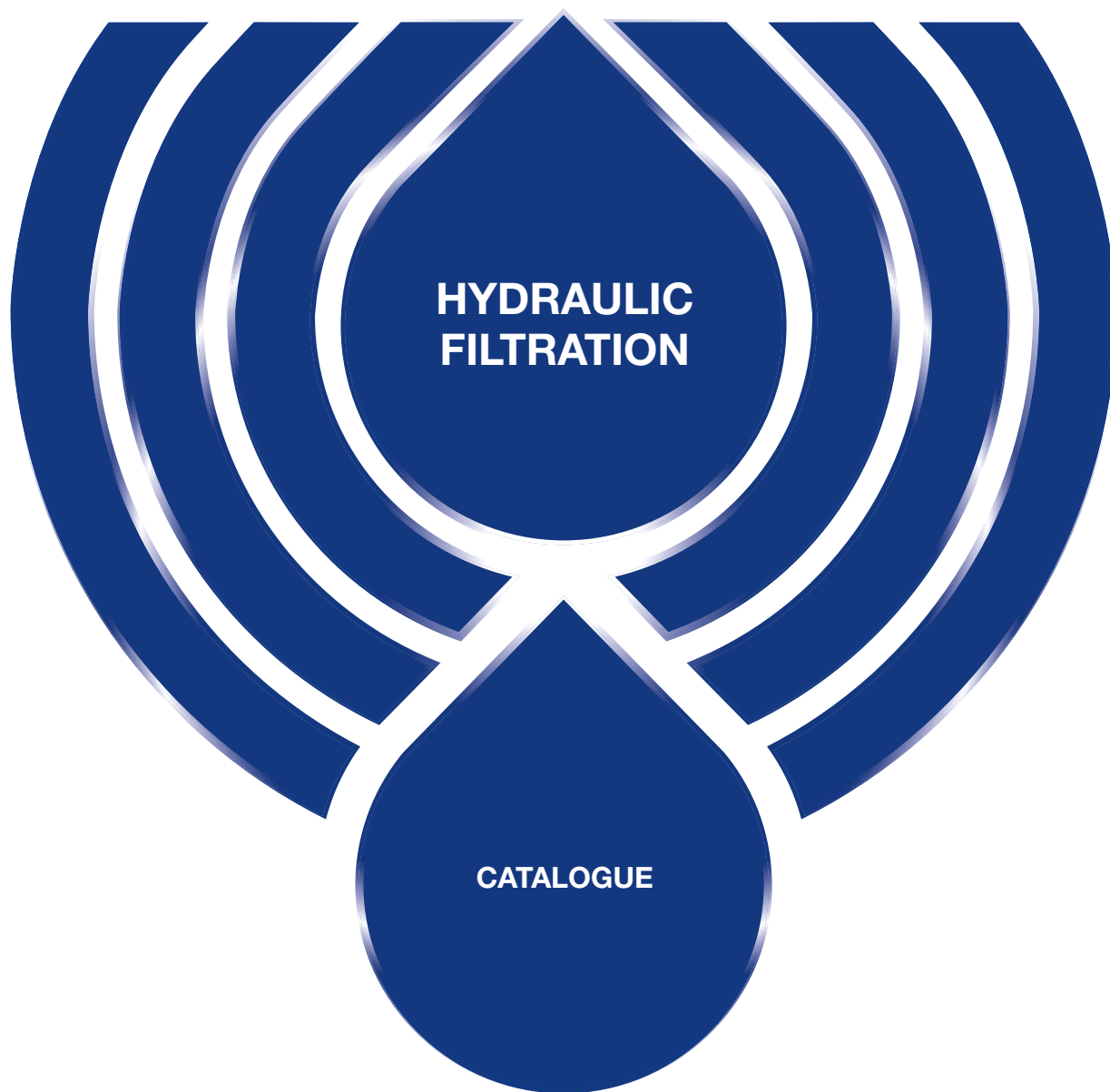




MPFILTRI®

PASSION TO 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

1	page	INTRODUCTION
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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
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			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
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245	FRI	Tank top semi-immersed filter, easy filter element disassembly, it can be used also as in-line filter	20 290	2500 660
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720		CLOGGING INDICATORS		

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			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
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294	page	SPIN-ON FILTERS	up to P_{max}	up to Q_{max}
			bar psi	l/min gpm
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320 page			LOW & MEDIUM PRESSURE FILTERS		up to P _{max}		up to Q _{max}	
			bar	psi	l/min	gpm		
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349	LMP 112 - 123 MULTIPORT	In-line filter with Multiport design for multiple choice connection	80	1160	175	46		
365	LMP 210 - 211	In-line low & medium pressure filter, low flow rate	60	870	365	96		
375	LMP 400 - 401	In-line low & medium pressure filter, high flow rate	60	870	780	206		
383	LMP 430 - 431	In-line low & medium pressure filter, high flow rate	60	870	780	206		
393	LMP 950 - 951	In-line filter, available with 2 and up to 6 different heads	30	435	2400	634		
399	LMP 952 - 953 - 954	In-line low pressure filter specifically designed to be mounted in series	25	363	4500	1189		
411	LMD 211	In-line duplex medium pressure filter	60	870	200	53		
419	LMD 400 - 401 & 431	In-line duplex low pressure filter	16	232	600	159		
435	LMD 951	In-line duplex filter, available with 2 up to 6 different heads	16	232	1200	317		
443 Filters featuring filter elements designed according to DIN24550								
445	LDP - LDD	In-line and duplex medium pressure filter	60	870	360	95		
455	LMP 900 - 901	In-line low pressure filter	30	435	2000	528		
463	LMP 902 - 903	In-line filter specifically designed to be mounted in series	20	290	3000	793		
472 ACCESSORIES								
726 CLOGGING INDICATORS								

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

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

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

709 page	CLOGGING INDICATORS	up to P _{max}		up to Q _{max}	
		bar	psi	l/min	gpm
714	QUICK REFERENCE GUIDE				
718	DESIGNATION AND ORDERING CODES				
730	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



Scan or click me!

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



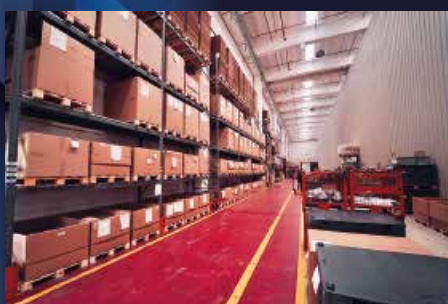
TECHNOLOGY

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 manifold 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



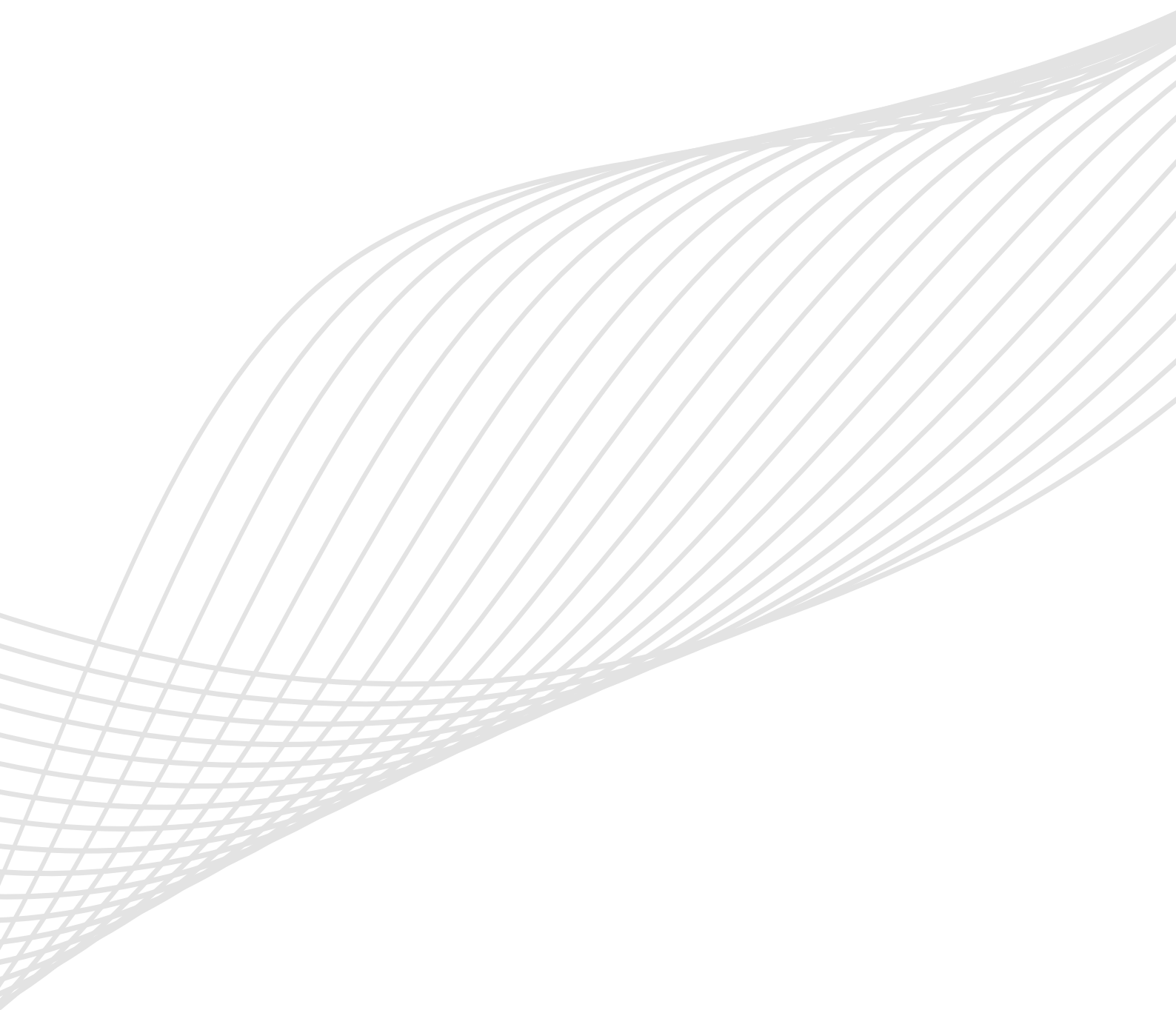
POWER TRANSMISSION PRODUCTS

- 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.

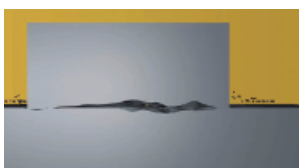
ABRASION



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

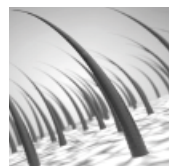
Gaseous contamination mainly results in decay of system performance.

- 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.

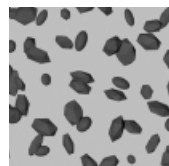
5 MEASURING THE SOLID CONTAMINATION LEVEL

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.

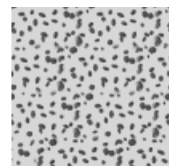
What is the size of the contaminating particles that we must handle in our hydraulic circuit?



HUMAN HAIR
(75 µm)



MINIMUM DIMENSION
VISIBLE WITH HUMAN
EYES
(40 µm)



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

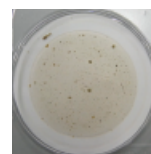
Contamination level analysis is significant only if performed with a uniform and repeatable method, conducted with standard test methods and suitably calibrated equipment. To this end, ISO has issued a set of standards that allow tests to be conducted and express the measured values in the following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

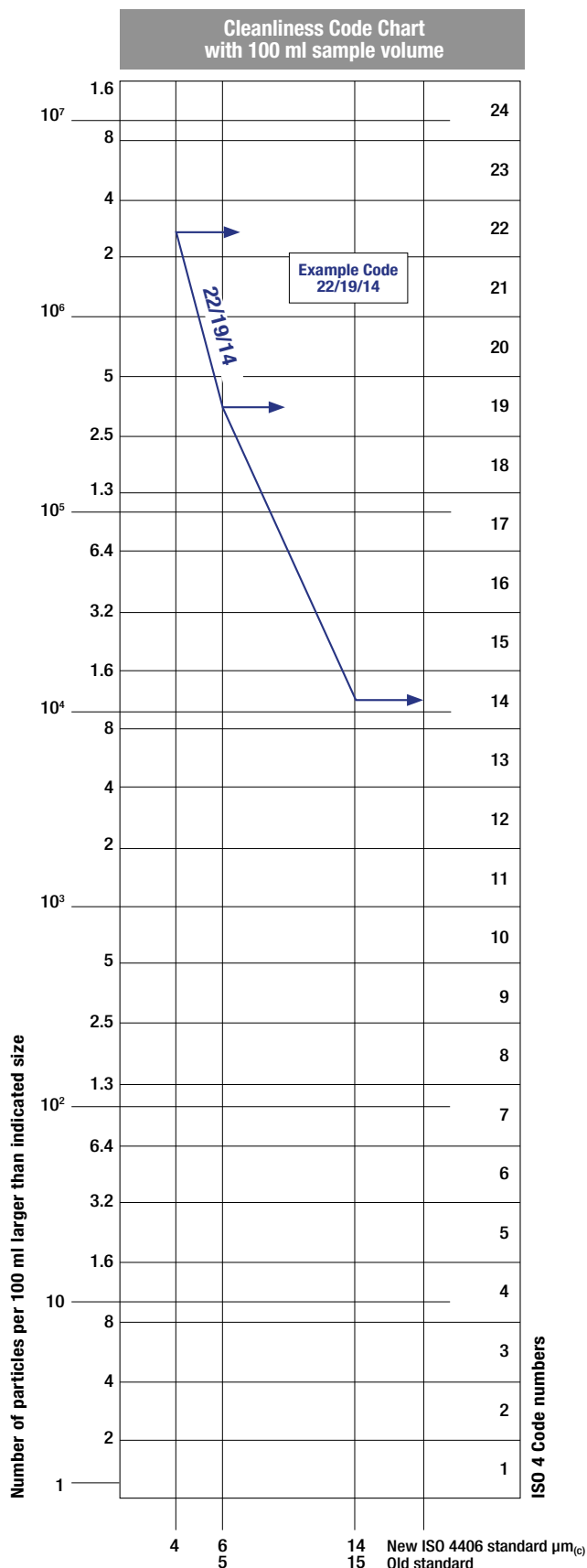
> 6 $\mu\text{m}_{(c)}$ = 100 particles

> 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



Scan or click me!

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

- 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

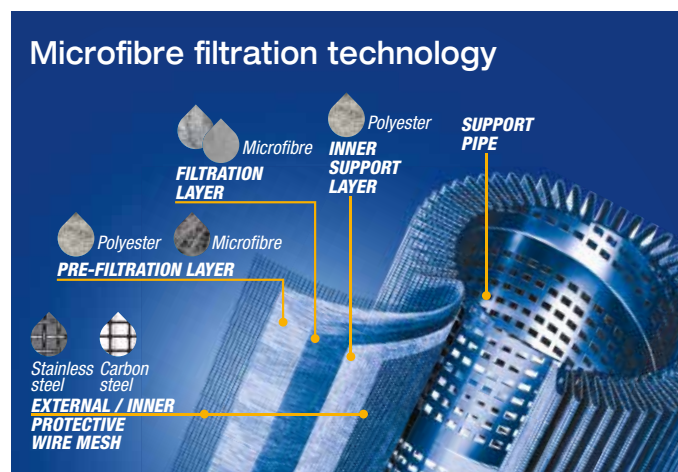
It is by direct interception. The filter prevents particles larger than the pores from continuing in the plant / system. Surface filters are generally manufactured with metal canvases or meshes.

- 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.

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



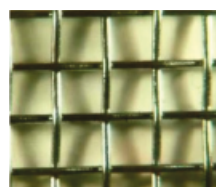
Value ($\beta_{x(c)}$)	2	10	75	100	200	1000
Efficiency	50%	90%	98.7%	99%	99.5%	99.9%

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

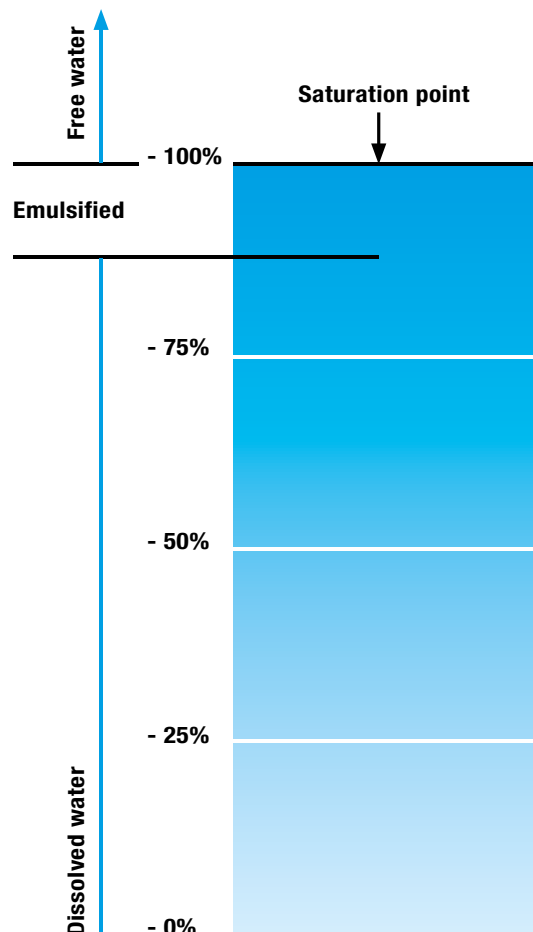
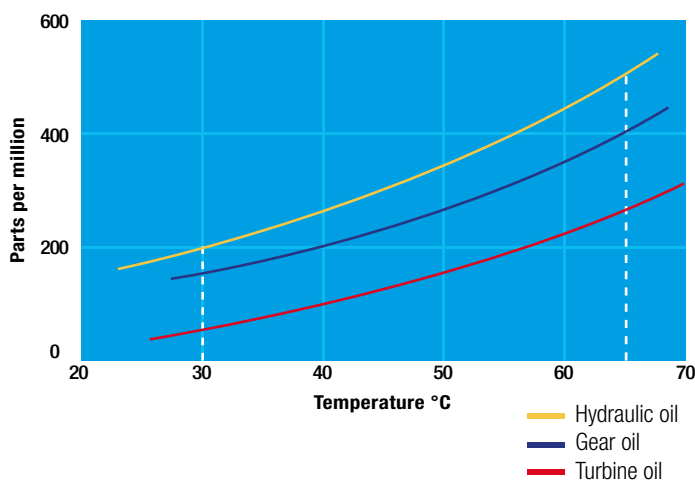
11 WATER IN HYDRAULIC AND LUBRICATING FLUIDS

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

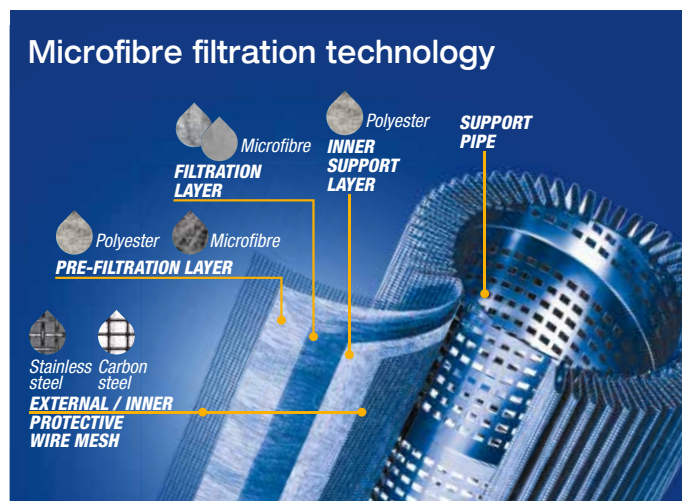


Fabric that absorbs water

Absorber media layer

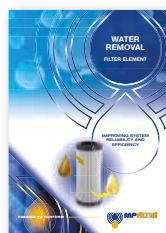


The Filter Media has absorbed water



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



Scan or click me!

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

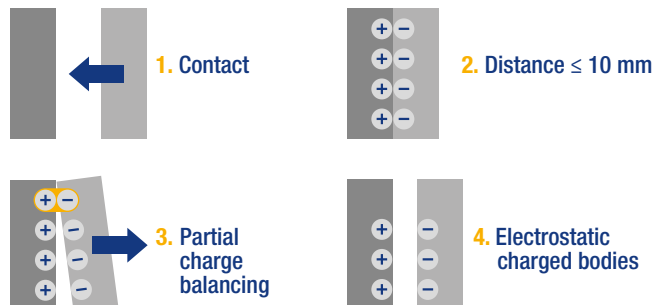
12 THE ANTI-STATIC FILTERS

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

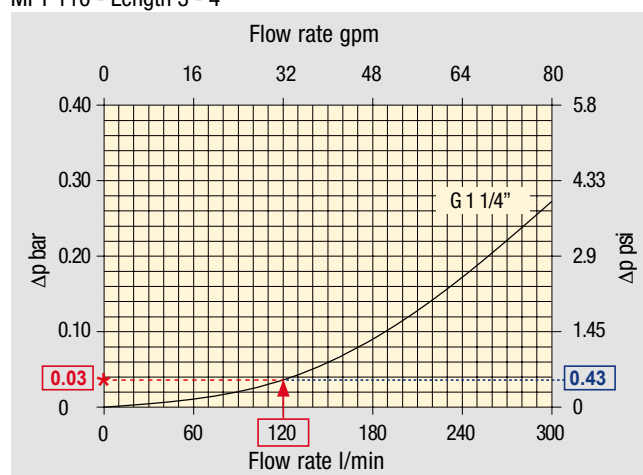
Viscosity V2 = $46 \text{ mm}^2/\text{s}$ (cSt) / 216 SUS

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

Calculation:

Δp_c = **0.03 bar / 0.43 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		
	A03	A06	A10	A16	A25	P(00)10	P(00)25	M(00)25 M(00)60 M(00)90
Return filters								
MF 020								
	2	29.20	24.12	8.00	7.22	5.00	3.33	2.85
	3	22.00	19.00	6.56	5.33	4.33	1.68	1.44
MF 030	1	74.00	50.08	20.00	16.00	9.00	6.43	5.51
MF 100	1	28.20	24.40	8.67	8.17	6.88	4.62	3.96
MF 100	2	17.33	12.50	6.86	5.70	4.00	3.05	2.47
MF 100	3	10.25	9.00	3.65	3.33	2.50	1.63	1.32
MF 100	4	6.10	5.40	2.30	2.20	2.00	1.19	0.96

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

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

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

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

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
MR 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

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
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

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
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

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 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 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 HPX 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 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 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
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
HP 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 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
HPX 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.

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.

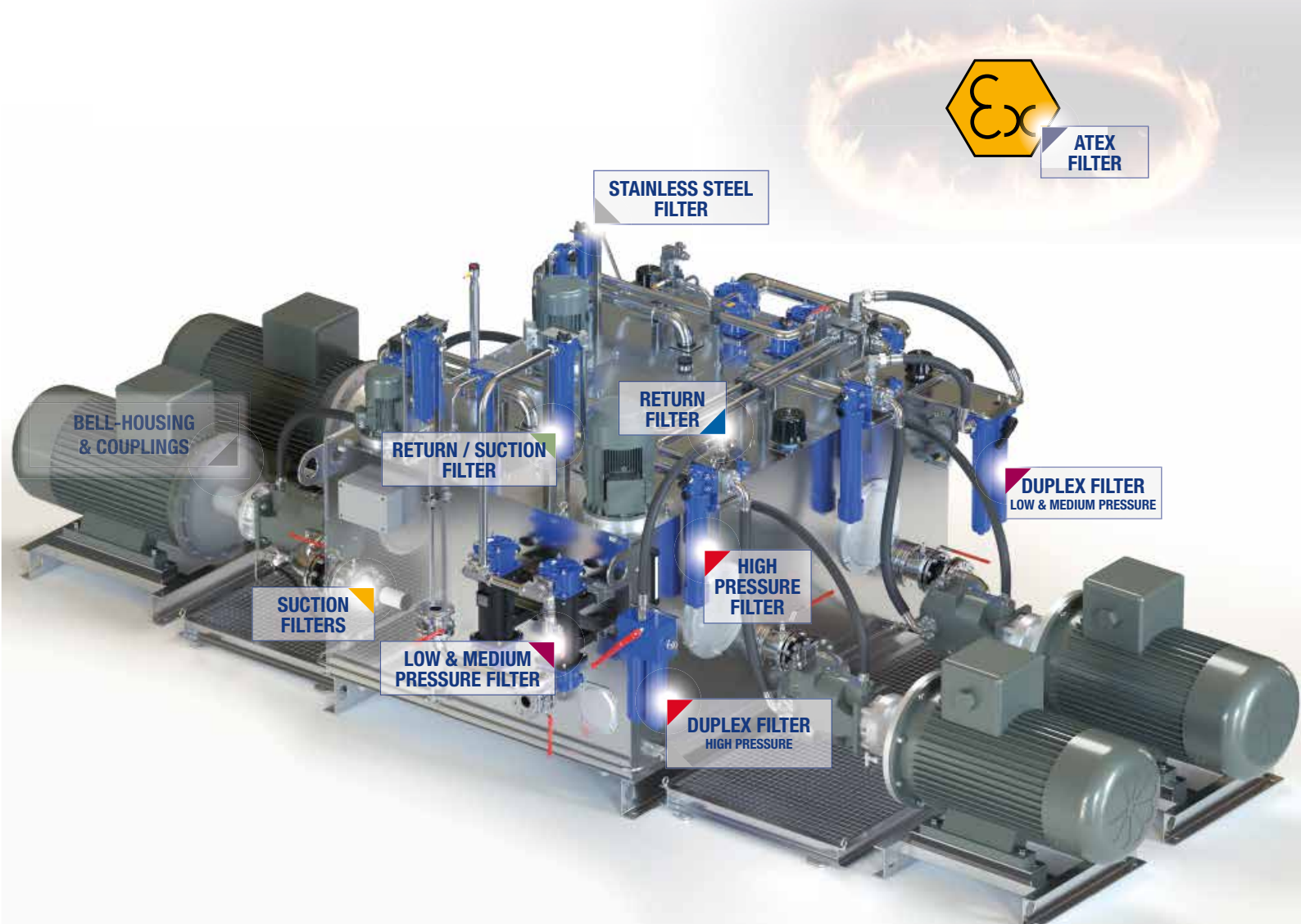
The MP Filtri Selection Tool software program is easy to use with a flexible fast design method and provides improved layout formats with full descriptions.

