ARGO HYTOS

Return Filters

E 094 · E 103 · E 143

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

20.30-7e

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

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

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

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 on request.
Dimensions and technical data see cataologue sheet 60.20.

Extension pipes on the bowl outlet are available in several lengths on request.
A self-assembly system for installation of extension pipes can be ordered.
For detailed information please see catalogue sheet 20.390.

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:
- closed by-pass valve at $\nu \leq 200$ mm²/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 ≤ 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 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)
With high filling conditions we recommend an electrical conductivity ≥ 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: $\nu < 60$ mm²/s
- as starting viscosity: $\nu_{max} = 1.200$ mm²/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.

Operating pressure
Max. 10 bar

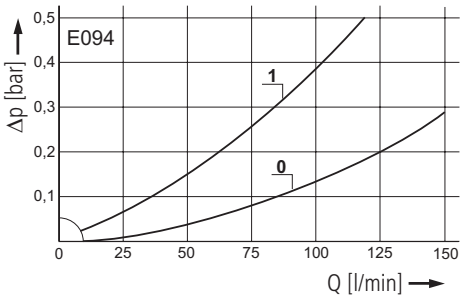
Mounting position
Preferably vertical, outlet downwards

Diagrams

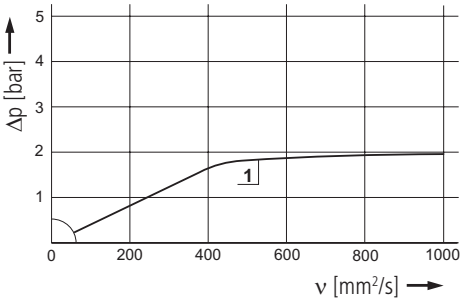
Δp-curves for complete filters in Selection Chart, column 3

D1

Pressure drop as a function of the **flow volume** at ν = 35 mm²/s (0 = casing empty)

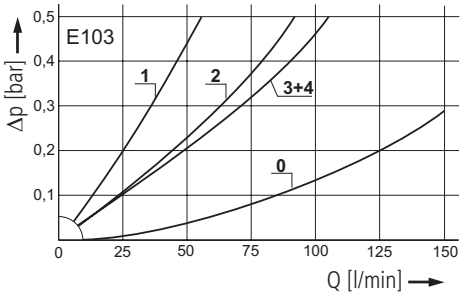


Pressure drop as a function of the **kinematic viscosity** at nominal flow

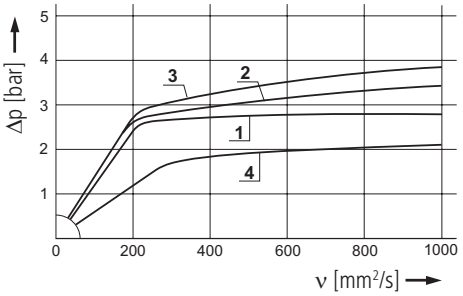


D2

Pressure drop as a function of the **flow volume** at ν = 35 mm²/s (0 = casing empty)

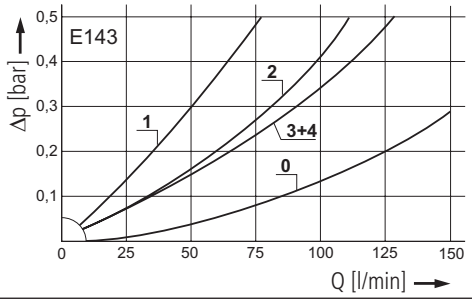


Pressure drop as a function of the **kinematic viscosity** at nominal flow

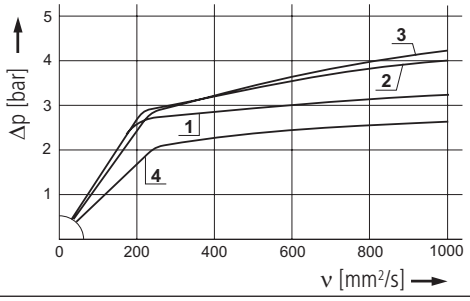


D3

Pressure drop as a function of the **flow volume** at ν = 35 mm²/s (0 = casing empty)



