

HIGH PRESSURE FILTERS

HYDRAULIC
FILTRATION

CATALOGUE



MPFILTRI®

PASSION  PERFORM



A WORLDWIDE LEADER IN THE FIELD OF HYDRAULIC FILTRATION EQUIPMENT.

Our company started life in 1964, when Bruno Pasotto decided to attempt to cater for the requests of a market still to be fully explored, with the study, design, development, production and marketing of a vast range of filters for hydraulic equipment, capable of satisfying the needs of manufacturers in all sectors. The quality of our products, our extreme competitiveness compared with major international producers and our constant activities of research, design and development has made us a worldwide leader in the field of hydraulic circuit filtering. Present for over 50 years in the market, we have played a truly decisive role in defining our sector, and by now we are a group capable of controlling our entire chain of production, monitoring all manufacturing processes to guarantee superior quality standards and to provide concrete solutions for the rapidly evolving needs of customers and the market.

HYDRAULIC FILTRATION PRODUCTS

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11		CONTAMINATION MANAGEMENT
21		FILTER SIZING

30	page	SUCTION FILTERS	up to Q_{max}	
			l/min	gpm
33	STRC & MPAC	Submerged suction filter, with bypass or magnetic filter	1000	264
41	SFEX	In-line filter with plastic bowl	100	26
51	SFMC	Semi-submerged positive head suction filter, low flow rate	160	42
61	SFSC	Semi-submerged positive head suction filter, high flow rate	700	185
711		CLOGGING INDICATORS		

72	page	RETURN FILTERS	up to P_{max}		up to Q_{max}	
			bar	psi	l/min	gpm
75	RFEX	Return filter, tank mounted filter suitable for all mineral oil and water glycol applications	16	232	260	69
85	MPFX	Tank top semi-immersed filter, standard filter element disassembly	8	116	900	238
113	MPLX	Tank top semi-immersed filter, standard filter element disassembly	10	145	1800	476
121	MPTX	Tank top semi-immersed filter, easy filter element disassembly	8	116	300	79
139	MFBX	Bowl assembly	8	116	700	185
147	MPF	Tank top semi-immersed filter, standard filter element disassembly	8	116	900	238
175	MPT	Tank top semi-immersed filter, easy filter element disassembly	8	116	300	79
193	MFB	Bowl assembly	8	116	700	185
201	MDH	Heavy industrial applications integrated in the tank - air separation	10	145	500	132
209	MPH	Tank top semi-immersed filter, standard filter element disassembly	10	145	3500	925
233	MPI	Tank top semi-immersed filter, standard filter element disassembly	10	145	3500	925
245	FRI	Tank top semi-immersed filter, easy filter element disassembly, it can be used also as in-line filter	20	290	2500	660
261	RF2	Semi-immersed under-head filter, easy filter element disassembly	20	290	615	162
268		ACCESSORIES				
712		CLOGGING INDICATORS				

270	page	RETURN / SUCTION FILTERS	up to P_{max}		up to Q_{max}	
			bar	psi	l/min	gpm
273	MRSX	Unique TANK TOP filter for mobile machinery, with combined filtration on return and suction to the inlet at the hydrostatic transmissions in closed circuit	10	145	250	66
287	LMP 124 MULTIPOST	Unique IN-LINE filter for mobile machinery, with combined filtration on return and suction to the inlet at the hydrostatic transmissions in closed circuit	80	1160	120	32
714		CLOGGING INDICATORS				

294	page	SPIN-ON FILTERS	up to P_{max}		up to Q_{max}	
			bar	psi	l/min	gpm
297	MPS	Low pressure filter, available with single cartridge (CS) for in-line or flange mounting or with two cartridge on the same axis on the opposite sides	12	174	365	96
717		CLOGGING INDICATORS				

312 page			LOW & MEDIUM PRESSURE FILTERS		up to P _{max}		up to Q _{max}	
			bar	psi	l/min	gpm		
315	LFEX	In-line filter with plastic bowl	16	232	300	79		
325	LPH 630	Off-line low pressure filter	10	145	1600	352		
333	LMP 110	In-line low & medium pressure filter, low to medium flow rate	80	1160	165	44		
341	LMP 112 - 123 MULTIPORT	In-line filter with Multiport design for multiple choice connection	80	1160	175	46		
357	LMP 210 - 211	In-line low & medium pressure filter, low flow rate	60	870	365	96		
367	LMP 400 - 401	In-line low & medium pressure filter, high flow rate	60	870	780	206		
375	LMP 430 - 431	In-line low & medium pressure filter, high flow rate	60	870	780	206		
383	LMP 950 - 951	In-line filter, available with 2 and up to 6 different heads	30	435	2400	634		
391	LMP 952 - 953 - 954	In-line low pressure filter specifically designed to be mounted in series	25	363	4500	1189		
403	LMD 211	In-line duplex medium pressure filter	60	870	200	53		
411	LMD 400 - 401 & 431	In-line duplex low pressure filter	16	232	600	159		
427	LMD 951	In-line duplex filter, available with 2 up to 6 different heads	16	232	1200	317		
435		Filters featuring filter elements designed according to DIN24550						
437	LDP - LDD	In-line and duplex medium pressure filter	60	870	360	95		
447	LMP 900 - 901	In-line low pressure filter	30	435	2000	528		
455	LMP 902 - 903	In-line filter specifically designed to be mounted in series	20	290	3000	793		
464		ACCESSORIES						
720		CLOGGING INDICATORS						

			up to P _{max}		up to Q _{max}	
466	page	HIGH PRESSURE FILTERS	bar	psi	l/min	gpm
469	FMMX	Typical high pressure filter for mobile applications, low flow rate	420	6092	300	79
479	FMM	Typical high pressure filter for mobile applications, low flow rate	420	6092	300	79
489	FHA	Filter optimized for use in high pressure operating systems, low flow rate	560	8122	150	40
497	FMP 039	Filter high pressure, low flow rate applications	110	1595	80	21
505	FMP	Filter high pressure, high flow rate applications	320	4641	500	132
517	FHP	Typical high pressure filter for mobile applications, high flow rate	420	6092	630	166
537	FHM	High pressure filter with intermediate manifold construction	320	4641	400	106
557	FHB	High pressure for block mounting	320	4641	485	128
569	FHF	In-line manifold top mounting according to SAE J2066	350	5076	550	145
579	FHD	In-line duplex high pressure filter	350	5076	250	66
593	HPB	Pressure filter kits for integration in control manifolds	420	6092	300	79
721	CLOGGING INDICATORS					

			up to P _{max}		up to Q _{max}	
602	page	STAINLESS STEEL HIGH PRESSURE FILTERS	bar	psi	l/min	gpm
605	FZP	In-line pressure filter with threaded mount	420	6092	160	42
615	FZH	In-line pressure filter with threaded mount for higher pressure	700	10153	80	21
625	FZX	In-line pressure filter with threaded mount up to 1000 bar	1000	14504	10	3
633	FZM	Manifold top mounting	320	4641	70	18
641	FZB	Manifold side mounting	320	4641	70	18
649	FZD	Duplex pressure filter for continuous operation requirements	350	5076	60	16
722	CLOGGING INDICATORS					

			up to P _{max}		up to Q _{max}	
(660) page	FILTERS FOR POTENTIALLY EXPLOSIVE ATMOSPHERE		bar	psi	l/min	gpm
663	FMMX	Typical high pressure filter for mobile applications, low flow rate	420	6092	300	79
673	FZP	In-line pressure filter with threaded mount	420	6092	160	42
683	FZH	In-line pressure filter with threaded mount for higher pressure	700	10153	80	21
693	FZX	In-line pressure filter with threaded mount up to 1000 bar	1000	14504	10	3
723	CLOGGING INDICATORS					

701 page		CLOGGING INDICATORS			
706	QUICK REFERENCE GUIDE				
710	DESIGNATION AND ORDERING CODES				
724	TECHNICAL DATA				

Our work is based on a skillful interaction between advanced technology and fine workmanship, **customizing products according to specific market requests**, focusing strongly on innovation and quality, and following every step in the manufacturing of both standard and special products, fully respecting customer expectations.

MARKET LEADER



Our customer-oriented philosophy, which enables us to satisfy all customer requests **rapidly** and **with personalized products**, makes us a **dynamic and flexible enterprise**.

The possibility of constantly controlling and monitoring the entire production process is essential to allow us to guarantee the quality of our products.

WORLDWIDE PRESENCE



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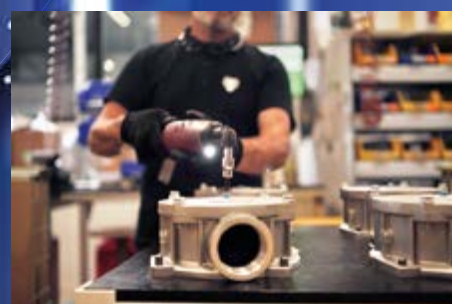
Our foreign Branches enable us to offer a diversified range of products that allow us to successfully face the aggressive challenge of international competition, and also to maintain a stable presence at a local level.

The Group boasts **9** business branches



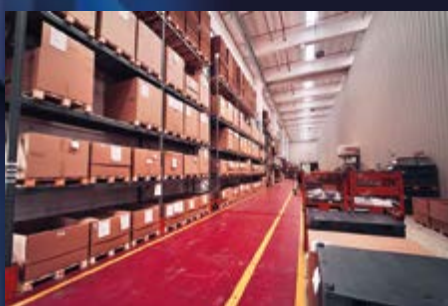
TECHNOLOGY

Our constant **quest for excellence in quality and technological innovation** allows us to offer only the best solutions and services for applications in many fields, including general industry, test rigs, lubrication, heavy engineering, renewable energies, naval engineering, offshore engineering, aviation systems, emerging technologies and mobile plant (i.e. tractors, excavators, concrete pumps, platforms).



AND PRODUCTION

Our high level of technological expertise means **we can rely entirely on our own resources, without resorting to external providers.** This in turn enables us to satisfy a growing number of customer requests, also exploiting our constantly updated range of machines and equipment, featuring **fully-automated workstations** capable of **24-hour production.**





SUCTION FILTERS

Mounting:

- Tank immersed
- In-Line
- In tank with shut off valve
- In tank with flooded suction



RETURN FILTERS

Mounting:

- In-Line
- Tank top
- In single and duplex designs



RETURN / SUCTION FILTERS

Mounting:

- In-Line
- Tank top



SPIN-ON FILTERS

Mounting:

- In-Line
- Tank top



LOW & MEDIUM PRESSURE FILTERS

Mounting:

- In-Line
- Parallel version
- In single and duplex designs



HIGH PRESSURE FILTERS

Mounting:

- In-Line
- Manifold
- In single and duplex designs

PRODUCT RANGE

MP Filtri can offer a vast and articulated range of products for the global market, suitable for all industrial sectors using hydraulic equipment.

This includes filters (suction, return, return/suction, spin-on, pressure, stainless steel pressure, ATEX filters) and structural components (motor/pump bell-housings, transmission couplings, damping rings, foot brackets, aluminium tanks, cleaning covers).

We can provide all the skills and solutions required by the modern hydraulics industry to monitor contamination levels and other fluid conditions.

Mobile filtration units and a full range of accessories allow us to supply everything necessary for a complete service in the hydraulic circuits.



STAINLESS STEEL HIGH PRESSURE FILTERS

Mounting:
- In-Line
- Manifold
- In single and duplex designs



FILTERS FOR POTENTIALLY EXPLOSIVE ATMOSPHERE

Mounting:
- In-Line



CONTAMINATION CONTROL SOLUTIONS

- Off-line, in-line particle analyser
- Off-line bottle sampling products
- Fully calibrated using relevant ISO standards
- A wide range of variants to support fluid types and communication protocols
- Mobile Filtration Units with flow rates from 15 l/min up to 200 l/min



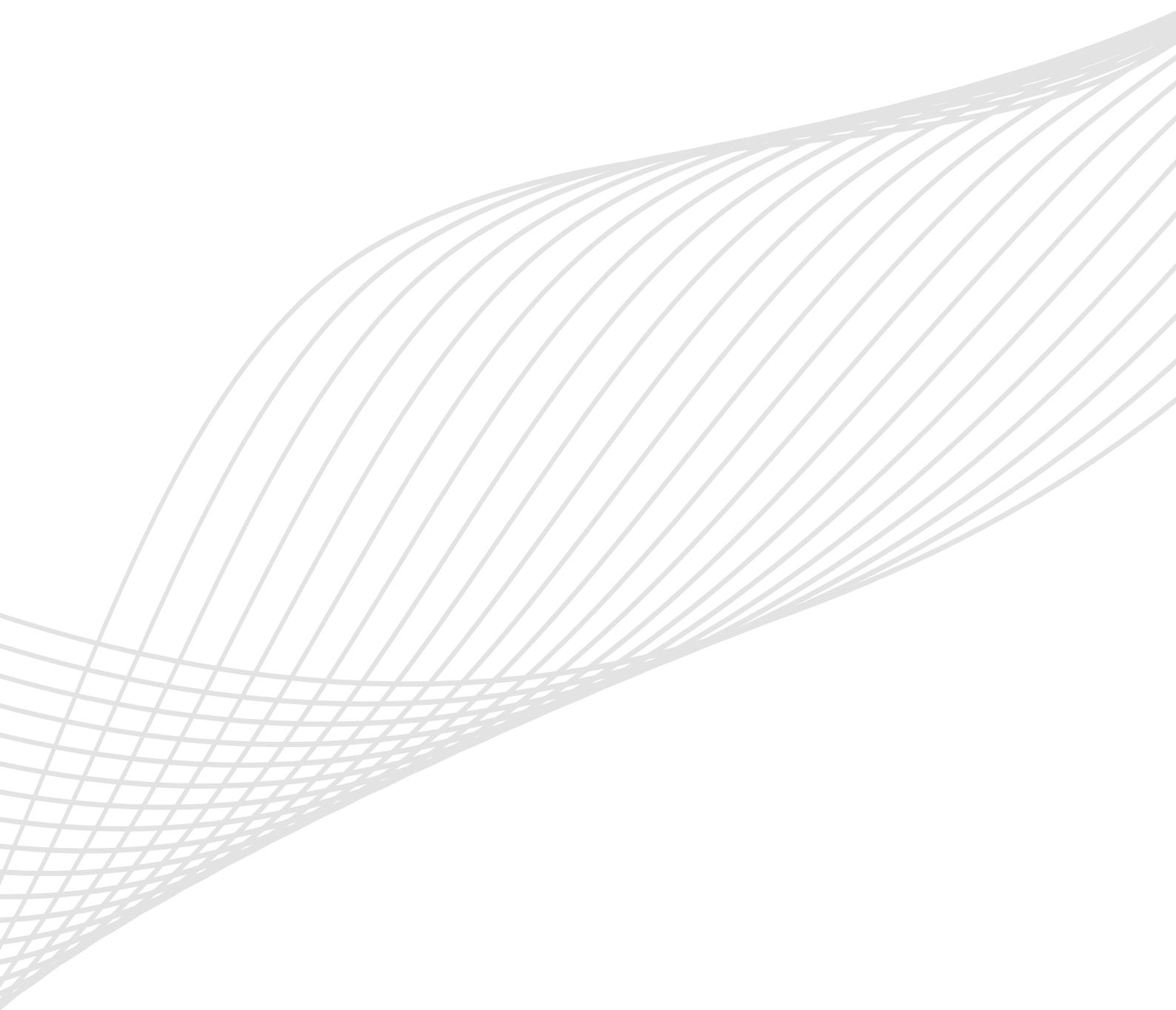
POWER TRANSMISSION PRODUCTS

- Aluminium bell-housings for motors from 0.12 kW to 400 kW
- Couplings in Aluminium Cast Iron - Steel
- Damping rings
- Foot bracket
- Aluminium tanks
- Cleaning covers



TANK ACCESSORIES

- Oil filler and air breather plugs
- Optical and electrical level gauges
- Pressure gauge valve selectors
- Pipe fixing brackets
- Pressure gauges



CONTAMINATION MANAGEMENT

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1 HYDRAULIC FLUIDS

The fluid is the vector that transmits power, energy within an oleodynamic circuit. In addition to transmitting energy through the circuit, it also performs additional functions such as lubrication, protection and cooling of the surfaces.

The classification of fluids used in hydraulic systems is coded in many regulatory references, different Standards.

The most important classification system for hydraulic fluids is the one defined by International Organization for Standardization (ISO), which established a classification system within their standard: "ISO 6743-4 Lubricants, Industrial Oils and Related Products". In particular, the parts of interest for hydraulic fluids are:

- Lubricants, industrial oils and related products (class L)
- Classifications - Part 4L - Family H (Hydraulic systems)

The ISO 6743-4 classification system can be generally applied to the three primary classes of hydraulic fluids:

- Mineral Oils (i.e.: petroleum) Hydraulic Fluids (i.e.: HH: Mineral lubricants without corrosion inhibitors; HL: HH-type lubricants with oxidation reduction and anticorrosive additives; HM: HL-type lubricants with anti-wear additives; HV: HM-type lubricants with a higher viscosity grade and temperature properties; and others).
- Biodegradable Hydraulic Fluids (HExx), also defined as "Environmentally acceptable hydraulic fluids".
- Fire Resistant Hydraulic Fluids (HFxx), which could be further split into: Fire-resistant aqueous fluids (HFAx, HFB; HFC); Fire-resistant synthetic anhydrous fluids (HFDx).

The choice of fluid for an hydraulic system must take into account several parameters.

These parameters can adversely affect the performance of an hydraulic system, causing delay in the controls, pump cavitation, excessive absorption, excessive temperature rise, efficiency reduction, increased drainage, wear, jam/block or air intake in the plant.

The main properties that characterize hydraulic fluids and affect their choice are:

- **DYNAMIC VISCOSITY**
It identifies the fluid's resistance to sliding due to the impact of the particles forming it.
- **KINEMATIC VISCOSITY**
It is a widespread formal dimension in the hydraulic field.
It is calculated with the ratio between the dynamic viscosity and the fluid density.
Kinematic viscosity varies with temperature and pressure variations.
- **VISCOSITY INDEX**
This value expresses the ability of a fluid to maintain viscosity when the temperature changes.
A high viscosity index indicates the fluid's ability to limit viscosity variations by varying the temperature.
- **FILTERABILITY INDEX**
It is the value that indicates the ability of a fluid to cross the filter materials.
A low filterability index could cause premature clogging of the filter material.
- **WORKING TEMPERATURE**
Working temperature affects the fundamental characteristics of the fluid.
As already seen, some fluid characteristics, such as cinematic viscosity, vary with the temperature variation.

When choosing a hydraulic oil, must therefore be taken into account of the environmental conditions in which the machine will operate.

- **COMPRESSIBILITY MODULE**
Every fluid subjected to a pressure contracts, increasing its density.
The compressibility module identifies the increase in pressure required to cause a corresponding increase in density.
- **HYDROLYTIC STABILITY**
It is the characteristic that prevents galvanic pairs that can cause wear in the plant/system.
- **ANTIOXIDANT STABILITY AND WEAR PROTECTION**
These features translate into the capacity of a hydraulic oil to avoid corrosion of metal elements inside the system.
- **HEAT TRANSFER CAPACITY**
It is the characteristic that indicates the capacity of hydraulic oil to exchange heat with the surfaces and then cool them.

2 FLUID CONTAMINATION

Whatever the nature and properties of fluids, they are inevitably subject to contamination. Fluid contamination can have two origins:

- **INITIAL CONTAMINATION**
Caused by the introduction of contaminated fluid into the circuit, or by incorrect storage, transport or transfer operations.
- **PROGRESSIVE CONTAMINATION**
Caused by factors related to the operation of the system, such as metal surface wear, sealing wear, oxidation or degradation of the fluid, the introduction of contaminants during maintenance, corrosion due to chemical or electrochemical action between fluid and components, cavitation.
The contamination of hydraulic systems can be of different nature:
- **SOLID CONTAMINATION**
For example rust, slag, metal particles, fibers, rubber particles, paint particles or additives
- **LIQUID CONTAMINATION**
For example, the presence of water due to condensation or external infiltration or acids
- **GASEOUS CONTAMINATION**
For example, the presence of air due to inadequate oil level in the tank, drainage in suction ducts, incorrect sizing of tubes or tanks.

3 FLUID COMPATIBILITY CHARTS

For more detailed information on specific fluid compatibility please refer to the fluid compatibility charts on our website:



Scan or click me!

④ EFFECTS OF CONTAMINATION ON HYDRAULIC COMPONENTS

Solid contamination is recognized as the main cause of malfunction, failure and early degradation in hydraulic systems. It is impossible to delete it completely, but it can be effectively controlled by appropriate devices.

CONTAMINATION IN PRESENCE OF LARGE TOLERANCES



CONTAMINATION IN PRESENCE OF NARROW TOLERANCES



Solid contamination mainly causes surface damage and component wear.

- ABRASION OF SURFACES
Cause of leakage through mechanical seals, reduction of system performance, failures.
- SURFACE EROSION
Cause of leakage through mechanical seals, reduction of system performance, variation in adjustment of control components, failures.
- ADHESION OF MOVING PARTS
Cause of failure due to lack of lubrication.
- DAMAGES DUE TO FATIGUE
Cause of breakdowns and components breakdown.

ABRASION



EROSION



ADHESION



FATIGUE



Liquid contamination mainly results in decay of lubrication performance and protection of fluid surfaces.

DISSOLVED WATER

- INCREASING FLUID ACIDITY
Cause of surface corrosion and premature fluid oxidation
- GALVANIC COUPLE AT HIGH TEMPERATURES
Cause of corrosion

FREE WATER - ADDITIONAL EFFECTS

- DECAY OF LUBRICANT PERFORMANCE
Cause of rust and sludge formation, metal corrosion and increased solid contamination
- BATTERY COLONY CREATION
Cause of worsening in the filterability feature

- ICE CREATION AT LOW TEMPERATURES
Cause damage to the surface
- ADDITIVE DEPLETION
Free water retains polar additives

Gaseous contamination mainly results in decay of system performance.

- CUSHION SUSPENSION
Cause of increased noise and cavitation.
- FLUID OXIDATION
Cause of corrosion acceleration of metal parts.
- MODIFICATION OF FLUID PROPERTIES (COMPRESSIBILITY MODULE, DENSITY, VISCOSITY)
Cause of system's reduction of efficiency and of control.
It is easy to understand how a system without proper contamination management is subject to higher costs than a system that is provided.
- MAINTENANCE
Increase maintenance activities, spare parts, machine stop costs.
- ENERGY AND EFFICIENCY
Efficiency and performance reduction due to friction, drainage, cavitation.

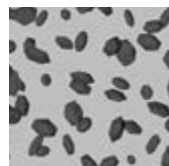
⑤ MEASURING THE SOLID CONTAMINATION LEVEL

The level of contamination of a system identifies the amount of contaminant contained in a fluid. This parameter refers to a unit volume of fluid. The level of contamination may be different at different points in the system. From the information in the previous paragraphs it is also apparent that the level of contamination is heavily influenced by the working conditions of the system, by its working years and by the environmental conditions.

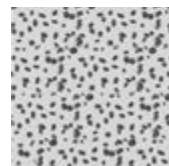
What is the size of the contaminating particles that we must handle in our hydraulic circuit?



HUMAN HAIR
(75 µm)



MINIMUM DIMENSION
VISIBLE WITH HUMAN
EYES
(40 µm)



TYPICAL CONTAMINANT
DIMENSION IN A
HYDRAULIC CIRCUIT
(4 - 14 µm)

Contamination level analysis is significant only if performed with a uniform and repeatable method, conducted with standard test methods and suitably calibrated equipment. To this end, ISO has issued a set of standards that allow tests to be conducted and express the measured values in the following ways.

- GRAVIMETRIC LEVEL - ISO 4405

The level of contamination is defined by checking the weight of particles collected by a laboratory membrane. The membrane must be cleaned, dried and desiccated, with fluid and conditions defined by the Standard. The volume of fluid is filtered through the membrane by using a suitable suction system. The weight of the contaminant is determined by checking the weight of the membrane before and after the fluid filtration.



CLEAN
MEMBRANE



CONTAMINATED
MEMBRANE

CONTAMINATION MANAGEMENT

- CUMULATIVE DISTRIBUTION OF THE PARTICLES SIZE - ISO 4406

The level of contamination is defined by counting the number of particles of certain dimensions per unit of volume of fluid. Measurement is performed by Contamination Monitoring Products (CMP).

Following the count, the contamination classes are determined, corresponding to the number of particles detected in the unit of fluid.

The most common classification methods follow ISO 4406 and SAE AS 4059 (Aerospace Sector) regulations.

NAS 1638 is still used although obsolete.

Classification example according to ISO 4406

The International Standards Organization standard ISO 4406 is the preferred method of quoting the number of solid contaminant particles in a sample. The level of contamination is defined by counting the number of particles of certain dimensions per unit of volume of fluid. The measurement is performed by Contamination Monitoring Products (CMP).

The numbers represent a code which identifies the number of particles of certain sizes in 1ml of fluid. Each code number has a particular size range. The first scale number represents the number of particles equal to or larger than 4 $\mu\text{m}_{(c)}$ per millilitre of fluid; The second scale number represents the number of particles equal to or larger than 6 $\mu\text{m}_{(c)}$ per millilitre of fluid; The third scale number represents the number of particles equal to or larger than 14 $\mu\text{m}_{(c)}$ per millilitre of fluid.

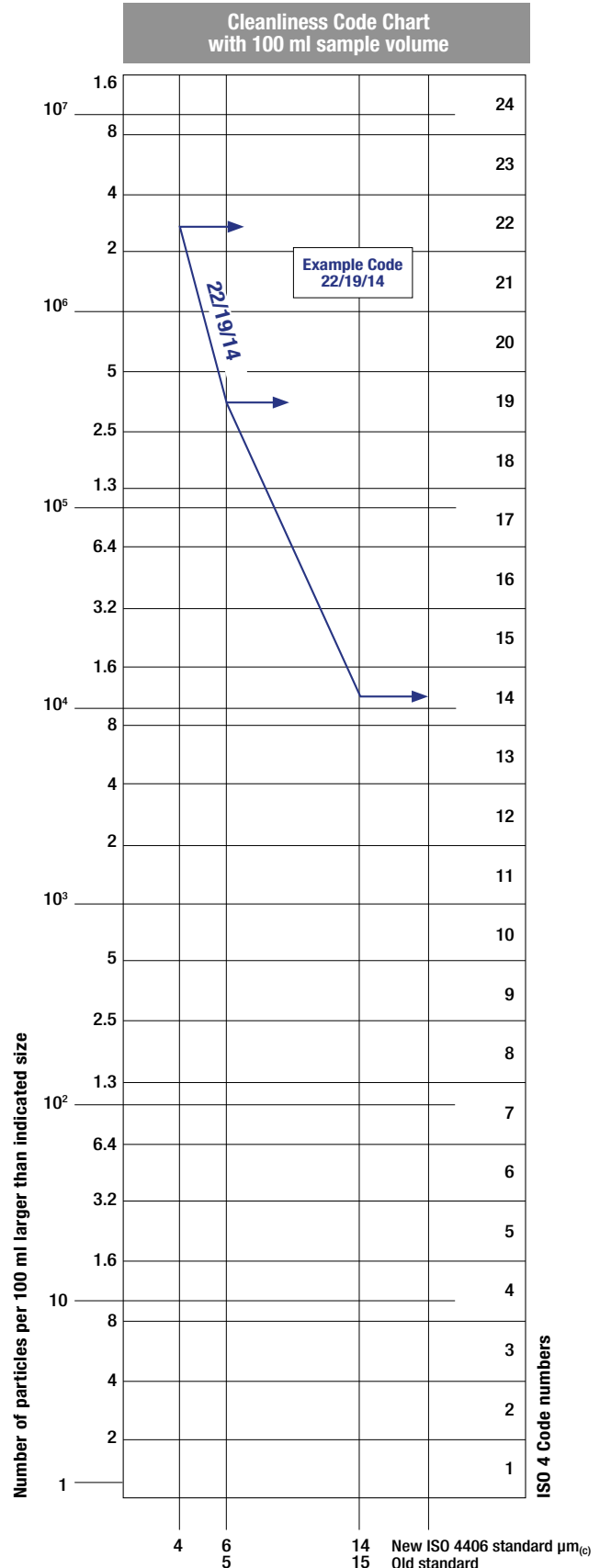
ISO 4406 - Allocation of Scale Numbers

Class	Number of particles per ml	
	Over	Up to
28	1 300 000	2 500 000
27	640 000	1 300 000
26	320 000	640 000
25	160 000	320 000
24	80 000	160 000
23	40 000	80 000
22	20 000	40 000
21	10 000	20 000
20	5 000	10 000
19	2 500	5 000
18	1 300	2 500
17	640	1 300
16	320	640
15	160	320
14	80	160
13	40	80
12	20	40
11	10	20
10	5	10
9	2.5	5
8	1.3	2.5
7	0.64	1.3
6	0.32	0.64
5	0.16	0.32
4	0.08	0.16
3	0.04	0.08
2	0.02	0.04
1	0.01	0.02
0	0	0.01

> 4 $\mu\text{m}_{(c)}$ = 350 particles
> 6 $\mu\text{m}_{(c)}$ = 100 particles
> 14 $\mu\text{m}_{(c)}$ = 25 particles
16 / 14 / 12

ISO 4406 Cleanliness Code System

Microscope counting examines the particles differently to Contamination Monitoring Products (CMP) and the code is given with two scale numbers only. These are at 5 μm and 15 μm equivalent to the 6 $\mu\text{m}_{(c)}$ and 14 $\mu\text{m}_{(c)}$ of Contamination Monitoring Products (CMP).



- CUMULATIVE DISTRIBUTION OF THE PARTICLES SIZE SAE AS4059-1 and SAE AS4059-2

Classification example according to SAE AS4059 - Rev. G

The code, prepared for the aerospace industry, is based on the size, quantity, and particle spacing in a 100 ml fluid sample. The contamination classes are defined by numeric codes, the size of the contaminant is identified by letters (A-F).

This SAE Aerospace Standard (AS) defines cleanliness levels for particulate contamination of hydraulic fluids and includes methods of reporting data relating to the contamination levels. Tables 1 and 2 below provide differential and cumulative particle counts respectively for counts obtained by an automatic particle counter, e.g. LPA3.

Table 1 - Class for differential measurement

Class	Dimension of contaminant Maximum Contamination Limits per 100 ml					(3)
	5-15 µm	15-25 µm	25-50 µm	50-100 µm	>100 µm	
	6-14 µm _(c)	14-21 µm _(c)	21-38 µm _(c)	38-70 µm _(c)	>70 µm _(c)	
00	125	22	4	1	0	(1)
0	250	44	8	2	0	(2)
1	500	89	16	3	1	
2	1 000	178	32	6	1	
3	2 000	356	63	11	2	
4	4 000	712	126	22	4	
5	8 000	1 425	253	45	8	
6	16 000	2 850	506	90	16	
7	32 000	5 700	1 012	180	32	
8	64 000	11 400	2 025	360	64	
9	128 000	22 800	4 050	720	128	
10	256 000	45 600	8 100	1 440	256	
11	512 000	91 200	16 200	2 880	512	
12	1 024 000	182 400	32 400	5 760	1 024	

6 - 14 µm _(c) = 15 000 particles
14 - 21 µm _(c) = 2 200 particles
21 - 38 µm _(c) = 200 particles
38 - 70 µm _(c) = 35 particles
> 70 µm _(c) = 3 particles
SAE AS4059 REV G - Class 6

(1) Size range, optical microscope, based on longest dimension as measured per AS598 or ISO 4407. (2) Size range CMP calibrated per ISO 11171 or an optical or electron microscope with image analysis software, based on projected area equivalent diameter. (3) Contamination classes and particle count limits are identical to NAS 1638.

Table 2 - Class for cumulative measurement

Class	Dimension of contaminant Maximum Contamination Limits per 100 ml						(1)
	>1 µm	>5 µm	>15 µm	>25 µm	>50 µm	>100 µm	
	>4 µm _(c)	>6 µm _(c)	>14 µm _(c)	>21 µm _(c)	>38 µm _(c)	>70 µm _(c)	
000	195	76	14	3	1	0	(2)
00	390	152	27	5	1	0	
0	780	304	54	10	2	0	
1	1 560	609	109	20	4	1	
2	3 120	1 217	217	39	7	1	
3	6 250	2 432	432	76	13	2	
4	12 500	4 864	864	152	26	4	
5	25 000	9 731	1 731	306	53	8	
6	50 000	19 462	3 462	612	106	16	
7	100 000	38 924	6 924	1 224	212	32	
8	200 000	77 849	13 849	2 449	424	64	
9	400 000	155 698	27 698	4 898	848	128	
10	800 000	311 396	55 396	9 796	1 696	256	
11	1 600 000	622 792	110 792	19 592	3 392	512	
12	3 200 000	1 245 584	221 584	39 184	6 784	1 024	

> 4 µm _(c) = 45 000 particles
> 6 µm _(c) = 15 000 particles
> 14 µm _(c) = 1 500 particles
> 21 µm _(c) = 250 particles
> 38 µm _(c) = 15 particles
> 70 µm _(c) = 3 particle
SAE AS4059 REV G
cpc* Class 6 6/6/5/5/4/2

* cumulative particle count

- CLASSES OF CONTAMINATION ACCORDING TO NAS 1638 (January 1964)

The NAS system was originally developed in 1964 to define contamination classes for the contamination contained within aircraft components.

The application of this standard was extended to industrial hydraulic systems simply because nothing else existed at the time.

The coding system defines the maximum numbers permitted of 100 ml volume at various size intervals (differential counts) rather than using cumulative counts as in ISO 4406. Although there is no guidance given in the standard on how to quote the levels, most industrial users quote a single code which is the highest recorded in all sizes and this convention is used on MP Filtri Contamination Monitoring Products (CMP).

The contamination classes are defined by a number (from 00 to 12) which indicates the maximum number of particles per 100 ml, counted on a differential basis, in a given size bracket.

Size Range Classes (in microns)

Maximum Contamination Limits per 100 ml					
Class	5-15	15-25	25-50	50-100	>100
00	125	22	4	1	0
0	250	44	8	2	0
1	500	89	16	3	1
2	1 000	178	32	6	1
3	2 000	356	63	11	2
4	4 000	712	126	22	4
5	8 000	1 425	253	45	8
6	16 000	2 850	506	90	16
7	32 000	5 700	1 012	180	32
8	64 000	11 400	2 025	360	64
9	128 000	22 800	4 050	720	128
10	256 000	45 600	8 100	1 440	256
11	512 000	91 200	16 200	2 880	512
12	1 024 000	182 400	32 400	5 760	1 024

5-15 µm = 42 000 particles
15-25 µm = 2 200 particles
25-50 µm = 150 particles
50-100 µm = 18 particles
> 100 µm = 3 particles
Class NAS 8

- CUMULATIVE DISTRIBUTION OF THE PARTICLES SIZE - ISO 4407

The level of contamination is defined by counting the number of particles collected by a laboratory membrane per unit of fluid volume. The measurement is done by a microscope. The membrane must be cleaned, dried and desiccated, with fluid and conditions defined by the Standard. The fluid volume is filtered through the membrane, using a suitable suction system.

The level of contamination is identified by dividing the membrane into a predefined number of areas and by counting the contaminant particles using a suitable laboratory microscope.

MICROSCOPE CONTROL
AND MEASUREMENT



Example figure 1 and 2

COMPARISON PHOTOGRAPH'S
1 graduation = 10µm



Fig. 1



Fig. 2



For other comparison photographs for contamination classes see the "Filtration and Particle Analyser Handbook".

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- CLEANLINESS CODE COMPARISON

Although ISO 4406 standard is being used extensively within the hydraulics industry other standards are occasionally required and a comparison may be requested. The table below gives a very general comparison but often no direct comparison is possible due to the different classes and sizes involved.

ISO 4406	SAE AS4059 Table 2	SAE AS4059 Table 1	NAS 1638
> 4 $\mu\text{m}_{(c)}$ 6 $\mu\text{m}_{(c)}$ 14 $\mu\text{m}_{(c)}$	> 4 $\mu\text{m}_{(c)}$ 6 $\mu\text{m}_{(c)}$ 14 $\mu\text{m}_{(c)}$	4-6 6-14 14-21 21-38 38-70 >70	5-15 15-25 25-50 50-100 >100
23 / 21 / 18	13A / 12B / 12C	12	12
22 / 20 / 17	12A / 11B / 11C	11	11
21 / 19 / 16	11A / 10B / 10C	10	10
20 / 18 / 15	10A / 9B / 9B	9	9
19 / 17 / 14	9A / 8B / 8C	8	8
18 / 16 / 13	8A / 7B / 7C	7	7
17 / 15 / 12	7A / 6B / 6C	6	6
16 / 14 / 11	6A / 5B / 5C	5	5
15 / 13 / 10	5A / 4B / 4C	4	4
14 / 12 / 09	4A / 3B / 3C	3	3

6 FILTRATION TECHNOLOGIES

Various mechanisms such as mechanical stoppage, magnetism, gravimetric deposit, or centrifugal separation can be used to reduce the level of contamination.

The mechanical stoppage method is most effective and can take place in two ways:

- SURFACE FILTRATION

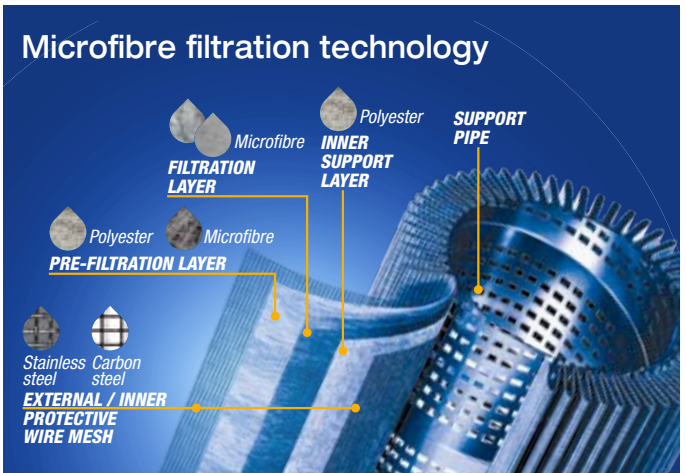
It is by direct interception. The filter prevents particles larger than the pores from continuing in the plant / system. Surface filters are generally manufactured with metal canvases or meshes.

- DEPTH FILTERING

Filters are constructed by fiber interlacing. Such wraps form pathways of different shapes and sizes in which the particles remain trapped when they find smaller apertures than their diameter.

Depth filters are generally produced with papers impregnated with phenolic resins, metal fibers or inorganic fibers.

In inorganic fiber filtration, commonly called microfibre, the filtering layers are often overlapped in order to increase the ability to retain the contaminant.



The filtration efficiency of metallic mesh filtrations is defined as the maximum particle size that can pass through the meshes of the filtering grid. The efficiency of microfibre and paper filtration ($\beta_{x(c)}$) is defined through a lab test called Multipass Test. The efficiency value ($\beta_{x(c)}$) is defined as the ratio between the number of particles of certain dimensions detected upstream and downstream of the filter.

$$\frac{\text{Upstream particles number} > X \mu\text{m}_{(c)}}{\text{Downstream particles number} > X \mu\text{m}_{(c)}} = \beta_{x(c)}$$



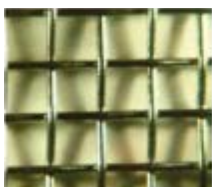
Value ($\beta_{x(c)}$)	2	10	75	100	200	1000
Efficiency	50%	90%	98.7%	99%	99.5%	99.9%

Test conditions, such as type of fluid to be used (MIL-H-5606), type of contaminant to be used (ISO MTD), fluid viscosity, test temperature, are determined by ISO 16889.

In addition to the filtration efficiency value during the Multipass test, other important features, such as filtration stability (β stability) and dirt holding capacity (DHC), are also tested.

Poor filtration stability is the cause of the filtering quality worsening as the filter life rises. Low dirt holding capacity causes a reduction in the life of the filter.

WIRE MESH FILTRATION



PAPER FILTRATION



MICROFIBER FILTRATION



Filtration ISO Standard Comparison

$\beta_{x(c)} > 1000$ ISO 16889	$\beta_x > 200$ ISO 4572	MP Filtri Filter media code
5 $\mu\text{m}_{(c)}$	3 μm	A03
7 $\mu\text{m}_{(c)}$	6 μm	A06
10 $\mu\text{m}_{(c)}$	10 μm	A10
16 $\mu\text{m}_{(c)}$	18 μm	A16
21 $\mu\text{m}_{(c)}$	25 μm	A25

7 RECOMMENDED CONTAMINATION CLASSES

Any are the nature and the properties of fluids, they are inevitably subject to contamination. The level of contamination can be managed by using special components called filters.

Hydraulic components builders, knowing the problem of contamination, recommend the filtration level appropriate to the use of their products.

Example of recommended contamination levels for pressures below 140 bar.

Piston pumps with fixed flow rate	•					
Piston pumps with variable flow rate			•			
Vane pumps with fixed flow rate		•				
Vane pumps with variable flow			•			
Engines	•					
Hydraulic cylinders	•					
Actuators					•	
Test benches						•
Check valve	•					
Directional valves	•					
Flow regulating valves	•					
Proportional valves				•		
Servo-valves					•	
Flat bearings			•			
Ball bearings				•		
ISO 4406 CODE	20/18/15	19/17/14	18/16/13	17/15/12	16/14/11	15/13/10
Recommended filtration $\beta_{x(c)} \geq 1.000$	$\beta_{21(c)} > 1000$	$\beta_{15(c)} > 1000$	$\beta_{10(c)} > 1000$	$\beta_{7(c)} > 1000$	$\beta_{7(c)} > 1000$	$\beta_{5(c)} > 1000$
MP Filtri media code	A25	A16	A10	A06	A06	A03

The common classification of filters is determined by their position in the plant.

8 TYPES OF FILTERS

Suction filters

They are positioned before the pump and are responsible for protecting the pump from dirty contaminants. It also provides additional flow guidance to the pump suction line.

Being subject to negligible working pressures are manufactured with simple and lightweight construction.

They are mainly produced with gross grade surface filtrations, mainly $60 \div 125 \mu\text{m}$.

They can be equipped with a magnetic filter for retaining ferrous particles.

They are generally placed under the fluid head to take advantage of the piezometric thrust of the fluid and reduce the risk of cavitation.

There are two types of suction filters:

- IMMERSION FILTERS

Simple filter element screwed on the suction pipe

- FILTERS WITH CONTAINER

Container filters that are more bulky, but provide easier maintenance of the tank

Delivery (or Pressure) filters

They are positioned between the pump and most sensitive regulating and controlling components, such as servo valves or proportional valves, and are designed to ensure the class of contamination required by the components used in the circuit.

Being subjected to high working pressures are manufactured with more robust and articulated construction. In particular situations of corrosive environments or aggressive fluids can be made of stainless steel.

They are mainly produced with filtering depths of $3 \div 25 \mu\text{m}$.

They can be manufactured with in-line connections, with plate or flange connections or directly integrated into the circuit control blocks / manifolds.

They can also be manufactured in duplex configuration to allow the contaminated section to be maintained even when the plant / system is in operation without interruption of the working cycle.

Return filters

They are positioned on the return line to the tank and perform the task of filtering the fluid from particles entering the system from the outside or generated by the wear of the components.

They are generally fixed to the reservoir (for this reason also called top tank mounted), positioned semi-immersed or completely immersed.

The positioning of the return filters must guarantee in all operating conditions that the fluid drainage takes place in immersed condition; this is to avoid creating foams in the tank that can cause malfunctions or cavitation in the pumps.

For the sizing of the return filters, account must be taken of the presence of accumulators or cylinders that can make the return flow considerably greater than the pump suction flow rate.

Being subject to contained working pressures are manufactured with simple and lightweight construction.

Normally it is possible to extract the filter element without disconnecting the filter from the rest of the system.

Combined filters

They are designed to be applied to systems with two or more circuits. They are commonly used in hydrostatic transmission machines where they have a dual filtration function of the return line and suction line of the hydrostatic transmission pump.

The filter is equipped with a valve that keeps the 0.5 bar pressure inside the filter. A portion of the fluid that returns to the tank is filtered by the return filter element, generally produced with absolute filtration, and returns to the transmission booster pump.

Only excess fluid returns to the tank through the valve.

The internal pressure of the filter and the absolute filtration help to avoid the cavitation phenomenon inside the pump.

Off-line filters

They are generally used in very large systems / plants, placed in a closed circuit independent from the main circuit. They remain in operation regardless of the operation of the main circuit and are crossed by a constant flow rate.

They can also be manufactured in duplex configuration to allow the contaminated section to be maintained even when the unit is in operation without interruption of the work cycle.

Venting filters

During the operation of the plants, the fluid level present in the reservoir changes continuously.

The result of this continuous fluctuation is an exchange of air with the outside environment.

The venting filter function, positioned on the tank, is to filter the air that enters the tank to compensate for fluid level variations.

9 FILTER SIZING PARAMETERS

The choice of the filter system for an hydraulic system is influenced by several factors.

It is necessary to consider the characteristics of the various components present in the plant and their sensitivity to contamination.

It is also necessary to consider all the tasks that the filter will have to do within the plant:

- FLUID PROTECTION FROM CONTAMINATION
- PROTECTION OF OLEODYNAMIC COMPONENTS SENSITIVE TO CONTAMINATION
- PROTECTION OF OLEODYNAMIC PLANTS FROM ENVIRONMENTAL WASTE
- PROTECTION OF OLEODYNAMIC PLANTS FROM CONTAMINATION CAUSED BY COMPONENTS' FAILURES

The advantages of proper positioning and sizing of the filters are

- MORE RELIABILITY OF THE SYSTEM
- LONGER LIFE OF THE FLUID COMPONENTS
- REDUCTION OF STOP TIME
- REDUCTION OF FAILURE CASUALTIES

Each hydraulic filter is described by general features that identify the possibility of use in different applications.

- **MAXIMUM WORKING PRESSURE (P_{max})**

The maximum working pressure of the filter must be greater than or equal to the pressure of the circuit section in which it will be installed.

- **PRESSURE DROP (ΔP)**

The pressure drop depends on a number of factors, such as the working circuit temperature, the fluid viscosity, the filter element cleaning condition.

- **WORKING TEMPERATURE (T)**

The working temperature deeply affect the choice of materials. Excessively high or low temperatures may adversely affect the strength of the materials or the characteristics of the seals.

- **FILTRATION EFFICIENCY (%) / FILTRATION RATIO ($\beta_{x(c)}$)**

Filtration efficiency is the most important parameter to consider when selecting a filter.

When choosing the filtration performances, the needs of the most sensitive components in the system must be considered.

- **FLUID TYPE**

The type of fluid influences the choice of filters in terms of compatibility and viscosity. It is always mandatory to check the filterability.

- **PLACEMENT IN THE PLANT**

The position of the filter in the system conditions the efficiency of all filter performances.

10 APPLICABLE STANDARDS FOR FILTER DEVELOPMENT

In order to obtain unique criteria for development and verification of the filters performance, specific regulations for the filters and filter elements testing have been issued by ISO. These norms describe the target, the methodology, the conditions and the presentation methods for the test results.

ISO 2941

Hydraulic fluid power -- Filter elements -- Verification of collapse/burst pressure rating

This Standard describes the method for testing the collapse / burst resistance of the filter elements.

The test is performed by crossing the contaminated fluid filter element at a predefined flow rate. The progressive clogging of the filter element, determined by contamination, causes an increase in differential pressure.

ISO 2942

Hydraulic fluid power -- Filter elements -- Verification of fabrication integrity and determination of the first bubble point

This Standard describes the method to verify the integrity of the assembled filter elements.

It can be used to verify the quality of the production process or the quality of the materials by verifying the pressure value of the first bubble point.

ISO 2943

Hydraulic fluid power -- Filter elements -- Verification of material compatibility with fluids

This Standard describes the method to verify the compatibility of materials with certain hydraulic fluids.

The test is carried out by keeping the element (the material sample) immersed in the fluid under high or low temperature conditions for a given period of time and verifying the retention of the characteristics.

ISO 3723

Hydraulic fluid power -- Filter elements -- Method for end load test

This Standard describes the method for verifying the axial load resistance of the filter elements.

After performing the procedure described in ISO 2943, the designed axial load is applied to the filter element. To verify the test results, then the test described in ISO 2941 is performed.

ISO 3968

Hydraulic fluid power -- Filters -- Evaluation of differential pressure versus flow characteristics

This Standard describes the method for checking the pressure drop across the filter.

The test is carried out by crossing the filter from a given fluid and by detecting upstream and downstream pressures.

Some of the parameters defined by the Standard are the fluid, the test temperature, the size of the tubes, the position of the pressure detection points.

ISO 16889

Hydraulic fluid power -- Filters -- Multi-pass method for evaluating filtration performance of a filter element

This Standard describes the method to check the filtration characteristics of the filter elements.

The test is performed by constant introduction of contaminant (ISO MTD). The characteristics observed during the test are the filtration efficiency and the dirty holding capacity related to the differential pressure.

ISO 23181

Hydraulic fluid power -- Filter elements -- Determination of resistance to flow fatigue using high viscosity fluid

This Standard describes the method for testing the fatigue resistance of the filter elements. The test is carried out by subjecting the filter to continuous flow variations, thus differential pressure, using a high viscosity fluid.

ISO 11170

Hydraulic fluid power -- Sequence of tests for verifying performance characteristics of filter elements

The Standard describes the method for testing the performance of filter elements. The protocol described by the regulations provides the sequence of all the tests described above in order to verify all the working characteristics (mechanical, hydraulic and filtration).

ISO 10771-1

Hydraulic fluid power -- Fatigue pressure testing of metal pressure-containing envelopes -- Test method

This Standard describes the method to check the resistance of the hydraulic components with pulsing pressure.

It can be applied to all metal components (excluding tubes) subject to cyclic pressure used in the hydraulic field.

Saturation Levels

Since the effects of free (also emulsified) water is more harmful than those of dissolved water, water levels should remain well below the saturation point.

However, even water in solution can cause damage and therefore every reasonable effort should be made to keep saturation levels as low as possible. There is no such thing as too little water. As a guideline, we recommend maintaining saturation levels below 50% in all equipment.

TYPICAL WATER SATURATION LEVEL FOR NEW OILS

Examples:

Hydraulic oil @ 30°C = 200 ppm = 100% saturation

Hydraulic oil @ 65°C = 500 ppm = 100% saturation

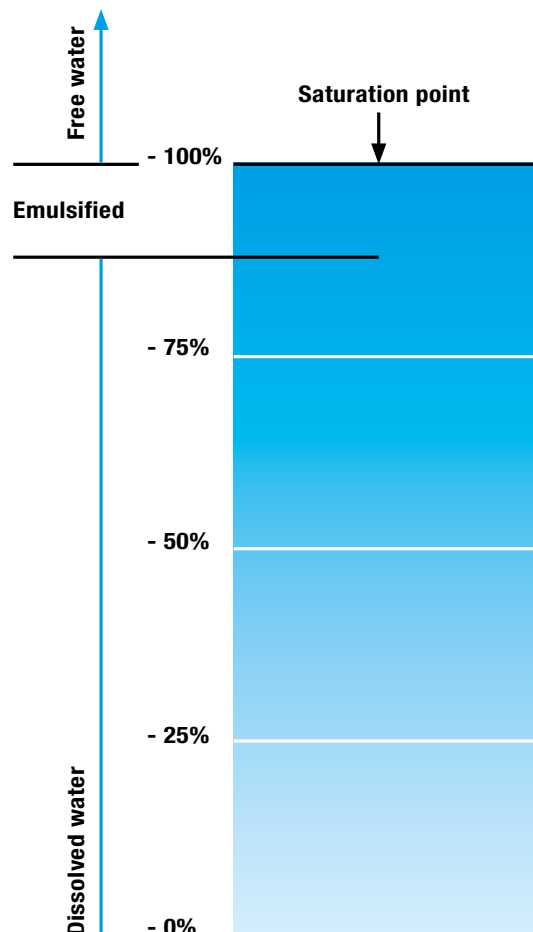
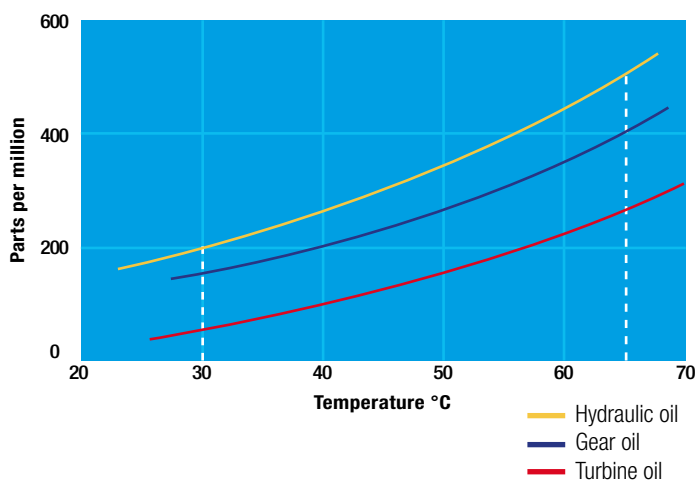
11 WATER IN HYDRAULIC AND LUBRICATING FLUIDS

Water Content

In mineral oils and non aqueous resistant fluids water is undesirable. Mineral oil usually has a water content of 50-300 ppm (@40°C) which it can support without adverse consequences.

Once the water content exceeds about 300ppm the oil starts to appear hazy. Above this level there is a danger of free water accumulating in the system in areas of low flow. This can lead to corrosion and accelerated wear.

Similarly, fire resistant fluids have a natural water which may be different to mineral oil.



WATER REMOVAL

Water is present everywhere, during storage, handling and servicing.

MP Filtri filter elements feature an absorbent media which protects hydraulic systems from both particulate and water contamination.

MP Filtri's filter element technology is available with inorganic microfiber media with a filtration rating 25 μm (therefore identified with media designation WA025), providing absolute filtration of solid particles to $\beta_{x(c)} = 1000$.

Absorbent media is made by water absorbent fibres which increase in size during the absorption process.

Free water is thus bonded to the filter media and completely removed from the system (it cannot even be squeezed out).

Filter Media

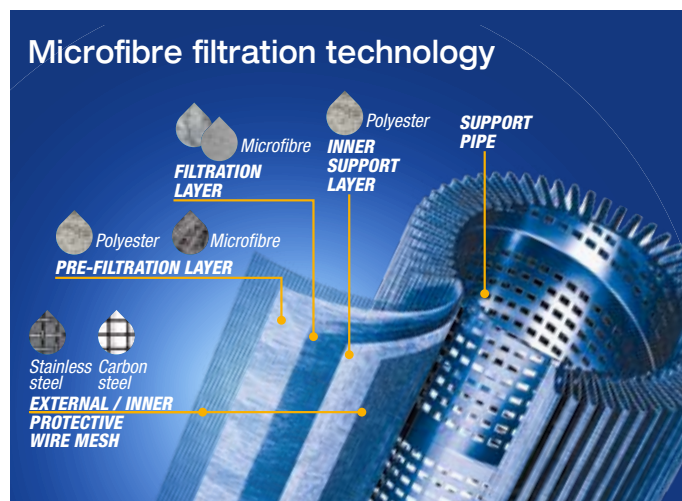


Fabric that absorbs water

Absorber media layer



The Filter Media has absorbed water



By removing water from your fluid power system, you can prevent such key problems as:

- corrosion (metal etching)
- loss of lubricant power
- accelerated abrasive wear in hydraulic components
- valve-locking
- bearing fatigue
- viscosity variance (reduction in lubricating properties)
- additive precipitation and oil oxidation
- increase in acidity level
- increased electrical conductivity (loss of dielectric strength)
- slow/weak response of control systems



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For more details please refer to our dedicate brochure "WATER REMOVAL"

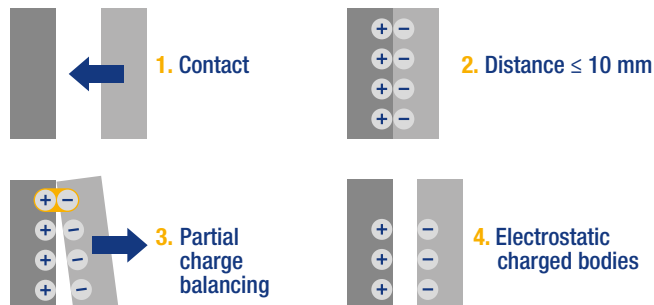
12 THE ANTI-STATIC FILTERS

zerospark®

zerospark is a specialist solution designed to solve the problem of electrostatic discharge inside hydraulic filters. Caused by the electrical charge build-up due to the passage of oil through the filters, this can result in damage to filter elements, oils and circuit components. It can even cause fire hazards in environments where flammable materials are present.

THE TRIBOELECTRIC EFFECT

The body with the most electronegativity strips electrons from the other, generating a build-up of a net negative charge on itself. The other body is charged by the same amount but with the opposite sign, giving rise to very high potential differences. These, if not dissipated, can give rise to electrostatic discharges.



Scan or click me!

For more details please refer to our dedicate brochure "ZEROSPARK"

FILTER SIZING

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FILTER SIZING Calculation

THE CORRECT FILTER SIZING HAS TO BE BASED ON THE TOTAL PRESSURE DROP DEPENDING ON THE APPLICATION.

FOR EXAMPLE, THE MAXIMUM TOTAL PRESSURE DROP ALLOWED BY A NEW AND CLEAN RETURN FILTER HAS TO BE IN THE RANGE 0.4 - 0.6 bar / 5.80 - 8.70 psi.

The pressure drop calculation is performed by adding together the value of the housing with the value of the filter element. The pressure drop Δp_c of the housing is proportional to the fluid density (kg/dm^3 / lb/ft^3). The filter element pressure drop Δp_e is proportional to its viscosity (mm^2/s / SUS), the corrective factor Y have to be used in case of an oil viscosity different than $30 \text{ mm}^2/\text{s}$ (cSt) / 150 SUS.

Sizing data for single filter element, head at top

Δp_c = Filter housing pressure drop [bar / psi]

Δp_e = Filter element pressure drop [bar / psi]

Y = Corrective factor Y (see correspondent table), depending on the filter type, on the filter element size, on the filter element length and on the filter media

Q = flow rate (l/min - gpm)

V1 reference oil viscosity = $30 \text{ mm}^2/\text{s}$ (cSt) / 150 SUS

V2 = operating oil viscosity in mm^2/s (cSt) / SUS

Filter element pressure drop calculation with an oil viscosity different than $30 \text{ mm}^2/\text{s}$ (cSt) / 150 SUS

International system:

$$\Delta p_e = Y : 1000 \times Q \times (V2:V1)$$

Imperial system:

$$\Delta p_e = Y : 17.2 \times Q \times (V2:V1)$$

$$\Delta p_{\text{Tot.}} = \Delta p_c + \Delta p_e$$

Verification formula

$$\Delta p_{\text{Tot.}} \leq \Delta p_{\text{max allowed}}$$

Maximum total pressure drop (Δp_{max}) allowed by a new and clean filter

Filter family	Δp_{max}	
	[bar]	[psi]
Suction	0.08 bar	1.15 psi
Return	0.50 bar	7.25 psi
Return - Suction (*)	1.50 bar	22.00 psi
Low & Medium Pressure/Duplex	0.70 bar	10.15 psi
High Pressure Pressure/Duplex	1.50 bar	22.00 psi
Stainless Steel	1.50 bar	22.00 psi
ATEX	1.50 bar	22.00 psi

(*) The suction flow rate should not exceed 30% of the return flow rate

Filter pressure drop calculation example

Application data:

Selected filter: tank top return filter - MPT110 series with bypass valve and G 1 1/4" inlet connection.

Selected filter element: **MF100 length 4**

Required filtration efficiency = **25 μm** absolute filtration with microfibre

Pressure Pmax = 10 bar / 145.03 psi

Flow rate Q = 120 l/min / 31.7 gpm

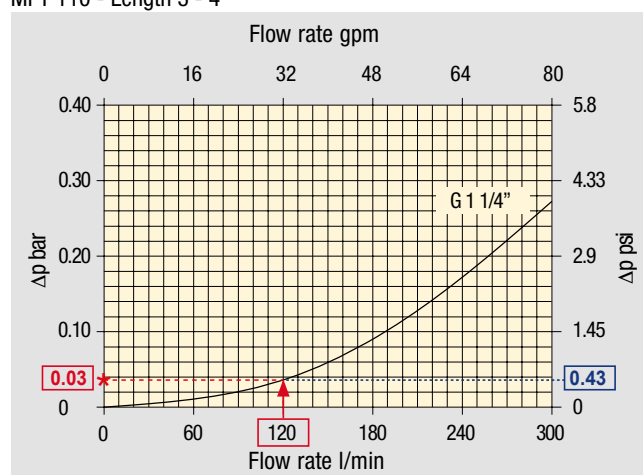
Viscosity V2 = $46 \text{ mm}^2/\text{s}$ (cSt) / 216 SUS

Oil density = 0.86 kg/dm^3 / 53.68 lb/ft³

Calculation:

$$\Delta p_c = \mathbf{0.03 \text{ bar}} / \mathbf{0.43 \text{ psi}}$$
 (see graphic below)

MPT 110 - Length 3 - 4



Filter housings Δp pressure drop.

The curves are plotted using mineral oil with density of 0.86 kg/dm^3 in compliance with ISO 3968. Δp varies proportionally with density.

Filter element		Absolute filtration H Series					Nominal filtration N Series		
Type		A03	A06	A10	A16	A25	P(00)10	P(00)25	M(00)10 M(00)6 M(00)9
Return filters									
MF 020		74.00	50.08	20.00	16.00	9.00	6.43	5.51	4.40
	2	29.20	24.12	8.00	7.22	5.00	3.33	2.85	2.00
	3	22.00	19.00	6.56	5.33	4.33	1.68	1.44	1.30
MF 030	1	74.00	50.08	20.00	16.00	9.00	6.43	5.51	3.40
MF 100 MFX 100	1	28.20	24.40	8.67	8.17	6.88	4.62	3.96	1.25
	2	17.33	12.50	6.86	5.70	4.00	3.05	2.47	1.10
	3	10.25	9.00	3.65	3.33	2.50	1.63	1.32	0.96
	4	6.10	5.40	2.30	2.20	2.00	1.19	0.96	0.82

$$\Delta p_e = (2.00 : 1000) \times 120 \times (46 : 30) = 0.37 \text{ bar}$$

$$\Delta p_e = (2.00 : 17.2) \times 32 \times (216 : 150) = 5.36 \text{ psi}$$

$$\Delta p_{\text{Tot.}} = 0.03 + 0.37 = 0.4 \text{ bar}$$

$$\Delta p_{\text{Tot.}} = 0.43 + 5.36 = 5.79 \text{ psi}$$

The selection is correct because the total pressure drop value is inside the admissible range for top tank return filters.

In case the max allowed total pressure drop is not verified, it is necessary to repeat the calculation changing the filter and/or filter element length/size.

