	L1.0403-51 (2CL)	-
FR 072-166	50	<b>D2/1</b>	10EX2	13	20.5	2.5	2	V3.0520-56	0.58	L1.0403-51 (2CL)	Indicator port M12 x 1.5
<b>FR 072-158<sup>1</sup></b>	70	<b>D2/2</b>	16EX2	13	20.5	2.5	1	V3.0520-58	0.58	L1.0403-51 (2CL)	-
FR 072-168	70	<b>D2/2</b>	16EX2	13	20.5	2.5	2	V3.0520-58	0.58	L1.0403-51 (2CL)	Indicator port M12 x 1.5
FR 072-151	50	<b>D2/3</b>	30P	6.6	20.5	1.5	1	P3.0520-51 <sup>2</sup>	0.58	L1.0403-51 (2CL)	-
FR 072-171	50	<b>D2/3</b>	30P	6.6	20.5	1.5	2	P3.0520-51 <sup>2</sup>	0.58	L1.0403-51 (2CL)	Indicator port M12 x 1.5

<sup>1</sup> Preferred type, no minimum order quantity required

<sup>2</sup> Paper media supported with metal gauze

On types with indicator port M12 x 1.5 either manometers or electrical pressure switches can be used as clogging indicators. 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 FR 072-156 has to be supplied with an extension pipe for a mounting depth of 500 mm.**

**Order description:** FR 072-156 / EV 500

**Part No. (Basic unit)** \_\_\_\_\_

**Extension pipe (5 various lengths are available on request)** \_\_\_\_\_

FR 043: EV 150, EV 200, EV 300, EV 400, EV 500

FR 072: EV 250, EV 300, EV 400, EV 500, EV 600

**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. N007.0103, 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).
- › Clogging indicators are optional and always delivered detached from the filter.
- › For fastening the filter the enclosed spring washers have to be used. Assembly torque 15<sup>+5</sup> Nm.
- › The filters listed in this chart are standard filters. Other designs available on request.

## Selection Chart

Part No.	Nominal flow rate	Pressure drop see Diagram D1/curve no.	Filter fineness see Diagram Dx	Dirt-holding capacity	Connection A	Cracking pressure of by-pass	Symbol	Replacement filter element Part No.	Weight	Replacement ventilating filter Part No. (filter fineness, see diagrams)	Remarks
	gpm		g	inch	psi				lbs		
1	2	3	4	5	6	7	8	9	10	11	12
FR 043-256	6.6	D1/1	10EX2	6.1	ID 5/8	36	3	V3.0510-56	0.93	-	w/o ventilating filter
<b>FR 043-266<sup>1</sup></b>	6.6	D1/1	10EX2	6.1	ID 5/8	36	4	V3.0510-56	0.93	L1.0403-51 (2CL)	with oil separator
FR 043-168	9.2	D1/2	16EX2	6.1	ID 5/8	36	3	V3.0510-58	0.93	-	w/o ventilating filter
<b>FR 043-198<sup>1</sup></b>	9.2	D1/2	16EX2	6.1	ID 5/8	36	4	V3.0510-58	0.93	L1.0403-51 (2CL)	with oil separator
FR 043-281	7.9	D1/3	30P	4.0	ID 5/8	22	3	P3.0510-51	0.93	-	w/o ventilating filter
FR 043-291	7.9	D1/3	30P	4.0	ID 5/8	22	4	P3.0510-51	0.93	L1.0403-51 (2CL)	with oil separator
FR 072-266	13.2	D2/1	10EX2	13	ID 3/4	36	3	V3.0520-56	1.28	-	w/o ventilating filter
<b>FR 072-276<sup>1</sup></b>	13.2	D2/1	10EX2	13	ID 3/4	36	4	V3.0520-56	1.28	L1.0403-51 (2CL)	with oil separator
FR 072-188	18.5	D2/2	16EX2	13	ID 3/4	36	3	V3.0520-58	1.28	-	w/o ventilating filter
<b>FR 072-258<sup>1</sup></b>	18.5	D2/2	16EX2	13	ID 3/4	36	4	V3.0520-58	1.28	L1.0403-51 (2CL)	with oil separator
FR 072-281	13.2	D2/3	30P	6.6	ID 3/4	22	3	P3.0520-51*	1.28	-	w/o ventilating filter
FR 072-291	13.2	D2/3	30P	6.6	ID 3/4	22	4	P3.0520-51*	1.28	L1.0403-51 (2CL)	with oil separator

<sup>1</sup> Preferred type, no minimum order quantity required    <sup>2</sup> paper media supported with metal gauze

All filters are delivered with a plugged clogging indicator connection M12 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.