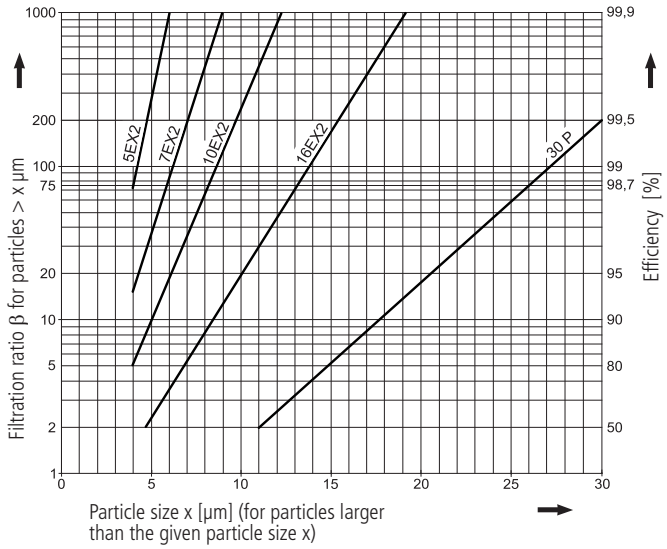
Pressure drop as a function of the **kinematic viscosity** at nominal flow



Filter fineness curves in Selection Chart, column 4

Dx

Filtration ratio 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 2- and Paper elements:

5EX2 = $\bar{\beta}_{5\,(c)}$ = 200 EXAPOR®MAX 2
7EX2 = $\bar{\beta}_{7\,(c)}$ = 200 EXAPOR®MAX 2
10EX2 = $\bar{\beta}_{10\,(c)}$ = 200 EXAPOR®MAX 2
16EX2 = $\bar{\beta}_{16\,(c)}$ = 200 EXAPOR®MAX 2
30P = $\bar{\beta}_{30\,(c)}$ = 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 accordung 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.

Selection Chart

Part No.	Nominal flow rate	Pressure drop see diagram **D**/curve no.	Filter fineness see Diagr. **Dx**	Dirt-holding capacity	Connection A	Cracking pressure of by-pass	Symbol	Replacement element Part No.	Weight	Replacement ventilating filter Part No. (Filter fineness, see diagrams)	Remarks
	l/min			g		bar			kg		
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
E 094-661	50	**D1**/1	30P	11	$G^3/_4$	1,5	2	P3.0613-51	0,8	L1.0503-03 (2 CL)	-
E 094-671	50	**D1**/1	30P	11	$G^3/_4$	1,5	1	P3.0613-51	0,8	-	-
E 103-657	45	**D2**/1	5EX2	18	$G^1/_2$	2,5	2	V3.0620-53	1,0	L1.0503-03 (2 CL)	-
E 103-677	45	**D2**/1	5EX2	18	$G^1/_2$	2,5	1	V3.0620-53	1,0	-	-
E 103-676	80	**D2**/2	10EX2	25	$G^3/_4$	2,5	2	V3.0620-56	1,0	L1.0503-03 (2 CL)	-
E 103-686	80	**D2**/2	10EX2	25	$G^3/_4$	2,5	1	V3.0620-56	1,0	-	-
E 103-898	110	**D2**/3	16EX2	25	G1	2,5	2	V3.0620-58	1,0	L1.0503-03 (2 CL)	-
E 103-888	110	**D2**/3	16EX2	25	G1	2,5	1	V3.0620-58	1,0	-	-
E 103-871	70	**D2**/4	30P	11	$G^3/_4$	1,5	2	P3.0620-51*	1,0	L1.0503-03 (2 CL)	-
E 103-861	70	**D2**/4	30P	11	$G^3/_4$	1,5	1	P3.0620-51*	1,0	-	-
E 143-657	70	**D3**/1	5EX2	28	$G^3/_4$	2,5	2	V3.0730-53	1,2	L1.0503-03 (2 CL)	-
E 143-667	70	**D3**/1	5EX2	28	$G^3/_4$	2,5	1	V3.0730-53	1,2	-	-
E 143-676	115	**D3**/2	10EX2	38	G1	2,5	2	V3.0730-56	1,2	L1.0503-03 (2 CL)	-
E 143-686	115	**D3**/2	10EX2	38	G1	2,5	1	V3.0730-56	1,2	-	-
E 143-888	135	**D3**/3	16EX2	38	G1	2,5	2	V3.0730-58	1,2	L1.0503-03 (2 CL)	-
E 143-688	135	**D3**/3	16EX2	38	G1	2,5	1	V3.0730-58	1,2	-	-
E 143-851	120	**D3**/4	30P	17	G1	1,5	2	P3.0730-51*	1,2	L1.0503-03 (2 CL)	-
E 143-861	120	**D3**/4	30P	17	G1	1,5	1	P3.0730-51*	1,2	-	-

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.