SUCTION FILTERS

Filter element		Nominal filtration Filter element ΔP Series : A - C					
Type	Length	P0010	P0025	M0025	M0060	M0090	M0250
SMC 250	10	0.65	0.20	0.10	0.08	0.05	0.03
SSC 503	10	-	-	0.17	0.11	0.11	0.11
SSC 504	10	-	-	0.11	0.08	0.08	0.08
SSC 505	10	-	-	0.23	0.18	0.18	0.18
SSC 510	10	-	-	0.18	0.14	0.14	0.14
SSC 535	10	-	-	0.08	0.05	0.05	0.05
SSC 540	10	-	-	0.05	0.04	0.04	0.04
FEX 060	10	4.58	3.22	1.02	0.89	0.63	0.63
	20	1.97	1.38	0.62	0.45	0.29	0.29
FEX 110	10	1.33	1.12	0.22	0.18	0.14	0.14
	20	0.90	0.76	0.15	0.10	0.09	0.09

RETURN FILTERS

Filter element		Absolute filtration Filter element ΔP Series: H					Nominal filtration Filter Element ΔP Series: N		
Type	Length	A03	A06	A10	A16	A25	P10	P25	M25 - M60 - M90
MF 020	1	74.00	50.08	20.00	16.00	9.00	6.43	5.51	4.40
	2	29.20	24.12	8.00	7.22	5.00	3.33	2.85	2.00
	3	22.00	19.00	6.56	5.33	4.33	1.68	1.44	1.30
MF 030 MFX 030	1	74.00	50.08	20.00	16.00	9.00	6.43	5.51	3.40
MF 100 MFX 100	1	28.20	24.40	8.67	8.17	6.88	4.62	3.96	1.25
	2	17.33	12.50	6.86	5.70	4.00	3.05	2.47	1.10
	3	10.25	9.00	3.65	3.33	2.50	1.63	1.32	0.96
	4	6.10	5.40	2.30	2.20	2.00	1.19	0.96	0.82
MF 180 MFX 180	1	3.67	3.05	1.64	1.56	1.24	1.18	1.06	0.26
	2	1.69	1.37	0.68	0.54	0.51	0.43	0.39	0.12
MF 190 MFX 190	2	1.69	1.37	0.60	0.49	0.44	0.35	0.31	0.11
MF 400 MFX 400	1	3.20	2.75	1.39	1.33	1.06	0.96	0.87	0.22
	2	2.00	1.87	0.88	0.85	0.55	0.49	0.45	0.13
	3	1.90	1.60	0.63	0.51	0.49	0.39	0.35	0.11
MF 750 MFX 750	1	1.08	0.84	0.49	0.36	0.26	0.21	0.19	0.06
MLX 250	2	3.00	3.04	1.46	1.25	1.17	-	-	M25 0.20
MLX 660	2	1.29	1.26	0.52	0.44	0.38	-	-	M25 0.10
CU 025		78.00	48.00	28.00	24.00	9.33	9.33	8.51	1.25
CU 040		25.88	20.88	10.44	10.00	3.78	3.78	3.30	1.25
CU 100		15.20	14.53	5.14	4.95	2.00	2.00	0.17	1.10
CU 250		3.25	2.55	1.55	1.35	0.71	0.71	0.59	0.25
CU 630		1.96	1.68	0.85	0.72	0.24	0.42	0.36	0.09
CU 850		1.06	0.84	0.42	0.33	0.17	0.17	0.13	0.04

TO BE CONTINUED >>

Corrective factor Y to be used for the filter element pressure drop calculation. The values depend to the filter size and length and to the filter media.
Reference oil viscosity 30 mm²/s

FILTER SIZING Corrective factor

RETURN FILTERS

Filter element		Absolute filtration Filter element ΔP Series: H					Nominal filtration Filter Element ΔP Series: N		
Type	Length	A03	A06	A10	A16	A25	P10	P25	M25 - M60 - M90
DH 250	2	3.61	4.08	1.81	1.71	1.35	-	-	M25 0.55
	4	2.10	1.70	1.14	0.77	0.53	-	-	0.60
MR 100	1	19.00	17.00	6.90	6.30	4.60	2.94	2.52	1.60
	2	11.70	10.80	4.40	4.30	3.00	2.94	2.52	1.37
	3	7.80	6.87	3.70	3.10	2.70	2.14	1.84	1.34
	4	5.50	4.97	2.60	2.40	2.18	1.72	1.47	1.34
	5	4.20	3.84	2.36	2.15	1.90	1.60	1.37	1.34
MR 250	1	5.35	4.85	2.32	1.92	1.50	1.38	1.20	0.15
	2	4.00	3.28	1.44	1.10	1.07	0.96	0.83	0.13
	3	2.60	2.20	1.08	1.00	0.86	0.77	0.64	0.12
	4	1.84	1.56	0.68	0.56	0.44	0.37	0.23	0.11
MR 630	1	3.10	2.48	1.32	1.14	0.92	0.83	0.73	0.09
	2	2.06	1.92	0.82	0.76	0.38	0.33	0.27	0.08
	3	1.48	1.30	0.60	0.56	0.26	0.22	0.17	0.08
	4	1.30	1.20	0.48	0.40	0.25	0.21	0.16	0.08
	5	0.74	0.65	0.30	0.28	0.13	0.10	0.08	0.04
MR 850	1	0.60	0.43	0.34	0.25	0.13	0.12	0.09	0.03
	2	0.37	0.26	0.23	0.21	0.11	0.08	0.07	0.03
	3	0.27	0.18	0.17	0.17	0.05	0.04	0.04	0.02
	4	0.23	0.16	0.13	0.12	0.04	0.03	0.03	0.02

Filter element		Absolute filtration Filter element ΔP Series: H					Nominal filtration Filter Element ΔP Series: N		
Type		A03	A06	A10	A16	A25	P10	P25	M60 - M90
FEX 060		11.63	10.79	5.1	4.78	4.26	4.58	3.22	0.89
FEX 080		6.83	6.69	3.35	3.19	2.56	1.97	1.38	0.45
FEX 110		5.73	5.22	2.52	2.16	1.66	1.33	1.12	0.18
FEX 160		3.72	3.59	1.79	1.76	1.22	0.9	0.76	0.1

RETURN / SUCTION FILTERS

Filter element		Absolute filtration		
Type	Length	A10	A16	A25
RSX 116	1	5.12	4.33	3.85
	2	2.22	1.87	1.22
RSX 165 RSX 166	1	2.06	1.75	1.46
	2	1.24	1.05	0.96
	3	0.94	0.86	0.61

Filter element		Absolute filtration Filter Element ΔP Series: N							
Type	Length	A03	A06	A10	A16	A25	P10	P25	M25 - M60 - M90
CU 110	1	16.25	15.16	8.75	8.14	5.87	2.86	2.65	0.14
	2	12.62	10.44	6.11	6.02	4.16	1.60	1.49	0.12
	3	8.57	7.95	5.07	4.07	2.40	1.24	1.15	0.11
	4	5.76	4.05	4.05	2.36	1.14	0.91	0.85	0.05

Corrective factor Y to be used for the filter element pressure drop calculation. The values depend to the filter size and length and to the filter media.
Reference oil viscosity 30 mm²/s

LOW & MEDIUM PRESSURE FILTERS

Filter element		Absolute filtration Filter Element ΔP Series: N - W					Nominal filtration Filter Element ΔP Series: N		
Type	Length	A03	A06	A10	A16	A25	P10	P25	M25 M60 M90
CU 110	1	16.25	15.16	8.75	8.14	5.87	2.86	2.65	0.14
	2	12.62	10.44	6.11	6.02	4.15	1.60	1.49	0.12
	3	8.57	7.95	5.07	4.07	2.40	1.24	1.15	0.11
	4	5.76	4.05	2.80	2.36	1.14	0.91	0.85	0.05
CU 210	1	5.30	4.80	2.00	1.66	1.32	0.56	0.43	0.12
	2	3.44	2.95	1.24	1.09	0.70	0.42	0.35	0.09
	3	2.40	1.70	0.94	0.84	0.54	0.33	0.23	0.05
DN	016	7.95	7.20	3.00	2.49	1.98	0.84	0.65	0.18
	025	5.00	4.53	1.89	1.57	1.25	0.53	0.41	0.11
	040	3.13	2.66	1.12	0.98	0.63	0.38	0.32	0.08
CU 400	2	3.14	2.55	1.46	1.22	0.78	0.75	0.64	0.19
	3	2.15	1.70	0.94	0.78	0.50	0.40	0.34	0.10
	4	1.60	1.28	0.71	0.61	0.40	0.34	0.27	0.08
	5	1.00	0.83	0.47	0.34	0.20	0.24	0.19	0.06
	6	0.82	0.58	0.30	0.27	0.17	0.22	0.18	0.105
CU 900	1	0.86	0.63	0.32	0.30	0.21	-	-	0.05
CU 950	2	1.03	0.80	0.59	0.40	0.26	-	-	0.05
	3	0.44	0.40	0.27	0.18	0.15	-	-	0.02
MR 630	7	0.88	0.78	0.36	0.34	0.16	0.12	0.96	0.47

Filter element		Absolute filtration Filter Element ΔP Series: N - W					Nominal filtration Filter Element ΔP Series: N			
Type		A03	A06	A10	A16	A25	P10	P25	M25	M60 M90
FEX 060		11.63	10.79	5.1	4.78	4.26	4.58	3.22	1.02	0.89
FEX 080		6.83	6.69	3.35	3.19	2.56	1.97	1.38	0.62	0.45
FEX 110		5.73	5.22	2.52	2.16	1.66	1.33	1.12	0.22	0.18
FEX 160		3.72	3.59	1.79	1.76	1.22	0.9	0.76	0.15	0.1

HIGH PRESSURE FILTERS

Filter element		Absolute filtration Filter Element ΔP Series: N - R					Nominal filtration Filter El. ΔP Series: N
Type	Length	A03	A06	A10	A16	A25	M25
HP 010 HP 011	1	332.71	250.07	184.32	152.36	128.36	-
	2	220.28	165.56	74.08	59.13	37.05	-
	3	123.24	92.68	41.48	33.08	20.72	-
	4	77.76	58.52	28.37	22.67	16.17	-
HP 039	2	70.66	53.20	25.77	20.57	14.67	4.90
	3	36.57	32.28	18.00	13.38	8.00	2.90
	4	26.57	23.27	12.46	8.80	5.58	2.20
HP 050 HPX 050	1	31.75	30.30	13.16	12.3	7.29	1.60
	2	24.25	21.26	11.70	9.09	4.90	1.40
	3	17.37	16.25	8.90	7.18	3.63	1.25
	4	12.12	10.75	6.10	5.75	3.08	1.07
	5	7.00	6.56	3.60	3.10	2.25	0.80
HP 065	1	58.50	43.46	23.16	19.66	10.71	1.28
	2	42.60	25.64	16.22	13.88	7.32	1.11
	3	20.50	15.88	8.18	6.81	3.91	0.58
HP 135	1	20.33	18.80	9.71	8.66	4.78	2.78
	2	11.14	10.16	6.60	6.38	2.22	1.11
	3	6.48	6.33	3.38	3.16	2.14	1.01

TO BE CONTINUED >>

Corrective factor Y to be used for the filter element pressure drop calculation. The values depend to the filter size and length and to the filter media.
Reference oil viscosity 30 mm²/s

FILTER SIZING Corrective factor

HIGH PRESSURE FILTERS

Filter element		Absolute filtration Filter Element ΔP Series: N - R					Nominal filtration Filter El. ΔP Series: N
Type	Length	A03	A06	A10	A16	A25	M25
HP 150 HPX 150	1	17.53	15.91	7.48	6.96	5.94	1.07
	2	8.60	8.37	3.54	3.38	3.15	0.58
	3	6.53	5.90	2.93	2.79	2.12	0.49
HP 320	1	10.88	9.73	5.02	3.73	2.54	1.04
	2	4.40	3.83	1.75	1.48	0.88	0.71
	3	2.75	2.11	1.05	0.87	0.77	0.61
	4	2.12	1.77	0.98	0.78	0.55	0.47
HP 500	1	4.44	3.67	2.30	2.10	1.65	0.15
	2	3.37	2.77	1.78	1.68	1.24	0.10
	3	2.22	1.98	1.11	1.09	0.75	0.08
	4	1.81	1.33	0.93	0.86	0.68	0.05
	5	1.33	1.15	0.77	0.68	0.48	0.04
HP 325	1	3.65	2.95	2.80	1.80	0.90	0.38
	2	2.03	1.73	1.61	1.35	0.85	0.36
	3	1.84	1.42	1.32	1.22	0.80	0.35

Filter element		Absolute filtration S - H - U Series				
Type	Length	A03	A06	A10	A16	A25
HP 010 HP 011	1	424.58	319.74	235.17	194.44	163.78
	2	281.06	211.25	94.35	75.45	47.26
	3	130.14	97.50	43.63	34.82	21.81
	4	109.39	82.25	36.79	29.37	18.40
HP 039	2	73.00	57.00	28.00	24.00	17.20
	3	40.90	36.33	21.88	18.80	11.20
	4	31.50	28.22	17.22	9.30	6.70
HP 050	1	47.33	34.25	21.50	20.50	14.71
	2	29.10	25.95	10.04	10.90	5.88
	3	20.85	19.50	10.68	8.61	4.36
	4	14.55	12.90	7.32	6.90	3.69
	5	9.86	9.34	6.40	4.80	2.50
HP 135	1	29.16	25.33	13.00	12.47	5.92
	2	14.28	11.04	7.86	7.90	4.44
	3	8.96	7.46	4.89	4.16	3.07
HP 150 HPX 150	1	25.14	21.44	10.01	10.02	7.36
	2	11.02	9.09	4.22	4.19	4.00
	3	9.03	6.95	3.82	3.67	3.04
HP 320	1	13.00	12.19	6.80	6.40	3.32
	2	6.45	5.31	3.01	2.89	1.73
	3	4.13	3.14	1.90	1.78	1.17
	4	3.17	2.71	1.80	1.70	1.10
HP 500	1	9.70	8.81	4.55	4.47	2.80
	2	5.46	4.63	2.88	2.68	2.20
	3	3.90	3.74	2.22	2.07	1.53
	4	3.10	2.84	1.56	1.53	1.02
	5	1.93	1.83	1.14	1.08	0.69

Corrective factor Y to be used for the filter element pressure drop calculation. The values depend to the filter size and length and to the filter media.
Reference oil viscosity 30 mm²/s

STAINLESS STEEL HIGH PRESSURE FILTERS

Filter element		Absolute filtration Filter Element ΔP Series: N - R					Nominal filtration Filter El. ΔP Series: N
Type	Length	A03	A06	A10	A16	A25	M25
HP 010 HP 011	1	332.71	250.07	184.32	152.36	128.36	-
	2	220.28	165.56	74.08	59.13	37.05	-
	3	123.24	92.68	41.48	33.08	20.72	-
	4	77.76	58.52	28.37	22.67	16.17	-
HP 039	2	70.66	53.20	25.77	20.57	14.67	4.90
	3	36.57	32.28	18.00	13.38	8.00	2.90
	4	26.57	23.27	12.46	8.80	5.58	2.20
HP 050	1	31.75	30.30	13.16	12.3	7.29	1.60
	2	24.25	21.26	11.70	9.09	4.90	1.40
	3	17.37	16.25	8.90	7.18	3.63	1.25
	4	12.12	10.75	6.10	5.75	3.08	1.07
	5	7.00	6.56	3.60	3.10	2.25	0.80
HP 135	1	20.33	18.80	9.71	8.66	4.78	2.78
	2	11.14	10.16	6.60	6.38	2.22	1.11
	3	6.48	6.33	3.38	3.16	2.14	1.01

Filter element		Absolute filtration Filter Element ΔP Series: S - H - U				
Type	Length	A03	A06	A10	A16	A25
HP 010 HP 011	1	424.58	319.74	235.17	194.44	163.78
	2	281.06	211.25	94.35	75.45	47.26
	3	130.14	97.50	43.63	34.82	21.81
	4	109.39	82.25	36.79	29.37	18.40
HP 039	2	73.00	57.00	28.00	24.00	17.20
	3	40.90	36.33	21.88	18.80	11.20
	4	31.50	28.22	17.22	9.30	6.70
HP 050	1	47.33	34.25	21.50	20.50	14.71
	2	29.10	25.95	10.04	10.90	5.88
	3	20.85	19.50	10.68	8.61	4.36
	4	14.55	12.90	7.32	6.90	3.69
	5	9.86	9.34	6.40	4.80	2.50
HP 135	1	29.16	25.33	13.00	12.47	5.92
	2	14.28	11.04	7.86	7.90	4.44
	3	8.96	7.46	4.89	4.16	3.07

Corrective factor Y to be used for the filter element pressure drop calculation. The values depend to the filter size and length and to the filter media.
Reference oil viscosity 30 mm²/s

FILTER SIZING Corrective factor

FILTERS FOR POTENTIALLY EXPLOSIVE ATMOSPHERE

Filter element		Absolute filtration Filter Element ΔP Series: N - R					Nominal filtration Filter El. ΔP Series: N
Type	Length	A03	A06	A10	A16	A25	M25
HP 011	1	332.71	250.07	184.32	152.36	128.36	-
	2	220.28	165.56	74.08	59.13	37.05	-
	3	123.24	92.68	41.48	33.08	20.72	-
	4	77.76	58.52	28.37	22.67	16.17	-
HP 039	2	70.66	53.20	25.77	20.57	14.67	4.90
	3	36.57	32.28	18.00	13.38	8.00	2.90
	4	26.57	23.27	12.46	8.80	5.58	2.20
HPX 050	1	31.75	30.30	13.16	12.3	7.29	1.60
	2	24.25	21.26	11.70	9.09	4.90	1.40
	3	17.37	16.25	8.90	7.18	3.63	1.25
	4	12.12	10.75	6.10	5.75	3.08	1.07
	5	7.00	6.56	3.60	3.10	2.25	0.80
HP 135	1	20.33	18.80	9.71	8.66	4.78	2.78
	2	11.14	10.16	6.60	6.38	2.22	1.11
	3	6.48	6.33	3.38	3.16	2.14	1.01
HPX 150	1	17.53	15.91	7.48	6.96	5.94	1.07
	2	8.60	8.37	3.54	3.38	3.15	0.58
	3	6.53	5.90	2.93	2.79	2.12	0.49

Filter element		Absolute filtration Filter Element ΔP Series: S - H - U				
Type	Length	A03	A06	A10	A16	A25
HP 011	1	424.58	319.74	235.17	194.44	163.78
	2	281.06	211.25	94.35	75.45	47.26
	3	130.14	97.50	43.63	34.82	21.81
	4	109.39	82.25	36.79	29.37	18.40
HP 039	2	73.00	57.00	28.00	24.00	17.20
	3	40.90	36.33	21.88	18.80	11.20
	4	31.50	28.22	17.22	9.30	6.70
HP 135	1	29.16	25.33	13.00	12.47	5.92
	2	14.28	11.04	7.86	7.90	4.44
	3	8.96	7.46	4.89	4.16	3.07
HPX 150	1	25.14	21.44	10.01	10.02	7.36
	2	11.02	9.09	4.22	4.19	4.00
	3	9.03	6.95	3.82	3.67	3.04

Corrective factor Y to be used for the filter element pressure drop calculation. The values depend to the filter size and length and to the filter media.

Filters sizing software

The web-based software program will allow you to select the most suitable MP Filtri's Filters, in accordance with your process design requirements.

The program will automatically check your input design process prior to propose you the acceptable solutions and create an output in PDF report style format.

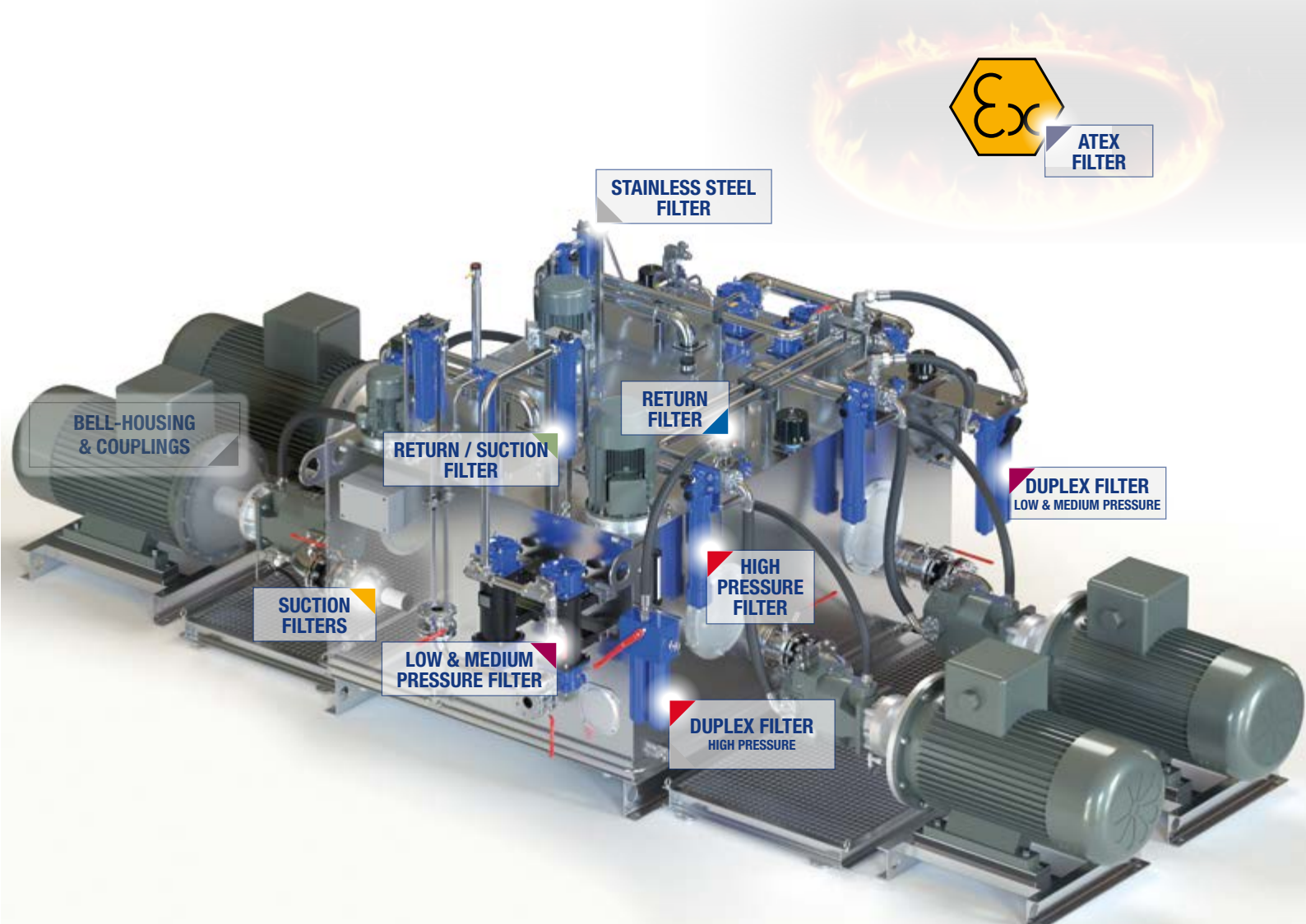
The MP Filtri Selection Tool software program is easy to use with a flexible fast design method and provides improved layout formats with full descriptions.

The web-based tool is available at MP Filtri website at following link:
<https://www.mpfiltri.com/tools/>

The related, complete user guide is available as Manual and downloadable from the "Download" section of MP Filtri website, as well as scanning the following QR code



Scan or click me!



High pressure filters are used as process filters to protect individual valves or the entire hydraulic circuit from contamination as per ISO 4406.

9 versions are available with operating pressures range from 110 bar up to 560 bar.

A range of products is available to resolve all filter mounting problems, in the following configurations:

- In-line, with threaded and flange mounting
- Manifold top mounting
- Manifold side mounting
- Manifold mounting, to DIN 24340 CETOP R 35 H
- Manifold threaded/flange mounting in the top extraction filter cartridge version
- Duplex versions for continuous operation requirements

FMP series is specifically designed and suitable for:

- feed pumps of hydrostatic drives
- pressure lubrication
- hydraulic systems in the high pressure range

FMMX & FMM series is optimized for the protection of servo and proportional hydraulics:

- in agricultural machinery
- in construction machinery
- in commercial vehicles

HPB are kits designed for the direct integration into the control block; they can be easily integrated into the block through a simple cavity.

FHP & FHA series are the typical high-pressure filters optimized for industrial applications.

FHM series is designed for intermediate plate construction, CETOP design.

FHB series is designed for block mounting; the filter head can be screwed in from the outside.

FHF series is designed to assemble HF4 filter element according to SAE J2066.

FHD series is the duplex high pressure filter; with two independent filter heads, the flow can be switched without interruption during operation.

The range includes a complete set of valves:

- Bypass valve
- Check valve
- Bypass + check valve
- Reverse-flow valve
- Reverse-flow + bypass valve

FILTER SIZING

For the proper calculation see pag. 22

High pressure filters



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THE X CONCEPT FOR OUR FILTERS

Protect the performance of your system with MYclean.

Quality and efficiency are fundamental for MP Filtri:

this exclusive new filter element possesses polygon shape geometry and specific seal that ensures only original spare parts can be used - ensuring correct operation and higher system reliability.

FMMX series

with  HPX Filter Element



- ◆ **Protects the machine from improper use of non-original products.**
- ◆ **Safety of constant quality protection & reliability**

With exclusive filter element you are sure that only MP Filtri filter elements can be used, ensuring the best cleaning level of the oil due to the use of originals filter elements.



The products identified as FMMX series are protected by:

- ◆ Italian Patent n° 102014902261205
- ◆ Canadian Patent n° 2,937,258
- ◆ European Patent n° 3 124 092 B1
- ◆ US Patent n° 20170030384 A1

TOGETHER WITH  , AS OPTION, FMMX SERIES CAN BE PROVIDED WITH

zerospark®
THE ANTI-STATIC FILTERS

THE Z CONCEPT FOR OUR FILTERS

Zerospark® is a specialist solution designed to solve the problem of electrostatic discharge inside hydraulic filters. Caused by the electrical charge build-up due to the passage of oil through the filters, this can result in damage to filter elements, oils and circuit components. It can even cause fire hazards in environments where flammable materials are present.



FMMX series

Maximum working pressure up to 42 MPa (420 bar) - Flow rate up to 300 l/min



INSTALLATION, SERVICE AND MAINTENANCE MANUAL AND SAFETY INSTRUCTIONS



FMMX050



FMMX150

Please scan or click the QR codes
to get updated electronic version
of the related document.



For all the QR codes: Scan or click me!

Description

High Pressure filters

In-line

Maximum working pressure up to 42 MPa (420 bar)

Flow rate up to 300 l/min

FMMX is a range of versatile high pressure filter for protection of sensitive components in high pressure hydraulic systems in the mobile machines.

They are directly connected to the lines of the system through the hydraulic fittings.

Available features:

- Female threaded connections up to 1 1/4", for a maximum flow rate of 300 l/min
- Fine filtration rating, to get a good cleanliness level into the system
- Bypass valve, to relieve excessive pressure drop across the filter media
- Low collapse filter element "N", for use with filters provided with bypass valve
- Visual, electrical and electronic differential clogging indicators
- MYclean interface connection for the filter element, to protect the product against non-original spare parts.
- External protective wrap, to optimize the flow through the element and to save the element efficiency against non-proper handling

Common applications:

- Agricultural machines
- Mobile machines

Technical data

Filter housing materials

- Head: Painted cast iron, black RAL 9005
- Housing: Phosphatized steel
- Bypass valve: Steel

Pressure

- Test pressure: 63 MPa (630 bar)
- Min. Burst pressure: 126 MPa (1260 bar)
- Pulse pressure fatigue test: 1 000 000 cycles with pressure from 0 to 42 MPa (420 bar)

Bypass valve

- Opening pressure 0.6 MPa (6 bar) $\pm 10\%$
- Other opening pressures on request.

Filter element features

Filter FMMX		Filter element HPX	
Δp Element type			
Element media	Construction	Δp Series	Δp
A - Microfiber	Standard	N	20 bar
A - Microfiber	High Δp with external support	S	210 bar
M - Wire mesh	Standard	N	20 bar
Please see ordering code tables to check element Δp series availability based on filter features.			
Flow direction through the filter element: From OUT to IN			

Seals

- Standard NBR series A
- Optional FPM series V

Temperature

From -25 °C to +110 °C

Connections

In-line Inlet/Outlet

Note

FMMX filters are provided for vertical mounting

Weights [kg] and volumes [dm³]

Filter series	Weights [kg]					Volumes [dm³]						
	Length	1	2	3	4	5	Length	1	2	3	4	5
FMMX 050		3.11	3.48	3.90	4.36	5.54		0.34	0.48	0.63	0.81	1.23
FMMX 150		7.50	9.50	10.90	-	-		0.60	1.00	1.25	-	-

Flow rates [l/min]

Filter series	Length	Filter element design - N Series						Filter element design - S Series				
		A03	A06	A10	A16	A25	M25	A03	A06	A10	A16	A25
FMMX 050	1	42	43	79	82	106	147	29	39	57	59	74
	2	52	57	85	96	121	149	45	49	76	88	114
	3	66	69	97	106	130	150	58	61	89	99	125
	4	83	89	113	115	134	152	74	80	106	108	129
	5	107	110	130	134	141	154	93	95	111	121	139
FMMX 150	1	81	88	156	163	179	295	58	67	128	128	158
	2	142	145	227	230	236	312	119	137	212	212	207
	3	170	180	242	245	263	315	138	164	211	224	239

Maximum flow rate for a complete pressure filter with a pressure drop $\Delta p = 1.5$ bar.

The reference fluid has a kinematic viscosity of 30 mm²/s (cSt) and a density of 0.86 kg/dm³.

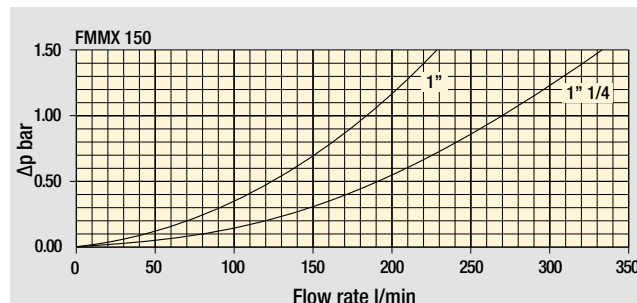
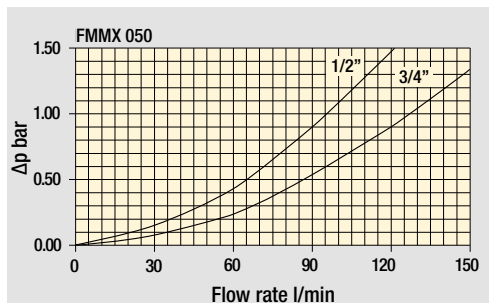
For different pressure drop or fluid viscosity we recommend to use our selection software available on www.mpfiltri.com.

You can also calculate the right size using the formulas present on the FILTER SIZING paragraph at the beginning of the full catalogue or at the beginning of the filter family brochure.

Please, contact our Sales Department for further additional information.

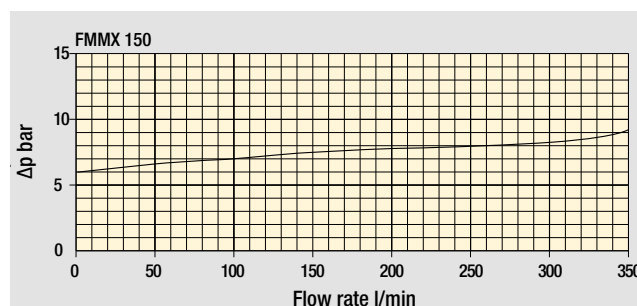
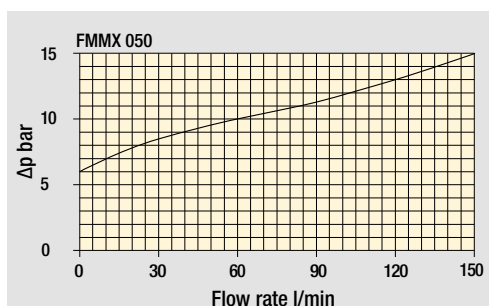
Hydraulic symbols

Filter series	Style S	Style B	Style T	Style D
FMMX 050	•	•	•	•
FMMX 150	•	•	•	•

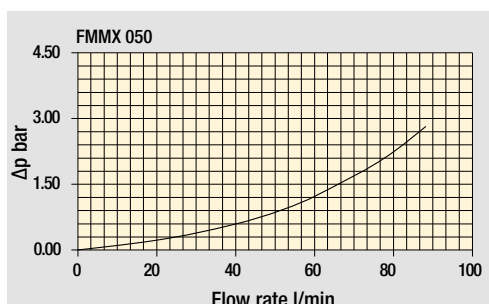


Pressure drop

Filter housings
 Δp pressure drop



Bypass valve
pressure drop



Filter housing
with check valve

The curves are plotted using mineral oil with density of 0.86 kg/dm³ in compliance with ISO 3968.
 Δp varies proportionally with density.

Designation & Ordering code

COMPLETE FILTER

Series and size Configuration example: **FMMX050** **3** **B** **A** **G** **A10** **N** **P01**

FMMX050 Filter featuring **MYCLEAN** Filter Element

Length **1** **2** **3** **4** **5**

Valves (see page 471)
S Without bypass
B With bypass 6 bar
T With check valve, without bypass
D With check valve, with bypass 6 bar

Seals
A NBR **V** FPM

Connections
A M18x1.5 - ISO 6149 **E** 1/2" NPT
B M22x1.5 - ISO 6149 **F** 3/4" NPT
C G 1/2" **G** SAE 8 - 3/4" - 16 UNF
D G 3/4" **H** SAE 12 - 1 1/16" - 12 UN

Filtration rating (filter media)
A03 Inorganic microfiber 3 µm **A16** Inorganic microfiber 16 µm
A06 Inorganic microfiber 6 µm **A25** Inorganic microfiber 25 µm
A10 Inorganic microfiber 10 µm **M25** Wire mesh 25 µm

Element Δp	Valves			
	S	B	T	D
N 20 bar	-	•	-	•
S 210 bar	•	•	•	•

Executions		
Base	zero spark ®	
P01	Z01 *	Upper connection for clogging indicator
P02	Z02 *	Without connection for clogging indicator
P03	Z03 *	Frontal connection for clogging indicator
Pxx	Zxx *	Customized

* Not for Mxx filter media

FILTER ELEMENT

Element series and size Configuration example: **HPX050** **3** **A10** **A** **N** **P01**

HPX050 Filter Element with **MYCLEAN** feature

Element length **1** **2** **3** **4** **5**

Filtration rating (filter media)
A03 Inorganic microfiber 3 µm
A06 Inorganic microfiber 6 µm
A10 Inorganic microfiber 10 µm
A16 Inorganic microfiber 16 µm
A25 Inorganic microfiber 25 µm
M25 Wire mesh 25 µm

Seals
A NBR
V FPM

Element Δp
N 20 bar
S 210 bar

Executions

Base	zero spark ®	
P01	Z01 *	MP Filtri standard
Pxx	Zxx *	Customized

* Not for Mxx filter media

CLOGGING INDICATORS

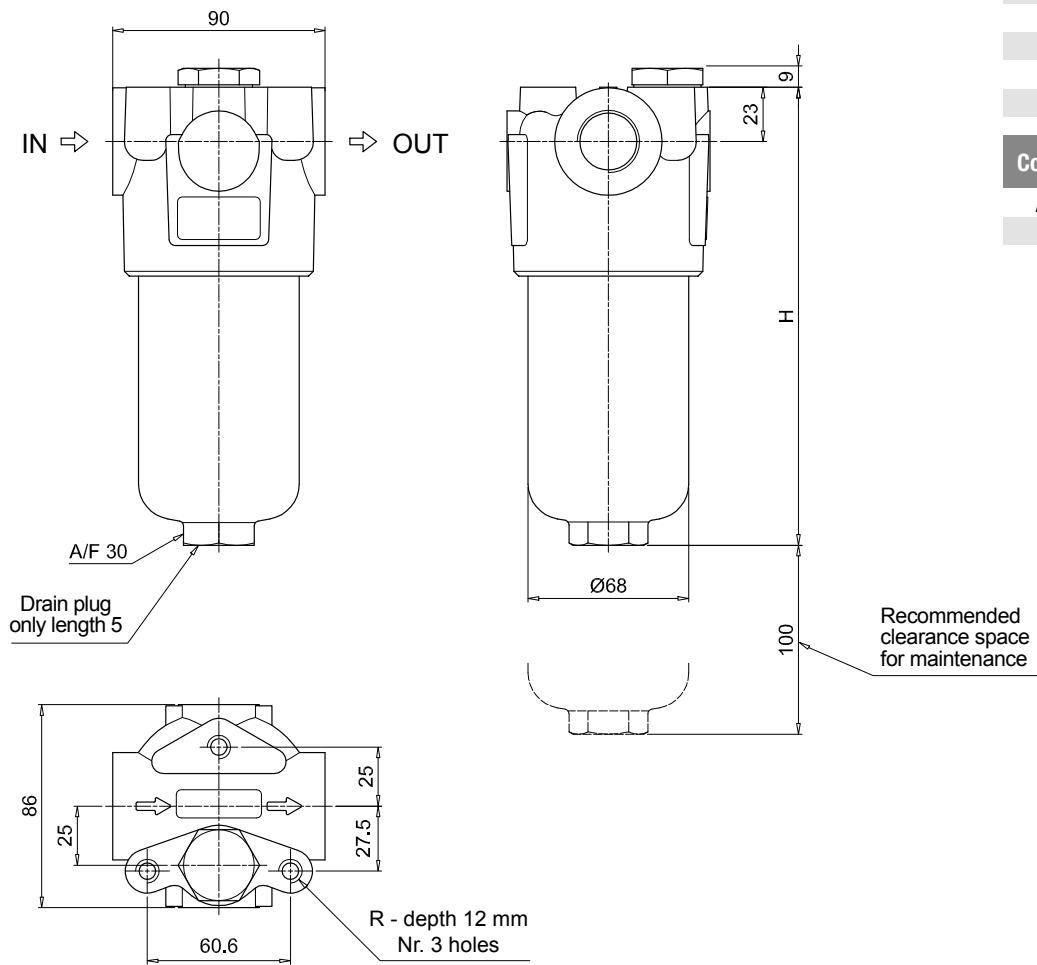
See page 721

DEA Electrical differential pressure indicator	DLE Electrical / visual differential pressure indicator
DEM Electrical differential pressure indicator	DTA Electronic differential pressure indicator
DEU Electrical differential pressure indicator	DVA Visual differential pressure indicator
DLA Electrical / visual differential pressure indicator	DVM Visual differential pressure indicator

PLUGS

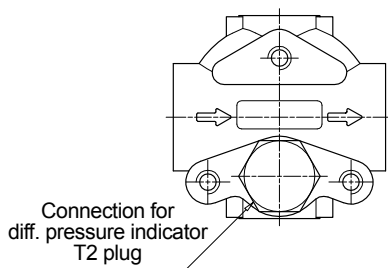
See page 741

T2 Plug

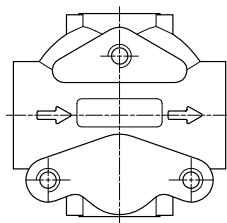


FMMX050	
Filter length	H [mm]
1	158
2	195
3	237
4	285
5	407
Connections	R
A-B-C-D	M10
E-F-G-H	3/8" UNC

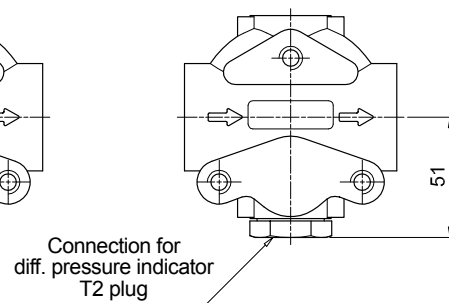
Execution P01



Execution P02



Execution P03



Designation & Ordering code

COMPLETE FILTER

Series and size Configuration example: **FMMX150** **2** **B** **A** **D** **2** **M25** **N** **P01**

FMMX150 Filter featuring **MYCLEAN** Filter Element

Length **1** | **2** | **3** |

Valves (see page 471)
S Without bypass **B** With bypass 6 bar

Seals
A NBR **V** FPM

Connections
C G1" **F** 1 1/4" NPT
D G1 1/4" **G** SAE 16 - 1 5/16" - 12 UN
E 1" NPT **H** SAE 20 - 1 5/8" - 12 UN

Connections for differential indicator
1 Without connection
2 Upper connection
3 Frontal connection

Filtration rating (filter media)	
A03 Inorganic microfiber	3 µm
A06 Inorganic microfiber	6 µm
A10 Inorganic microfiber	10 µm
A16 Inorganic microfiber	16 µm
A25 Inorganic microfiber	25 µm
M25 Wire mesh	25 µm

Element Δp	Valves	
	S	B
N 20 bar	-	•
S 210 bar	•	•

Executions		
Base	zerospark	
P01	Z01 *	MP Filtri standard
Pxx	Zxx *	Customized

* Not for Mxx filter media

FILTER ELEMENT

Element series and size Configuration example: **HPX150** **3** **A10** **A** **N** **P01**

HPX150 Filter Element with **MYCLEAN** feature

Element length **1** | **2** | **3** |

Filtration rating (filter media)	
A03 Inorganic microfiber	3 µm
A06 Inorganic microfiber	6 µm
A10 Inorganic microfiber	10 µm
A16 Inorganic microfiber	16 µm
A25 Inorganic microfiber	25 µm
M25 Wire mesh	25 µm

Seals	
A NBR	
V FPM	

Element Δp	
N 20 bar	
S 210 bar	

Executions		
Base	zerospark	
P01	Z01 *	MP Filtri standard
Pxx	Zxx *	Customized

* Not for Mxx filter media

CLOGGING INDICATORS

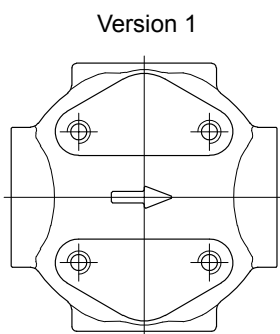
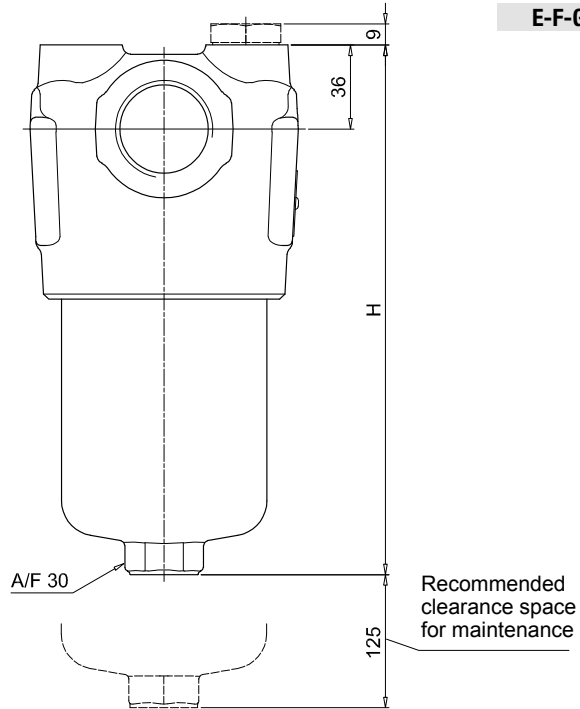
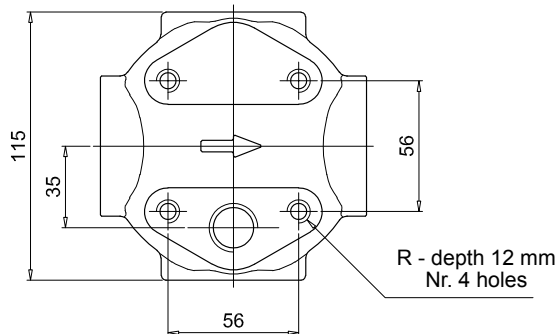
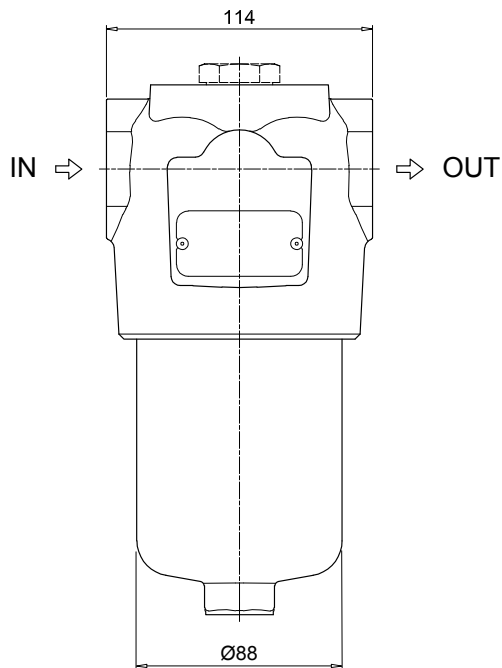
See page 721

DEA Electrical differential pressure indicator	DLE Electrical / visual differential pressure indicator
DEM Electrical differential pressure indicator	DTA Electronic differential pressure indicator
DEU Electrical differential pressure indicator	DVA Visual differential pressure indicator
DLA Electrical / visual differential pressure indicator	DVM Visual differential pressure indicator

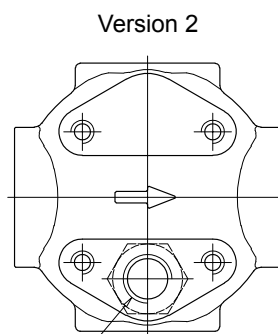
PLUGS

See page 741

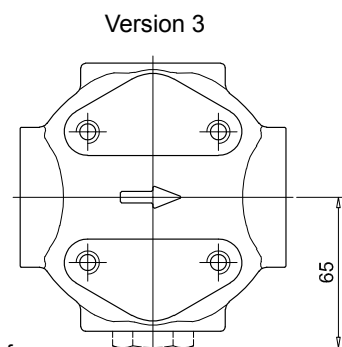
T2 Plug



Connection for differential indicator
T2 plug not included



Connection for differential indicator
T2 plug not included



FMMX150

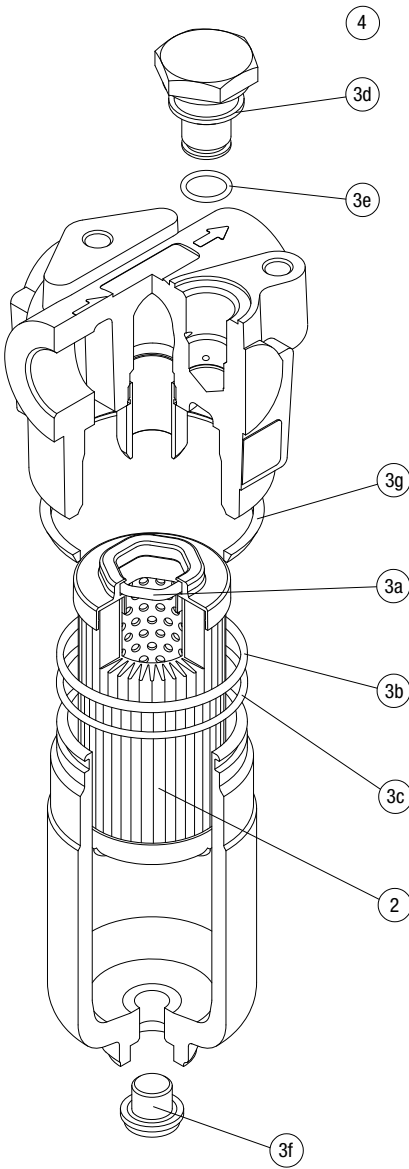
Filter length	H [mm]
1	230
2	340
3	415

Connections	R
C-D	M10
E-F-G-H	3/8" UNC

FMMX SPARE PARTS

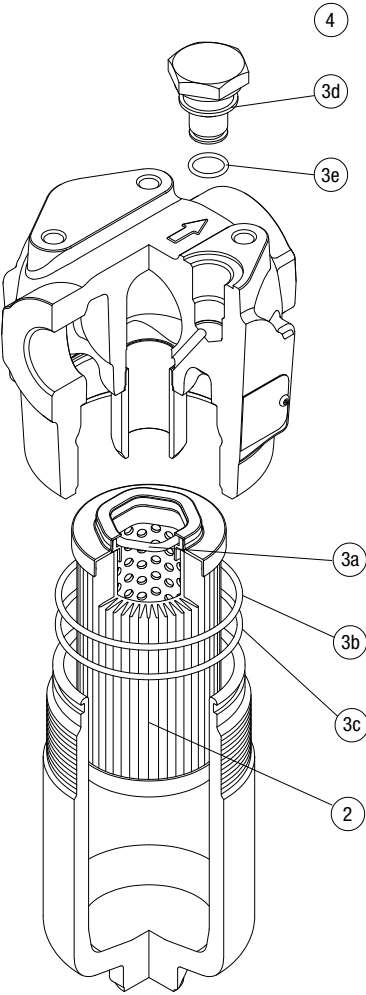
Order number for spare parts

FMMX 050



Item:	Q.ty: 1 pc.	Q.ty: 1 pc.	Q.ty: 1 pc.
Filter series	Filter element	Seal Kit code number	Indicator connection plug
FMMX 050	See order table	NBR	NBR
		FPM	FPM
		02050864	T2H
		02050865	T2V

FMMX 150



Item:		Q.ty: 1 pc.		Q.ty: 1 pc.		Q.ty: 1 pc.	
		2		3 (3a ÷ 3e)		4	
Filter series	Filter element	Seal Kit code number		Indicator connection plug			
		NBR	FPM	NBR	FPM		
FMMX 150	See order table	02050868	02050869	T2H	T2V		

FMM series

Maximum working pressure up to 42 MPa (420 bar) - Flow rate up to 300 l/min



INSTALLATION, SERVICE AND MAINTENANCE MANUAL AND SAFETY INSTRUCTIONS



FMM050



FMM150

Please scan or click the QR codes
to get updated electronic version
of the related document.



For all the QR codes: Scan or click me!

Description

Technical data

High Pressure filters

In-line

Maximum working pressure up to 42 MPa (420 bar)

Flow rate up to 300 l/min

FMM is a range of versatile high pressure filter for protection of sensitive components in high pressure hydraulic systems in the mobile machines.

They are directly connected to the lines of the system through the hydraulic fittings.

Available features:

- Female threaded connections up to 1 1/4", for a maximum flow rate of 250 l/min
- Fine filtration rating, to get a good cleanliness level into the system
- Bypass valve, to relieve excessive pressure drop across the filter media
- Low collapse filter element "N", for use with filters provided with bypass valve
- Low collapse filter element with external support "R", for filter element protection against the back pressure caused by the check valve in filters provided with the bypass valve
- High collapse filter element with external support "S", for filter element protection against the back pressure caused by the check valve in filters not provided with the bypass valve
- Visual, electrical and electronic differential clogging indicators

Common applications:

- Agricultural machines
- Mobile machines

Filter housing materials

- Head: Painted cast iron, black RAL 9005
- Housing: Phosphatized steel
- Bypass valve: Steel

Pressure

- Test pressure: 63 MPa (630 bar)
- Min. Burst pressure: 126 MPa (1260 bar)
- Pulse pressure fatigue test: 1 000 000 cycles with pressure from 0 to 42 MPa (420 bar)

Bypass valve

- Opening pressure 0.6 MPa (6 bar) $\pm 10\%$
- Other opening pressures on request.

Filter element features

Filter FMM		Filter element HP	
Δp Element type			
Element media	Construction	Δp Series	Δp
A - Microfiber	Standard	N	20 bar
A - Microfiber	With external support	R	20 bar
A - Microfiber	High Δp with external support	S	210 bar
M - Wire mesh	Standard	N	20 bar
Please see ordering code tables to check element Δp series availability based on filter features.			
Flow direction through the filter element: From OUT to IN			

Seals

- Standard NBR series A
- Optional FPM series V

Temperature

From -25 °C to +110 °C

Connections

In-line Inlet/Outlet

Note

FMM filters are provided for vertical mounting

Weights [kg] and volumes [dm³]

Filter series	Weights [kg]					Volumes [dm³]						
	Length	1	2	3	4	5	Length	1	2	3	4	5
FMM 050		3.11	3.48	3.90	4.36	5.54		0.34	0.48	0.63	0.81	1.23
FMM 150		7.50	9.50	10.90	-	-		0.60	1.00	1.25	-	-

Flow rates [l/min]

Filter series	Length	Filter element design - N - R Series						Filter element design - S Series				
		A03	A06	A10	A16	A25	M25	A03	A06	A10	A16	A25
FMM 050	1	42	43	79	82	106	147	29	39	57	59	74
	2	52	57	85	96	121	149	45	49	76	88	114
	3	66	69	97	106	130	150	58	61	89	99	125
	4	83	89	113	115	134	152	74	80	106	108	129
	5	107	110	130	134	141	154	93	95	111	121	139
FMM 150	1	81	88	156	163	179	295	58	67	128	128	158
	2	142	145	227	230	236	312	119	137	212	212	207
	3	170	180	242	245	263	315	138	164	211	224	239

Maximum flow rate for a complete pressure filter with a pressure drop $\Delta p = 1.5$ bar.

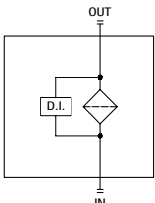
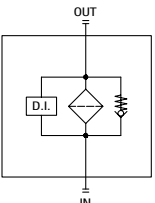
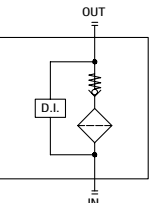
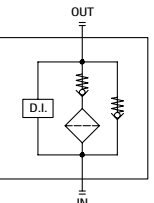
The reference fluid has a kinematic viscosity of 30 mm²/s (cSt) and a density of 0.86 kg/dm³.

For different pressure drop or fluid viscosity we recommend to use our selection software available on www.mpfiltri.com.

You can also calculate the right size using the formulas present on the FILTER SIZING paragraph at the beginning of the full catalogue or at the beginning of the filter family brochure. Please, contact our Sales Department for further additional information.

Hydraulic symbols

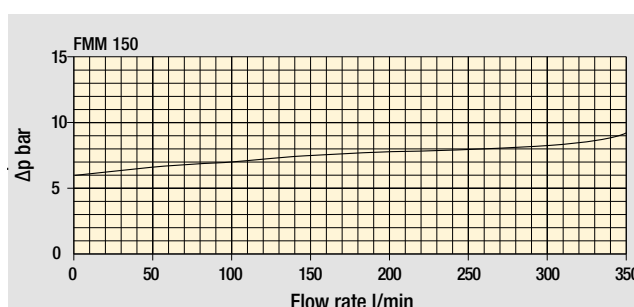
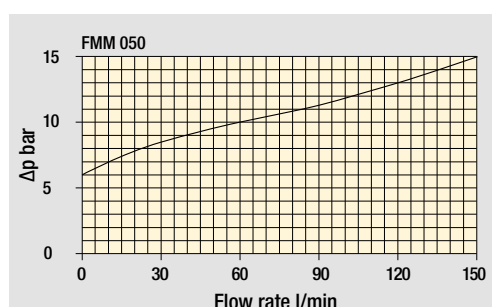
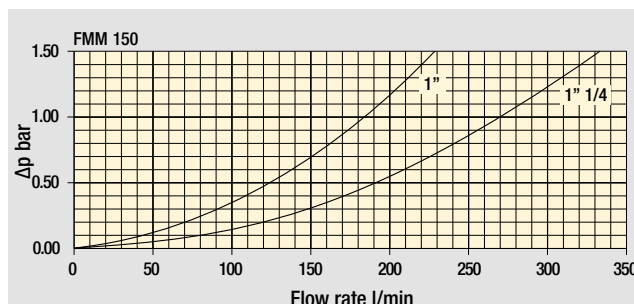
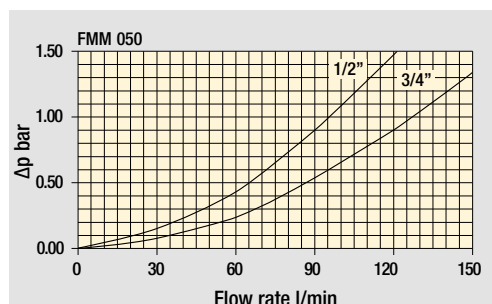
Filter series	Style S	Style B	Style T	Style D
FMM 050	•	•	•	•
FMM 150	•	•	-	-

Pressure drop

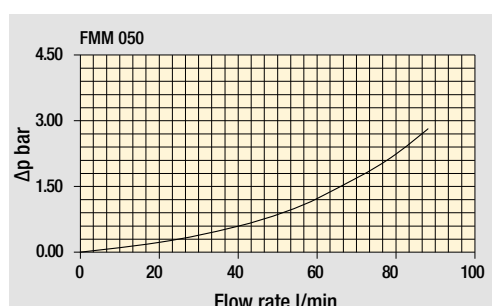
Filter housings

Δp pressure drop



Bypass valve

pressure drop



Filter housing
with check valve

Valves

The curves are plotted using mineral oil with density of 0.86 kg/dm³ in compliance with ISO 3968. Δp varies proportionally with density.

Designation & Ordering code

COMPLETE FILTER

Series and size **FMM050** Configuration example: **FMM050** **3** **B** **A** **G** **A10** **N** **P01**

Length **1** **2** **3** **4** **5**

Valves (see page 481)

S Without bypass
B With bypass 6 bar
T With check valve, without bypass
D With check valve, with bypass 6 bar

Seals
A NBR
V FPM

Connections
A M18x1.5 - ISO 6149
B M22x1.5 - ISO 6149
C G 1/2"
D G 3/4"
E 1/2" NPT
F 3/4" NPT
G SAE 8 - 3/4" - 16 UNF
H SAE 12 - 1 1/16" - 12 UN

Filtration rating (filter media)
A03 Inorganic microfiber 3 µm
A06 Inorganic microfiber 6 µm
A10 Inorganic microfiber 10 µm
A16 Inorganic microfiber 16 µm
A25 Inorganic microfiber 25 µm
M25 Wire mesh 25 µm

Element Δp	Valves			
	S	B	T	D
N 20 bar	-	•	-	-
R 20 bar	-	-	-	•
S 210 bar	•	•	•	•

Executions
P01 Upper connection for clogging indicator
P02 Without connection for clogging indicator
P03 Frontal connection for clogging indicator
Pxx Customized

FILTER ELEMENT

Element series and size **HP050** Configuration example: **HP050** **3** **A10** **A** **N** **P01**

Element length **1** **2** **3** **4** **5**

Filtration rating (filter media)
A03 Inorganic microfiber 3 µm
A06 Inorganic microfiber 6 µm
A10 Inorganic microfiber 10 µm
A16 Inorganic microfiber 16 µm
A25 Inorganic microfiber 25 µm
M25 Wire mesh 25 µm

Seals
A NBR
V FPM

Element Δp
N 20 bar
R 20 bar
S 210 bar

Execution
P01 MP Filtri standard
Pxx Customized

CLOGGING INDICATORS

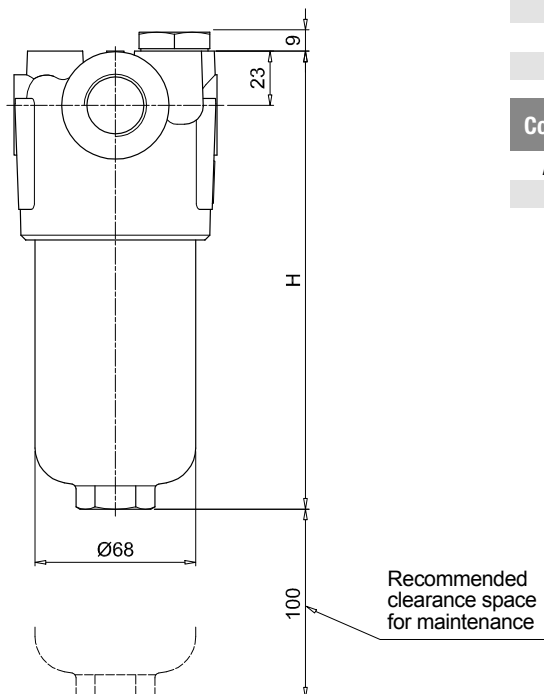
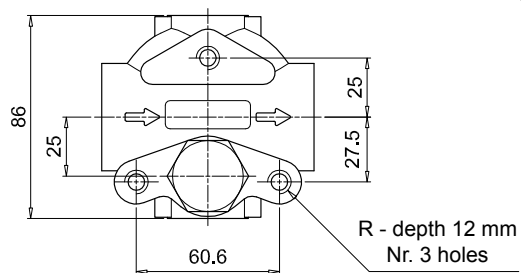
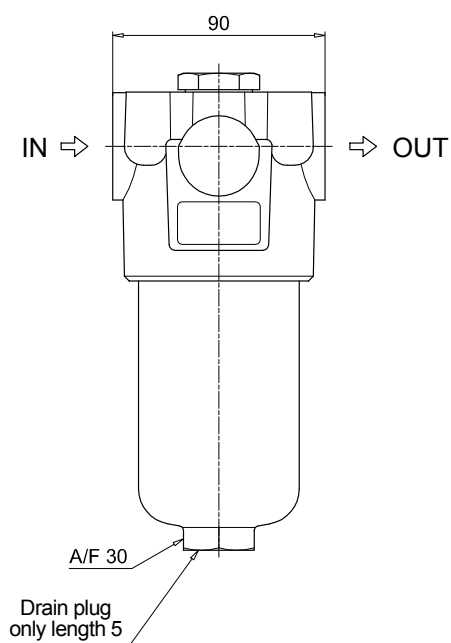
See page 721

DEA Electrical differential pressure indicator	DLE Electrical / visual differential pressure indicator
DEM Electrical differential pressure indicator	DTA Electronic differential pressure indicator
DEU Electrical differential pressure indicator	DVA Visual differential pressure indicator
DLA Electrical / visual differential pressure indicator	DVM Visual differential pressure indicator

PLUGS

See page 741

T2 Plug

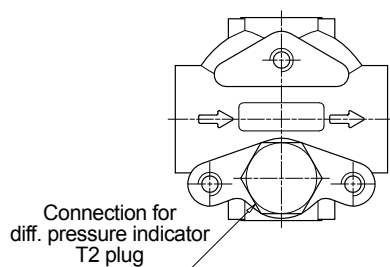


FMMO50

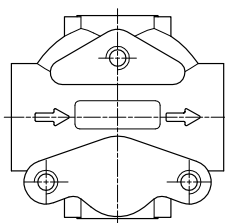
Filter length	H [mm]
1	158
2	195
3	237
4	285
5	407

Connections	R
A-B-C-D	M10
E-F-G-H	3/8" UNC

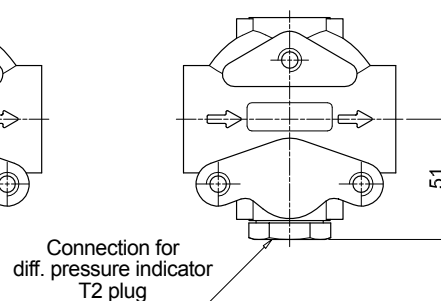
Execution P01



Execution P02



Execution P03



Designation & Ordering code

COMPLETE FILTER

Configuration example: **FMM150** **2** **B** **A** **D** **2** **M25** **N** **P01**

Series and size
FMM150

Length
1 | **2** | **3** |

Valves (see page 481)
S Without bypass
B With bypass 6 bar

Seals
A NBR
V FPM

Connections
C G 1"
D G 1 1/4"
E 1" NPT
F 1 1/4" NPT
G SAE 16 - 1 5/16" - 12 UN
H SAE 20 - 1 5/8" - 12 UN

Connection for differential pressure indicator
1 Without connection
2 Upper connection
3 Frontal connection

Filtration rating (filter media)

A03	Inorganic microfiber	3 µm
A06	Inorganic microfiber	6 µm
A10	Inorganic microfiber	10 µm
A16	Inorganic microfiber	16 µm
A25	Inorganic microfiber	25 µm
M25	Wire mesh	25 µm

Element Δp	Valves	
	S	B
N 20 bar	-	•
S 210 bar	•	•

Execution	
P01	MP Filtri standard
Pxx	Customized

FILTER ELEMENT

Configuration example: **HP150** **2** **M25** **A** **N** **P01**

Element series and size
HP150

Element length
1 | **2** | **3** |

Filtration rating (filter media)

A03	Inorganic microfiber	3 µm
A06	Inorganic microfiber	6 µm
A10	Inorganic microfiber	10 µm
A16	Inorganic microfiber	16 µm
A25	Inorganic microfiber	25 µm
M25	Wire mesh	25 µm

Seals	
A	NBR
V	FPM

Element Δp	
N	20 bar
S	210 bar

Execution	
P01	MP Filtri standard
Pxx	Customized

CLOGGING INDICATORS

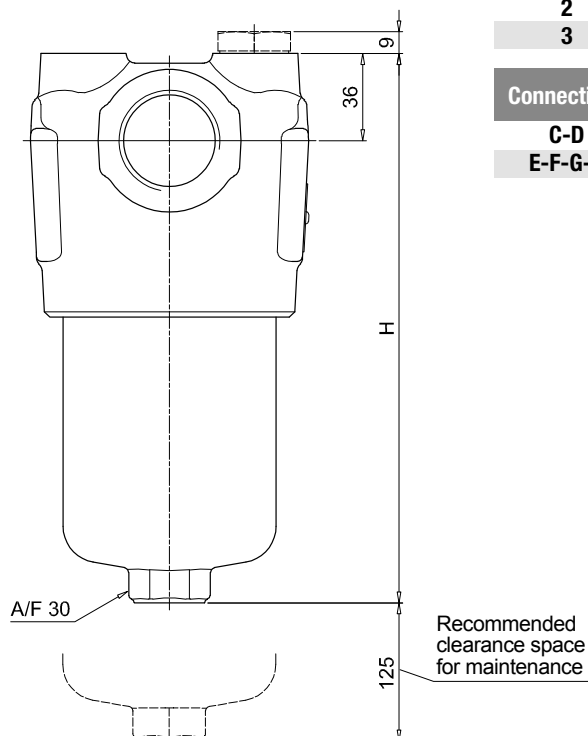
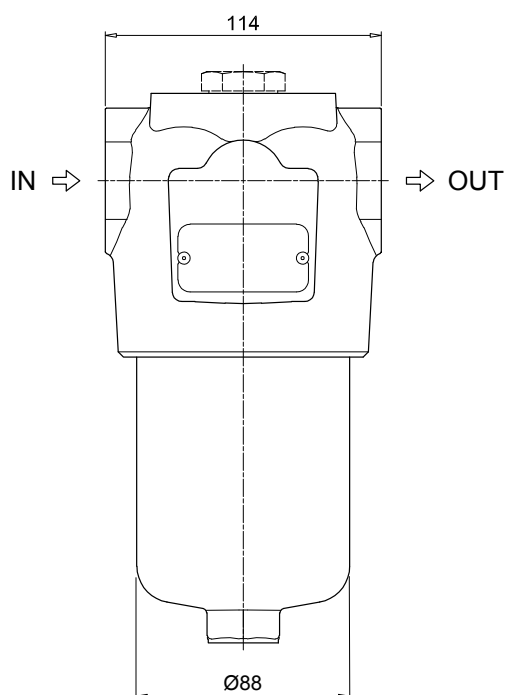
See page 721

DEA Electrical differential pressure indicator	DLE Electrical / visual differential pressure indicator
DEM Electrical differential pressure indicator	DTA Electronic differential pressure indicator
DEU Electrical differential pressure indicator	DVA Visual differential pressure indicator
DLA Electrical / visual differential pressure indicator	DVM Visual differential pressure indicator

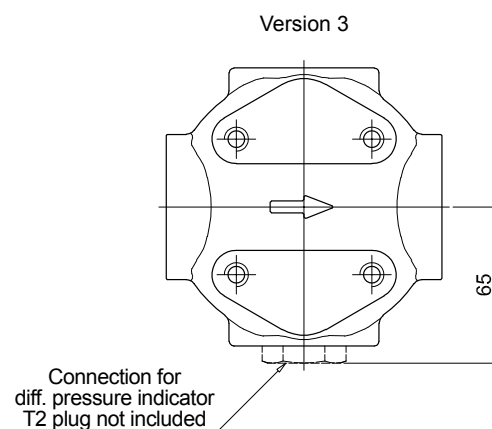
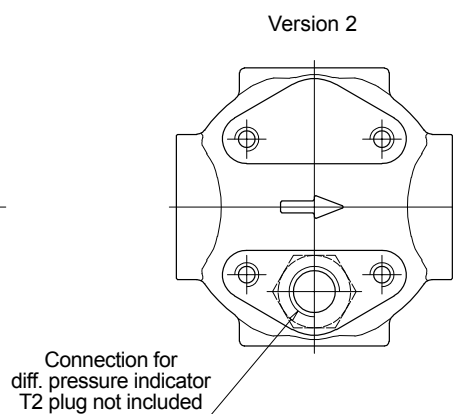
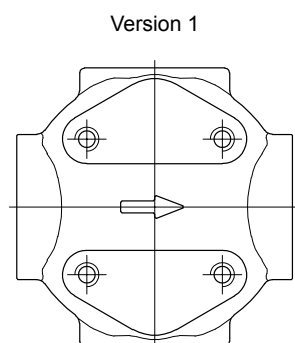
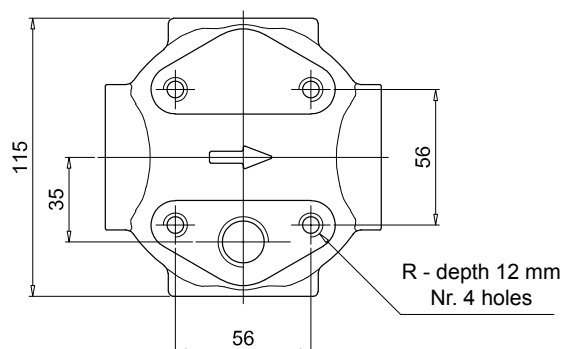
PLUGS

See page 741

T2 Plug (not included)



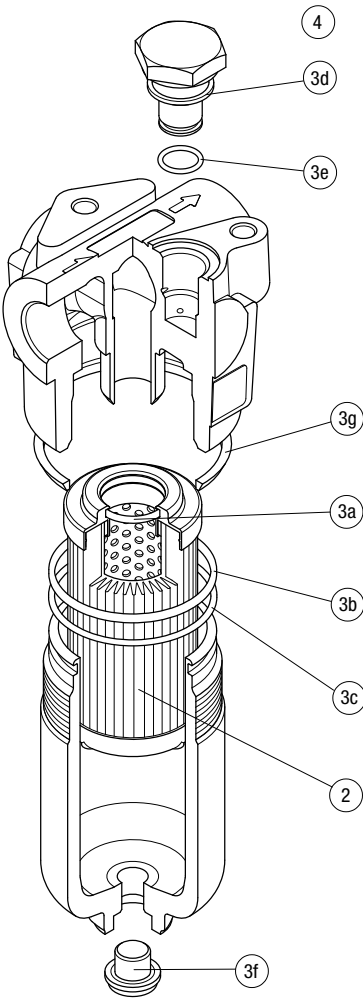
FMM150	
Filter length	H [mm]
1	230
2	340
3	415
Connections	R
C-D	M10
E-F-G-H	3/8" UNC



FMM SPARE PARTS

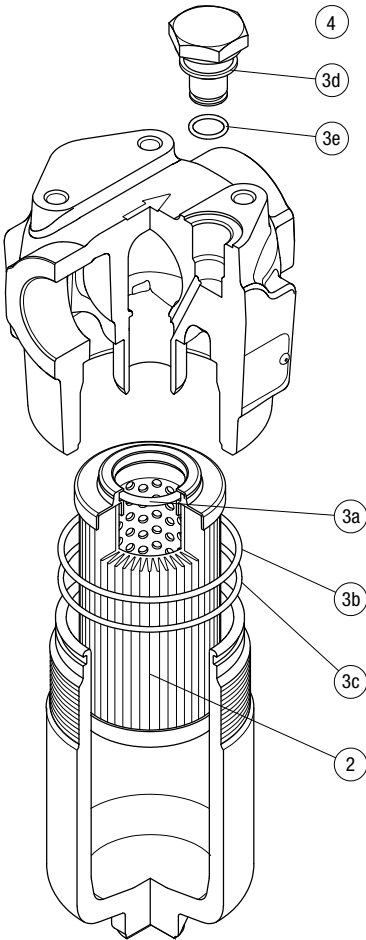
Order number for spare parts

FMM 050



Item:	Q.ty: 1 pc.	Q.ty: 1 pc.	Q.ty: 1 pc.
Filter series	Filter element	Seal Kit code number	Indicator connection plug
FMM 050	See order table	NBR	NBR
		FPM	FPM
		02050314	02050315
		T2H	T2V

FMM 150



Item:	Q.ty: 1 pc.	Q.ty: 1 pc.	Q.ty: 1 pc.
Filter series	Filter element	Seal Kit code number	Indicator connection plug
FMM 150	See order table	NBR	NBR
		FPM	FPM
		02050731	T2H
		02050732	T2V

FHA 051 series

Maximum working pressure up to 56 MPa (560 bar) - Flow rate up to 150 l/min



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FHA 051 GENERAL INFORMATION

Description

High Pressure filters

In-line

Maximum working pressure up to 56 MPa (560 bar)

Flow rate up to 150 l/min

FHA is a range of high pressure filter for protection of sensitive components in high pressure hydraulic systems in the mobile machines. They are directly connected to the lines of the system through the hydraulic fittings.

Available features:

- Female threaded connections up to 3/4", for a maximum flow rate of 150 l/min
- Fine filtration rating, to get a good cleanliness level into the system
- Bypass valve, to relieve excessive pressure drop across the filter media
- Check valve, to protect the system against reverse flow
- Reverse flow valve, to allow bidirectional flow through the filter housing. The back flow is not filtered
- Low collapse filter element "N", for use with filters provided with bypass valve
- Low collapse filter element with external support "R", for filter element protection against the back pressure caused by the check valve or the reverse flow in filters provided with the bypass valve
- High collapse filter element with external support "S", for filter element protection against the back pressure caused by the check valve or the reverse flow in filters not provided with the bypass valve
- Visual, electrical and electronic differential clogging indicators

Common applications:

Delivery lines, in any heavy duty industrial equipment or mobile machines

Technical data

Filter housing materials

- Head: Steel (chemical heat treatment)
- Housing: Steel (chemical heat treatment)
- Bypass valve: Steel

Pressure

- Test pressure: 84 MPa (840 bar)
- Min. Burst pressure: 168 MPa (1680 bar)
- Pulse pressure fatigue test: 1 00 000 cycles with pressure from 0 to 56 MPa (560 bar)

Bypass valve

- Opening pressure 0.6 MPa (6 bar) $\pm 10\%$
- Other opening pressures on request.

Filter element features

Filter FHA 051		Filter element HP	
Δp Element type			
Element media	Construction	Δp Series	Δp
A - Microfiber	Standard	N	20 bar
	With external support	R	20 bar
	High Δp with external support	S	210 bar
M - Wire mesh	Standard	N	20 bar
Please see ordering code tables to check element Δp series availability based on filter features.			
Flow direction through the filter element: From OUT to IN			

Seals

- Standard NBR series A
- Optional FPM series V

Temperature

From -25 °C to +110 °C

Connections

In-line Inlet/Outlet

Note

FHA filters are provided for vertical mounting

Weights [kg] and volumes [dm³]

Filter series	Weights [kg]					Volumes [dm³]						
	Length	1	2	3	4	5	Length	1	2	3	4	5
FHA 051		3.28	3.65	4.06	4.54	5.74		0.33	0.47	0.62	0.79	1.23

Flow rates [l/min]

Filter series	Length	Filter element design - N Series						Filter element design - R Series					Filter element design - S Series				
		A03	A06	A10	A16	A25	M25	A03	A06	A10	A16	A25	A03	A06	A10	A16	A25
FHA 051	1	42	41	82	85	110	156	42	41	82	85	110	30	40	58	60	76
	2	53	58	87	100	127	158	53	58	87	100	127	45	50	78	91	120
	3	68	71	101	111	137	160	68	71	101	111	137	59	62	92	103	131
	4	86	92	118	121	142	162	86	92	118	121	142	77	83	110	113	137
	5	112	115	137	142	150	165	112	115	137	142	150	96	99	116	128	147

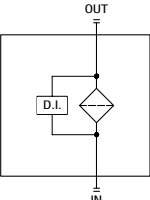
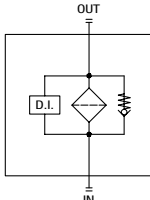
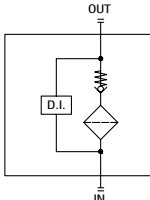
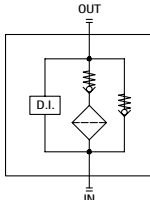
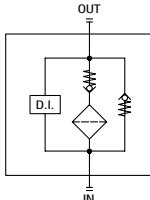
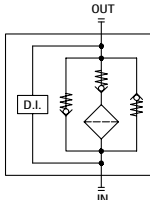
Maximum flow rate for a complete pressure filter with a pressure drop $\Delta p = 1.5$ bar.

The reference fluid has a kinematic viscosity of 30 mm²/s (cSt) and a density of 0.86 kg/dm³.

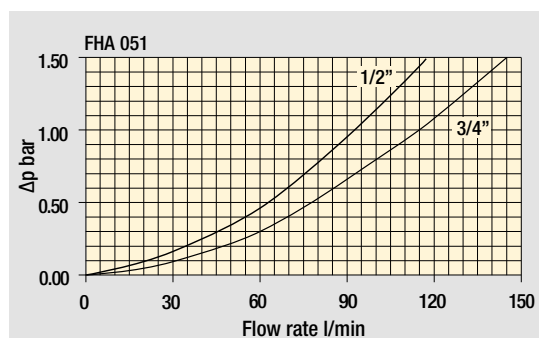
For different pressure drop or fluid viscosity we recommend to use our selection software available on www.mpfiltri.com.

You can also calculate the right size using the formulas present on the FILTER SIZING paragraph at the beginning of the full catalogue or at the beginning of the filter family brochure. Please, contact our Sales Department for further additional information.