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



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Description

Technical data

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

Filter housing materials

- Head: Painted cast iron, black RAL 9005
- Housing: Phosphatized steel
- Bypass 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 600 kPa (6 bar) $\pm 10\%$
- Other opening pressures on request.

Δp element type

- Microfiber filter elements - series N: 20 bar
- Wire mesh filter elements - series N: 20 bar
- Fluid flow 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					
		A03	A06	A10	A16	A25	M25
FMMX 050	1	42	43	79	82	106	147
	2	52	57	85	96	121	149
	3	66	69	97	106	130	150
	4	83	89	113	115	134	152
	5	107	110	130	134	141	154
FMMX 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.

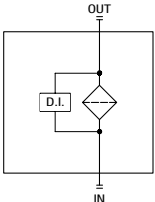
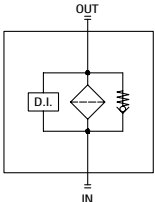
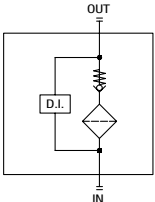
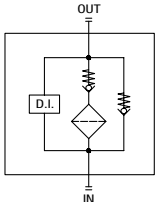
The reference fluid has a kinematic viscosity of 30 mm²/s (cSt) and a density of 0.86 kg/dm³.

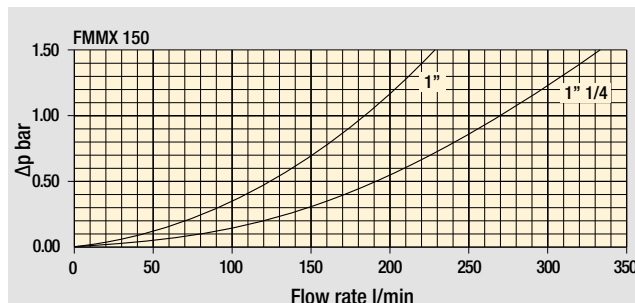
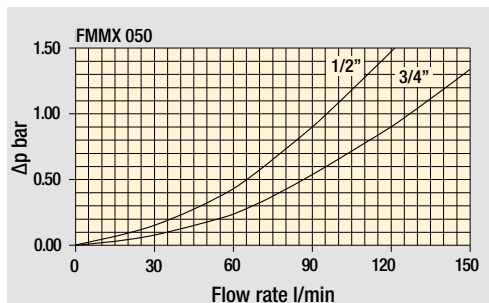
For different pressure drop or fluid viscosity we recommend to use our selection software available on www.mpfiltri.com.

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.

Hydraulic symbols

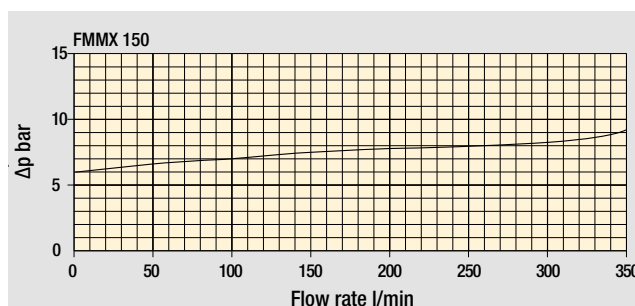
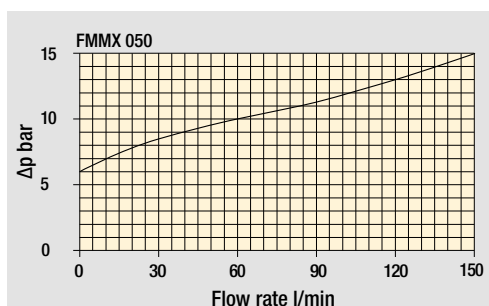
Filter series	Style S	Style B	Style T	Style D
FMMX 050	•	•	•	•
FMMX 150	•	•	•	•

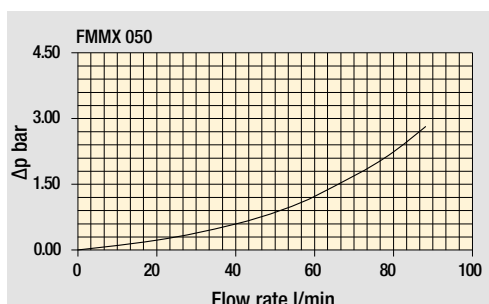


Pressure drop

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 **MY CLEAN** Filter Element

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

Valves **B** With bypass 6 bar
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
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

Executions
Base **zerospark**
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 **MY CLEAN** 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

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

* Not for Mxx filter media

CLOGGING INDICATORS

See page 727

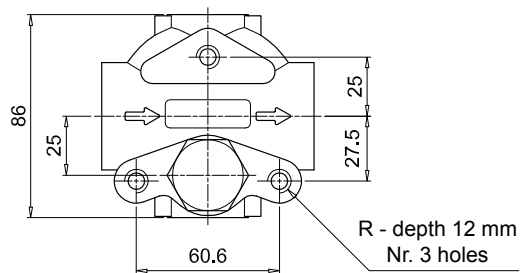
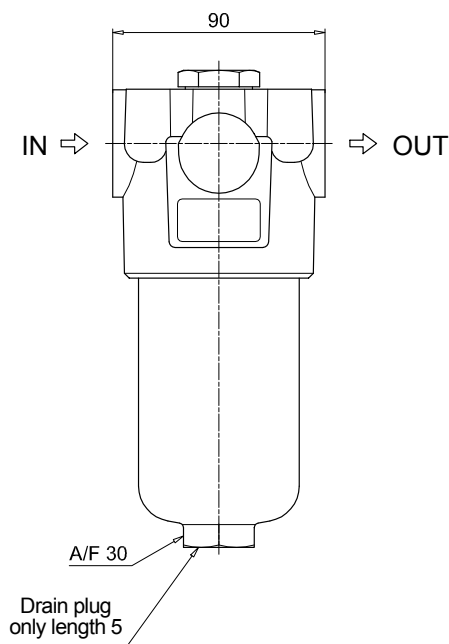
DEA Electrical differential pressure indicator
DEM Electrical differential pressure indicator
DEU Electrical differential pressure indicator
DLA Electrical / visual differential pressure indicator

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

PLUGS

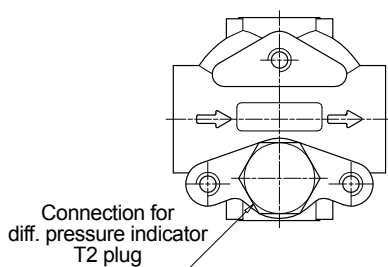
See page 747

T2 Plug

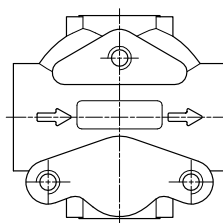


FMMX050	
Filter length	H [mm]
1	158
2	195
3	237
4	285
5	407
Connections	R
A-B-C-D	M10
E-F-G-H	3/8" UNC

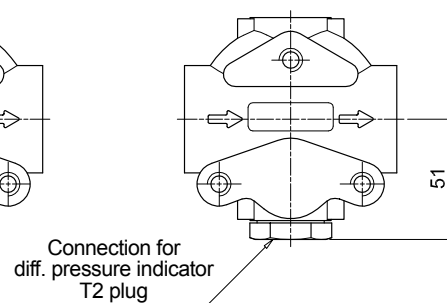
Execution P01



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 **MY CLEAN** Filter Element

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

Valves **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 **N** 20 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 **MY CLEAN** 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

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

* Not for Mxx filter media

CLOGGING INDICATORS

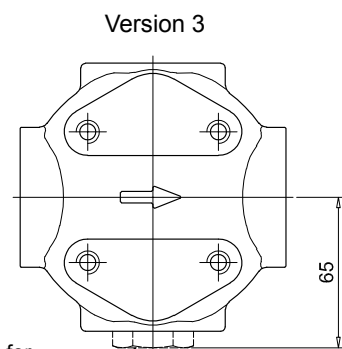
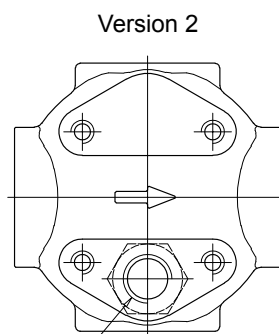
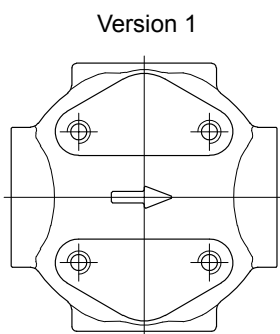
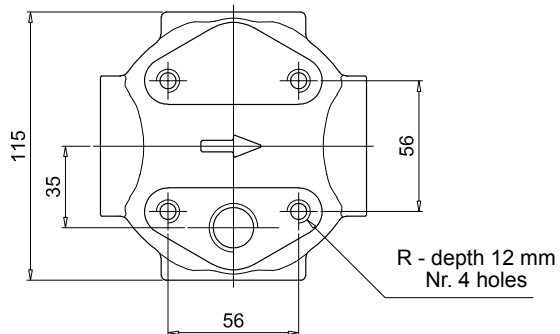
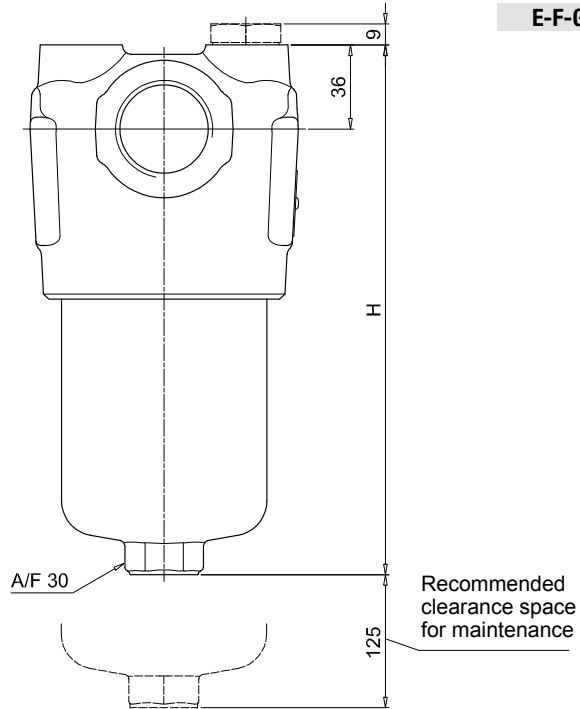
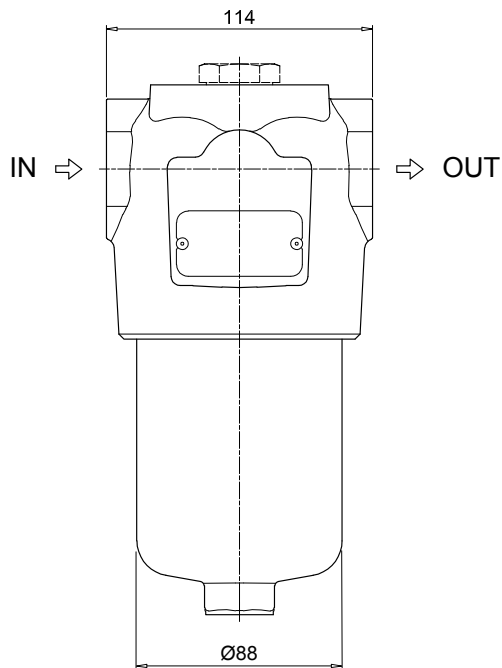
See page 727

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 747

T2 Plug



Connection for differential indicator
T2 plug not included

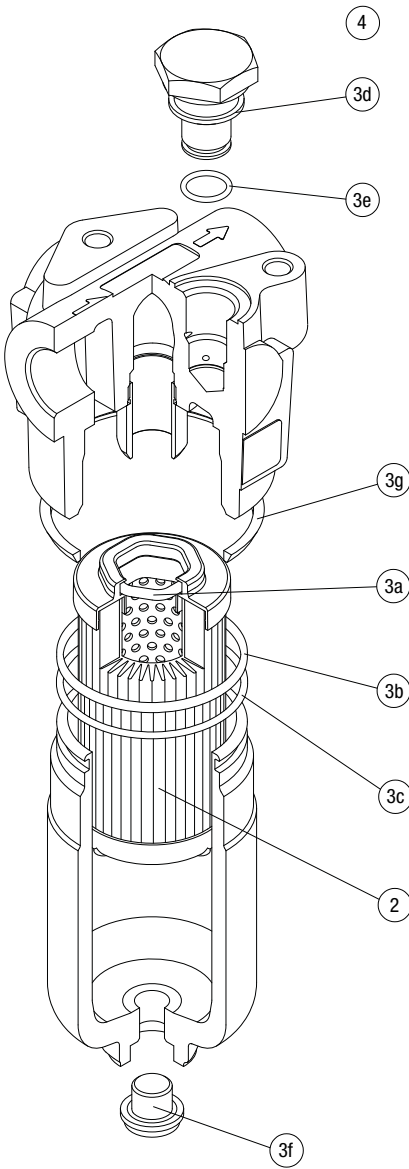
Connection for differential indicator
T2 plug not included

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

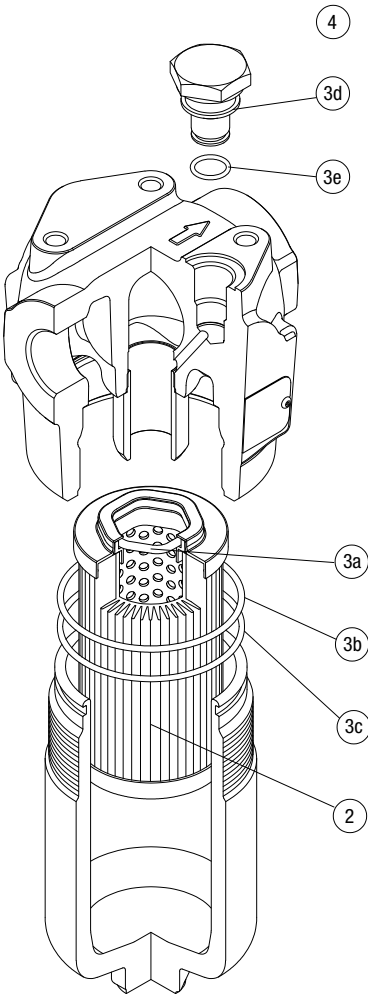
Order number for spare parts

FMMX 050



Item:	Q.ty: 1 pc.	Q.ty: 1 pc.	Q.ty: 1 pc.
	2	3 (3a ÷ 3g)	4
Filter series	Filter element	Seal Kit code number	Indicator connection plug
		NBR	FPM
FMMX 050	See order table	02050864	02050865
		T2H	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!

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)
- 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 600 kPa (6 bar) $\pm 10\%$
- Other opening pressures on request.

Δp element type

- Microfiber filter elements - series N-R: 20 bar
- Microfiber filter elements - series S: 210 bar
- Wire mesh filter elements - series N: 20 bar
- Fluid flow 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 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					
	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.

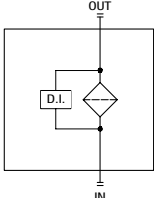
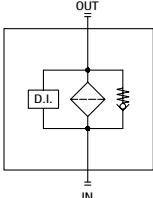
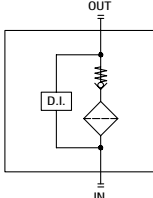
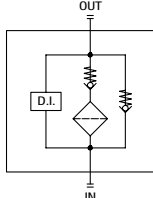
The reference fluid has a kinematic viscosity of 30 mm²/s (cSt) and a density of 0.86 kg/dm³.

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.

Hydraulic symbols

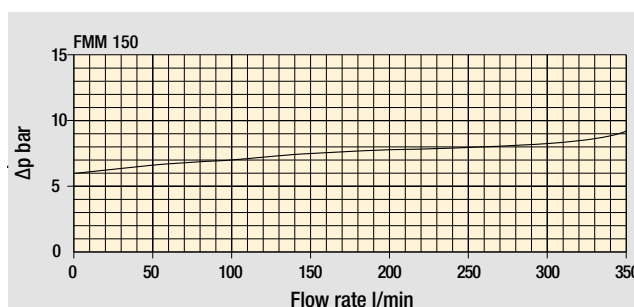
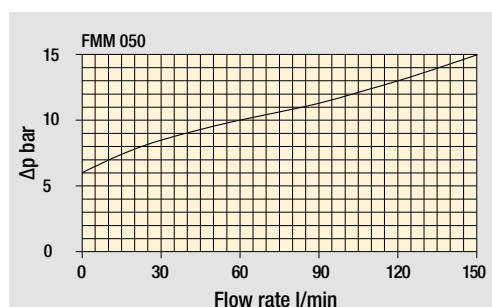
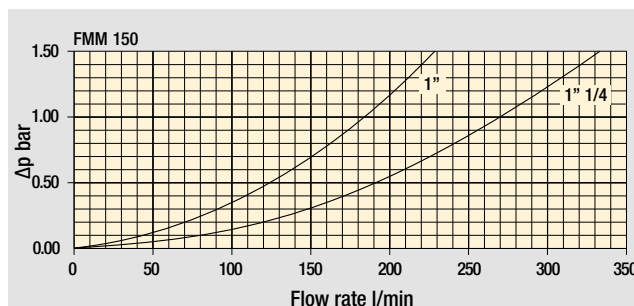
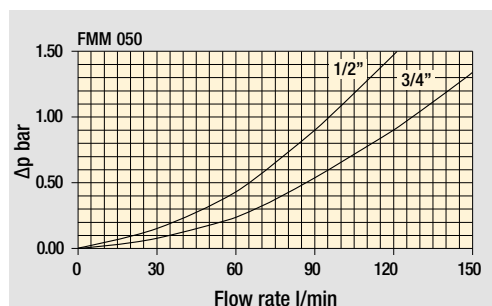
Filter series	Style S	Style B	Style T	Style D
FMM 050	•	•	•	•
FMM 150	•	•	-	-

Pressure drop

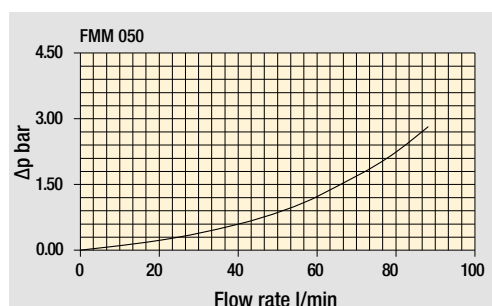
Filter housings

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
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
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 727

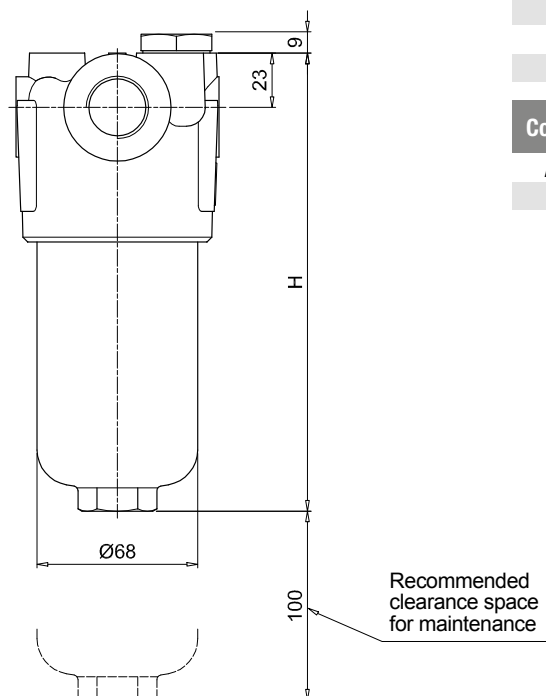
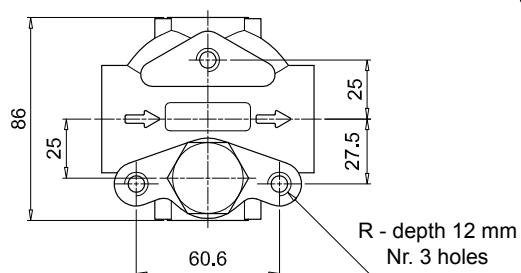
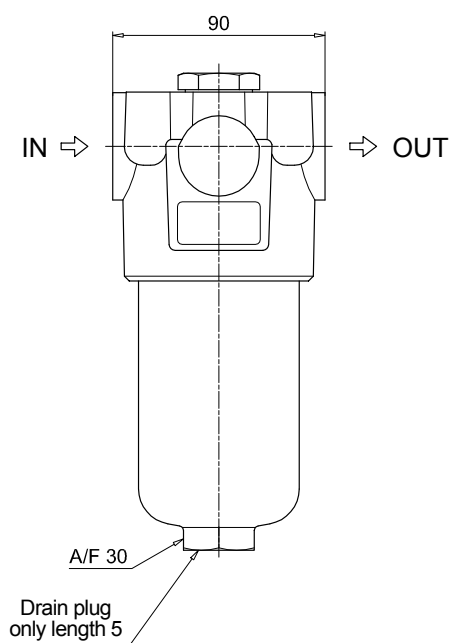
DEA Electrical differential pressure indicator
DEM Electrical differential pressure indicator
DEU Electrical differential pressure indicator
DLA Electrical / visual differential pressure indicator

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

PLUGS

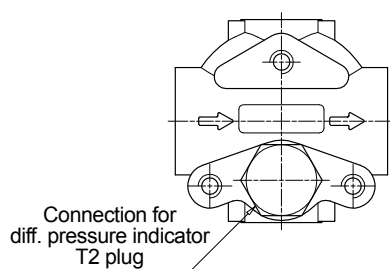
See page 747

T2 Plug

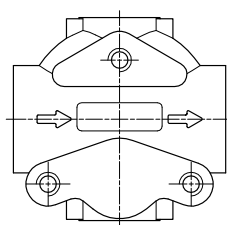


FMIM050	
Filter length	H [mm]
1	158
2	195
3	237
4	285
5	407
Connections	R
A-B-C-D	M10
E-F-G-H	3/8" UNC

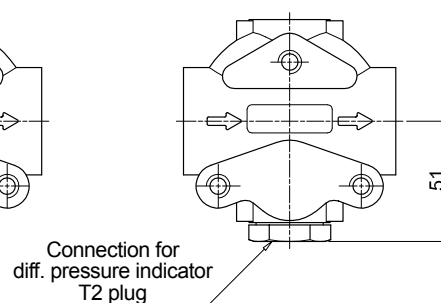
Execution P01



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
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	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 727