Order example: The filter E 103-676 has to be supplied with an extension pipe for a mounting depth of 500 mm.

Order description: **E 103-676** **EV 500**

Part No. (Basic unit)

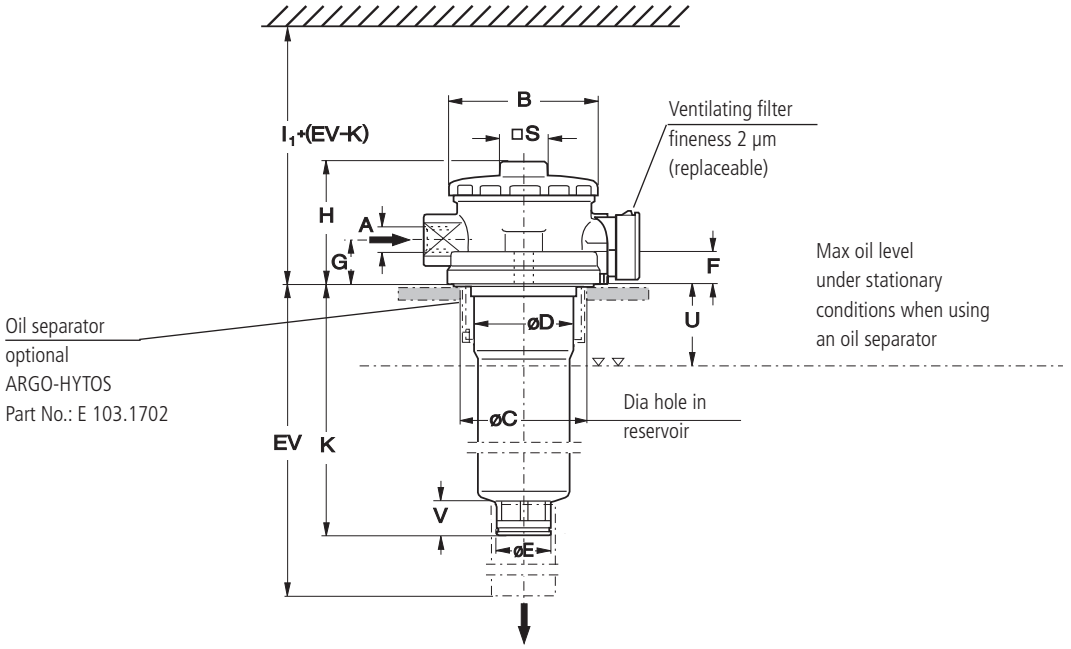
Mounted extension pipe (7 various lengths are available on request)
E 094: EV 130, EV 190, EV 234, EV 284, EV 334, EV 434, EV 534
E 103: EV 196, EV 256, EV 300, EV 350, EV 400, EV 500, EV 600
E 143: EV 297, EV 357, EV 400, EV 450, EV 500, EV 600, EV 700

For the suitable clogging indicators please see catalogue sheet 60.20.

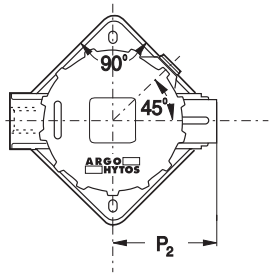
Remarks:
- The switching pressure of the electrical pressure switch has always to be lower than the cracking pressure of the by-pass valve (see Selection Chart, column 7).
- The clogging indicators are always delivered detached from the filter.
- The filters listed in this chart are standard filters. Other designs available on request.