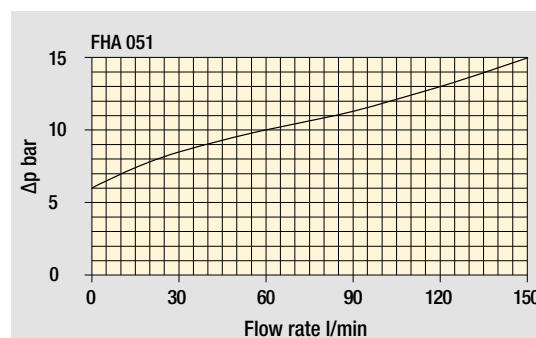
Hydraulic symbols

Filter series	Style S	Style B	Style T	Style D	Style V	Style Z
FHA 051	•	•	•	•	•	•
						

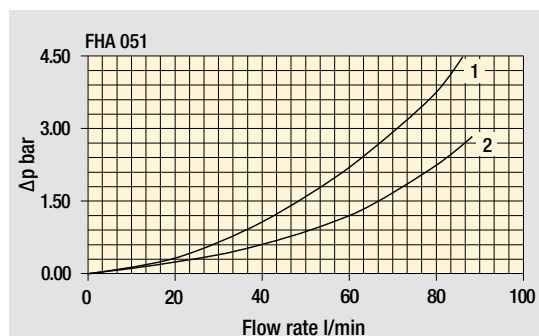
Pressure drop



Filter housings
 Δp pressure drop



Bypass valve
pressure drop



Pressure drop in reverse flow valves

- 1 - Reverse flow
- 2 - In filter direction

The curves are plotted using mineral oil with density of 0.86 kg/dm³ in compliance with ISO 3968. Δp varies proportionally with density.

FHA 051

Designation & Ordering code

COMPLETE FILTER

Series and size **FHA051** Configuration example: **FHA051** **3** **B** **A** **G** **A10** **N** **P01**

Length **1** **2** **3** **4** **5**

Valves
S Without bypass
B With bypass 6 bar
T With check valve, without bypass
D With check valve, with bypass 6 bar
V With reverse flow, without bypass
Z With reverse flow, with bypass 6 bar

Seals
A NBR
V FPM

Connections
A M18x1.5 - ISO 6149
B M22x1.5 - ISO 6149
C G 1/2"
D G 3/4"
E 1/2" NPT
F 3/4" NPT
G SAE 8 - 3/4" - 16 UNF
H SAE 12 - 1 1/16" - 12 UN

Filtration rating (filter media)
A03 Inorganic microfiber 3 µm
A06 Inorganic microfiber 6 µm
A10 Inorganic microfiber 10 µm
A16 Inorganic microfiber 16 µm
A25 Inorganic microfiber 25 µm
M25 Wire mesh 25 µm

Element Δp	S	B	T	D	V	Z
N 20 bar	-	•	-	-	-	-
R 20 bar	-	-	-	•	-	•
S 210 bar	•	-	•	-	•	-

Execution
P01 Upper connection for clogging indicator
P02 Without connection for clogging indicator
P03 Frontal connection for clogging indicator
Pxx Customized

FILTER ELEMENT

Element series and size **HP050** Configuration example: **HP050** **3** **A10** **A** **N** **P01**

Element length **1** **2** **3** **4** **5**

Filtration rating (filter media)
A03 Inorganic microfiber 3 µm
A06 Inorganic microfiber 6 µm
A10 Inorganic microfiber 10 µm
A16 Inorganic microfiber 16 µm
A25 Inorganic microfiber 25 µm
M25 Wire mesh 25 µm

Seals
A NBR
V FPM

Element Δp
N 20 bar
R 20 bar
S 210 bar

Execution
P01 MP Filtri standard
Pxx Customized

To be installed for working pressures up to 420 bar max

CLOGGING INDICATORS

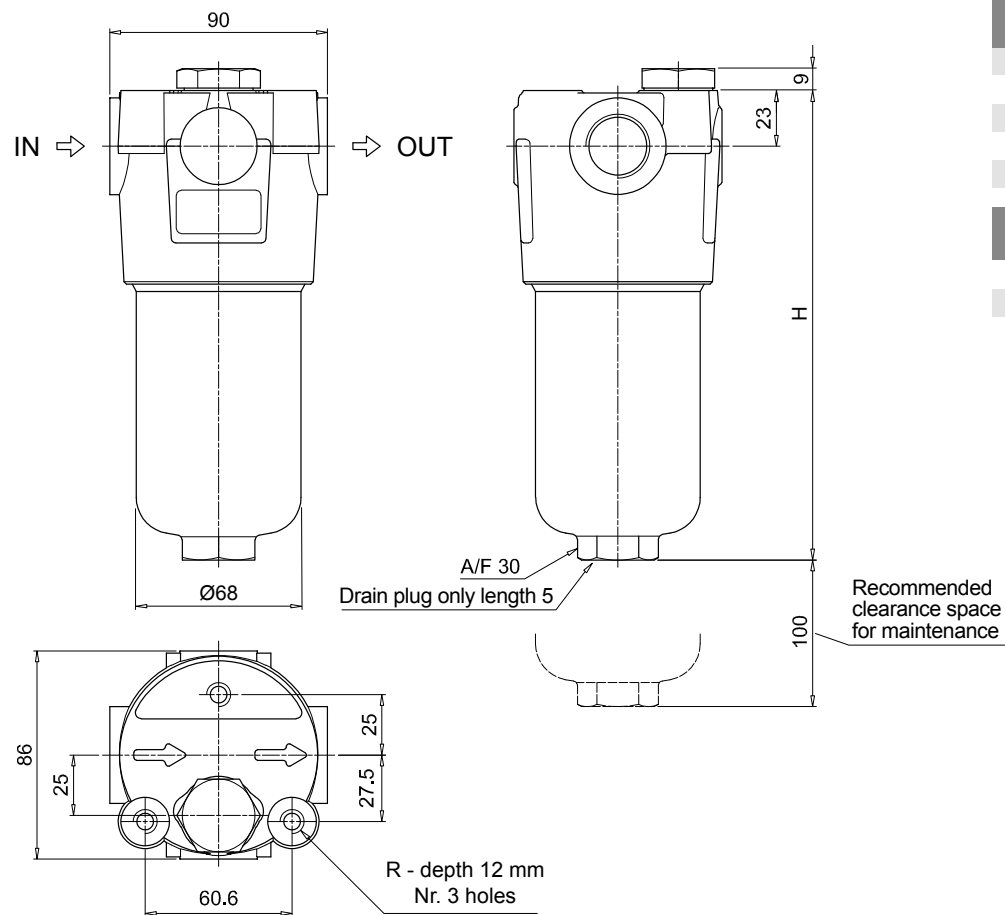
See page 721

DEA Electrical differential pressure indicator	DLE Electrical / visual differential pressure indicator
DEM Electrical differential pressure indicator	DTA Electronic differential pressure indicator
DEU Electrical differential pressure indicator	DVA Visual differential pressure indicator
DLA Electrical / visual differential pressure indicator	DVM Visual differential pressure indicator

PLUGS

See page 741

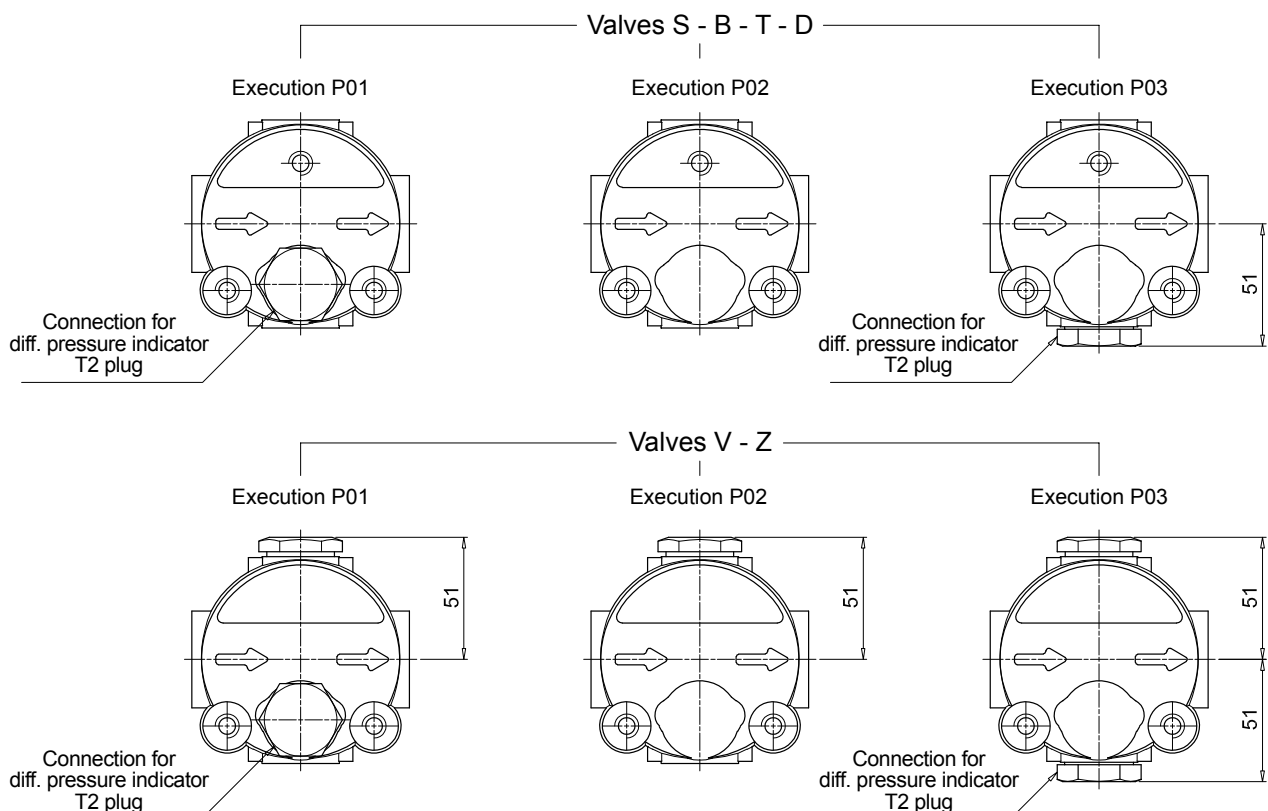
T2 Plug (not included)



FHA051

Filter length	H [mm]
1	158
2	195
3	237
4	285
5	407

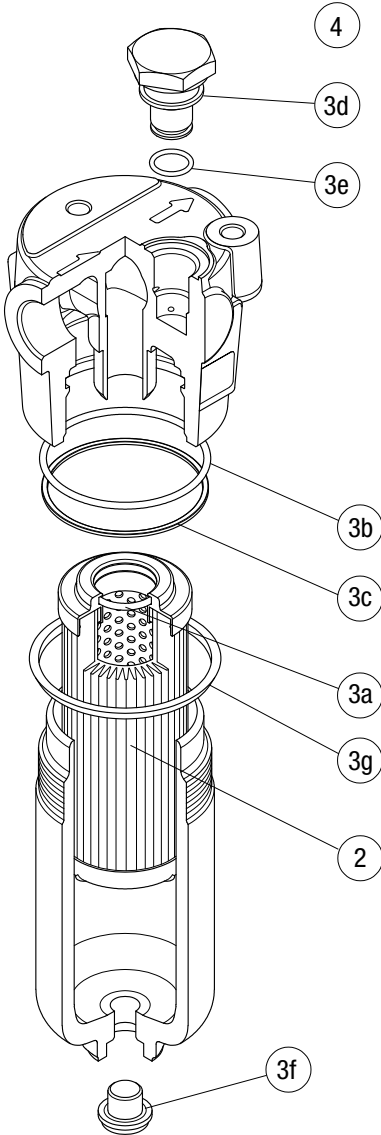
Connections	R
A-B-C-D	M10
E-F-G-H	3/8" UNC



FHA 051 SPARE PARTS

Order number for spare parts

FHA 051



Item:	Q.ty: 1 pc.	Q.ty: 1 pc.		Q.ty: 1 pc.	
	2	3	(3a ÷ 3g)	4	
Filter series	Filter element	Seal Kit code number		Indicator connection plug	
		NBR	FPM	NBR	FPM
FHA 051	See order table	02050288	02050305	T2H	T2V

FMP 039 series

Maximum working pressure up to 11 MPa (110 bar) - Flow rate up to 80 l/min



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FMP 039 GENERAL INFORMATION

Description

High Pressure filters

In-line

Maximum working pressure up to 11 MPa (110 bar)

Flow rate up to 80 l/min

FMP039 is a range of versatile medium pressure filter for transmission, protection of sensitive components in medium pressure hydraulic systems and filtration of the coolant into the machine tools.

They are directly connected to the lines of the system through the hydraulic fittings.

Available features:

- 1/2" female threaded connections, for a maximum flow rate of 80 l/min
- Fine filtration rating, to get a good cleanliness level into the system
- Bypass valve, to relieve excessive pressure drop across the filter media
- Low collapse filter element "N"
- Visual, electrical and electronic differential clogging indicators

Common applications:

Delivery lines, in any medium pressure industrial equipment or mobile machines

Technical data

Filter housing materials

- Head: Anodized aluminium
- Housing: Anodized aluminium
- Bypass valve: Steel

Pressure

- Test pressure: 16.5 MPa (165 bar)
- Min. Burst pressure: 33 MPa (330 bar)
- Pulse pressure fatigue test: 1 000 000 cycles with pressure from 0 to 11 MPa (110 bar)

Bypass valve

- Opening pressure 0.6 MPa (6 bar) $\pm 10\%$
- Other opening pressures on request.

Filter element features

Filter FMP 039		Filter element HP	
Δp Element type			
Element media	Construction	Δp Series	Δp
A - Microfiber	Standard	N	20 bar
M - Wire mesh	Standard	N	20 bar
Please see ordering code tables to check element Δp series availability based on filter features.			
Flow direction through the filter element: From OUT to IN			

Seals

- Standard NBR series A
- Optional FPM series V

Temperature

From -25 °C to +110 °C

Connections

In-line Inlet/Outlet

Note

FMP 039 filters are provided for vertical mounting

Weights [kg] and volumes [dm³]

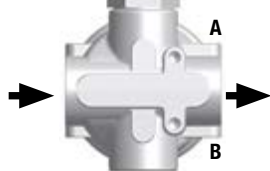
Filter series	Weights [kg]				Volumes [dm ³]			
	Length	2	3	4	Length	2	3	4
FMP 039		0.60	0.70	0.80		0.19	0.26	0.34

Executions

Execution 1:
without indicator connection



Execution 6
double indicator connection (A - B)

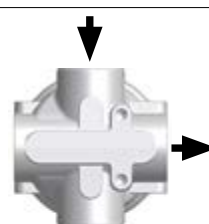
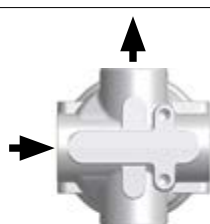
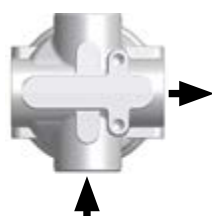
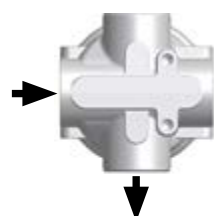


A:
Closure cap with standard T2 steel. The position of the cap is reversible.

B:
Standard closure cap with plastic thread protection.

If necessary, a second T2 plug is available, see ordering information.

Special connections on request



Flow rates [l/min]

Filter series	Length	Filter element design - N Series					
		A03	A06	A10	A16	A25	M25
FMP 039	2	20	26	45	52	61	97
	3	35	39	56	64	76	98
	4	44	48	66	71	82	92

Maximum flow rate for a complete pressure filter with a pressure drop $\Delta p = 1.5$ bar.

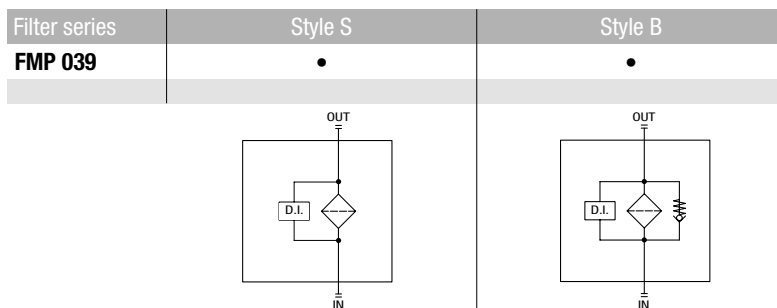
The reference fluid has a kinematic viscosity of 30 mm²/s (cSt) and a density of 0.86 kg/dm³.

For different pressure drop or fluid viscosity we recommend to use our selection software available on www.mpfiltri.com.

You can also calculate the right size using the formulas present on the FILTER SIZING paragraph at the beginning of the full catalogue or at the beginning of the filter family brochure.

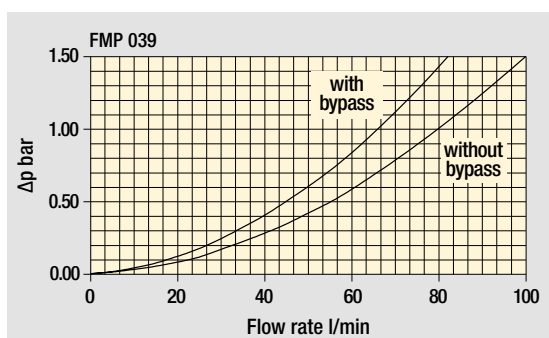
Please, contact our Sales Department for further additional information.

Hydraulic symbols

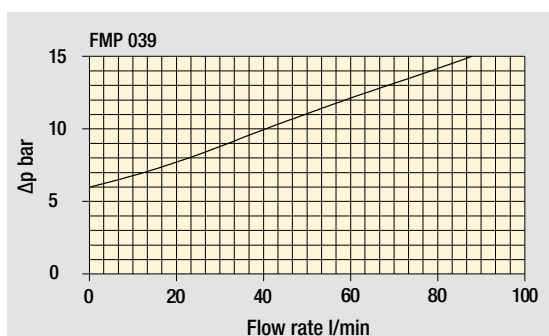


Pressure drop

Filter housings Δp pressure drop



Bypass valve pressure drop



The curves are plotted using mineral oil with density of 0.86 kg/dm³ in compliance with ISO 3968. Δp varies proportionally with density.

Designation & Ordering code

Series and size		Configuration example: FMP039									
FMP039		3	B	A	B	6	A03	N	P01		
Length											
2	3	4									
Valves											
S	Without bypass										
B	With bypass 6 bar										
Seals											
A	NBR										
V	FPM										
Connections											
A	G 1/2"										
B	1/2" NPT										
C	SAE 8 - 3/4" - 16 UNF										
Connection for differential pressure indicator											
1	Without connections										
6	With two connections on both sides										
Filtration rating (filter media)											
A03	Inorganic microfiber	3 µm	A16	Inorganic microfiber	16 µm						
A06	Inorganic microfiber	6 µm	A25	Inorganic microfiber	25 µm						
A10	Inorganic microfiber	10 µm	M25	Wire mesh	25 µm						

Element Δp	Execution
N 20 bar	P01 MP Filtri standard
	Pxx Customized

Element series and size
HP039

Configuration example: HP039

3

A03

A

N

P01

Element length
2 | 3 | 4 |

Filtration rating (filter media)

A03	Inorganic microfiber	3 µm
A06	Inorganic microfiber	6 µm
A10	Inorganic microfiber	10 µm
A16	Inorganic microfiber	16 µm
A25	Inorganic microfiber	25 µm
M25	Wire mesh	25 µm

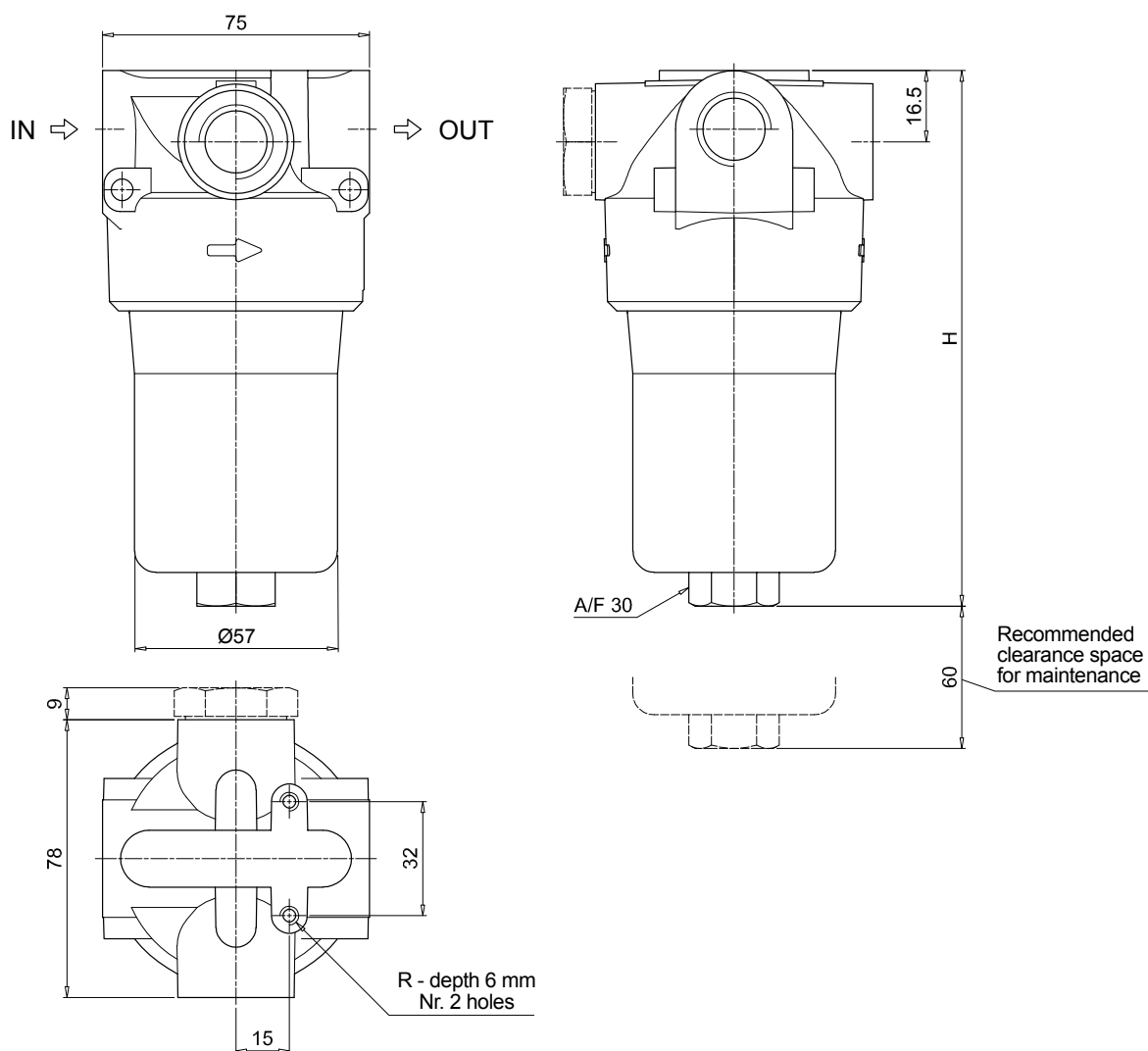
Element Δp	Execution
N 20 bar	P01 MP Filtri standard
	Pxx Customized

See page 721

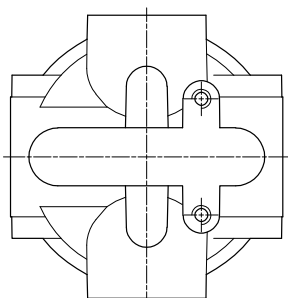
DEA	Electrical differential pressure indicator	DLE	Electrical / visual differential pressure indicator
DEM	Electrical differential pressure indicator	DTA	Electronic differential pressure indicator
DEU	Electrical differential pressure indicator	DVA	Visual differential pressure indicator
DLA	Electrical / visual differential pressure indicator	DVM	Visual differential pressure indicator

See page 741

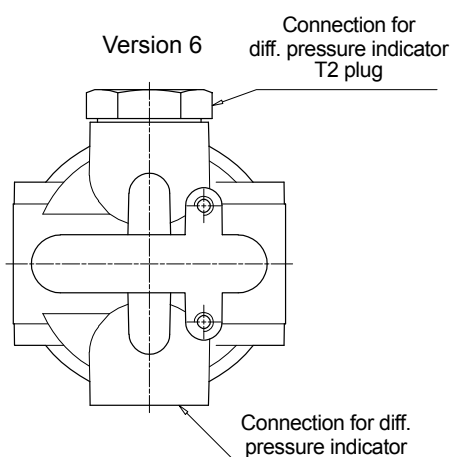
T2 Plug (not included)



Version 1



Version 6



The position of the T2 plug is reversible

FMP039

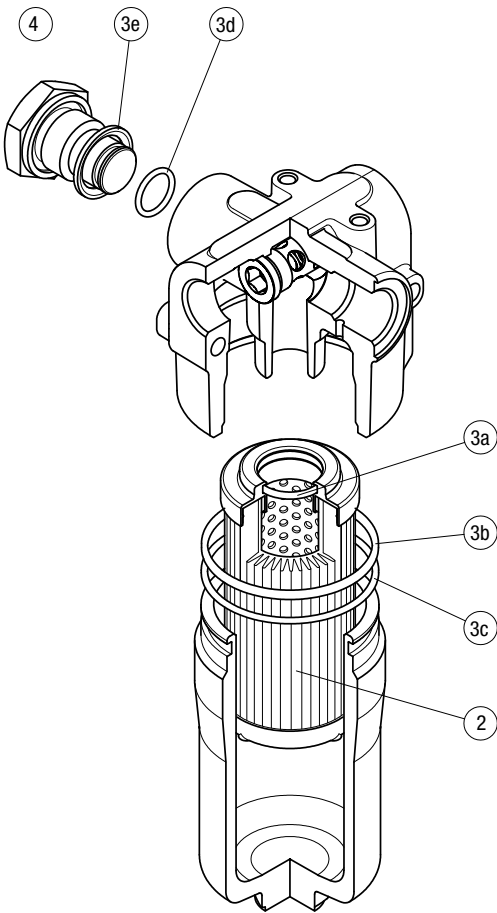
Filter length	H [mm]
2	151
3	194
4	238

Connections	R
A	M6
B - C	1/4" UNC

FMP 039 SPARE PARTS

Order number for spare parts

FMP 039



Q.ty: 1 pc.		Q.ty: 1 pc.	
Item:	2	3	(3a ÷ 3e)
Filter series	Filter element	Seal Kit code number	
		NBR	FPM
FMP 039	See order table	02050509	02050510

FMP series

Maximum working pressure up to 32 MPa (320 bar) - Flow rate up to 500 l/min



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FMP065



FMP135



FMP320

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Description

Technical data

High Pressure filters

In-line

Maximum working pressure up to 32 MPa (320 bar)

Flow rate up to 500 l/min

FMP is a range of versatile high pressure filter for protection of sensitive components in high pressure hydraulic systems in the industrial equipment.

They are directly connected to the lines of the system through the hydraulic fittings.

Available features:

- Female threaded connections up to 1 1/2" and flanged connections up to 1 1/2", for a maximum flow rate of 500 l/min
- Fine filtration rating, to get a good cleanliness level into the system
- Bypass valve, to relieve excessive pressure drop across the filter media
- Check valve, to protect the system against reverse flow
- Low collapse filter element "N", for use with filters provided with bypass valve
- High collapse filter element "H", for use with filters not provided with bypass valve
- Low collapse filter element with external support "R", for filter element protection against the back pressure caused by the check valve in filters provided with the bypass valve
- High collapse filter element with external support "S", for filter element protection against the back pressure caused by the check valve in filters not provided with the bypass valve
- Visual, electrical and electronic differential clogging indicators

Common applications:

Delivery lines, in any high pressure industrial equipment or mobile machines

Filter housing materials

- Head: Phosphatized cast iron
- Housing: Phosphatized steel
- Bypass valve: Brass
- Reverse Flow: Steel (only for series FMP 320)
- Check valve: Steel

Pressure

- Test pressure: 48 MPa (480 bar)
- Min. Burst pressure: 96 MPa (960 bar)
- Pulse pressure fatigue test: 1 000 000 cycles with pressure from 0 to 32 MPa (320 bar)

Bypass valve

- Opening pressure 0.6 MPa (6 bar) $\pm 10\%$
- Other opening pressures on request.

Filter element features

Filter FMP		Filter element HP	
Δp Element type			
Element media	Construction	Δp Series	Δp
A - Microfiber	Standard	N	20 bar
	With external support	R	20 bar
	High Δp	H	210 bar
	High Δp with external support	S	210 bar
M - Wire mesh	Standard	N	20 bar
Please see ordering code tables to check element Δp series availability based on filter features.			
Flow direction through the filter element: From OUT to IN			

Seals

- Standard NBR series A
- Optional FPM series V

Temperature

From -25 °C to +110 °C

Note

FMP filters are provided for vertical mounting

Connections

In-line Inlet/Outlet

Weights [kg] and volumes [dm³]

Filter series	Weights [kg]					Volumes [dm³]				
	Length	1	2	3	4	Length	1	2	3	4
FMP 065		3.26	3.62	4.83	-		0.36	0.47	0.84	-
FMP 135		5.61	7.21	8.27	-		0.45	0.78	1.00	-
FMP 320		10.95	13.08	15.37	17.85		1.03	1.75	2.52	3.35

Flow rates [l/min]

Filter series	Length	Filter element design - N Series					
		A03	A06	A10	A16	A25	M25
FMP 065	1	23	30	48	54	72	105
	2	31	45	60	65	82	106
	3	52	60	80	84	94	108
FMP 135	1	69	73	120	129	171	201
	2	110	117	149	152	211	232
	3	151	152	192	195	212	233
FMP 320	1	130	144	244	296	361	477
	2	267	291	417	438	492	509
	3	348	390	476	493	503	519
	4	389	415	483	502	525	534

Maximum flow rate for a complete pressure filter with a pressure drop $\Delta p = 1.5$ bar.

The reference fluid has a kinematic viscosity of 30 mm²/s (cSt) and a density of 0.86 kg/dm³.

For different pressure drop or fluid viscosity we recommend to use our selection software available on www.mpfiltri.com.

You can also calculate the right size using the formulas present on the FILTER SIZING paragraph at the beginning of the full catalogue or at the beginning of the filter family brochure. Please, contact our Sales Department for further additional information.

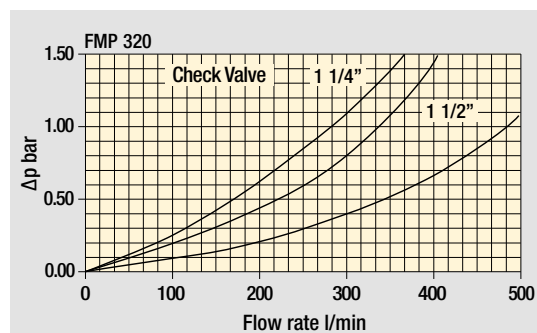
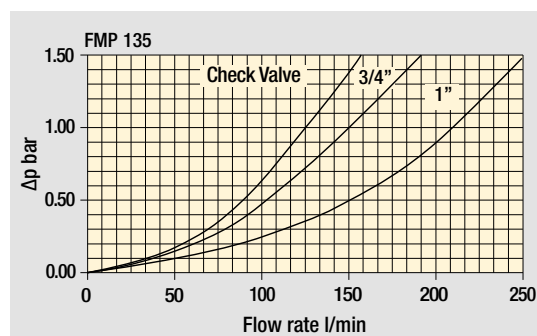
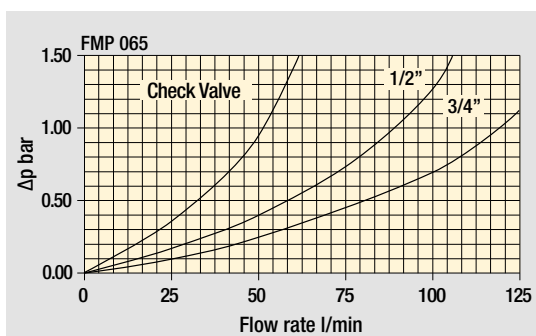
Hydraulic symbols

Filter series	Style S - E	Style B - C	Style T	Style D
FMP 065	•	•	•	•
FMP 135	•	•	•	•
FMP 320	•	•	•	•

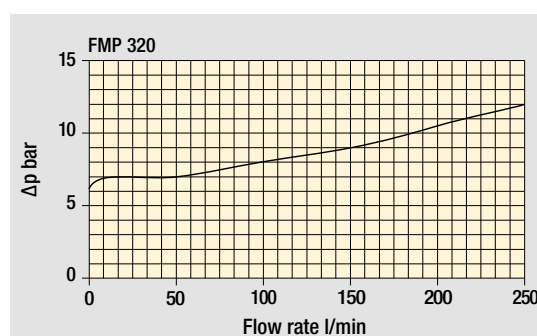
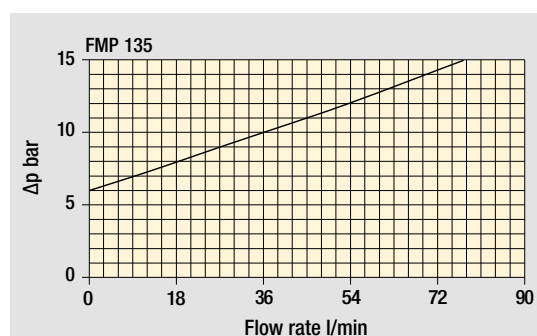
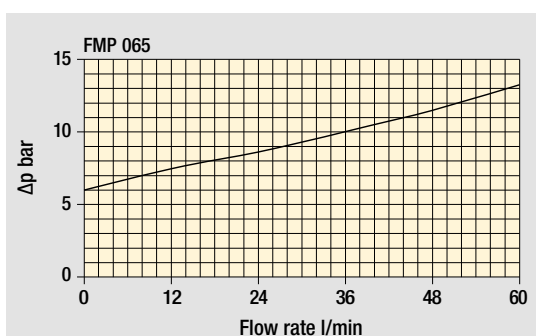
FMP GENERAL INFORMATION

Pressure drop

Filter housings Δp pressure drop



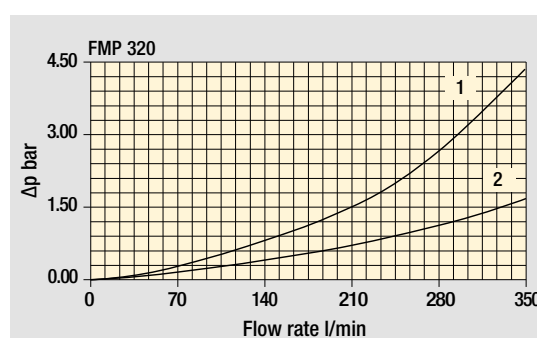
Bypass valve pressure drop



Valves

Filter housing with check valve

- 1 - Reverse flow
- 2 - In filter direction



The curves are plotted using mineral oil with density of 0.86 kg/dm³ in compliance with ISO 3968. Δp varies proportionally with density.

FMP FMP065 - FMP135 - FMP320

Designation & Ordering code

COMPLETE FILTER

Series and size				Configuration example: FMP065 3 T A G1 M25 S P01											
FMP065 FMP135 FMP320															
Length	FMP065	FMP135	FMP320												
1	•	•	•												
2	•	•	•												
3	•	•	•												
4	-	-	•												
Valves															
S		Without bypass		C		With bypass 6 bar, plug on the opposite side									
E		Without bypass, plug on the opposite side		T		With check valve, without bypass									
B		With bypass 6 bar		D		With check valve, with bypass									
Seals															
A		NBR		V		FPM									
Connections	FMP065		FMP135	FMP320											
G1	G 1/2"		G 3/4"	G 1 1/4"											
G2	G 3/4"		G 1"	G 1 1/2"											
G3	1/2" NPT		3/4" NPT	1 1/4" NPT											
G4	3/4" NPT		1" NPT	1 1/2" NPT											
G5	SAE 8 - 3/4" - 16 UNF		SAE 12 - 1 1/16" - 12 UN	SAE 20 - 1 5/8" - 12 UN											
G6	SAE 12 - 1 1/16" - 12 UN		SAE 16 - 1 5/16" - 12 UN	SAE 24 - 1 7/8" - 12 UN											
F1	-		3/4" SAE 3000 psi/M	1 1/4" SAE 3000 psi/M											
F2	-		1" SAE 3000 psi/M	1 1/2" SAE 3000 psi/M											
F3	-		3/4" SAE 3000 psi/UNC	1 1/4" SAE 3000 psi/UNC											
F4	-		1" SAE 3000 psi/UNC	1 1/2" SAE 3000 psi/UNC											
Filtration rating (filter media)															
A03	Inorganic microfiber	3 µm													
A06	Inorganic microfiber	6 µm													
A10	Inorganic microfiber	10 µm													
A16	Inorganic microfiber	16 µm													
A25	Inorganic microfiber	25 µm													
M25	Wire mesh	25 µm													
			Valves						Filter length						
Element Δp	S	E	B	C	T	D									
N 20 bar	-	-	•	•	-	-									
R 20 bar	-	-	-	-	-	•									
H 210 bar	•	•	-	-	-	-									
S 210 bar	-	-	-	-	•	-									
Execution							1	2	3	4					
P01 MP Filtri standard							•	•	•	•					
P02 Maintenance from the bottom of the housing							-	-	-	•					
Pxx Customized							-	-	-	-					

FILTER ELEMENT

Element series and size				Configuration example: HP065 3 M25 A S P01					
HP065 HP135 HP320									
Element length	HP065	HP135	HP320						
1	•	•	•						
2	•	•	•						
3	•	•	•						
4	-	-	•						
Filtration rating (filter media)				Seals		Element Δp		Execution	
A03	Inorganic microfiber	3 μm		A	NBR	N	20 bar	P01	MP Filtri standard
A06	Inorganic microfiber	6 μm		V	FPM	R	20 bar	Pxx	Customized
A10	Inorganic microfiber	10 μm				H	210 bar		
A16	Inorganic microfiber	16 μm				S	210 bar		
A25	Inorganic microfiber	25 μm							
M25	Wire mesh	25 μm							

CLOGGING INDICATORS

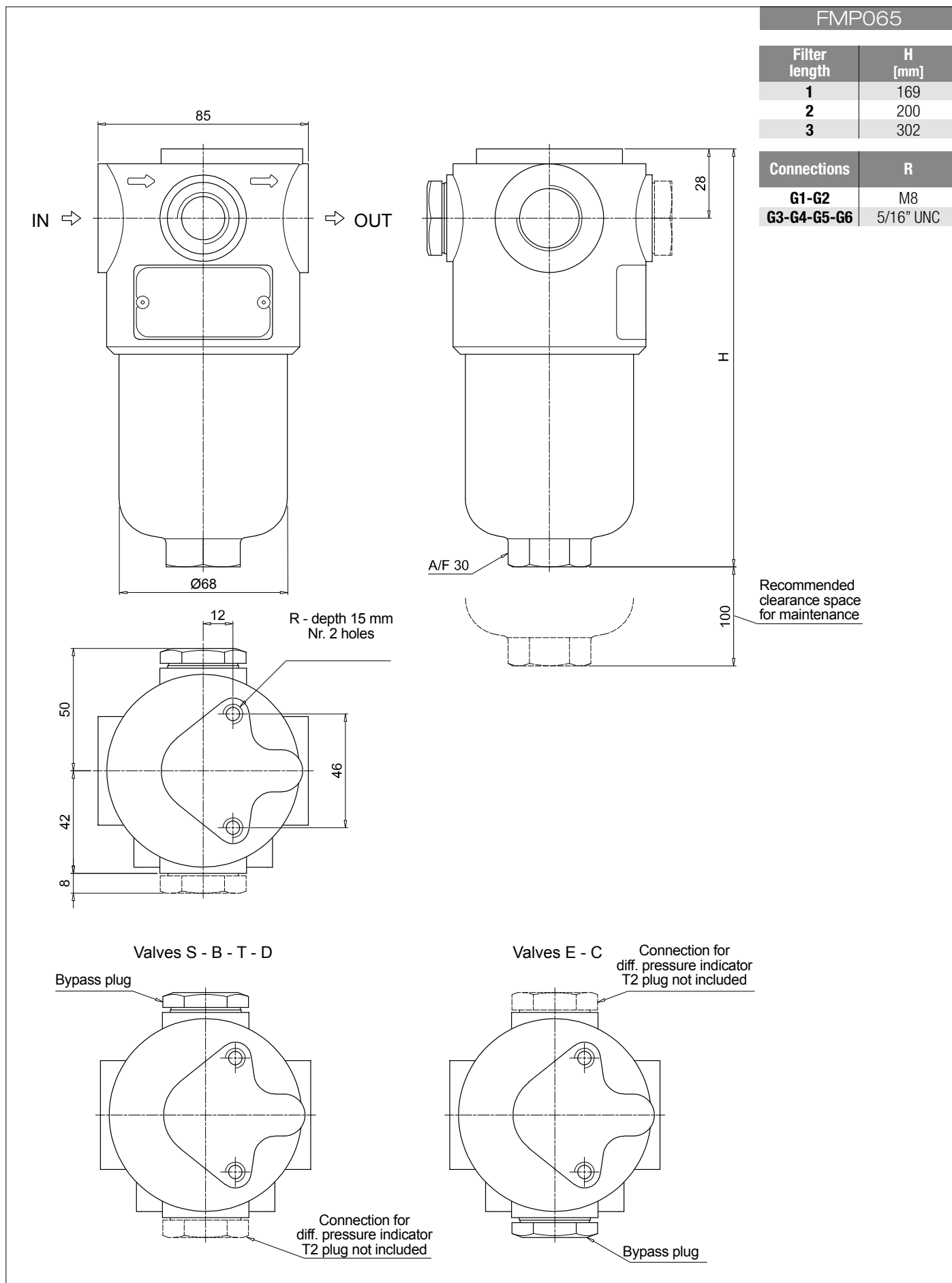
See page 721

DEA Electrical differential pressure indicator	DLE Electrical / visual differential pressure indicator
DEM Electrical differential pressure indicator	DTA Electronic differential pressure indicator
DEU Electrical differential pressure indicator	DVA Visual differential pressure indicator
DLA Electrical / visual differential pressure indicator	DVM Visual differential pressure indicator

PLUGS

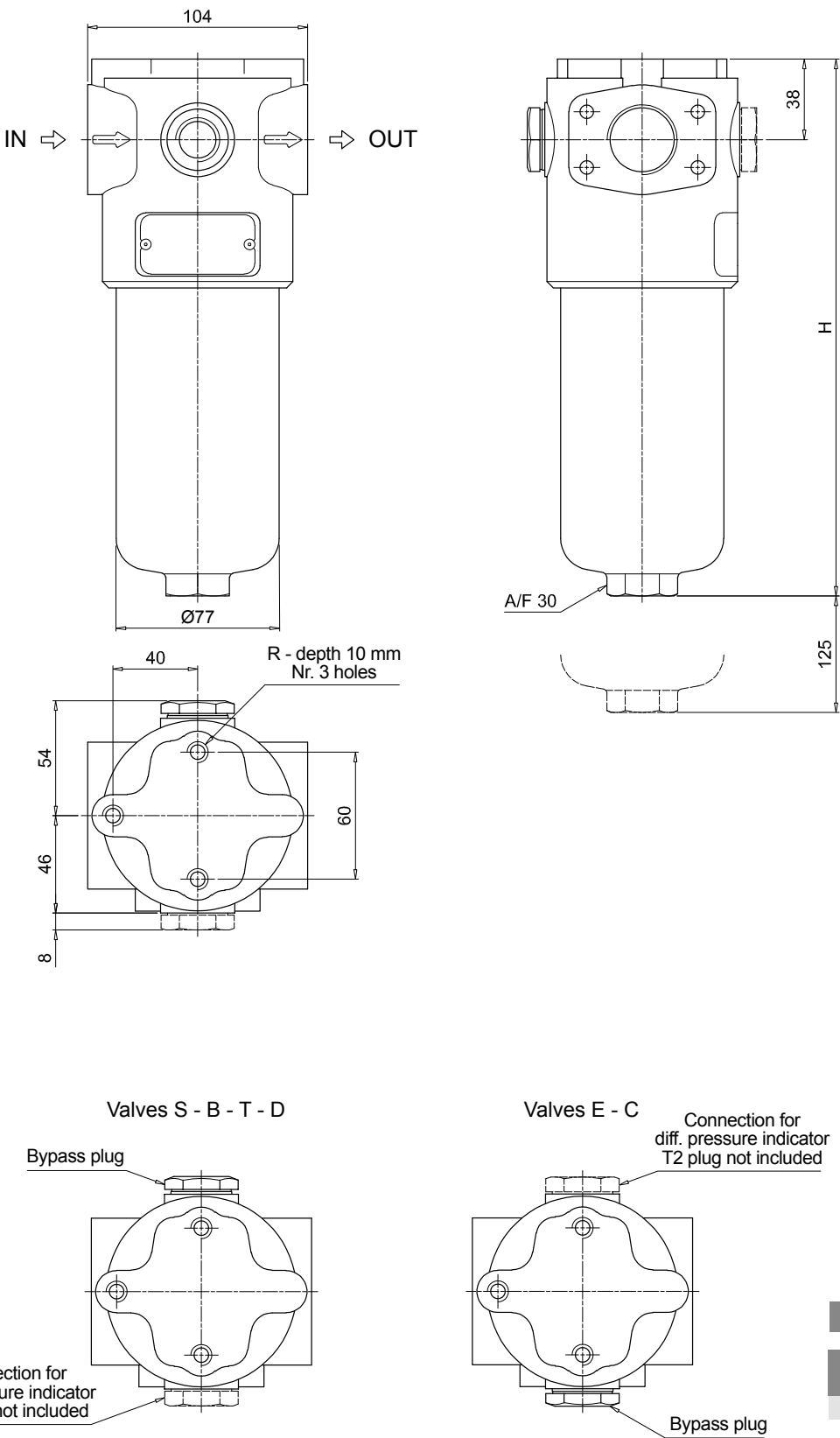
See page 741

T2 Plug (not included)

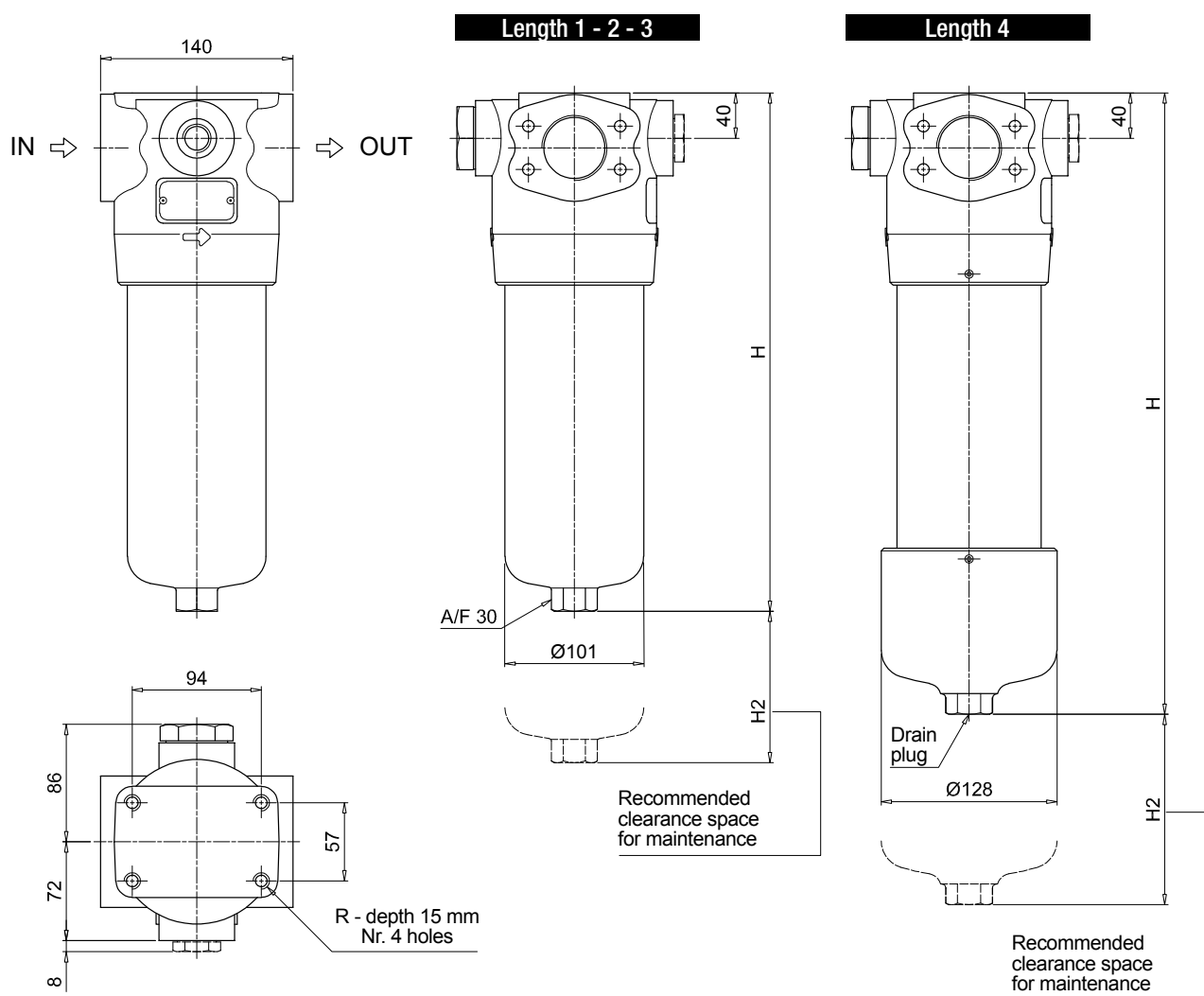


FMP FMP065 - FMP135 - FMP320

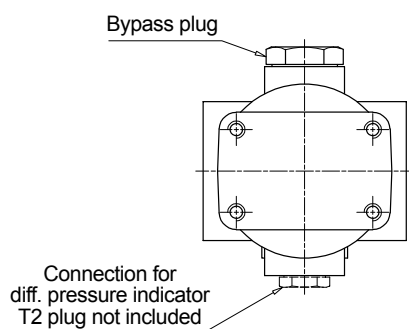
Dimensions



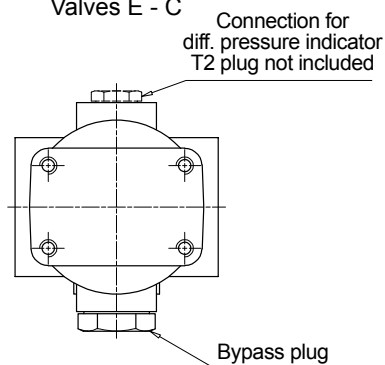
FMP135	
Filter length	H [mm]
1	221
2	334
3	409
Connections	R
G1-G2	M10
G3-G4-G5-G6	3/8" UNC
F1-F2	M10
F3-F4	3/8" UNC



Valves S - B - T - D



Valves E - C



FMP320

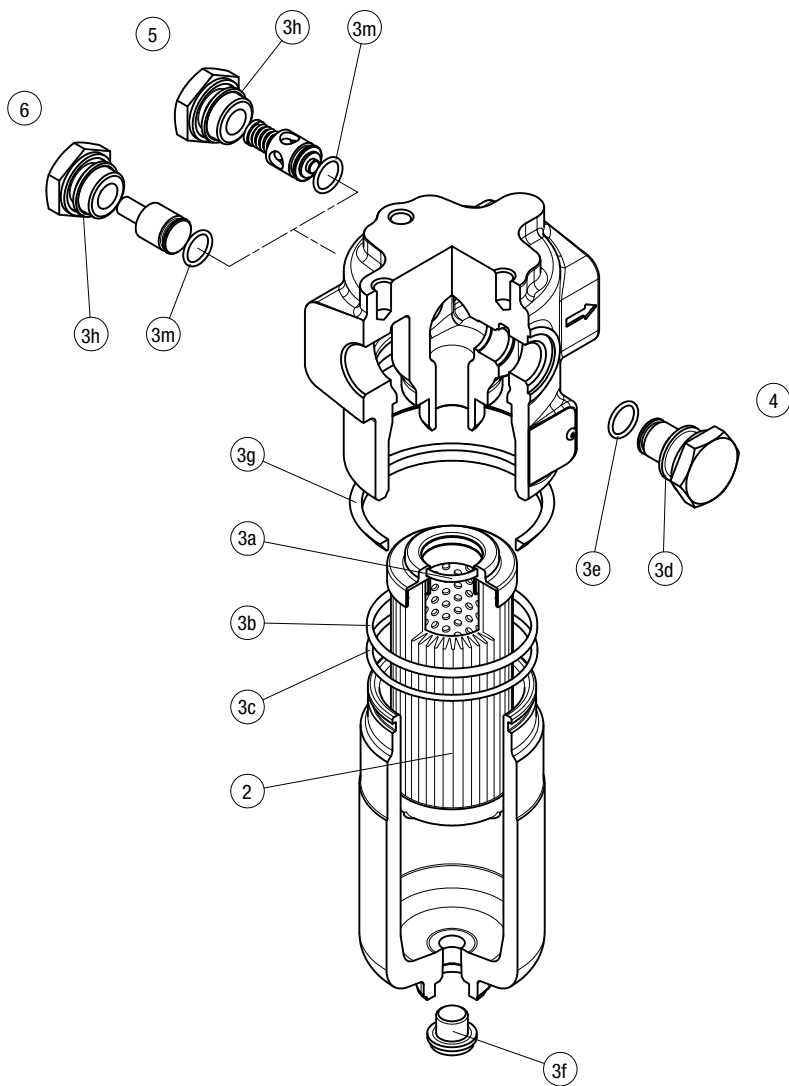
Filter length	H [mm]	H2 [mm]	
		Execution P01	P02
1	263	150	-
2	386	150	-
3	518	150	-
4	671	150	550

Connections	R
G1-G2	M12
G3-G4-G5-G6	1/2" UNC
F1-F2	M12
F3-F4	1/2" UNC

FMP SPARE PARTS

Order number for spare parts

FMP 065 - 135 - 320



Item:		Q.ty: 1 pc.		Q.ty: 1 pc.		Q.ty: 1 pc.		Q.ty: 1 pc.		Q.ty: 1 pc.	
		2		3 (3a ÷ 3m)		4		5		6	
Filter series	Filter element	Seal Kit code number		Indicator connection plug		Bypass assembly		Non-bypass assembly			
		NBR	FPM	NBR	FPM	NBR	FPM	NBR	FPM	NBR	FPM
FMP 065	See order table	02050267	02050278	T2H	T2V	02001312	02001385	02001314	02001386		
FMP 135		02050293	02050294			02001312	02001385	02001314	02001386		
FMP 320		02050274	02050285			02001396	02001397	02001398	02001399		

FHP series

Maximum working pressure up to 42 MPa (420 bar) - Flow rate up to 630 l/min



INSTALLATION, SERVICE AND MAINTENANCE MANUAL AND SAFETY INSTRUCTIONS



Please scan or click the QR codes to get updated electronic version of the related document:



FHP010



FHP011



FHP065



FHP135



FHP350



FHP351



FHP500

For all the QR codes: Scan or click me!

Description

Technical data

High Pressure filters

In-line

Maximum working pressure up to 42 MPa (420 bar)

Flow rate up to 630 l/min

FHP is a range of versatile high pressure filter for protection of sensitive components in high pressure hydraulic systems in the industrial equipment.

They are directly connected to the lines of the system through the hydraulic fittings.

Available features:

- Female threaded connections up to 1 1/2" and flanged connections up to 2", for a maximum return flow rate of 630 l/min
- Fine filtration rating, to get a good cleanliness level into the system
- Bypass valve, to relieve excessive pressure drop across the filter media
- Check valve, to protect the system against reverse flow
- Reverse flow valve, to allow bidirectional flow through the filter housing. The back flow is not filtered. The filter requires the use of internal check valves to direct the flow through the element in one direction and around the element in the other
- Low collapse filter element "N", for use with filters provided with bypass valve
- High collapse filter element "H", for use with filters not provided with bypass valve
- Low collapse filter element with external support "R", for filter element protection against the back pressure caused by the check valve or the reverse flow in filters provided with the bypass valve
- High collapse filter element with external support "S", for filter element protection against the back pressure caused by the check valve or the reverse flow in filters not provided with the bypass valve
- Visual, electrical and electronic differential clogging indicators

Common applications:

Delivery lines, in any high pressure industrial equipment or mobile machines

Filter housing materials

- Head: Phosphatized cast iron
- Housing: Phosphatized steel
- Bypass valve
AISI 316L: FHP 010 - 011
Brass: FHP 065 - 135
Brass / AISI 304: FHP 350-351
Steel: FHP 500
- Reverse Flow
Steel: FHP 350 - FHP 500
- Check valve: Steel

Pressure

- Test pressure: 63 MPa (630 bar)
- Burst pressure: 126 MPa (1260 bar)
- Pulse pressure fatigue test: 1 000 000 cycles with pressure from 0 to 42 MPa (420 bar)

Bypass valve

- Opening pressure 0.6 MPa (6 bar) $\pm 10\%$
- Other opening pressures on request.

Filter element features

Filter FHP		Filter element HP	
Δp Element type			
Element media	Construction	Δp Series	Δp
A - Microfiber	Standard	N	20 bar
	With external support	R	20 bar
	High Δp	H	210 bar
	High Δp with external support	S	210 bar
M - Wire mesh	Standard	N	20 bar
Please see ordering code tables to check element Δp series availability based on filter features.			
Flow direction through the filter element:			
From OUT to IN			

Seals

- Standard NBR series A
- Optional FPM series V

Temperature

From -25 °C to +110 °C

Connections

FHP 010 - 065 - 135 - 350 - 351 - 500:
In-line Inlet/Outlet
FHP 011:
90° Inlet/Outlet

Note

FHP filters are provided for vertical mounting

Weights [kg] and volumes [dm³]

Filter series	Weights [kg]					Volumes [dm³]						
	Length	1	2	3	4	5	Length	1	2	3	4	5
FHP 010 - 011		2.05	2.18	2.64	3.13	-		0.10	0.12	0.15	0.20	-
FHP 065		4.26	4.62	5.83	-	-		0.25	0.30	0.50	-	-
FHP 135		7.11	8.71	9.76	-	-		0.43	0.76	0.97	-	-
FHP 350 - 351		13.95	16.08	18.37	20.85	-		1.00	1.72	2.49	3.32	-
FHP 500		27.00	31.17	34.69	46.70	52.5		1.71	2.43	3.04	5.18	6.51

Flow rates [l/min]

Filter series	Length	Filter element design - H Series					Filter element design - N Series					
		A03	A06	A10	A16	A25	A03	A06	A10	A16	A25	M25
FHP 010	1	3	5	6	7	8	4	6	8	9	10	37
	2	5	7	13	16	22	6	8	16	19	24	40
	3	10	13	22	25	30	11	14	23	26	31	41
	4	12	15	25	27	32	16	19	27	30	33	41
FHP 011	1	3	5	6	7	9	4	6	8	9	11	47
	2	5	7	14	17	24	7	9	17	21	28	52
	3	11	14	25	29	36	11	14	26	30	37	53
	4	12	16	28	32	38	17	21	32	36	40	54
FHP 065	1	24	25	50	59	84	25	33	56	63	90	142
	2	33	38	68	77	98	34	52	72	79	106	143
	3	61	70	100	107	123	61	73	101	108	125	147
FHP 135	1	49	55	95	98	147	67	72	115	122	159	184
	2	89	106	129	131	163	105	111	140	142	192	209
	3	120	132	158	166	180	141	143	176	179	193	211
FHP 350 FHP 351	1	108	115	188	197	301	127	140	234	282	343	451
	2	196	225	317	323	396	256	278	394	415	465	480
	3	266	310	384	392	440	331	370	450	466	475	490
	4	308	333	391	398	445	369	393	456	474	495	503
FHP 500	1	144	157	265	268	355	269	305	390	406	444	612
	2	232	262	350	363	398	321	357	433	441	484	619
	3	293	301	398	408	455	396	416	497	499	537	622
	4	336	377	452	455	507	430	475	516	524	545	626
	5	420	428	494	500	544	475	493	535	545	569	627

Maximum flow rate for a complete pressure filter with a pressure drop $\Delta p = 1.5$ bar.

The reference fluid has a kinematic viscosity of 30 mm²/s (cSt) and a density of 0.86 kg/dm³.

For different pressure drop or fluid viscosity we recommend to use our selection software available on www.mpfiltri.com.

You can also calculate the right size using the formulas present on the FILTER SIZING paragraph at the beginning of the full catalogue or at the beginning of the filter family brochure.

Please, contact our Sales Department for further additional information.

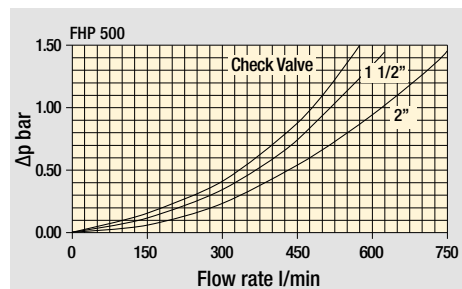
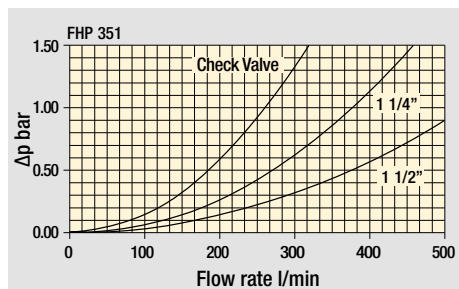
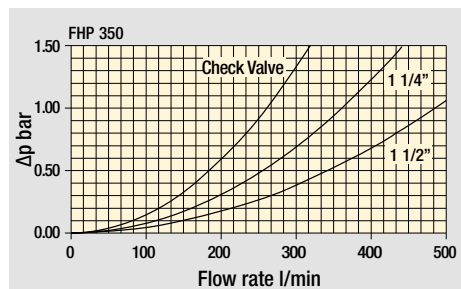
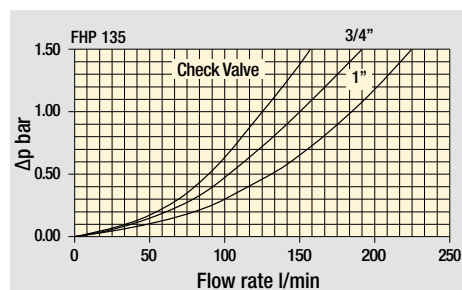
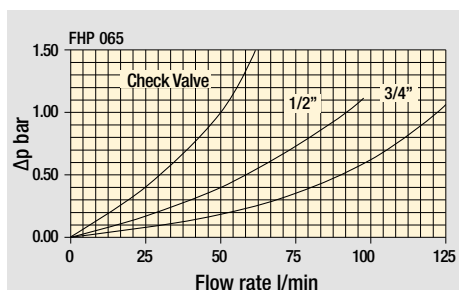
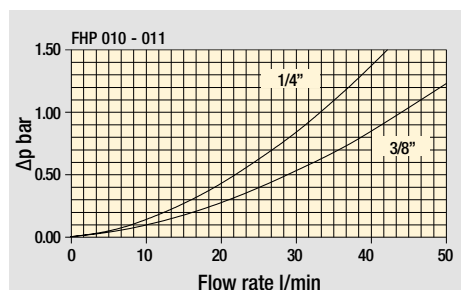
Hydraulic symbols

Filter series	Style S	Style B	Style T	Style D	Style V	Style Z
FHP 010 - 011	•	•	-	-	•	•
FHP 065	•	•	•	-	-	-
FHP 135	•	•	•	-	-	-
FHP 350-351	•	•	•	•	•	•
FHP 500	•	•	•	•	•	•

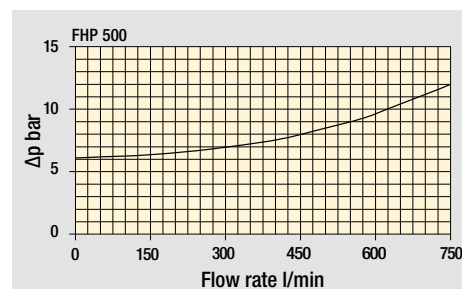
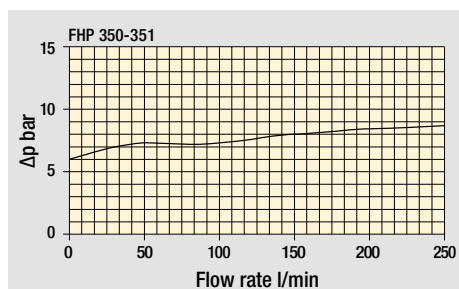
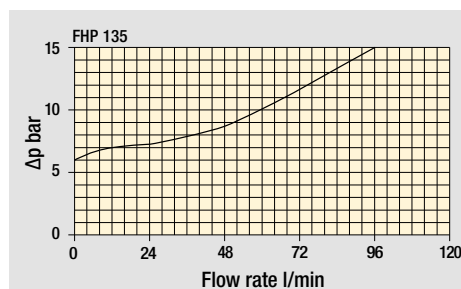
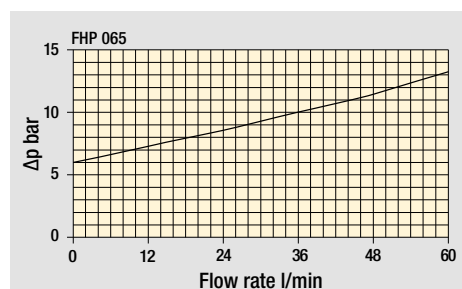
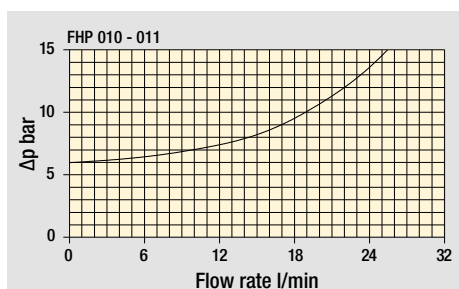
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Pressure drop

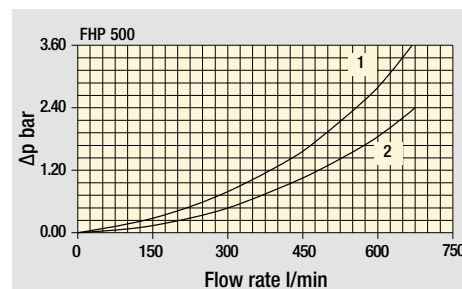
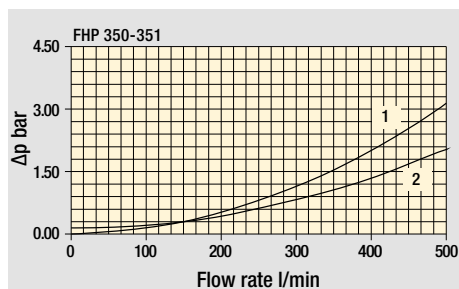
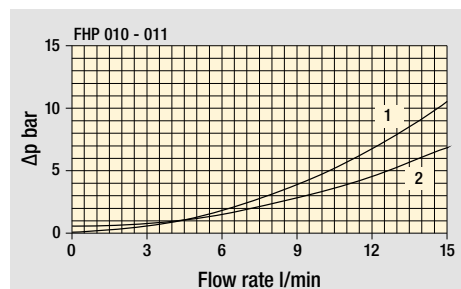
Filter housings Δp pressure drop



Bypass valve pressure drop



Valves



Pressure drop with reverse flow valve in
1 - Filtering direction
2 - Opposite direction

Pressure drop with reverse flow valve in
1 - Filtering direction
2 - Opposite direction

Pressure drop with reverse flow valve in
1 - Opposite direction
2 - Filtering direction

The curves are plotted using mineral oil with density of 0.86 kg/dm^3 in compliance with ISO 3968. Δp varies proportionally with density.