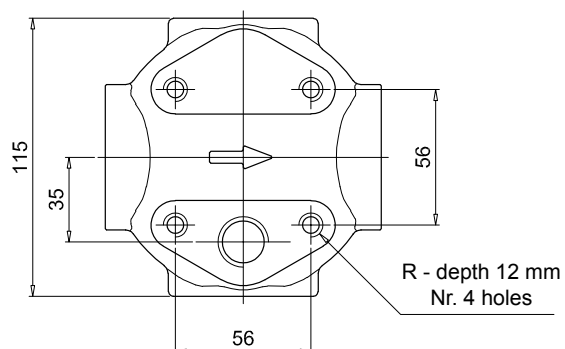
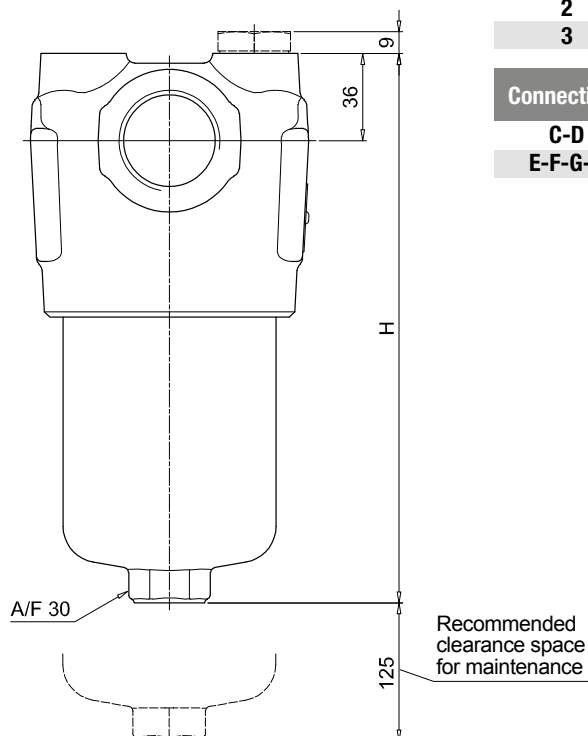
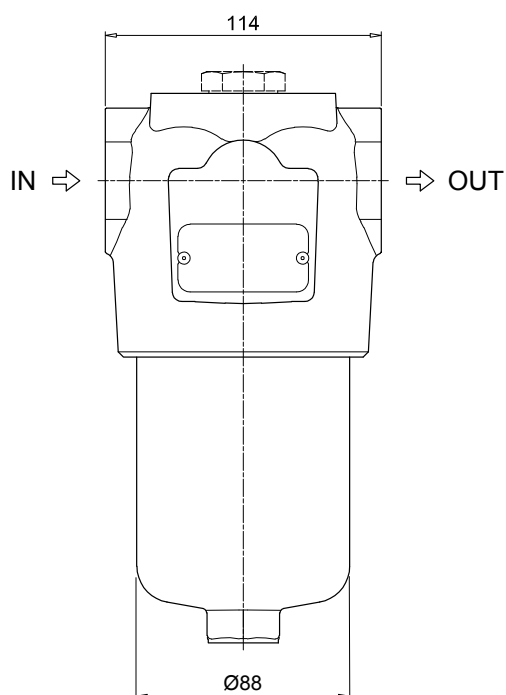
DEA Electrical differential pressure indicator
DEM Electrical differential pressure indicator
DEU Electrical differential pressure indicator
DLA Electrical / visual differential pressure indicator

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

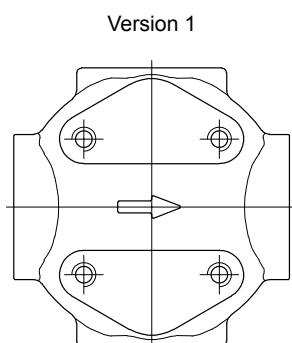
PLUGS

See page 747

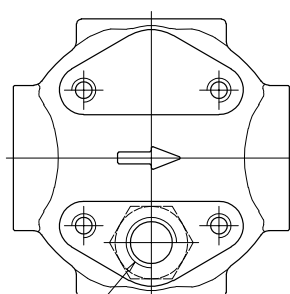
T2 Plug (not included)



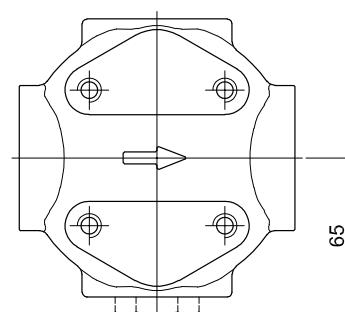
FMM150	
Filter length	H [mm]
1	230
2	340
3	415
Connections	R
C-D	M10
E-F-G-H	3/8" UNC



Version 1



Version 2



Version 3

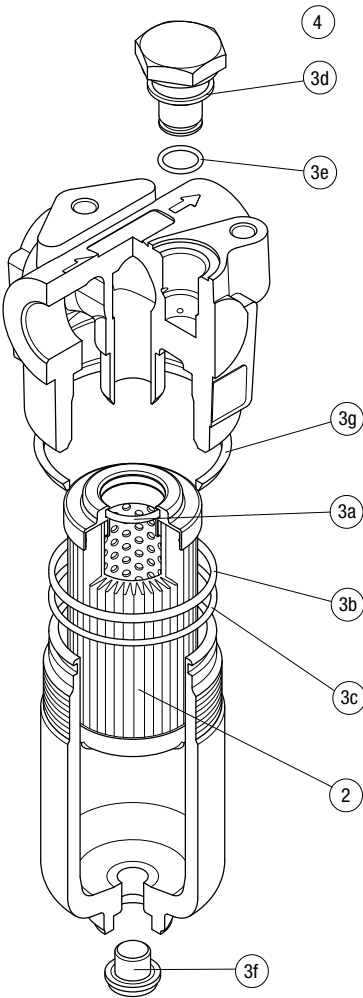
Connection for
diff. pressure indicator
T2 plug not included

Connection for
diff. pressure indicator
T2 plug not included

FMM SPARE PARTS

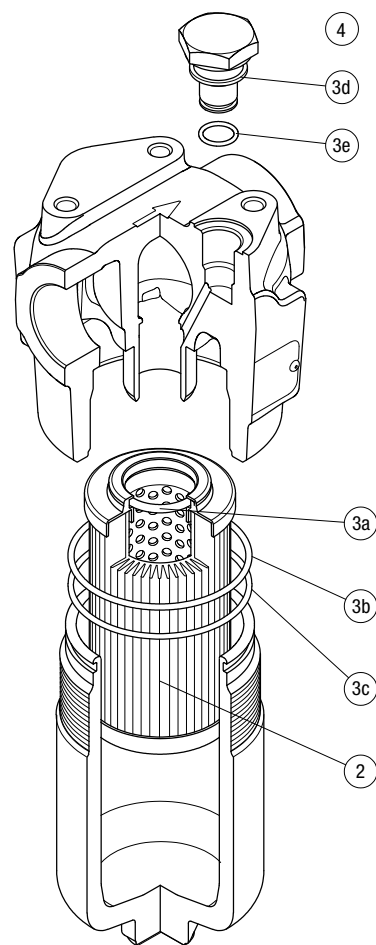
Order number for spare parts

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	02050314	T2H
		02050315	T2V

FMM 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		
FMM 150	See order table	02050731	02050732	T2H	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

Technical data

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

Filter housing materials

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

Pressure

- Test pressure: 84 MPa (840 bar)
- 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 600 kPa (6 bar) $\pm 10\%$
- Other opening pressures on request.

Δp element type

- Microfibre filter elements - series N-R: 20 bar
- Microfibre filter elements - series S: 210 bar
- Wire mesh filter elements - series N: 20 bar
- Fluid flow 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

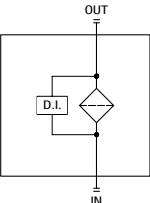
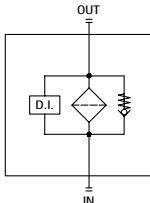
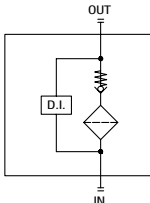
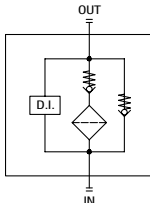
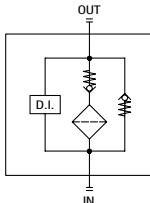
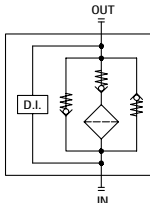
Maximum flow rate for a complete pressure filter with a pressure drop $\Delta p = 1.5$ bar.

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

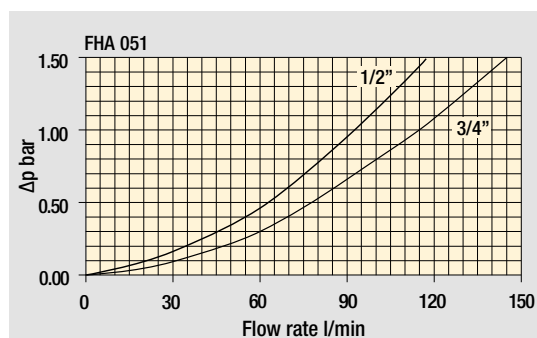
For different pressure drop or fluid viscosity we recommend to use our selection software available on www.mpfiltri.com.

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.

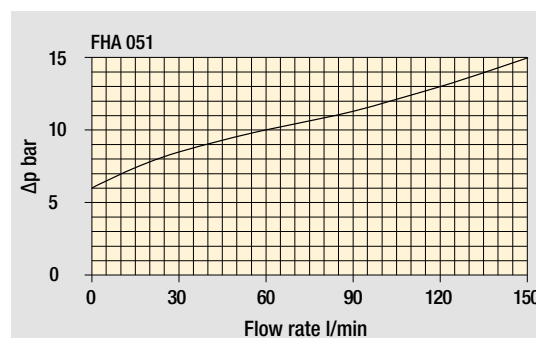
Hydraulic symbols

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

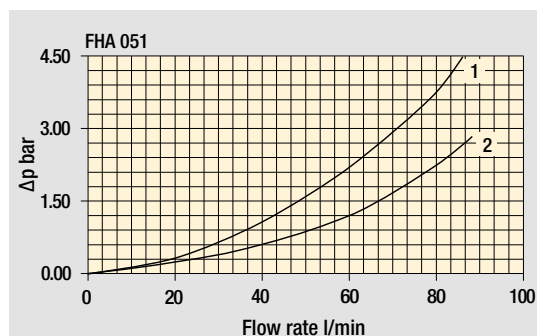
Pressure drop



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 727

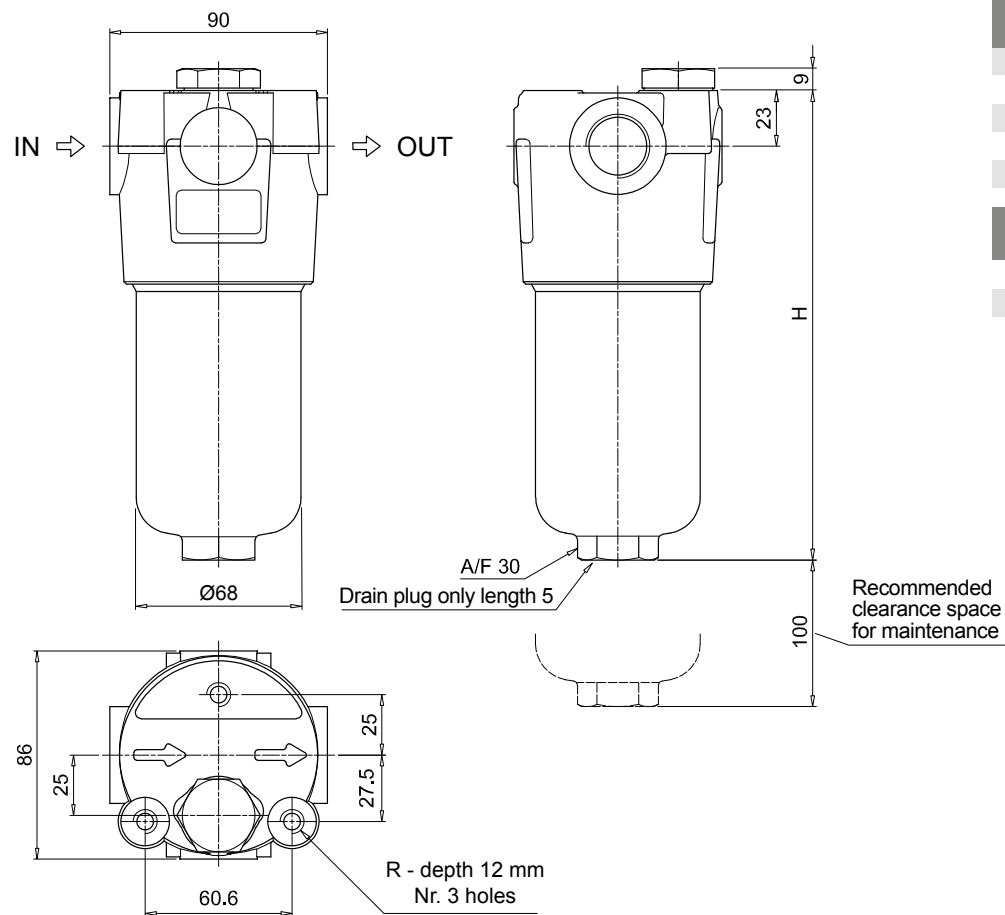
DEA Electrical differential pressure indicator
DEM Electrical differential pressure indicator
DEU Electrical differential pressure indicator
DLA Electrical / visual differential pressure indicator

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

PLUGS

See page 747

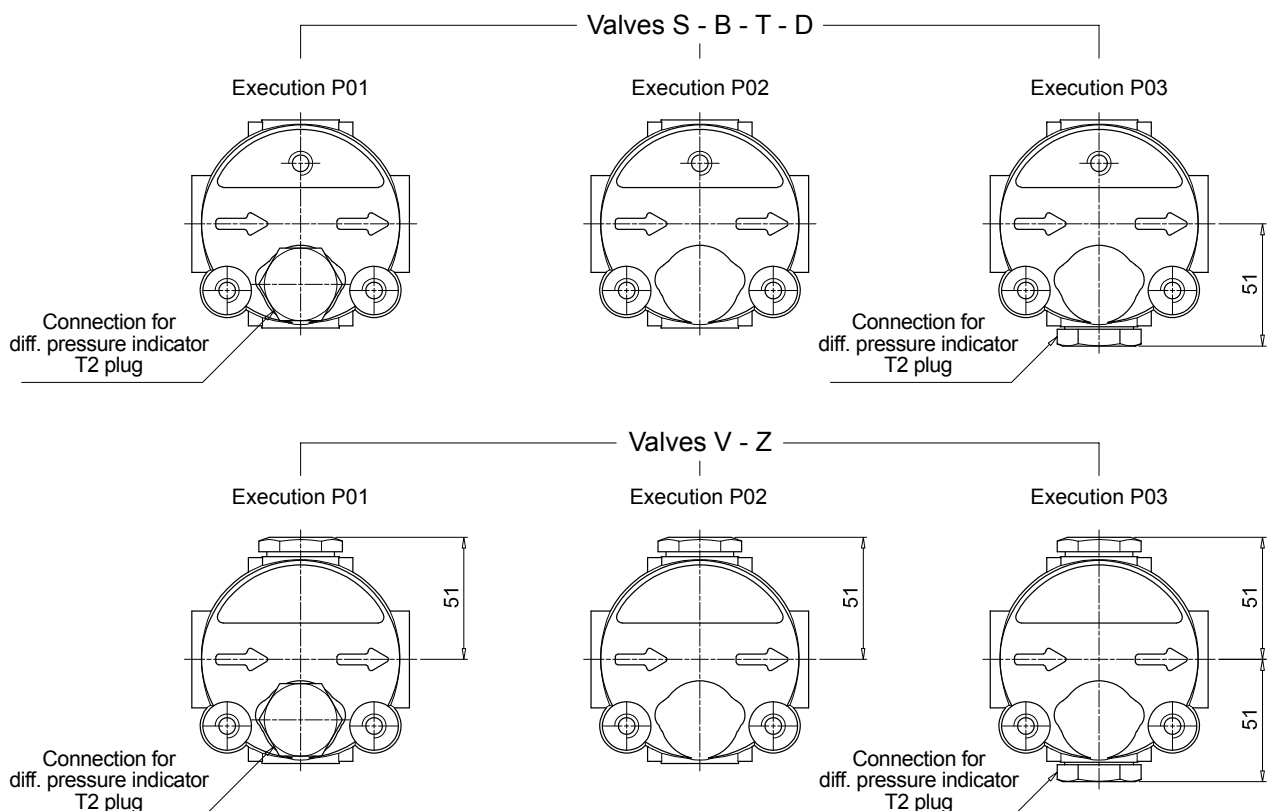
T2 Plug (not included)



FHA051

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

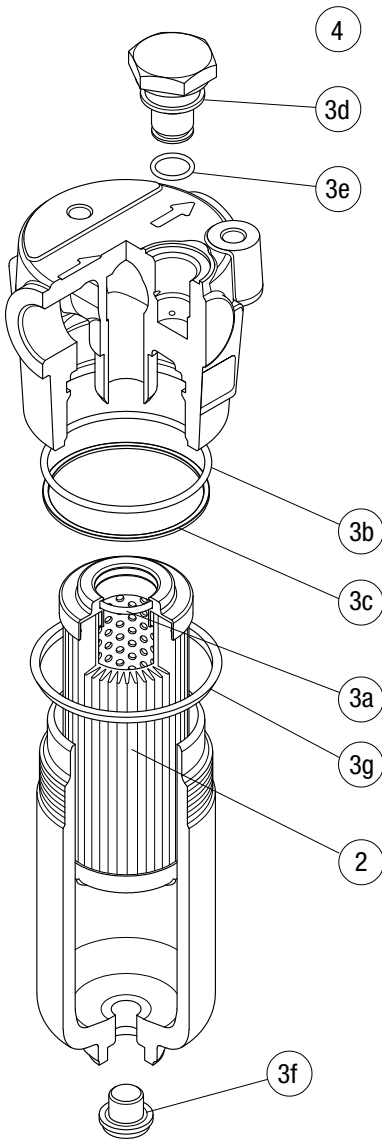
Connections	R
A-B-C-D	M10
E-F-G-H	3/8" UNC



FHA 051 SPARE PARTS

Order number for spare parts

FHA 051



Item:	Q.ty: 1 pc.	Q.ty: 1 pc.	Q.ty: 1 pc.
Filter series	Filter element	Seal Kit code number	Indicator connection plug
FHA 051	See order table	02050288	02050305
		NBR	FPM
		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

Technical data

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

Filter housing materials

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

Pressure

- Test pressure: 17 MPa (170 bar)
- 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 600 kPa (6 bar) $\pm 10\%$
- Other opening pressures on request.

Δp element type

- Microfibre filter elements - series N: 20 bar
- Wire mesh filter elements - series N: 20 bar
- Fluid flow 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]

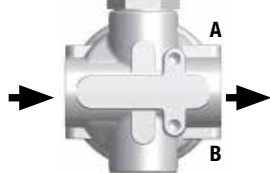
Filter series	Weights [kg]				Volumes [dm³]			
	Length	2	3	4	Length	2	3	4
FMP 039		0.60	0.70	0.80		0.19	0.26	0.34

Executions

Execution 1:
without indicator connection



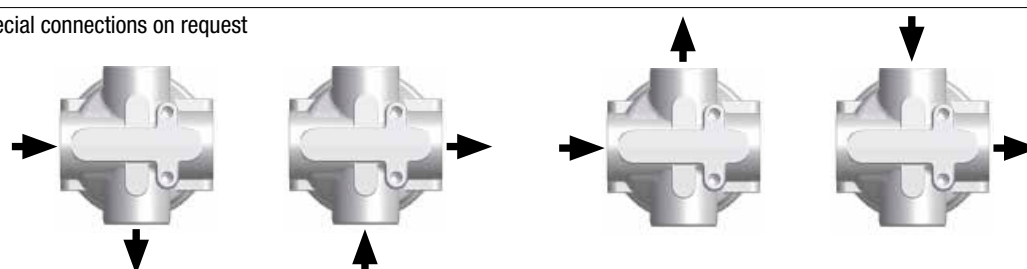
Execution 6
double indicator connection (A - B)



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.

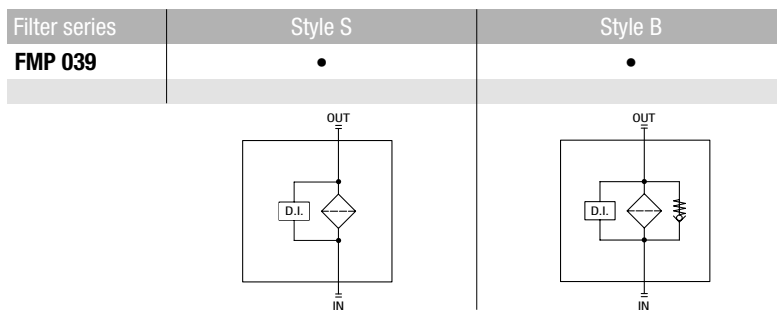
The reference fluid has a kinematic viscosity of 30 mm²/s (cSt) and a density of 0.86 kg/dm³.

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.

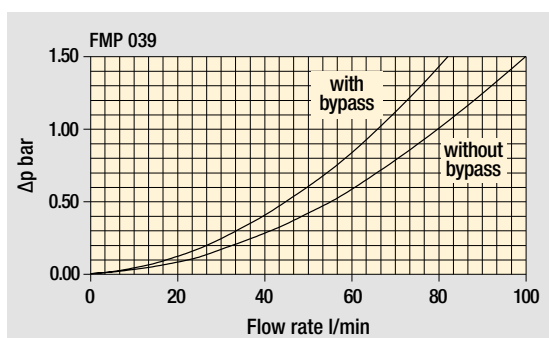
Please, contact our Sales Department for further additional information.

Hydraulic symbols

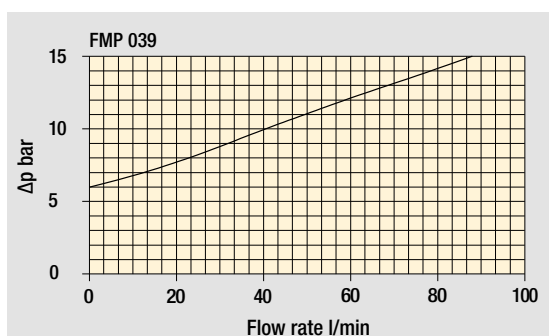


Pressure drop

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.