* Paper media supported with metal gauze

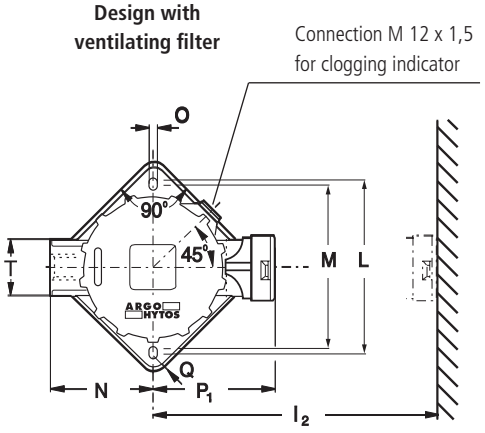
Dimensions



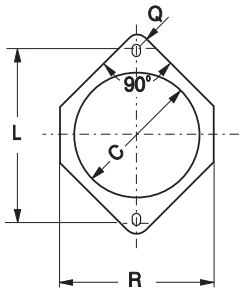
Design without ventilating filter



Design with ventilating filter



Required mounting surface



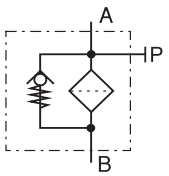
For dimension EV see selection chart

Measurements

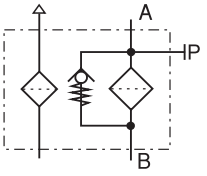
Type	A	B	C min./max.	D	E	F	G	H	l_1	l_2	K	L	M	N	O	P_1	P_2	Q	R	S	T	U	V
E 094	G¾	105	87 / 91	73,5	38	20,5	30	88,5	235	125	111	115	110	70	11	82	69	13,5	107,5	32	AF41	50	23
E 103	G½ , G¾, G1	105	87 / 91	73,5	38	20,5	30	88,5	300	125	177	115	110	70	11	82	69	13,5	107,5	32	AF41	50	23
E 143	G¾, G1	105	87 / 91	73,5	38	20,5	30	88,5	400	125	278	115	110	70	11	82	69	13,5	107,5	32	AF41	50	23

Symbols

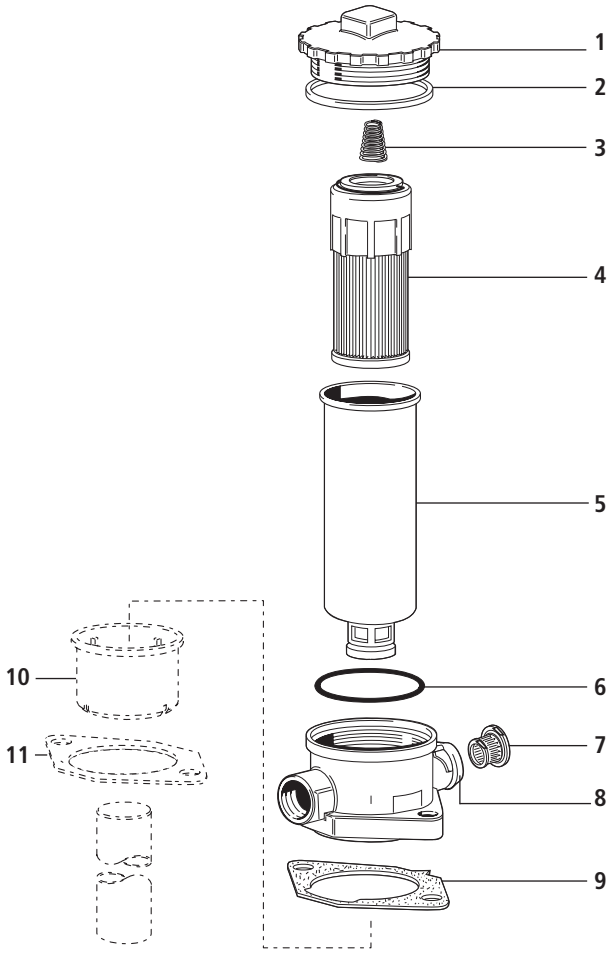
1



2



Spare Parts



Pos.	Designation	Part No.
1	Screw-on cap	E 103.0201
2	Flat gasket	N031.0841
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	N007.0703
7	Ventilating filter	L1.0503-03K
8	Housing (for pos. 7)	L1.0503-0801
9	Flat gasket (for versions without oil separator)	E 103.0147
10	Oil separator with Pos. 11	E 103.1702
11	Flat gasket (for versions with oil separator)	E 103.0148

* 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.

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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