Designation & Ordering code

COMPLETE FILTER

Series and size		Configuration example: FHP010 2 B A B 2 A03 N P01									
FHP010 FHP011											
Length											
1 2 3 4											
Valves											
S Without bypass											
B With bypass 6 bar											
V With reverse flow, without bypass											
Z With reverse flow, with bypass 6 bar											
Seals											
A NBR											
V FPM											
Connections											
A G 1/4"											
B 1/4" NPT											
C SAE 5 - 1/2" - 20 UNF											
D G 3/8"											
E 3/8" NPT											
F SAE 6 - 9/16" - 18 UNF											
Connection for differential pressure indicator											
1 Without											
2 With connection											
Filtration rating (filter media)											
A03 Inorganic microfiber 3 µm											
A06 Inorganic microfiber 6 µm											
A10 Inorganic microfiber 10 µm											
A16 Inorganic microfiber 16 µm											
A25 Inorganic microfiber 25 µm											
M25 Wire mesh 25 µm											

Element Δp	S	B	V	Z	Execution
N 20 bar	-	•	-	•	P01 MP Filtri standard
H 210 bar	•	-	•	-	Pxx Customized

FILTER ELEMENT

Element series and size		Configuration example: HP011 2 A03 A N P01					
HP011							
Element length							
1 2 3 4							
Filtration rating (filter media)							
A03 Inorganic microfiber 3 µm							
A06 Inorganic microfiber 6 µm							
A10 Inorganic microfiber 10 µm							
A16 Inorganic microfiber 16 µm							
A25 Inorganic microfiber 25 µm							
M25 Wire mesh 25 µm							

Seals	Element Δp	Execution
A NBR	N 20 bar	P01 MP Filtri standard
V FPM	H 210 bar	Pxx Customized

CLOGGING INDICATORS

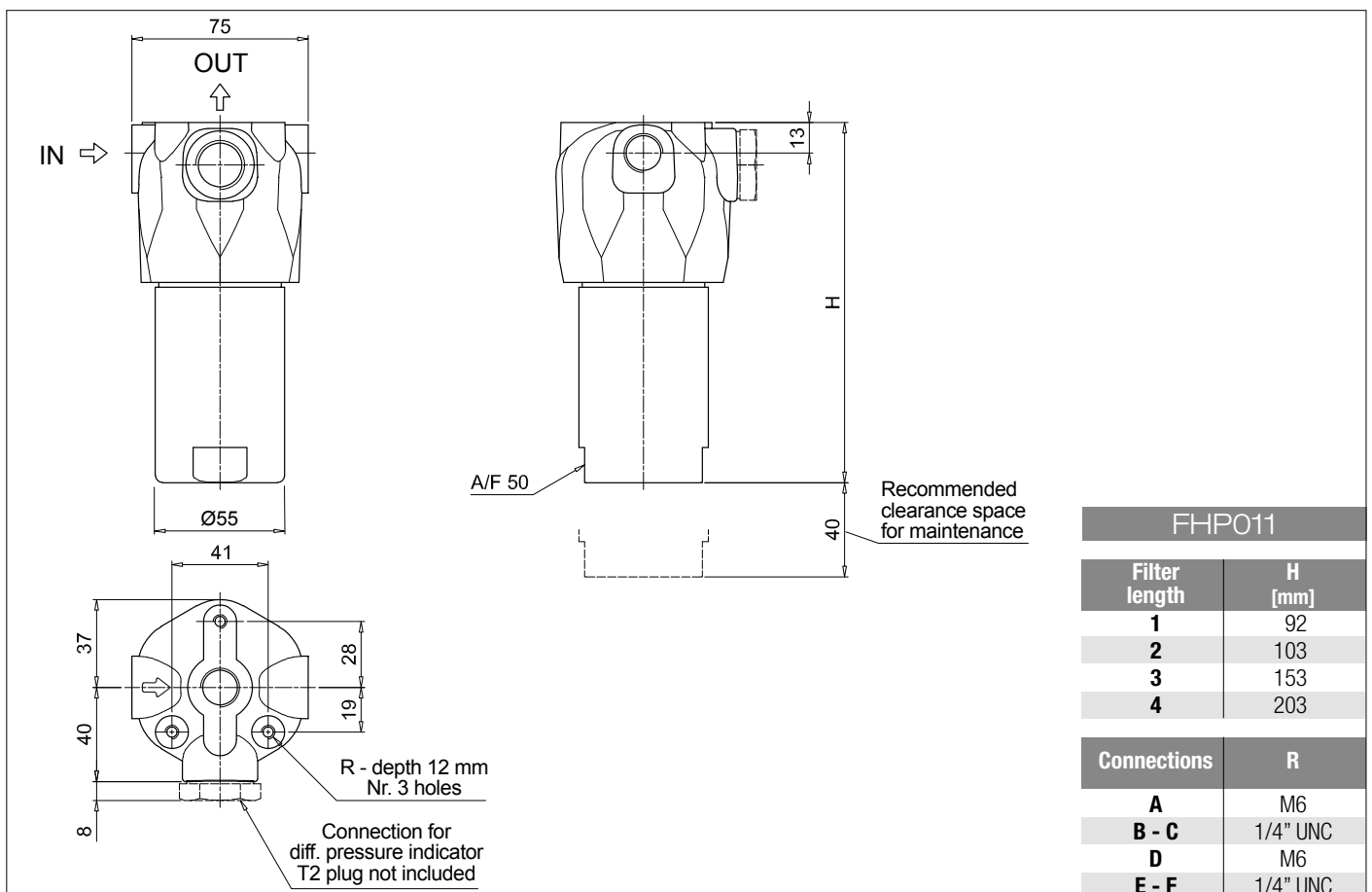
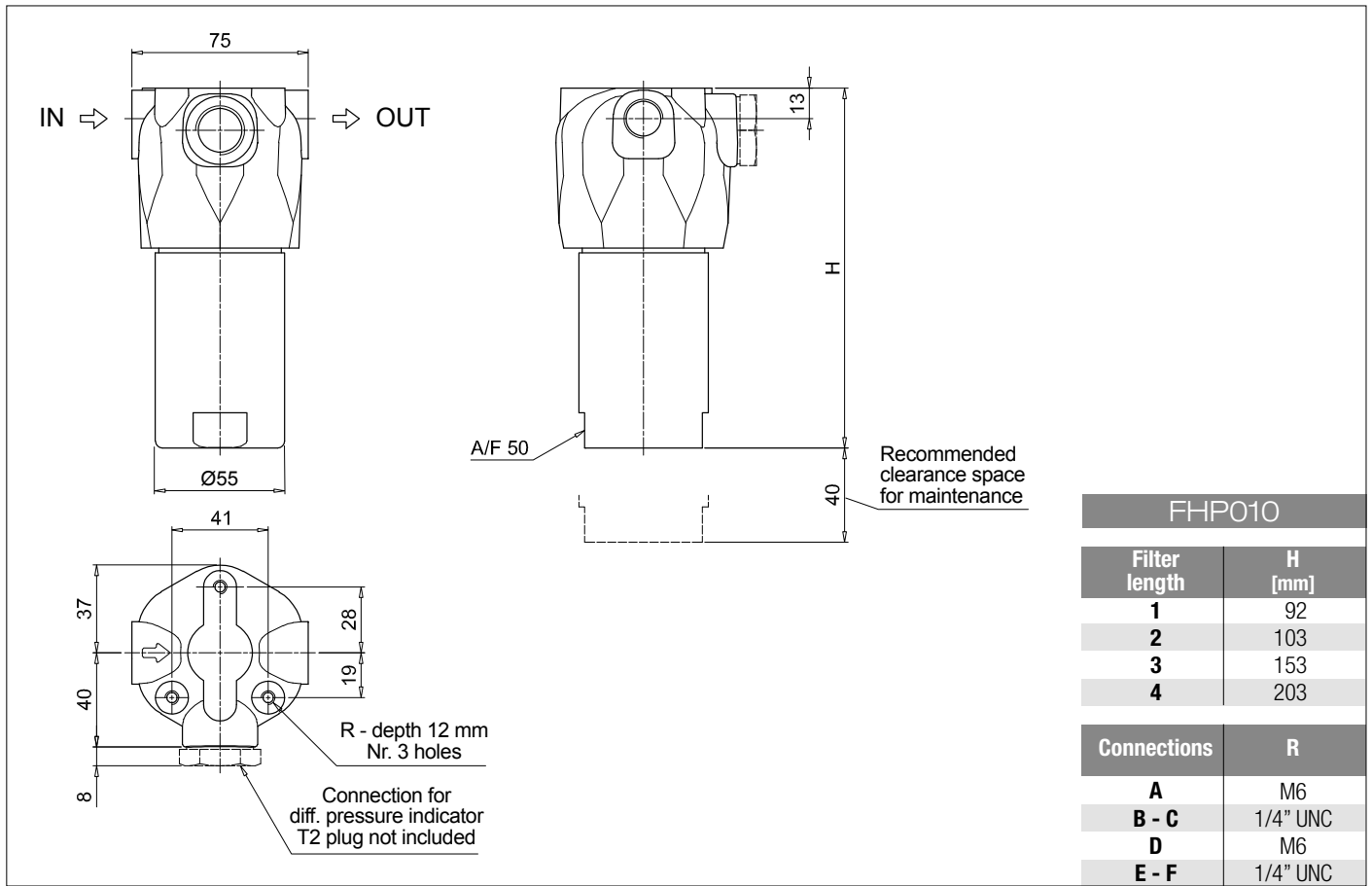
See page 721

DEA Electrical differential pressure indicator	DLE Electrical / visual differential pressure indicator
DEM Electrical differential pressure indicator	DTA Electronic differential pressure indicator
DEU Electrical differential pressure indicator	DVA Visual differential pressure indicator
DLA Electrical / visual differential pressure indicator	DVM Visual differential pressure indicator

PLUGS

See page 741

T2 Plug (not included)



Designation & Ordering code

COMPLETE FILTER

Series and size		Configuration example: FHP135 2 B A G3 A06 S P01																																
FHP065 FHP135																																		
Length																																		
1 2 3																																		
Valves																																		
S Without bypass																																		
B With bypass 6 bar																																		
T With check valve, without bypass																																		
Seals																																		
A NBR																																		
V FPM																																		
Connections	FHP065	FHP135																																
G1	G 1/2"	G 3/4"																																
G2	G 3/4"	G 1"																																
G3	1/2" NPT	3/4" NPT																																
G4	3/4" NPT	1" NPT																																
G5	SAE 8 - 3/4" - 16 UNF	SAE 12 - 1 1/16" - 12 UN																																
G6	SAE 12 - 1 1/16" - 12 UN	SAE 16 - 1 5/16" - 12 UN																																
F1	-	3/4" SAE 3000 psi/M																																
F2	-	1" SAE 3000 psi/M																																
F3	-	3/4" SAE 3000 psi/UNC																																
F4	-	1" SAE 3000 psi/UNC																																
F5	-	3/4" SAE 6000 psi/M																																
F6	-	3/4" SAE 6000 psi/UNC																																
Filtration rating (filter media)																																		
A03	Inorganic microfiber	3 µm																																
A06	Inorganic microfiber	6 µm																																
A10	Inorganic microfiber	10 µm																																
A16	Inorganic microfiber	16 µm																																
A25	Inorganic microfiber	25 µm																																
M25	Wire mesh	25 µm																																
			<table border="1"> <tr> <th>Element Δp</th> <th colspan="3">Valves</th> </tr> <tr> <th></th> <th>S</th> <th>B</th> <th>T</th> </tr> <tr> <td>N 20 bar</td> <td>-</td> <td>•</td> <td>-</td> </tr> <tr> <td>H 210 bar</td> <td>•</td> <td>-</td> <td>-</td> </tr> <tr> <td>S 210 bar</td> <td>-</td> <td>-</td> <td>•</td> </tr> </table>			Element Δp	Valves				S	B	T	N 20 bar	-	•	-	H 210 bar	•	-	-	S 210 bar	-	-	•	<table border="1"> <tr> <th colspan="2">Execution</th> </tr> <tr> <td>P01</td> <td>MP Filtri standard</td> </tr> <tr> <td>Pxx</td> <td>Customized</td> </tr> </table>			Execution		P01	MP Filtri standard	Pxx	Customized
Element Δp	Valves																																	
	S	B	T																															
N 20 bar	-	•	-																															
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S 210 bar	-	-	•																															
Execution																																		
P01	MP Filtri standard																																	
Pxx	Customized																																	

FILTER ELEMENT

Element series and size		Configuration example: HP135 2 A06 A S P01																						
HP065 HP135																								
Element length																								
1 2 3																								
Filtration rating (filter media)																								
A03	Inorganic microfiber	3 µm																						
A06	Inorganic microfiber	6 µm																						
A10	Inorganic microfiber	10 µm																						
A16	Inorganic microfiber	16 µm																						
A25	Inorganic microfiber	25 µm																						
M25	Wire mesh	25 µm																						
			<table border="1"> <tr> <th colspan="2">Seals</th> </tr> <tr> <td>A</td> <td>NBR</td> </tr> <tr> <td>V</td> <td>FPM</td> </tr> </table>		Seals		A	NBR	V	FPM	<table border="1"> <tr> <th>Element Δp</th> </tr> <tr> <td>N 20 bar</td> </tr> <tr> <td>H 210 bar</td> </tr> <tr> <td>S 210 bar</td> </tr> </table>		Element Δp	N 20 bar	H 210 bar	S 210 bar	<table border="1"> <tr> <th colspan="2">Execution</th> </tr> <tr> <td>P01</td> <td>MP Filtri standard</td> </tr> <tr> <td>Pxx</td> <td>Customized</td> </tr> </table>		Execution		P01	MP Filtri standard	Pxx	Customized
Seals																								
A	NBR																							
V	FPM																							
Element Δp																								
N 20 bar																								
H 210 bar																								
S 210 bar																								
Execution																								
P01	MP Filtri standard																							
Pxx	Customized																							

CLOGGING INDICATORS

See page 721

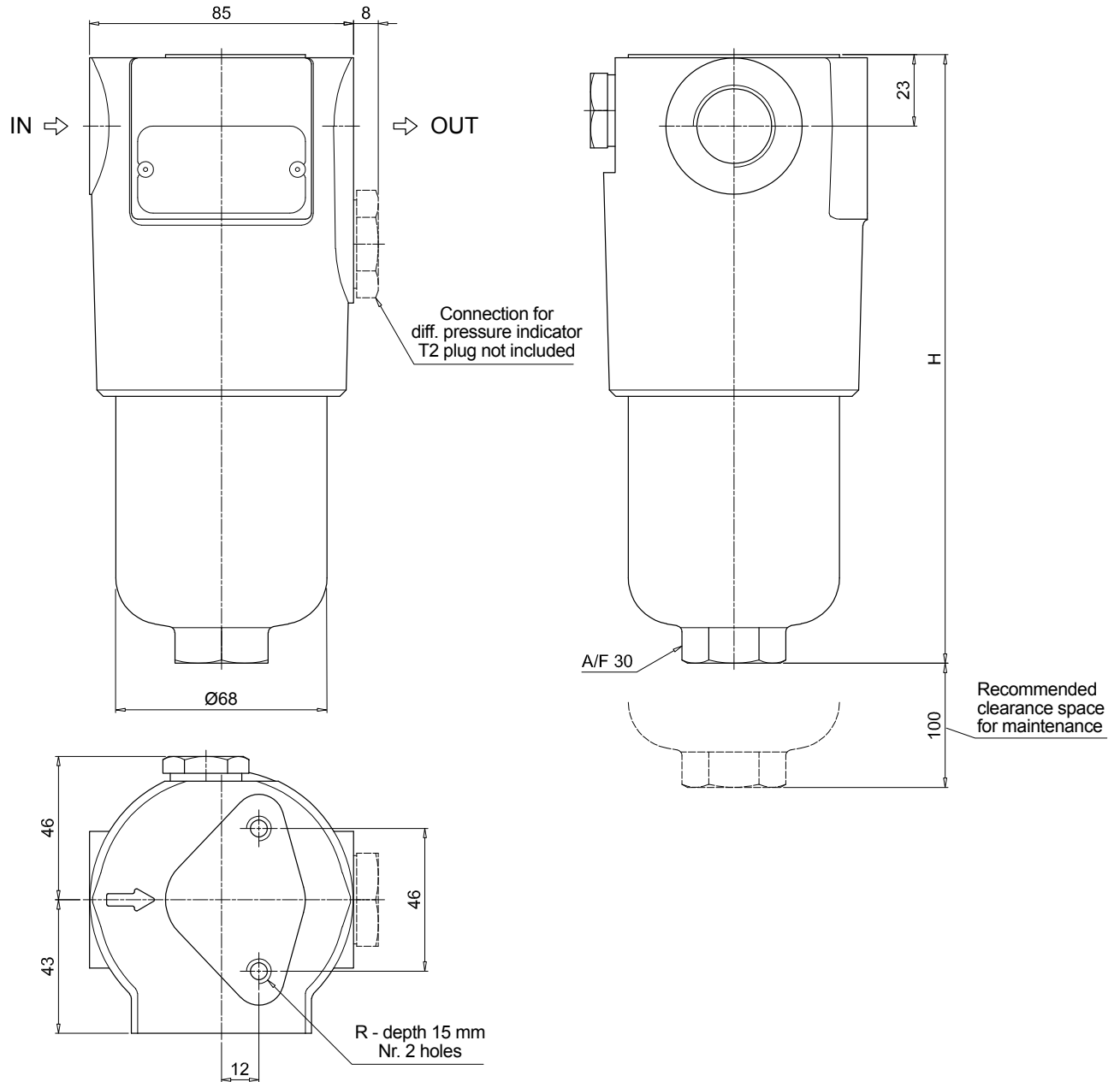
DEA	Electrical differential pressure indicator
DEM	Electrical differential pressure indicator
DEU	Electrical differential pressure indicator
DLA	Electrical / visual differential pressure indicator

DLE	Electrical / visual differential pressure indicator
DTA	Electronic differential pressure indicator
DVA	Visual differential pressure indicator
DVM	Visual differential pressure indicator

PLUGS

See page 741

T2	Plug (not included)
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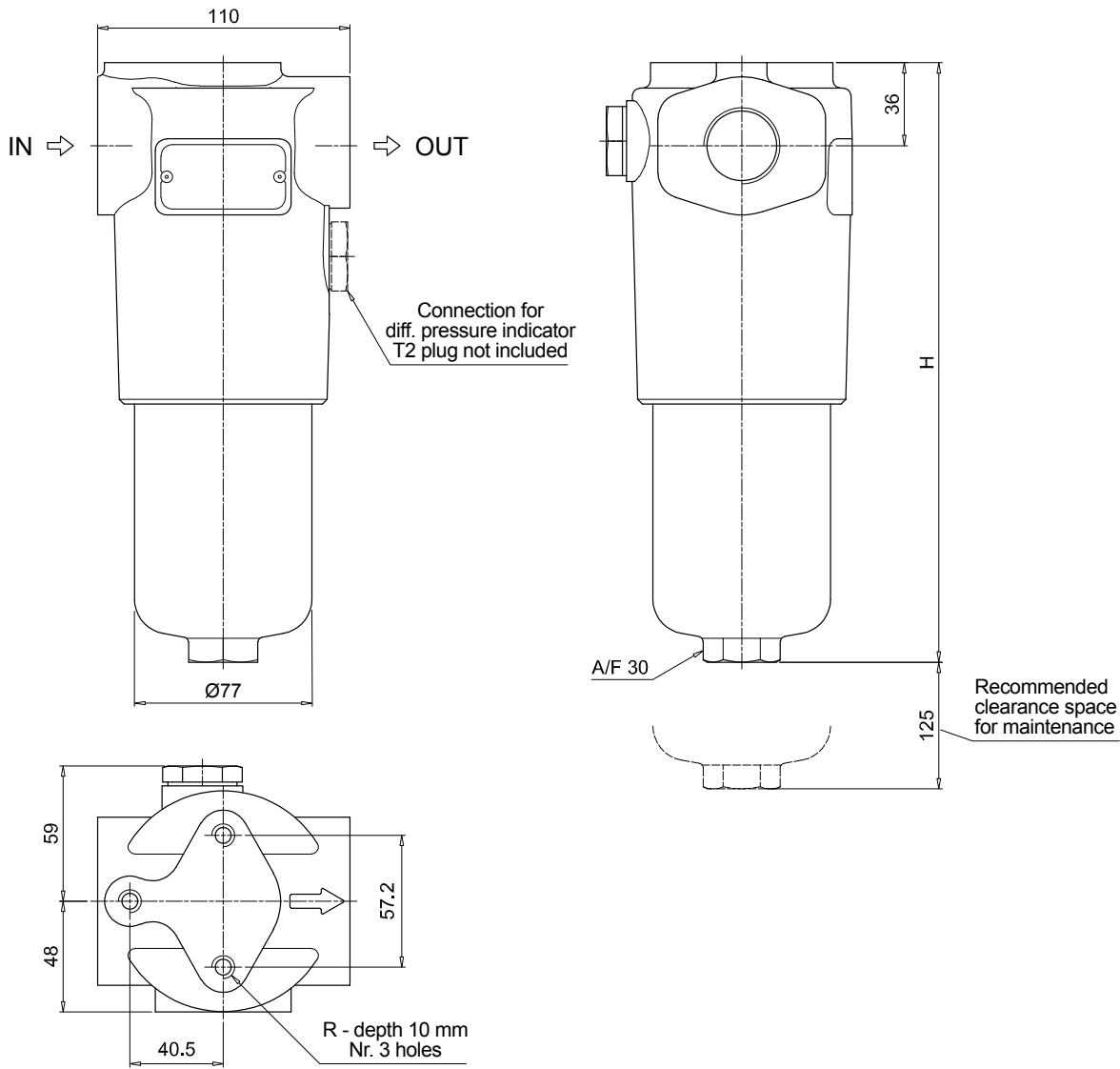


FHP065

Filter length	H [mm]
1	196
2	227
3	329
Connections	R
G1-G2	M8
G3-G4-G5-G6	5/16" UNC

FHP FHP065 - FHP135

Dimensions



FHP135	
Filter length	H [mm]
1	260
2	373
3	448
Connections	R
G1-G2	M10
G3-G4-G5-G6	3/8" UNC
F1-F2	M10
F3-F4	3/8" UNC
F5	M10
F6	3/8" UNC

FHP FHP350 - FHP351

Designation & Ordering code

COMPLETE FILTER

Series and size		Configuration example: FHP350 4 B A D 2 A06 N P01																																																			
FHP350																																																					
FHP351																																																					
Length																																																					
1 2 3 4																																																					
Valves																																																					
S Without bypass																																																					
B With bypass 6 bar																																																					
T With check valve, without bypass																																																					
D With check valve, with bypass 6 bar																																																					
V With reverse flow, without bypass																																																					
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Seals																																																					
A NBR																																																					
V FPM																																																					
Connections																																																					
A G 1 1/2"		F 1 1/2" SAE 3000 psi/UNC + SAE 20 - 1 5/8" - 12 UN																																																			
B 1 1/2" NPT		G 1 1/4" SAE 3000 psi/M																																																			
C SAE 24 - 1 7/8" - 12 UN		H 1 1/4" SAE 3000 psi/UNC																																																			
D 1 1/2" SAE 3000 psi/M + G 1 1/4"		I 1 1/4" SAE 6000 psi/M (bolts M12, IAW ISO 6162-2:2018)																																																			
E 1 1/2" SAE 3000 psi/UNC + 1 1/4" NPT		L 1 1/4" SAE 6000 psi/UNC																																																			
Connection for differential pressure indicator																																																					
2 With connection																																																					
Filtration rating (filter media)																																																					
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Element Δp	Valves																																																				
	S	B	T	D	V	Z																																															
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R 20 bar	-	-	-	•	-	•																																															
H 210 bar	•	-	-	-	-	-																																															
S 210 bar	-	-	•	-	•	-																																															
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Execution	Filter length																																																				
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P02 Maintenance from the bottom of the housing	-	-	-	•																																																	
Pxx Customized	-	-	-	-																																																	

FILTER ELEMENT

Element series and size		Configuration example: HP320 4 A06 A N P01																				
HP320																						
Element length																						
1 2 3 4																						
Filtration rating (filter media)																						
A03 Inorganic microfiber 3 µm																						
A06 Inorganic microfiber 6 µm																						
A10 Inorganic microfiber 10 µm																						
A16 Inorganic microfiber 16 µm																						
A25 Inorganic microfiber 25 µm																						
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Seals	Element Δp	Execution																				
A NBR	N 20 bar	P01 MP Filtri standard																				
V FPM	R 20 bar	Pxx Customized																				
	H 210 bar																					
	S 210 bar																					

CLOGGING INDICATORS

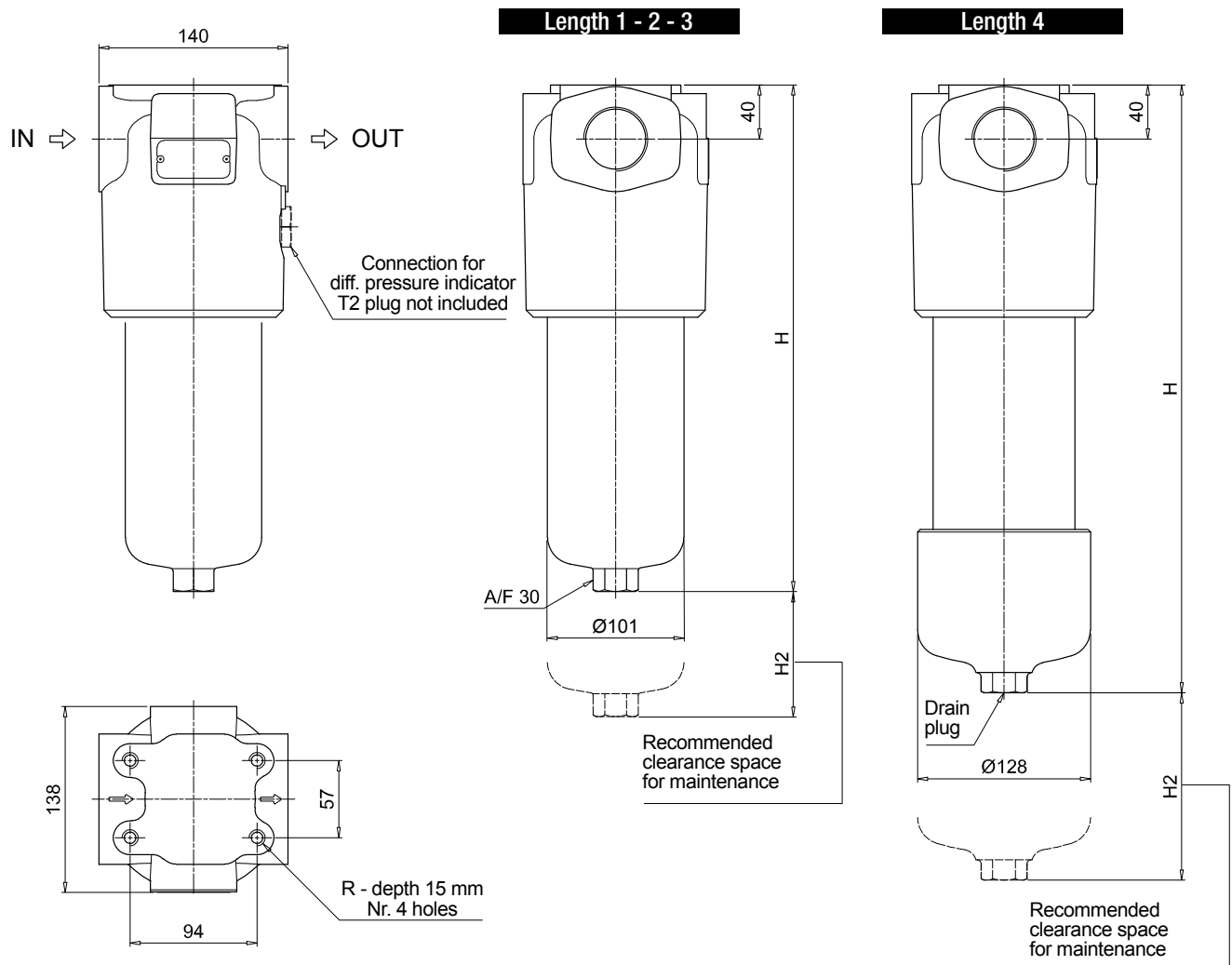
See page 721

DEA Electrical differential pressure indicator	DLE Electrical / visual differential pressure indicator
DEM Electrical differential pressure indicator	DTA Electronic differential pressure indicator
DEU Electrical differential pressure indicator	DVA Visual differential pressure indicator
DLA Electrical / visual differential pressure indicator	DVM Visual differential pressure indicator

PLUGS

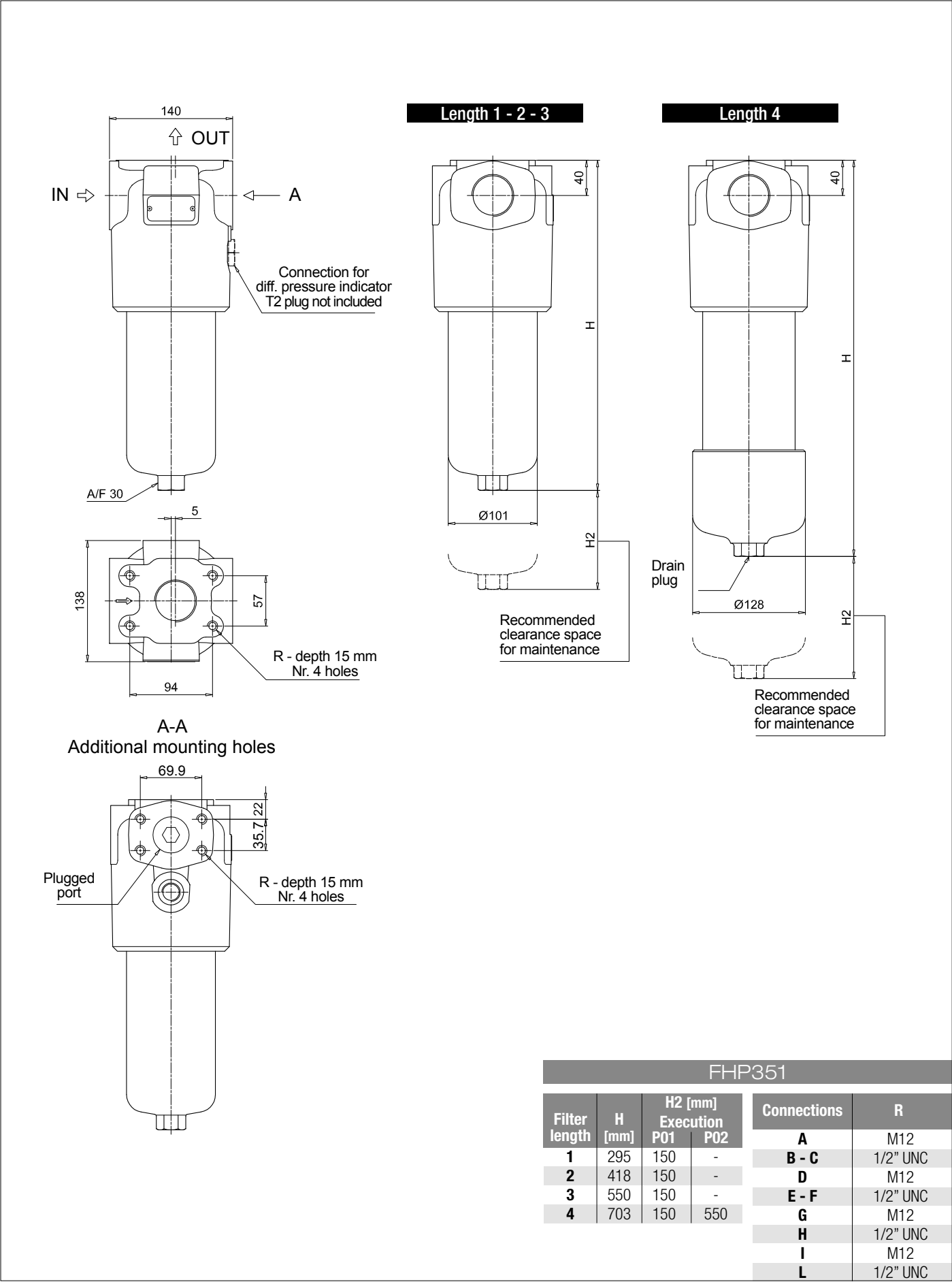
See page 741

T2 Plug (not included)



FHP350

Filter length	H [mm]	H2 [mm]		Connections	R
		P01	P02		
1	295	150	-	A	M12
2	418	150	-	B - C	1/2" UNC
3	550	150	-	D	M12
4	703	150	550	E - F	1/2" UNC
				G	M12
				H	1/2" UNC
				I	M12
				L	1/2" UNC



Designation & Ordering code

COMPLETE FILTER

Series and size **FHP500** Configuration example: **FHP500** **4** **V** **A** **F1** **A06** **S** **P01**

Length **1** **2** **3** **4** **5**

Valves

S Without bypass
B With bypass 6 bar
T With check valve, without bypass
D With check valve, with bypass 6 bar
V With reverse flow, without bypass
Z With reverse flow, with bypass 6 bar

Seals

A NBR
V FPM

Connections

F1 1 1/2" SAE 3000 psi/M
F2 1 1/2" SAE 3000 psi/UNC
F3 2" SAE 3000 psi/M
F4 2" SAE 3000 psi/UNC + 1 1/2" NPT
F5 1 1/2" SAE 6000 psi/M
F6 1 1/2" SAE 6000 psi/UNC
F7 2" SAE 6000 psi/M + G 1 1/2"
F8 2" SAE 6000 psi/UNC + SAE 24 - 1 7/8" - 12 UN

Filtration rating (filter media)

A03 Inorganic microfiber 3 µm
A06 Inorganic microfiber 6 µm
A10 Inorganic microfiber 10 µm
A16 Inorganic microfiber 16 µm
A25 Inorganic microfiber 25 µm
M25 Wire mesh 25 µm

Element Δp	Valves					
	S	B	T	D	V	Z
N 20 bar	-	•	-	-	-	-
R 20 bar	-	-	-	•	-	•
S 210 bar	•	-	•	-	•	-

Execution	Filter length				
	1	2	3	4	5
P01 MP Filtri standard	•	•	•	•	•
P02 Maintenance from the bottom of the housing	-	-	-	•	•
P03 Drain plug	•	•	-	-	-
Pxx Customized	•	•	•	•	•

FILTER ELEMENT

Element series and size **HP500** Configuration example: **HP500** **4** **A06** **A** **S** **P01**

Element length **1** **2** **3** **4** **5**

Filtration rating (filter media)

A03 Inorganic microfiber 3 µm
A06 Inorganic microfiber 6 µm
A10 Inorganic microfiber 10 µm
A16 Inorganic microfiber 16 µm
A25 Inorganic microfiber 25 µm
M25 Wire mesh 25 µm

Seals	
A	NBR
V	FPM

Element Δp	
N	20 bar
R	20 bar
S	210 bar

Execution	
P01	MP Filtri standard
Pxx	Customized

CLOGGING INDICATORS

See page 721

DEA Electrical differential pressure indicator
DEM Electrical differential pressure indicator
DEU Electrical differential pressure indicator
DLA Electrical / visual differential pressure indicator

DLE Electrical / visual differential pressure indicator
DTA Electronic differential pressure indicator
DVA Visual differential pressure indicator
DVM Visual differential pressure indicator

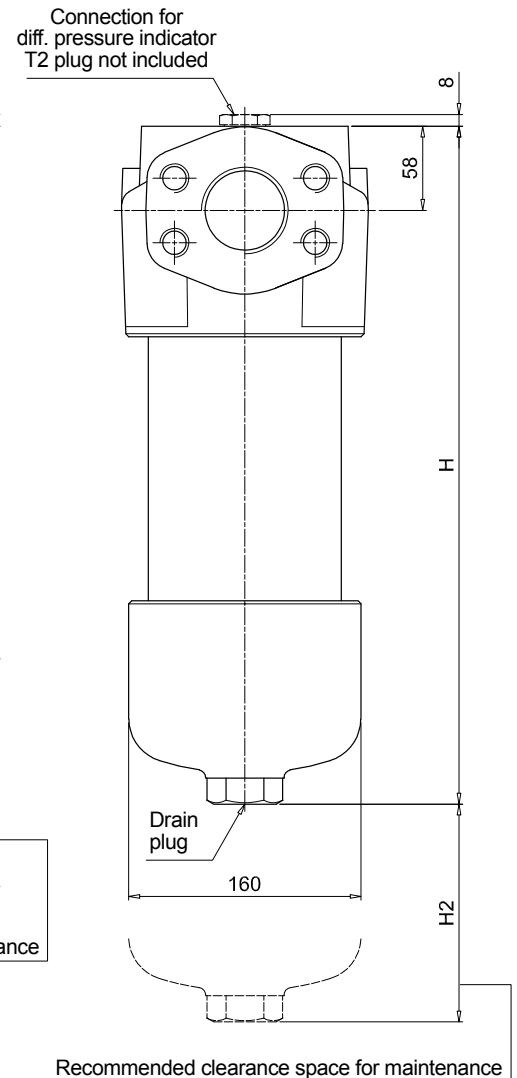
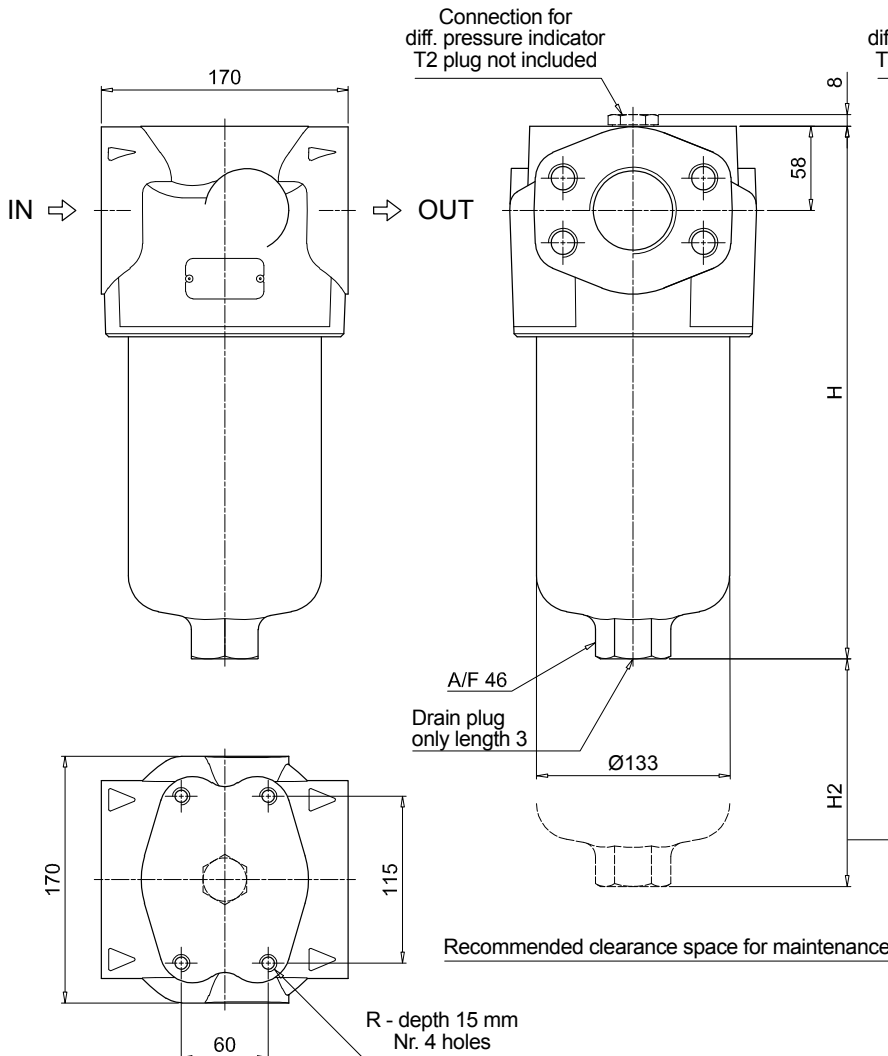
PLUGS

See page 741

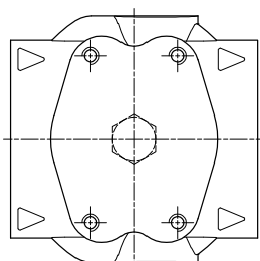
T2 Plug (not included)

Length 1 - 2 - 3

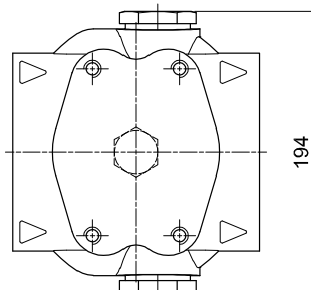
Length 4 - 5



Valves S - B - T - D



Valves V - Z



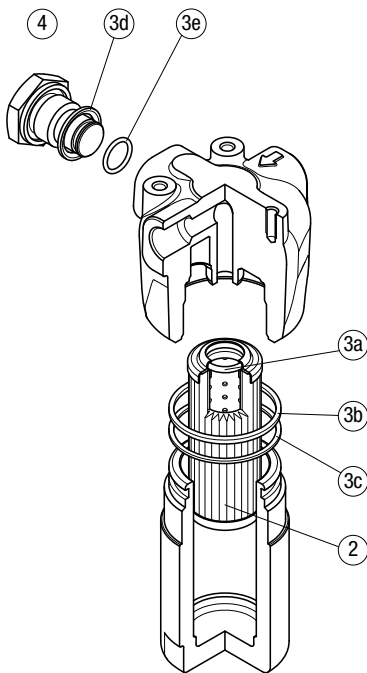
FHP500

Filter length	H [mm]	H2 [mm]	
		Execution P01	P02
1	330	150	-
2	420	150	-
3	496	150	-
4	654	150	480
5	820	150	650

Connections	R
F1	M12
F2	1/2" UNC
F3	M12
F4	1/2" UNC
F5	M12
F6	1/2" UNC
F7	M12
F8	1/2" UNC

Order number for spare parts

FHP 010 - 011

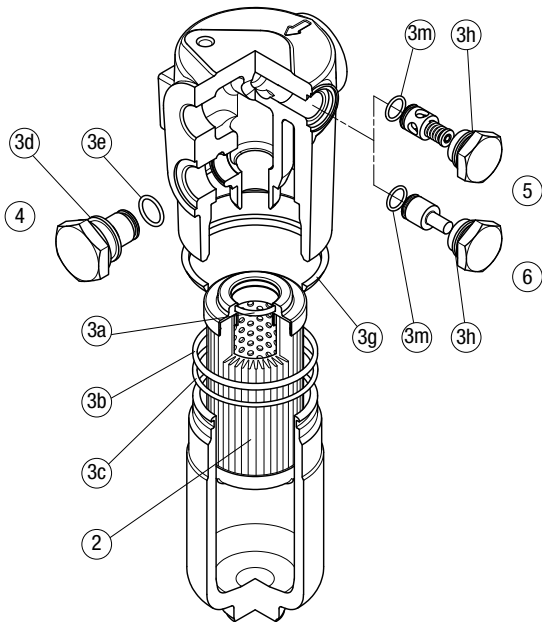


Q.ty:
nr. 0 pcs. for version 1
(without indicator port)

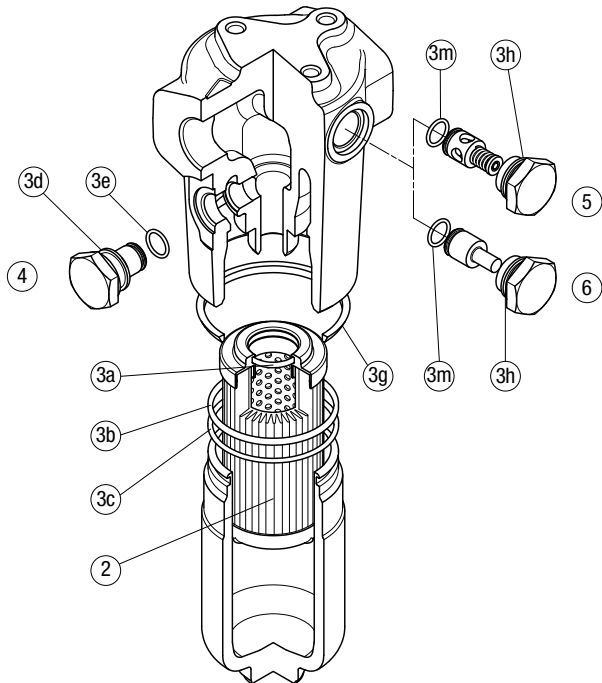
nr. 1 pc. for version 2
(with indicator port)

Q.ty: 1 pc.		Q.ty: 1 pc.		Q.ty: 1 pc.	
Item: 2		3 (3a ÷ 3e)		4	
Filter series	Filter element	Seal Kit code number		Indicator connection plug	
		NBR	FPM	NBR	FPM
FHP 010-011	See order table	02050501	02050492	T2H	T2V

FHP 065



FHP 135

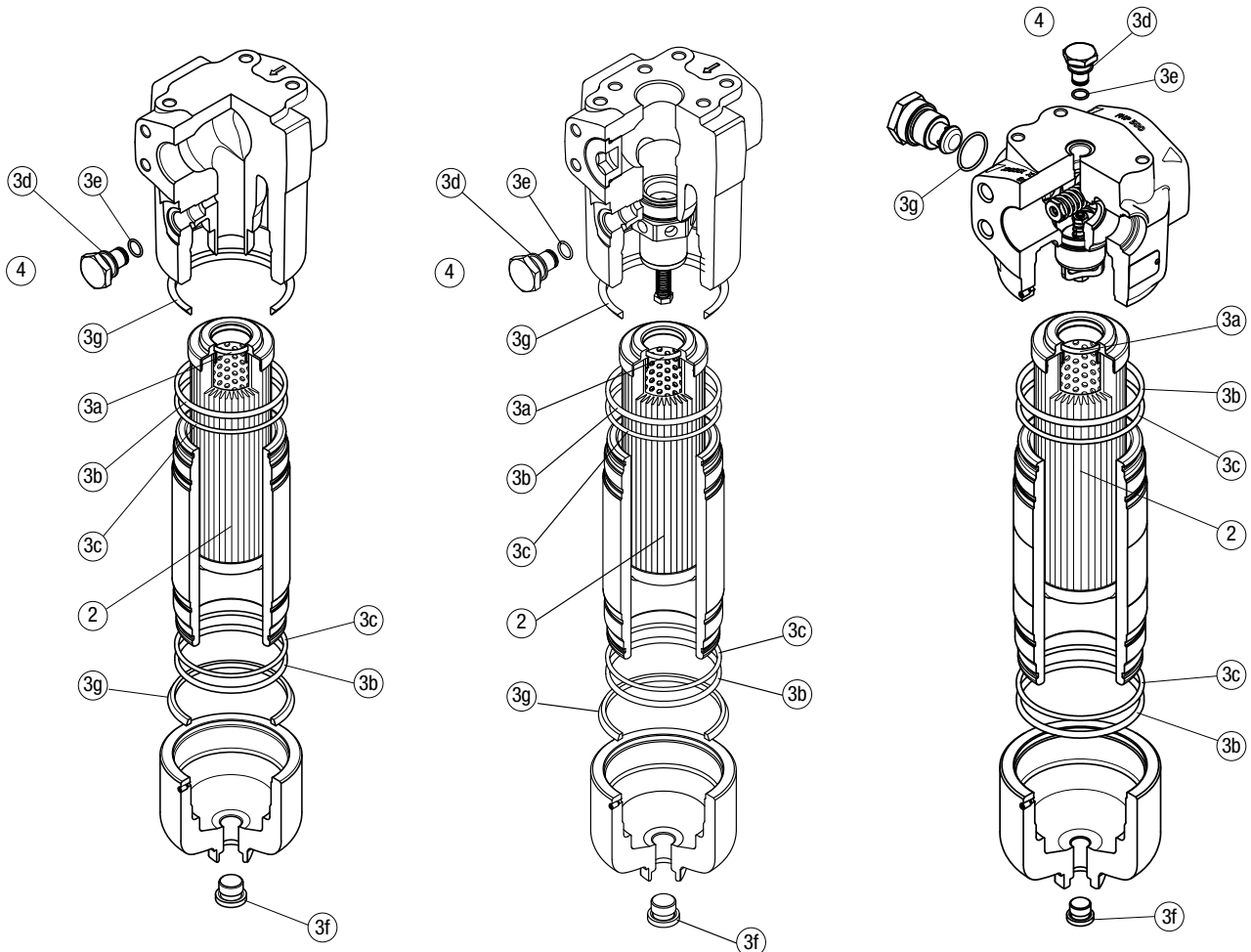


Q.ty: 1 pc.		Q.ty: 1 pc.		Q.ty: 1 pc.		Q.ty: 1 pc.		Q.ty: 1 pc.	
Item: 2		3 (3a ÷ 3m)		4		5		6	
Filter series	Filter element	Seal Kit code number		Indicator connection plug		Bypass assembly		Non-bypass assembly	
		NBR	FPM	NBR	FPM	NBR	FPM	NBR	FPM
FHP 065	See order table	02050265	02050276	T2H	T2V	02001116	02001136	02001142	02001139
FHP 135		02050269	02050280			02001117	02001137	02001143	02001392

FHP 350

FHP 351

FHP 500



Q.ty: 1 pc.		Q.ty: 1 pc. (3a ÷ 3g for FHP 350) (3a ÷ 3f for FHP 500)		Q.ty: 1 pc.	
Item:	2	3		4	
Filter series	Filter element	Seal Kit code number		Indicator connection plug	
		NBR	FPM	NBR	FPM
FHP 350 - 351	See order table	02050272	02050283	T2H	T2V
FHP 500		02050330	02050331		

FHM series

Maximum working pressure up to 32 MPa (320 bar) - Flow rate up to 400 l/min



INSTALLATION, SERVICE AND MAINTENANCE MANUAL AND SAFETY INSTRUCTIONS



Please scan or click the QR codes to get updated electronic version of the related document:



FHM006



FHM007



FHM010



FHM050



FHM065



FHM135



FHM320



FHM500

For all the QR codes: Scan or click me!

High Pressure filters

Manifold

Maximum working pressure up to 32 MPa (320 bar)

Flow rate up to 400 l/min

FHM is a range of high pressure filter for protection of sensitive components in high pressure hydraulic systems in the mobile machines. They are directly connected to the top of the manifold, through the proper flanged interface.

Available features:

- Manifold connections up to Ø30 mm, for a maximum flow rate of 400 l/min
- ISO 4401 CETOP 3 and CETOP 5 interface, for direct mounting on the CETOP valves
- Fine filtration rating, to get a good cleanliness level into the system
- Bypass valve, to relieve excessive pressure drop across the filter media
- Check valve, to protect the system against reverse flow
- Low collapse filter element "N", for use with filters provided with bypass valve
- High collapse filter element "H", for use with filters not provided with bypass valve
- High collapse filter element with external support "S", for filter element protection against the back pressure caused by the check valve in filters not provided with the bypass valve
- Visual, electrical and electronic differential clogging indicators

Common applications:

Delivery lines, in any high pressure industrial equipment

Filter housing materials

- Head
Phosphatized cast iron: FHM 006-007-010
Phosphatized steel: FHM 050-065-135-320-500

- Housing: Phosphatized steel

- Bypass valve: Steel

- Check valve: Steel

Pressure

- Test pressure: 48 MPa (480 bar)
- Min. Burst pressure: 96 MPa (960 bar)
- Pulse pressure fatigue test: 1 000 000 cycles with pressure from 0 to 32 MPa (320 bar)

Bypass valve

- Opening pressure 0.6 MPa (6 bar) $\pm 10\%$
- Other opening pressures on request.

Filter element features

Filter FHM		Filter element HP	
Δp Element type			
Element media	Construction	Δp Series	Δp
A - Microfiber	Standard	N	20 bar
	High Δp	H	210 bar
	High Δp with external support	S	210 bar
M - Wire mesh	Standard	N	20 bar
Please see ordering code tables to check element Δp series availability based on filter features.			
Flow direction through the filter element: From OUT to IN			

Seals

- Standard NBR series A
- Optional FPM series V

Temperature

From -25 °C to +110 °C

Connections

Manifold mounting

Note

FHM filters are provided for vertical mounting

Weights [kg] and volumes [dm³]

Filter series	Weights [kg]					Volumes [dm³]						
	Length	1	2	3	4	5	Length	1	2	3	4	5
FHM 006		2.17	-	-	-	-		0.12	-	-	-	-
FHM 007		-	4.74	5.95	-	-		-	0.30	0.50	-	-
FHM 010		-	4.74	5.95	-	-		-	0.30	0.50	-	-
FHM 050		5.31	5.68	6.09	6.56	7.74		0.29	0.38	0.48	0.60	0.89
FHM 065		5.47	5.83	7.04	-	-		0.27	0.34	0.56	-	-
FHM 135		8.78	10.38	11.43	-	-		0.49	0.82	1.03	-	-
FHM 320		19.80	21.93	24.22	26.70	-		1.04	1.76	2.53	3.36	-
FHM 500		35.00	39.17	42.69	54.70	60.50		1.63	2.35	2.96	5.11	6.44

Flow rates [l/min]

Filter series	Length	Filter element design - H Series					
		A03	A06	A10	A16	A25	M25
FHM 006	1	9	10	13	14	15	16
FHM 007	2	13	13	15	16	16	16
	3	15	15	16	16	17	17
FHM 010	2	23	25	32	34	37	38
	3	31	33	37	38	39	40

Filter series	Length	Filter element design - N Series						Filter element design - S Series				
		A03	A06	A10	A16	A25	M25	A03	A06	A10	A16	A25
FHM 050	1	38	37	65	67	81	101	28	36	50	52	62
	2	46	50	69	75	89	102	41	44	63	71	85
	3	57	59	76	81	93	103	51	53	71	77	90
	4	68	71	84	86	95	103	62	66	81	82	93
	5	82	83	93	95	98	105	73	75	83	89	97

Filter series	Length	Filter element design - N Series						Filter element design - H Series				
		A03	A06	A10	A16	A25	M25	A03	A06	A10	A16	A25
FHM 065	1	23	30	48	53	71	102	22	23	43	50	67
	2	30	45	59	64	81	103	30	34	56	62	76
	3	52	60	78	82	92	105	51	58	77	81	91
FHM 135	1	61	65	99	104	131	149	46	51	83	86	122
	2	91	96	118	119	155	167	79	92	109	111	134
	3	118	119	144	146	156	168	103	112	130	137	146
FHM 320	1	112	121	187	217	252	312	97	102	156	162	228
	2	200	214	281	293	320	328	161	181	237	241	282
	3	245	267	312	320	325	333	207	233	275	280	306
	4	267	281	315	325	336	341	232	247	279	283	309

Filter series	Length	Filter element design - N Series						Filter element design - S Series				
		A03	A06	A10	A16	A25	M25	A03	A06	A10	A16	A25
FHM 500	1	211	232	281	289	309	394	126	135	208	210	261
	2	242	262	303	308	330	397	187	206	258	266	285
	3	284	294	336	338	357	399	226	230	285	290	315
	4	302	325	346	350	361	401	251	273	314	315	341
	5	325	334	356	361	373	401	296	301	335	338	360

Maximum flow rate for a complete pressure filter with a pressure drop $\Delta p = 1.5$ bar.

The reference fluid has a kinematic viscosity of 30 mm²/s (cSt) and a density of 0.86 kg/dm³.

For different pressure drop or fluid viscosity we recommend to use our selection software available on www.mpfiltri.com.

You can also calculate the right size using the formulas present on the FILTER SIZING paragraph at the beginning of the full catalogue or at the beginning of the filter family brochure.

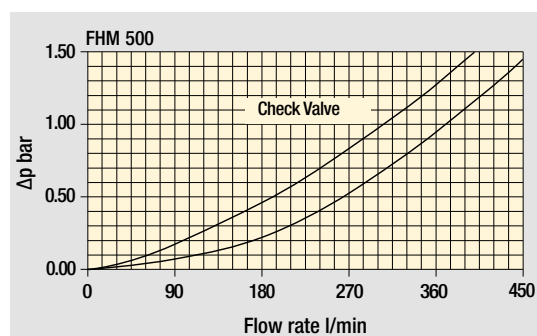
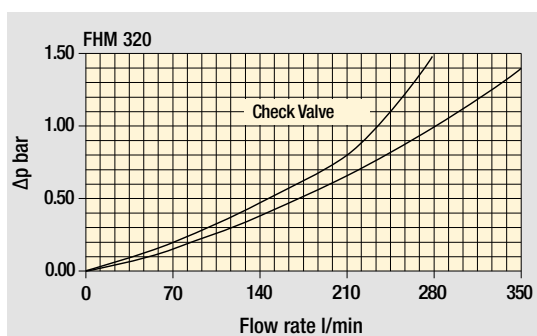
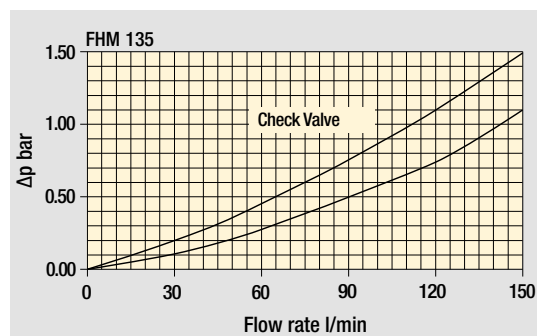
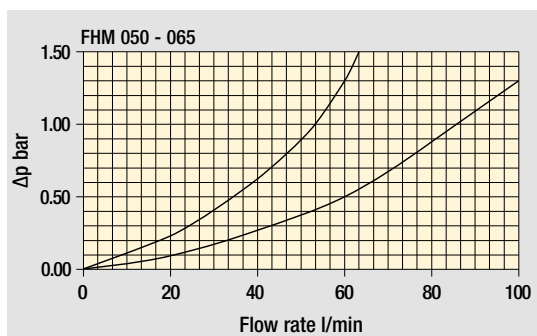
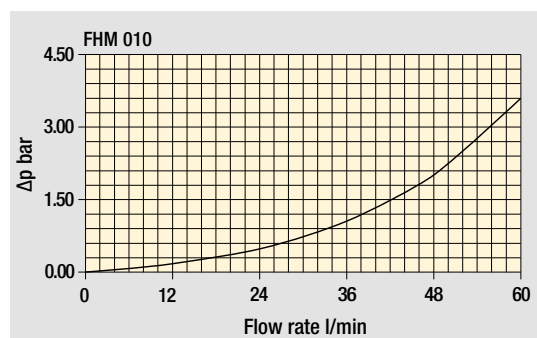
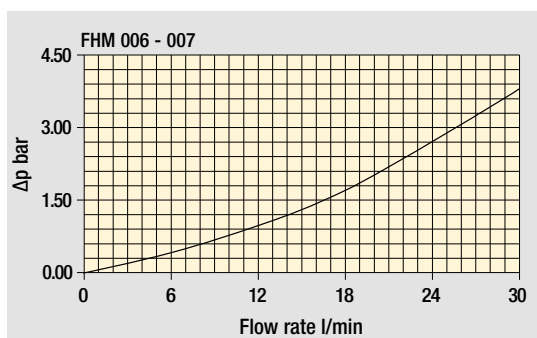
Please, contact our Sales Department for further additional information.

Hydraulic symbols

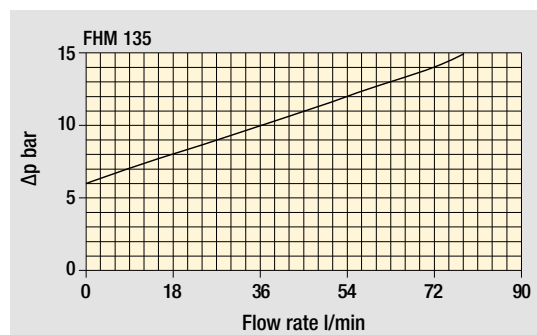
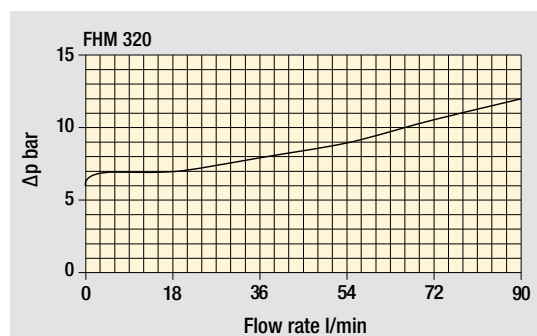
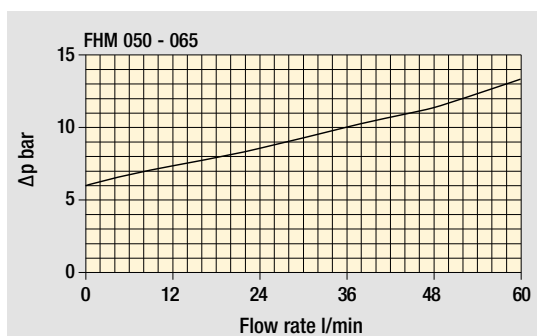
Filter series	Stile S	Stile S	Stile S	Stile B	Stile T	Stile D
FHM 006	•	-	-	-	-	-
FHM 007	•	-	-	-	-	-
FHM 010	-	•	-	-	-	-
FHM 050	-	-	•	•	•	•
FHM 065	-	-	•	•	•	•
FHM 135	-	-	•	•	•	•
FHM 320	-	-	•	•	•	•
FHM 500	-	-	•	•	•	•

Pressure drop

Filter housings Δp pressure drop



Bypass valve pressure drop



The curves are plotted using mineral oil with density of 0.86 kg/dm^3 in compliance with ISO 3968. Δp varies proportionally with density.

FHM FHM006 - FHM007 - FHM010

Designation & Ordering code

COMPLETE FILTER

Series and size				Configuration example: FHM010 2 S V G1 A03 H P01							
FHM006 FHM007 FHM010											
Length	FHM006	FHM007	FHM010								
1	•	-	-								
2	-	•	•								
3	-	•	•								
Valves											
S Without bypass											
Seals											
A NBR											
V FPM											
Connections											
G1 Manifold side "A"											
G2 Manifold side "B"											
Filtration rating (filter media)											
A03 Inorganic microfiber 3 µm				A16 Inorganic microfiber 16 µm							
A06 Inorganic microfiber 6 µm				A25 Inorganic microfiber 25 µm							
A10 Inorganic microfiber 10 µm				M25 Wire mesh 25 µm							
								Element Δp		Execution	
								H 210 bar		P01 MP Filtri standard	
										Pxx Customized	

FILTER ELEMENT

Element series and size				Configuration example: HP065 2 A03 A H P01							
	FHM006	FHM007	FHM010								
HP011	•	-	-								
HP065	-	•	•								
Element length	FHM006	FHM007	FHM010								
2	-	•	•								
3	•	•	•								
Filtration rating (filter media)											
A03 Inorganic microfiber 3 µm											
A06 Inorganic microfiber 6 µm											
A10 Inorganic microfiber 10 µm											
A16 Inorganic microfiber 16 µm											
A25 Inorganic microfiber 25 µm											
M25 Wire mesh 25 µm											
				Seals		Element Δp		Execution			
				A NBR		H 210 bar		P01 MP Filtri standard			
				V FPM				Pxx Customized			

CLOGGING INDICATORS

See page 721

DEA Electrical differential pressure indicator	
DEM Electrical differential pressure indicator	
DEU Electrical differential pressure indicator	
DLA Electrical / visual differential pressure indicator	

DLE Electrical / visual differential pressure indicator	
DTA Electronic differential pressure indicator	
DVA Visual differential pressure indicator	
DVM Visual differential pressure indicator	

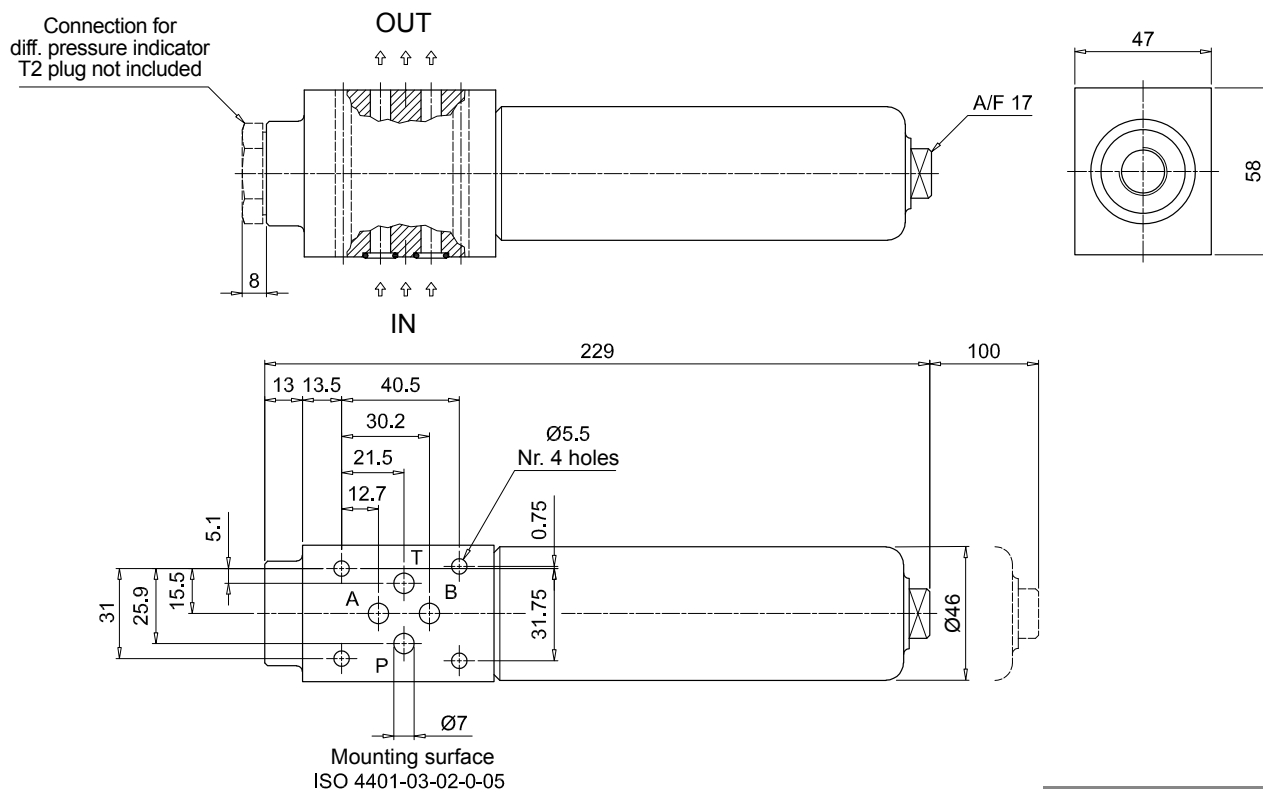
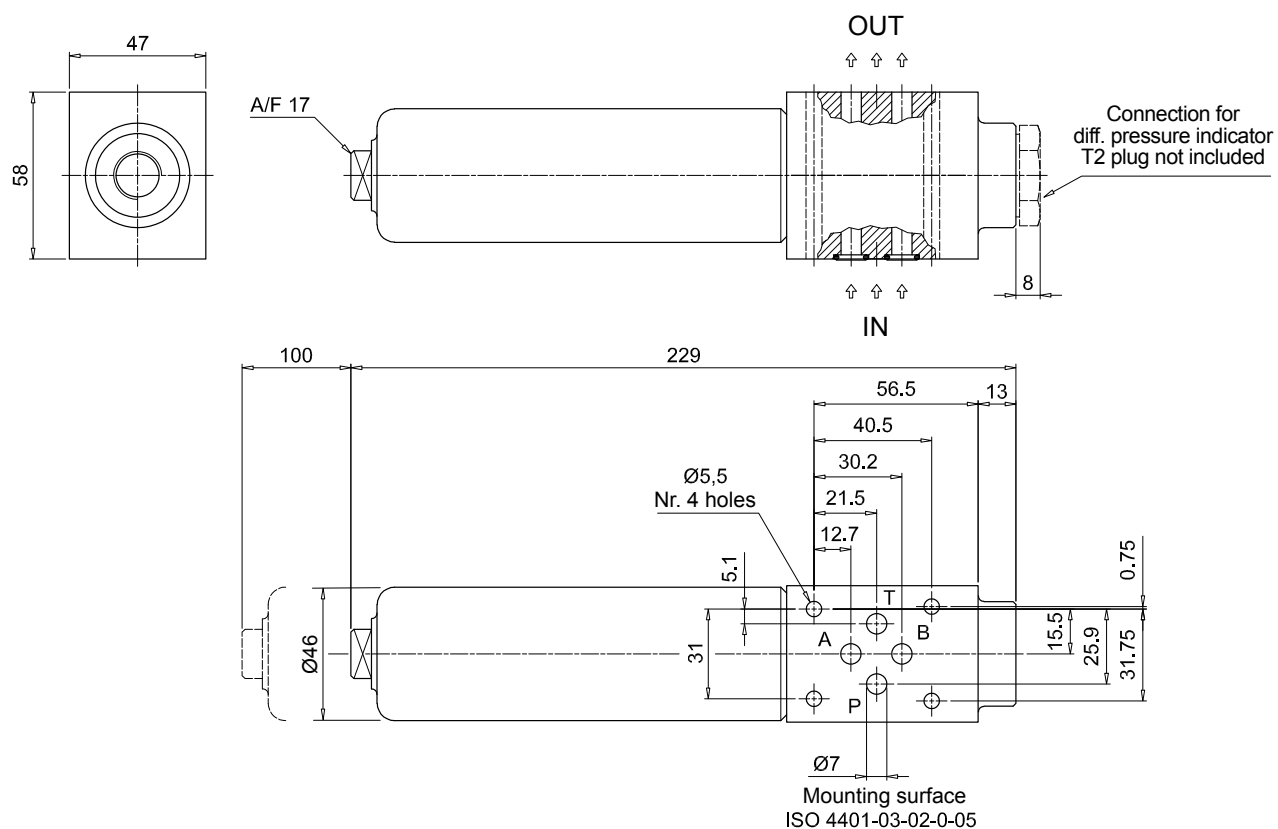
PLUGS

See page 741

T2 Plug (not included)	
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FHM006