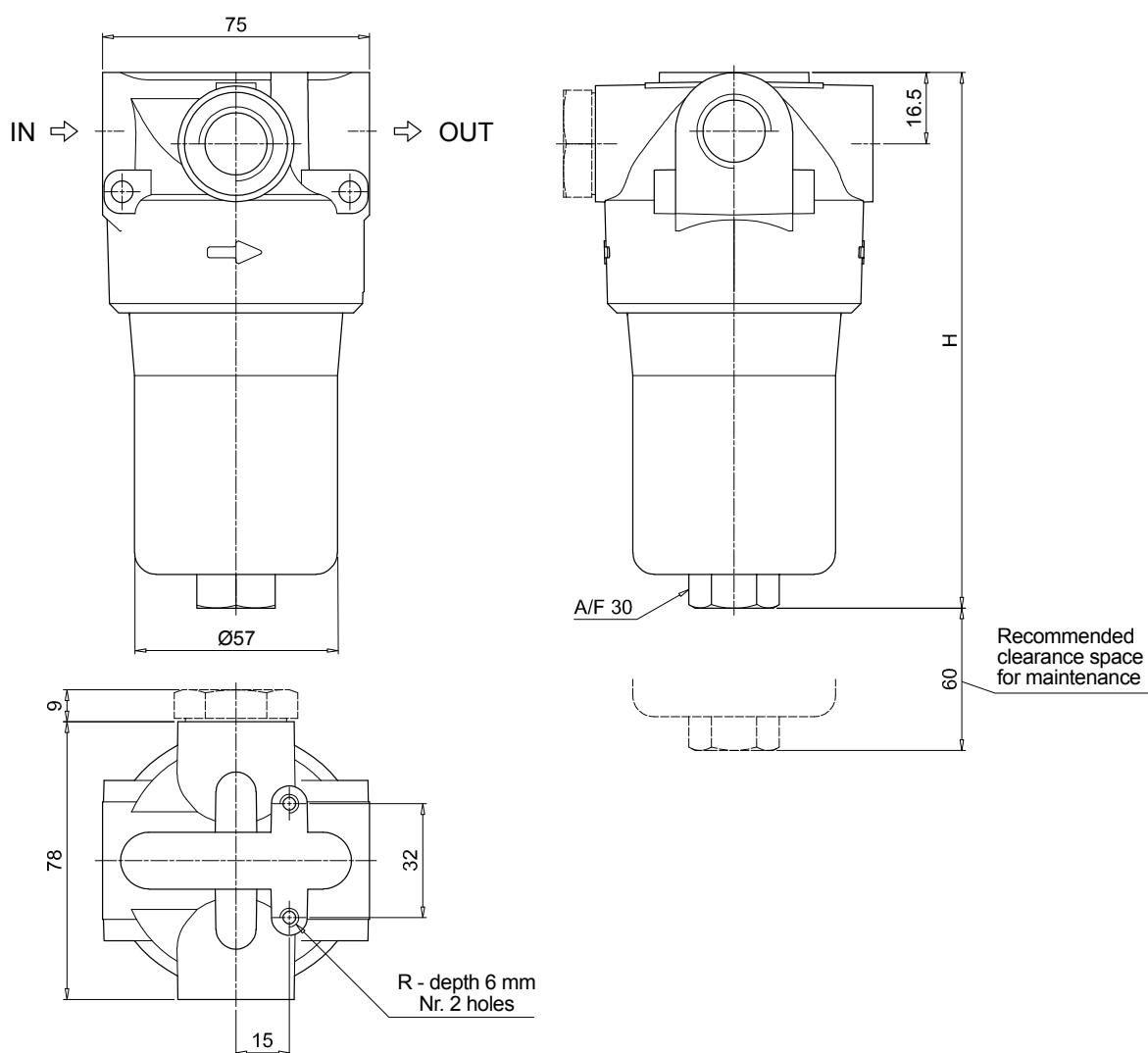
Designation & Ordering code

FILTER ELEMENT

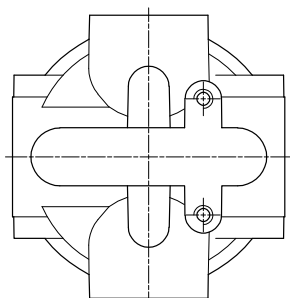
CLOGGING INDICATORS

PLUGS

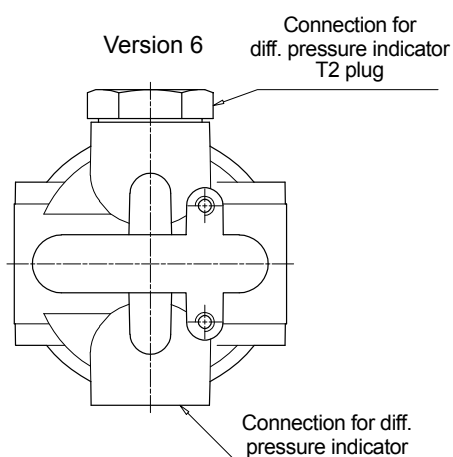




Version 1



Version 6



The position of the T2 plug is reversible

FMP039

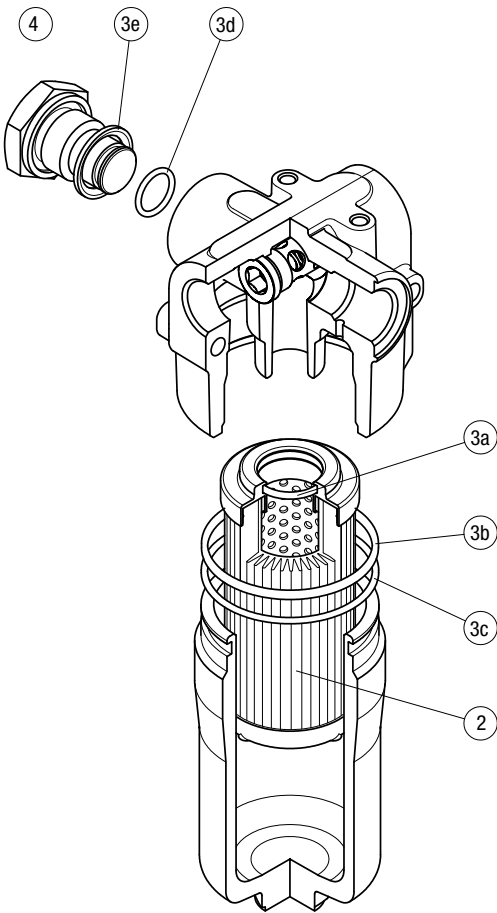
Filter length	H [mm]
2	151
3	194
4	238

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

FMP 039 SPARE PARTS

Order number for spare parts

FMP 039



Item:		Q.ty: 1 pc.	Q.ty: 1 pc.
		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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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)
- 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 600 kPa (6 bar) $\pm 10\%$
- Other opening pressures on request.

Δp element type

- Microfibre filter elements - series N-R: 20 bar
- Microfibre filter elements - series H-S: 210 bar
- Wire mesh filter elements - series N: 20 bar
- Fluid flow 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 filters are provided for vertical mounting

Weights [kg] and volumes [dm³]

Filter series	Weights [kg]					Volumes [dm ³]				
	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

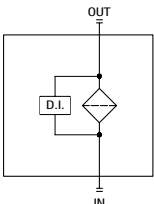
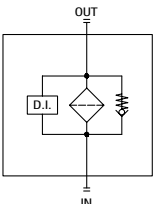
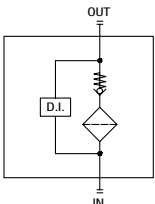
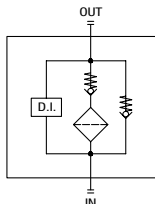
Maximum flow rate for a complete pressure filter with a pressure drop $\Delta p = 1.5$ bar.

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.

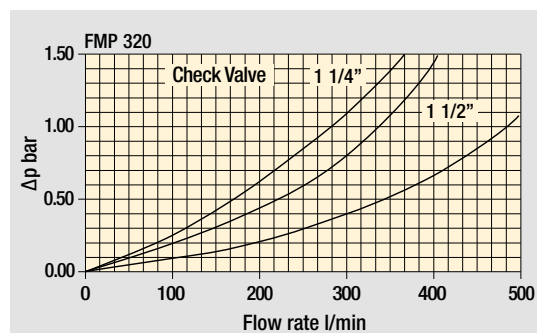
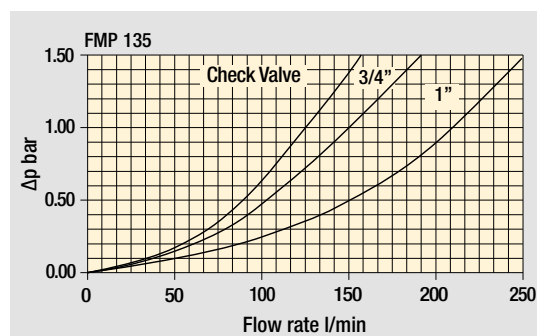
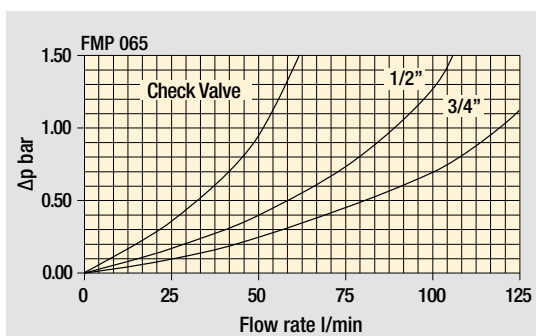
Hydraulic symbols

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

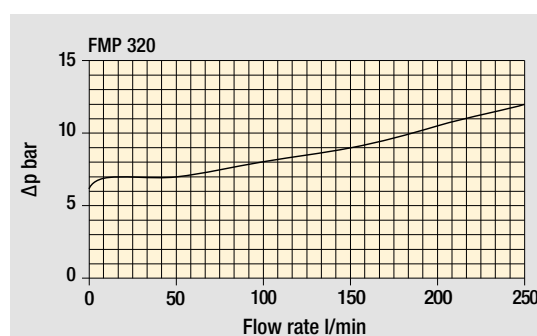
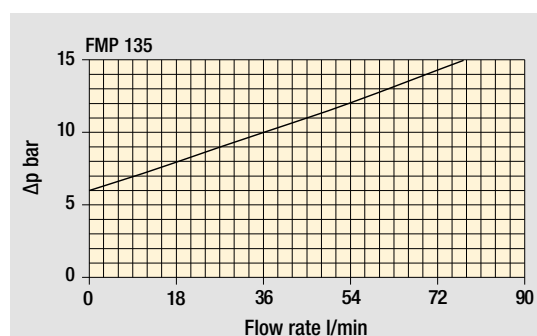
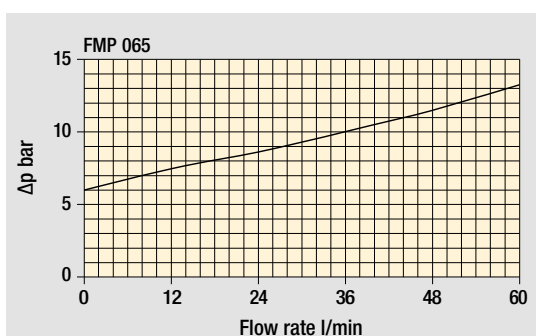
FMP GENERAL INFORMATION

Pressure drop

Filter housings Δp pressure drop



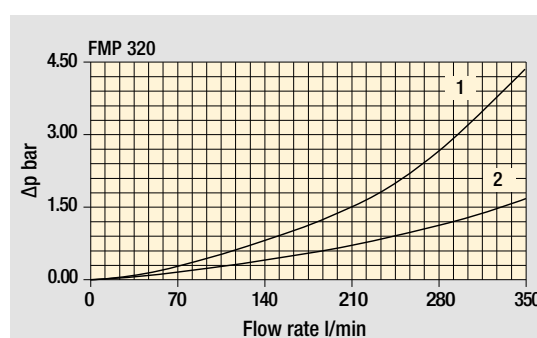
Bypass valve pressure drop



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	-	-	-	-	•	-							

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)									
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		R 20 bar		Pxx Customized	
						H 210 bar			
						S 210 bar			

CLOGGING INDICATORS

See page 727

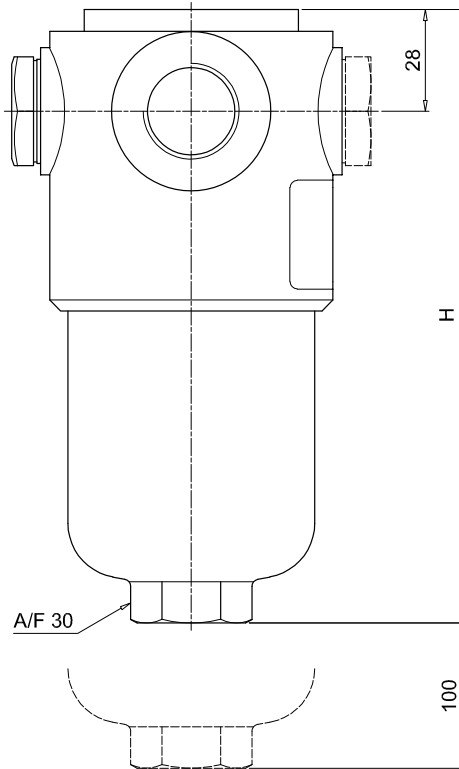
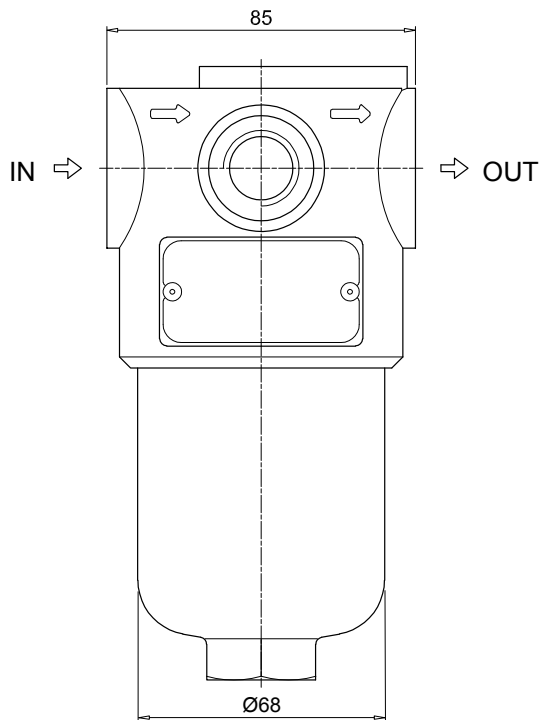
DEA	Electrical differential pressure indicator
DEM	Electrical differential pressure indicator
DEU	Electrical differential pressure indicator
DLA	Electrical / visual differential pressure indicator

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

PLUGS

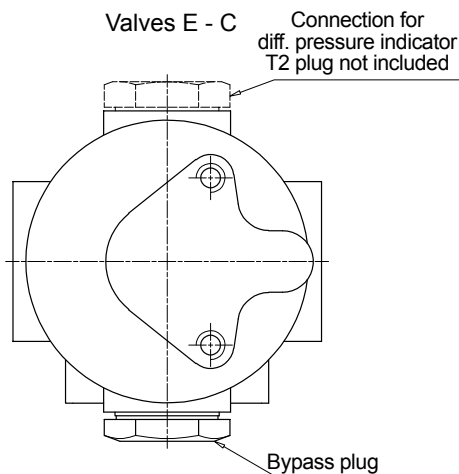
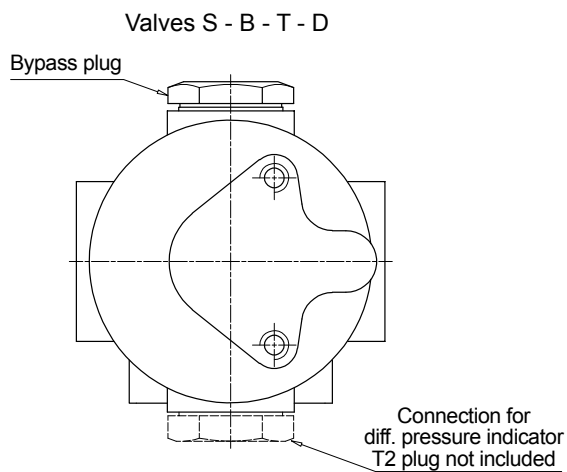
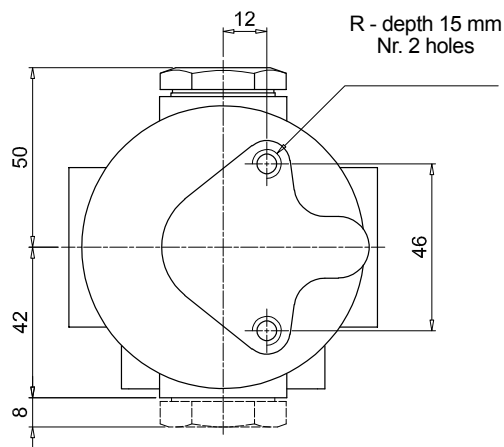
See page 747

T2	Plug (not included)
----	---------------------



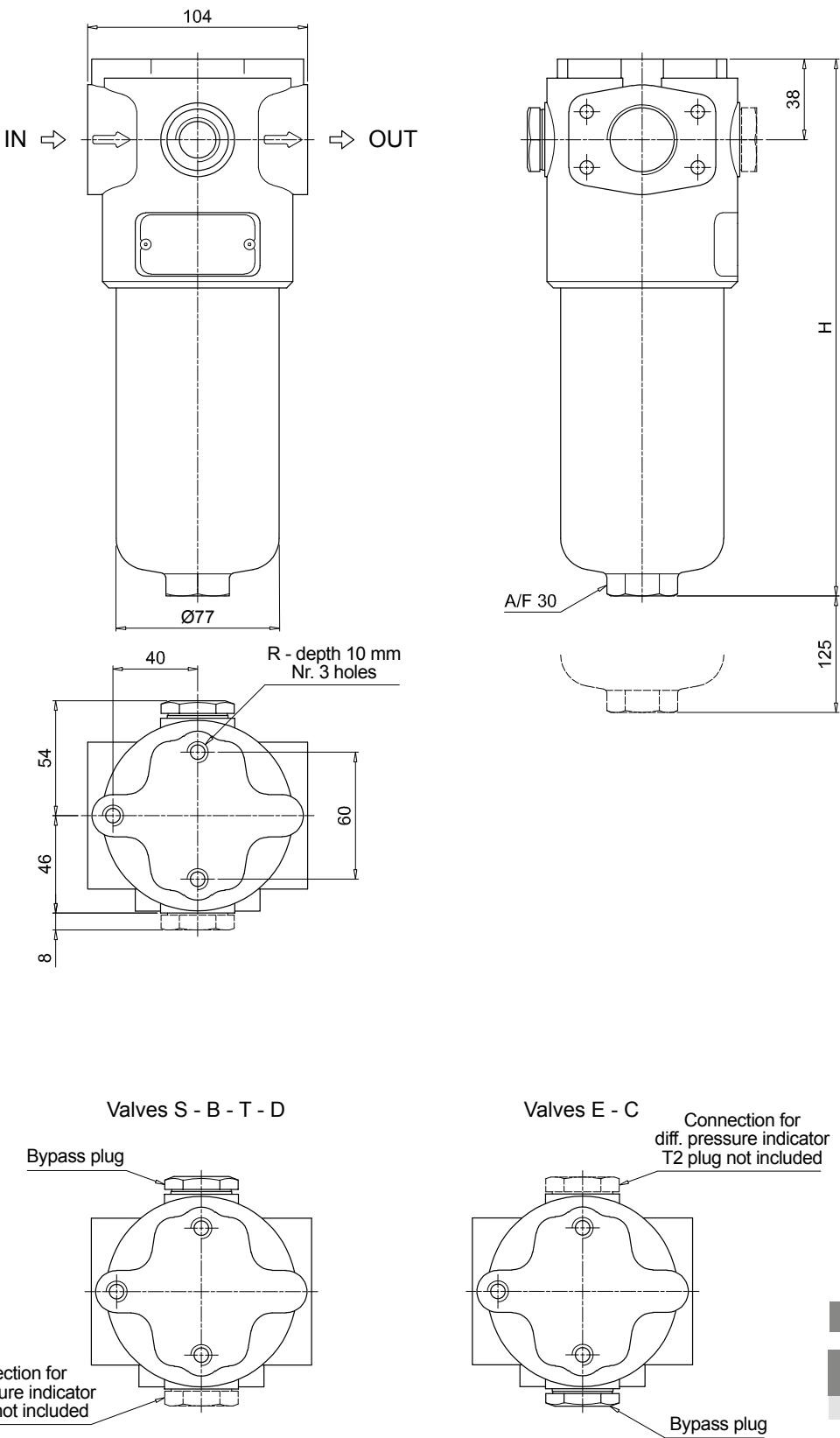
FMP065	
Filter length	H [mm]
1	169
2	200
3	302
Connections	R
G1-G2	M8
G3-G4-G5-G6	5/16" UNC

Recommended
clearance space
for maintenance

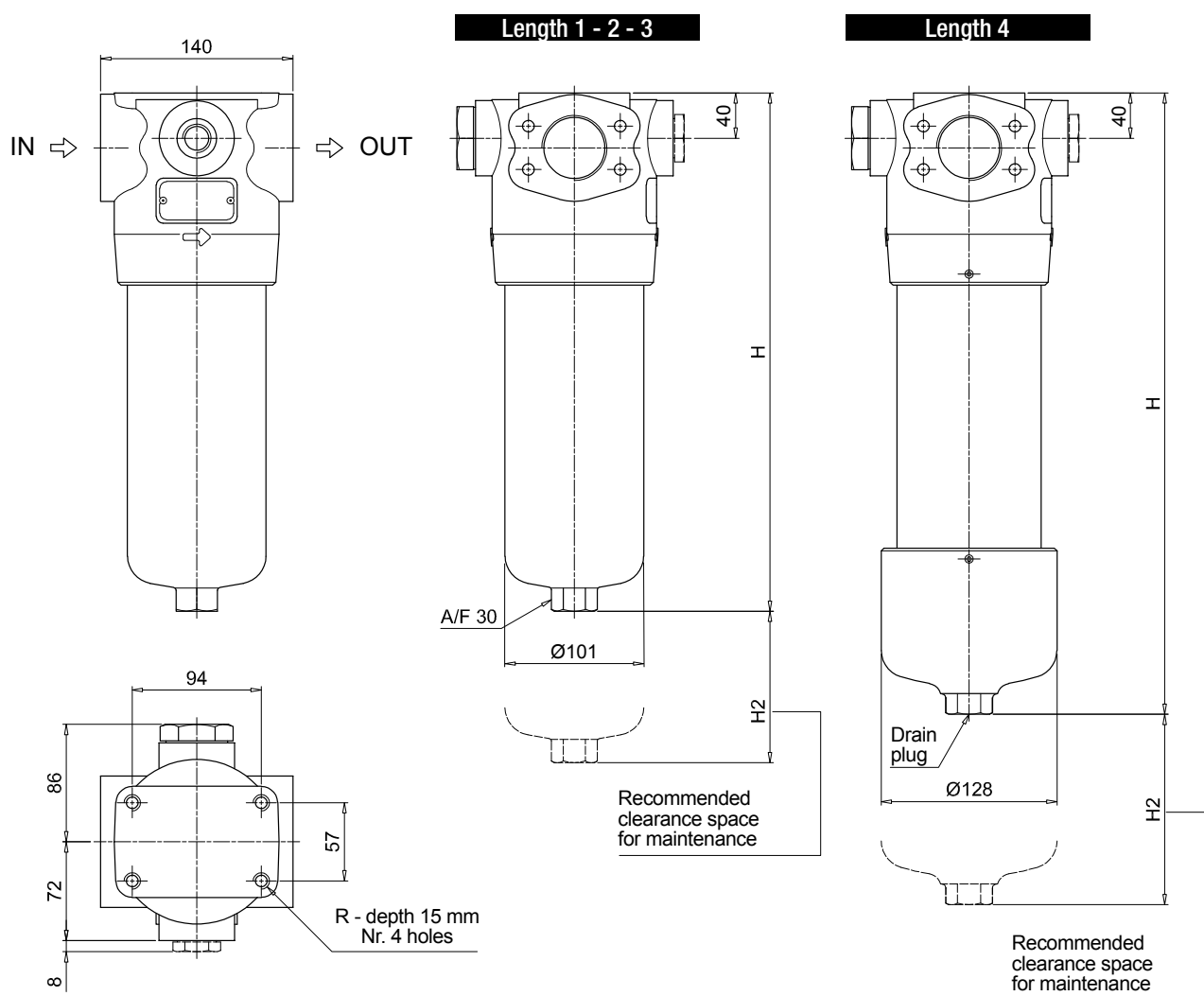


FMP FMP065 - FMP135 - FMP320

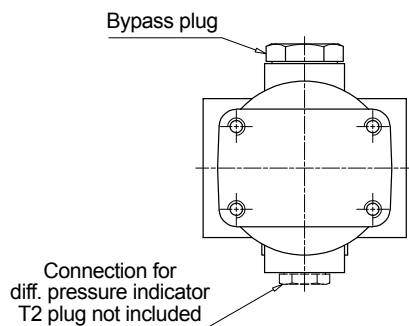
Dimensions



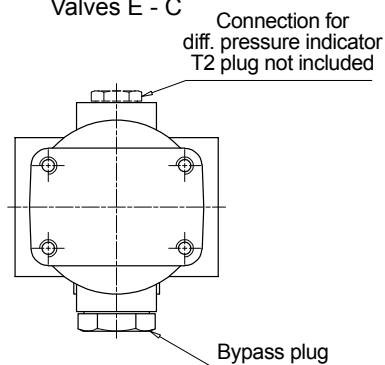
FMP135	
Filter length	H [mm]
1	221
2	334
3	409
Connections	R
G1-G2	M10
G3-G4-G5-G6	3/8" UNC
F1-F2	M10
F3-F4	3/8" UNC



Valves S - B - T - D



Valves E - C



FMP320

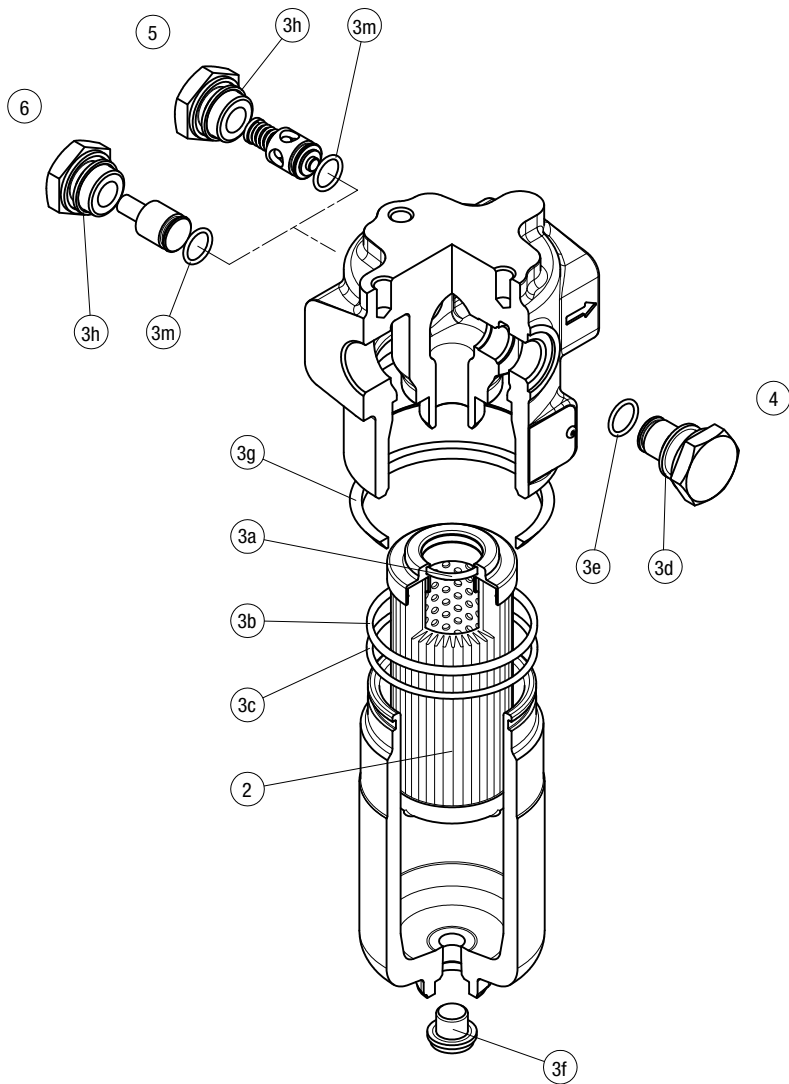
Filter length	H [mm]	H2 [mm]	
		Execution P01	P02
1	263	150	-
2	386	150	-
3	518	150	-
4	671	150	550

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
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 600 kPa (6 bar) ±10%
- Other opening pressures on request.