**Order example: The filter FR 072-276 has to be supplied with an extension pipe for a mounting depth of 500 mm (resp. 19.69 inch).**

**Order description:** FR 072-276 / EV 500

**Part No. (Basic unit)**

**Extension pipe (5 various lengths are available on request)**

FR 043: EV 150 (5.90 inch), EV 200 (7.87 inch), EV 300 (11.81 inch), EV 400 (15.74 inch), EV 500 (19.69 inch)  
FR 072: EV 250 (9.84 inch), EV 300 (11.81 inch), EV 400 (15.74 inch), EV 500 (19.69 inch), EV 600 (23.62 inch)

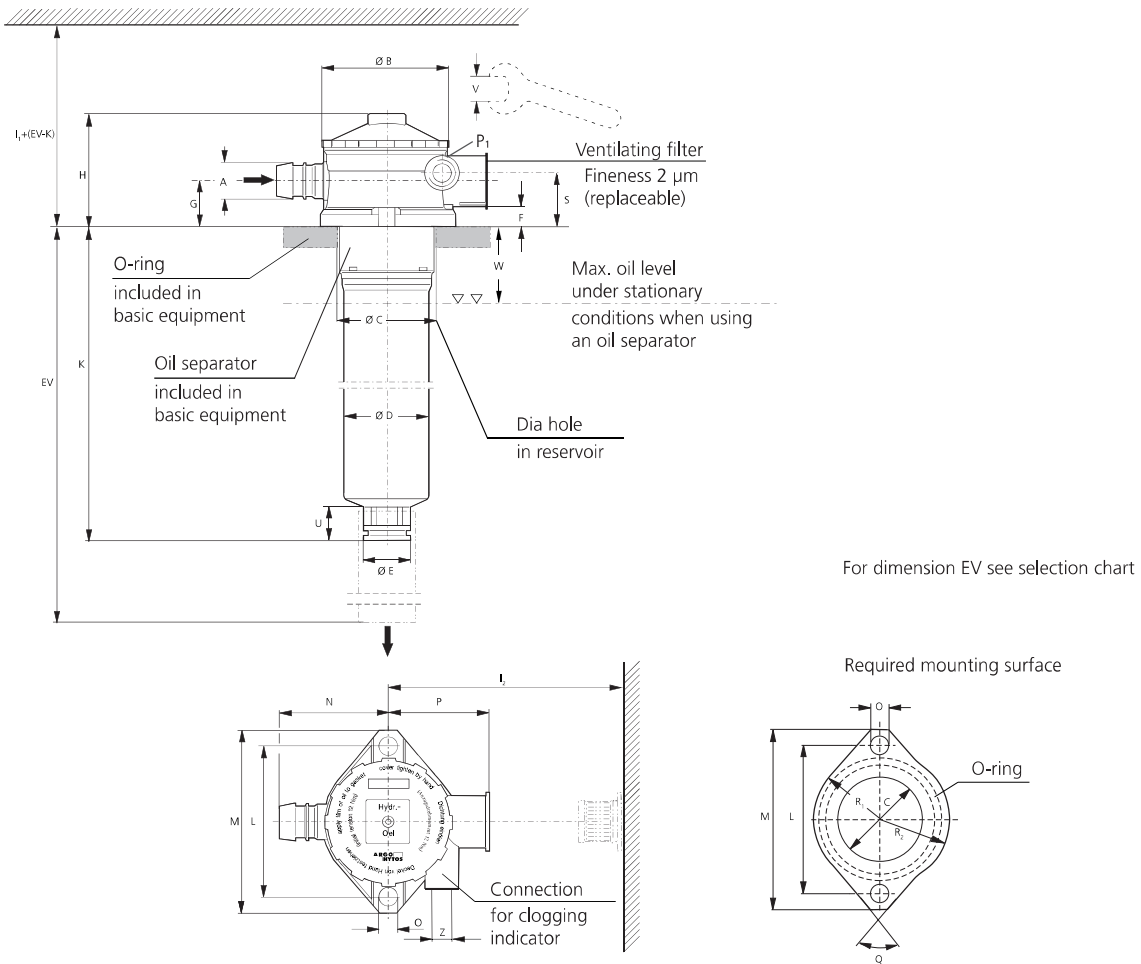
**For the appropriate clogging indicator see data sheet 60.20.**

When using pressure switches of series DG 813 sealing by means of an O-ring (order no. N007.0103, 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).
- › Clogging indicators are optional and always delivered detached from the filter.
- › For fastening the filter the enclosed spring washers have to be used. Assembly torque 15<sup>+5</sup> Nm.
- › The filters listed in this chart are standard filters. Other designs available on request.