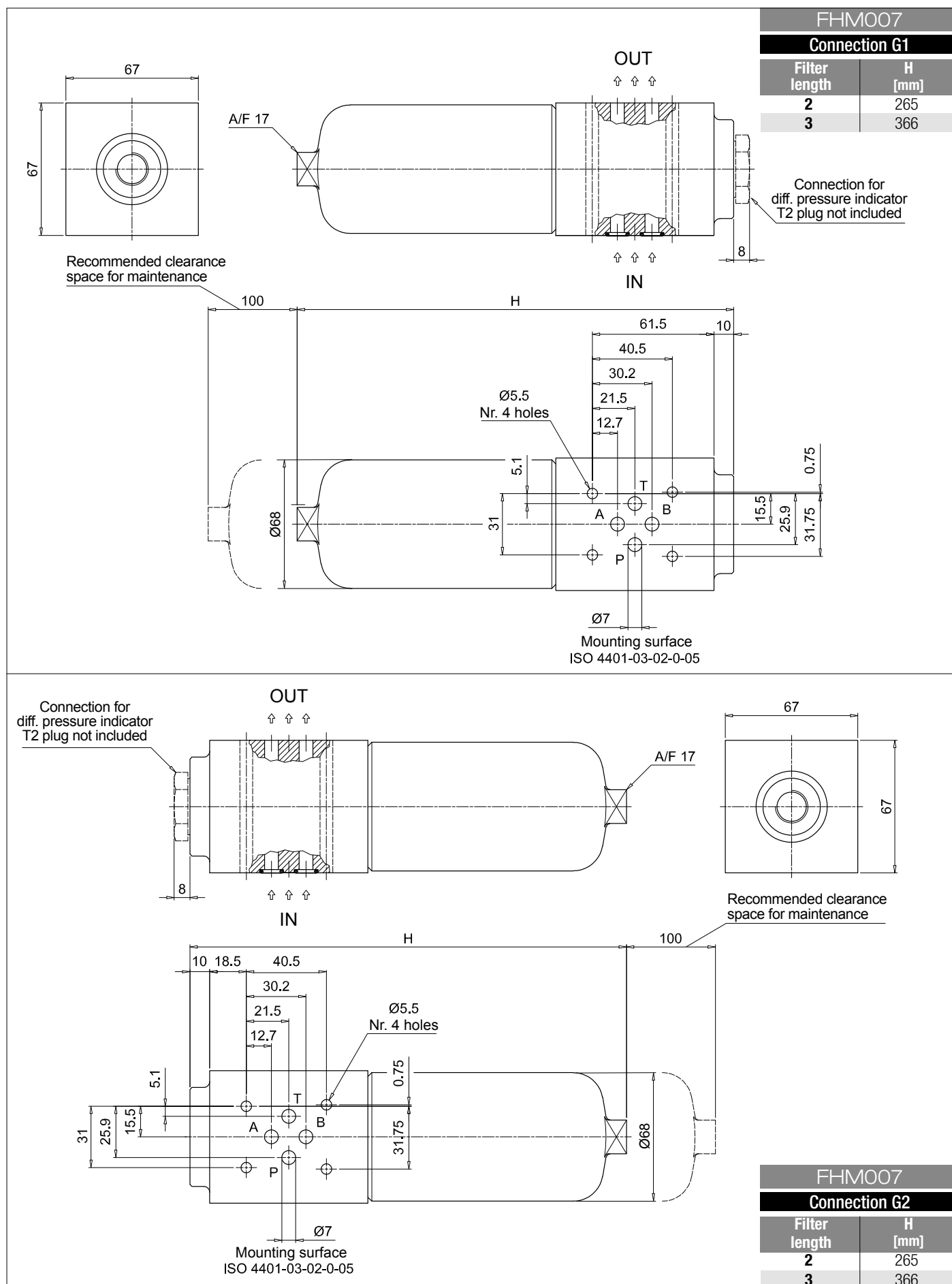
Connection G1

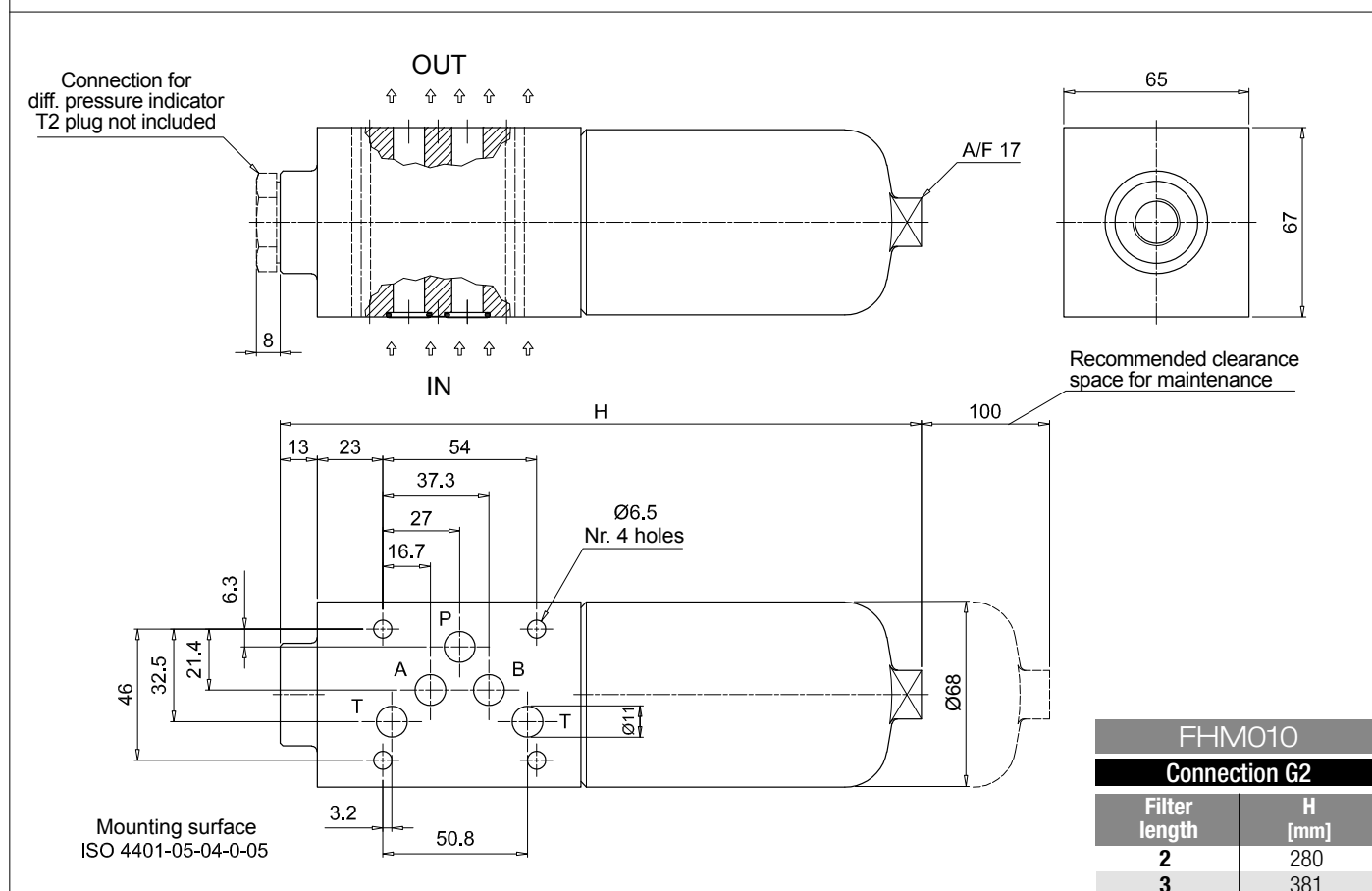
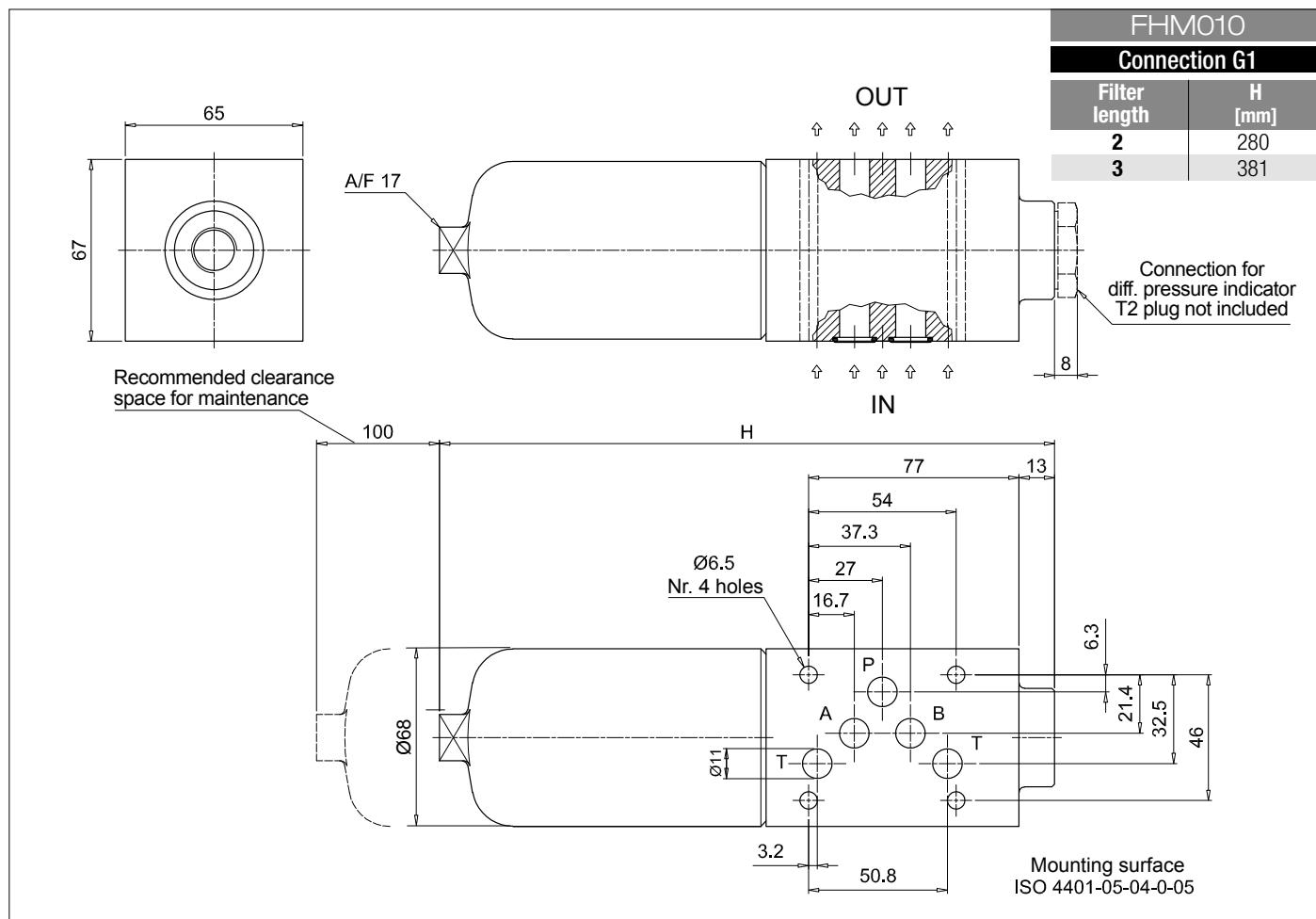


FHM006

Connection G2

Dimensions





FHM FHM050 - FHM065 - FHM135

Designation & Ordering code

COMPLETE FILTER

Series and size				Configuration example: FHM135 3 S A F1 A10 H P01									
FHM050 FHM065 FHM135													
Length	FHM050	FHM065	FHM135										
1	•	•	•										
2	•	•	•										
3	•	•	•										
4	•	-	-										
5	•	-	-										
Valves													
S	Without bypass												
B	With bypass 6 bar												
T	With check valve, without bypass												
D	With check valve, with bypass 6 bar												
Seals													
A	NBR												
V	FPM												
Connections													
F1	Manifold												
Filtration rating (filter media)													
A03	Inorganic microfiber	3 µm											
A06	Inorganic microfiber	6 µm											
A10	Inorganic microfiber	10 µm											
A16	Inorganic microfiber	16 µm											
A25	Inorganic microfiber	25 µm											
M25	Wire mesh	25 µm											

Valves:		FHM050				FHM065-135				Execution	
Element	Δp	S	B	T	D	S	B	T	D		
N	20 bar	-	•	-	•	-	•	-	•	P01	MP Filtri standard
H	210 bar	-	-	-	-	•	-	•	-	Pxx	Customized
S	210 bar	•	-	•	-	-	-	-	-		

FILTER ELEMENT

Element series and size				Configuration example: HP135 3 A10 A H P01					
HP050 HP065 HP135									
Element length	HP050	HP065	HP135						
1	•	•	•						
2	•	•	•						
3	•	•	•						
4	•	-	-						
5	•	-	-						
Filtration rating (filter media)									
A03	Inorganic microfiber	3 µm							
A06	Inorganic microfiber	6 µm							
A10	Inorganic microfiber	10 µm							
A16	Inorganic microfiber	16 µm							
A25	Inorganic microfiber	25 µm							
M25	Wire mesh	25 µm							

Seals		Element	HP050	HP065	HP135	Execution	
A	NBR	N	20 bar	•	•	P01	MP Filtri standard
V	FPM	H	210 bar	-	•	Pxx	Customized
		S	210 bar	•	-		

CLOGGING INDICATORS

See page 721

DEA	Electrical differential pressure indicator
DEM	Electrical differential pressure indicator
DEU	Electrical differential pressure indicator
DLA	Electrical / visual differential pressure indicator

DLE	Electrical / visual differential pressure indicator
DTA	Electronic differential pressure indicator
DVA	Visual differential pressure indicator
DVM	Visual differential pressure indicator

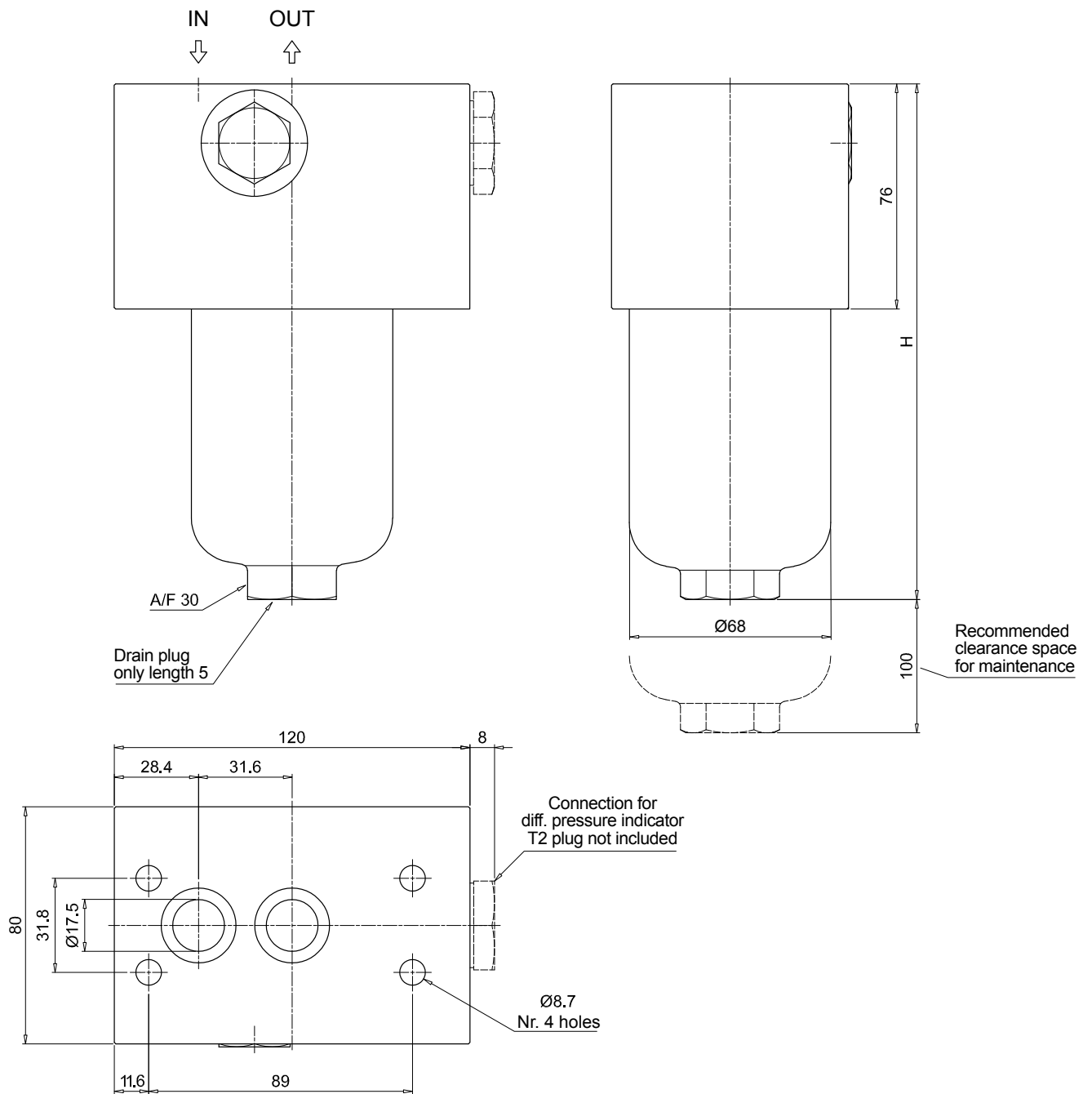
PLUGS

See page 741

T2	Plug (not included)
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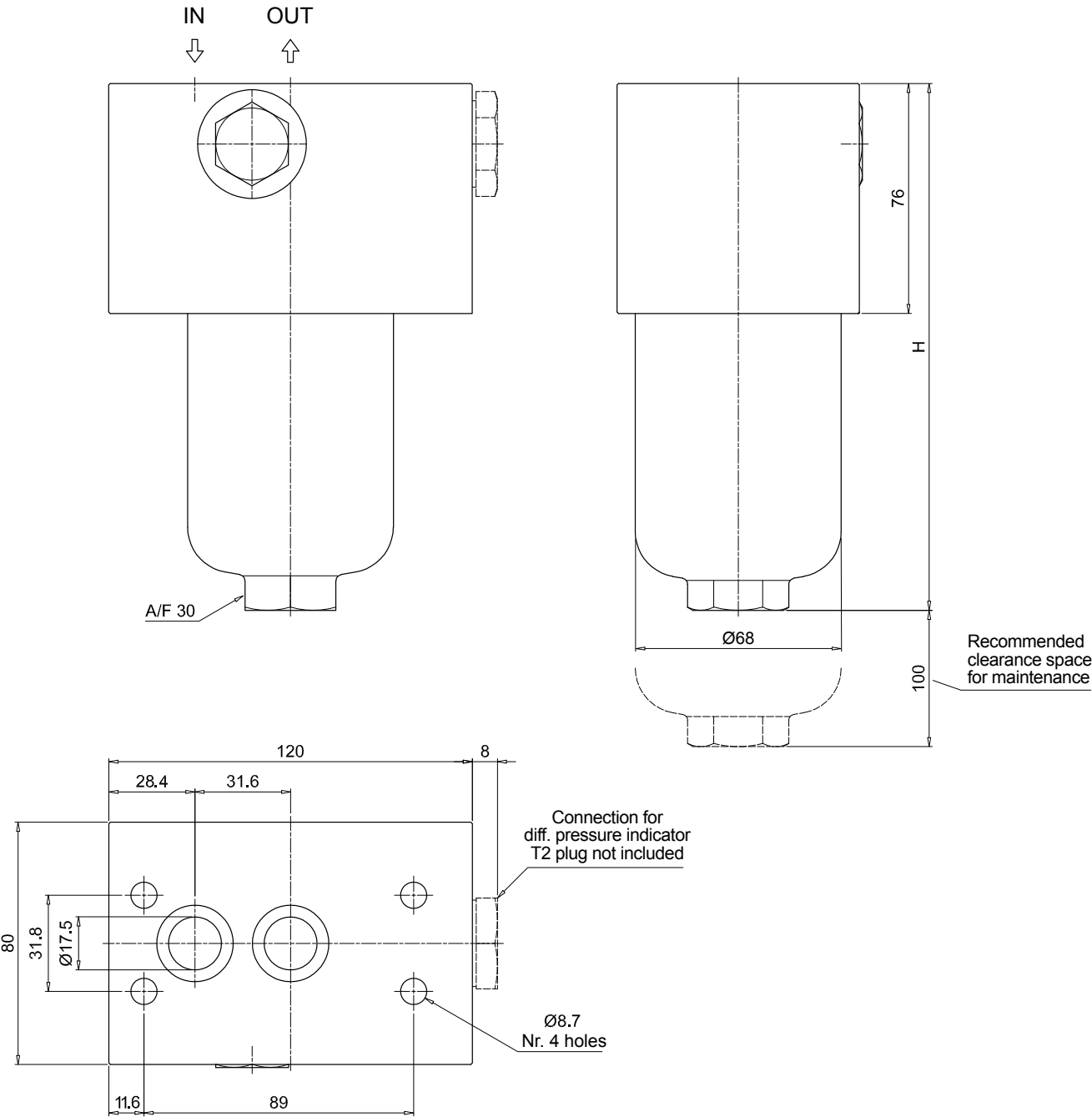
FHM050

Filter length	H [mm]
1	154
2	191
3	233
4	281
5	403



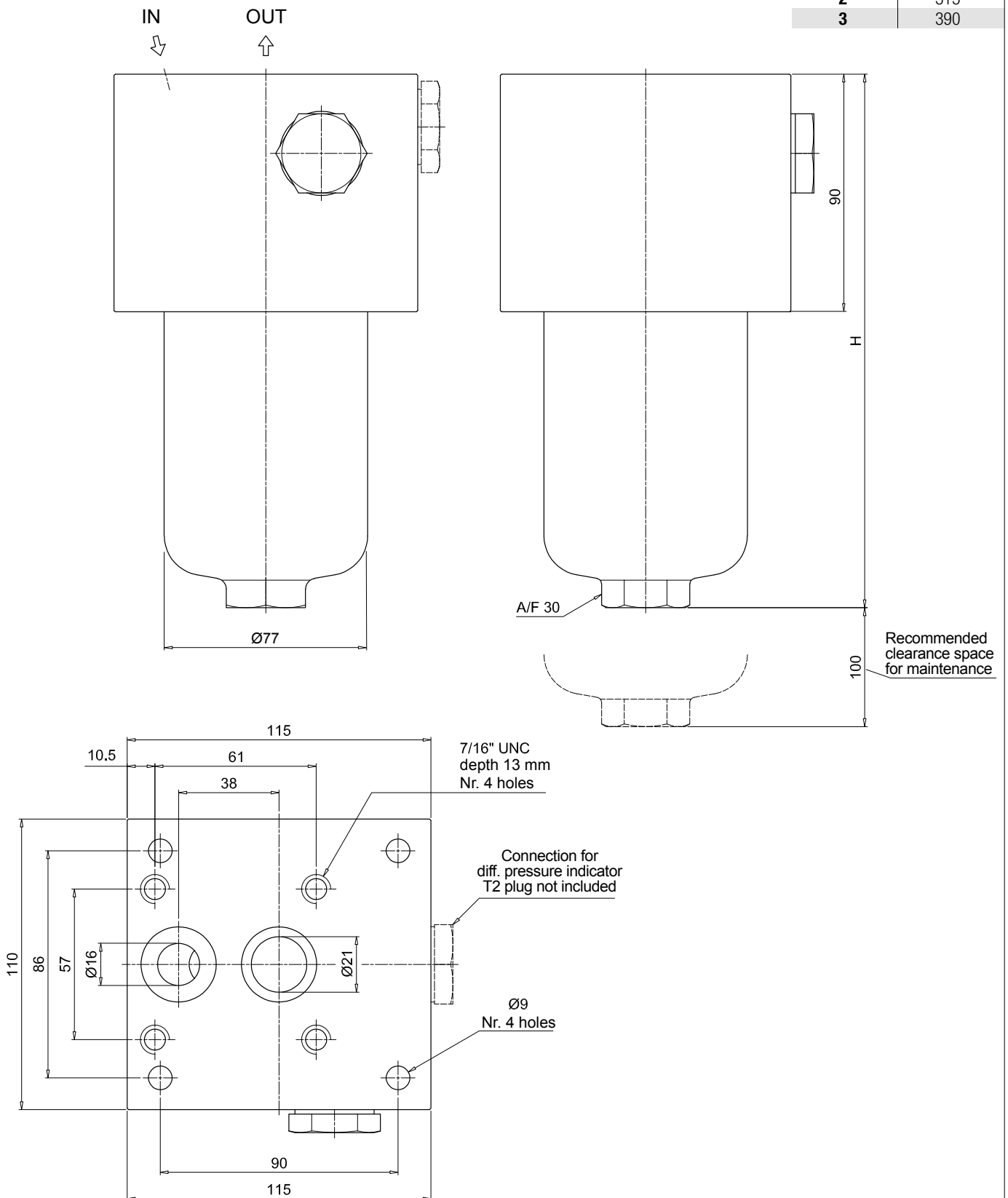
Dimensions

FHM065	
Filter length	H [mm]
1	162
2	193
3	295



FHM135

Filter length	H [mm]
1	202
2	315
3	390



FHM FHM320 - FHM500

Designation & Ordering code

COMPLETE FILTER

Series and size		Configuration example: FHM320 4 D A F1 A06 N P01													
FHM320 FHM500															
Length	FHM320	FHM500													
1	•	•													
2	•	•													
3	•	•													
4	•	•													
5	-	•													
Valves															
S	Without bypass														
B	With bypass 6 bar														
T	With check valve, without bypass														
D	With check valve, with bypass 6 bar														
Seals															
A	NBR														
V	FPM														
Connections															
F1	Manifold														
Filtration rating (filter media)															
A03	Inorganic microfiber	3 µm	A16	Inorganic microfiber	16 µm										
A06	Inorganic microfiber	6 µm	A25	Inorganic microfiber	25 µm										
A10	Inorganic microfiber	10 µm	M25	Wire mesh	25 µm										
		Valves:								Filter length					
		FHM320				FHM500									
Element	Δp	S	B	T	D	S	B	T	D	1	2	3	4	5	
N	20 bar	-	•	-	•	-	•	-	•	•	•	•	•	•	
H	210 bar	•	-	•	-	-	-	-	-						
S	210 bar	-	-	-	-	•	-	•	-						
Execution															
P01	MP Filtri standard	•	•	•	•	•	•	•	•	•	•	•	•	•	
P02	Maintenance from the bottom of the housing												•	•	
Pxx	Customized														

FILTER ELEMENT

Element series and size			Configuration example: HP320 4 A06 A N P01			
HP320 HP500						
Element length	HP320	HP500				
1	•	•				
2	•	•				
3	•	•				
4	•	•				
5		•				
Filtration rating (filter media)						
A03	Inorganic microfiber	3 µm				
A06	Inorganic microfiber	6 µm				
A10	Inorganic microfiber	10 µm				
A16	Inorganic microfiber	16 µm				
A25	Inorganic microfiber	25 µm				
M25	Wire mesh	25 µm				

Seals		Element Δp		HP320	HP500	Execution	
A	NBR	N	20 bar	•	•	P01	MP Filtri standard
V	FPM	H	210 bar	•	-	Pxx	Customized
		S	210 bar	-	•		

CLOGGING INDICATORS

See page 721

DEA	Electrical differential pressure indicator	DLE	Electrical / visual differential pressure indicator
DEM	Electrical differential pressure indicator	DTA	Electronic differential pressure indicator
DEU	Electrical differential pressure indicator	DVA	Visual differential pressure indicator
DLA	Electrical / visual differential pressure indicator	DVM	Visual differential pressure indicator

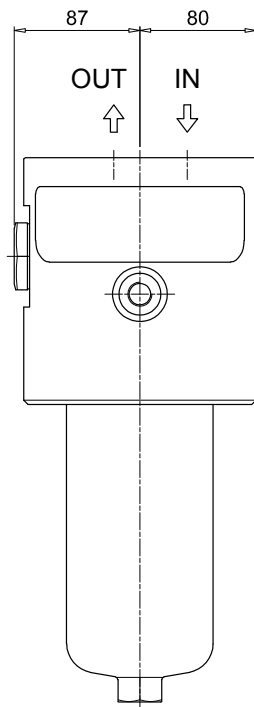
PLUGS

See page 741

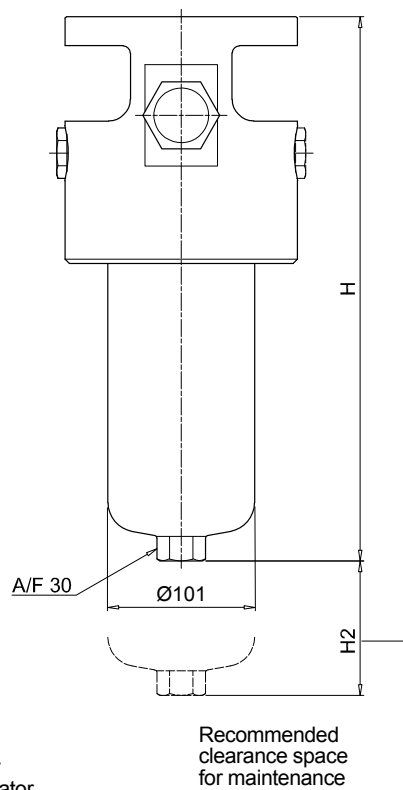
T2	Plug (not included)
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FHM320

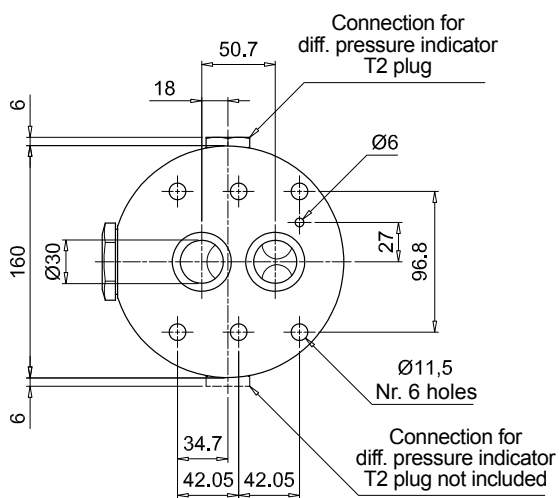
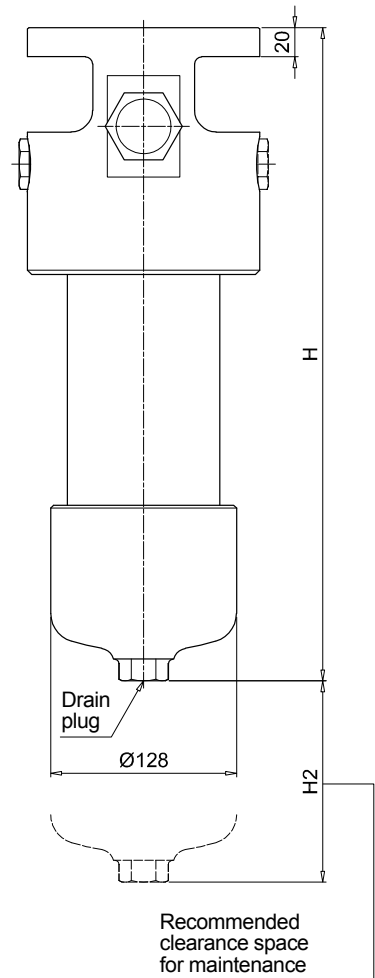
Filter length	H [mm]	H2 [mm]	
		Execution P01	Execution P02
1	293	150	-
2	416	150	-
3	548	150	-
4	702	150	550



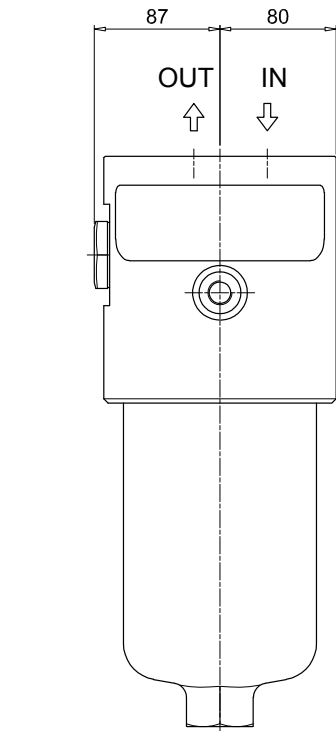
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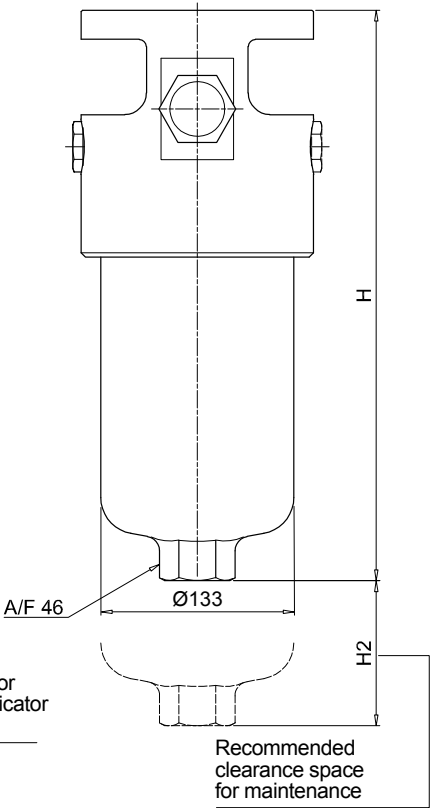
Length 4



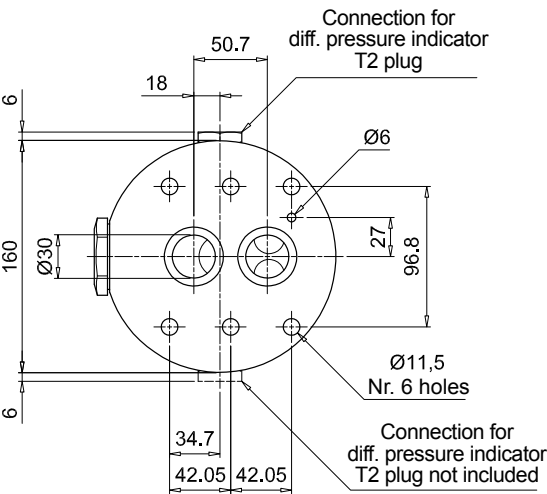
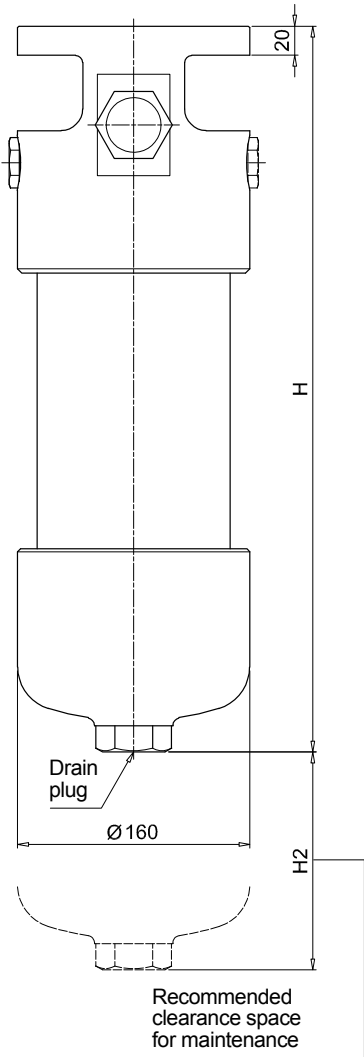
FHM500			
Filter length	H [mm]	H2 [mm]	
		Execution P01	Execution P02
1	355	150	-
2	445	150	-
3	521	150	-
4	679	150	480
5	845	150	650



Length 1 - 2 - 3

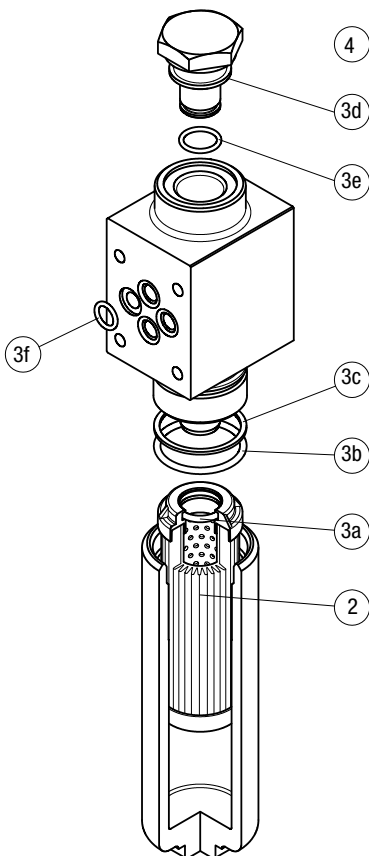


Length 4 - 5



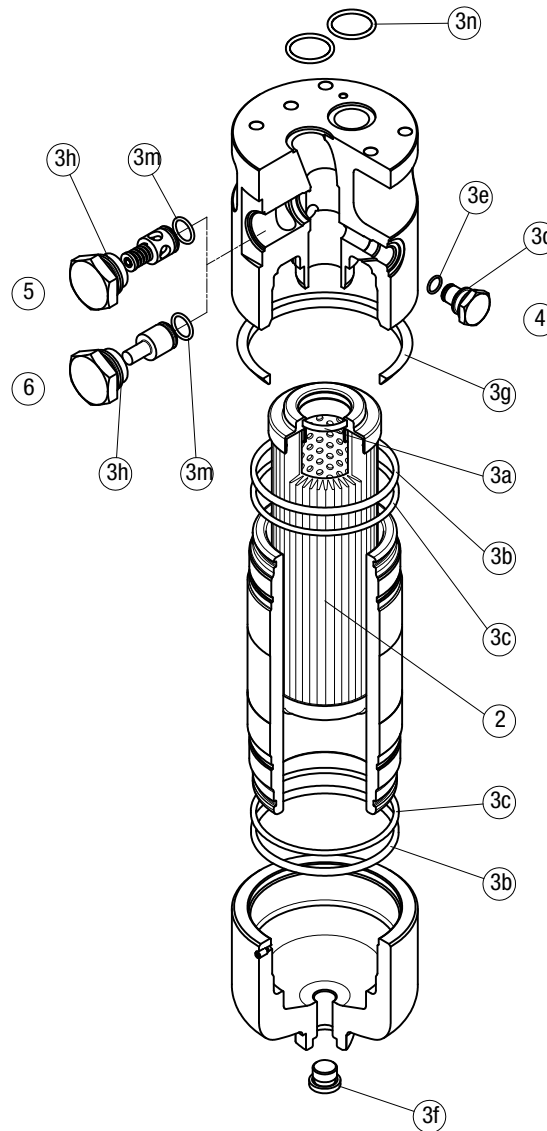
Order number for spare parts

FHM 006 - 007 - 010



Item:		Q.ty: 1 pc.		Q.ty: 1 pc.		Q.ty: 1 pc.	
		2		3 (3a ÷ 3f)		4	
Filter series	Filter element	Seal Kit code number		Indicator connection plug			
		NBR	FPM	NBR	FPM		
FHM 006	See order table	02050324	02050325	T2H	T2V		
FHM 007		02050600	02050601				
FHM 010		02050320	02050321				

FHM 050 - 065 - 135 - 320 - 500



Item:		Q.ty: 1 pc.		Q.ty: 1 pc.		Q.ty: 1 pc.		Q.ty: 1 pc.	
		2		3 (3a ÷ 3m)		4		5	
Filter series	Filter element	Seal Kit code number		Indicator connection plug		Bypass assembly		Non-bypass assembly	
		NBR	FPM	NBR	FPM	NBR	FPM	NBR	FPM
FHM 050	See order table	02050410	02050411	T2H	T2V	02001400	02001401	02001402	02001403
FHM 065		02050268	02050279			02001400	02001401	02001402	02001403
FHM 135		02050271	02050282			02001404	02001405	02001406	02001407
FHM 320		02050275	02050286			02001408	02001409	02001410	02001411
FHM 500		02050332	02050333			02001408	02001409	02001410	02001411

FHB series

Maximum working pressure up to 32 MPa (320 bar) - Flow rate up to 485 l/min



INSTALLATION, SERVICE AND MAINTENANCE MANUAL AND SAFETY INSTRUCTIONS



Please scan or click the QR codes to get updated electronic version of the related document:



FHB050



FHB065



FHB135



FHB320

For all the QR codes: Scan or click me!

Description

Technical data

High Pressure filters

Manifold

Maximum working pressure up to 32 MPa (320 bar)

Flow rate up to 485 l/min

FHB is a range of high pressure filter for protection of sensitive components in high pressure hydraulic systems in the mobile machines. They are directly connected to the side of the manifold, through the proper flanged interface.

Available features:

- Manifold connections up to Ø30 mm, for a maximum flow rate of 485 l/min
- Fine filtration rating, to get a good cleanliness level into the system
- Bypass valve, to relieve excessive pressure drop across the filter media
- Check valve, to protect the system against reverse flow
- Low collapse filter element "N", for use with filters provided with bypass valve
- High collapse filter element "H", for use with filters not provided with bypass valve
- High collapse filter element with external support "S", for filter element protection against the back pressure caused by the check valve in filters not provided with the bypass valve
- Visual, electrical and electronic differential clogging indicators

Common applications:

Delivery lines, in any high pressure industrial equipment or mobile machines

Filter housing materials

- Head: Phosphatized cast iron
- Housing: Phosphatized steel
- Bypass valve: Steel
- Check valve: Steel

Pressure

- Test pressure: 48 MPa (480 bar)
- Min. Burst pressure: 96 MPa (960 bar)
- Pulse pressure fatigue test: 1 000 000 cycles with pressure from 0 to 32 MPa (320 bar)

Bypass valve

- Opening pressure 0.6 MPa (6 bar) $\pm 10\%$
- Other opening pressures on request.

Filter element features

Filter FHB		Filter element HP	
Δp Element type			
Element media	Construction	Δp Series	Δp
A - Microfiber	Standard	N	20 bar
	High Δp	H	210 bar
	High Δp with external support	S	210 bar
M - Wire mesh	Standard	N	20 bar
Please see ordering code tables to check element Δp series availability based on filter features.			
Flow direction through the filter element: From OUT to IN			

Seals

- Standard NBR series A
- Optional FPM series V

Temperature

From -25 °C to +110 °C

Connections

Manifold mounting

Note

FHB filters are provided for vertical mounting

Weights [kg] and volumes [dm³]

Filter series	Weights [kg]					Volumes [dm³]						
	Length	1	2	3	4	5	Length	1	2	3	4	5
FHB 050		2.61	2.98	3.39	3.86	5.04		0.21	0.30	0.40	0.52	0.81
FHB 065		3.33	3.69	4.90	-	-		0.20	0.27	0.49	-	-
FHB 135		6.61	8.21	9.21	-	-		0.40	0.73	0.94	-	-
FHB 320		12.95	15.08	17.37	26.77	-		0.91	1.63	2.40	3.59	-

Flow rates [l/min]

Filter series	Length	Filter element design - N Series						Filter element design - S Series				
		A03	A06	A10	A16	A25	M25	A03	A06	A10	A16	A25
FHB 050	1	43	42	79	81	101	131	30	40	58	60	74
	2	53	58	84	93	112	132	46	50	76	86	108
	3	67	70	94	101	119	133	59	62	87	95	115
	4	82	87	106	108	122	134	74	80	101	103	119
	5	102	104	119	122	127	136	90	92	105	113	126

Filter series	Length	Filter element design - N Series						Filter element design - H Series				
		A03	A06	A10	A16	A25	M25	A03	A06	A10	A16	A25
FHB 065	1	25	33	55	62	87	133	23	25	49	58	81
	2	33	51	70	76	101	134	33	38	66	75	94
	3	60	71	97	103	118	138	60	68	95	102	116
FHB 135	1	67	72	120	129	177	212	49	55	97	100	160
	2	109	116	152	154	224	250	90	110	137	140	182
	3	153	155	201	205	226	253	126	142	175	187	207
FHB 320	1	130	143	238	286	343	442	110	117	192	201	304
	2	259	281	391	409	454	468	200	230	319	325	392
	3	332	368	441	455	463	476	269	312	381	389	432
	4	368	390	446	462	481	488	311	334	388	394	437

Maximum flow rate for a complete pressure filter with a pressure drop $\Delta p = 1.5$ bar.

The reference fluid has a kinematic viscosity of 30 mm²/s (cSt) and a density of 0.86 kg/dm³.

For different pressure drop or fluid viscosity we recommend to use our selection software available on www.mpfiltri.com.

You can also calculate the right size using the formulas present on the FILTER SIZING paragraph at the beginning of the full catalogue or at the beginning of the filter family brochure.

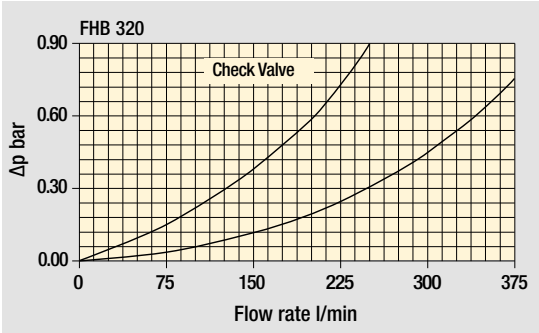
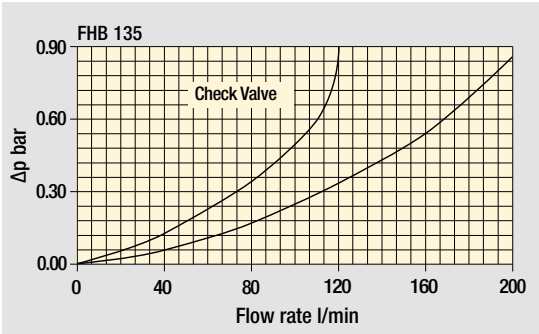
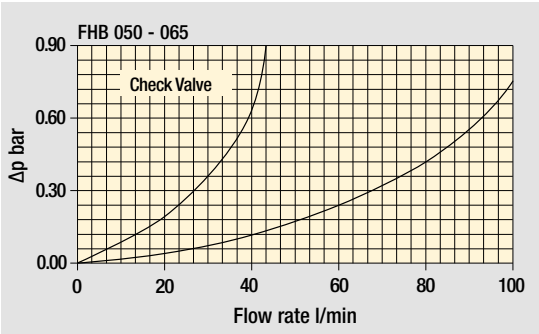
Please, contact our Sales Department for further additional information.

Hydraulic symbols

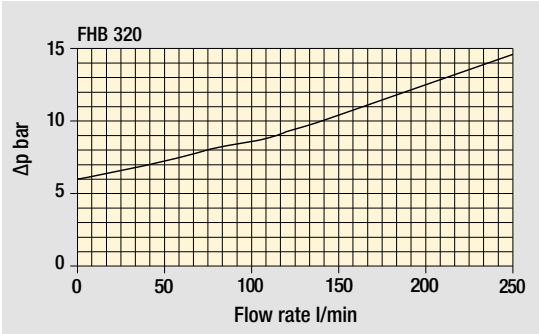
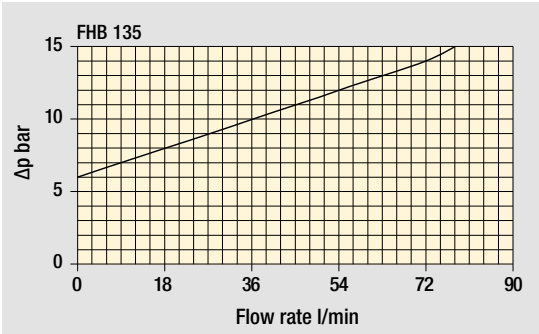
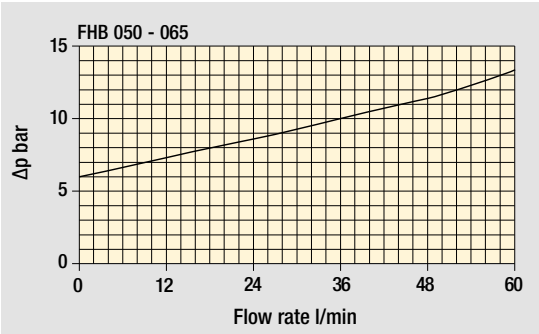
Filter series	Style S	Style B	Style T	Style D
FHB 050	•	•	•	•
FHB 065	•	•	•	•
FHB 135	•	•	•	•
FHB 320	•	•	•	•

Pressure drop

Filter housings Δp pressure drop



Bypass valve pressure drop



The curves are plotted using mineral oil with density of 0.86 kg/dm³ in compliance with ISO 3968. Δp varies proportionally with density.

FHB FHB050 - FHB065 - FHB135 - FHB320

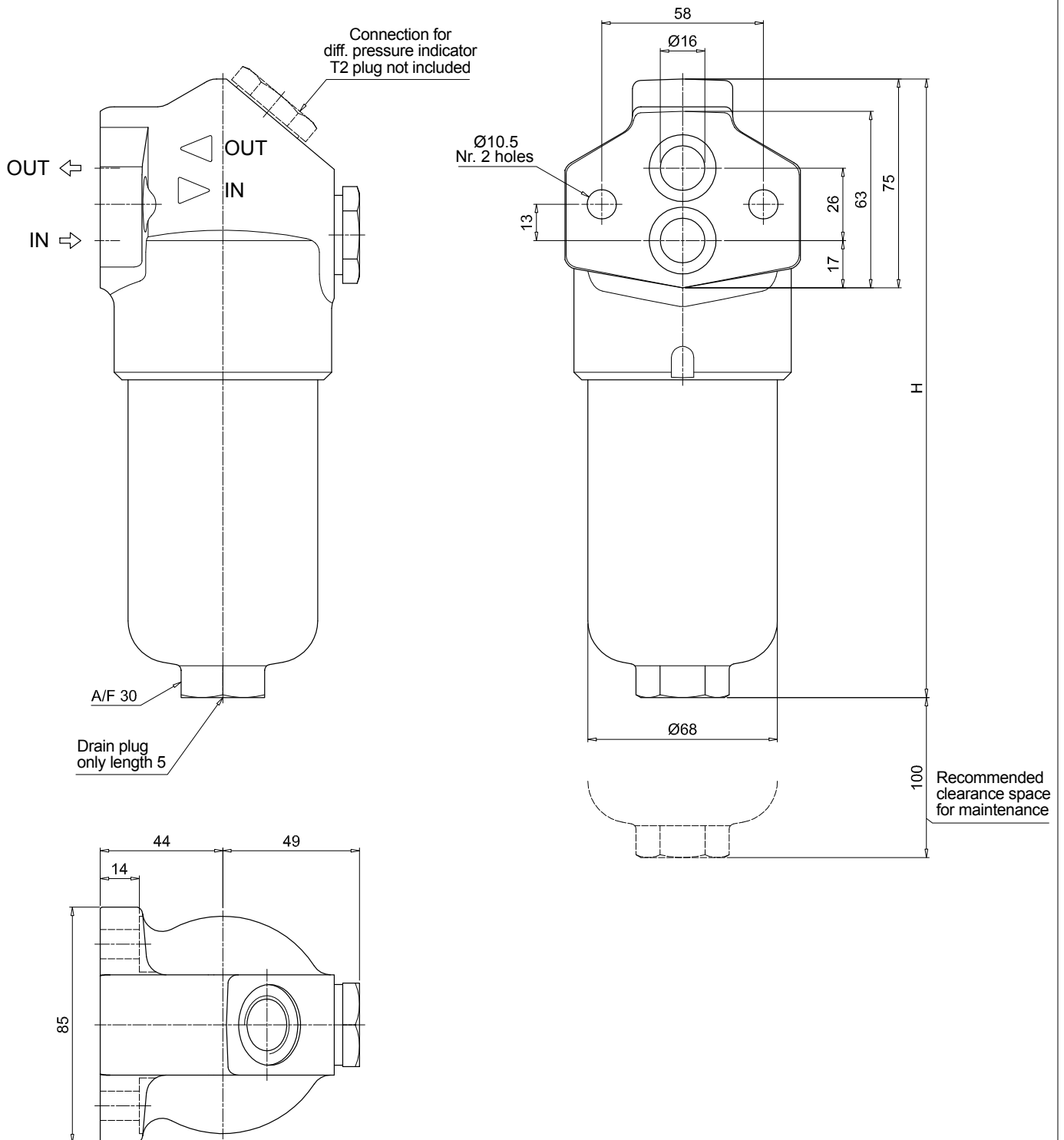
Designation & Ordering code

COMPLETE FILTER

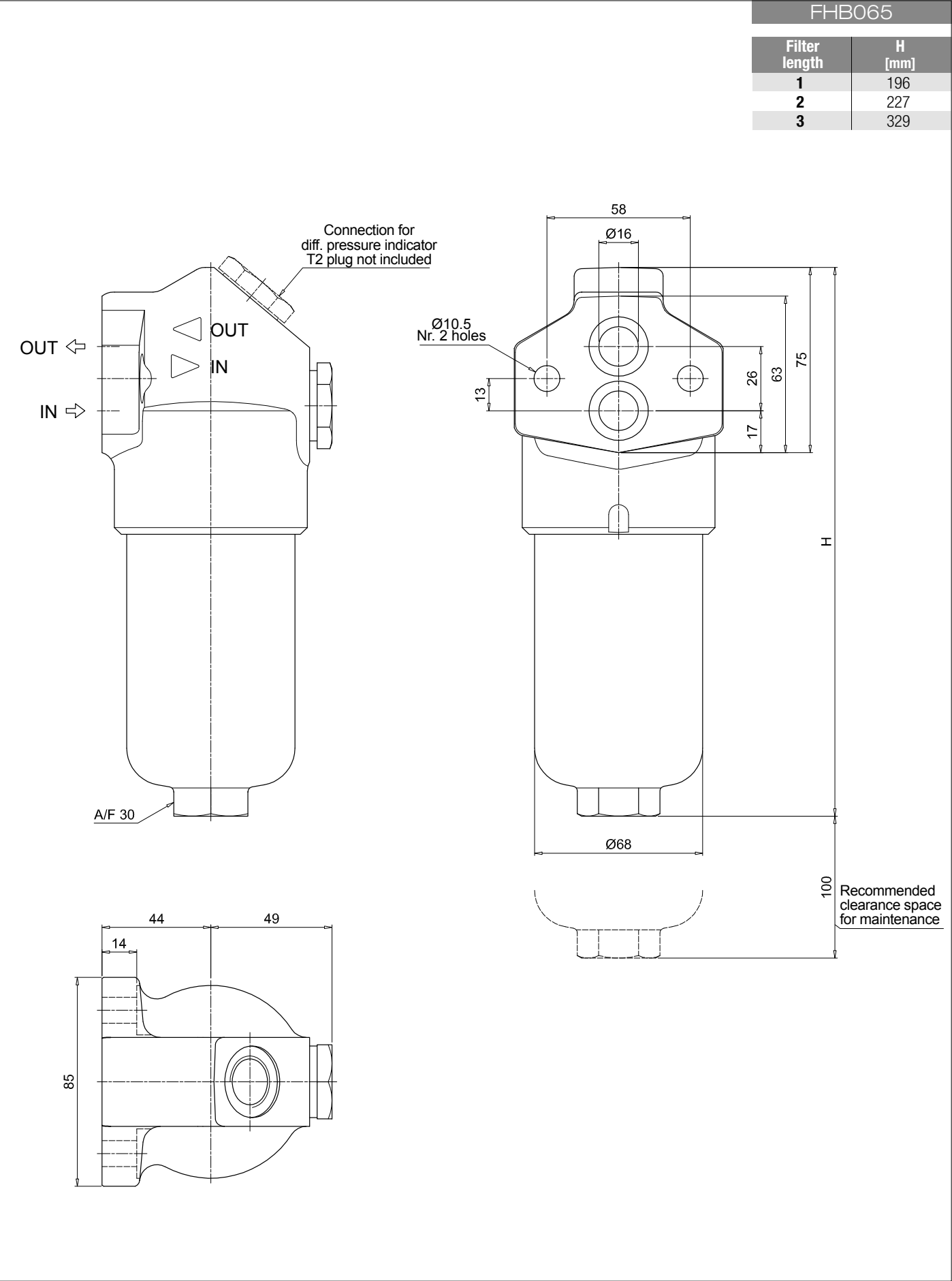
Series and size					Configuration example: FHB320 4 S A F1 A06 H P01									
FHB050 FHB065 FHB135 FHB320														
Length	FHB050	FHB065	FHB135	FHB320										
1	•	•	•	•										
2	•	•	•	•										
3	•	•	•	•										
4	•	-	-	•										
5	•	-	-	-										
Valves														
S Without bypass														
B With bypass 6 bar														
T With check valve, without bypass														
D With check valve, with bypass 6 bar														
Seals														
A NBR														
V FPM														
Connections														
F1 Manifold														
Filtration rating (filter media)														
A03 Inorganic microfiber 3 µm														
A06 Inorganic microfiber 6 µm														
A10 Inorganic microfiber 10 µm														
A16 Inorganic microfiber 16 µm														
A25 Inorganic microfiber 25 µm														
M25 Wire mesh 25 µm														

FHB050

Filter length	H [mm]
1	187
2	224
3	266
4	314
5	436

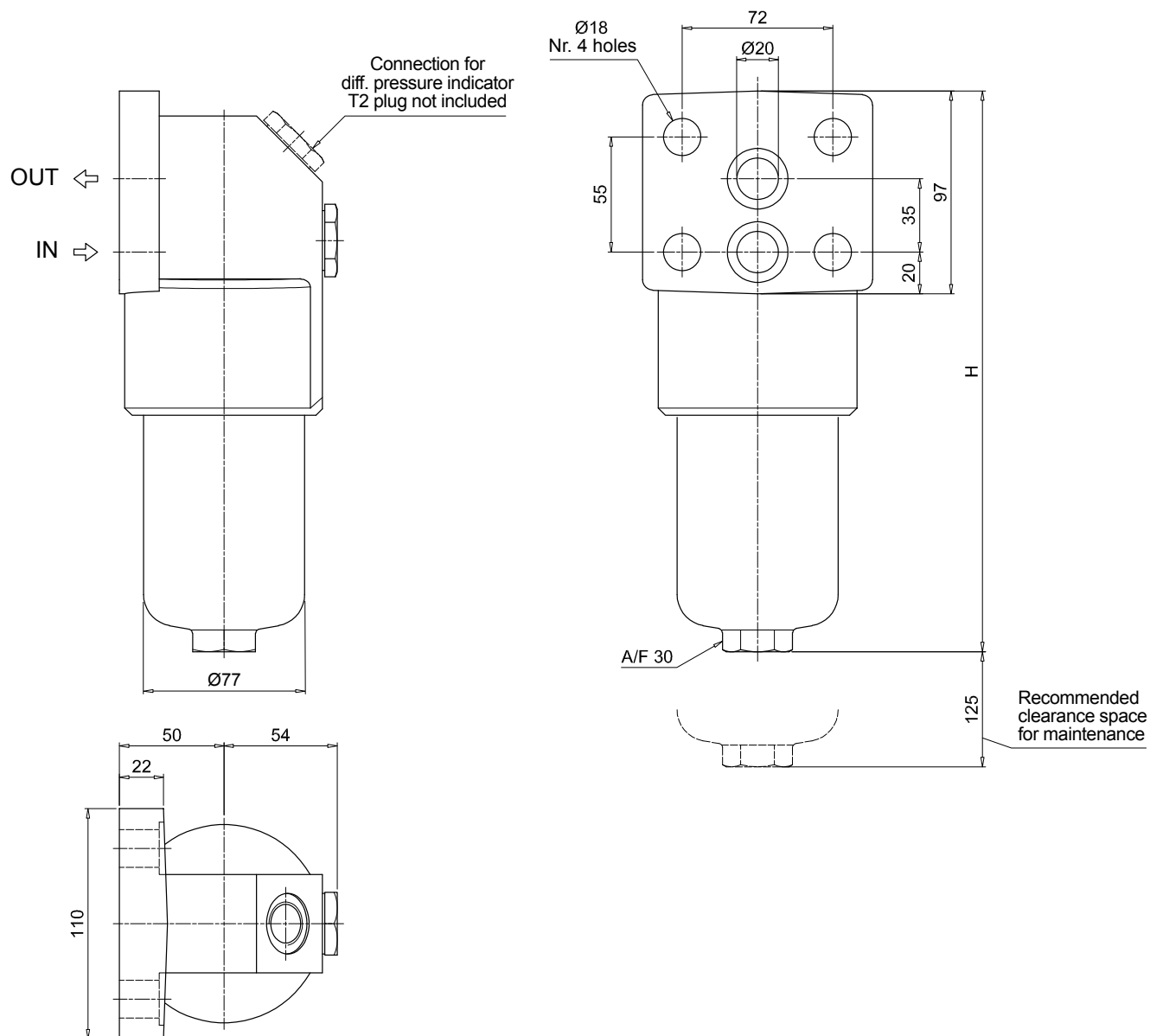


Dimensions



FHB135

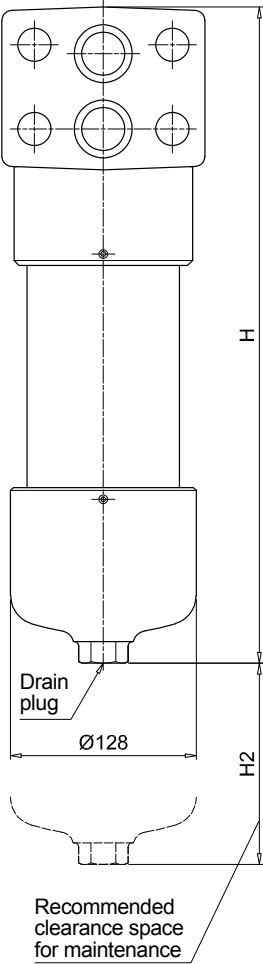
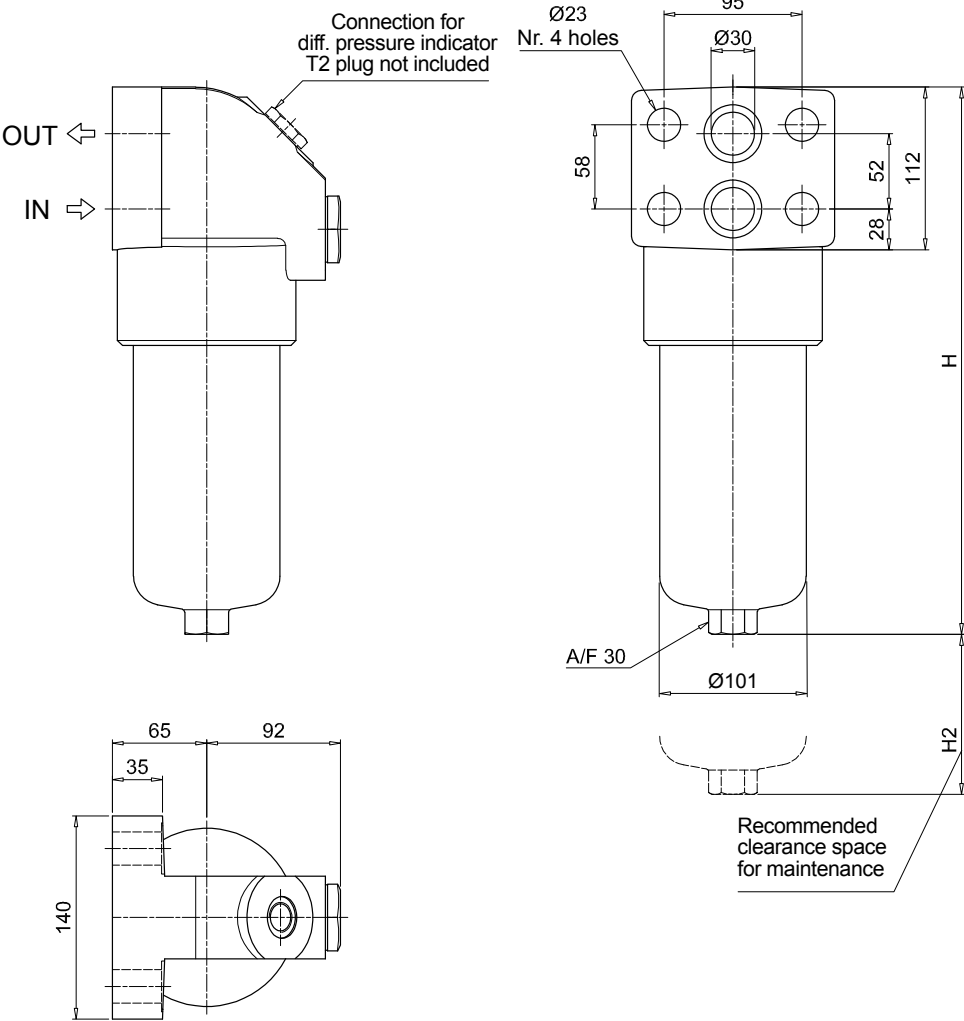
Filter length	H [mm]
1	268
2	381
3	456



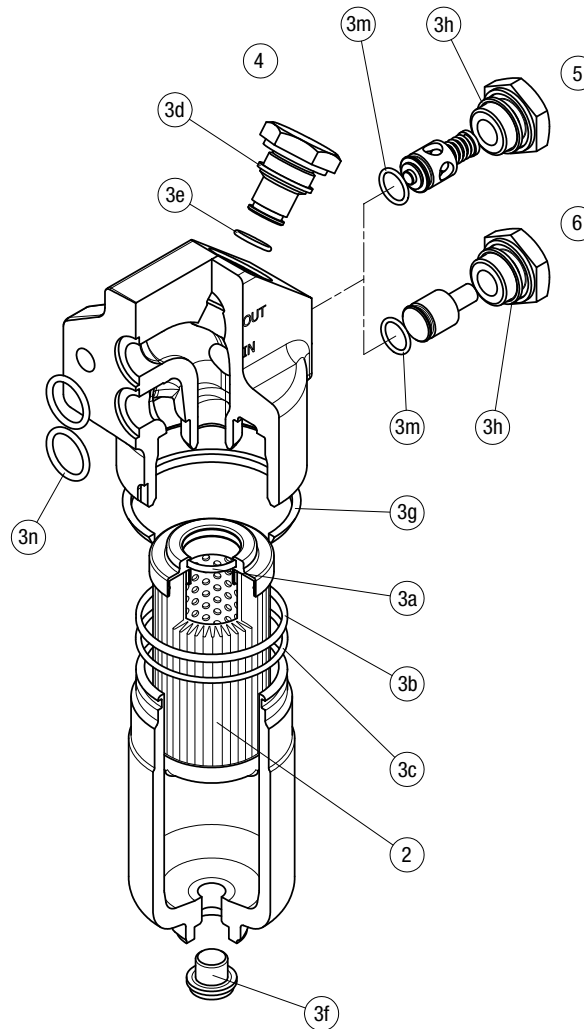
FHB320			
Filter length	H [mm]	H2 [mm]	
		Execution P01	Execution P02
1	301	150	-
2	424	150	-
3	556	150	-
4	709	150	550

Length 1 - 2 - 3

Length 4



FHB 050 - 065 - 135 - 320



Item:		Q.ty: 1 pc.		Q.ty: 1 pc.		Q.ty: 1 pc.		Q.ty: 1 pc.		Q.ty: 1 pc.	
		2		3 (3a ÷ 3n)		4		5		6	
Filter series	Filter element	Seal Kit code number		Indicator connection plug		Bypass assembly		Non-bypass assembly			
		NBR	FPM	NBR	FPM	NBR	FPM	NBR	FPM	NBR	FPM
FHB 050	See order table	02050412	02050413	T2H	T2V	02001312	02001385	02001314	02001386		
FHB 065		02050266	02050277			02001312	02001385	02001314	02001386		
FHB 135		02050270	02050281			02001312	02001385	02001314	02001386		
FHB 320		02050273	02050284			02001381	02001382	02001383	02001384		

FHF 325 series

Maximum working pressure up to 35 MPa (350 bar) - Flow rate up to 550 l/min

Filter housing according to SAE J2066 for HF4 filter elements



INSTALLATION, SERVICE AND MAINTENANCE MANUAL AND SAFETY INSTRUCTIONS



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FHF 325 GENERAL INFORMATION

Filter housing according to SAE J2066 for HF4 filter elements

Description

High Pressure filters

Manifold

Maximum working pressure up to 35 MPa (350 bar)

Flow rate up to 550 l/min

FHF is a range of high pressure filter for protection of sensitive components in high pressure hydraulic systems in the mobile machines. They are directly connected to the lines of the system through the hydraulic fittings or the proper flanged interface.

Available features:

- 1 1/2" female threaded connections, 1 1/2" flanged connections and manifold connections up to 1 1/2", for a maximum flow rate of 550 l/min
- Base-mounting design, for ease of the replacement of the filter element
- Filter element designed in accordance with SAE J2066 HF4 regulation
- Fine filtration rating, to get a good cleanliness level into the system
- Bypass valve, to relieve excessive pressure drop across the filter media
- Low collapse filter element "N", for use with filters provided with bypass valve
- Visual, electrical and electronic differential clogging indicators

Common applications:

Delivery lines, in any high pressure industrial equipment

Technical data

Filter housing materials

- Head: Phosphatized cast iron
- Housing: Phosphatized steel
- Cover: Cast iron (chemical heat treatment)
- Bypass valve: Brass - Steel

Pressure

- Test pressure: 52.5 MPa (525 bar)
- Min. Burst pressure: 105 MPa (1050 bar)
- Pulse pressure fatigue test: 1 000 000 cycles with pressure from 0 to 35 MPa (350 bar)

Bypass valve

- Opening pressure 0.6 MPa (6 bar) $\pm 10\%$
- Other opening pressures on request.

Filter element features

Filter FHF		Filter element HF	
Δp Element type			
Element media	Construction	Δp Series	Δp
A - Microfiber	Standard	N	20 bar
M - Wire mesh	Standard	N	20 bar
Please see ordering code tables to check element Δp series availability based on filter features.			
Flow direction through the filter element: From OUT to IN			

Seals

- Standard NBR series A
- Optional FPM series V

Temperature

From -25 °C to +110 °C

Connections

FHF 325: In-line threaded connection
FHF 325: In-line flanged connection
FHF 325: Manifold mounting

Note

FHF filters are provided for vertical mounting

Weights [kg] and volumes [dm³]

Filter series	Weights [kg]			Volumes [dm³]				
	Length	1	2	3	Length	1	2	3
FHF 325		23.90	32.68	41.47		3.50	5.80	8.11

GENERAL INFORMATION FHF 325

Filter housing according to SAE J2066 for HF4 filter elements

Flow rates [l/min]

Filter series	Length	Filter element design - N Series					
		A03	A06	A10	A16	A25	M25
FHF 325	1	302	339	348	419	500	556
	2	401	424	434	457	505	557
	3	416	451	460	469	510	559

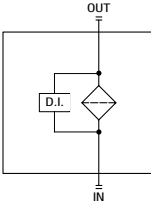
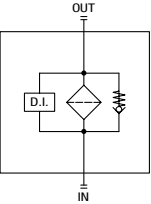
Maximum flow rate for a complete pressure filter with a pressure drop $\Delta p = 1.5$ bar.

The reference fluid has a kinematic viscosity of 30 mm²/s (cSt) and a density of 0.86 kg/dm³.

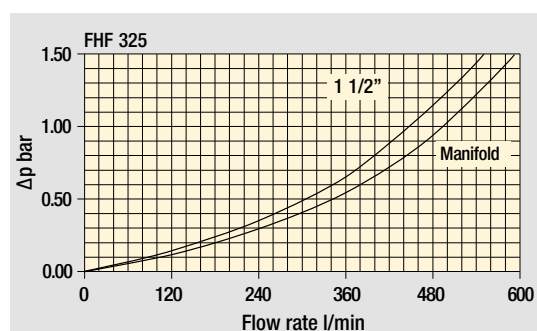
For different pressure drop or fluid viscosity we recommend to use our selection software available on www.mpfiltri.com.

You can also calculate the right size using the formulas present on the FILTER SIZING paragraph at the beginning of the full catalogue or at the beginning of the filter family brochure. Please, contact our Sales Department for further additional information.

Hydraulic symbols

Filter series	Style S	Style B
FHF 325	•	•
		

Pressure drop Filter housings Δp pressure drop



The curves are plotted using mineral oil with density of 0.86 kg/dm³ in compliance with ISO 3968. Δp varies proportionally with density.