Δp element type

- Microfibre filter elements - series N: 20 bar
- Microfibre filter elements - series R: 20 bar (not available for FHP 010-011 and FHP 500)
- Microfibre filter elements - series H: 210 bar
- Microfibre filter elements - series S: 210 bar (only for FHP 500)
- Wire mesh filter elements - series N: 20 bar
- Fluid flow 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.

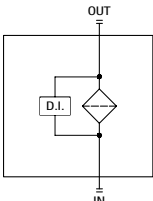
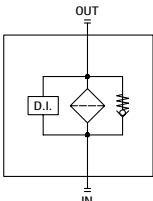
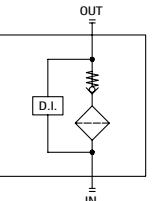
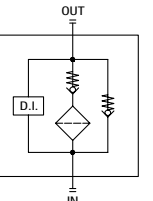
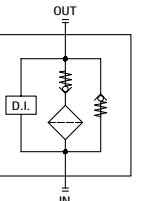
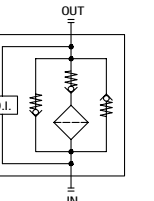
The reference fluid has a kinematic viscosity of 30 mm²/s (cSt) and a density of 0.86 kg/dm³.

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.

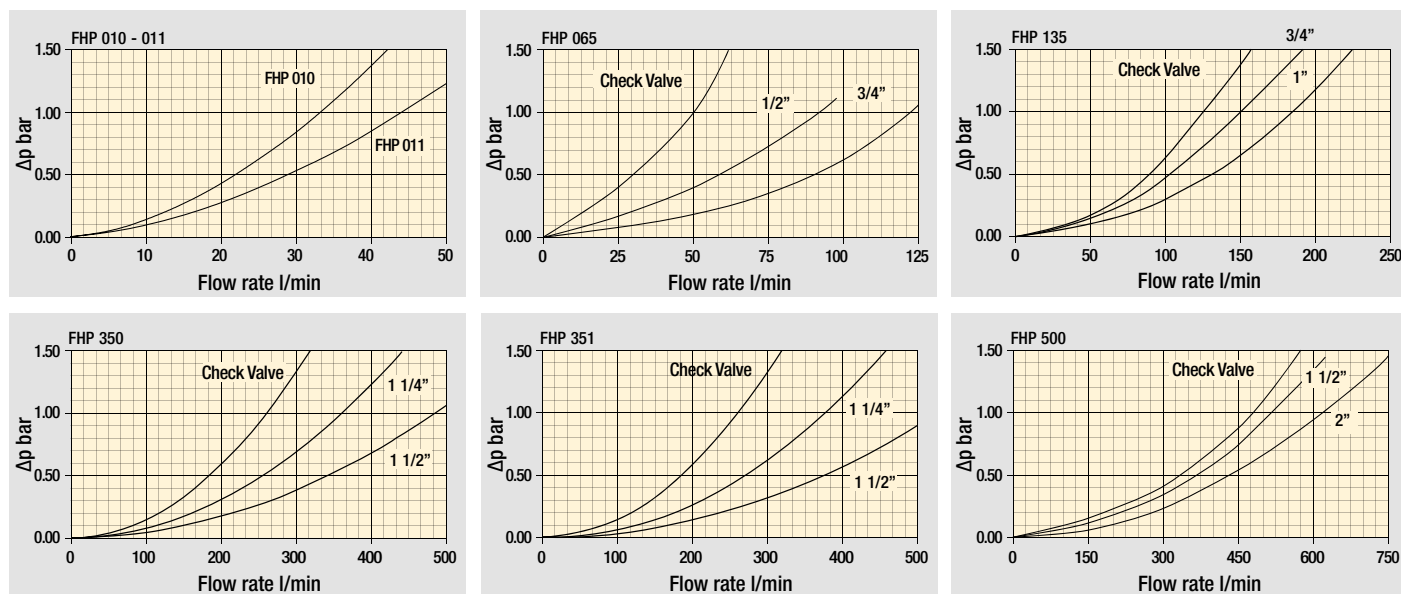
Please, contact our Sales Department for further additional information.

Hydraulic symbols

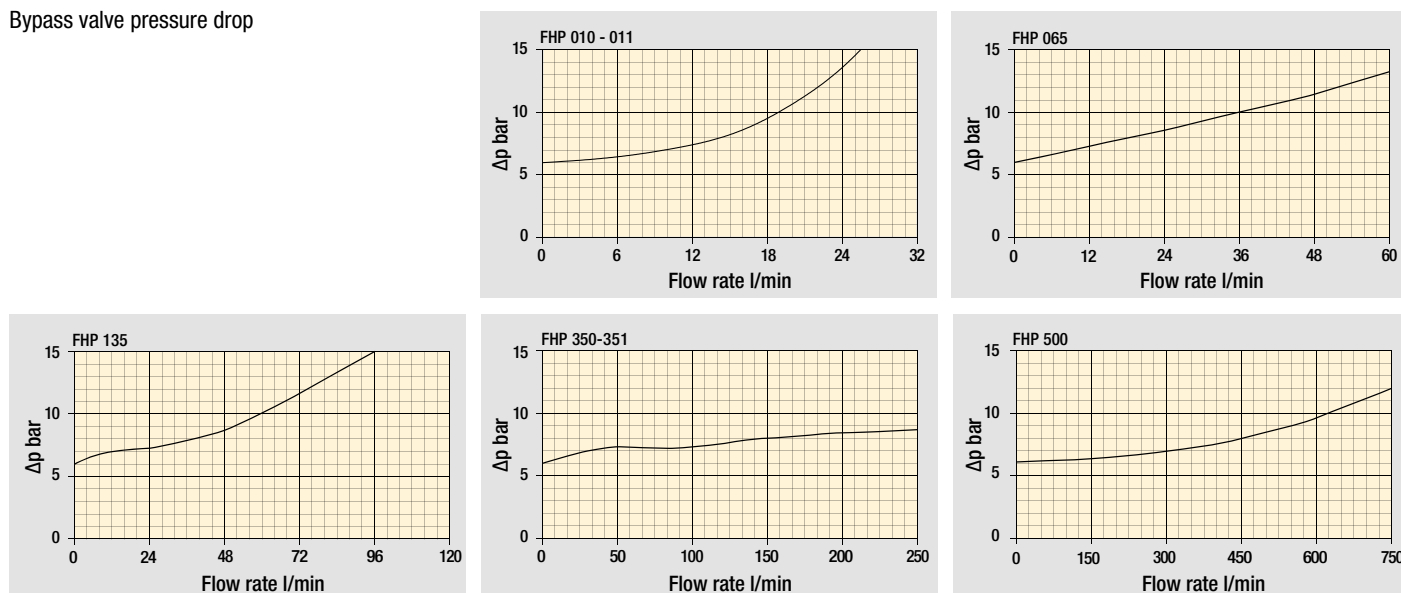
Filter series	Style S	Style B	Style T	Style D	Style V	Style Z
FHP 010 - 011	•	•	-	-	•	•
FHP 065	•	•	•	-	-	-
FHP 135	•	•	•	-	-	-
FHP 350-351	•	•	•	•	•	•
FHP 500	•	•	•	•	•	•
						

Pressure drop

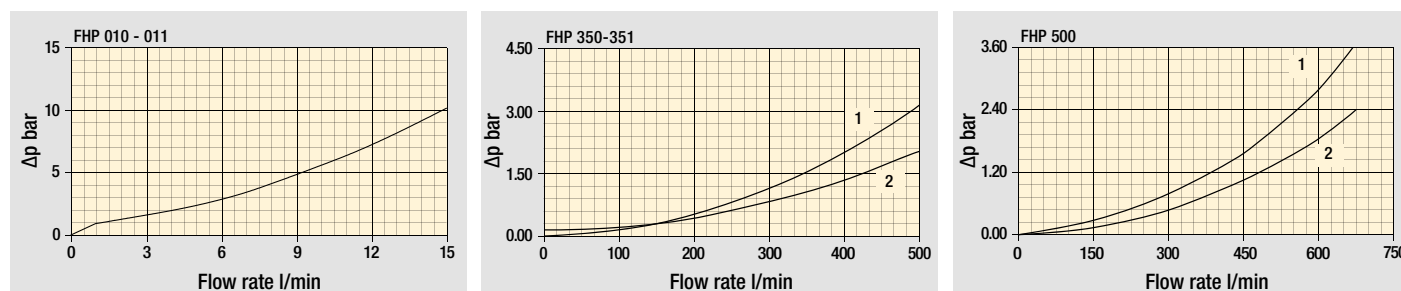
Filter housings Δp pressure drop



Bypass valve pressure drop



Valves



Filter housing with check valve

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 727

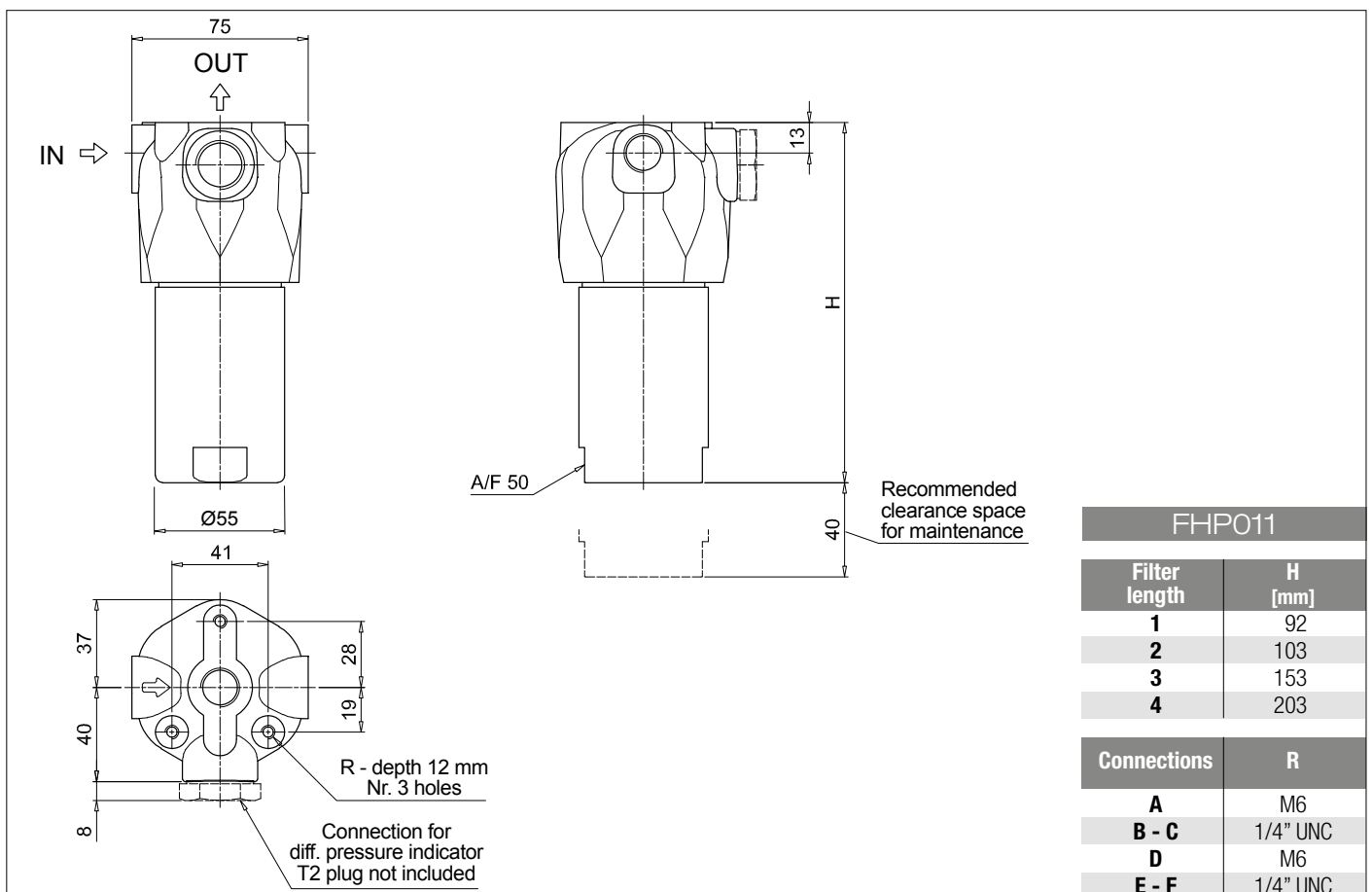
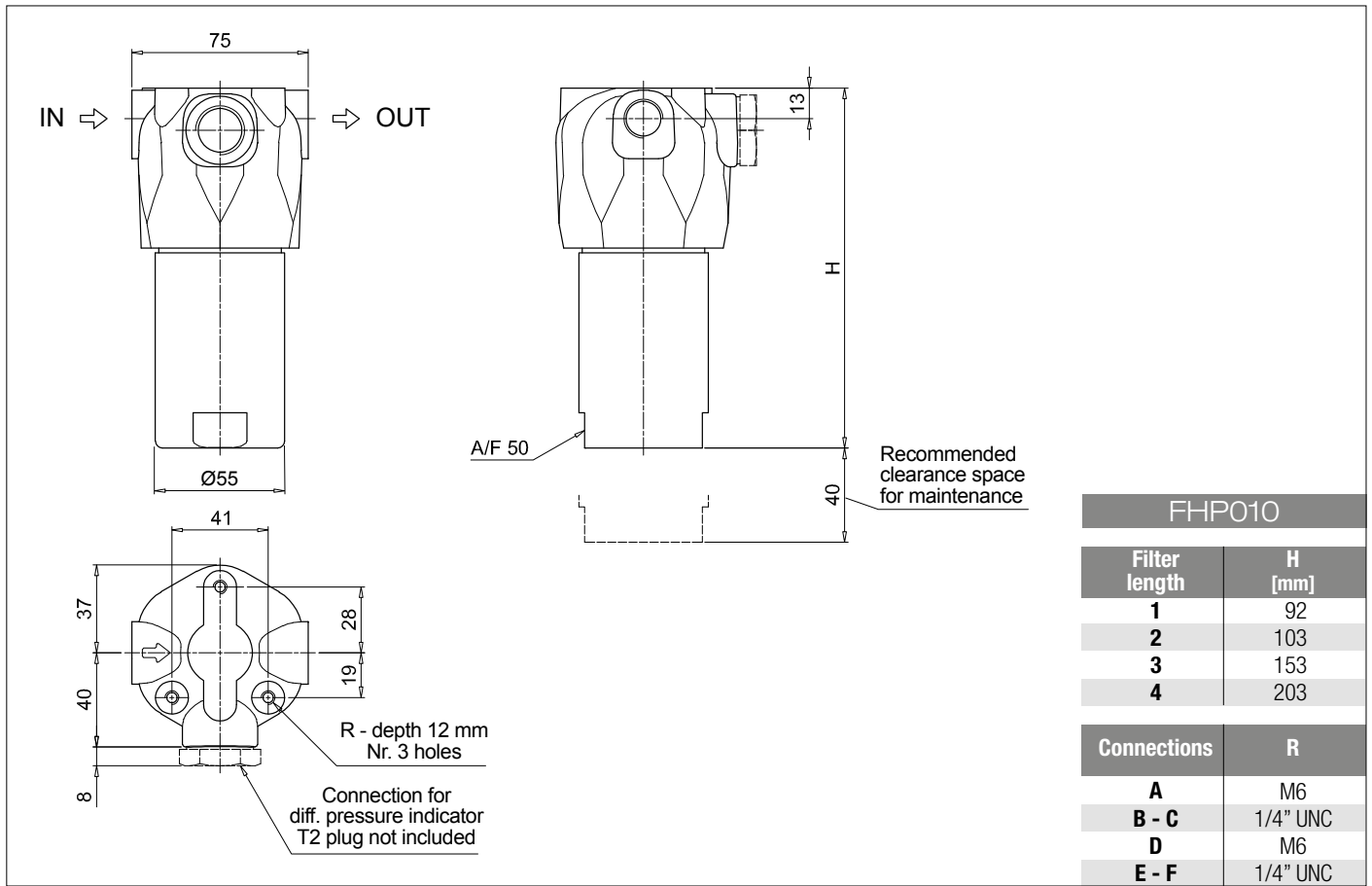
DEA Electrical differential pressure indicator
DEM Electrical differential pressure indicator
DEU Electrical differential pressure indicator
DLA Electrical / visual differential pressure indicator

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

PLUGS

See page 747

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	-	•	-																															
H 210 bar	•	-	-																															
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 colspan="2">Element Δp</th> </tr> <tr> <td>N</td> <td>20 bar</td> </tr> <tr> <td>H</td> <td>210 bar</td> </tr> <tr> <td>S</td> <td>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 727

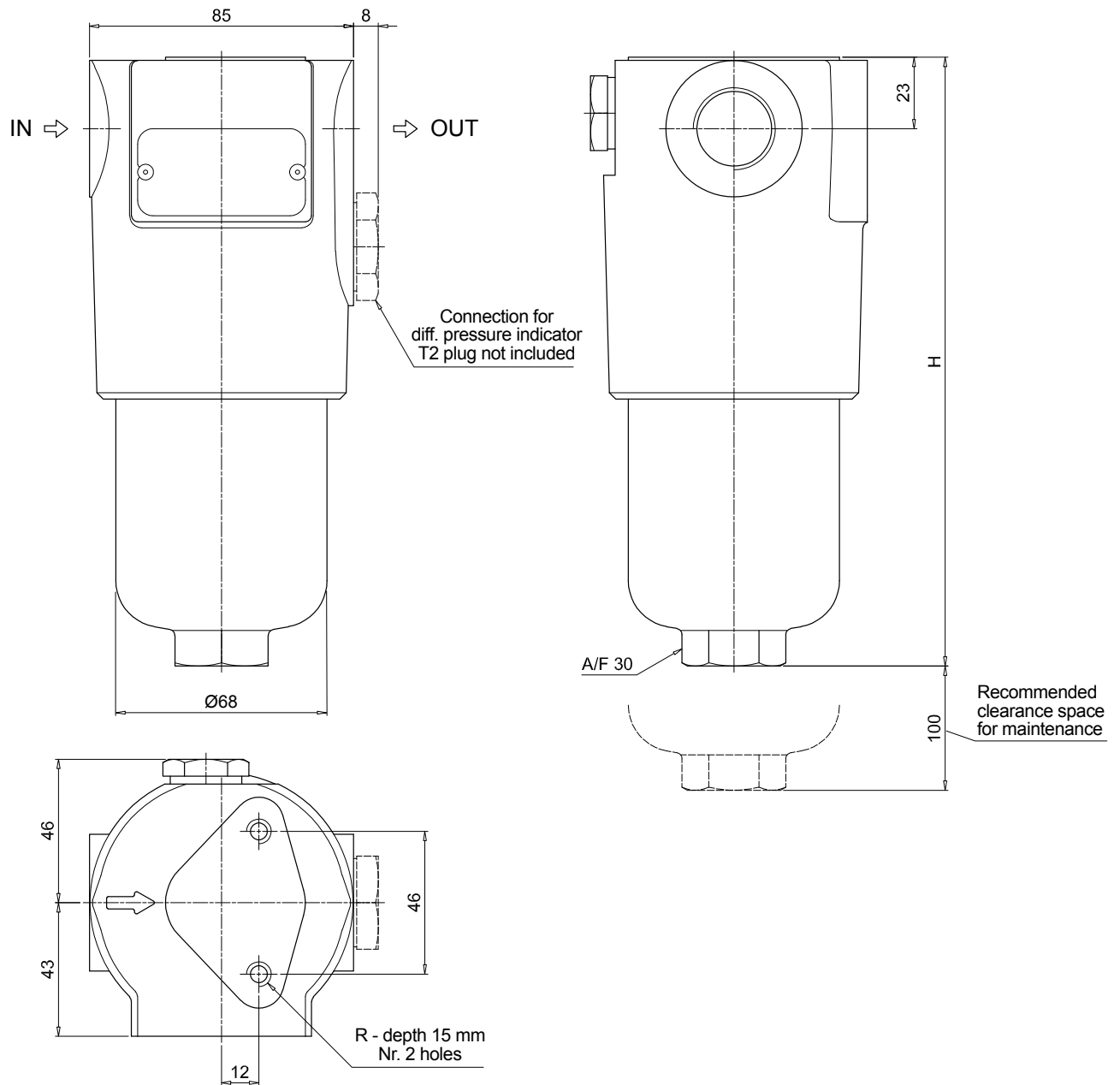
DEA	Electrical differential pressure indicator
DEM	Electrical differential pressure indicator
DEU	Electrical differential pressure indicator
DLA	Electrical / visual differential pressure indicator

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

PLUGS

See page 747

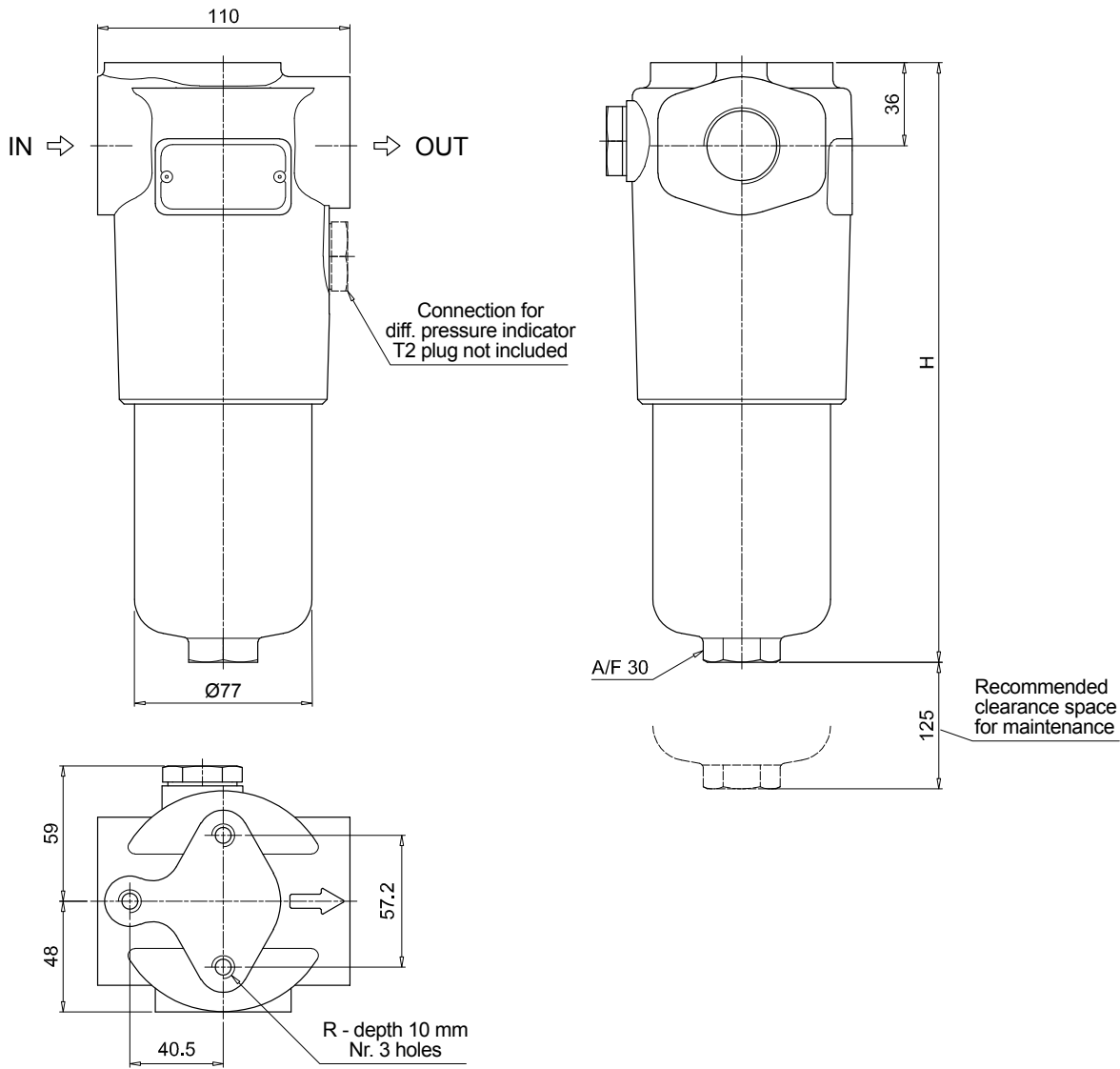
T2	Plug (not included)
-----------	---------------------