## Dimensions



## Measurements in mm

Type	A	B	C (min/max.)	D	E	F*	G	H	I <sub>1</sub>	I <sub>2</sub>	K	L	M	N	O	P
FR 043	17.5	75	60/61	51	27.8	11	22	65	175	110	85	88	108	65	11	58
FR 072	20.5	75	60/61	51	27.8	11	22	65	270	110	182	88	108	65	11	58

Type	Q	R <sub>1</sub>	R <sub>2</sub>	S	U	V	W	Z Ø / depth								
FR 043	80°	39	42	27	20	AF 27	40	M12 x 1.5 / 10								
FR 072	80°	39	42	27	20	AF 27	40	M12 x 1.5 / 10								

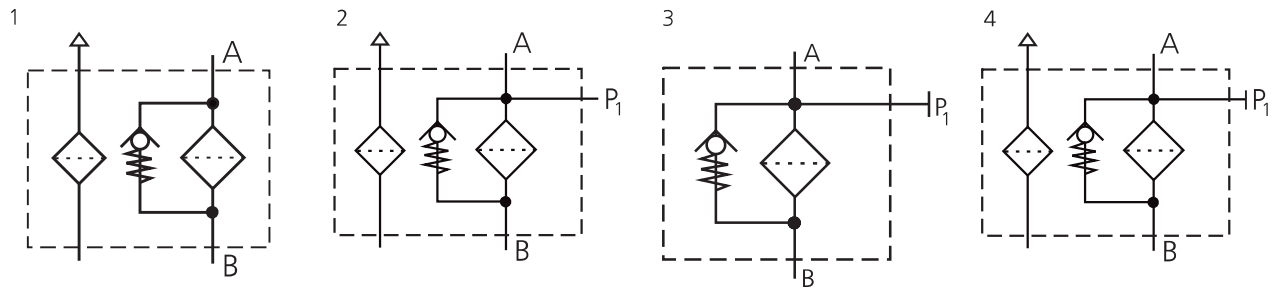
## Measurements in inch

Type	A	B	C (min/max.)	D	E	F*	G	H	I <sub>1</sub>	I <sub>2</sub>	K	L	M	N	O	P
FR 043	0.69	2.95	2.36/2.40	2.01	1.09	0.43	0.87	2.56	6.89	4.33	3.35	3.46	4.25	2.56	0.43	2.28
FR 072	0.81	2.95	2.36/2.40	2.01	1.09	0.43	0.87	2.56	10.63	4.33	7.17	3.46	4.25	2.56	0.43	2.28

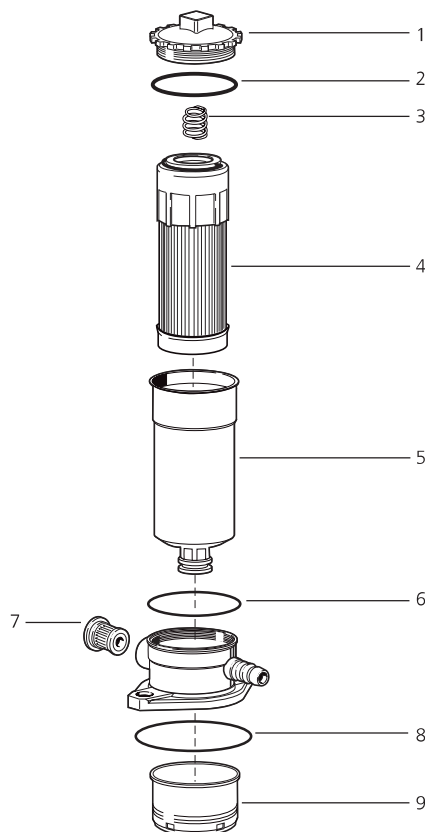
Type	Q	R <sub>1</sub>	R <sub>2</sub>	S	U	V mm	W	Z Ø / depth								
FR 043	80°	1.54	1.65	1.06	0.79	AF 27	1.57	M12 x 1.5 / 0.39								
FR 072	80°	1.54	1.65	1.06	0.79	AF 27	1.57	M12 x 1.5 / 0.39								

\*Including the enclosed spring washers Ø10 mm (0.39 inch), DIN 137 shape B, corrugated

## Symbols



## Spare Parts



Pos.	Designation	Part No.
1	Screw-on cap	FR 043.0201
2	O-ring 57 x 3 mm 2.24 x 0.12 inch	N007.0573
3	Compression spring	N015.1606
4	Replacement 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 mm 1.97 x 0.08 inch	N007.0501
7	Replacement ventilating filter	L1.0403-51
8	O-ring 69 x 4 mm 2.72 x 0.16 inch	N007.0704
9	Oil separator	FR 043.0701

\*Specify mounting depth (EV) 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 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.