Designation & Ordering code

Series and size		Configuration example: FHF325										2	S	A	H	7	A10	N	P01	
FHF325																				
Length																				
1	2	3																		
Valves																				
S	Without bypass																			
B	With bypass 6 bar																			
Seals																				
A	NBR																			
V	FPM																			
Connections																				
A	G 1 1/2"																			
B	1 1/2" NPT																			
C	SAE 24 - 1 7/8" - 12 UN																			
G	1 1/2" SAE 6000 psi/M																			
H	1 1/2" SAE 6000 psi/UNC																			
M	Manifold ø1.38"																			
N	Manifold ø1.50"																			
Connection for differential pressure indicator																				
7	With two connections plugged on both sides																			
Filtration rating (filter media)																				
A03	Inorganic microfiber	3 µm																		
A06	Inorganic microfiber	6 µm																		
A10	Inorganic microfiber	10 µm																		
A16	Inorganic microfiber	16 µm																		
A25	Inorganic microfiber	25 µm																		
M25	Wire mesh	25 µm																		

Element Δp
N 20 bar

Execution
P01 MP Filtri standard
Pxx Customized

Configuration example: **HF325** | **2** | **A10** | **A** | **N** | **P01**

Element series and size
HF325

Element length
1 | **2** | **3**

Filtration rating (filter media)
A03 Inorganic microfiber 3 µm
A06 Inorganic microfiber 6 µm
A10 Inorganic microfiber 10 µm
A16 Inorganic microfiber 16 µm
A25 Inorganic microfiber 25 µm
M25 Wire mesh 25 µm

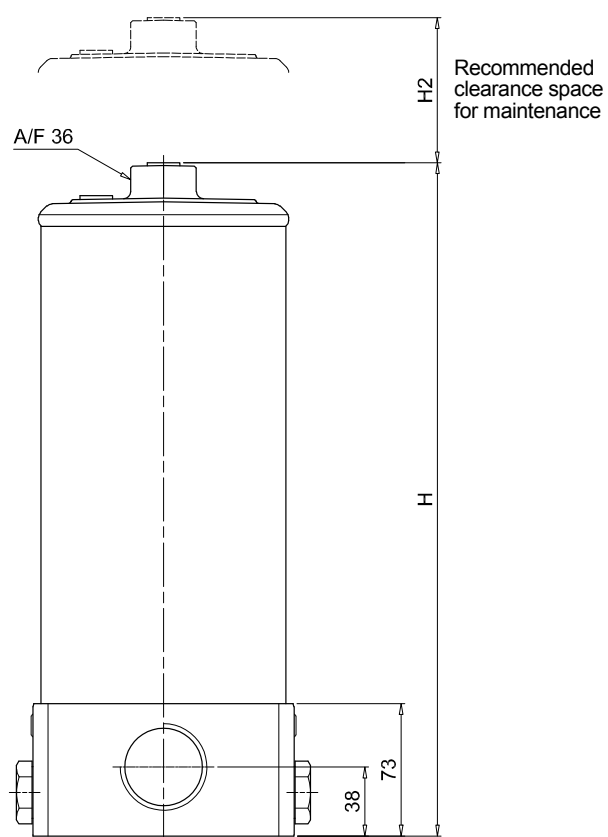
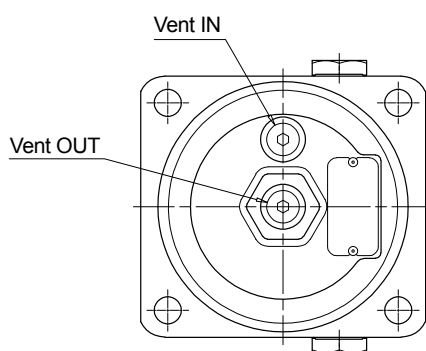
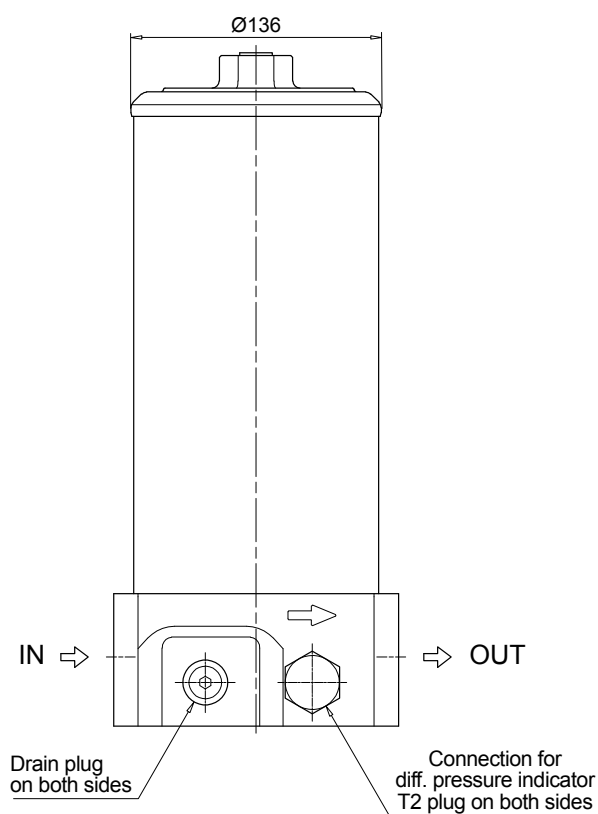
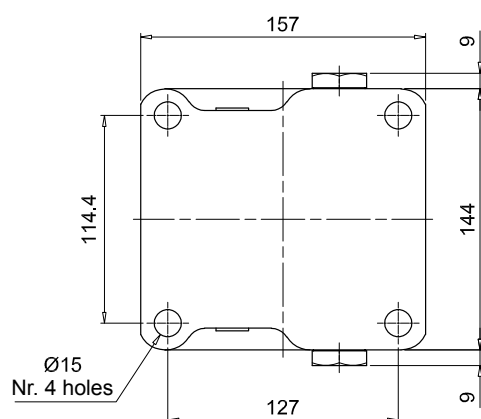
Seals
A NBR
V FPM

Element Δp
N 20 bar

Execution
P01 MP Filtri standard
Pxx Customized

DLE	Electrical / visual differential pressure indicator
DTA	Electronic differential pressure indicator
DVA	Visual differential pressure indicator
DVM	Visual differential pressure indicator

T2 Plug (not included)

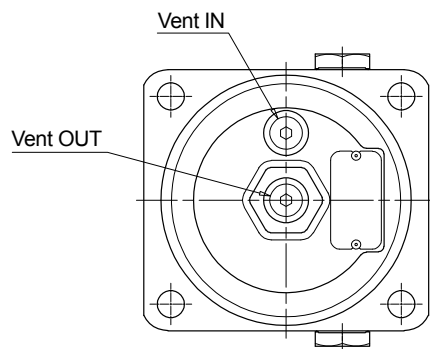
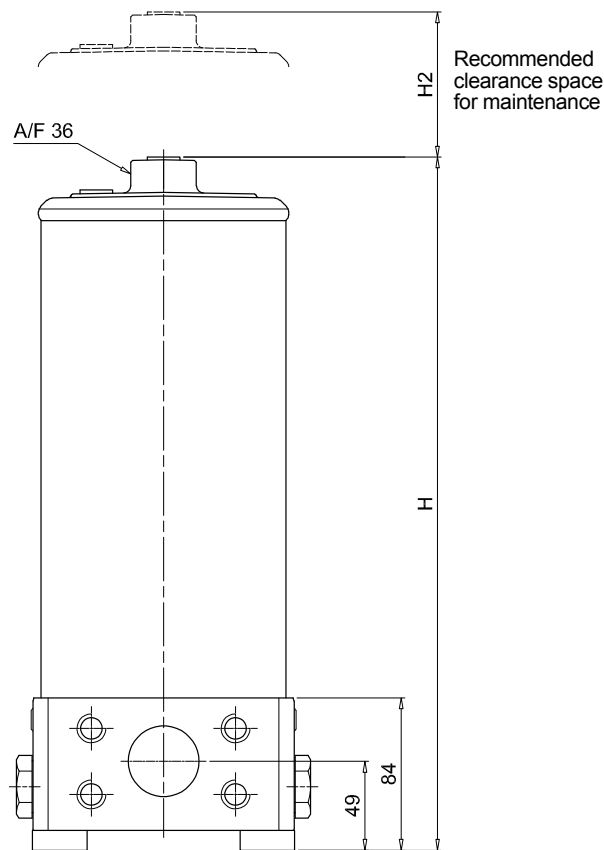
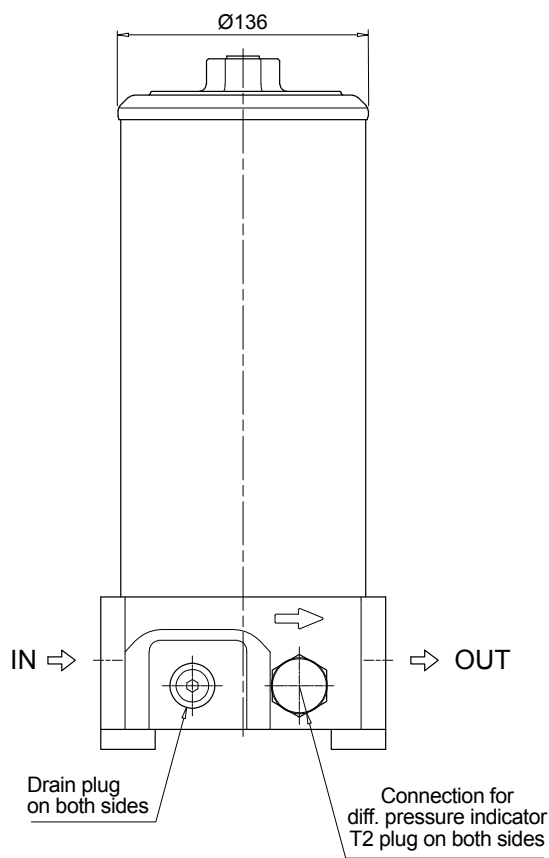
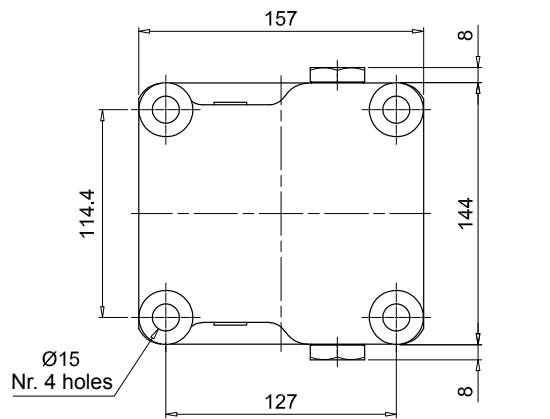


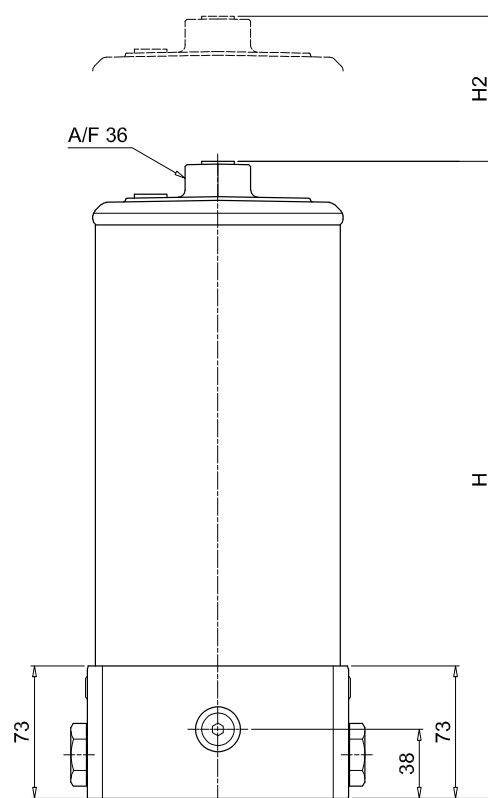
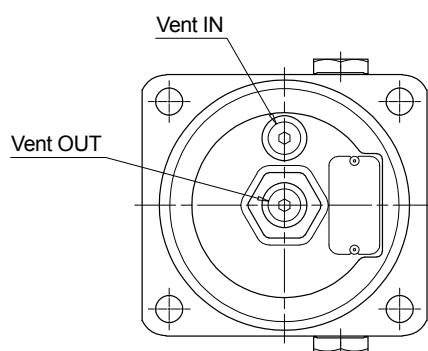
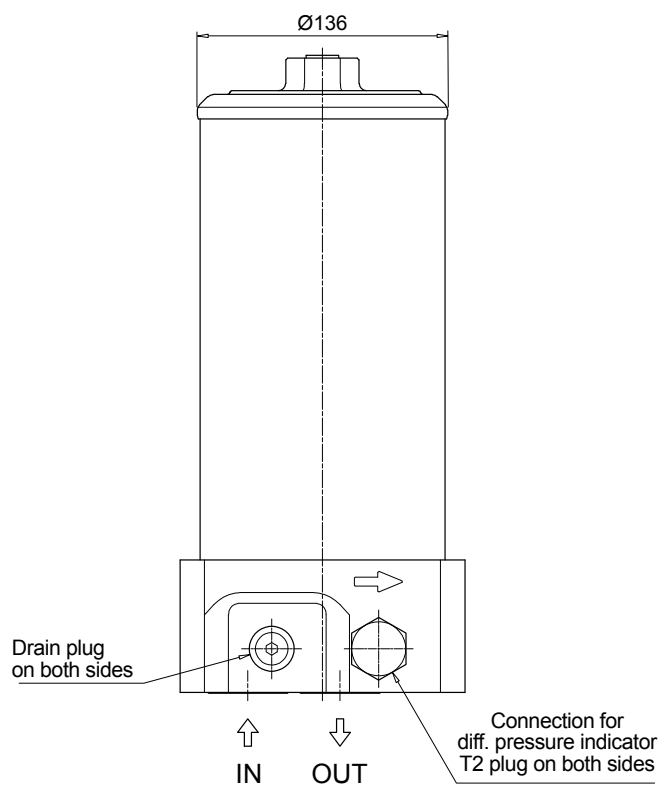
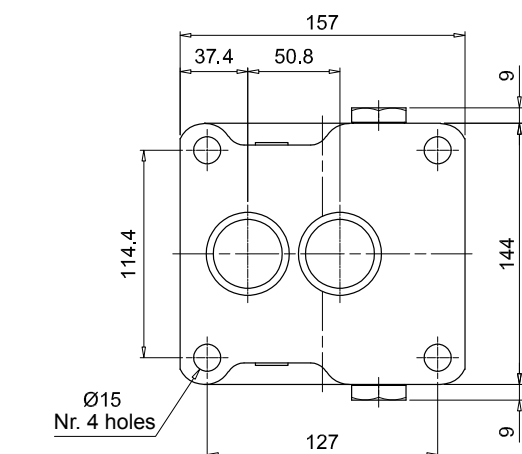
FHF325		
Connection A - B - C		
Filter length	H [mm]	H2 [mm]
1	452	250
2	690	485
3	928	725

FHF 325

Dimensions

FHF325		
Connection G - H		
Filter length	H [mm]	H2 [mm]
1	463	250
2	701	485
3	939	725





Recommended clearance space for maintenance

FHF325		
Connection M - N		
Filter length	H [mm]	H2 [mm]
1	452	250
2	690	485
3	928	725

FHF 325 SPARE PARTS

Filter housing according to SAE J2066 for HF4 filter elements

Order number for spare parts

FHF 325
Connections
A - B - C - G - H

Item:	Q.ty: 1 pc.	Q.ty: 1 pc.	Q.ty: 2 pc.
	2	3 (3a ÷ 3f)	4
Filter series	Filter element	Seal Kit code number NBR FPM	Indicator connection plug NBR FPM
FHF 325 A-B-C-G-H	See order table	02050588 02050589	T2H T2V

FHF 325
Connections
M - N

Item:	Q.ty: 1 pc.	Q.ty: 1 pc.	Q.ty: 2 pc.
	2	3 (3a ÷ 3h)	4
Filter series	Filter element	Seal Kit code number NBR FPM	Indicator connection plug NBR FPM
FHF 325 M-N	See order table	02050590 02050591	T2H T2V

FHD series

Maximum working pressure up to 35 MPa (350 bar) - Flow rate up to 250 l/min



INSTALLATION, SERVICE AND MAINTENANCE MANUAL AND SAFETY INSTRUCTIONS



Please scan or click the QR codes to get updated electronic version of the related document:



FHD021



FHD051



FHD326



FHD333

For all the QR codes: Scan or click me!

High Pressure filters

Duplex

Maximum working pressure up to 35 MPa (350 bar)

Flow rate up to 250 l/min

FHD is a range of high pressure duplex filter with integrated changeover function to allow the filter element replacement without the system shut-down.

They are directly connected to the lines of the system through the hydraulic fittings.

Available features:

- Female threaded connections up to 1 1/4" and flanged connections up to 1 1/2", for a maximum flow rate of 345 l/min
- Fine filtration rating, to get a good cleanliness level into the system
- Balancing valve, available for FHD051, FHD326 and FHD333, to equalize the housing pressure before the switch.
- Bypass valve, to relieve excessive pressure drop across the filter media
- Vent ports, to avoid air trapped into the filter going into the system
- Drain ports, to remove the fluid from the housing prior the maintenance work
- Low collapse filter element "N", for use with filters provided with M25 wire mesh
- High collapse filter element "H", for use with filters not provided with bypass valve
- Low collapse filter element with external support "R", for filter element protection against the back pressure caused by the check valve or the reverse flow in filters provided with the bypass valve
- High collapse filter element with external support "S", for filter element protection against the back pressure caused by the check valve or the reverse flow in filters not provided with the bypass valve
- Visual, electrical and electronic differential clogging indicators

Common applications:

- System where shut-down causes high costs
- System where shut-down causes safety issues

Filter housing materials

- Head: Phosphatized cast iron
- Housing: Phosphatized steel
- Bypass valve: Steel

Pressure

- Test pressure: 52.5 MPa (525 bar)
- Min. Burst pressure: 105 MPa (1050 bar)
- Pulse pressure fatigue test: 1 000 000 cycles with pressure from 0 to 35 MPa (350 bar)

Bypass valve

- Opening pressure 0.6 MPa (6 bar) $\pm 10\%$
- Other opening pressures on request.

Filter element features

Filter FHD		Filter element HP	
Δp Element type			
Element media	Construction	Δp Series	Δp
A - Microfiber	with outer net	R	20 bar
	High Δp	H	210 bar
	High Δp with external support	S	210 bar
M - Wire mesh	Standard	N	20 bar
	High Δp	H	210 bar
<i>Please see ordering code tables to check element Δp series availability based on filter features.</i>			
Flow direction through the filter element:			
From OUT to IN			

Seals

- Standard NBR series A
- Optional FPM series V

Connections

In-line Inlet/Outlet 90°

Temperature

From -25 °C to +110 °C

Note

FHD filters are provided for vertical mounting

Weights [kg] and volumes [dm³]

Filter series	Weights [kg]					Volumes [dm³]						
	Length	1	2	3	4	5	Length	1	2	3	4	5
FHD 021		-	8.0	9.0	9.9	-		-	0.06	0.12	0.22	-
FHD 051		-	16.9	17.5	18.5	19.8		-	0.31	0.41	0.53	0.83
FHD 326		43.0	50.0	54.0	-	-		0.88	1.60	2.37	-	-
FHD 333		-	74.0	79.0	98.0	-		-	1.75	2.52	3.35	-

Flow rates [l/min]

Filter series	Length	Filter element design - H Series					
		A03	A06	A10	A16	A25	M25
FHD 021	2	6	8	14	16	19	26
	3	10	12	18	20	22	27
	4	13	16	21	22	24	27

Filter series	Length	Filter element design - R Series					N Series	Filter element design - S Series				
		A03	A06	A10	A16	A25		A03	A06	A10	A16	A25
FHD 051	2	39	41	51	54	59	64	35	37	48	51	58
	3	45	46	54	56	61	65	41	43	52	54	60
	4	50	52	58	58	62	65	47	49	56	56	61
	5	56	57	61	62	63	65	53	53	57	59	63
FHD 326	1	93	99	131	142	154	171	83	87	117	120	146
	2	136	141	163	166	173	176	119	128	149	151	163
	3	152	159	171	174	175	177	139	148	161	163	170
FHD 333	2	175	184	224	230	245	249	147	162	199	201	225
	3	204	217	241	245	247	252	179	196	221	224	238
	4	216	224	242	247	253	255	196	204	223	225	239

Maximum flow rate for a complete pressure filter with a pressure drop $\Delta p = 1.5$ bar.

The reference fluid has a kinematic viscosity of 30 mm²/s (cSt) and a density of 0.86 kg/dm³.

For different pressure drop or fluid viscosity we recommend to use our selection software available on www.mpfiltri.com.

You can also calculate the right size using the formulas present on the FILTER SIZING paragraph at the beginning of the full catalogue or at the beginning of the filter family brochure.

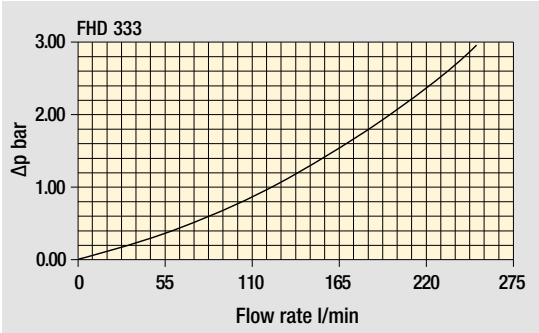
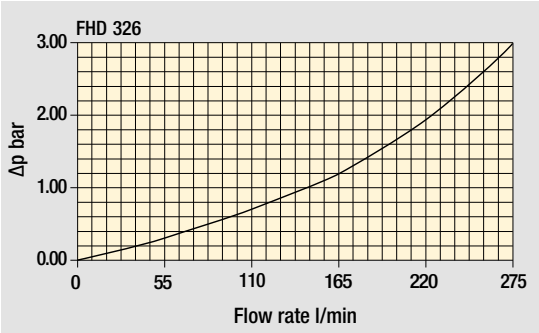
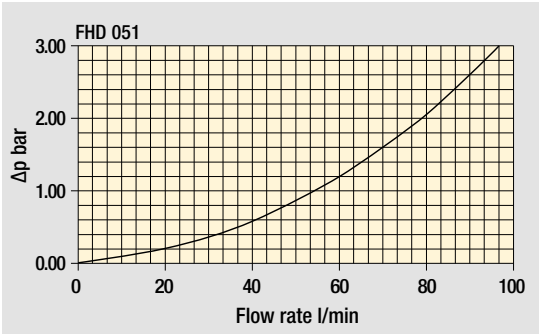
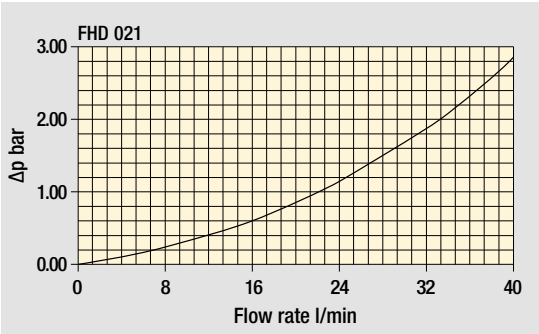
Please, contact our Sales Department for further additional information.

Hydraulic symbols

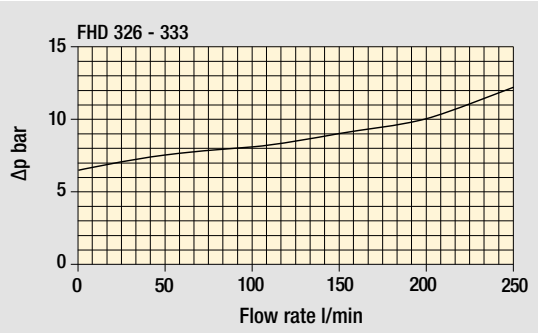
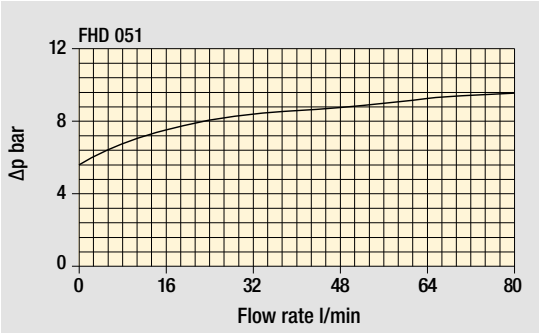
Filter series	Style S	Style B	Style B
FHD 021	•	-	-
FHD 051	•	•	-
FHD 326	•	-	•
FHD 333	•	-	•

Pressure drop

Filter housings Δp pressure drop



Bypass valve pressure drop



The curves are plotted using mineral oil with density of 0.86 kg/dm³ in compliance with ISO 3968. Δp varies proportionally with density.

Designation & Ordering code

COMPLETE FILTER

Series and size	Configuration example: FHD021 4 S A G1 A06 H P01							
FHD021								
Length								
2 3 4								
Bypass valve								
S Without bypass								
Seals								
A NBR								
V FPM								
Connections								
G1 G 1/2"								
G2 1/2" NPT								
G3 SAE 8 - 3/4" - 16 UNF								
Filtration rating (filter media)								
A03 Inorganic microfiber 3 µm								
A06 Inorganic microfiber 6 µm								
A10 Inorganic microfiber 10 µm								
A16 Inorganic microfiber 16 µm								
A25 Inorganic microfiber 25 µm								
M25 Wire mesh 25 µm								

Filtration rating			Execution	
Element Δp	Axx	M25	P01	Pxx
N 20 bar	-	•	MP Filtri standard	Customized
H 210 bar	•	•		

FILTER ELEMENT

Element series and size	Configuration example: HP011 4 A06 A H P01					
HP011						
Element length						
2 3 4						
Filtration rating (filter media)						
A03 Inorganic microfiber 3 µm						
A06 Inorganic microfiber 6 µm						
A10 Inorganic microfiber 10 µm						
A16 Inorganic microfiber 16 µm						
A25 Inorganic microfiber 25 µm						
M25 Wire mesh 25 µm						

Seals		Filtration rating			Execution	
A	V	Element Δp	Axx	M25	P01	Pxx
A NBR		N 20 bar	-	•	MP Filtri standard	
V FPM		H 210 bar	•	•		Customized

CLOGGING INDICATORS

See page 721

DEA Electrical differential pressure indicator	DLE Electrical / visual differential pressure indicator
DEM Electrical differential pressure indicator	DTA Electronic differential pressure indicator
DEU Electrical differential pressure indicator	DVA Visual differential pressure indicator
DLA Electrical / visual differential pressure indicator	DVM Visual differential pressure indicator

PLUGS

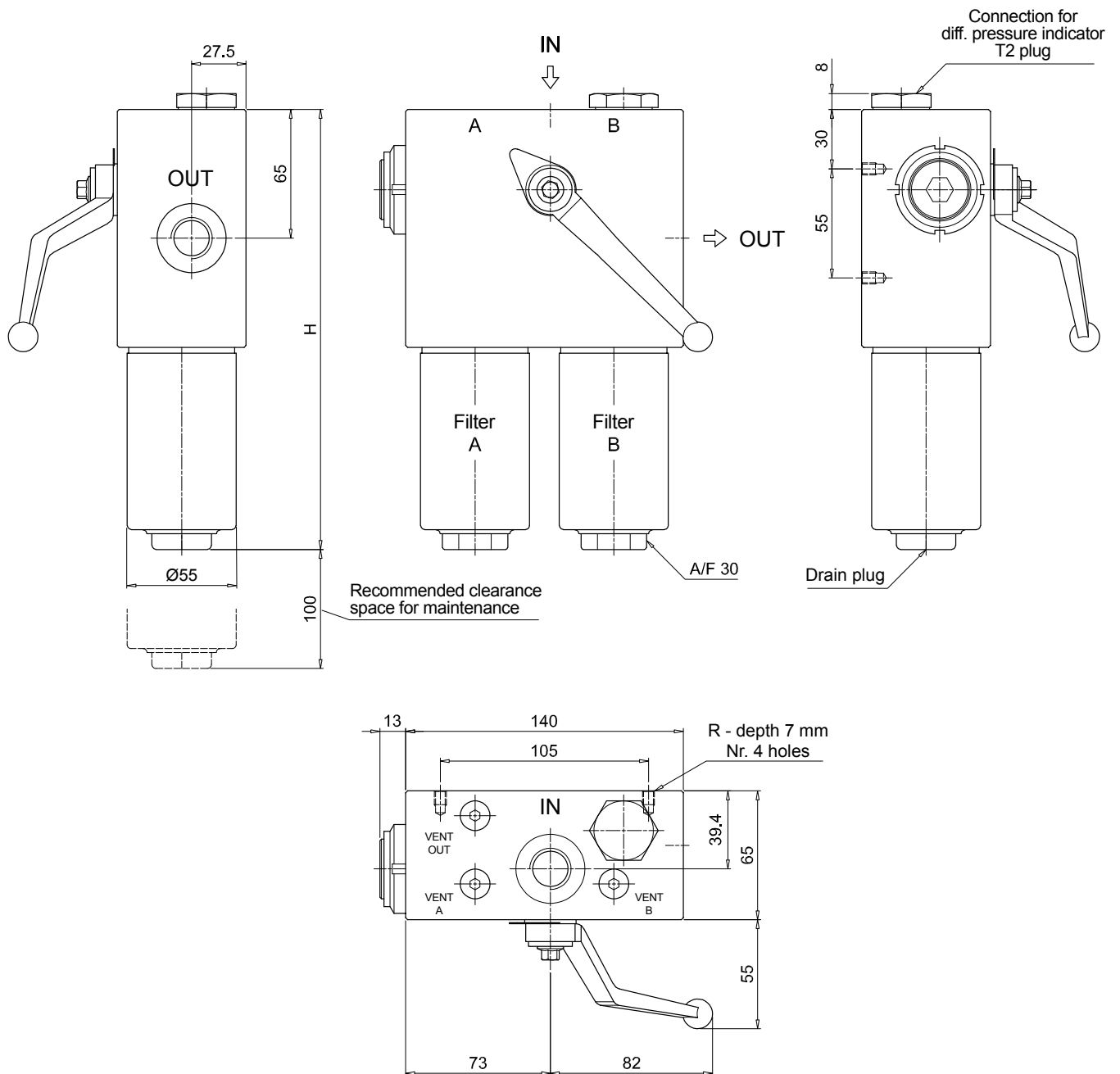
See page 741

T2 Plug (not included)

FHDO21

Filter length	H [mm]
2	172
3	222
4	272

Connections	R
G1	M6
G2 - G3	1/4" UNC



FHD FHD051 - FHD326 - FHD333

Designation & Ordering code

COMPLETE FILTER

Series and size				Configuration example: FHD3263SAG1M25NP01							
FHD051 FHD326 FHD333											
Length	FHD051	FHD326	FHD333								
1	-	•	-								
2	•	•	•								
3	•	•	•								
4	•	-	•								
5	•	-	-								
Valves											
S Without bypass											
B With bypass 6 bar											
Seals											
A NBR											
V FPM											
Connections	FHD051	FHD326	FHD333								
G1	G 3/4"	G 1 1/4"	-								
G2	3/4" NPT	-	-								
G3	G 1/2"	1 1/4" NPT	-								
G4	1/2" NPT	SAE 20 - 1 5/8" - 12 UN	-								
G5	SAE 8 - 3/4" - 16 UNF	-	-								
G6	SAE 12 - 1 1/16" - 12 UN	-	-								
F1	-	-	1 1/2" SAE 6000 psi/M								
F2	-	-	1 1/2" SAE 6000 psi/UNC								
Filtration rating (filter media)											
A03 Inorganic microfiber 3 µm											
A06 Inorganic microfiber 6 µm											
A10 Inorganic microfiber 10 µm											
A16 Inorganic microfiber 16 µm											
A25 Inorganic microfiber 25 µm											
M25 Wire mesh 25 µm											
				Element Δp		Filtration rating		Execution			
						Axx	M25				
				N 20 bar		-	•	P01 MP Filtri standard			
				R 20 bar		•	-	Pxx Customized			
				S 210 bar		•	-				

FILTER ELEMENT

Element series and size				Configuration example: HP320 3 M25 A N P01							
	FHD051	FHD326	FHD333								
HP050	•										
HP320		•	•								
Element length		HP050	HP320								
1			•								
2		•	•								
3		•	•								
4		•	•								
5		•									
Filtration rating (filter media)											
A03	Inorganic microfiber	3 µm									
A06	Inorganic microfiber	6 µm									
A10	Inorganic microfiber	10 µm									
A16	Inorganic microfiber	16 µm									
A25	Inorganic microfiber	25 µm									
M25	Wire mesh	25 µm									
				Seals		Element Δp		Filtration rating		Execution	
				A NBR		N 20 bar		Axx - M25 •		P01 MP Filtri standard	
				V FPM		R 20 bar		• -		Pxx Customized	
						S 210 bar		• -			

CLOGGING INDICATORS

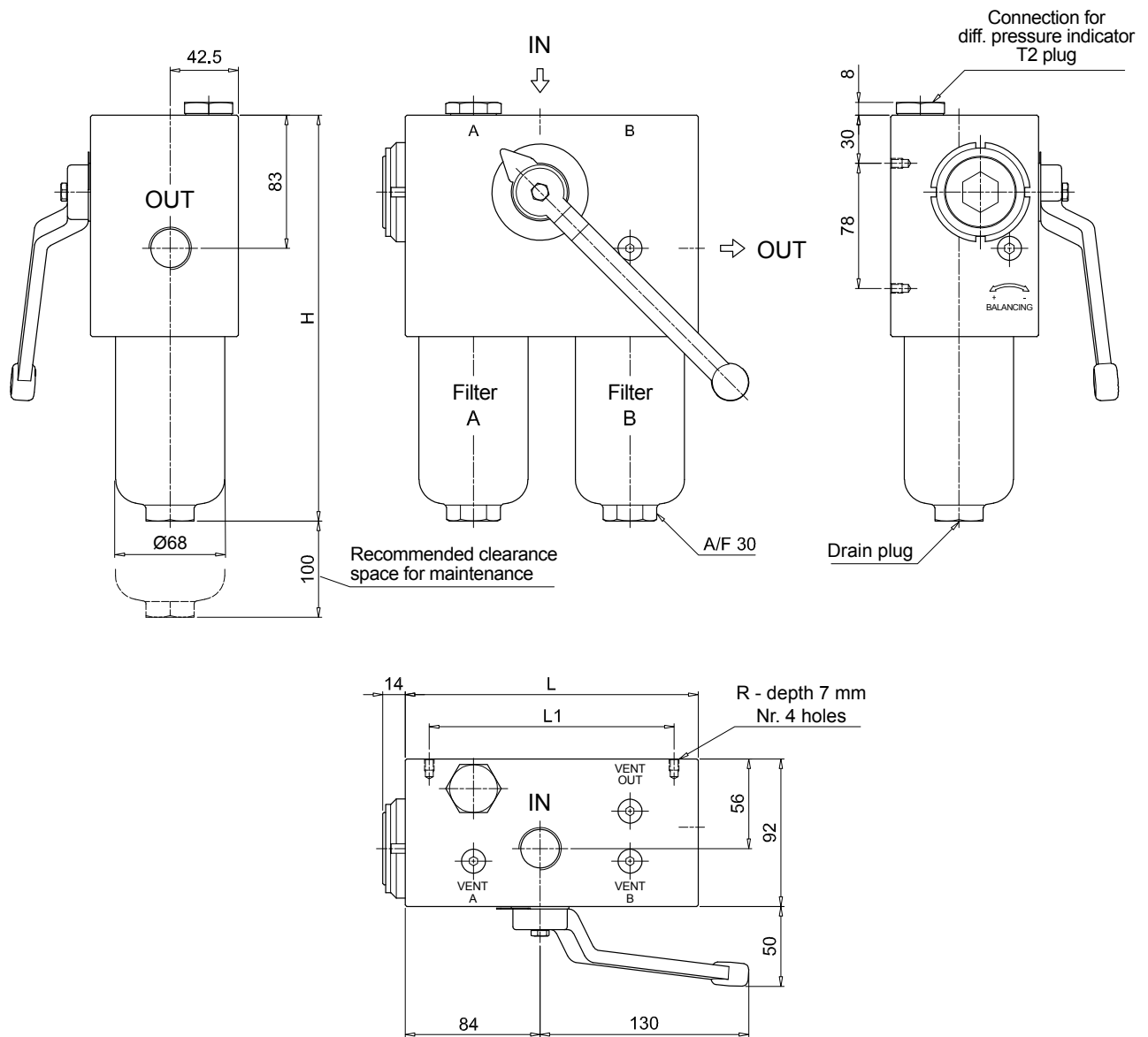
See page 721

DEA Electrical differential pressure indicator	DLE Electrical / visual differential pressure indicator
DEM Electrical differential pressure indicator	DTA Electronic differential pressure indicator
DEU Electrical differential pressure indicator	DVA Visual differential pressure indicator
DLA Electrical / visual differential pressure indicator	DVM Visual differential pressure indicator

PLUGS

See page 741

T2 Plug (not included)



FHD051

Filter length	H [mm]
2	253
3	295
4	343
5	465

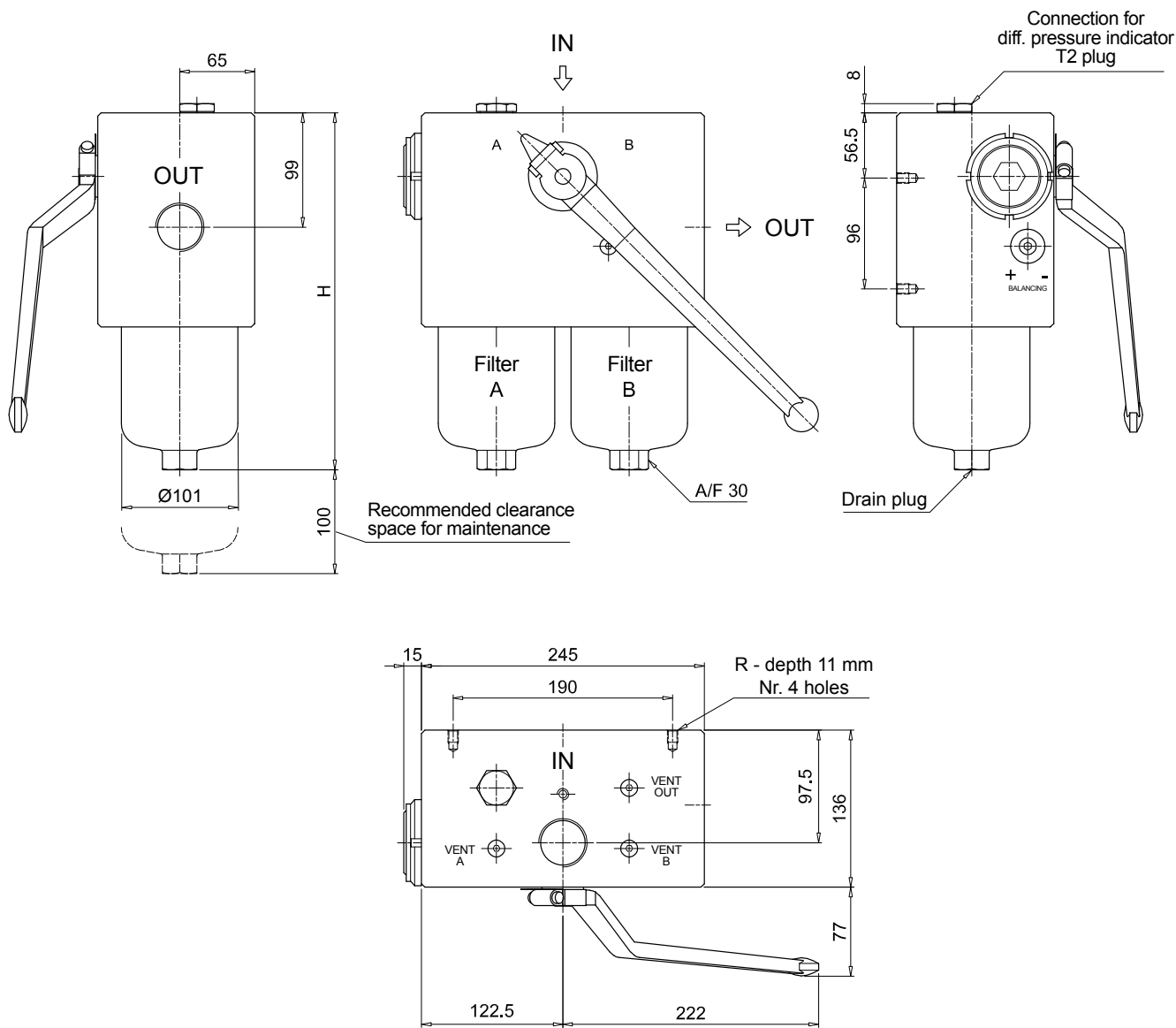
Connections	R
G1	M6
G2	1/4" UNC
G3	M6
G4-G5-G6	1/4" UNC

Valves	L [mm]	L1 [mm]
S	168	138
B	182.5	152.5

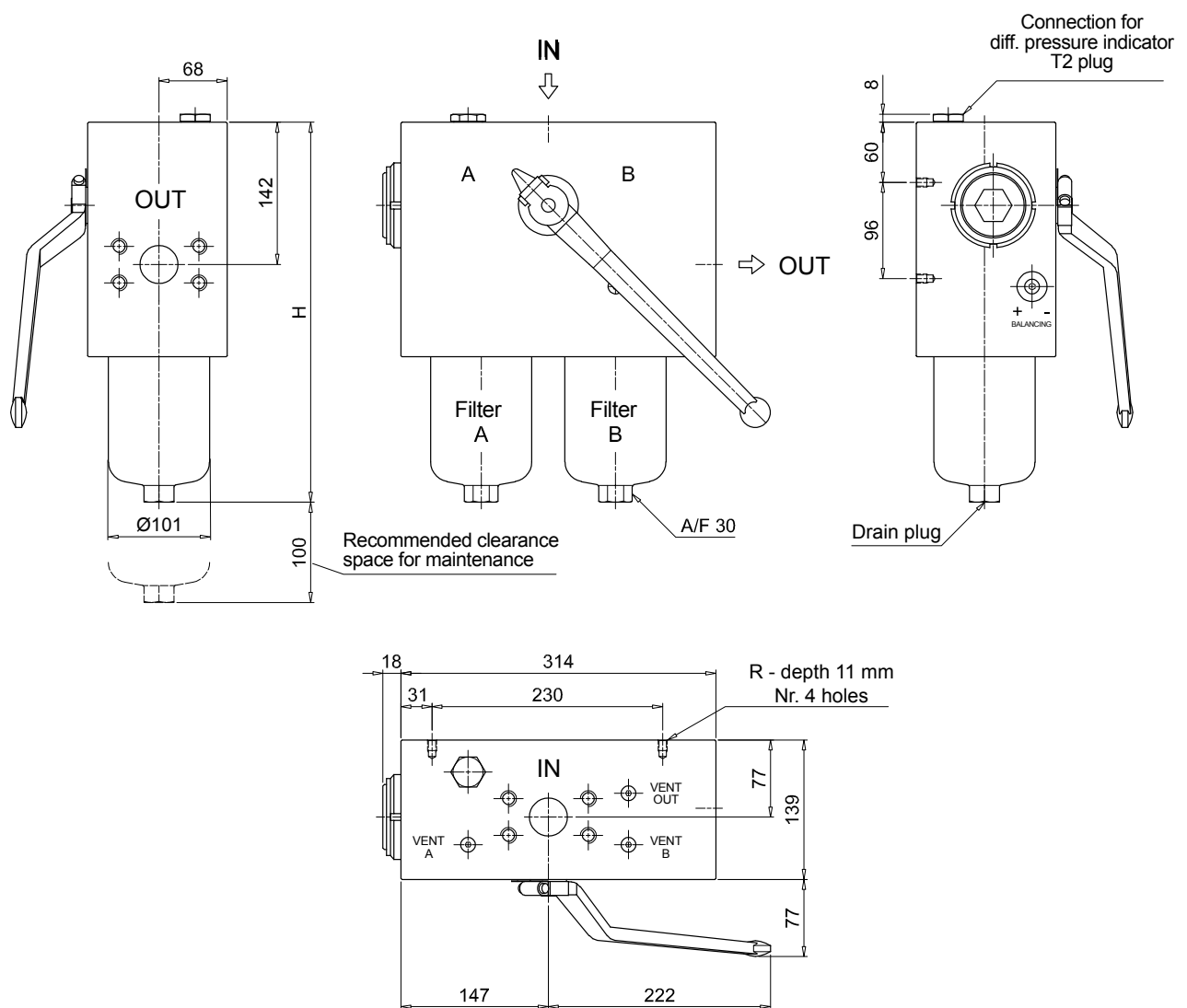
FHD FHD051 - FHD326 - FHD333

Dimensions

FHD326	
Filter length	H [mm]
1	309
2	432
3	564
Connections	R
G1	M10
G2 - G3	3/8" UNC



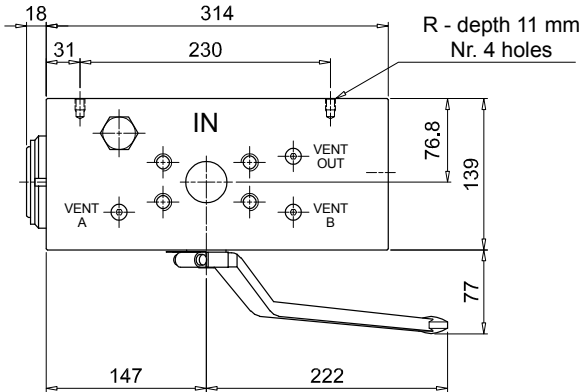
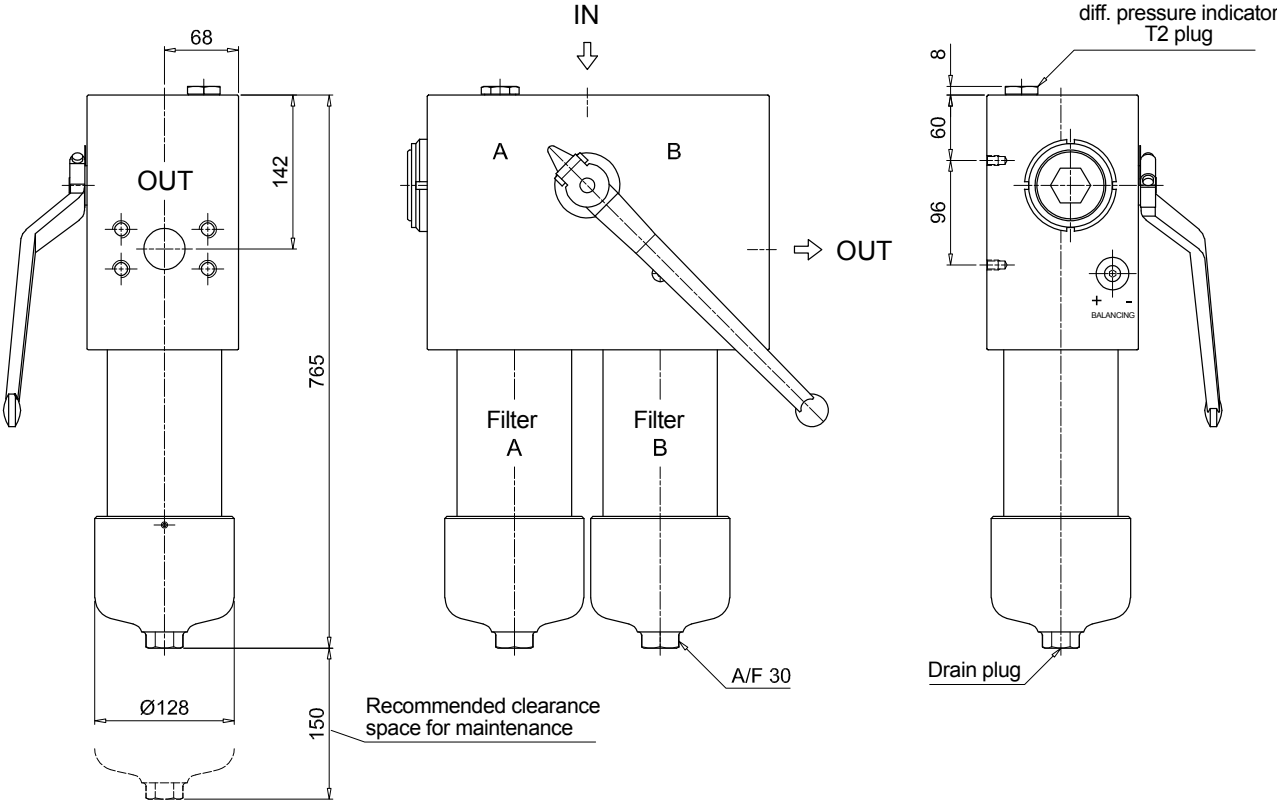
FHD333	
Length 2 - 3	
Filter length	H [mm]
2	479
3	612
Connections	R
F1	M10
F2	3/8" UNC



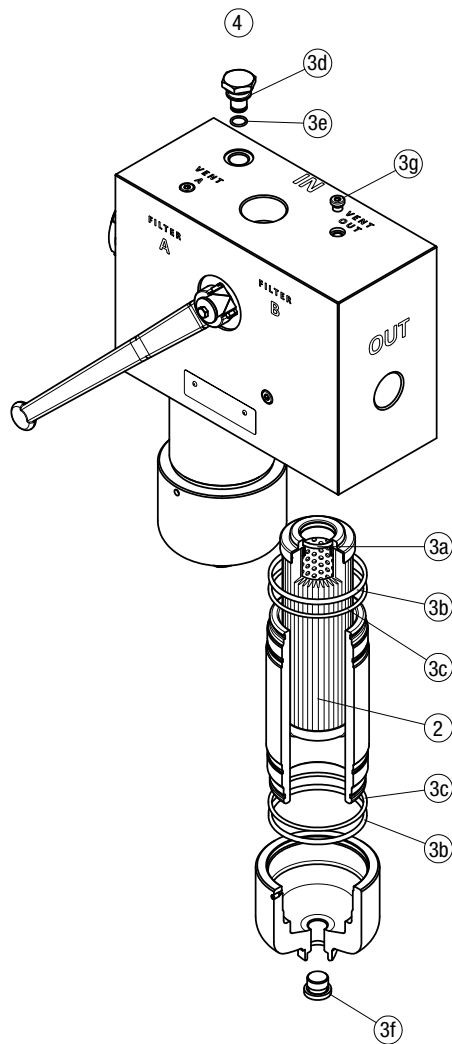
FHD FHD051 - FHD326 - FHD333

Dimensions

FHD333	
Length 4	
Connections	R
F1	M10
F2	3/8" UNC



FHD 021 - 051 - 326 - 333



Q.ty: 1 pc.		Q.ty: 1 pc.		Q.ty: 1 pc.	
Item: 2		3 (3a ÷ 3g)		4	
Filter series	Filter element	Seal Kit code number		Indicator connection plug	
		NBR	FPM	NBR	FPM
FHD 021	See order table	02050511	02050512	T2H	T2V
FHD 051		02050420	02050421		
FHD 326-333		02050377	02050378		

HPB series

BOWL KIT

Maximum working pressure up to 42 MPa (420 bar) - Flow rate up to 300 l/min



INSTALLATION, SERVICE AND MAINTENANCE MANUAL AND SAFETY INSTRUCTIONS



HPB050



HPB150

Please scan or click the QR codes
to get updated electronic version
of the related document.



For all the QR codes: Scan or click me!

Description

High Pressure Bowl Kit

Maximum working pressure up to 42 MPa (420 bar)

Flow rate up to 300 l/min

HPB is a range of high pressure bowl kits for protection of sensitive components in high pressure hydraulic systems in the mobile machines. They are directly integrated in the control blocks.

Available features:

- Fine filtration rating, to get a good cleanliness level into the system
- Low collapse filter element "N", for use with blocks provided with bypass valve
- High collapse filter element with external support "S", for use with blocks not provided with the bypass valve

Technical data

Filter housing materials

- Housing: Phosphatized steel

Pressure

- Test pressure: 63 MPa (630 bar)
- Min. Burst pressure: 126 MPa (1260 bar)
- Pulse pressure fatigue test: 1 000 000 cycles with pressure from 0 to 42 MPa (420 bar)

Filter element features

Filter HPB		Filter element HP	
Δp Element type			
Element media	Construction	Δp Series	Δp
A - Microfiber	Standard	N	20 bar
	High Δp with external support	S	210 bar
M - Wire mesh	Standard	N	20 bar
Please see ordering code tables to check element Δp series availability based on filter features.			
Flow direction through the filter element:			
From OUT to IN			

Seals

- Standard NBR series A
- Optional FPM series V

Temperature

From -25 °C to +110 °C

Note

HPB filters are provided for vertical mounting

Weights [kg] and volumes [dm³]

Filter series	Weights [kg]					Volumes [dm³]						
	Length	1	2	3	4	5	Length	1	2	3	4	5
HPB 050		1.10	1.50	1.90	2.40	3.50		0.30	0.45	0.60	0.80	1.20
HPB 150		2.90	4.90	6.30	-	-		0.45	0.85	1.10	-	-

Flow rates [l/min]

Filter series	Length	Filter element design - N Series						Filter element design - S Series				
		A03	A06	A10	A16	A25	M25	A03	A06	A10	A16	A25
HPB 050	1	42	43	79	82	106	147	29	39	57	59	74
	2	52	57	85	96	121	149	45	49	76	88	114
	3	66	69	97	106	130	150	58	61	89	99	125
	4	83	89	113	115	134	152	74	80	106	108	129
	5	107	110	130	134	141	154	93	95	111	121	139
HPB 150	1	81	88	156	163	179	295					
	2	142	145	227	230	236	312					
	3	170	180	242	245	263	315					

Maximum flow rate for a complete pressure filter with a pressure drop $\Delta p = 1.5$ bar.

The reference fluid has a kinematic viscosity of 30 mm²/s (cSt) and a density of 0.86 kg/dm³.

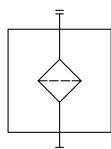
For different pressure drop or fluid viscosity we recommend to use our selection software available on www.mpfiltri.com.

You can also calculate the right size using the formulas present on the FILTER SIZING paragraph at the beginning of the full catalogue or at the beginning of the filter family brochure.

Please, contact our Sales Department for further additional information.

Filter series	Style S
HPB 050	•
HPB 150	•

Hydraulic symbols



Designation & Ordering code

COMPLETE FILTER

Series and size **HPB050** Configuration example: **HPB050** **3** **A** **A10** **N** **P01**

Length **1** **2** **3** **4** **5**

Seals **A** NBR **V** FPM

Filtration rating (filter media)

Code	Media	Rating
A03	Inorganic microfiber	3 µm
A06	Inorganic microfiber	6 µm
A10	Inorganic microfiber	10 µm
A16	Inorganic microfiber	16 µm
A25	Inorganic microfiber	25 µm
M25	Wire mesh	25 µm

Filtration rating

Element	Δp	Axx	M25
N	20 bar	•	•
S	210 bar	•	-

Execution

Code	Description
P01	MP Filtri standard
Pxx	Customized

FILTER ELEMENT

Element series and size **HP050** Configuration example: **HP050** **3** **A10** **A** **N** **P01**

Element length **1** **2** **3** **4** **5**

Filtration rating (filter media)

Code	Media	Rating
A03	Inorganic microfiber	3 µm
A06	Inorganic microfiber	6 µm
A10	Inorganic microfiber	10 µm
A16	Inorganic microfiber	16 µm
A25	Inorganic microfiber	25 µm
M25	Wire mesh	25 µm

Seals **A** NBR **V** FPM

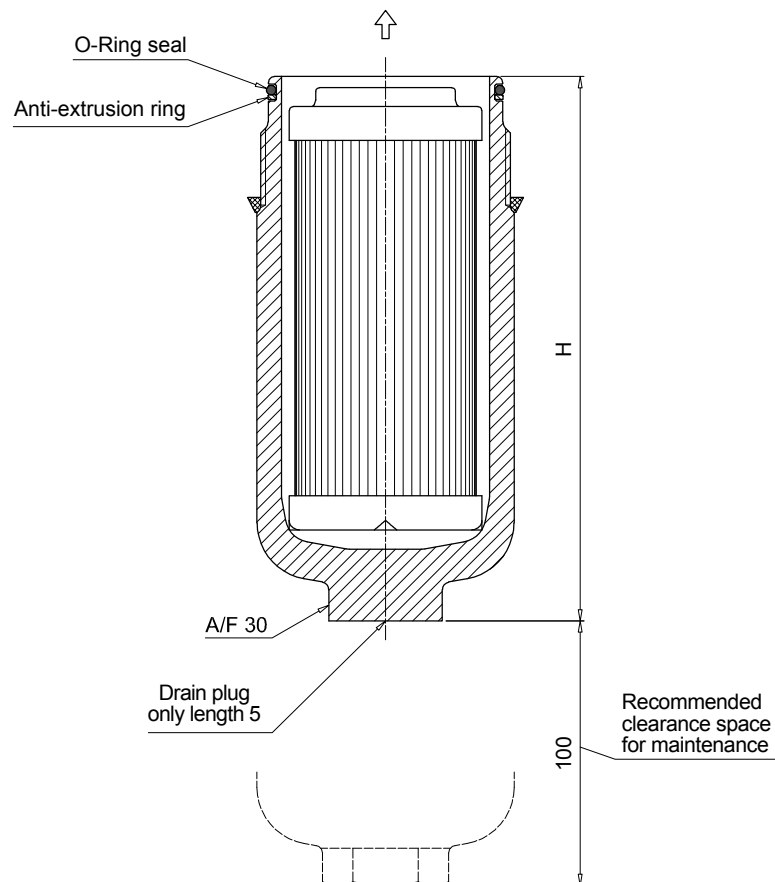
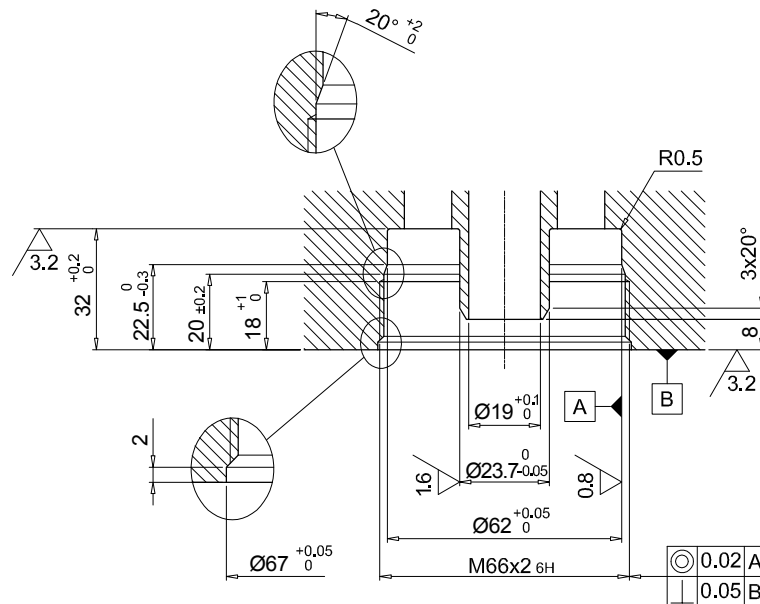
Filtration rating

Element	Δp	Axx	M25
N	20 bar	•	•
S	210 bar	•	-

Execution

Code	Description
P01	MP Filtri standard
Pxx	Customized

HPB050	
Filter length	H [mm]
1	107
2	144
3	186
4	234
5	356



COMPLETE FILTER

Series and size **HPB150** Configuration example: **HPB150** **3** **A** **A10** **N** **P01**

Length **1** | **2** | **3** |

Seals **A** NBR
V FPM

Filtration rating (filter media)

A03	Inorganic microfiber	3 µm
A06	Inorganic microfiber	6 µm
A10	Inorganic microfiber	10 µm
A16	Inorganic microfiber	16 µm
A25	Inorganic microfiber	25 µm
M25	Wire mesh	25 µm

Element Δp **N** 20 bar

Execution **P01** MP Filtri standard
Pxx Customized

FILTER ELEMENT

Element series and size **HP150** Configuration example: **HP150** **3** **A10** **A** **N** **P01**

Element length **1** | **2** | **3** |

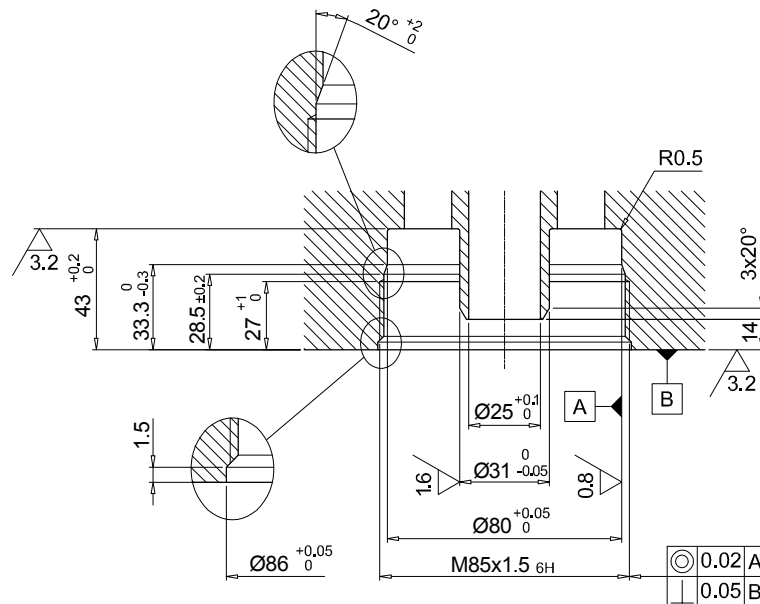
Filtration rating (filter media)

A03	Inorganic microfiber	3 µm
A06	Inorganic microfiber	6 µm
A10	Inorganic microfiber	10 µm
A16	Inorganic microfiber	16 µm
A25	Inorganic microfiber	25 µm
M25	Wire mesh	25 µm

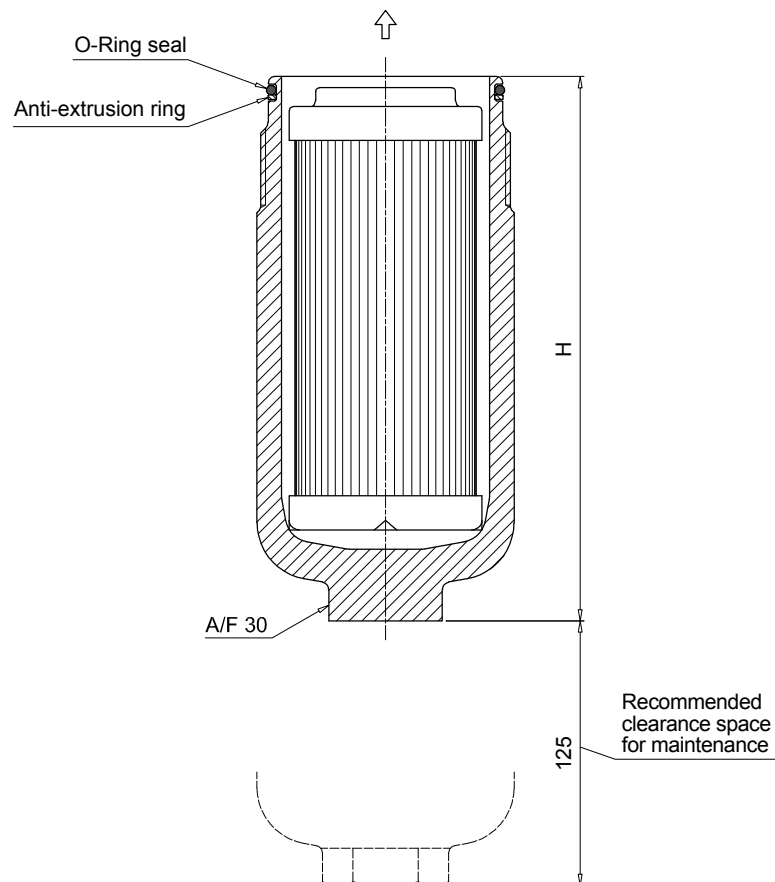
Seals **A** NBR
V FPM

Element Δp **N** 20 bar

Execution **P01** MP Filtri standard
Pxx Customized

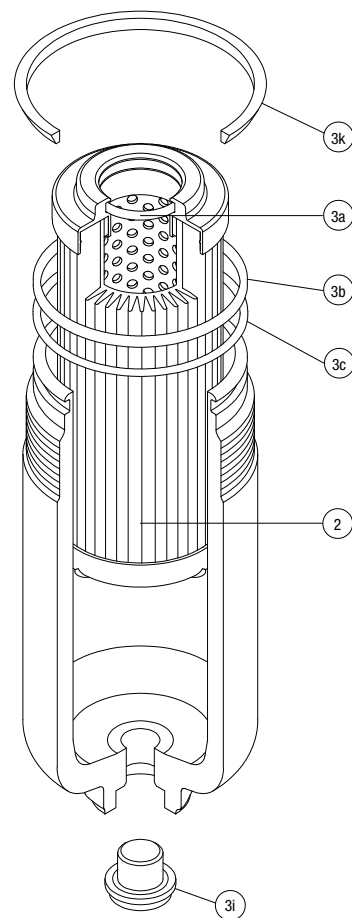


HPB150	
Filter length	H [mm]
1	161
2	271
3	346



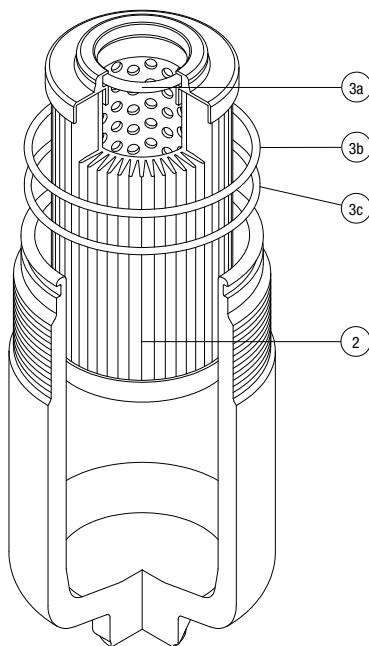
Order number for spare parts

HPB 050

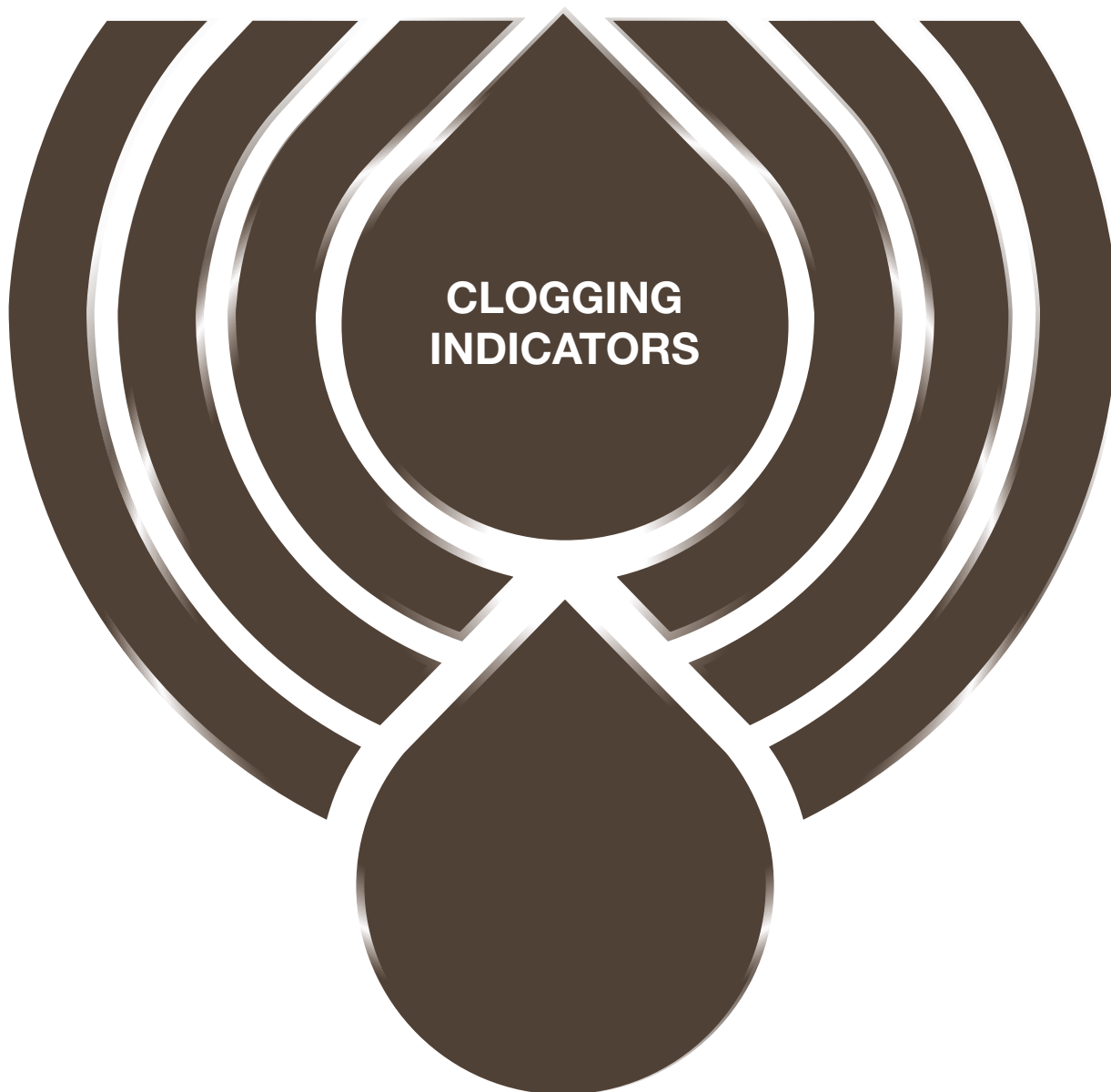


Item:		Q.ty: 1 pc. 2	Q.ty: 1 pc. 3 (3a ÷ 3i)
Filter series	Filter element	Seal Kit code number	
		NBR	FPM
HPB 050	See order table	02050813	02050823

HPB 150



Item:		Q.ty: 1 pc. 2	Q.ty: 1 pc. 3 (3a ÷ 3c)
Filter series	Filter element	Seal Kit code number	
		NBR	FPM
HPB 150	See order table	02050816	02050826



Clogging indicators are devices that check the life time of the filter elements. They measure the pressure drop through the filter element directly connected to the filter housing.

These devices trip when the clogging of the filter element causes a pressure drop increasing across the filter element.

Filter elements are efficient only if their Dirt Holding Capacity is fully exploited. This is achieved by using filter housings equipped with clogging indicators.

The indicator is set to alarm before the element becomes fully clogged.