FHP065

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

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

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																									
Z	With reverse flow, with bypass 6 bar																									
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)																										
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	B	T	D	V	Z	Execution		1	2	3	4													
N	20 bar	-	•	-	-	-	-	P01	MP Filtri standard	•	•	•	•													
R	20 bar	-	-	-	•	-	•	P02	Maintenance from the bottom of the housing	-	-	-	•													
H	210 bar	•	-	-	-	-	-	Pxx	Customized	-	-	-	-													
S	210 bar	-	-	•	-	•	-																			

FILTER ELEMENT

Configuration example: **HP320** **4** **A06** **A** **N** **P01**

Element series and size
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
M25	Wire mesh	25 µm

Seals

A	NBR
V	FPM

Element Δp

N	20 bar
R	20 bar
H	210 bar
S	210 bar

Execution

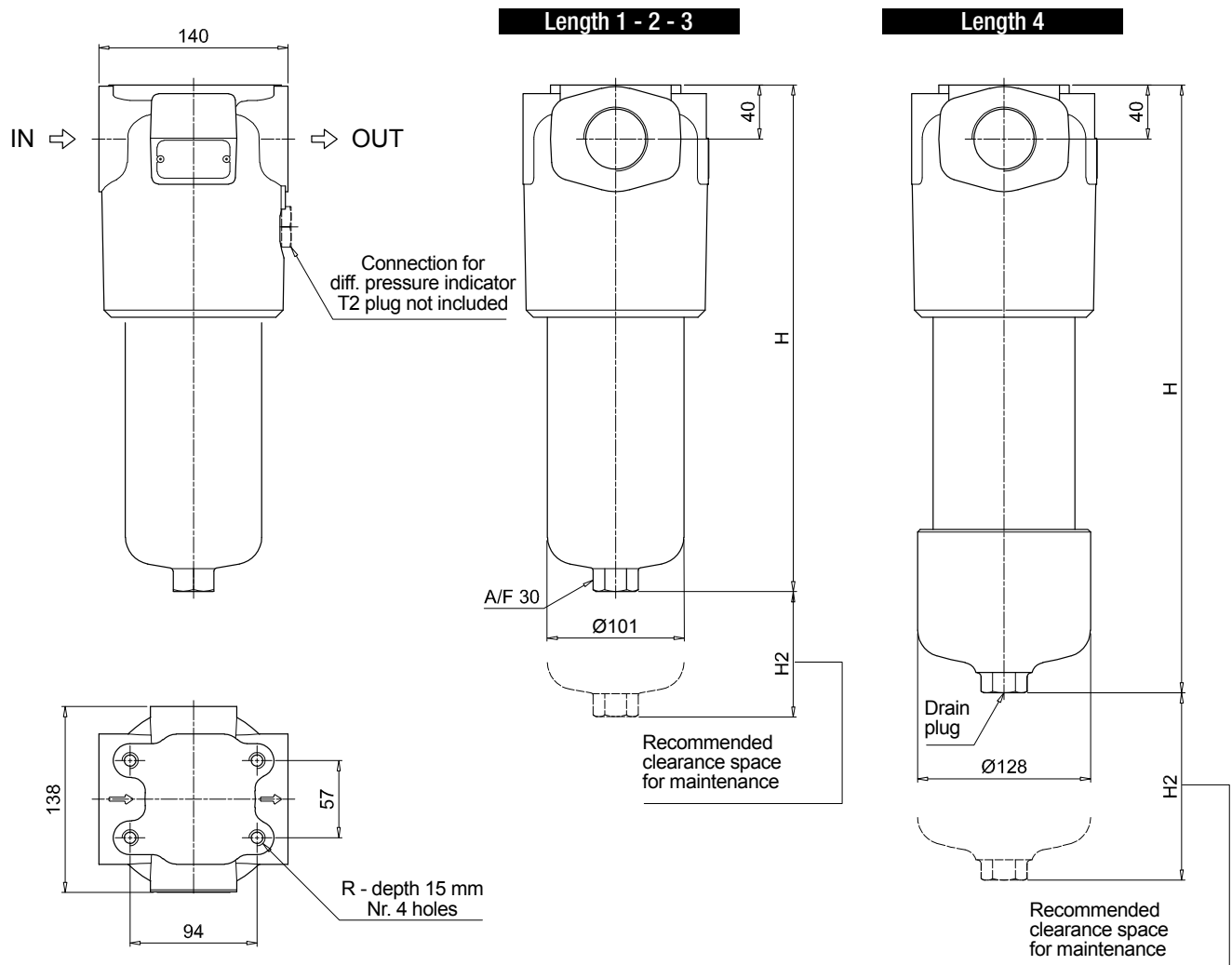
P01	MP Filtri standard
Pxx	Customized

CLOGGING INDICATORS

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

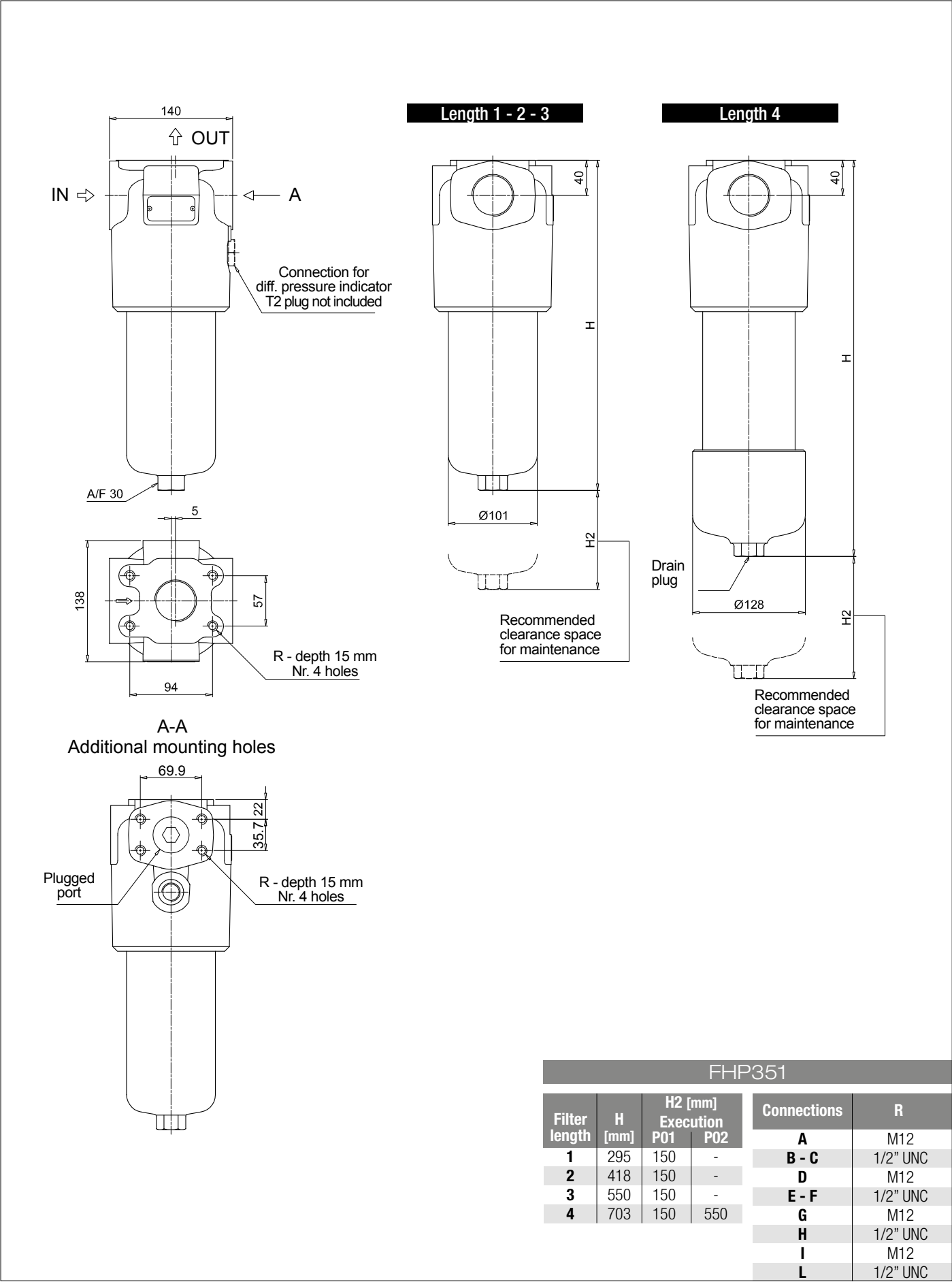
T2	Plug (not included)	
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FHP350

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

Dimensions



FHP351					
Filter length	H [mm]	H2 [mm]		Connections	R
		Execution 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 727

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

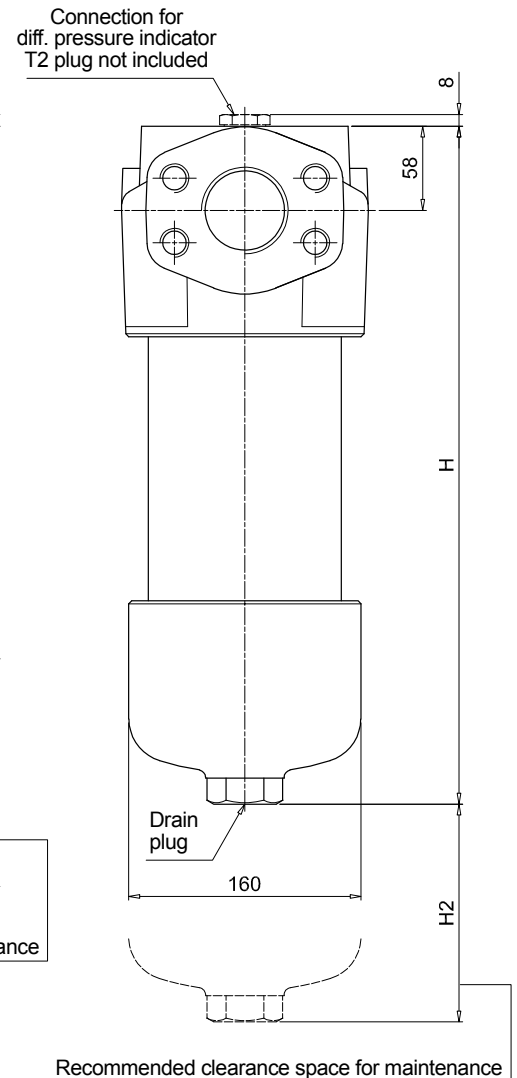
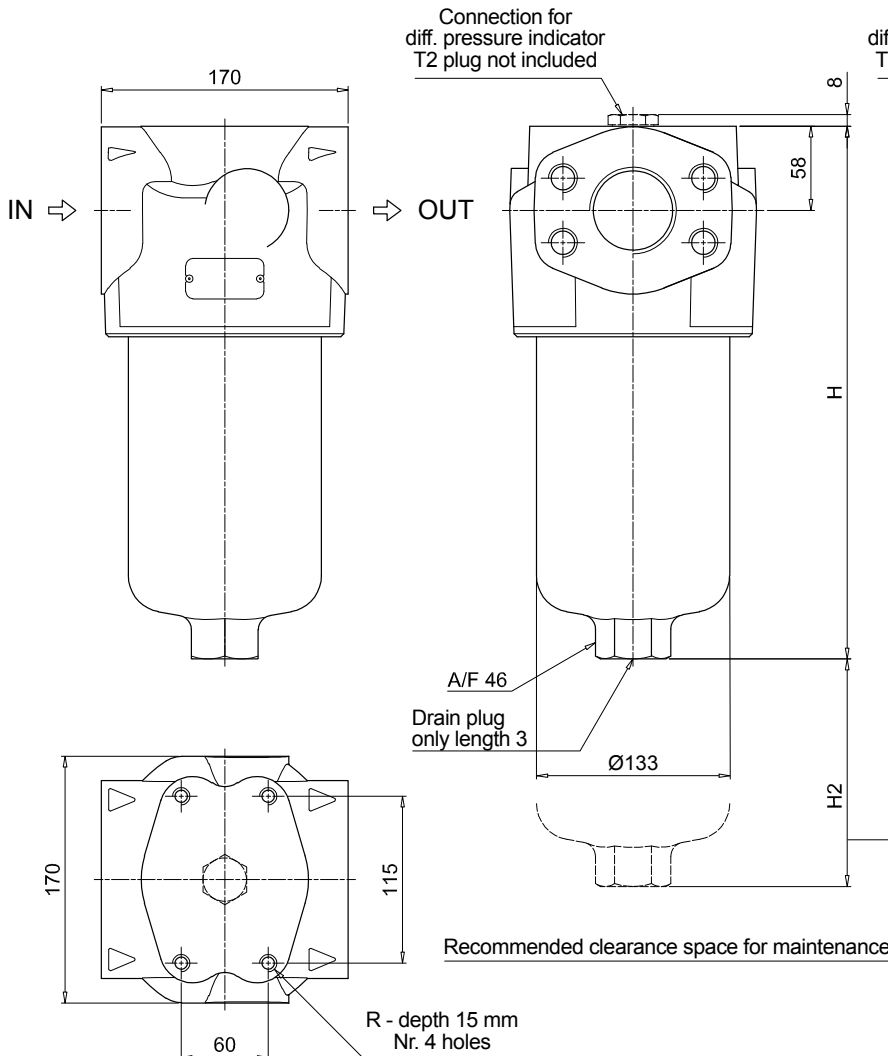
PLUGS

See page 747

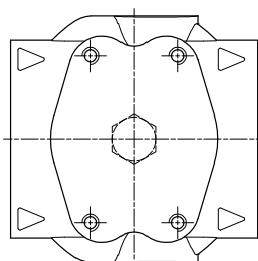
T2 Plug (not included)

Length 1 - 2 - 3

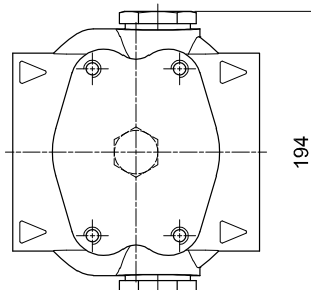
Length 4 - 5



Valves S - B - T - D



Valves V - Z



FHP500

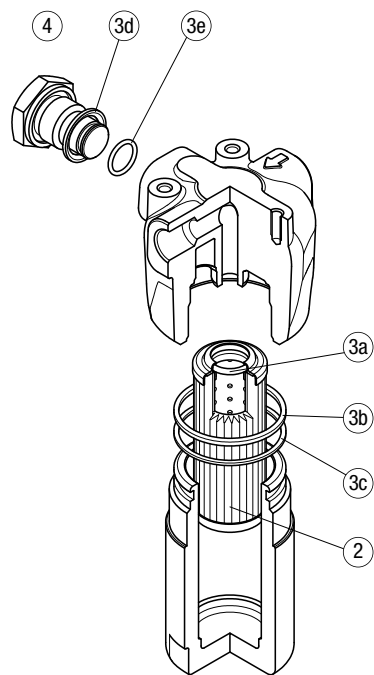
Filter length	H [mm]	H2 [mm]	
		Execution P01	P02
1	330	150	-
2	420	150	-
3	496	150	-
4	654	150	480
5	820	150	650

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

FHP SPARE PARTS

Order number for spare parts

FHP 010 - 011

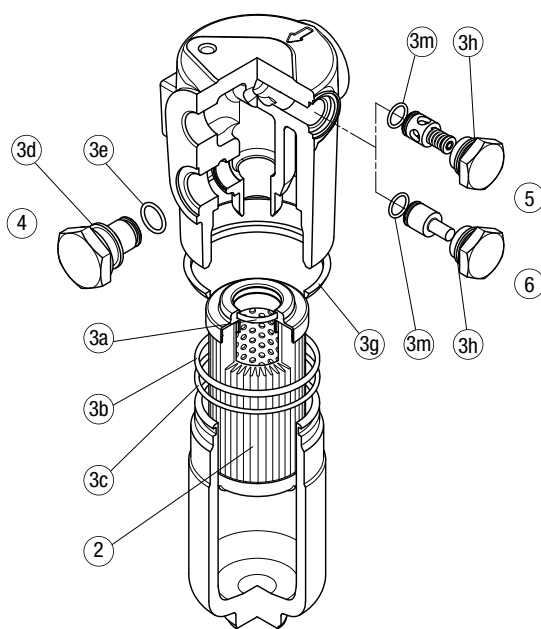


Q.ty:
nr. 0 pcs. for version 1
(without indicator port)

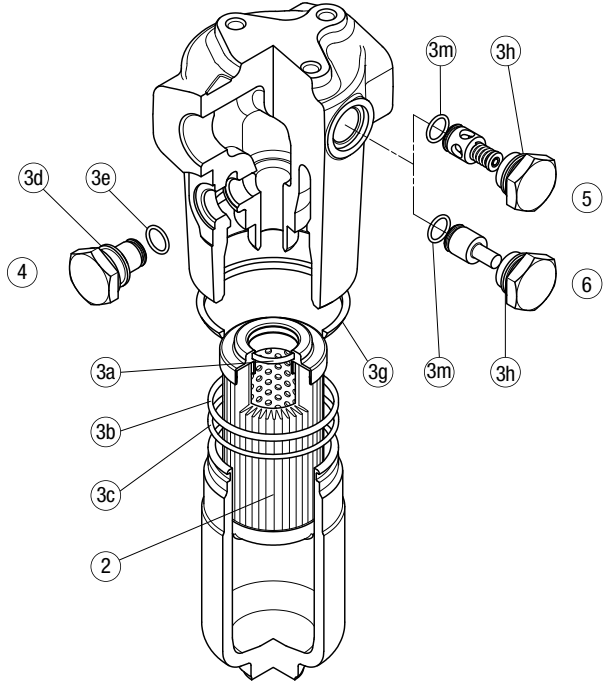
nr. 1 pc. for version 2
(with indicator port)

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

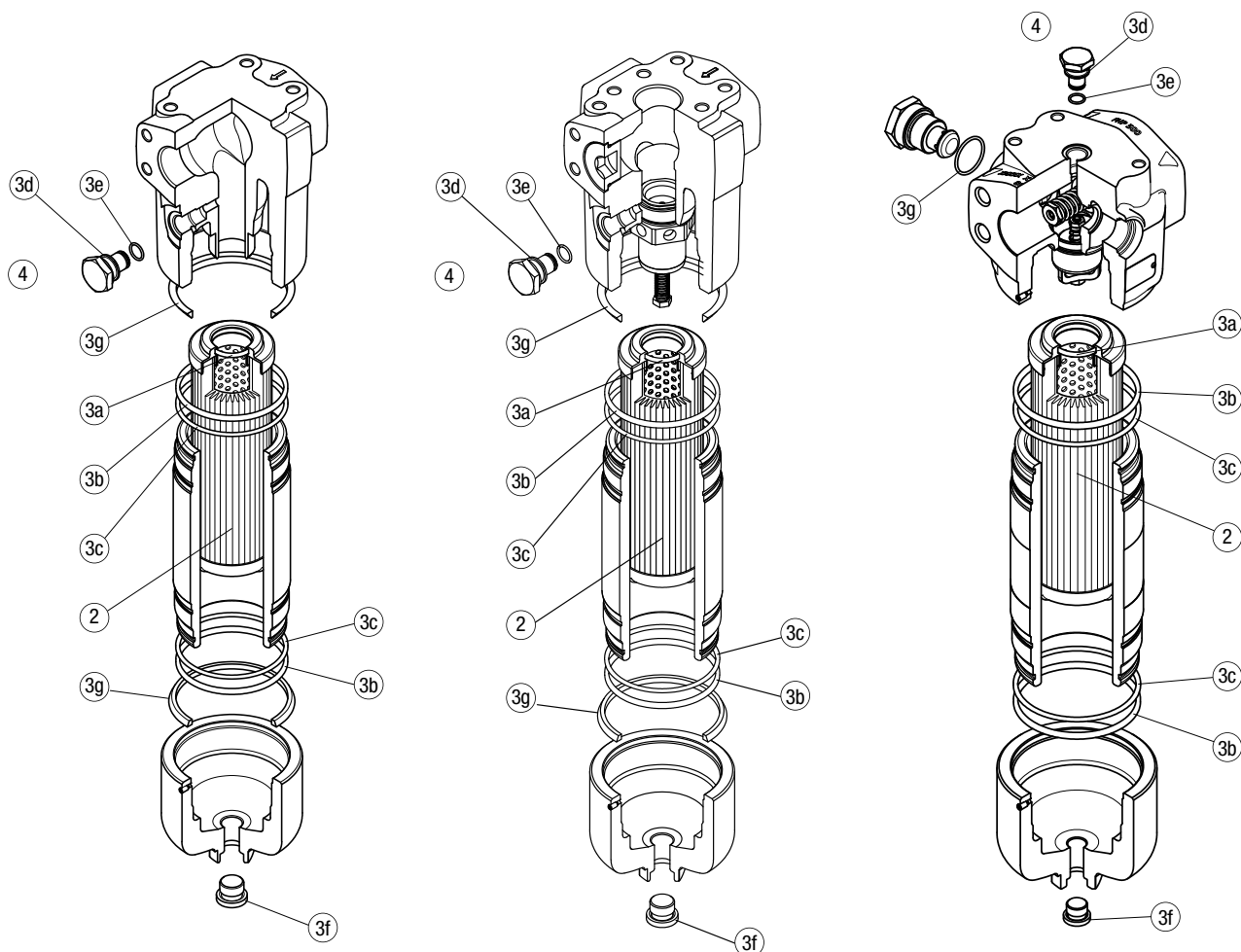


Q.ty: 1 pc.		Q.ty: 1 pc.		Q.ty: 1 pc.		Q.ty: 1 pc.		Q.ty: 1 pc.	
Item: 2		3 (3a ÷ 3m)		4		5		6	
Filter series	Filter element	Seal Kit code number		Indicator connection plug		Bypass assembly		Non-bypass assembly	
		NBR	FPM	NBR	FPM	NBR	FPM	NBR	FPM
FHP 065	See order table	02050265	02050276	T2H	T2V	02001116	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.		Q.ty: 1 pc.	
Item:	2	3	(3a ÷ 3g for FHP 350) (3a ÷ 3f for FHP 500)	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!

Description

Technical data

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:

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)
- 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 600 kPa (6 bar) ±10%
- Other opening pressures on request.

Δp element type

- Microfibre filter elements - series N: 20 bar
(not available for FHM 006, FHM 007 and FHM 010)
- Microfibre filter elements - series H: 210 bar
(not available for FHM 050 and FHM 500)
- Microfibre filter elements - series S: 210 bar
(only for FHM 050 and FHM 500)
- Wire mesh filter elements - series N: 20 bar
(not available for FHM 006)
- Wire mesh filter elements - series H: 210 bar
(not available for FHM 050 and FHM 500)
- Fluid flow 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

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.

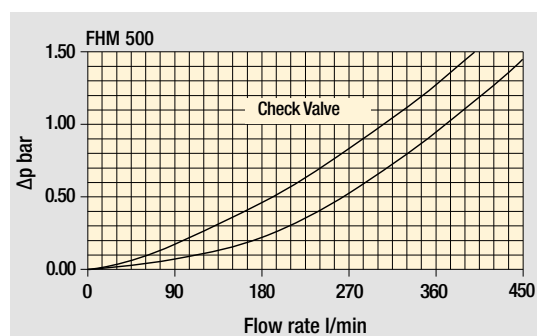
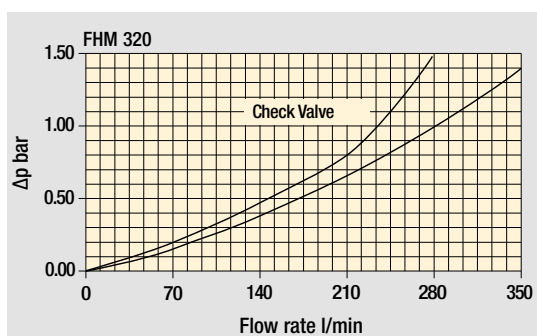
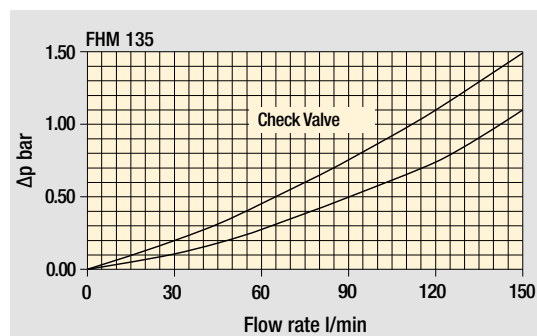
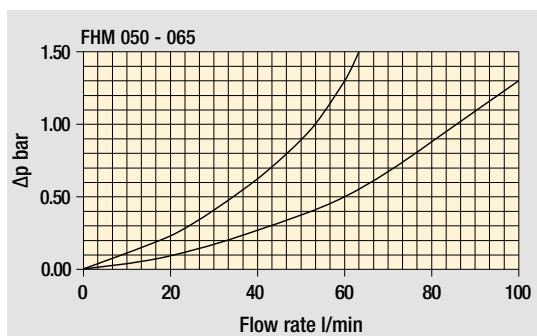
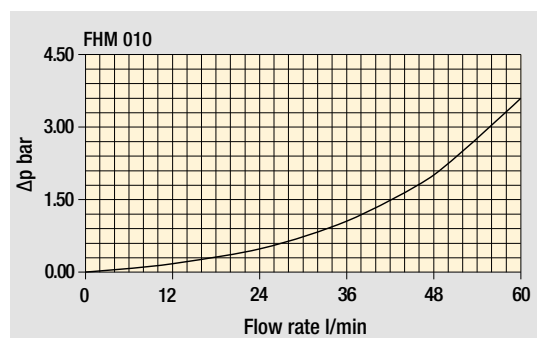
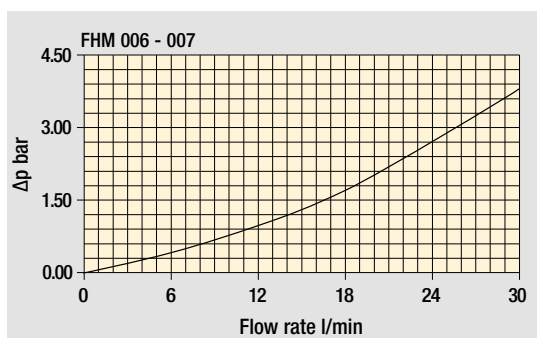
Please, contact our Sales Department for further additional information.