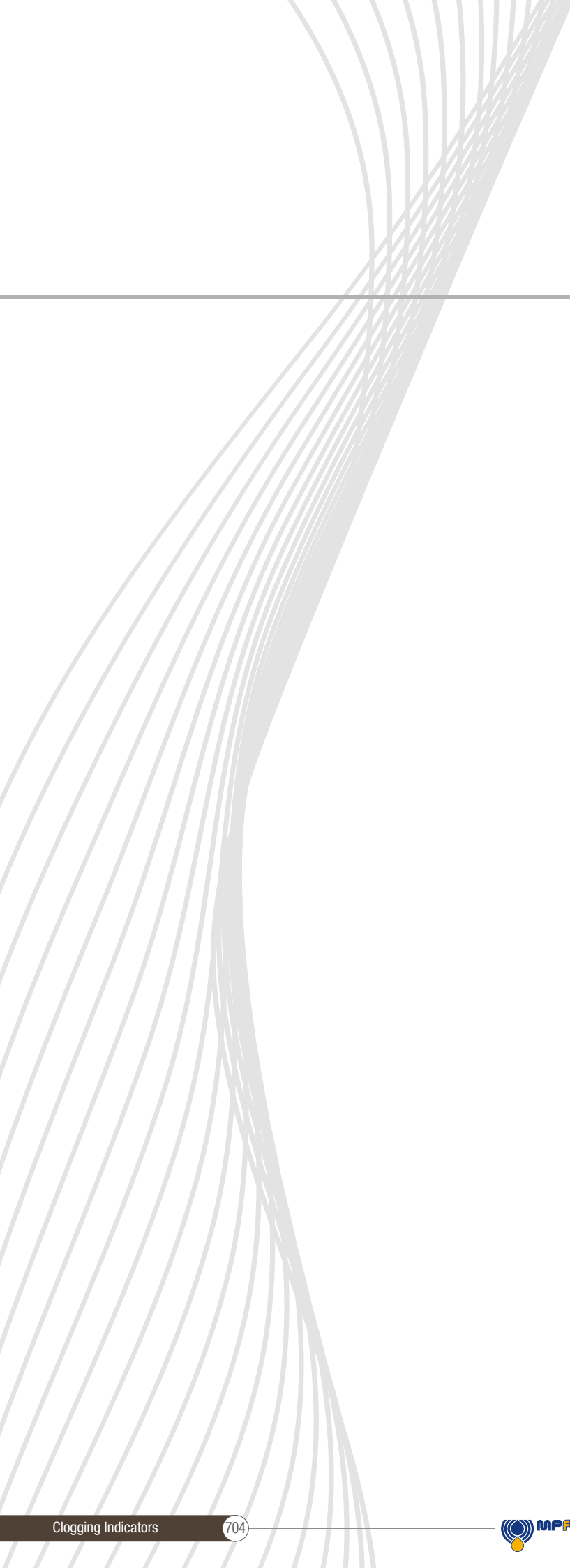
MP Filtri can supply indicators of the following designs:

- Vacuum switches and gauges
- Pressure switches and gauges
- Differential pressure indicators

These type of devices can be provided with a visual, electrical or both signals. The electronic differential pressure clogging indicator is also available. It provides both analogical 4-20 mA output and digital warning (75% of clogging) and alarm (clogging) outputs.

In the following pages you can find a reference guide about the types of clogging indicators available in the different families of MP Filtri's Hydraulic Filtration range of products.





DESIGNATION, ORDERING CODES & TECHNICAL DATA

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QUICK REFERENCE GUIDE

Ordering codes

Filter family	Filter series	Visual indicators	Electrical indicators	Electronic / Electrical-Visual indicators
SUCTION FILTERS	ELIXIR® SFEX060-110	VVB20P01 VVS20P01	VEB21AA50P01	VLB21AA51P01 VLB21AA52P01 VLB21AA53P01 VLB21AA71P01
	Suction Line SFMC250	VVA20P01 VVR20P01	VEA21xA50P01 VEA21xA50P01UL	VLA21xA51P01 VLA21xA52P01 VLA21xA53P01 VLA21xA71P01
	Without bypass SFSC 500 - 503 - 504 - 505 SFSC 510 - 535 - 540	VVA20P01 VVR20P01	VEA21xA50P01 VEA21xA50P01UL	VLA21xA51P01 VLA21xA52P01 VLA21xA53P01 VLA21xA71P01
RETURN FILTERS	With bypass 1.75 bar ELIXIR® RFEX060-080-110-160	BVA14P01 BVR14P01 BVP15HP01 BVQ15HP01	BEA15HA50P01 BEA15HA50P01UL BEM15HA41P01	BLA15HA51P01 BLA15HA52P01 BLA15HA53P01 BLA15HA71P01
	Without bypass ELIXIR® RFEX060-080-110-160	BVA25P01 BVR25P01 BVP20HP01 BVQ20HP01	BEA20HA50P01 BEA20HA50P01UL BEM20HA41P01	BLA20HA51P01 BLA20HA52P01 BLA20HA53P01 BLA20HA71P01
	With bypass 1.75 bar MDH 250	BVA14P01 BVR14P01 BVP15HP01 BVQ15HP01 DVS12HP01	BEA15HA50P01 BEA15HA50P01UL BEM15HA41P01 DES12HA10P01 DES12HA30P01 DES12HA80P01	BLA15HA51P01 BLA15HA52P01 BLA15HA53P01 BLA15HA71P01
	With bypass 3 bar MDH 250	BVA25P01 BVR25P01 BVP20HP01 BVQ20HP01 DVS25HP01	BEA20HA50P01 BEA20HA50P01UL BEM20HA41P01 BET20HF10P01 BET20HF30P01 BET25HF10P01 BET25HF30P01 DES25HA10P01 DES25HA30P01 DES25HA80P01	BLA20HA51P01 BLA20HA52P01 BLA20HA53P01 BLA20HA71P01
	With bypass 1.75 bar MPFX MPTX MPF MPT MPH	BVA14P01 BVR14P01 BVP15HP01 BVQ15HP01	BEA15HA50P01 BEA15HA50P01UL BEM15HA41P01	BLA15HA51P01 BLA15HA52P01 BLA15HA53P01 BLA15HA71P01
	With bypass 3 bar MPFX MPTX MPF MPT	BVA25P01 BVR25P01 BVP20HP01 BVQ20HP01	BEA20HA50P01 BEA20HA50P01UL BEM20HA41P01 BET20HF10P01 BET20HF30P01	BLA20HA51P01 BLA20HA52P01 BLA20HA53P01 BLA20HA71P01
	With bypass 2.5 bar MPH			
	With bypass 4.5 bar MPLX	DVA20xP01 DVM20xP01	DEA20xA50P01 DEM20xx10P01 DEM20xx20P01 DEM20xx30P01 DEM20xx35P01	DLA20xA51P01 DLA20xA52P01 DLA20xA71P01 DLE20xA50P01 DLE20xF50P01
	With bypass 2.4 bar FRI		DEU20VA50P01UL	DTA20xF70P01
	Without bypass valve FRI	DVA50xP01 DVM50xP01	DEA50xA50P01 DEM50xx10P01 DEM50xx20P01 DEM50xx30P01 DEM50xx35P01 DEU50VA50P01UL	DLA50xA51P01 DLA50xA52P01 DLA50xA71P01 DLE50xA50P01 DLE50xF50P01 DTA50xF70P01

Filter family	Filter series	Visual indicators	Electrical indicators	Electronic / Electrical-Visual indicators
RETURN / SUCTION FILTERS	With bypass valve 2.5 bar	MRSX 116 - 165 - 166 Suction line	VVB20P01 VVS20P01	VEB21AA50P01 VLB21AA51P01 VLB21AA52P01 VLB21AA53P01 VLB21AA71P01
		MRSX 116 - 165 - 166 Return line	BVA25P01 BVR25P01 BVP20HP01 BVQ20HP01	BEA20HA50P01 BEA20HA50P01UL BEM20HA41P01 BET25HF10P01 BET25HF30P01 BET25HF50P01 BLA20HA51P01 BLA20HA52P01 BLA20HA53P01 BLA20HA71P01
	With bypass valve 2.5 bar	LMP 124 MULTIPORT	BVA25P01 BVR25P01 BVP20HP01 BVQ20HP01 DVA20xP01 DVM20xP01	BEA20HA50P01 BEA20HA50P01UL BEM20HA41P01 BET25HF10P01 BET25HF30P01 BET25HF50P01 DLA20xA51P01 DLA20xA52P01 DLA20xA71P01 DLE20xA50P01 DLE20xF50P01
				DEA20xA50P01 DEM20xx10P01 DEM20xx20P01 DEM20xx30P01 DEM20xx35P01 DTA20xF70P01 DEU20VA50P01UL
SPIN-ON FILTERS	Suction line	MPS 050 - 070 - 100 - 150 MPS 200 - 250 - 300 - 350	WVB20P01 VVS20P01	VEB21AA50P01 VLB21AA51P01 VLB21AA52P01 VLB21AA53P01 VLB21AA71P01
	Return line	MPS 050 - 070 - 100 - 150 MPS 200 - 250 - 300 - 350	BVA14P01 BVR14P01 BVP15HP01 BVQ15HP01	BEA15HA50P01 BEA15HA50P01UL BEM15HA41P01 BLA15HA51P01 BLA15HA52P01 BLA15HA53P01 BLA15HA71P01
	In-line	MPS 051 - 071 - 101 - 151 MPS 301 - 351 MSH 050 - 070 - 100 - 150	DVA12xP01 DVM12xP01 DVA20xP01 DVM20xP01	DEA12xA50P01 DEM12xAxxP01 DEA20xA50P01 DEM20xAxxP01 DEU20VA50P01UL DLA12xA51P01 DLA12xA52P01 DLA12xA71P01 DLA20xA51P01 DLA20xA52P01 DLA20xA71P01 DLE12xA50P01 DLE12xF50P01 DLE20xF50P01 DLE20xF50P01 DTA12xF70P01 DTA20xF70P01

QUICK REFERENCE GUIDE

Ordering codes

Filter family	Filter series	Visual indicators	Electrical indicators	Electronic / Electrical-Visual indicators
LOW & MEDIUM PRESSURE FILTERS	ELIXIR® LFEX 060-080-110-160	DVS25HP01	DES25HA10P01 DES25HA30P01 DES25HA80P01	
	With bypass valve 3.5 bar	LMP 110 LMP 112 - 116 - 118 - 119 MULTIPORT LMP 120 - 122 - 123 MULTIPORT LMP 210 - 211 - LDP LMP 400 - 401 & 430 - 431 LMP 900 - 901 LMP 902 - 903 LMP 950 - 951 LMP 952 - 953 - 954 LMD 211 - 400 - 401 - 431 - 951 - LDD	DVA20xP01 DVM20xP01	DEA20xA50P01 DEA20xA51P01 DLA20xA52P01 DLA20xA71P01 DEM20xx10P01 DEM20xx20P01 DEM20xx30P01 DEM20xx35P01 DLE20xA50P01 DLE20xF50P01 DEU20VA50P01UL DTA20xF70P01
	With bypass valve 2.5 bar	LPH 630	DVA20xP01 DVM20xP01	DEA20xA50P01 DEA20xA51P01 DLA20xA52P01 DLA20xA71P01 DEM20xx10P01 DEM20xx20P01 DEM20xx30P01 DEM20xx35P01 DLE20xA50P01 DLE20xF50P01 DEU20VA50P01UL DTA20xF70P01
	With bypass valve 1.75 bar	LPH 630	DVA12xP01 DVM12xP01	DEA12xA50P01 DEA12xA51P01 DLA12xA52P01 DLA12xA71P01 DEM12xx10P01 DEM12xx20P01 DEM12xx30P01 DEM12xx35P01 DLE12xA50P01 DLE12xF50P01 DTA12xF70P01
	Without bypass valve	LMP 110 LMP 112 - 116 - 118 - 119 MULTIPORT LMP 120 - 122 - 123 MULTIPORT LMP 210 - 211 - LDP LMP 400 - 401 & 430 - 431 LMP 900 - 901 LMP 902 - 903 LMP 950 - 951 LMP 952 - 953 - 954 LMD 211 - 400 - 401 - 431 - 951 - LDD LPH 630	DVA50xP01 DVM50xP01	DES40HA10P01 DES40HA30P01 DES40HA80P01 DEA50xA50P01 DEA50xA51P01 DLA50xA52P01 DLA50xA71P01 DEM50xx10P01 DEM50xx20P01 DEM50xx30P01 DEM50xx35P01 DLE50xA50P01 DLE50xF50P01 DEU50VA50P01UL DTA50xF70P01
	With bypass valve 6 bar	FMP 039 - 065 - 135 - 320 FHP 010 - 011 - 065 - 135 - 350 - 351 - 500 FMMX 050 - 150 FMM 050 - 150 FHA 051 FHM 006 - 007 - 010 - 050 - 065 - 135 - 320 - 500 FHB 050 - 135 - 320 FHF 325 FHD 021 - 051 - 326 - 333	DVA50xP01 DVM50xP01	DEA50xA50P01 DEA50xA51P01 DLA50xA52P01 DLA50xA71P01 DEM50xx10P01 DEM50xx20P01 DEM50xx30P01 DEM50xx35P01 DLE50xA50P01 DLE50xF50P01 DEU50VA50P01UL
	Without bypass valve	FMP 039 - 065 - 135 - 320 FHP 010 - 011 - 065 - 135 - 350 - 351 - 500 FMMX 050 - 150 FMM 050 - 150 FHA 051 FHM 006 - 007 - 010 - 050 - 065 - 135 - 320 - 500 FHB 050 - 135 - 320 FHF 325 FHD 021 - 051 - 326 - 333	DVA70xP01 DVA95xP01 DVM70xP01 DVM95xP01	DEA70xA50P01 DEA95xA50P01 DEA70xA51P01 DLA70xA52P01 DLA70xA71P01 DEM70xx10P01 DEM70xx20P01 DEM70xx30P01 DEM70xx35P01 DLE70xA50P01 DLE70xF50P01 DEU70VA50P01UL DLE95xA50P01 DLE95xF50P01 DEM95xx10P01 DEM95xx20P01 DEM95xx30P01 DEM95xx35P01 DTA70xF70P01 DTA95xF70P01
	With bypass valve 6 bar	FMP 039 - 065 - 135 - 320 FHP 010 - 011 - 065 - 135 - 350 - 351 - 500 FMMX 050 - 150 FMM 050 - 150 FHA 051 FHM 006 - 007 - 010 - 050 - 065 - 135 - 320 - 500 FHB 050 - 135 - 320 FHF 325 FHD 021 - 051 - 326 - 333	DVA50xP01 DVM50xP01	DEA50xA50P01 DEA50xA51P01 DLA50xA52P01 DLA50xA71P01 DEM50xx10P01 DEM50xx20P01 DEM50xx30P01 DEM50xx35P01 DLE50xA50P01 DLE50xF50P01 DEU50VA50P01UL
	Without bypass valve	FMP 039 - 065 - 135 - 320 FHP 010 - 011 - 065 - 135 - 350 - 351 - 500 FMMX 050 - 150 FMM 050 - 150 FHA 051 FHM 006 - 007 - 010 - 050 - 065 - 135 - 320 - 500 FHB 050 - 135 - 320 FHF 325 FHD 021 - 051 - 326 - 333	DVA70xP01 DVA95xP01 DVM70xP01 DVM95xP01	DEA70xA50P01 DEA95xA50P01 DEA70xA51P01 DLA70xA52P01 DLA70xA71P01 DEM70xx10P01 DEM70xx20P01 DEM70xx30P01 DEM70xx35P01 DLE70xA50P01 DLE70xF50P01 DEU70VA50P01UL DLE95xA50P01 DLE95xF50P01 DEM95xx10P01 DEM95xx20P01 DEM95xx30P01 DEM95xx35P01 DTA70xF70P01 DTA95xF70P01
	With bypass valve 6 bar	FMP 039 - 065 - 135 - 320 FHP 010 - 011 - 065 - 135 - 350 - 351 - 500 FMMX 050 - 150 FMM 050 - 150 FHA 051 FHM 006 - 007 - 010 - 050 - 065 - 135 - 320 - 500 FHB 050 - 135 - 320 FHF 325 FHD 021 - 051 - 326 - 333	DVA50xP01 DVM50xP01	DEA50xA50P01 DEA50xA51P01 DLA50xA52P01 DLA50xA71P01 DEM50xx10P01 DEM50xx20P01 DEM50xx30P01 DEM50xx35P01 DLE50xA50P01 DLE50xF50P01 DEU50VA50P01UL

Filter family	Filter series		Visual indicators	Electrical indicators	Electronic / Electrical-Visual indicators
STAINLESS STEEL HIGH PRESSURE FILTERS	With bypass valve 6 bar	FZH 012 - 040	DVZ50xP01	DEZ50xA50P01	DLZ50xA51P01 DLZ50xA52P01
	Without bypass valve	FZH 012 - 040	DVZ70xP01 DVZ95xP01	DEZ70xA50P01 DEZ95xA50P01	DLZ70xA51P01 DLZ70xA52P01 DLZ95xA51P01 DLZ95xA52P01
	With bypass valve 6 bar	FZP 039 - 136 FZB 039 FZM 039 FZD 051	DVX50xP01 DYY50xP01	DEX50xA50P01	DLX50xA51P01 DLX50xA52P01
	Without bypass valve	FZP 039 - 136 FZB 039 FZM 039 FZD 010 - 021 - 051	DVX70xP01 DVX95xP01 DYY70xP01 DYY95xP01	DEX70xA50P01 DEX95xA50P01	DLX70xA51P01 DLX70xA52P01 DLX95xA51P01 DLX95xA52P01
FILTERS FOR POTENTIALLY EXPLOSIVE ATMOSPHERE	With bypass valve 6 bar	FMMX 050 - 150	DVA50xP01 DVM50xP01	DEH50xA48P01 DEH50xA49P01 DEH50xA70P01	
	Without bypass valve	FMMX 050 - 150	DVA70xP01 DVA95xP01 DVM70xP01 DVM95xP01	DEH70xA48P01 DEH70xA49P01 DEH70xA70P01	
	With bypass valve 6 bar	FZP 039 - 136	DVX50xP01 DYY50xP01	DEH50xA48P01 DEH50xA49P01 DEH50xA70P01	
	Without bypass valve	FZP 039 - 136	DVX70xP01 DVX95xP01 DYY70xP01 DYY95xP01	DEH70xA48P01 DEH70xA49P01 DEH70xA70P01	
	With bypass valve 6 bar	FZH 012 - 040	DVZ50xP01		
	Without bypass valve	FZH 012 - 040	DVZ70xP01 DVZ95xP01		

Suitable indicator types

V ACUUM INDICATORS

Vacuum indicators are used on the Suction line to check the efficiency of the filter element.

They measure the pressure downstream of the filter element.

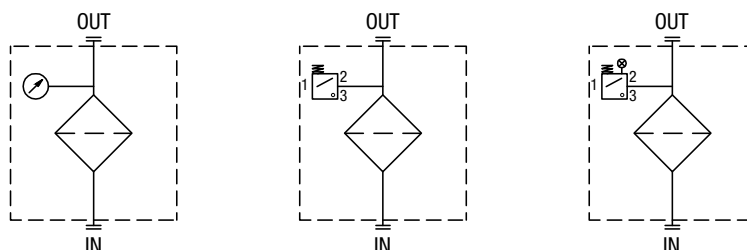
Standard items are produced with R 1/4" EN 10226 connection.

Available products with R 1/8" EN 10226 to be fitted on MPS series.

Vacuum indicators are identified in the Hydraulic Filtration catalogue and in the Quick Reference Guide table by the letter "V".

Example:

V VVB20P01



B BAROMETRIC (PRESSURE) INDICATORS

Pressure indicators are used on the Return line to check the efficiency of the filter element.

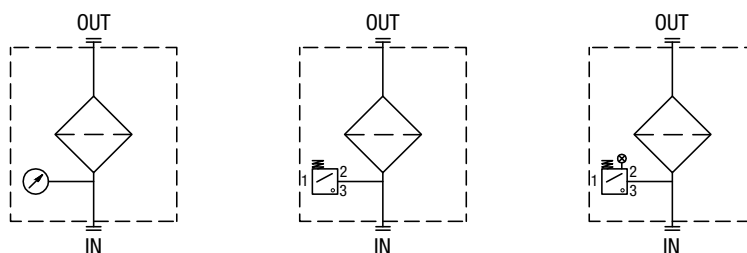
They measure the pressure upstream of the filter element.

Standard items are produced with R 1/8" EN 10226 connection.

Barometric (pressure) indicators are identified in the Hydraulic Filtration catalogue and in the Quick Reference Guide table by the letter "B".

Example:

B BVA14P01



D DIFFERENTIAL PRESSURE INDICATORS

Differential pressure indicators are used on the Pressure line to check the efficiency of the filter element.

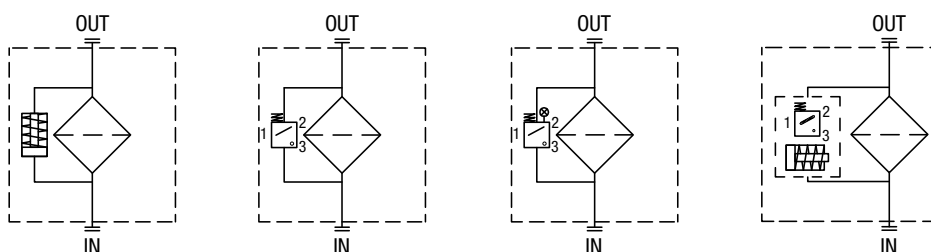
They measure the pressure upstream and downstream of the filter element (differential pressure).

Standard items are produced with special connection G 1/2" size.

Also available in Stainless Steel models. Differential pressure indicators are identified in the Hydraulic Filtration catalogue and in the Quick Reference Guide table by the letter "D".

Example:

D DVA20xP01



Designation & Ordering code

APPLICABLE VACUUM INDICATORS BY FILTER SERIES

Filter Series	VEA	VEB	VLA	VLB	VVA	VVB	VVR	VVS
STRC	-	-	-	-	-	-	-	-
MPAC	-	-	-	-	-	-	-	-
SFEX	-	•	-	•	-	•	-	•
SFMC	•	-	•	-	•	-	•	-
SFSC	•	-	•	-	•	-	•	-

VACUUM INDICATORS

Series		Configuration example 1: VE A 21 V A 50 P01 EX									
VE Electrical vacuum indicator		Configuration example 2: VL B 21 A A 71 P01									
VL Electrical/Visual vacuum indicator		Configuration example 3: VV R 20 P01									
VV Vacuum gauge											
Type VE - VL		Type VV		SFC	SFEX						
A	Connection EN 10226 - R1/4"	A	Axial connection EN 10226 - R1/4"	•	-						
B	Connection EN 10226 - R1/8"	B	Axial connection EN 10226 - R1/8"	-	•						
		R	Radial connection EN 10226 - R1/4"	•	-						
		S	Radial connection EN 10226 - R1/8"	-	•						
Vacuum setting		VE	VL	VVA	VVB	VVR	VVS				
20	0.20 bar	-	-	•	•	•	•				
21	0.21 bar	•	•	-	-	-	-				
Seals				VEA - VLA	VEB - VLB	VV					
A	NBR			•	•	-					
V	FPM			•	-	-					
Thermostat				VE	VL	VV					
A	Without			•	•	-					
Electrical connections				VE	VL	VV					
50	Connection EN 175301-803			•	-	-					
51	Connection EN 175301-803, transparent base with lamps 24 Vdc			-	•	-					
52	Connection EN 175301-803, transparent base with lamps 110 Vdc			-	•	-					
53	Connection EN 175301-803, transparent base with lamps 230 Vac			-	•	-					
71	Connection IEC 61076-2-101 D (M12), black base with lamps 24 Vdc			-	•	-					
Option											
P01 MP Filtri standard											
Pxx Customized											
Certifications				VEA21A	VEA21V	VEB	VL	VV			
Without				•	•	•	•	•			
EX	ATEX certification			•	•	•	-	-			
UL	UL certification			•	-	-	-	-			

Designation & Ordering code

APPLICABLE BAROMETRIC (PRESSURE) INDICATORS BY FILTER SERIES

Filter Series	BEA	BEM	BET	BLA	BVA	BVR	BVP	BVQ
RFEX	•	•	-	•	•	•	•	•
MPFX	•	•	•	•	•	•	•	•
MPLX	-	-	-	-	-	-	-	-
MPTX	•	•	•	•	•	•	•	•
MFBX	-	-	-	-	-	-	-	-
MPF	•	•	•	•	•	•	•	•
MPT	•	•	•	•	•	•	•	•
MFB	-	-	-	-	-	-	-	-
MDH	•	•	•	•	•	•	•	•
MPH	•	•	-	•	•	•	•	•
MPI	-	-	-	-	-	-	-	-
FRI (all sizes, except 255)	-	-	-	-	-	-	-	-
FRI 255	•	•	-	•	•	•	•	•
RF2	-	-	-	-	-	-	-	-

BAROMETRIC (PRESSURE) INDICATORS

Series				Configuration example 1:										BE	A	15	H	A	41	P01	EX
BE Electrical pressure indicator				Configuration example 2:										BL	A	20	H	A	71	P01	
BL Electrical/Visual pressure indicator				Configuration example 3:										BV	R	14				P01	
BV Visual pressure indicator				Configuration example 4:										BV	P	20	H			P01	
Type				BE	BL	BV															
A Standard type				•	•	A Axial connection pressure gauge															
M With wired electrical connection				•	-	R Radial connection pressure gauge															
T With thermal switch				•	-	P Visual indicator with automatic reset															
						Q Visual indicator with manual reset															
Pressure setting				BEA-BEM	BET	BLA	BVA-BVR-BVE-BVH				BVP-BVQ-BVN-BVO										
14 1.4 bar				-	-	-	•				-										
15 1.5 bar				•	-	•	-				•										
20 2.0 bar				•	•	•	-				•										
25 2.5 bar				-	•	-	•				-										
Seals				BE	BLA	BVA-BVR-BVE-BVH				BVP-BVQ-BVN-BVO											
H HNBR				•	•	-				•											
Thermostat				BEA-BEM	BET	BLA	BV														
A Without thermostat				•	-	•	-														
F With thermostat				-	•	-	-														
Electrical connections				BEA	BEM	BET	BL	BV													
10 Connection AMP Superseal series 1,5				-	-	•	-	-													
30 Connection Deutsch DT-04-2-P				-	-	•	-	-													
41 Connection via four-core cable				-	•	-	-	-													
50 Connection EN 175301-803				•	-	-	-	-													
51 Connection EN 175301-803, transparent base with lamps 24 Vdc				-	-	-	•	-													
52 Connection EN 175301-803, transparent base with lamps 110 Vdc				-	-	-	•	-													
53 Connection EN 175301-803, transparent base with lamps 230 Vac				-	-	-	•	-													
71 Connection IEC 61076-2-101 D (M12), black base with lamps 24 Vdc				-	-	-	•	-													
Option																					
P01 MP Filtri standard																					
Pxx Customized																					
Certifications				BEA	BEM-BET	BL	BV														
Without				•	•	•	•														
EX ATEX certification				•	-	-	-														
UL UL certification				•	-	-	-														

APPLICABLE DIFFERENTIAL PRESSURE INDICATORS BY FILTER SERIES

Filter Series	DEA	DEM	DEU	DES	DLA	DLE	DTA	DVA	DVM	DVS
RFEX	-	-	-	-	-	-	-	-	-	-
MPFX	-	-	-	-	-	-	-	-	-	-
MPLX	•	•	•	-	•	•	•	•	•	-
MPTX	-	-	-	-	-	-	-	-	-	-
MFBX	-	-	-	-	-	-	-	-	-	-
MPF	-	-	-	-	-	-	-	-	-	-
MPT	-	-	-	-	-	-	-	-	-	-
MFB	-	-	-	-	-	-	-	-	-	-
MDH	-	-	-	•	-	-	-	-	-	•
MPH	-	-	-	-	-	-	-	-	-	-
MPI	-	-	-	-	-	-	-	-	-	-
FRI (all sizes, except 255)	•	•	•	-	•	•	•	•	•	-
FRI 255	-	-	-	-	-	-	-	-	-	-
RF2	-	-	-	-	-	-	-	-	-	-

DIFFERENTIAL PRESSURE INDICATORS

Series	Configuration example 1:										Configuration example 2:		Configuration example 3:		Configuration example 4:		Configuration example 5:		UL
DE Electrical differential pressure indicator	DE	M	20	H	F	50	P01		DE	U	50	V	A	50	P01				
DL Electrical/Visual differential pressure indicator	DL	E	20	V	A	71	P01		DL	E	20	V	A	71	P01				
DT Electrical differential pressure indicator	DT	A	20	H	F	70	P01		DT	A	20	H	F	70	P01				
DV Visual differential pressure indicator	DV	M	20	V			P01		DV	M	20	V			P01				
Type	DE	DL	DT	DV															
A Standard type	•	•	•	A	With automatic reset														
M With wired electrical connection	•	-	-	M	With manual reset														
U Standard type 210 bar, UL certified	•	-	-	S	With automatic reset														
E For high power supply	-	•	-																
S Compact version	•	-	-																
Pressure setting	DEA	DEM	DEU	DES	DL	DT	DVA	DVM	DVS										
12 1.2 bar	-	-	-	•	-	-	-	-	•										
20 2.0 bar	•	•	•	-	•	•	•	•	•										
25 2.5 bar	-	-	-	•	-	-	-	-	•										
50 5.0 bar	•	•	•	-	•	•	•	•	-										
Seals	DEA	DEM	DEU	DES	DL	DT	DVA	DVM	DVS										
H HNBR	•	•	-	•	•	•	•	•	•										
V FPM	•	•	•	-	•	•	•	•	-										
Thermostat	DEA	DEM	DEU	DES	DLA	DLE	DT												
A Without thermostat	•	•	•	•	•	•	-												
F With thermostat	-	•	-	-	-	•	•												
Electrical connections	DEA	DEM	DEU	DES	DLA	DLE	DT												
10 Connection AMP Superseal series 1.5	-	•	-	•	-	-	-												
20 Connection AMP Timer Junior	-	•	-	-	-	-	-												
30 Connection Deutsch DT-04-2-P	-	•	-	•	-	-	-												
35 Connection Deutsch DT-04-3-P	-	•	-	-	-	-	-												
50 Connection EN 175301-803	•	-	•	-	-	•	-												
51 Connection EN 175301-803, transparent base with lamps 24 Vdc	-	-	-	-	•	-	-												
52 Connection EN 175301-803, transparent base with lamps 110 Vdc	-	-	-	-	•	-	-												
70 Connection IEC 61076-2-101 D (M12)	-	-	-	-	-	-	•												
71 Connection IEC 61076-2-101 D (M12), black base with lamps 24 Vdc	-	-	-	-	•	-	-												
80 Connection Stud #10-32 UNF	-	-	-	•	-	-	-												
								Option											
								P01	MP Filtri standard										
								Pxx	Customized										

PLUGS

Series	Configuration example		T2	H
T2 Plug				
T4 Plug				
Seals	T2	T4		
A NBR	-	•		
H HNBR	•	-		
V FPM	•	-		

Certifications	DEU	OTHERS
Without	-	•
UL UL certification	•	-

Designation & Ordering code

APPLICABLE VACUUM INDICATORS BY FILTER SERIES

Filter Series	VEB	VLB	VVB	VVS
MRSX	•	•	•	•
LMP124	-	-	-	-

VACUUM INDICATORS

Series					Configuration example 1:							EX	
VE Electrical vacuum indicator					VL		B	21	V	A	50	P01	EX
VL Electrical/Visual vacuum indicator					VV		S	20				P01	
VV Vacuum gauge													
Type VE - VL					Type VV								
B Connection EN 10226 - R1/8"					B Axial connection EN 10226 - R1/8"								
					S Radial connection EN 10226 - R1/8"								
Vacuum setting					VE	VL	VVB	VVS					
20 0.20 bar					-	-	•	•					
21 0.21 bar					•	•	-	-					
Seals					VEB - VLB		VV						
A NBR							•	-					
V FPM							-	-					
Thermostat					VE	VL	VV						
A Without					•	•	-						
Electrical connections					VE	VL							
50 Connection EN 175301-803					•	-							
51 Connection EN 175301-803, transparent base with lamps 24 Vdc					-	•							
52 Connection EN 175301-803, transparent base with lamps 110 Vdc					-	•							
53 Connection EN 175301-803, transparent base with lamps 230 Vac					-	•							
71 Connection IEC 61076-2-101 D (M12), black base with lamps 24 Vdc					-	•							

APPLICABLE BAROMETRIC (PRESSURE) INDICATORS BY FILTER SERIES

Filter Series	BEA	BEM	BET	BLA	BVA	BVR	BVP	BVQ
MRSX	•	•	•	•	•	•	•	•
LMP124	•	•	•	•	•	•	•	•

BAROMETRIC (PRESSURE) INDICATORS

Series				Configuration example 1:										EX	
BE Electrical pressure indicator				Configuration example 2:											
BL Electrical/Visual pressure indicator				Configuration example 3:											
BV Visual pressure indicator				Configuration example 4:											
Type				BE	BL	BV									
A Standard type				•	•	A Axial connection pressure gauge									
M With wired electrical connection				•	-	R Radial connection pressure gauge									
T With thermal switch				•	-	P Visual indicator with automatic reset									
						Q Visual indicator with manual reset									
Pressure setting				BEA-BEM	BET	BLA	BVA-BVR-BVE-BVH				BVP-BVQ-BVN-BVO				
14 1.4 bar				-	-	-	•				-				
15 1.5 bar				•	-	•	-				•				
20 2.0 bar				•	•	•	-				•				
25 2.5 bar				-	•	-	•				-				
Seals				BE	BLA	BVA-BVR-BVE-BVH				BVP-BVQ-BVN-BVO					
H HNBR				•	•	-				•					
Thermostat				BEA-BEM	BET	BLA	BV								
A Without thermostat				•	-	•	-								
F With thermostat				-	•	-	-								
Electrical connections				BEA	BEM	BET	BL								
10 Connection AMP Superseal series 1.5				-	-	•	-								
30 Connection Deutsch DT-04-2-P				-	-	•	-								
41 Connection via four-core cable				-	•	-	-								
50 Connection EN 175301-803				•	-	•	-								
51 Connection EN 175301-803, transparent base with lamps 24 Vdc				-	-	-	•								
52 Connection EN 175301-803, transparent base with lamps 110 Vdc				-	-	-	•								
53 Connection EN 175301-803, transparent base with lamps 230 Vac				-	-	-	•								
71 Connection IEC 61076-2-101 D (M12), black base with lamps 24 Vdc				-	-	-	•								
Option															
P01				MP Filtri standard											
Pxx				Customized											
Certifications				BEA	BEM-BET		BL	BV							
Without				•	•		•	•							
EX ATEX certification				•	-		-	-							
UL UL certification				•	-		-	-							

Designation & Ordering code

APPLICABLE DIFFERENTIAL PRESSURE INDICATORS BY FILTER SERIES

Filter Series	DEA	DEM	DEU	DLA	DLE	DTA	DVA	DVM
MRSX	-	-	-	-	-	-	-	-
LMP124	•	•	•	•	•	•	•	•

DIFFERENTIAL PRESSURE INDICATORS

Series	Configuration example 1:	DE	M	12	H	F	50	P01	
DE Electrical differential pressure indicator	Configuration example 2:	DE	U	50	V	A	50	P01	UL
DL Electrical/Visual differential pressure indicator	Configuration example 3:	DL	E	20	V	A	71	P01	
DT Electronic differential pressure indicator	Configuration example 4:	DT	A	50	H	F	70	P01	
DV Visual differential pressure indicator	Configuration example 5:	DV	M	70	V			P01	
Type	DE	DL	DT	DV					
A Standard type	•	•	•	A With automatic reset					
M With wired electrical connection	•	-	-	M With manual reset					
U Standard type 210 bar, UL certified	•	-	-						
E For high power supply	-	•	-						
Pressure setting	DEA	DEM	DEU	DLA	DLE	DTA	DVA	DVM	
20 2.0 bar	•	•	•	•	•	•	•	•	
Seals	DEA	DEM	DEU	DLA	DLE	DTA	DVA	DVM	
H HNBR	•	•	-	•	•	•	•	•	
V FPM	•	•	•	•	•	•	•	•	
Thermostat	DEA	DEM	DEU	DLA	DLE	DT			
A Without thermostat		•	•	•	•	•	-		
F With thermostat		-	•	-	-	•	•		
Electrical connections	DEA	DEM	DEU	DLA	DLE	DT			
10 Connection AMP Superseal series 1.5	-	•	-	-	-	-			
20 Connection AMP Timer Junior	-	•	-	-	-	-			
30 Connection Deutsch DT-04-2-P	-	•	-	-	-	-			
35 Connection Deutsch DT-04-3-P	-	•	-	-	-	-			
50 Connection EN 175301-803	•	-	•	-	•	-			
51 Connection EN 175301-803, transparent base with lamps 24 Vdc	-	-	-	•	-	-			
52 Connection EN 175301-803, transparent base with lamps 110 Vdc	-	-	-	•	-	-			
70 Connection IEC 61076-2-101 D (M12)	-	-	-	-	-	•			
71 Connection IEC 61076-2-101 D (M12), black base with lamps 24 Vdc	-	-	-	•	-	-			
Option									
P01 MP Filtri standard									
Pxx Customized									
Certifications	DEU	OTHERS							
Without	-	•							
UL UL certification	•	-							

PLUGS

Series	Configuration example	T2	H
T2 Plug			
Seals			
H HNBR			
V FPM			

APPLICABLE VACUUM INDICATORS BY FILTER SERIES

Filter Series	VEA	VEB	VLA	VLB	VVA	VVB	VVR	VVS
MPS	-	•	-	•	-	•	-	•

VACUUM INDICATORS

Series	Configuration example 1:										VE	B	21	A	A	50	P01	EX
VE Electrical vacuum indicator	Configuration example 2:										VL	B	21	A	A	71	P01	
VL Electrical/Visual vacuum indicator	Configuration example 3:										VV	S	20				P01	
VV Vacuum gauge																		
Type VE - VL										Type VV								
B Connection EN 10226 - R1/8"										B Axial connection EN 10226 - R1/8"								
										S Radial connection EN 10226 - R1/8"								
Vacuum setting										VE	VL	VVB	VVS					
20 0.20 bar										-	-	•	•					
21 0.21 bar										•	•	-	-					
Seals										VEA - VLA	VEB - VLB	VV						
A NBR										•		•	-					
V FPM										•		-	-					
Thermostat										VE	VL	VV						
A Without											•	•	-					
Electrical connections										VE	VL							
50 Connection EN 175301-803										•	-							
51 Connection EN 175301-803, transparent base with lamps 24 Vdc										-	•							
52 Connection EN 175301-803, transparent base with lamps 110 Vdc										-	•							
53 Connection EN 175301-803, transparent base with lamps 230 Vac										-	•							
71 Connection IEC 61076-2-101 D (M12), black base with lamps 24 Vdc										-	•							
										Option								
										P01 MP Filtri standard								
										Pxx Customized								
Certifications										VEA21A	VEA21V	VEB	VL	VV				
Without										•	•	•	•	•				
EX ATEX certification										•	•	•	-	-				
UL UL certification										•	-	-	-	-				

Designation & Ordering code

APPLICABLE BAROMETRIC (PRESSURE) INDICATORS BY FILTER SERIES

Filter Series	BEA	BEM	BET	BLA	BVA	BVR	BVP	BVQ
MPS	•	•	•	•	•	•	•	•

BAROMETRIC (PRESSURE) INDICATORS

Series	Configuration example 1:	BE	M	15	H	A	41	P01
BE Electrical pressure indicator	Configuration example 2:	BL	A	20	H	A	71	P01
BL Electrical/Visual pressure indicator	Configuration example 3:	BV	R	14				P01
BV Visual pressure indicator	Configuration example 4:	BV	P	20	H			P01

Type	BE	BL	BV
A Standard type	•	•	A Axial connection pressure gauge
M With wired electrical connection	•	-	R Radial connection pressure gauge
			P Visual indicator with automatic reset
			Q Visual indicator with manual reset

Pressure setting	BEA-BEM	BET	BLA	BVA-BVR-BVE-BVH	BVP-BVQ-BVN-BVO
14 1.4 bar	-	-	-	•	-
15 1.5 bar	•	-	•	-	•
20 2.0 bar	•	•	•	-	•
25 2.5 bar	-	•	-	•	-

Seals	BE	BLA	BVA-BVR-BVE-BVH	BVP-BVQ-BVN-BVO
H HNBR	•	•	-	•

Thermostat	BEA-BEM	BET	BLA	BV
A Without thermostat	•	-	•	-
F With thermostat	-	•	-	-

Electrical connections	BEA	BEM	BL
10 Connection AMP Superseal series 1.5	-	-	-
30 Connection Deutsch DT-04-2-P	-	-	-
41 Connection via four-core cable	-	•	-
50 Connection EN 175301-803	•	-	-
51 Connection EN 175301-803, transparent base with lamps 24 Vdc	-	-	•
52 Connection EN 175301-803, transparent base with lamps 110 Vdc	-	-	•
53 Connection EN 175301-803, transparent base with lamps 230 Vac	-	-	•
71 Connection IEC 61076-2-101 D (M12), black base with lamps 24 Vdc	-	-	•

Option
P01 MP Filtri standard
Pxx Customized

Certifications	BEA	BEM-BET	BL	BV
Without	•	•	•	•
EX ATEX certification	•	-	-	-
UL UL certification	•	-	-	-

APPLICABLE DIFFERENTIAL PRESSURE INDICATORS BY FILTER SERIES

Filter Series	DEA	DEM	DEU	DLA	DLE	DTA	DVA	DVM
MPS	•	•	•	•	•	•	•	•

DIFFERENTIAL PRESSURE INDICATORS

Series				Configuration example 1:							Configuration example 2:		Configuration example 3:		Configuration example 4:		Configuration example 5:		UL
DE Electrical differential pressure indicator				DE		U		50		V		A		50		P01			
DL Electrical/Visual differential pressure indicator				DL		E		20		V		A		71		P01			
DT Electronic differential pressure indicator				DT		A		50		H		F		70		P01			
DV Visual differential pressure indicator				DV		M		70		V						P01			
Type		DE	DL	DT	DV														
A Standard type		•	•	•	A With automatic reset														
M With wired electrical connection		•	-	-	M With manual reset														
U Standard type 210 bar, UL certified		•	-	-															
E For high power supply		-	•	-															
Pressure setting		DEA	DEM	DEU	DLA	DLE	DTA	DVA	DVM										
12 1.2 bar		•	•	-	•	•	•	•	•										
20 2.0 bar		•	•	•	•	•	•	•	•										
Seals		DEA	DEM	DEU	DLA	DLE	DTA	DVA	DVM										
H HNBR		•	•	-	•	•	•	•	•										
V FPM		•	•	•	•	•	•	•	•										
Thermostat		DEA	DEM	DEU	DLA	DLE	DT												
A Without thermostat			•	•	•	•	•	-											
F With thermostat			-	•	-	-	•	•											
Electrical connections		DEA	DEM	DEU	DLA	DLE	DT												
10 Connection AMP Superseal series 1.5		-	•	-	-	-	-												
20 Connection AMP Timer Junior		-	•	-	-	-	-												
30 Connection Deutsch DT-04-2-P		-	•	-	-	-	-												
35 Connection Deutsch DT-04-3-P		-	•	-	-	-	-												
50 Connection EN 175301-803		•	-	•	-	•	-												
51 Connection EN 175301-803, transparent base with lamps 24 Vdc		-	-	-	•	-	-												
52 Connection EN 175301-803, transparent base with lamps 110 Vdc		-	-	-	•	-	-												
70 Connection IEC 61076-2-101 D (M12)		-	-	-	-	-	•												
71 Connection IEC 61076-2-101 D (M12), black base with lamps 24 Vdc		-	-	-	•	-	-												
Option																			
P01 MP Filtri standard																			
Pxx Customized																			
Certifications		DEU	OTHERS																
Without		-	•																
UL UL certification		•	-																

PLUGS

Series	Configuration example T2 H									
T2 Plug										
Seals										
H HNBR										
V FPM										

Designation & Ordering code

APPLICABLE DIFFERENTIAL PRESSURE INDICATORS BY FILTER SERIES

Filter Series	DEA	DEM	DEU	DES	DLA	DLE	DTA	DVA	DVM	DVS
LFEX	-	-	-	•	-	-	-	-	-	•
LPH 630	•	•	•	-	•	•	•	•	•	-
LMP 110	•	•	•	-	•	•	•	•	•	-
LMP 112 / 123 MULTIPOINT	•	•	•	-	•	•	•	•	•	-
LMP 210 - 211	•	•	•	-	•	•	•	•	•	-
LMP 400 - 401	•	•	•	-	•	•	•	•	•	-
LMP 430 - 431	•	•	•	-	•	•	•	•	•	-
LMP 950 - 951	•	•	•	-	•	•	•	•	•	-
LMP 952 - 953 - 954	•	•	•	-	•	•	•	•	•	-
LMD 211	•	•	•	-	•	•	•	•	•	-
LMD 400 - 401 & 431	•	•	•	-	•	•	•	•	•	-
LMD 951	•	•	•	-	•	•	•	•	•	-
LDP-LDD	•	•	•	-	•	•	•	•	•	-
LMP 900 - 901	•	•	•	-	•	•	•	•	•	-
LMP 902 - 903	•	•	•	-	•	•	•	•	•	-

DIFFERENTIAL PRESSURE INDICATORS

Series	Configuration example 1:	DE	M	20	H	F	50	P01	
DE Electrical differential pressure indicator	Configuration example 2:	DE	U	50	V	A	50	P01	UL
DL Electrical/Visual differential pressure indicator	Configuration example 3:	DL	E	50	V	A	71	P01	
DT Electronic differential pressure indicator	Configuration example 4:	DT	A	20	H	F	70	P01	
DV Visual differential pressure indicator	Configuration example 5:	DV	M	50	V			P01	

Type	DE	DL	DT	DV
A Standard type	•	•	•	A With automatic reset
M With wired electrical connection	•	-	-	M With manual reset
U Standard type 210 bar, UL certified	•	-	-	S With automatic reset
E For high power supply	-	•	-	
S Compact version	•	-	-	

Pressure setting	DEA	DEM	DEU	DES	DLA	DLE	DTA	DVA	DVM	DVS
12 1.2 bar	•	•	-	•	•	•	•	•	•	•
20 2.0 bar	•	•	•	-	•	•	•	•	•	-
25 2.5 bar	-	-	-	-	-	-	-	-	-	•
40 4.0 bar	-	-	-	•	-	-	-	-	-	•
50 5.0 bar	•	•	•	-	•	•	•	•	•	-

Seals	DEA	DEM	DEU	DES	DL	DT	DVA	DVM	DVS
H HNBR	•	•	-	•	•	•	•	•	•
V FPM	•	•	•	-	•	•	•	•	-

Thermostat	DEA	DEM	DEU	DES	DLA	DLE	DT
A Without thermostat	•	•	•	•	•	•	-
F With thermostat	-	•	-	-	-	•	•

Electrical connections	DEA	DEM	DEU	DES	DLA	DLE	DT	
10 Connection AMP Superseal series 1.5	-	•	-	•	-	-	-	
20 Connection AMP Timer Junior	-	•	-	-	-	-	-	
30 Connection Deutsch DT-04-2-P	-	•	-	•	-	-	-	
35 Connection Deutsch DT-04-3-P	-	•	-	-	-	-	-	
50 Connection EN 175301-803	•	-	•	-	-	•	-	
51 Connection EN 175301-803, transparent base with lamps 24 Vdc	-	-	-	-	•	-	-	
52 Connection EN 175301-803, transparent base with lamps 110 Vdc	-	-	-	-	•	-	-	
70 Connection IEC 61076-2-101 D (M12)	-	-	-	-	-	-	•	Option
71 Connection IEC 61076-2-101 D (M12), black base with lamps 24 Vdc	-	-	-	-	•	-	-	P01 MP Filtri standard
80 Connection Stud #10-32 UNF	-	-	-	•	-	-	-	Pxx Customized

PLUGS

Series	Configuration example	T2	H
T2 Plug			
T4 Plug			

Seals	T2	T4
A NBR	-	•
H HNBR	•	-
V FPM	•	-

Certifications	DEU	OTHERS
Without	-	•
UL UL certification	•	-

APPLICABLE DIFFERENTIAL PRESSURE INDICATORS BY FILTER SERIES

Filter Series	DEA	DEM	DEU	DLA	DLE	DTA	DVA	DVM
FMX	•	•	•	•	•	•	•	•
FMM	•	•	•	•	•	•	•	•
FHA	•	•	•	•	•	•	•	•
FMP 039	•	•	•	•	•	•	•	•
FMP	•	•	•	•	•	•	•	•
FHP	•	•	•	•	•	•	•	•
FHM	•	•	•	•	•	•	•	•
FHB	•	•	•	•	•	•	•	•
FHF	•	•	•	•	•	•	•	•
FHD	•	•	•	•	•	•	•	•
HPB	-	-	-	-	-	-	-	-

DIFFERENTIAL PRESSURE INDICATORS

Series				Configuration example 1:																	
DE Electrical differential pressure indicator				DE		M		12		H		F		50		P01					
DL Electrical/Visual differential pressure indicator				DE		U		50		V		A		50		P01					
DT Electronic differential pressure indicator				DL		E		20		V		A		71		P01					
DV Visual differential pressure indicator				DT		A		50		H		F		70		P01					
				DV		M		70		V						P01					
Type				DE		DL		DT		DV											
A Standard type				•		•		•		A		With automatic reset									
M With wired electrical connection				•		-		-		M		With manual reset									
U Standard type 210 bar, UL certified				•		-		-													
E For high power supply				-		•		-													
Pressure setting				DEA		DEM		DEU		DLA		DLE		DTA		DVA		DVM			
50 5.0 bar				•		•		•		•		•		•		•		•			
70 7.0 bar				•		•		•		•		•		•		•		•			
95 9.5 bar				•		•		-		•		•		•		•		•			
Seals				DEA		DEM		DEU		DLA		DLE		DTA		DVA		DVM			
H HNBR				•		•		-		•		•		•		•		•			
V FPM				•		•		•		•		•		•		•		•			
Thermostat				DEA		DEM		DEU		DLA		DLE		DT							
A Without thermostat				•		•		•		•		•		-							
F With thermostat				-		•		-		-		•		•							
Electrical connections				DEA		DEM		DEU		DLA		DLE		DT							
10 Connection AMP Superseal series 1.5				-		•		-		-		-		-							
20 Connection AMP Timer Junior				-		•		-		-		-		-							
30 Connection Deutsch DT-04-2-P				-		•		-		-		-		-							
35 Connection Deutsch DT-04-3-P				-		•		-		-		-		-							
50 Connection EN 175301-803				•		-		•		-		•		-							
51 Connection EN 175301-803, transparent base with lamps 24 Vdc				-		-		-		•		-		-							
52 Connection EN 175301-803, transparent base with lamps 110 Vdc				-		-		-		•		-		-							
70 Connection IEC 61076-2-101 D (M12)				-		-		-		-		-		•							
71 Connection IEC 61076-2-101 D (M12), black base with lamps 24 Vdc				-		-		-		•		-		-							

PLUGS

Series	Configuration example	T2	H
T2 Plug			
Seals			
H HNBR			
V FPM			

DIFFERENTIAL PRESSURE INDICATORS

FILTERS FOR POTENTIALLY EXPLOSIVE ATMOSPHERE

Designation & Ordering code

APPLICABLE DIFFERENTIAL PRESSURE INDICATORS BY FILTER SERIES

Filter Series	DEH	DEX	DVA	DVM	DVX	DVY	DVZ
FMMX	•	•	•	•	-	-	-
FZP	•	-	-	-	•	•	-
FZH	-	-	-	-	-	-	•
FZX	-	-	-	-	-	-	-

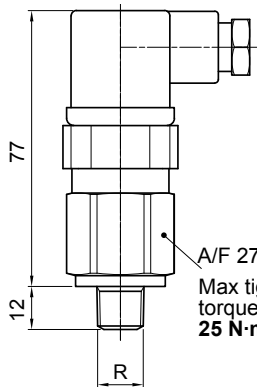
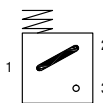
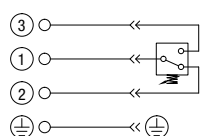
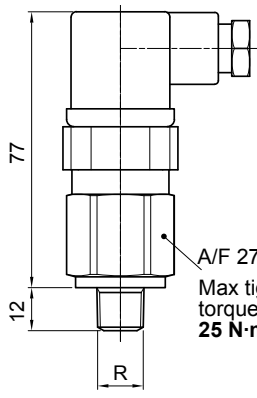
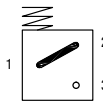
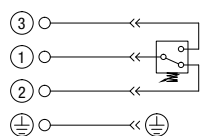
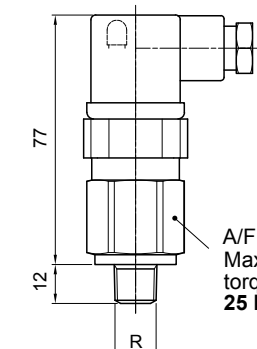
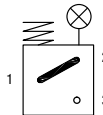
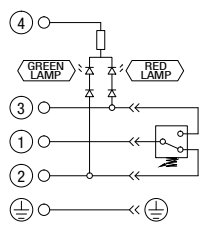
DIFFERENTIAL PRESSURE INDICATORS

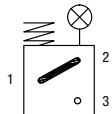
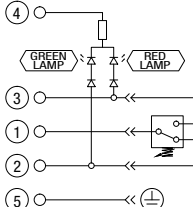
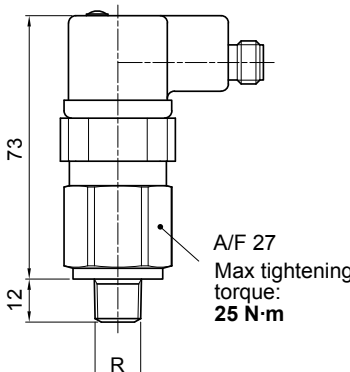
Series		Configuration example 1:																			
DE Electrical differential pressure indicator		DE		H		50		F		A		48		P01							
DV Visual differential pressure indicator		Configuration example 2:										DV		X		70		V		P01	
Type		DE		DV																	
A With automatic reset		-		•																	
M With manual reset		-		•																	
H Stainless steel hazardous area 420 bar		•		-																	
X Stainless steel standard type 420 bar		-		•																	
Y Stainless steel optional type 420 bar		-		•																	
Pressure setting		DEH		DVA		DVM		DVX		DVY											
50 5.0 bar		•		•		•		•		•											
70 7.0 bar		•		•		•		•		•											
95 9.5 bar		-		•		•		•		•											
Seals		DEH		DVA		DVM		DVX		DVY											
H HNBR		-		•		•		•		•											
V FPM		•		•		•		•		•											
F MFQ		•		-		-		-		-											
Thermostat		DEH																			
A Without thermostat		•																			
T With thermostat		-																			
Electrical connections		DEH																			
48 Connection via three-core cable - fitting M20x1.5		•																			
49 Connection via four-core cable - fitting 1/2" NPT		•																			
70 Connection IEC 61076-2-101 D (M12)		•																			
														Option							
														P01 MP Filtri standard							
														Pxx Customized							

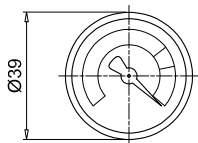
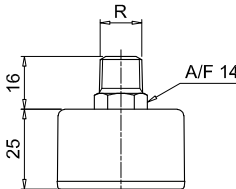
PLUGS

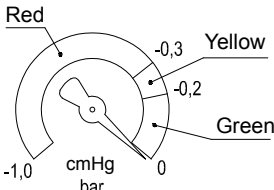
Series	Configuration example X2 H		
T2 Plug			
X2 Stainless Steel plug 420 bar			
X3 Stainless Steel plug 700 bar (only for FZH)			
Seals	T2	X2	X3
H HNBR	•	•	•
V FPM	•	•	•
F MFQ	-	•	•

Technical data

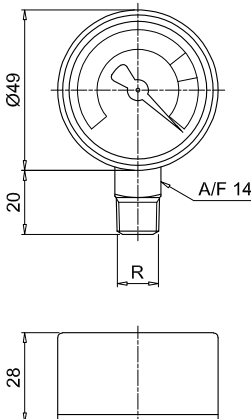
VE*50 (EX) Electrical Vacuum Indicator Connection: EN 175301-803 <table><tr><th>R</th><th>Ordering code</th></tr><tr><td>EN 10226 - R1/4"</td><td>VE A 21 x A 50 P01 VE A 21 x A 50 P01 EX</td></tr><tr><td>EN 10226 - R1/8"</td><td>VE B 21 A A 50 P01 VE B 21 A A 50 P01 EX</td></tr></table>  A/F 27 Max tightening torque: 25 N·m		R	Ordering code	EN 10226 - R1/4"	VE A 21 x A 50 P01 VE A 21 x A 50 P01 EX	EN 10226 - R1/8"	VE B 21 A A 50 P01 VE B 21 A A 50 P01 EX	Hydraulic symbol  Electrical symbol   - Certification: ATEX, IECEx - Certification included in EX version	Materials - Body: - Base: - Contacts: - Seal: Brass Black polyamide Silver VEA: NBR/FPM VEB: NBR Technical data - Vacuum setting: - Max working pressure: - Proof pressure: - Working temperature: - Compatibility with fluids: - Degree of protection: 0.21 bar ±10% 10 bar 15 bar From -25 °C to +80 °C Mineral oils, Synthetic fluids HFB and HFC according to ISO 2943 IP65 according to EN 60529 Electrical data - Electrical connection: - Resistive load: EN 175301-803 5 A / 14 Vdc 4 A / 30 Vdc 5 A / 125 Vac 4 A / 250 Vac
R	Ordering code								
EN 10226 - R1/4"	VE A 21 x A 50 P01 VE A 21 x A 50 P01 EX								
EN 10226 - R1/8"	VE B 21 A A 50 P01 VE B 21 A A 50 P01 EX								
VEA50 UL Electrical Vacuum Indicator Connection: EN 175301-803 <table><tr><th>R</th><th>Ordering code</th></tr><tr><td>EN 10226 - R1/4"</td><td>VE A 21 A A 50 P01 UL</td></tr></table>  A/F 27 Max tightening torque: 25 N·m		R	Ordering code	EN 10226 - R1/4"	VE A 21 A A 50 P01 UL	Hydraulic symbol  Electrical symbol   - Certification: UL - Certification included as standard	Materials - Body: - Base: - Contacts: - Seal: Brass Black polyamide Silver VEA: NBR/FPM VEB: NBR Technical data - Vacuum setting: - Max working pressure: - Proof pressure: - Working temperature: - Compatibility with fluids: - Degree of protection: 0.21 bar ±10% 10 bar 15 bar From -25 °C to +80 °C Mineral oils, Synthetic fluids HFB and HFC according to ISO 2943 IP65 according to EN 60529 Electrical data - Electrical connection: - Resistive load: EN 175301-803 5 A / 14 Vdc 4 A / 30 Vdc 5 A / 125 Vac 4 A / 250 Vac		
R	Ordering code								
EN 10226 - R1/4"	VE A 21 A A 50 P01 UL								
VL*51 - VL*52 - VL*53 Electrical/Visual Vacuum Indicator Connection: EN 175301-803 51: Transparent base with lamps 24 Vdc 52: Transparent base with lamps 110 Vdc 53: Transparent base with lamps 230 Vac <table><tr><th>R</th><th>Ordering code</th></tr><tr><td>EN 10226 - R1/4"</td><td>VL A 21 x A xx P01</td></tr><tr><td>EN 10226 - R1/8"</td><td>VL B 21 A A xx P01</td></tr></table>  A/F 27 Max tightening torque: 25 N·m		R	Ordering code	EN 10226 - R1/4"	VL A 21 x A xx P01	EN 10226 - R1/8"	VL B 21 A A xx P01	Hydraulic symbol  Electrical symbol 	Materials - Body: - Base: - Contacts: - Seal: Brass Transparent polyamide Brass - Polyamide VLA: NBR/FPM VLB: NBR Technical data - Vacuum setting: - Max working pressure: - Proof pressure: - Working temperature: - Compatibility with fluids: - Degree of protection: 0.21 bar ±10% 10 bar 15 bar From -25 °C to +80 °C Mineral oils, Synthetic fluids HFB and HFC according to ISO 2943 IP65 according to EN 60529 Electrical data - Electrical connection: - Type - Lamps - Resistive load: EN 175301-803 51 52 53 24 Vdc 110 Vdc 230 Vac 1 A / 24 Vdc 1 A / 110 Vdc 1 A / 230 Vac
R	Ordering code								
EN 10226 - R1/4"	VL A 21 x A xx P01								
EN 10226 - R1/8"	VL B 21 A A xx P01								

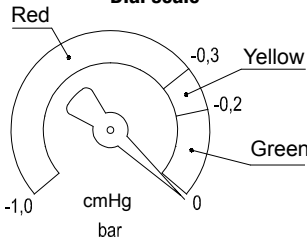
VL*71		Hydraulic symbol	Materials
Electrical/Visual Vacuum Indicator Connection IEC 61076-2-101 D (M12), black base with lamps 24 Vdc			- Body: Brass - Base: Black polyamide - Contacts: Silver - Seal: VLA: NBR/FPM VLB: NBR
Connections	Indicator code	Electrical symbol	Technical data
EN 10226 - R1/4"	VL A 21 x A 71 P01		
EN 10226 - R1/8"	VL B 21 A A 71 P01		- Vacuum setting: 0.21 bar $\pm$ 10% - Max working pressure: 10 bar - Proof pressure: 15 bar - Working temperature: From -25 °C to +80 °C - Compatibility with fluids: Mineral oils, Synthetic fluids HFB and HFC according to ISO 2943 - Degree of protection: IP65 according to EN 60529
			
		Electrical data	- Electrical connection: IEC 61076-2-101 D (M12) - Lamps: 24 Vdc (black base) - Resistive load: 0.4 A / 24 Vdc

VVA - VVB	
Axial Vacuum Gauge	
R	Ordering code
EN 10226 - R1/4"	VVA 20 P01
EN 10226 - R1/8"	VVB 20 P01
 	

Hydraulic symbol	
	
Dial scale	
	
Conversion to SI units	
[cmHg]	[bar]
-12	-0.16
-18	-0.24
-76	-1.01

Materials	
- Case:	Black plastic
- Window:	Clear plastic
- Dial:	White plastic
- Pointer:	Black plastic
- Pressure connection:	Cu-alloy
- Pressure element:	Bourdon tube Cu-alloy soft soldered, C type
- Movement:	Cu-alloy
Technical data	
- Max working pressure:	Steady: -0.7 bar Fluctuating: -0.6 bar Short time: -1.0 bar
- Working temperature:	Ambient from -40 °C to +60 °C Fluid max + 60 °C Storage from -40 °C to +60 °C
- Compatibility with fluids:	Mineral oils, Synthetic fluids HFB and HFC according to ISO 2943
- Accuracy:	Class 2.5 according to EN 13190
- Degree of protection:	IP31 according to EN 60529

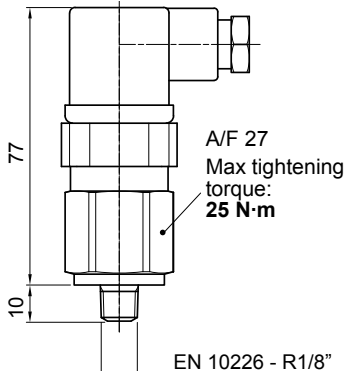
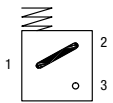
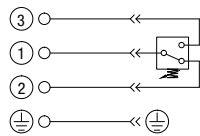
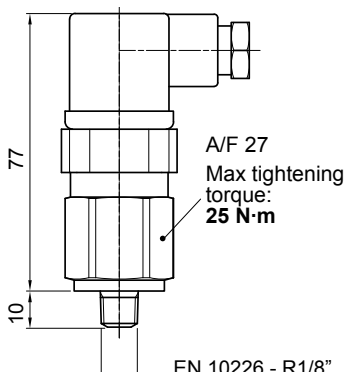
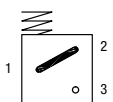
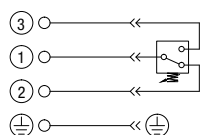
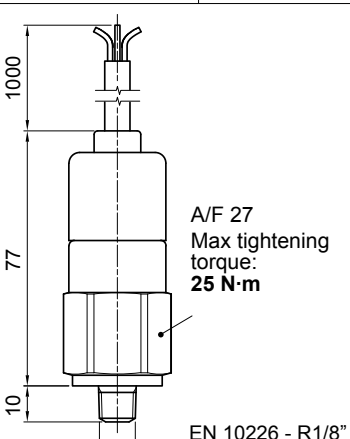
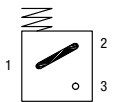
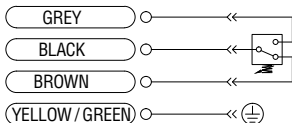
VVR - VVS		
Radial Vacuum Gauge		
R	A/F	Ordering code
EN 10226 - R1/4"	14	VVR 20 P01
EN 10226 - R1/8"	11	VVS 20 P01
		

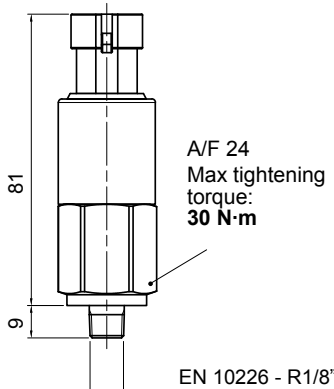
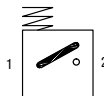
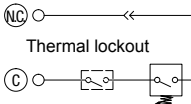
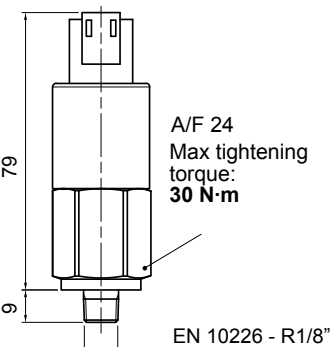
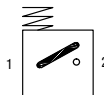
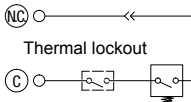
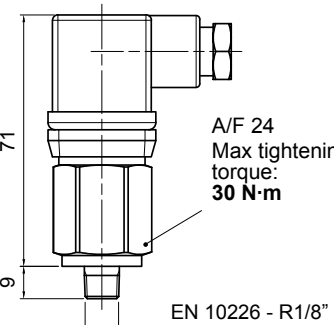
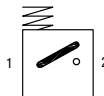
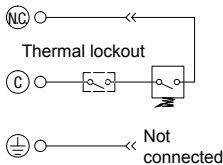
Hydraulic symbol	
	
Dial scale	
	
Conversion to SI units	
[cmHg]	[bar]
-12	-0.16
-18	-0.24
-76	-1.01

Materials	
- Case:	Black plastic
- Window:	Clear plastic
- Dial:	White plastic
- Pointer:	Black plastic
- Pressure connection:	Cu-alloy
- Pressure element:	Bourdon tube Cu-alloy soft soldered, C type
- Movement:	Cu-alloy
Technical data	
- Max working pressure:	Steady: -0.7 bar Fluctuating: -0.6 bar Short time: -1.0 bar
- Working temperature:	Ambient from -40 °C to +60 °C Fluid max + 60 °C Storage from -40 °C to +60 °C
- Compatibility with fluids:	Mineral oils, Synthetic fluids HFB and HFC according to ISO 2943
- Accuracy:	Class 2.5 according to EN 13190
- Degree of protection:	IP31 according to EN 60529

BAROMETRIC (PRESSURE) INDICATORS

Dimensions

BEA*50 (EX) Electrical Pressure Indicator Connection EN 175301-803 <table><tr><th>Settings</th><th>Ordering code</th></tr><tr><td>1.5 bar ±10%</td><td>BE A 15 HA 50 P01 BE A 15 HA 50 P01 EX</td></tr><tr><td>2.0 bar ±10%</td><td>BE A 20 HA 50 P01 BE A 20 HA 50 P01 EX</td></tr></table> 		Settings	Ordering code	1.5 bar ±10%	BE A 15 HA 50 P01 BE A 15 HA 50 P01 EX	2.0 bar ±10%	BE A 20 HA 50 P01 BE A 20 HA 50 P01 EX	Hydraulic symbol  Electrical symbol   - Certification: ATEX, IECEx - Certification included in EX version	Materials - Body: Brass - Base: Black polyamide - Contacts: Silver - Seal: HNBR Technical data - Max working pressure: 40 bar - Proof pressure: 60 bar - Working temperature: From -25 °C to +80 °C - Compatibility with fluids: Mineral oils, Synthetic fluids HFB and HFC according to ISO 2943 - Degree of protection: IP65 according to EN 60529 Electrical data - Electrical connection: EN 175301-803 - Resistive load: 5 A / 14 Vdc 4 A / 30 Vdc 5 A / 125 Vac 4 A / 250 Vac
Settings	Ordering code								
1.5 bar ±10%	BE A 15 HA 50 P01 BE A 15 HA 50 P01 EX								
2.0 bar ±10%	BE A 20 HA 50 P01 BE A 20 HA 50 P01 EX								
BEA*50 UL Electrical Pressure Indicator Connection EN 175301-803 <table><tr><th>Settings</th><th>Ordering code</th></tr><tr><td>1.5 bar ±10%</td><td>BE A 15 HA 50 P01 UL</td></tr><tr><td>2.0 bar ±10%</td><td>BE A 20 HA 50 P01 UL</td></tr></table> 		Settings	Ordering code	1.5 bar ±10%	BE A 15 HA 50 P01 UL	2.0 bar ±10%	BE A 20 HA 50 P01 UL	Hydraulic symbol  Electrical symbol   - Certification: UL - Certification included as standard	Materials - Body: Brass - Base: Black polyamide - Contacts: Silver - Seal: HNBR Technical data - Max working pressure: 12 bar - Proof pressure: 40 bar - Working temperature: From -25 °C to +80 °C - Compatibility with fluids: Mineral oils, Synthetic fluids HFB and HFC according to ISO 2943 - Degree of protection: IP65 according to EN 60529 Electrical data - Electrical connection: EN 175301-803 - Resistive load: 5 A / 14 Vdc 4 A / 30 Vdc 5 A / 125 Vac 4 A / 250 Vac
Settings	Ordering code								
1.5 bar ±10%	BE A 15 HA 50 P01 UL								
2.0 bar ±10%	BE A 20 HA 50 P01 UL								
BEM*41 Electrical Pressure Indicator Connection via four-core cable <table><tr><th>Settings</th><th>Ordering code</th></tr><tr><td>1.5 bar ±10%</td><td>BE M 15 HA 41 P01</td></tr><tr><td>2.0 bar ±10%</td><td>BE M 20 HA 41 P01</td></tr></table> 		Settings	Ordering code	1.5 bar ±10%	BE M 15 HA 41 P01	2.0 bar ±10%	BE M 20 HA 41 P01	Hydraulic symbol  Electrical symbol 	Materials - Body: Brass - Base: Black polyamide - Contacts: Silver - Seal: HNBR Technical data - Max working pressure: 40 bar - Proof pressure: 60 bar - Working temperature: From -25 °C to +80 °C - Compatibility with fluids: Mineral oils, Synthetic fluids HFB and HFC according to ISO 2943 - Degree of protection: IP67 according to EN 60529 Electrical data - Electrical connection: Four-core cable - Resistive load: 5 A / 14 Vdc 4 A / 30 Vdc 5 A / 125 Vac 4 A / 250 Vac - CE certification On request this indicator can be provided with main connectors in use for wirings.
Settings	Ordering code								
1.5 bar ±10%	BE M 15 HA 41 P01								
2.0 bar ±10%	BE M 20 HA 41 P01								