Hydraulic symbols

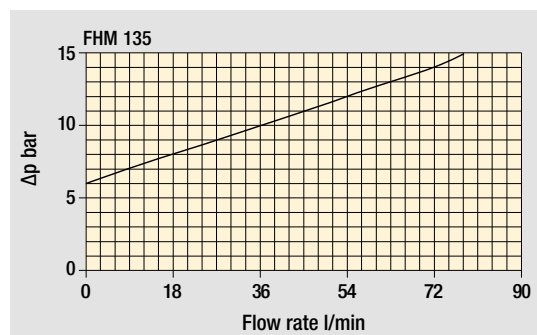
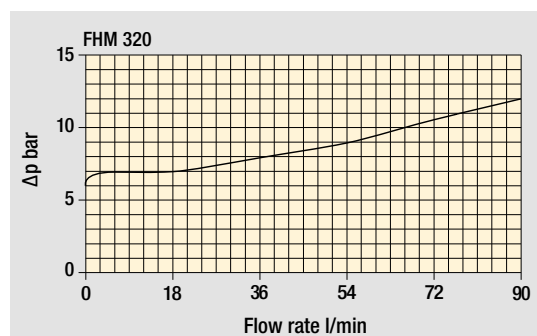
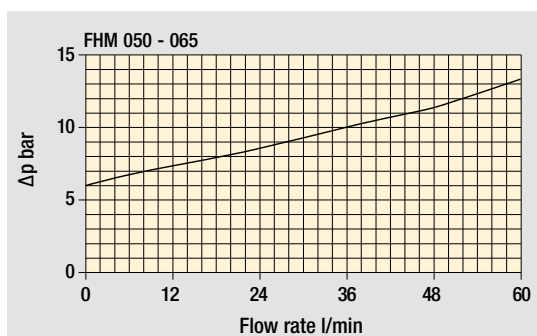
Filter series	Stile S	Stile S	Stile S	Stile B	Stile T	Stile D
FHM 006	•	-	-	-	-	-
FHM 007	•	-	-	-	-	-
FHM 010	-	•	-	-	-	-
FHM 050	-	-	•	•	•	•
FHM 065	-	-	•	•	•	•
FHM 135	-	-	•	•	•	•
FHM 320	-	-	•	•	•	•
FHM 500	-	-	•	•	•	•

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							

CLOGGING INDICATORS

See page 727

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	

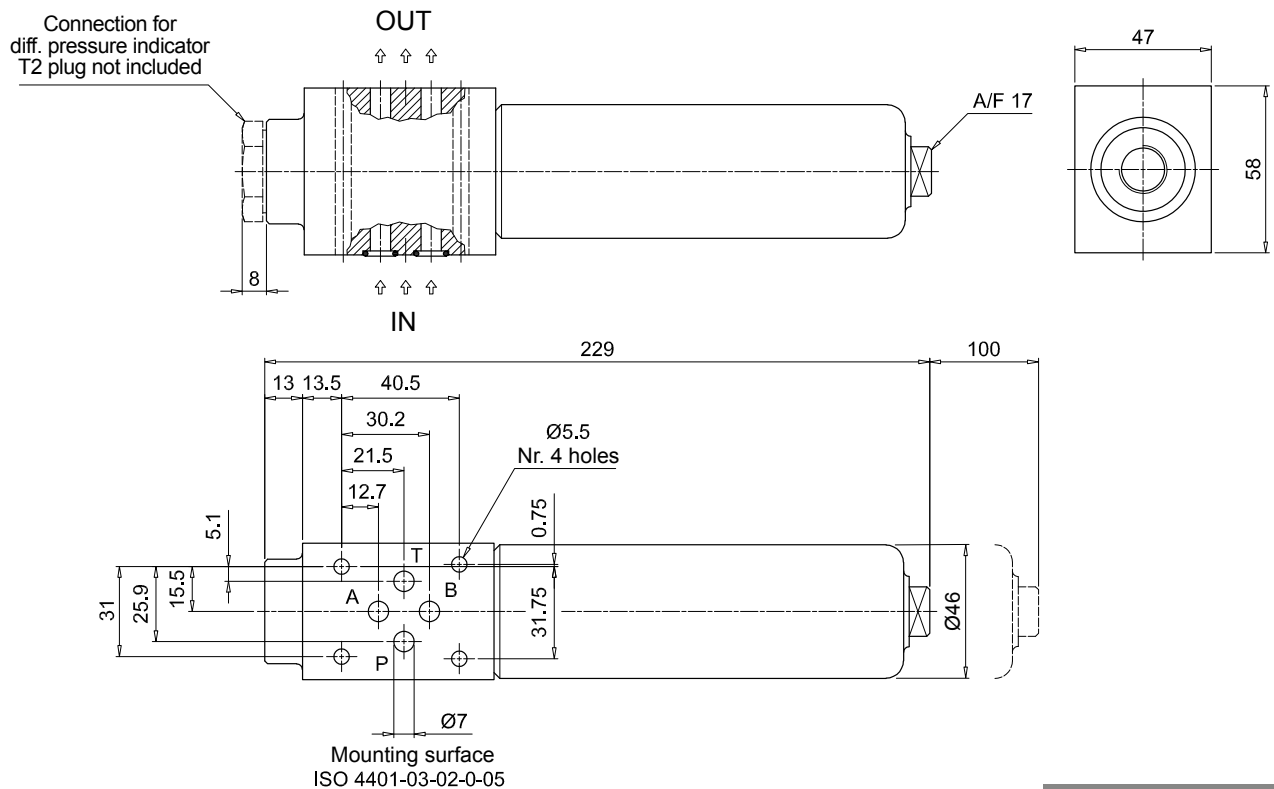
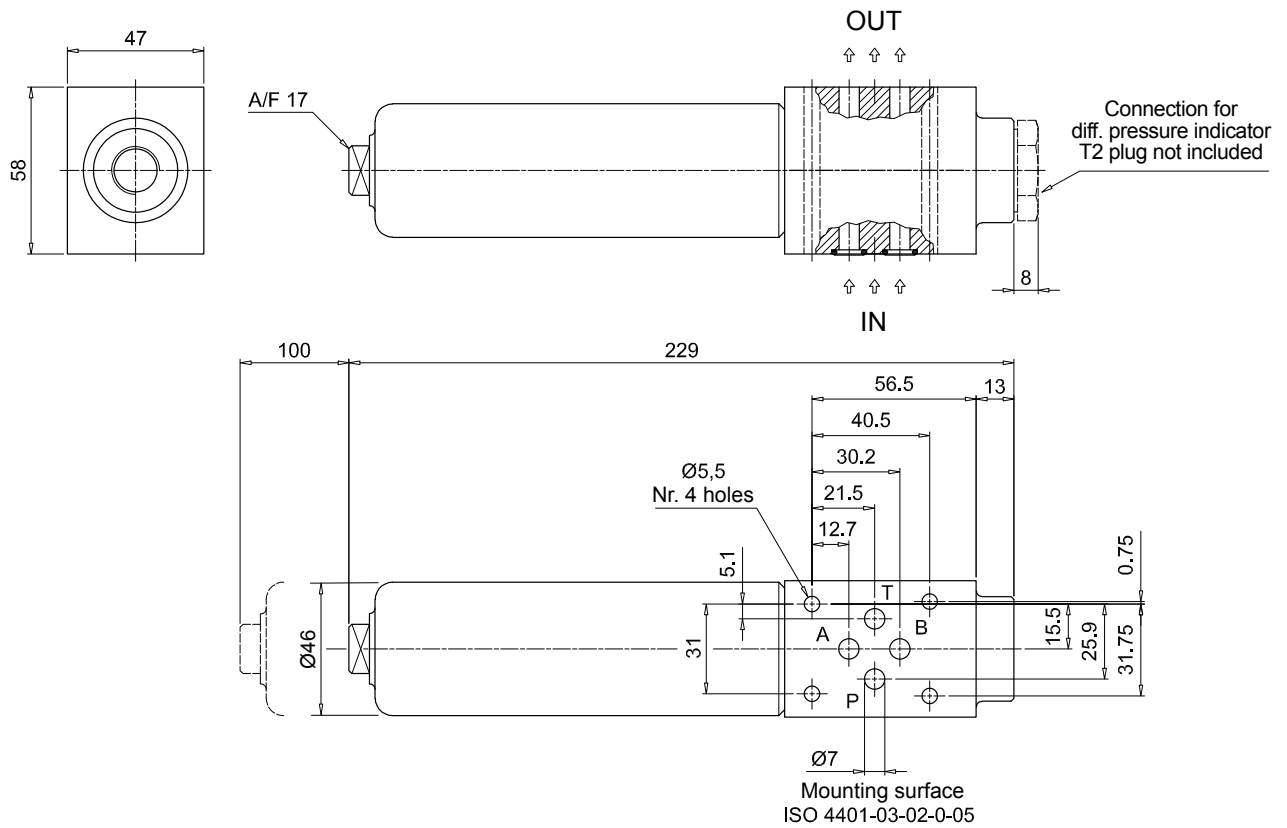
PLUGS

See page 747

T2 Plug (not included)	
-------------------------------	--

FHM006

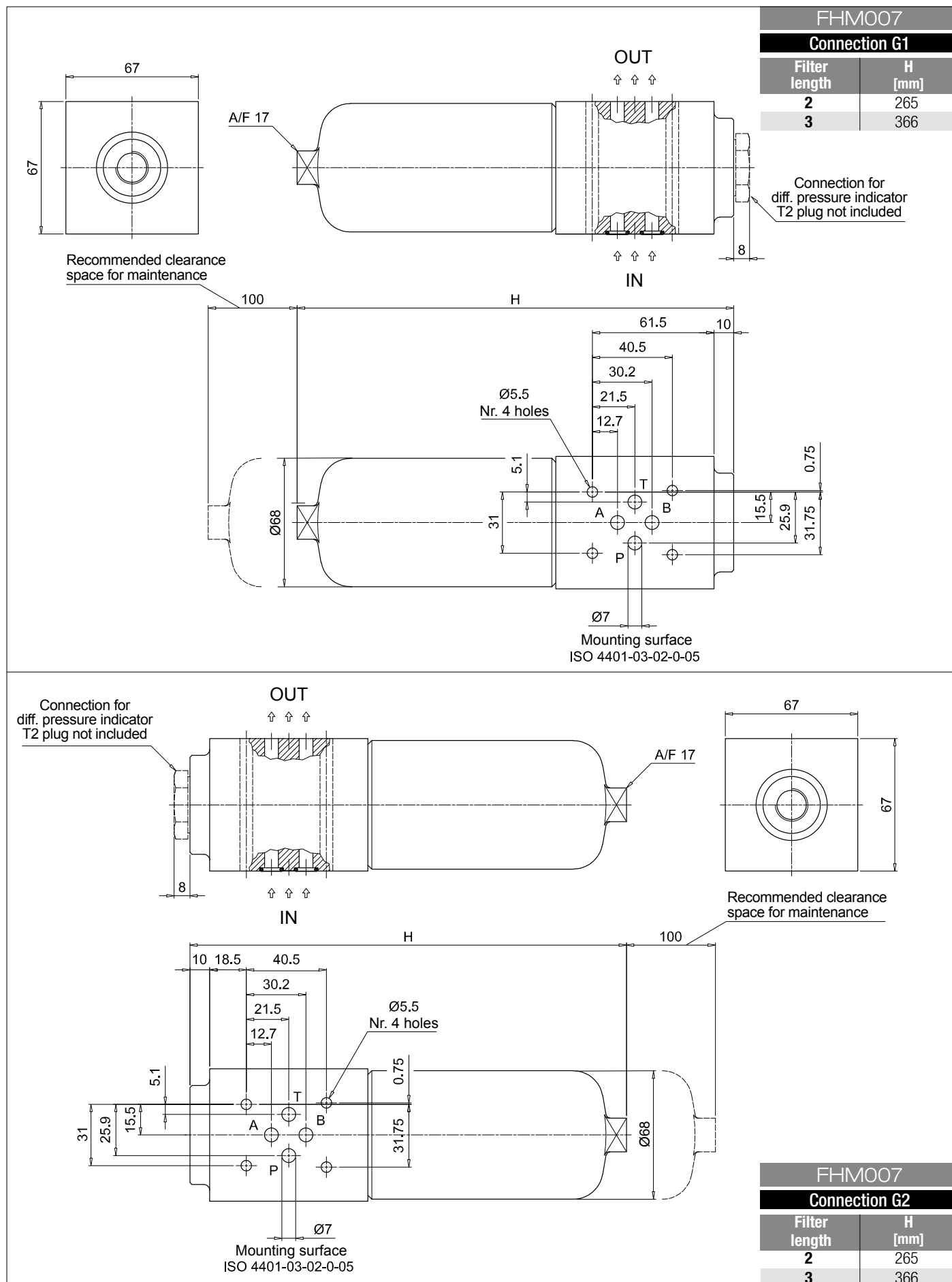
Connection G1

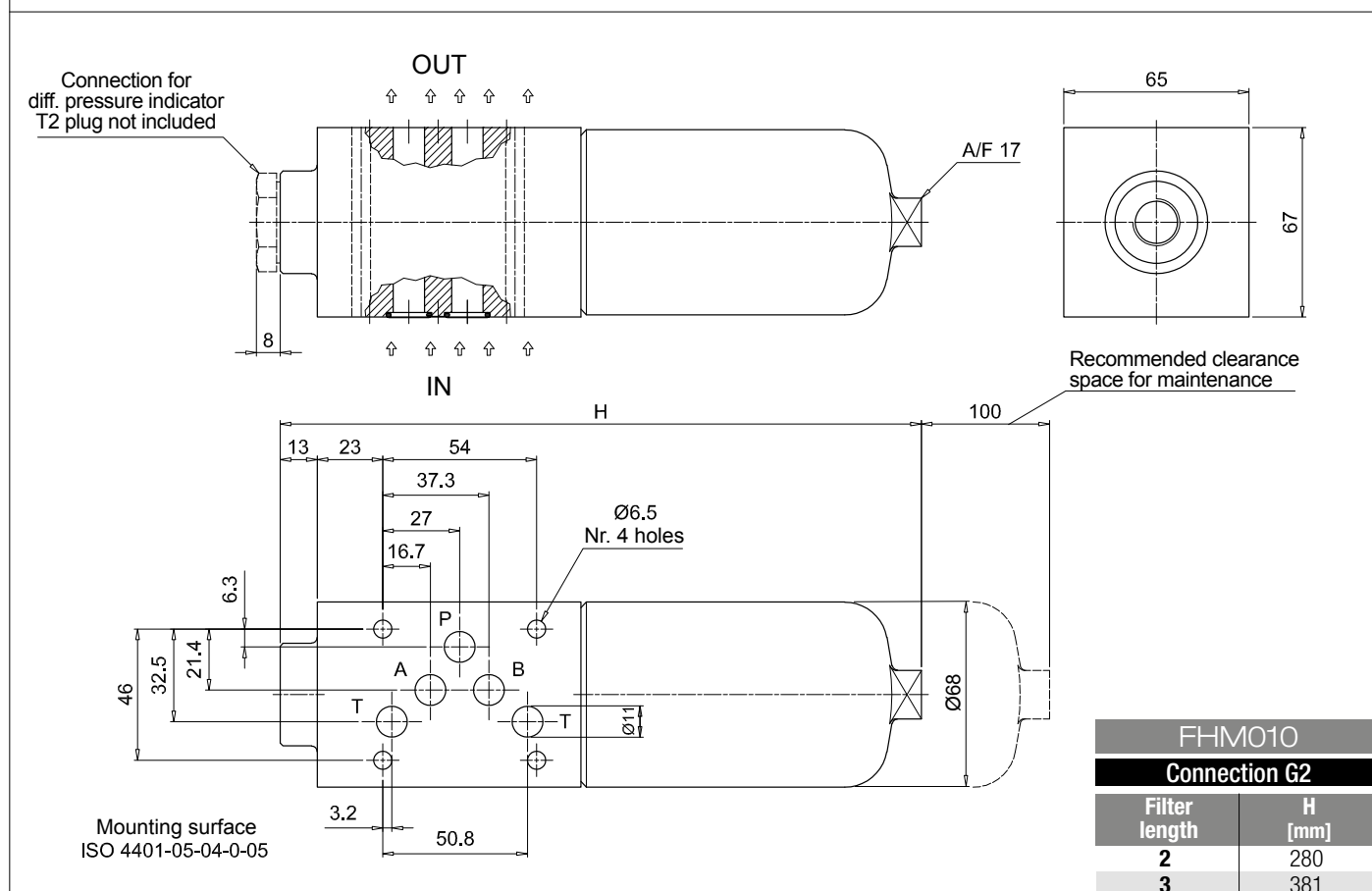
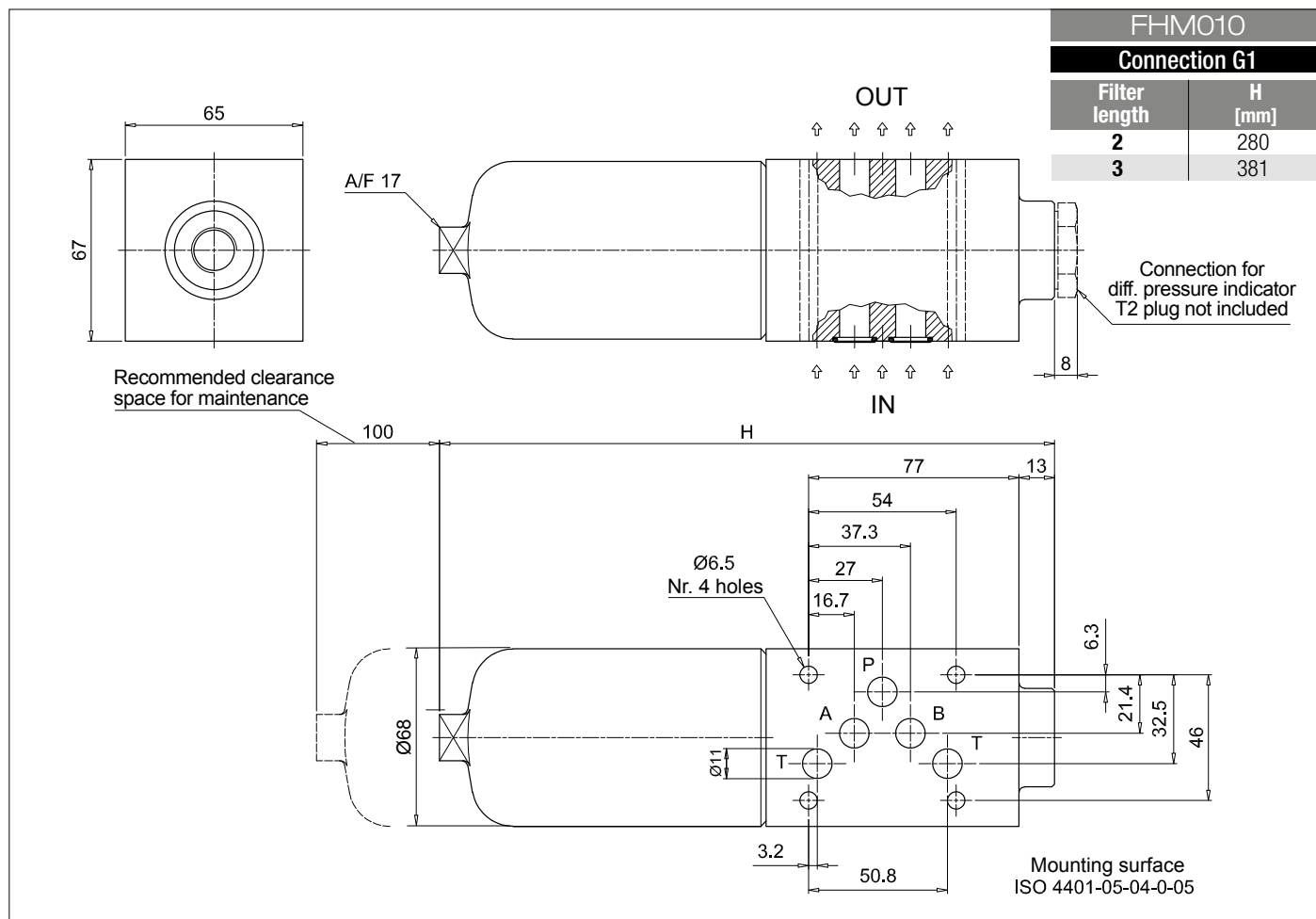


FHM006

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

Execution	
P01	MP Filtri standard
Pxx	Customized

		Valves: FHM050				FHM065-135			
Element Δp		S	B	T	D	S	B	T	D
N	20 bar	-	•	-	•	-	•	-	•
H	210 bar	-	-	-	-	•	-	•	-
S	210 bar	•	-	•	-	-	-	-	-

Execution	
P01	MP Filtri standard
Pxx	Customized

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 Δp	HP050	HP065	HP135
A	NBR	N 20 bar	•	•	•
V	FPM	H 210 bar	-	•	•
		S 210 bar	•	-	-