BET*F10 Electrical Pressure Indicator Connection AMP Superseal series 1.5 <table><tr><th>Settings</th><th>Ordering code</th></tr><tr><td>2.0 bar ±10%</td><td>BET 20 H F 10 P01</td></tr><tr><td>2.5 bar ±10%</td><td>BET 25 H F 10 P01</td></tr></table> 	Settings	Ordering code	2.0 bar ±10%	BET 20 H F 10 P01	2.5 bar ±10%	BET 25 H F 10 P01	Hydraulic symbol  Electrical symbol 	Materials - Body: Brass - Base: Black polyamide - Contacts: Silver - Seal: HNBR Technical data - Max working pressure: 10 bar - Proof pressure: 15 bar - Working temperature: From -25 °C to +100 °C - Compatibility with fluids: Mineral oils, Synthetic fluids HFB and HFC according to ISO 2943 - Degree of protection: IP65 according to EN 60529 Electrical data - Electrical connection: AMP Superseal series 1.5 - Resistive load: 0.5 A / 48 Vdc - Thermostat condition: Open up to 30 °C - CE certification
Settings	Ordering code							
2.0 bar ±10%	BET 20 H F 10 P01							
2.5 bar ±10%	BET 25 H F 10 P01							
BET*F30 Electrical Pressure Indicator Deutsch DT-04-2-P <table><tr><th>Settings</th><th>Ordering code</th></tr><tr><td>2.0 bar ±10%</td><td>BET 20 H F 30 P01</td></tr><tr><td>2.5 bar ±10%</td><td>BET 25 H F 30 P01</td></tr></table> 	Settings	Ordering code	2.0 bar ±10%	BET 20 H F 30 P01	2.5 bar ±10%	BET 25 H F 30 P01	Hydraulic symbol  Electrical symbol 	Materials - Body: Brass - Base: Black polyamide - Contacts: Silver - Seal: HNBR Technical data - Max working pressure: 10 bar - Proof pressure: 15 bar - Working temperature: From -25 °C to +100 °C - Compatibility with fluids: Mineral oils, Synthetic fluids HFB and HFC according to ISO 2943 - Degree of protection: IP65 according to EN 60529 Electrical data - Electrical connection: Deutsch DT-04-2-P - Resistive load: 0.5 A / 48 Vdc - Thermostat condition: Open up to 30 °C - CE certification
Settings	Ordering code							
2.0 bar ±10%	BET 20 H F 30 P01							
2.5 bar ±10%	BET 25 H F 30 P01							
BET*F50 Electrical Pressure Indicator Connection EN 175301-803 <table><tr><th>Settings</th><th>Ordering code</th></tr><tr><td>2.0 bar ±10%</td><td>BET 20 H F 50 P01</td></tr><tr><td>2.5 bar ±10%</td><td>BET 25 H F 50 P01</td></tr></table> 	Settings	Ordering code	2.0 bar ±10%	BET 20 H F 50 P01	2.5 bar ±10%	BET 25 H F 50 P01	Hydraulic symbol  Electrical symbol 	Materials - Body: Brass - Base: Black polyamide - Contacts: Silver - Seal: HNBR Technical data - Max working pressure: 10 bar - Proof pressure: 15 bar - Working temperature: From -25 °C to +100 °C - Compatibility with fluids: Mineral oils, Synthetic fluids HFB and HFC according to ISO 2943 - Degree of protection: IP65 according to EN 60529 Electrical data - Electrical connection: EN 175301-803 - Resistive load: 0.5 A / 48 Vdc - Thermostat condition: Open up to 30 °C - CE certification
Settings	Ordering code							
2.0 bar ±10%	BET 20 H F 50 P01							
2.5 bar ±10%	BET 25 H F 50 P01							

BAROMETRIC (PRESSURE) INDICATORS

Dimensions

BL*51 - BL*52 - BL*53	
Electrical/Visual Pressure Indicator Connection: EN 175301-803	
51: Transparent base with lamps 24 Vdc 52: Transparent base with lamps 110 Vdc 53: Transparent base with lamps 230 Vac	
Settings	Ordering code
1.5 bar ±10%	BL A 15 H A xx P01
2.0 bar ±10%	BL A 20 H A xx P01

Hydraulic symbol	
Electrical symbol	

Materials	
- Body:	Brass
- Base:	Transparent polyamide
- Contacts:	Silver
- Seal:	HNBR
Technical data	
- Max working pressure:	40 bar
- Proof pressure:	60 bar
- Working temperature:	From -25 °C to +80 °C
- Compatibility with fluids:	Mineral oils, Synthetic fluids HFB and HFC according to ISO 2943
- Degree of protection:	IP65 according to EN 60529
Electrical data	
- Electrical connection:	EN 175301-803
- Type:	51 52 53
- Lamps:	24 Vdc 110 Vdc 230 Vac
- Resistive load:	1 A / 24 Vdc 1 A / 110 Vdc 1 A / 230 Vac

BL*71	
Electrical/Visual Pressure Indicator Connection IEC 61076-2-101 D (M12), black base with lamps 24 Vdc	
Settings	**Ordering code**
1.5 bar ±10%	BL A 15 H A 71 P01
2.0 bar ±10%	BL A 20 H A 71 P01

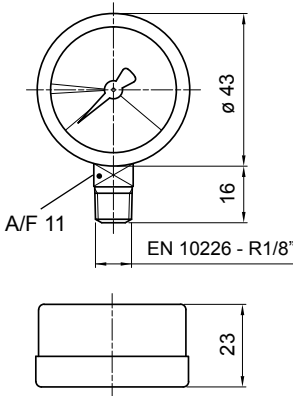
Hydraulic symbol	
Electrical symbol	

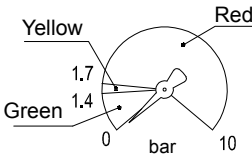
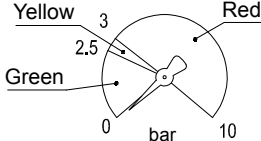
Materials	
- Body:	Brass
- Base:	Black polyamide
- Contacts:	Silver
- Seal:	HNBR
Technical data	
- Max working pressure:	40 bar
- Proof pressure:	60 bar
- Working temperature:	From -25 °C to +80 °C
- Compatibility with fluids:	Mineral oils, Synthetic fluids HFB and HFC according to ISO 2943
- Degree of protection:	IP65 according to EN 60529
Electrical data	
- Electrical connection:	IEC 61076-2-101 D (M12)
- Lamps:	24 Vdc (black base)
- Resistive load:	0.4 A / 24 Vdc

BVA	
Axial Pressure Gauge	
Settings	**Ordering code**
1.4 bar ±10%	BV A 14 P01
2.5 bar ±10%	BV A 25 P01

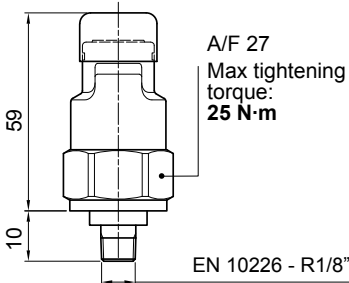
Hydraulic symbol	
Dial scale	
BV A 14 P01	
BV A 25 P01	

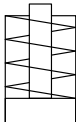
Materials	
- Case:	Painted Steel
- Window:	Clear plastic
- Dial:	Painted Steel
- Pointer:	Black plastic
- Pressure connection:	Brass
- Pressure element:	Bourdon tube Cu-alloy soft soldered, C type
- Movement:	Cu-alloy
Technical data	
- Max working pressure:	Static: 7 bar Fluctuating: 6 bar Short time: 10 bar
- Working temperature:	Ambient from -40 °C to +60 °C Fluid max +60 °C Storage from -40 °C to +60 °C
- Compatibility with fluids:	Mineral oils, Synthetic fluids HFB and HFC according to ISO 2943
- Accuracy:	Class 2.5 according to EN 13190
- Degree of protection:	IP31 according to EN 60529

BVR	
Radial Pressure Gauge	
Settings	Ordering code
1.4 bar ±10%	BV R 14 P01
2.5 bar ±10%	BV R 25 P01
	

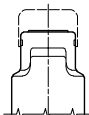
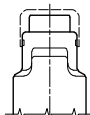
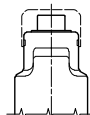
Hydraulic symbol	
	
Dial scale	
BV R 14 P01	
	
BV R 25 P01	
	

Materials	
- Case:	Painted Steel
- Window:	Clear plastic
- Dial:	Painted Steel
- Pointer:	Black plastic
- Pressure connection:	Brass
- Pressure element:	Bourdon tube Cu-alloy soft soldered, C type
- Movement:	Cu-alloy
Technical data	
- Max working pressure:	Static: 7 bar Fluctuating: 6 bar Short time: 10 bar
- Working temperature:	Ambient from -40 °C to +60 °C Fluid max +60 °C Storage from -40 °C to +60 °C
- Compatibility with fluids:	Mineral oils, Synthetic fluids HFB and HFC according to ISO 2943
- Accuracy:	Class 2.5 according to EN 13190
- Degree of protection:	IP31 according to EN 60529

BVP - BVQ	
Visual Pressure Indicator	
BVP - Automatic reset BVQ - Manual reset	
Setting	Ordering code
1.5 bar ±10%	BV P 15 H P01
	BV Q 15 H P01
2.0 bar ±10%	BV P 20 H P01
	BV Q 20 H P01
	

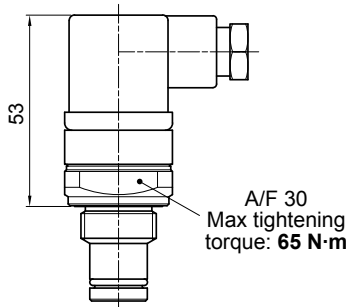
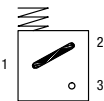
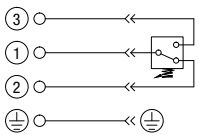
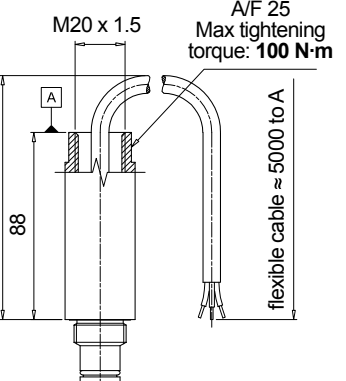
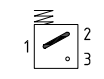
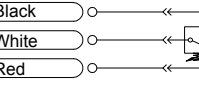
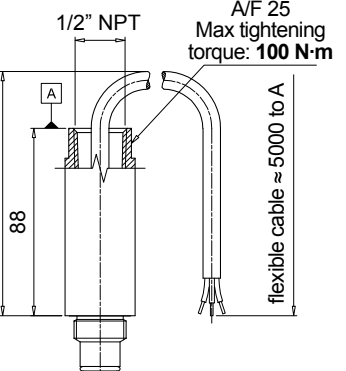
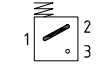
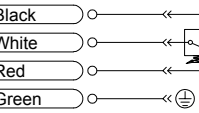
Hydraulic symbol	
	

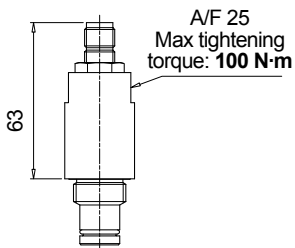
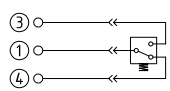
Materials	
- Body:	Brass
- Cover / internal parts:	Nylon
- Caps:	VMQ
- Seal:	HNBR
Technical data	
- Reset:	BVP - Automatic reset BVQ - Manual reset
- Max working pressure:	10 bar
- Proof pressure:	15 bar
- Working temperature:	From -25 °C to +80 °C
- Compatibility with fluids:	Mineral oils, Synthetic fluids HFB and HFC according to ISO 2943
- Degree of protection:	IP45 according to EN 60529

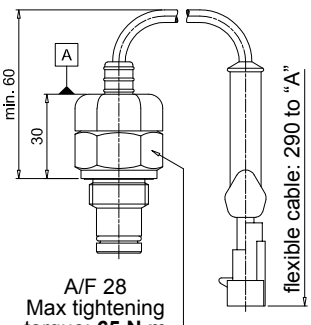
Signals			
	Absence of pressure (no indicator)	Presence of pressure (green button rises gradually)	Clogged filter element (red button risen)

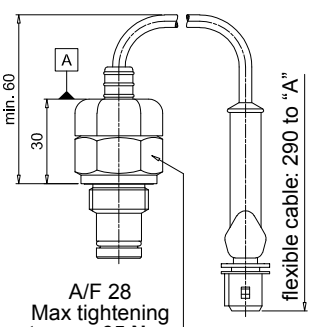
DIFFERENTIAL PRESSURE INDICATORS

Dimensions

DEA*50 Electrical Differential Pressure Indicator Connection: EN 175301-803 <table><tr><th>Settings</th><th>Ordering code</th></tr><tr><td>1.2 bar ±10%</td><td>DE A 12 x A 50 P01</td></tr><tr><td>2.0 bar ±10%</td><td>DE A 20 x A 50 P01</td></tr><tr><td>5.0 bar ±10%</td><td>DE A 50 x A 50 P01</td></tr><tr><td>7.0 bar ±10%</td><td>DE A 70 x A 50 P01</td></tr><tr><td>9.5 bar ±10%</td><td>DE A 95 x A 50 P01</td></tr></table> 		Settings	Ordering code	1.2 bar ±10%	DE A 12 x A 50 P01	2.0 bar ±10%	DE A 20 x A 50 P01	5.0 bar ±10%	DE A 50 x A 50 P01	7.0 bar ±10%	DE A 70 x A 50 P01	9.5 bar ±10%	DE A 95 x A 50 P01	Hydraulic symbol  Electrical symbol 	Materials - Body: - Base: - Contacts: - Seal: Brass Black polyamide Silver HNBR - FPM Technical data - Max working pressure: - Proof pressure: - Burst pressure: - Working temperature: - Compatibility with fluids: - Degree protection: 420 bar 630 bar 1260 bar From -25 °C to +110 °C Mineral oils, Synthetic fluids HFB and HFC according to ISO 2943 IP66 according to EN 60529 IP69K according to ISO 20653 Electrical data - Electrical connection: - Resistive load: EN 175301-803 0.2 A / 115 Vdc
Settings	Ordering code														
1.2 bar ±10%	DE A 12 x A 50 P01														
2.0 bar ±10%	DE A 20 x A 50 P01														
5.0 bar ±10%	DE A 50 x A 50 P01														
7.0 bar ±10%	DE A 70 x A 50 P01														
9.5 bar ±10%	DE A 95 x A 50 P01														
DEH*48 Hazardous Area Electrical Differential Pressure Indicator Connection via three-core cable - fitting M20x1.5 <table><tr><th>Settings</th><th>Ordering code</th></tr><tr><td>2.0 bar ±10%</td><td>DE H 20 x A 48 P01</td></tr><tr><td>5.0 bar ±10%</td><td>DE H 50 x A 48 P01</td></tr><tr><td>7.0 bar ±10%</td><td>DE H 70 x A 48 P01</td></tr></table> 		Settings	Ordering code	2.0 bar ±10%	DE H 20 x A 48 P01	5.0 bar ±10%	DE H 50 x A 48 P01	7.0 bar ±10%	DE H 70 x A 48 P01	Hydraulic symbol  Electrical symbol Black White Red   - Certification / Approvals: ATEX, IECEx, EAC TR CU - Certification included as standard	Materials - Body: - Contacts: - Seal: AISI 316L Rhodium FPM - MFQ Technical data - Max working pressure: - Proof pressure: - Burst pressure: - Compatibility with fluids: - Temperature range: - Degree of protection: - Connection type: - Contact type: 420 bar 630 bar 1260 bar Mineral oils, Synthetic fluids HFB and HFC according to ISO 2943 T4=Tamb -60 °C to +125 °C (-76 to 257 °F) T6=Tamb -60 °C to +80 °C (-76 to 176 °F) IP 66/67/68 according to EN 60529 Three-core cable, fitting M20x1.5 SPCO/SPDT (Hermetically sealed - Volt-free contacts) Electrical data - Resistive Load: - Electrical Ratings: 830 mA / 24 Vdc - 180 mA / 110 Vac Ui = 30 Vdc / li = 250 mA / Pi = 1.3 W Atex Rating II 1 GD Ex ia IIC T6 Ga Ex ia IIC T4 Ga Ex ia IIIC T₂₀₀ 85 °C Da Ex ia IIIC T₂₀₀ 135 °C Da IECEx Rating Ex ia IIC T6 Ga Ex ia IIC T4 Ga Ex ia IIIC T₂₀₀ 85 °C Da Ex ia IIIC T₂₀₀ 135 °C Da				
Settings	Ordering code														
2.0 bar ±10%	DE H 20 x A 48 P01														
5.0 bar ±10%	DE H 50 x A 48 P01														
7.0 bar ±10%	DE H 70 x A 48 P01														
DEH*49 Hazardous Area Electrical Differential Pressure Indicator Connection via four-core cable - fitting 1/2" NPT <table><tr><th>Settings</th><th>Ordering code</th></tr><tr><td>2.0 bar ±10%</td><td>DE H 20 x A 49 P01</td></tr><tr><td>5.0 bar ±10%</td><td>DE H 50 x A 49 P01</td></tr><tr><td>7.0 bar ±10%</td><td>DE H 70 x A 49 P01</td></tr></table> 		Settings	Ordering code	2.0 bar ±10%	DE H 20 x A 49 P01	5.0 bar ±10%	DE H 50 x A 49 P01	7.0 bar ±10%	DE H 70 x A 49 P01	Hydraulic symbol  Electrical symbol Black White Red Green   - Certification / Approvals: ATEX, IECEx, EAC TR CU, UL/CSA - Certification included as standard	Materials - Body: - Contacts: - Seal: AISI 316L Rhodium FPM - MFQ Technical data - Max working pressure: - Proof pressure: - Burst pressure: - Compatibility with fluids: - Temperature range: - Degree of protection: - Connection type: - Contact type: 420 bar 630 bar 1260 bar Mineral oils, Synthetic fluids HFB and HFC according to ISO 2943 T4=Tamb -60 °C to +120 °C (-76 to 248 °F) T6=Tamb -60 °C to +70 °C (-76 to 158 °F) From -60 °C to +105 °C (-76 to 221 °F) : UL/CSA IP 66/67/68 according to EN 60529 Four-core cable, fitting 1/2" NPT SPCO/SPDT (Hermetically sealed - Volt-free contacts) Electrical data - Resistive Load: - Electrical Ratings: 830 mA / 24 Vdc - 180 mA / 110 Vac Ui = 150 Vac/dc / Pi = 20 W Atex Rating II 2 GD Ex db IIC T6 Gb Ex db IIC T4 Gb Ex tb IIIC T85 °C Db Ex tb IIIC T135 °C Db IECEx Rating Ex db IIC T6 Gb Ex db IIC T4 Gb Ex tb IIIC T85 °C Db Ex tb IIIC T135 °C Db UL/CSA Rating Class I Div 1 Groups A, B, C, & D Class II Div 1 Groups E, F, & G Class III Hazardous Locations				
Settings	Ordering code														
2.0 bar ±10%	DE H 20 x A 49 P01														
5.0 bar ±10%	DE H 50 x A 49 P01														
7.0 bar ±10%	DE H 70 x A 49 P01														

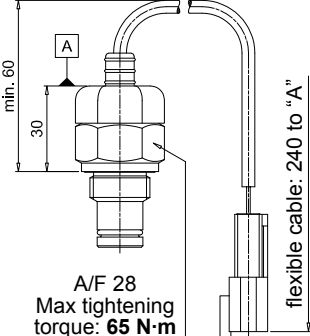
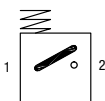
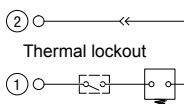
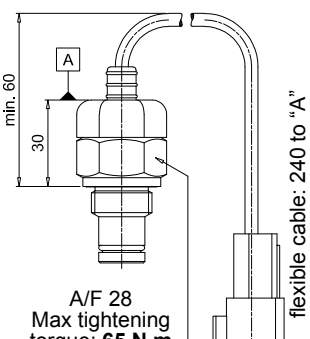
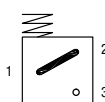
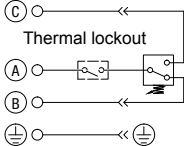
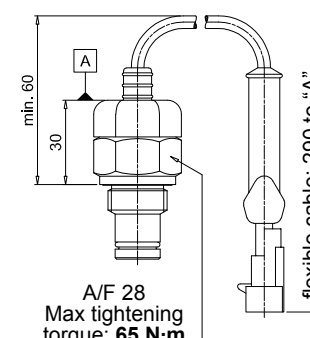
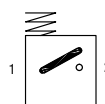
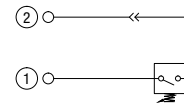
DEH*70		Hydraulic symbol	Materials
Hazardous Area Electrical Differential Pressure Indicator Connection IEC 61076-2-101 D (M12)			
Settings	Ordering code	Electrical symbol	Technical data
2.0 bar ±10%	DE H 20 x A 70 P01		
5.0 bar ±10%	DE H 50 x A 70 P01		
7.0 bar ±10%	DE H 70 x A 70 P01		
		  	Electrical data - Resistive Load: 830 mA / 24 Vdc - 180 mA / 110 Vdc - Electrical Ratings: $U_i = 30 \text{ Vdc}$ / $I_i = 250 \text{ mA}$ / $P_i = 1.3 \text{ W}$ Atex Rating II 1 GD Ex ia IIC T6 Ga Ex ia IIIC T₂₀₀ 135 °C Da IECEx Rating Ex ia IIC T6 Ga Ex ia IIIC T₂₀₀ 135 °C Da
- Certification / Approvals: ATEX, IECEx, EAC TR CU - Certification included as standard			

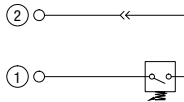
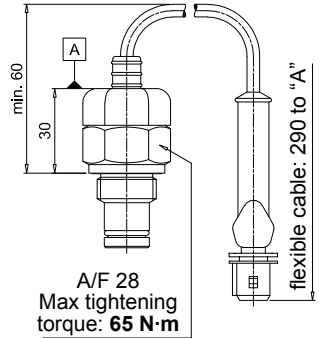
DEM*F10		Hydraulic symbol	Materials
Electrical Differential Pressure Indicator Connection: AMP Superseal series 1.5			
Settings	Ordering code	Electrical symbol	Technical data
1.2 bar $\pm 10\%$	DE M 12 x F 10 P01		
2.0 bar $\pm 10\%$	DE M 20 x F 10 P01		
5.0 bar $\pm 10\%$	DE M 50 x F 10 P01		
7.0 bar $\pm 10\%$	DE M 70 x F 10 P01		
9.5 bar $\pm 10\%$	DE M 95 x F 10 P01		
			Materials - Body: Brass - Base: Black polyamide - Contacts: Silver - Seal: HNBR - FPM Technical data - Max working pressure: 420 bar - Proof pressure: 630 bar - Burst pressure: 1260 bar - Working temperature: From -25 °C to +110 °C - Compatibility with fluids: Mineral oils, Synthetic fluids HFB and HFC according to ISO 2943 - Degree protection: IP66 according to EN 60529 Electrical data - Electrical connection: AMP Superseal series 1.5 - Resistive load: 0.2 A / 115 Vdc - Switching type: Normally open contacts (NC on request) - Thermal lockout: Normally open up to 30 °C (option "F")

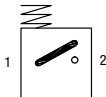
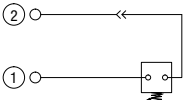
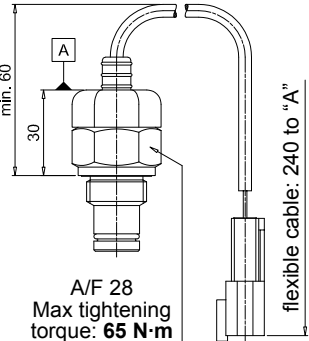
DEM*F20		Hydraulic symbol	Materials
Electrical Differential Pressure Indicator AMP Time junior			
Settings	Ordering code	Electrical symbol	Technical data
1.2 bar ±10%	DE M 12 x F 20 P01		
2.0 bar ±10%	DE M 20 x F 20 P01		
5.0 bar ±10%	DE M 50 x F 20 P01		
7.0 bar ±10%	DE M 70 x F 20 P01		
9.5 bar ±10%	DE M 95 x F 20 P01		
			Materials - Body: Brass - Base: Black polyamide - Contacts: Silver - Seal: HNBR - FPM Technical data - Max working pressure: 420 bar - Proof pressure: 630 bar - Burst pressure: 1260 bar - Working temperature: From -25 °C to +110 °C - Compatibility with fluids: Mineral oils, Synthetic fluids HFB and HFC according to ISO 2943 - Degree protection: IP66 according to EN 60529 Electrical data - Electrical connection: AMP Time junior - Resistive load: 0.2 A / 115 Vdc - Switching type: Normally open contacts (NC on request) - Thermal lockout: Normally open up to 30 °C (option "F")

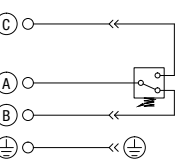
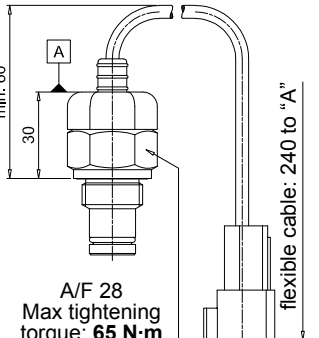
DIFFERENTIAL PRESSURE INDICATORS

Dimensions

DEM*F30 Electrical Differential Pressure Indicator Deutsch DT-04-2-P <table><tr><th>Settings</th><th>Ordering code</th></tr><tr><td>1.2 bar ±10%</td><td>DE M 12 x F 30 P01</td></tr><tr><td>2.0 bar ±10%</td><td>DE M 20 x F 30 P01</td></tr><tr><td>5.0 bar ±10%</td><td>DE M 50 x F 30 P01</td></tr><tr><td>7.0 bar ±10%</td><td>DE M 70 x F 30 P01</td></tr><tr><td>9.5 bar ±10%</td><td>DE M 95 x F 30 P01</td></tr></table> 		Settings	Ordering code	1.2 bar ±10%	DE M 12 x F 30 P01	2.0 bar ±10%	DE M 20 x F 30 P01	5.0 bar ±10%	DE M 50 x F 30 P01	7.0 bar ±10%	DE M 70 x F 30 P01	9.5 bar ±10%	DE M 95 x F 30 P01	Hydraulic symbol  Electrical symbol 	Materials - Body: Brass - Base: Black polyamide - Contacts: Silver - Seal: HNBR - FPM Technical data - Max working pressure: 420 bar - Proof pressure: 630 bar - Burst pressure: 1260 bar - Working temperature: From -25 °C to +110 °C - Compatibility with fluids: Mineral oils, Synthetic fluids HFB and HFC according to ISO 2943 - Degree protection: IP66 according to EN 60529 Electrical data - Electrical connection: Deutsch DT-04-2-P - Resistive load: 0.2 A / 115 Vdc - Switching type: Normally open contacts (NC on request) - Thermal lockout: Normally open up to 30 °C (option "F")
Settings	Ordering code														
1.2 bar ±10%	DE M 12 x F 30 P01														
2.0 bar ±10%	DE M 20 x F 30 P01														
5.0 bar ±10%	DE M 50 x F 30 P01														
7.0 bar ±10%	DE M 70 x F 30 P01														
9.5 bar ±10%	DE M 95 x F 30 P01														
DEM*F35 Electrical Differential Pressure Indicator Deutsch DT-04-3-P <table><tr><th>Settings</th><th>Ordering code</th></tr><tr><td>1.2 bar ±10%</td><td>DE M 12 x F 35 P01</td></tr><tr><td>2.0 bar ±10%</td><td>DE M 20 x F 35 P01</td></tr><tr><td>5.0 bar ±10%</td><td>DE M 50 x F 35 P01</td></tr><tr><td>7.0 bar ±10%</td><td>DE M 70 x F 35 P01</td></tr><tr><td>9.5 bar ±10%</td><td>DE M 95 x F 35 P01</td></tr></table> 		Settings	Ordering code	1.2 bar ±10%	DE M 12 x F 35 P01	2.0 bar ±10%	DE M 20 x F 35 P01	5.0 bar ±10%	DE M 50 x F 35 P01	7.0 bar ±10%	DE M 70 x F 35 P01	9.5 bar ±10%	DE M 95 x F 35 P01	Hydraulic symbol  Electrical symbol 	Materials - Body: Brass - Base: Black polyamide - Contacts: Silver - Seal: HNBR - FPM Technical data - Max working pressure: 420 bar - Proof pressure: 630 bar - Burst pressure: 1260 bar - Working temperature: From -25 °C to +110 °C - Compatibility with fluids: Mineral oils, Synthetic fluids HFB and HFC according to ISO 2943 - Degree protection: IP66 according to EN 60529 Electrical data - Electrical connection: Deutsch DT-04-3-P - Resistive load: 0.2 A / 115 Vdc - Switching type: SPDT contact - Thermal lockout: Normally open up to 30 °C (option "F")
Settings	Ordering code														
1.2 bar ±10%	DE M 12 x F 35 P01														
2.0 bar ±10%	DE M 20 x F 35 P01														
5.0 bar ±10%	DE M 50 x F 35 P01														
7.0 bar ±10%	DE M 70 x F 35 P01														
9.5 bar ±10%	DE M 95 x F 35 P01														
DEM*A10 Electrical Differential Pressure Indicator Connection: AMP Superseal series 1.5 <table><tr><th>Settings</th><th>Ordering code</th></tr><tr><td>1.2 bar ±10%</td><td>DE M 12 x A 10 P01</td></tr><tr><td>2.0 bar ±10%</td><td>DE M 20 x A 10 P01</td></tr><tr><td>5.0 bar ±10%</td><td>DE M 50 x A 10 P01</td></tr><tr><td>7.0 bar ±10%</td><td>DE M 70 x A 10 P01</td></tr><tr><td>9.5 bar ±10%</td><td>DE M 95 x A 10 P01</td></tr></table> 		Settings	Ordering code	1.2 bar ±10%	DE M 12 x A 10 P01	2.0 bar ±10%	DE M 20 x A 10 P01	5.0 bar ±10%	DE M 50 x A 10 P01	7.0 bar ±10%	DE M 70 x A 10 P01	9.5 bar ±10%	DE M 95 x A 10 P01	Hydraulic symbol  Electrical symbol 	Materials - Body: Brass - Base: Black polyamide - Contacts: Silver - Seal: HNBR - FPM Technical data - Max working pressure: 420 bar - Proof pressure: 630 bar - Burst pressure: 1260 bar - Working temperature: From -25 °C to +110 °C - Compatibility with fluids: Mineral oils, Synthetic fluids HFB and HFC according to ISO 2943 - Degree protection: IP66 according to EN 60529 Electrical data - Electrical connection: AMP Superseal series 1.5 - Resistive load: 0.2 A / 115 Vdc - Switching type: Normally open contacts (NC on request)
Settings	Ordering code														
1.2 bar ±10%	DE M 12 x A 10 P01														
2.0 bar ±10%	DE M 20 x A 10 P01														
5.0 bar ±10%	DE M 50 x A 10 P01														
7.0 bar ±10%	DE M 70 x A 10 P01														
9.5 bar ±10%	DE M 95 x A 10 P01														

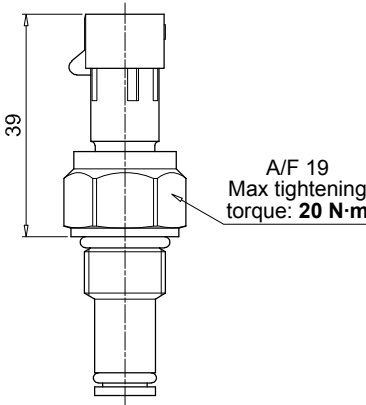
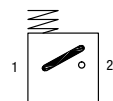
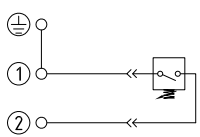
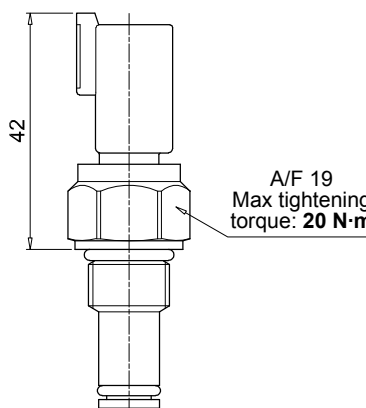
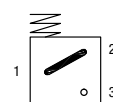
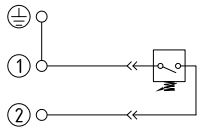
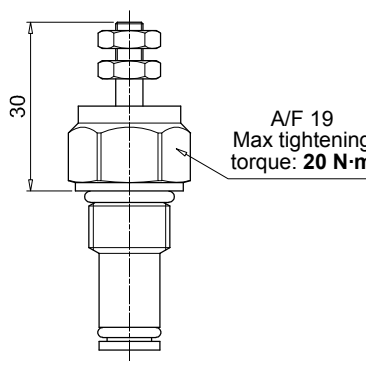
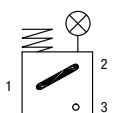
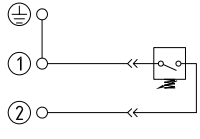
DEM*A20		Hydraulic symbol	Electrical symbol	Materials	Technical data	Electrical data			
Electrical Differential Pressure Indicator AMP Time junior									
Settings	Ordering code								
1.2 bar ±10%	DE M 12 x A 20 P01								
2.0 bar ±10%	DE M 20 x A 20 P01								
5.0 bar ±10%	DE M 50 x A 20 P01								
7.0 bar ±10%	DE M 70 x A 20 P01								
9.5 bar ±10%	DE M 95 x A 20 P01								
									

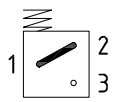
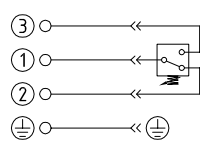
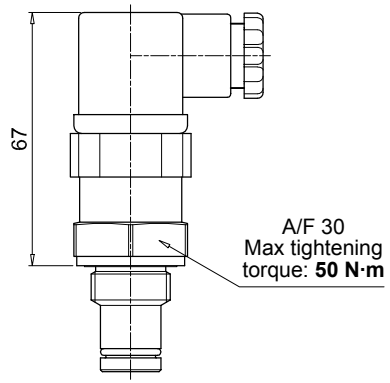
DEM*A30		Hydraulic symbol	Electrical symbol	Materials	Technical data	Electrical data			
Electrical Differential Pressure Indicator Deutsch DT-04-2-P									
Settings	Ordering code								
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2.0 bar ±10%	DE M 20 x A 30 P01								
5.0 bar ±10%	DE M 50 x A 30 P01								
7.0 bar ±10%	DE M 70 x A 30 P01								
9.5 bar ±10%	DE M 95 x A 30 P01								
									

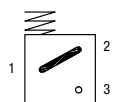
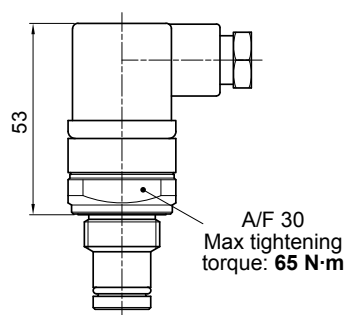
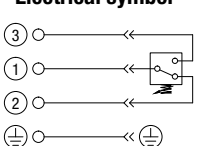
DEM*A35		Hydraulic symbol	Electrical symbol	Materials	Technical data	Electrical data			
Electrical Differential Pressure Indicator Deutsch DT-04-3-P									
Settings	Ordering code								
1.2 bar ±10%	DE M 12 x A 35 P01								
2.0 bar ±10%	DE M 20 x A 35 P01								
5.0 bar ±10%	DE M 50 x A 35 P01								
7.0 bar ±10%	DE M 70 x A 35 P01								
9.5 bar ±10%	DE M 95 x A 35 P01								
									

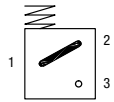
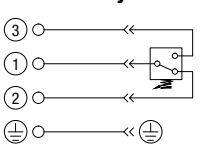
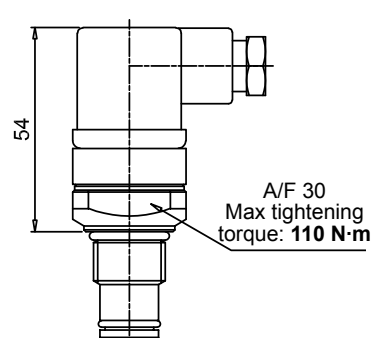
DIFFERENTIAL PRESSURE INDICATORS

Dimensions

DES*10 Electrical Differential Pressure Indicator AMP Superseal series 1.5 <table><tr><th>Settings</th><th>Ordering code</th></tr><tr><td>1.2 bar ±10%</td><td>DE S 12 H A 10 P01</td></tr><tr><td>2.5 bar ±10%</td><td>DE S 25 H A 10 P01</td></tr><tr><td>4.0 bar ±10%</td><td>DE S 40 H A 10 P01</td></tr></table> 		Settings	Ordering code	1.2 bar ±10%	DE S 12 H A 10 P01	2.5 bar ±10%	DE S 25 H A 10 P01	4.0 bar ±10%	DE S 40 H A 10 P01	Hydraulic symbol  Electrical symbol 	Materials - Body: - Internal parts: - Contacts: - Seal: Brass Brass - Polyamide Silver HNBR Technical data - Max working pressure: - Proof pressure: - Burst pressure: - Working temperature: - Compatibility with fluids: - Degree protection: 16 bar 24 bar 48 bar From -25 °C to +110 °C Mineral oils, Synthetic fluids HFB and HFC according to ISO 2943 IP67 according to EN 60529 Electrical data - Electrical connection: - Resistive load: - Switching type: AMP Superseal series 1.5 0.2 A / 24 Vdc Normally open contacts (NC on request)
Settings	Ordering code										
1.2 bar ±10%	DE S 12 H A 10 P01										
2.5 bar ±10%	DE S 25 H A 10 P01										
4.0 bar ±10%	DE S 40 H A 10 P01										
DES*30 Electrical Differential Pressure Indicator Deutsch DT-04-2-P <table><tr><th>Settings</th><th>Ordering code</th></tr><tr><td>1.2 bar ±10%</td><td>DE S 12 H A 30 P01</td></tr><tr><td>2.5 bar ±10%</td><td>DE S 25 H A 30 P01</td></tr><tr><td>4.0 bar ±10%</td><td>DE S 40 H A 30 P01</td></tr></table> 		Settings	Ordering code	1.2 bar ±10%	DE S 12 H A 30 P01	2.5 bar ±10%	DE S 25 H A 30 P01	4.0 bar ±10%	DE S 40 H A 30 P01	Hydraulic symbol  Electrical symbol 	Materials - Body: - Internal parts: - Contacts: - Seal: Brass Brass - Polyamide Silver HNBR Technical data - Max working pressure: - Proof pressure: - Burst pressure: - Working temperature: - Compatibility with fluids: - Degree protection: 16 bar 24 bar 48 bar From -25 °C to +110 °C Mineral oils, Synthetic fluids HFB and HFC according to ISO 2943 IP67 according to EN 60529 Electrical data - Electrical connection: - Resistive load: - Switching type: Deutsch DT-04-2-P 0.2 A / 24 Vdc Normally open contacts (NC on request)
Settings	Ordering code										
1.2 bar ±10%	DE S 12 H A 30 P01										
2.5 bar ±10%	DE S 25 H A 30 P01										
4.0 bar ±10%	DE S 40 H A 30 P01										
DES*80 Electrical Differential Pressure Indicator Stud #10-32 UNF <table><tr><th>Settings</th><th>Ordering code</th></tr><tr><td>1.2 bar ±10%</td><td>DE S 12 H A 80 P01</td></tr><tr><td>2.5 bar ±10%</td><td>DE S 25 H A 80 P01</td></tr><tr><td>4.0 bar ±10%</td><td>DE S 40 H A 80 P01</td></tr></table> 		Settings	Ordering code	1.2 bar ±10%	DE S 12 H A 80 P01	2.5 bar ±10%	DE S 25 H A 80 P01	4.0 bar ±10%	DE S 40 H A 80 P01	Hydraulic symbol  Electrical symbol 	Materials - Body: - Internal parts: - Contacts: - Seal: Brass Brass - Polyamide Silver HNBR Technical data - Max working pressure: - Proof pressure: - Burst pressure: - Working temperature: - Compatibility with fluids: - Degree protection: 16 bar 24 bar 48 bar From -25 °C to +110 °C Mineral oils, Synthetic fluids HFB and HFC according to ISO 2943 IP67 according to EN 60529 Electrical data - Electrical connection: - Resistive load: - Switching type: Stud #10-32 UNF 0.2 A / 24 Vdc Normally open contacts (NC on request)
Settings	Ordering code										
1.2 bar ±10%	DE S 12 H A 80 P01										
2.5 bar ±10%	DE S 25 H A 80 P01										
4.0 bar ±10%	DE S 40 H A 80 P01										

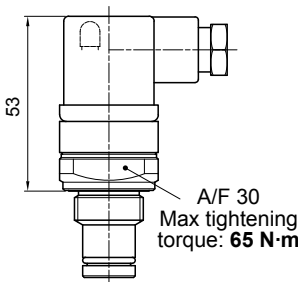
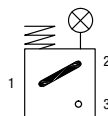
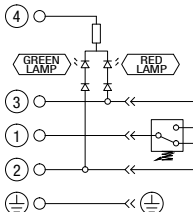
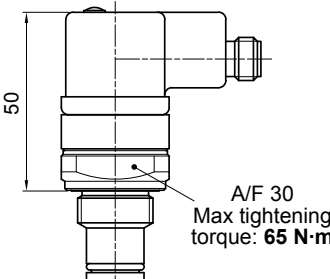
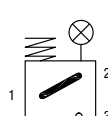
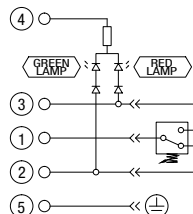
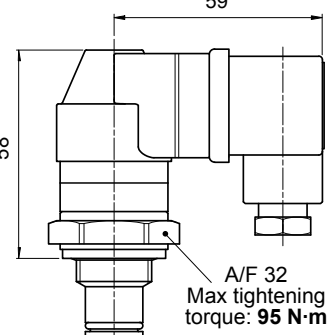
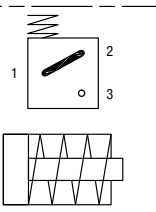
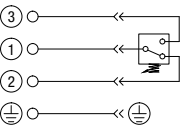
DEU*50 UL		Hydraulic symbol	Electrical symbol	Materials	Technical data	Electrical data
Electrical Differential Pressure Indicator Connection EN 175301-803						
Settings	Ordering code			- Body: Brass - Base: Black Polyamide - Contacts: Silver - Seal: FPM	- Max working pressure: 210 bar - Proof pressure: 220 bar - Burst pressure: 880 bar - Working temperature: From -25 °C to +85 °C - Compatibility with fluids: Mineral oils, Synthetic fluids HFB and HFC according to ISO 2943 - Degree protection: IP65 according to EN 60529	- Electrical connection: EN 175301-803 - Resistive load: 3 A / 30 Vdc 3 A / 125 Vac 3 (3) A / 250 Vac
2.0 bar ±10%	DE U 20 V A 50 P01 UL					
5.0 bar ±10%	DE U 50 V A 50 P01 UL					
7.0 bar ±10%	DE U 70 V A 50 P01 UL					
		 - Certification: UL - Certification included as standard				

DEX*50		Hydraulic symbol	Materials
Electrical Differential Pressure Indicator Connection: EN 175301-803			- Body: AISI 316L - Base: Black polyamide - Contacts: Silver - Seal: HNBR - MFQ
Settings	Ordering code		Technical data - Max working pressure: 420 bar - Proof pressure: 630 bar - Burst pressure: 1260 bar - Working temperature: From -25 °C to +110 °C - Compatibility with fluids: Mineral oils, Synthetic fluids HFB and HFC according to ISO 2943 - Degree protection: IP66 according to EN 60529 IP69K according to ISO 20653
1.2 bar ±10%	DE X 12 x A 50 P01		
2.0 bar ±10%	DE X 20 x A 50 P01		
5.0 bar ±10%	DE X 50 x A 50 P01		
7.0 bar ±10%	DE X 70 x A 50 P01		
9.5 bar ±10%	DE X 95 x A 50 P01		Electrical data - Electrical connection: EN 175301-803 - Resistive load: 0.2 A / 115 Vdc
		Electrical symbol 	

DEZ*50		Hydraulic symbol	Materials
Electrical Differential Pressure Indicator Connection: EN 175301-803			- Body: AISI 316L - Base: Black polyamide - Contacts: Silver - Seal: HNBR - MFQ
Settings	Ordering code	Electrical symbol	Technical data
1.2 bar ±10%	DE Z 12 x A 50 P01		- Max working pressure: 700 bar
2.5 bar ±10%	DE Z 25 x A 50 P01		- Proof pressure: 1050 bar
5.0 bar ±10%	DE Z 50 x A 50 P01		- Burst pressure: 2100 bar
7.0 bar ±10%	DE Z 70 x A 50 P01		- Working temperature: From -25 °C to +110 °C
9.5 bar ±10%	DE Z 95 x A 50 P01		- Compatibility with fluids: Mineral oils, Synthetic fluids HFA, HFB, HFC according to ISO 2943
		- Degree protection: IP66 according to EN 60529 IP69K according to ISO 20653	
		Electrical data	
		- Electrical connection: EN 175301-803	
		- Resistive load: 0.2 A / 115 Vdc	

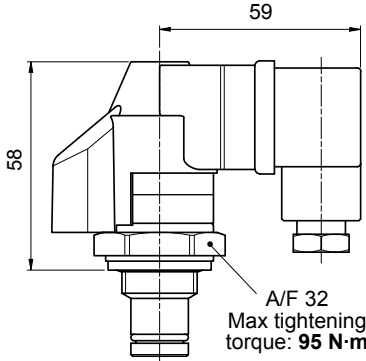
DIFFERENTIAL PRESSURE INDICATORS

Dimensions

DLA*51 - DLA*52 Electrical/Visual Differential Pressure Indicator Connection: EN 175301-803 51: Transparent base with lamps 24 Vdc 52: Transparent base with lamps 110 Vdc <table><tr><th>Settings</th><th>Ordering code</th></tr><tr><td>1.2 bar ±10%</td><td>DL A 12 x A xx P01</td></tr><tr><td>2.0 bar ±10%</td><td>DL A 20 x A xx P01</td></tr><tr><td>5.0 bar ±10%</td><td>DL A 50 x A xx P01</td></tr><tr><td>7.0 bar ±10%</td><td>DL A 70 x A xx P01</td></tr><tr><td>9.5 bar ±10%</td><td>DL A 95 x A xx P01</td></tr></table> 		Settings	Ordering code	1.2 bar ±10%	DL A 12 x A xx P01	2.0 bar ±10%	DL A 20 x A xx P01	5.0 bar ±10%	DL A 50 x A xx P01	7.0 bar ±10%	DL A 70 x A xx P01	9.5 bar ±10%	DL A 95 x A xx P01	Hydraulic symbol  Electrical symbol 	Materials - Body: - Base: - Contacts: - Seal: Brass Transparent polyamide Silver HNBR - FPM Technical data - Max working pressure: - Proof pressure: - Burst pressure: - Working temperature: - Compatibility with fluids: - Degree protection: 420 bar 630 bar 1260 bar From -25 °C to +110 °C Mineral oils, Synthetic fluids HFB and HFC according to ISO 2943 IP66 according to EN 60529 IP69K according to ISO 20653 Electrical data - Electrical connection: - Type - Lamps - Resistive load: EN 175301-803 51 52 24 Vdc 110 Vdc 1 A / 24 Vdc 1 A / 110 Vdc
Settings	Ordering code														
1.2 bar ±10%	DL A 12 x A xx P01														
2.0 bar ±10%	DL A 20 x A xx P01														
5.0 bar ±10%	DL A 50 x A xx P01														
7.0 bar ±10%	DL A 70 x A xx P01														
9.5 bar ±10%	DL A 95 x A xx P01														
DLA*71 Electrical/Visual Differential pressure indicator Connection IEC 61076-2-101 D (M12), black base with lamps 24 Vdc <table><tr><th>Settings</th><th>Ordering code</th></tr><tr><td>1.2 bar ±10%</td><td>DL A 12 x A 71 P01</td></tr><tr><td>2.0 bar ±10%</td><td>DL A 20 x A 71 P01</td></tr><tr><td>5.0 bar ±10%</td><td>DL A 50 x A 71 P01</td></tr><tr><td>7.0 bar ±10%</td><td>DL A 70 x A 71 P01</td></tr><tr><td>9.5 bar ±10%</td><td>DL A 95 x A 71 P01</td></tr></table> 		Settings	Ordering code	1.2 bar ±10%	DL A 12 x A 71 P01	2.0 bar ±10%	DL A 20 x A 71 P01	5.0 bar ±10%	DL A 50 x A 71 P01	7.0 bar ±10%	DL A 70 x A 71 P01	9.5 bar ±10%	DL A 95 x A 71 P01	Hydraulic symbol  Electrical symbol 	Materials - Body: - Base: - Contacts: - Seal: Brass Black polyamide Silver HNBR - FPM Technical data - Max working pressure: - Proof pressure: - Burst pressure: - Working temperature: - Compatibility with fluids: - Degree protection: 420 bar 630 bar 1260 bar From -25 °C to +110 °C Mineral oils, Synthetic fluids HFB and HFC according to ISO 2943 IP65 according to EN 60529 IP69K according to ISO 20653 Electrical data - Electrical connection: - Lamps - Resistive load: IEC 61076-2-101 D (M12) 24 Vdc (black base) 0.4 A / 24 Vdc
Settings	Ordering code														
1.2 bar ±10%	DL A 12 x A 71 P01														
2.0 bar ±10%	DL A 20 x A 71 P01														
5.0 bar ±10%	DL A 50 x A 71 P01														
7.0 bar ±10%	DL A 70 x A 71 P01														
9.5 bar ±10%	DL A 95 x A 71 P01														
DLE*A50 Electrical/Visual Differential Pressure Indicator Without term. Connections: EN 175301-803 <table><tr><th>Settings</th><th>Ordering code</th></tr><tr><td>1.2 bar ±10%</td><td>DL E 12 x A 50 P01</td></tr><tr><td>2.0 bar ±10%</td><td>DL E 20 x A 50 P01</td></tr><tr><td>5.0 bar ±10%</td><td>DL E 50 x A 50 P01</td></tr><tr><td>7.0 bar ±10%</td><td>DL E 70 x A 50 P01</td></tr><tr><td>9.5 bar ±10%</td><td>DL E 95 x A 50 P01</td></tr></table> 		Settings	Ordering code	1.2 bar ±10%	DL E 12 x A 50 P01	2.0 bar ±10%	DL E 20 x A 50 P01	5.0 bar ±10%	DL E 50 x A 50 P01	7.0 bar ±10%	DL E 70 x A 50 P01	9.5 bar ±10%	DL E 95 x A 50 P01	Hydraulic symbol  Electrical symbol 	Materials - Body: - Base: - Contacts: - Seal: Brass Black polyamide Silver HNBR - FPM Technical data - Max working pressure: - Proof pressure: - Burst pressure: - Working temperature: - Compatibility with fluids: - Degree protection: 420 bar 630 bar 1260 bar From -25 °C to +110 °C Mineral oils, Synthetic fluids HFB and HFC according to ISO 2943 IP65 according to EN 60529 Electrical data - Electrical connections: - Resistive load: - Available the connector with lamps EN 175301-803 5 A / 250 Vac
Settings	Ordering code														
1.2 bar ±10%	DL E 12 x A 50 P01														
2.0 bar ±10%	DL E 20 x A 50 P01														
5.0 bar ±10%	DL E 50 x A 50 P01														
7.0 bar ±10%	DL E 70 x A 50 P01														
9.5 bar ±10%	DL E 95 x A 50 P01														

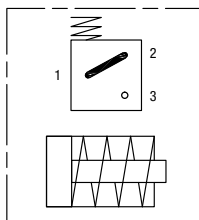
DLE*F50
Electrical/Visual Differential Pressure Indicator
 With term. Connections: EN 175301-803

Settings	Ordering code
1.2 bar $\pm 10\%$	DL E 12 x F 50 P01
2.0 bar $\pm 10\%$	DL E 20 x F 50 P01
5.0 bar $\pm 10\%$	DL E 50 x F 50 P01
7.0 bar $\pm 10\%$	DL E 70 x F 50 P01
9.5 bar $\pm 10\%$	DL E 95 x F 50 P01

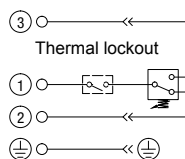


A/F 32
Max tightening torque: 95 N·m

Hydraulic symbol



Electrical symbol



Materials

- Body: Brass
- Base: Black polyamide
- Contacts: Silver
- Seal: HNBR - FPM

Technical data

- Max working pressure: 420 bar
- Proof pressure: 630 bar
- Burst pressure: 1260 bar
- Working temperature: From -25 °C to +110 °C
- Compatibility with fluids: Mineral oils, Synthetic fluids
HFB and HFC according to ISO 2943
- Degree protection: IP65 according to EN 60529

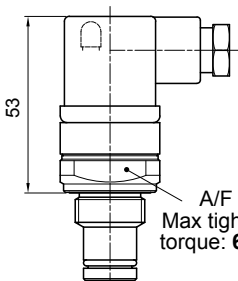
Electrical data

- Electrical connections: EN 175301-803
- Resistive load: 5 A / 250 Vac
- Thermal lockout setting: +30 °C

DLX*51 - DLX*52
Electrical/Visual Differential Pressure Indicator
 Connection: EN 175301-803

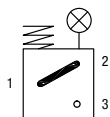
51: Transparent base with lamps 24 Vdc
 52: Transparent base with lamps 110 Vdc

Settings	Ordering code
1.2 bar $\pm 10\%$	DL X 12 x A 5x P01
2.0 bar $\pm 10\%$	DL X 20 x A 5x P01
5.0 bar $\pm 10\%$	DL X 50 x A 5x P01
7.0 bar $\pm 10\%$	DL X 70 x A 5x P01
9.5 bar $\pm 10\%$	DL X 95 x A 5x P01

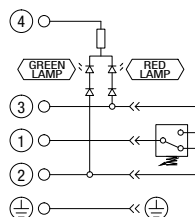


A/F 30
Max tightening torque: 65 N·m

Hydraulic symbol



Electrical symbol



Materials

- Body: AISI 316L
- Base: Transparent polyamide
- Contacts: Silver
- Seal: HNBR - MFQ

Technical data

- Max working pressure: 420 bar
- Proof pressure: 630 bar
- Burst pressure: 1260 bar
- Working temperature: From -25 °C to +110 °C
- Compatibility with fluids: Mineral oils, Synthetic fluids
HFB and HFC according to ISO 2943
- Degree protection: IP66 according to EN 60529
IP69K according to ISO 20653

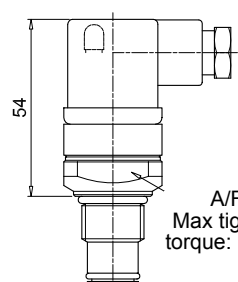
Electrical data

- Electrical connection: EN 175301-803
- Type: 51 52
- Lamps: 24 Vdc 110 Vdc
- Resistive load: 1 A / 24 Vdc 1 A / 110 Vdc

DLZ*51 - DLZ*52
Electrical/Visual Differential Pressure Indicator
 Connection: EN 175301-803

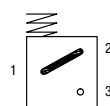
51: Transparent base with lamps 24 Vdc
 52: Transparent base with lamps 110 Vdc

Settings	Ordering code
1.2 bar $\pm 10\%$	DL Z 12 x A 5x P01
2.5 bar $\pm 10\%$	DL Z 25 x A 5x P01
5.0 bar $\pm 10\%$	DL Z 50 x A 5x P01
7.0 bar $\pm 10\%$	DL Z 70 x A 5x P01
9.5 bar $\pm 10\%$	DL Z 95 x A 5x P01

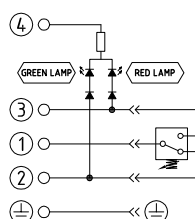


A/F 30
Max tightening torque: 110 N·m

Hydraulic symbol



Electrical symbol



Materials

- Body: AISI 316L
- Base: Transparent polyamide
- Contacts: Silver
- Seal: HNBR - MFQ

Technical data

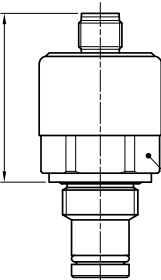
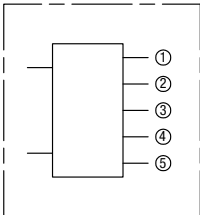
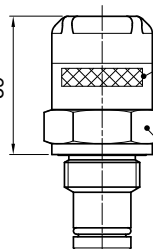
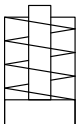
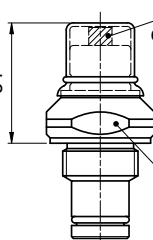
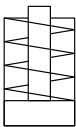
- Max working pressure: 700 bar
- Proof pressure: 1050 bar
- Burst pressure: 2100 bar
- Working temperature: From -25 °C to +110 °C
- Compatibility with fluids: Mineral oils, Synthetic fluids
HFB and HFC according to ISO 2943
- Degree protection: IP66 according to EN 60529
IP69K according to ISO 20653

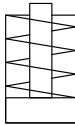
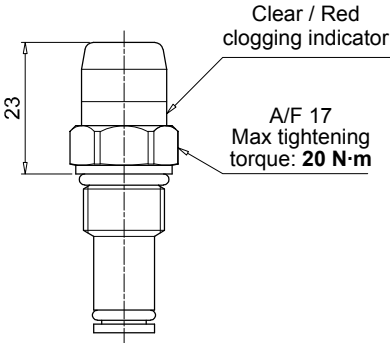
Electrical data

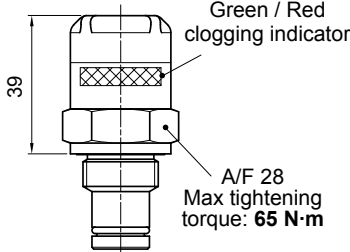
- Electrical connection: EN 175301-803
- Type: 51 52
- Lamps: 24 Vdc 110 Vdc
- Resistive load: 1 A / 24 Vdc 1 A / 110 Vdc

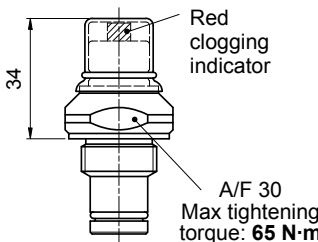
DIFFERENTIAL PRESSURE INDICATORS

Dimensions

DTA*F70 Electronic Differential Pressure Indicator Connection: IEC 61076-2-101 D (M12) <table><tr><th>Settings</th><th>Ordering code</th></tr><tr><td>1.2 bar ±10%</td><td>DT A 12 x F 70 P01</td></tr><tr><td>2.0 bar ±10%</td><td>DT A 20 x F 70 P01</td></tr><tr><td>5.0 bar ±10%</td><td>DT A 50 x F 70 P01</td></tr><tr><td>7.0 bar ±10%</td><td>DT A 70 x F 70 P01</td></tr><tr><td>9.5 bar ±10%</td><td>DT A 95 x F 70 P01</td></tr></table> 47  A/F 30 Max tightening torque: 50 N·m		Settings	Ordering code	1.2 bar ±10%	DT A 12 x F 70 P01	2.0 bar ±10%	DT A 20 x F 70 P01	5.0 bar ±10%	DT A 50 x F 70 P01	7.0 bar ±10%	DT A 70 x F 70 P01	9.5 bar ±10%	DT A 95 x F 70 P01	Hydraulic symbol  Electrical symbol <table><tr><td>①</td><td>○</td><td>○</td><td>+24 Vdc</td></tr><tr><td>②</td><td>○</td><td>○</td><td>4 ÷ 20 mA</td></tr><tr><td>③</td><td>○</td><td>○</td><td>75% - N.O. Digital output</td></tr><tr><td>④</td><td>○</td><td>○</td><td>100% - N.O. Digital output</td></tr><tr><td>⑤</td><td>○</td><td>○</td><td>0 Vdc</td></tr></table>	①	○	○	+24 Vdc	②	○	○	4 ÷ 20 mA	③	○	○	75% - N.O. Digital output	④	○	○	100% - N.O. Digital output	⑤	○	○	0 Vdc	Materials - Body: - Internal parts: - Contacts: - Seal: Brass Brass - Polyamide Silver HNBR - FPM Technical data - Max working pressure: - Proof pressure: - Burst pressure: - Compatibility with fluids: - Degree protection: 420 bar 630 bar 1260 bar Mineral oils, Synthetic fluids HFB and HFC according to ISO 2943 IP67 according to EN 60529 Electrical data - Electrical connection: - Power supply: - Analogue output: - Thermal lockout: IEC 61076-2-101 D (M12) 24 Vdc From 4 to 20 mA 30 °C (all output signals stalled up to 30 °C)
Settings	Ordering code																																		
1.2 bar ±10%	DT A 12 x F 70 P01																																		
2.0 bar ±10%	DT A 20 x F 70 P01																																		
5.0 bar ±10%	DT A 50 x F 70 P01																																		
7.0 bar ±10%	DT A 70 x F 70 P01																																		
9.5 bar ±10%	DT A 95 x F 70 P01																																		
①	○	○	+24 Vdc																																
②	○	○	4 ÷ 20 mA																																
③	○	○	75% - N.O. Digital output																																
④	○	○	100% - N.O. Digital output																																
⑤	○	○	0 Vdc																																
DVA Visual Differential Pressure Indicator <table><tr><th>Settings</th><th>Ordering code</th></tr><tr><td>1.2 bar ±10%</td><td>DV A 12 x P01</td></tr><tr><td>2.0 bar ±10%</td><td>DV A 20 x P01</td></tr><tr><td>5.0 bar ±10%</td><td>DV A 50 x P01</td></tr><tr><td>7.0 bar ±10%</td><td>DV A 70 x P01</td></tr><tr><td>9.5 bar ±10%</td><td>DV A 95 x P01</td></tr></table> 39  Green / Red clogging indicator A/F 28 Max tightening torque: 65 N·m		Settings	Ordering code	1.2 bar ±10%	DV A 12 x P01	2.0 bar ±10%	DV A 20 x P01	5.0 bar ±10%	DV A 50 x P01	7.0 bar ±10%	DV A 70 x P01	9.5 bar ±10%	DV A 95 x P01	Hydraulic symbol 	Materials - Body: - Internal parts: - Seal: Brass Brass - Polyamide HNBR - FPM Technical data - Reset: - Max working pressure: - Proof pressure: - Burst pressure: - Working temperature: - Compatibility with fluids: - Degree protection: Automatic reset 420 bar 630 bar 1260 bar From -25 °C to +110 °C Mineral oils, Synthetic fluids HFB and HFC according to ISO 2943 IP65 according to EN 60529																				
Settings	Ordering code																																		
1.2 bar ±10%	DV A 12 x P01																																		
2.0 bar ±10%	DV A 20 x P01																																		
5.0 bar ±10%	DV A 50 x P01																																		
7.0 bar ±10%	DV A 70 x P01																																		
9.5 bar ±10%	DV A 95 x P01																																		
DVM Visual Differential Pressure Indicator <table><tr><th>Settings</th><th>Ordering code</th></tr><tr><td>1.2 bar ±10%</td><td>DV M 12 x P01</td></tr><tr><td>2.0 bar ±10%</td><td>DV M 20 x P01</td></tr><tr><td>5.0 bar ±10%</td><td>DV M 50 x P01</td></tr><tr><td>7.0 bar ±10%</td><td>DV M 70 x P01</td></tr><tr><td>9.5 bar ±10%</td><td>DV M 95 x P01</td></tr></table> 34  Red clogging indicator A/F 30 Max tightening torque: 65 N·m		Settings	Ordering code	1.2 bar ±10%	DV M 12 x P01	2.0 bar ±10%	DV M 20 x P01	5.0 bar ±10%	DV M 50 x P01	7.0 bar ±10%	DV M 70 x P01	9.5 bar ±10%	DV M 95 x P01	Hydraulic symbol 	Materials - Body: - Internal parts: - Seal: Brass Brass - Polyamide HNBR - FPM Technical data - Reset: - Max working pressure: - Proof pressure: - Burst pressure: - Working temperature: - Compatibility with fluids: - Degree protection: Manual reset 420 bar 630 bar 1260 bar From -25 °C to +110 °C Mineral oils, Synthetic fluids HFB and HFC according to ISO 2943 IP65 according to EN 60529																				
Settings	Ordering code																																		
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7.0 bar ±10%	DV M 70 x P01																																		
9.5 bar ±10%	DV M 95 x P01																																		

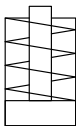
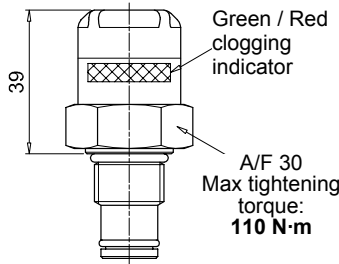
DVS		Hydraulic symbol	Materials
Visual Differential Pressure Indicator			
Connection: EN 175301-803			- Body: Brass
			- Internal parts: Brass - Polyamide
			- Seal: HNBR
Settings	Ordering code		Technical data
1.2 bar ±10%	DV S 12 H P01		
2.5 bar ±10%	DV S 25 H P01		
4.0 bar ±10%	DV S 40 H P01		
		- Reset: Automatic reset	
		- Max working pressure: 16 bar	
		- Proof pressure: 24 bar	
		- Burst pressure: 48 bar	
		- Working temperature: From -25 °C to +110 °C	
		- Compatibility with fluids: Mineral oils, Synthetic fluids	
		HFB and HFC according to ISO 2943	
		- Degree protection: IP67 according to EN 60529	

DVX		Hydraulic symbol	Materials
Visual Differential Pressure Indicator			
Settings	Ordering code		- Body: AISI 316L
1.2 bar ±10%	DV X 12 x P01		- Internal parts: AISI 316L - Polyamide
2.0 bar ±10%	DV X 20 x P01		- Seal: HNBR - MFQ
5.0 bar ±10%	DV X 50 x P01		
7.0 bar ±10%	DV X 70 x P01		
9.5 bar ±10%	DV X 95 x P01		
			
			Technical data
		- Reset:	Automatic reset
		- Max working pressure:	420 bar
		- Proof pressure:	630 bar
		- Burst pressure:	1260 bar
		- Working temperature:	From -25 °C to +110 °C
		- Compatibility with fluids:	Mineral oils, Synthetic fluids HFB and HFC according to ISO 2943
		- Degree protection:	IP65 according to EN 60529

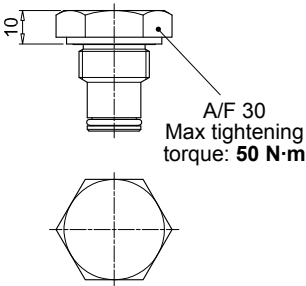
DVY		Hydraulic symbol	Materials
Visual Differential Pressure Indicator			
Settings	Ordering code		- Body: AISI 316L - Internal parts: AISI 316L - Polyamide - Seal: HNBR - MFQ
1.2 bar ±10%	DV Y 12 x P01		
2.0 bar ±10%	DV Y 20 x P01		
5.0 bar ±10%	DV Y 50 x P01		
7.0 bar ±10%	DV Y 70 x P01		
9.5 bar ±10%	DV Y 95 x P01		
		Technical data	
		- Reset: Manual reset	
		- Max working pressure: 420 bar	
		- Proof pressure: 630 bar	
		- Burst pressure: 1260 bar	
		- Working temperature: From -25 °C to +110 °C	
		- Compatibility with fluids: Mineral oils, Synthetic fluids HFB and HFC according to ISO 2943	
		- Degree protection: IP65 according to EN 60529	

DIFFERENTIAL PRESSURE INDICATORS

Dimensions

DVZ		Hydraulic symbol	Materials - Body: AISI 316L - Internal parts: AISI 316L - Polyamide - Seal: HNBR - MFQ
Visual Differential Pressure Indicator			
Settings	Ordering code		Technical data - Reset: Automatic reset - Max working pressure: 700 bar - Proof pressure: 1050 bar - Burst pressure: 2100 bar - Working temperature: From -25 °C to +110 °C - Compatibility with fluids: Mineral oils, Synthetic fluids HFB and HFC according to ISO 2943 - Degree protection: IP65 according to EN 60529
1.2 bar ±10%	DV Z 12 x P01		
2.5 bar ±10%	DV Z 25 x P01		
5.0 bar ±10%	DV Z 50 x P01		
7.0 bar ±10%	DV Z 70 x P01		
9.5 bar ±10%	DV Z 95 x P01		
			

T2	
Plug	
Seal	Ordering code
HNBR	T2 H
FPM	T2 V



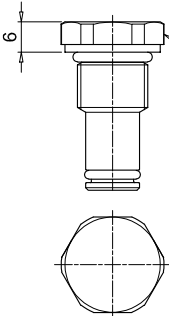
10

A/F 30
Max tightening
torque: **50 N·m**

Materials

- Body:
Phosphatized steel
- Seal:
HNBR / FPM

T4	
Plug	
Seal	Ordering code
NBR	T4 A

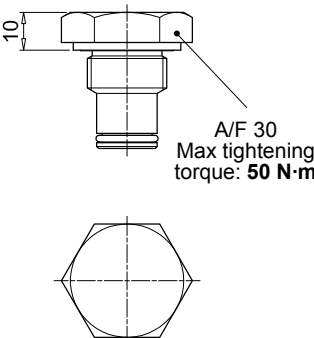


A/F 19
Max tightening
torque: **20 N·m**

Materials

- Body:
Anodized aluminium
- Seal:
NBR

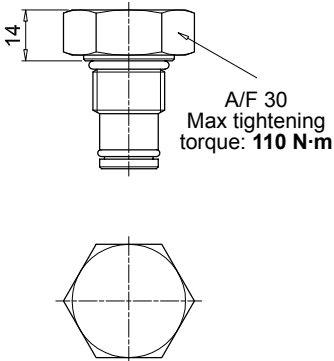
X2		Materials - Body: AISI 316L - Seal: HNBR / FPM / MFQ
Stainless Steel plug 420 bar		
Seal	Ordering code	
HNBR	X2 H	
FPM	X2 V	
MFQ	X2 F	



10

A/F 30
Max tightening
torque: **50 N·m**

X3	
Stainless Steel plug 700 bar (only for FZH)	
Seal	Ordering code
HNBR	X3 H
FPM	X3 V
MFQ	X3 F



A/F 30
Max tightening
torque: **110 N·m**

Materials

- Body:
AISI 316L
- Seal:
HNBR / FPM / MFQ

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