Execution	
P01	MP Filtri standard
Pxx	Customized

CLOGGING INDICATORS

See page 727

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

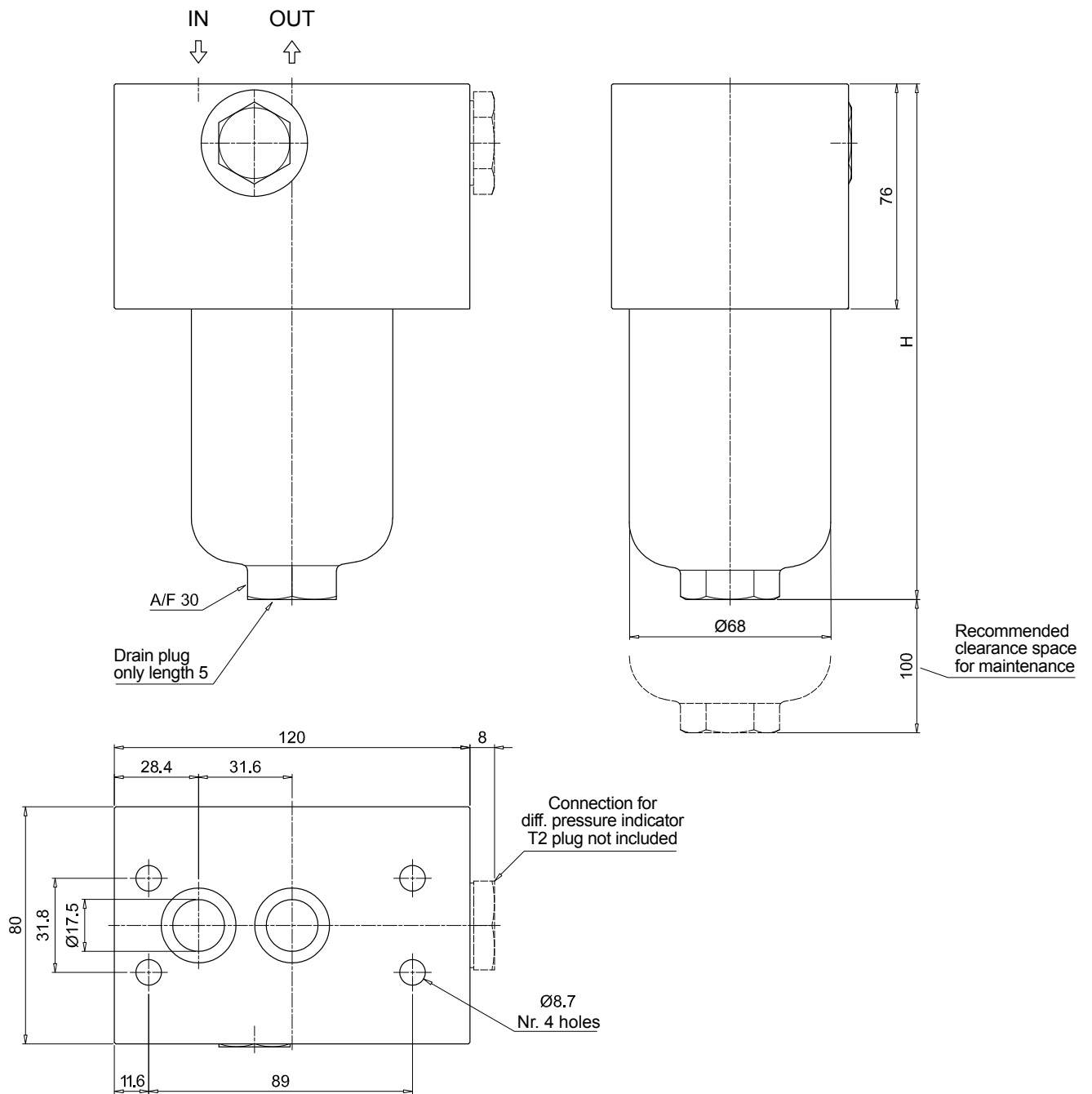
PLUGS

See page 747

T2	Plug (not included)
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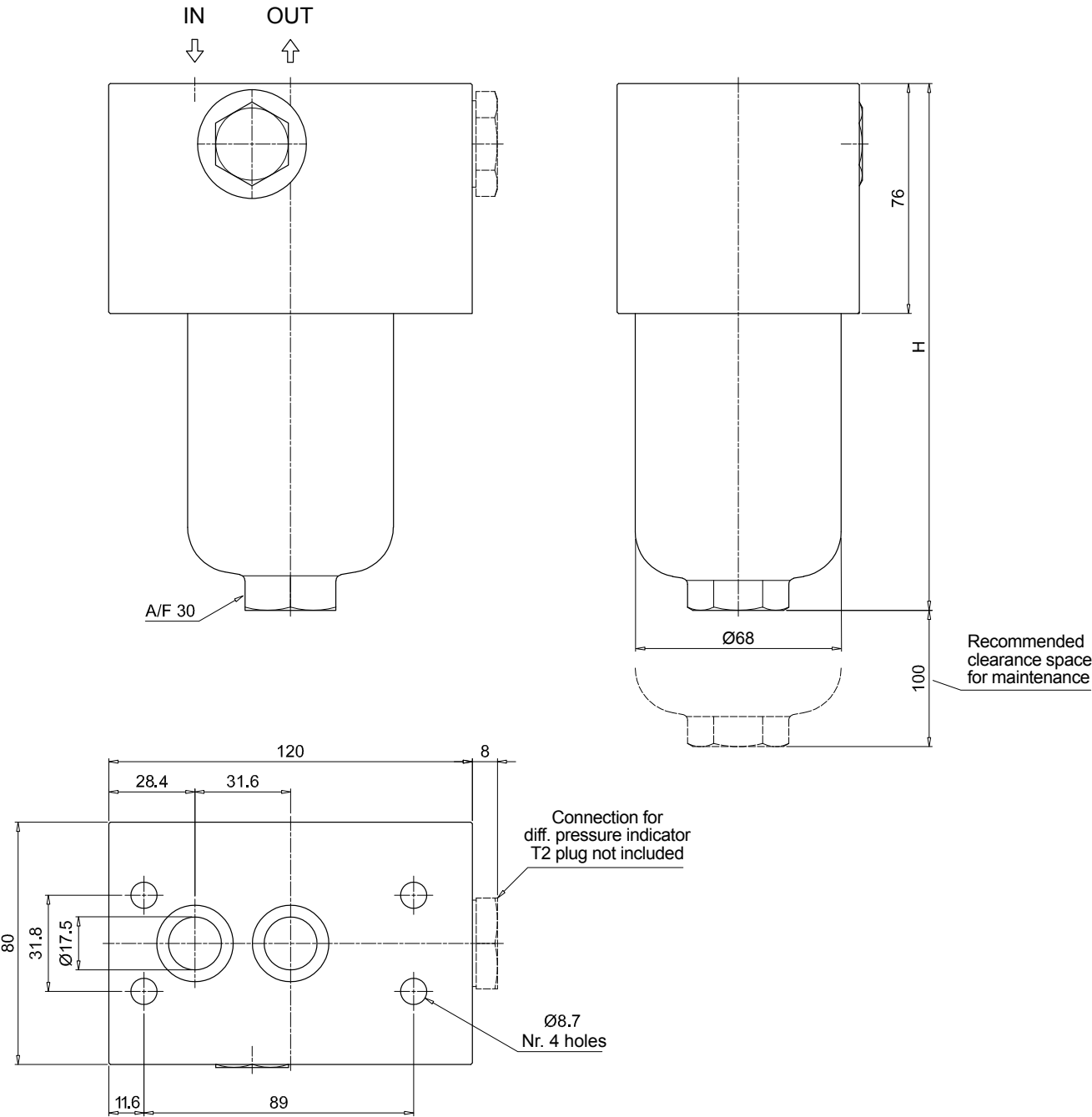
FHM050

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



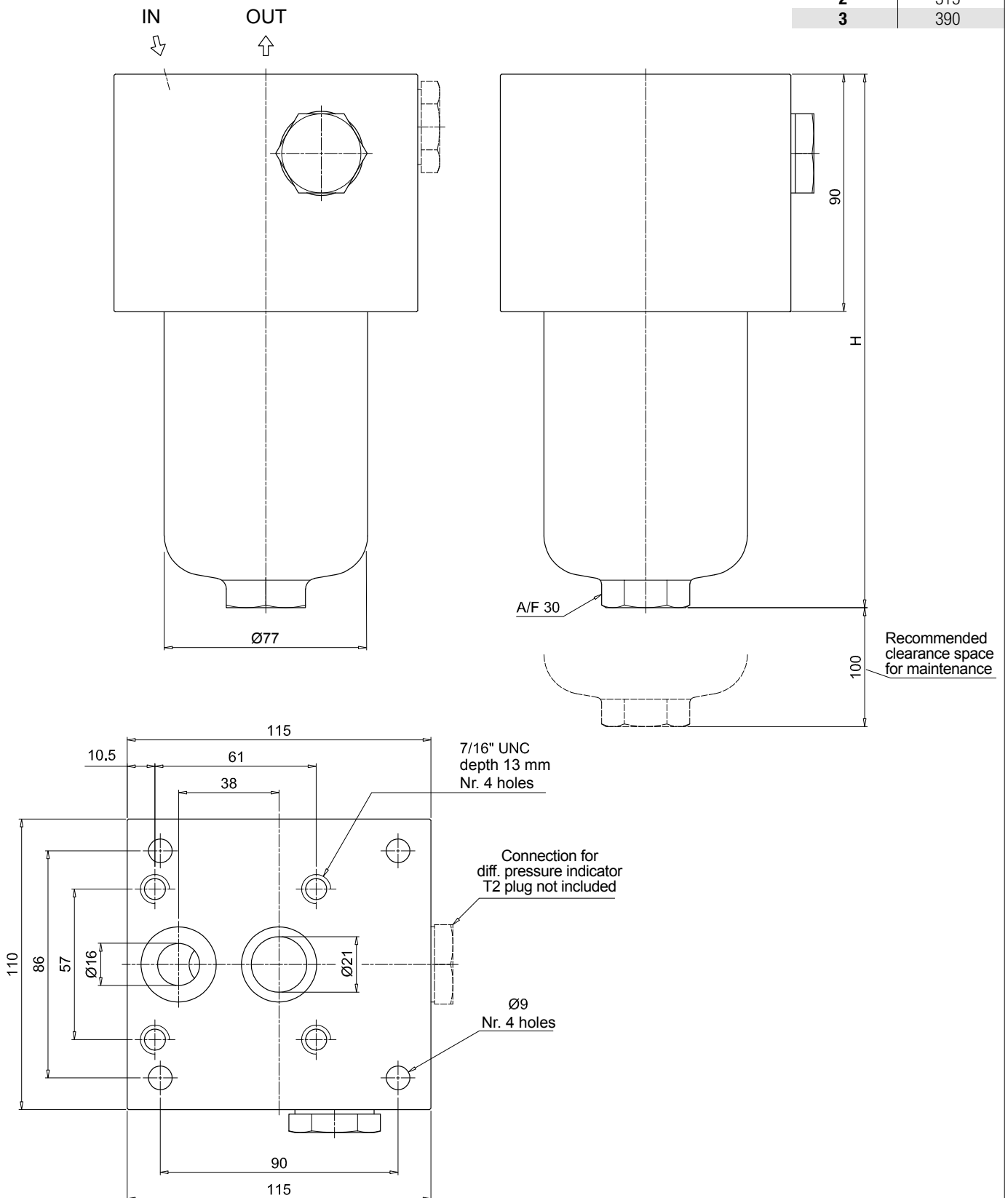
Dimensions

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

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:

FHM320

FHM500

Element Δp

S

B

T

D

S

B

T

D

N

20 bar

-

•

-

•

-

•

-

•

H

210 bar

•

-

•

-

-

-

-

-

S

210 bar

-

-

-

-

•

-

•

-

Execution

1

2

3

4

5

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 727

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

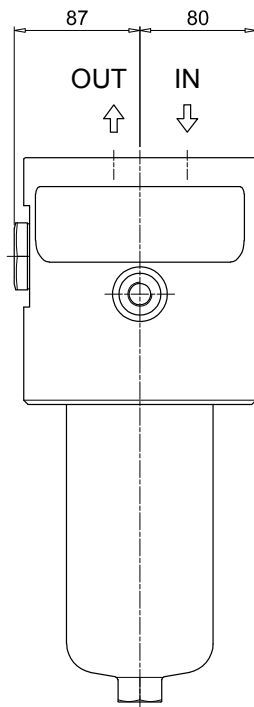
PLUGS

See page 747

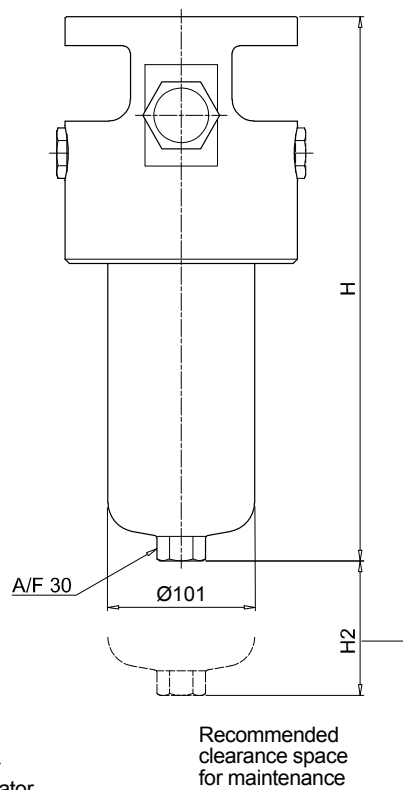
T2	Plug (not included)
-----------	---------------------

FHM320

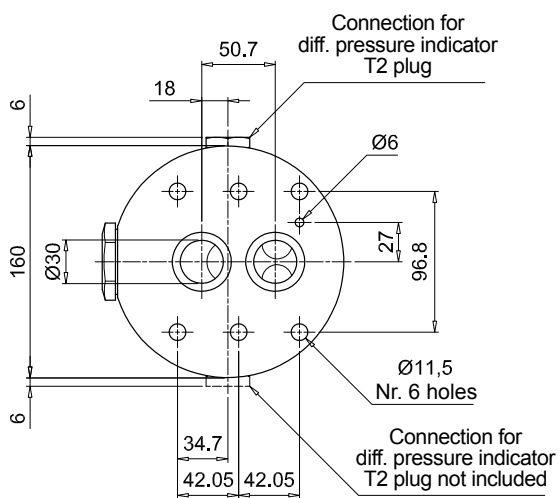
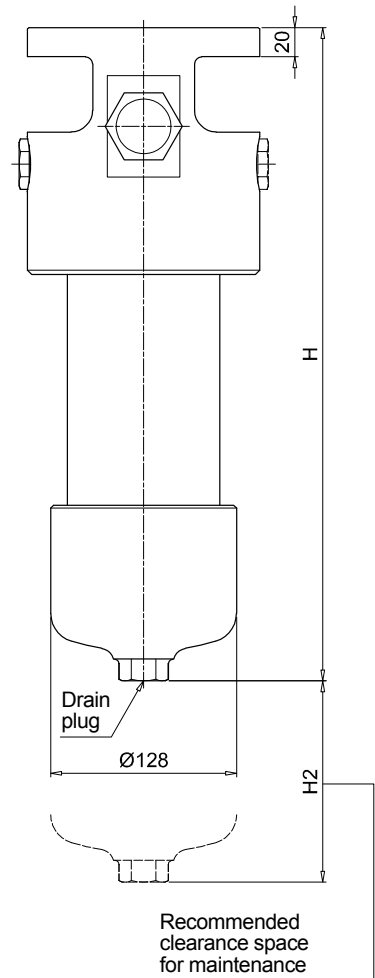
Filter length	H [mm]	H2 [mm]	
		Execution P01	Execution P02
1	293	150	-
2	416	150	-
3	548	150	-
4	702	150	550



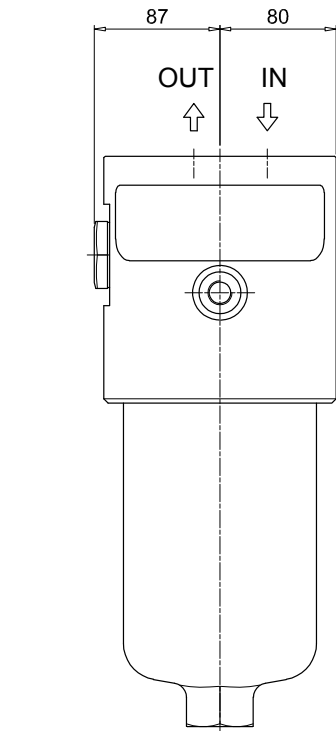
Length 1 - 2 - 3



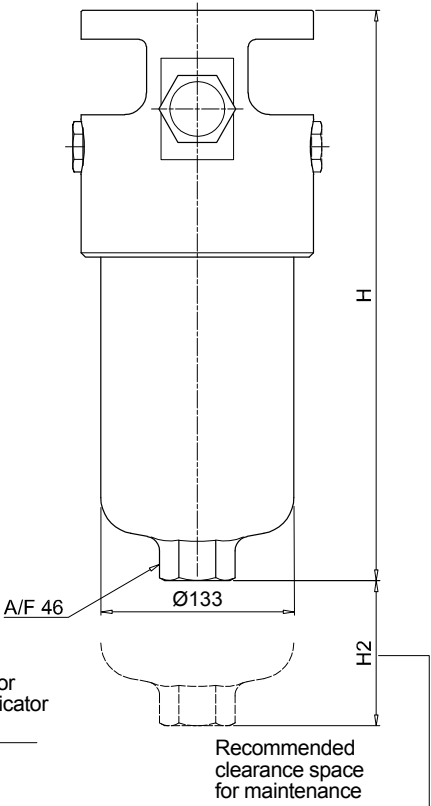
Length 4



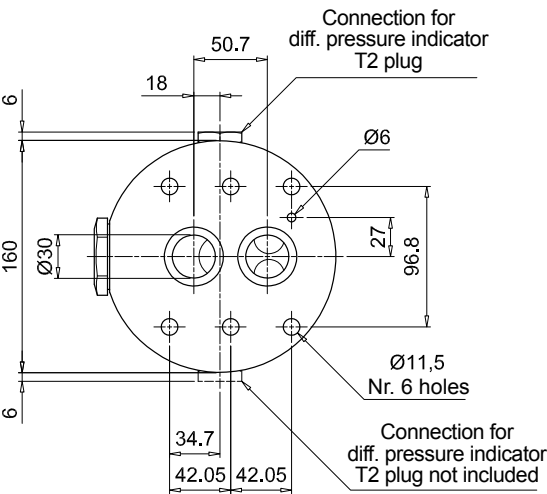
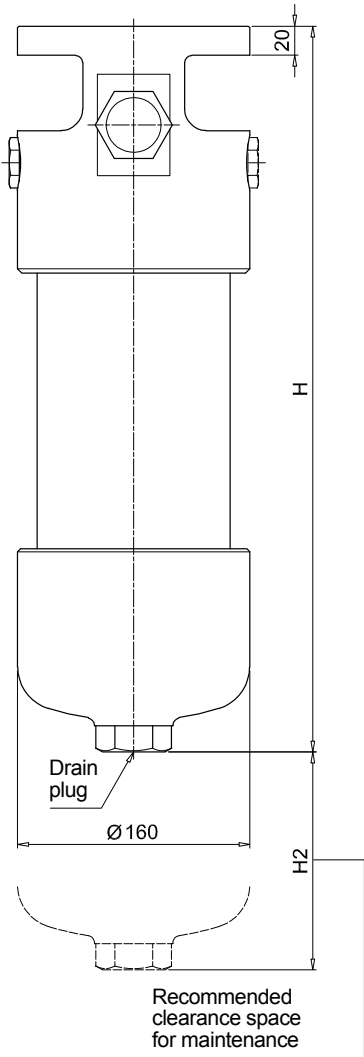
FHM500			
Filter length	H [mm]	H2 [mm]	
		Execution P01	Execution P02
1	355	150	-
2	445	150	-
3	521	150	-
4	679	150	480
5	845	150	650



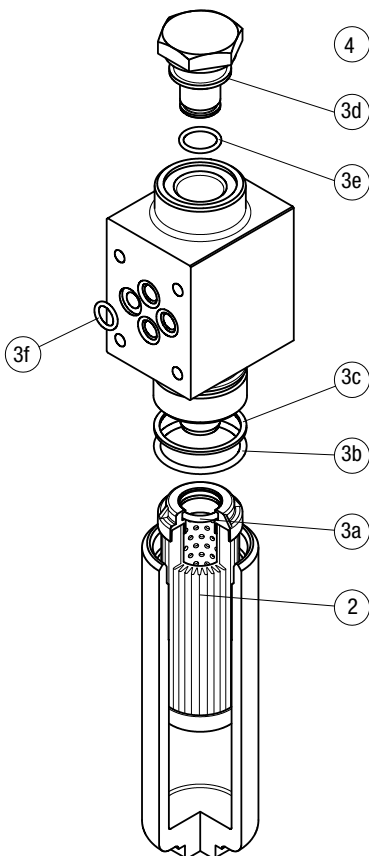
Length 1 - 2 - 3



Length 4 - 5

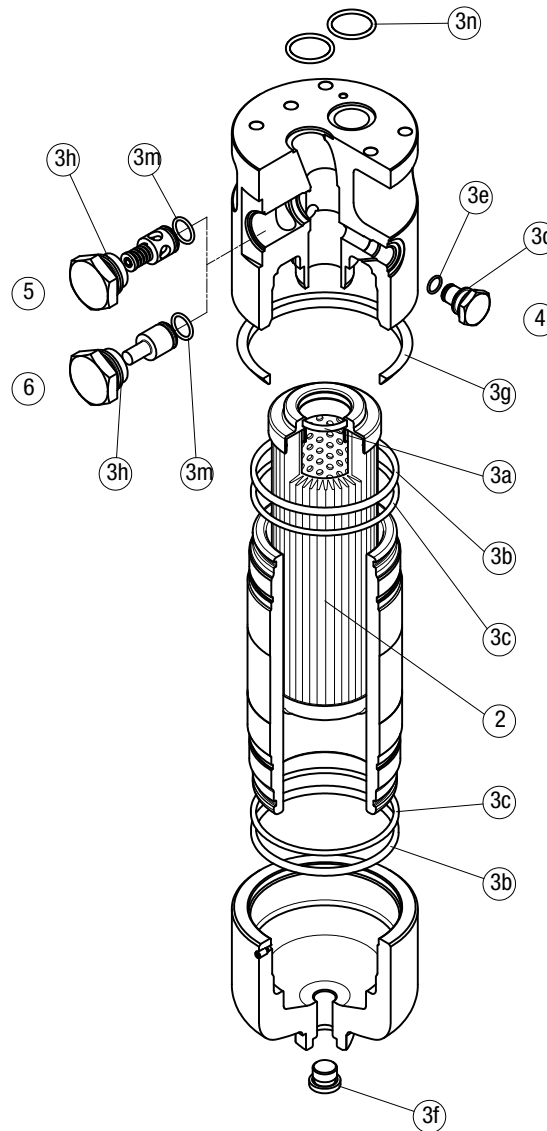


FHM 006 - 007 - 010



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

- Working pressure: 32 MPa (320 bar)
- Test pressure: 48 MPa (480 bar)
- 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 600 kPa (6 bar) $\pm 10\%$
- Other opening pressures on request.

Δp element type

- Microfibre filter elements - series N: 20 bar
- Microfibre filter elements - series H: 210 bar (not available for FHB050)
- Microfibre filter elements - series S: 210 bar (only for FHB050)
- Wire mesh filter elements - series N: 20 bar
- Fluid flow 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	•	•	•	•

OUT

IN

OUT

IN

OUT

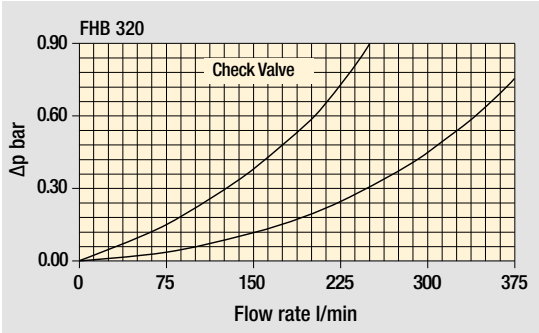
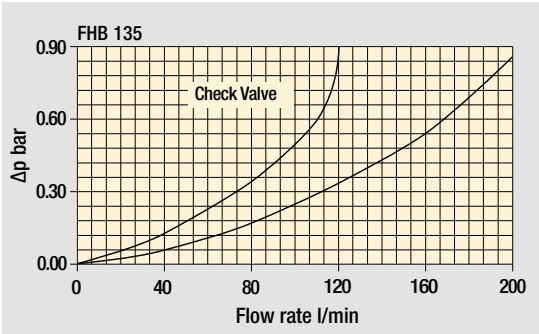
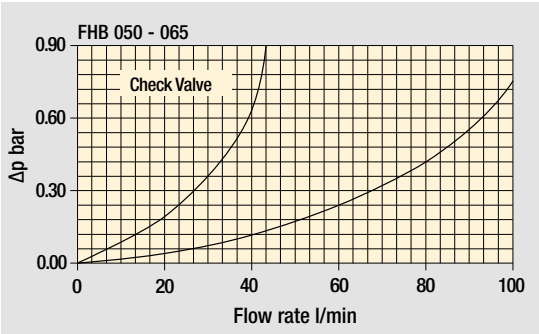
IN

OUT

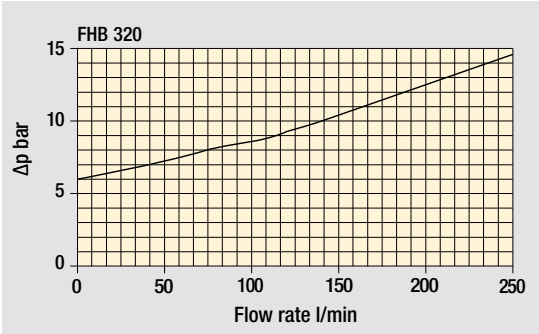
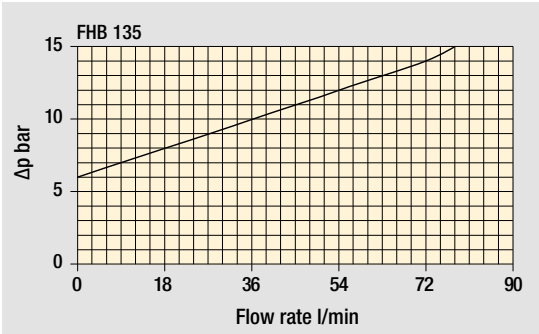
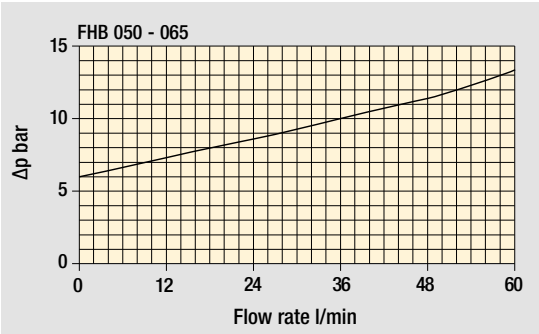
IN

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

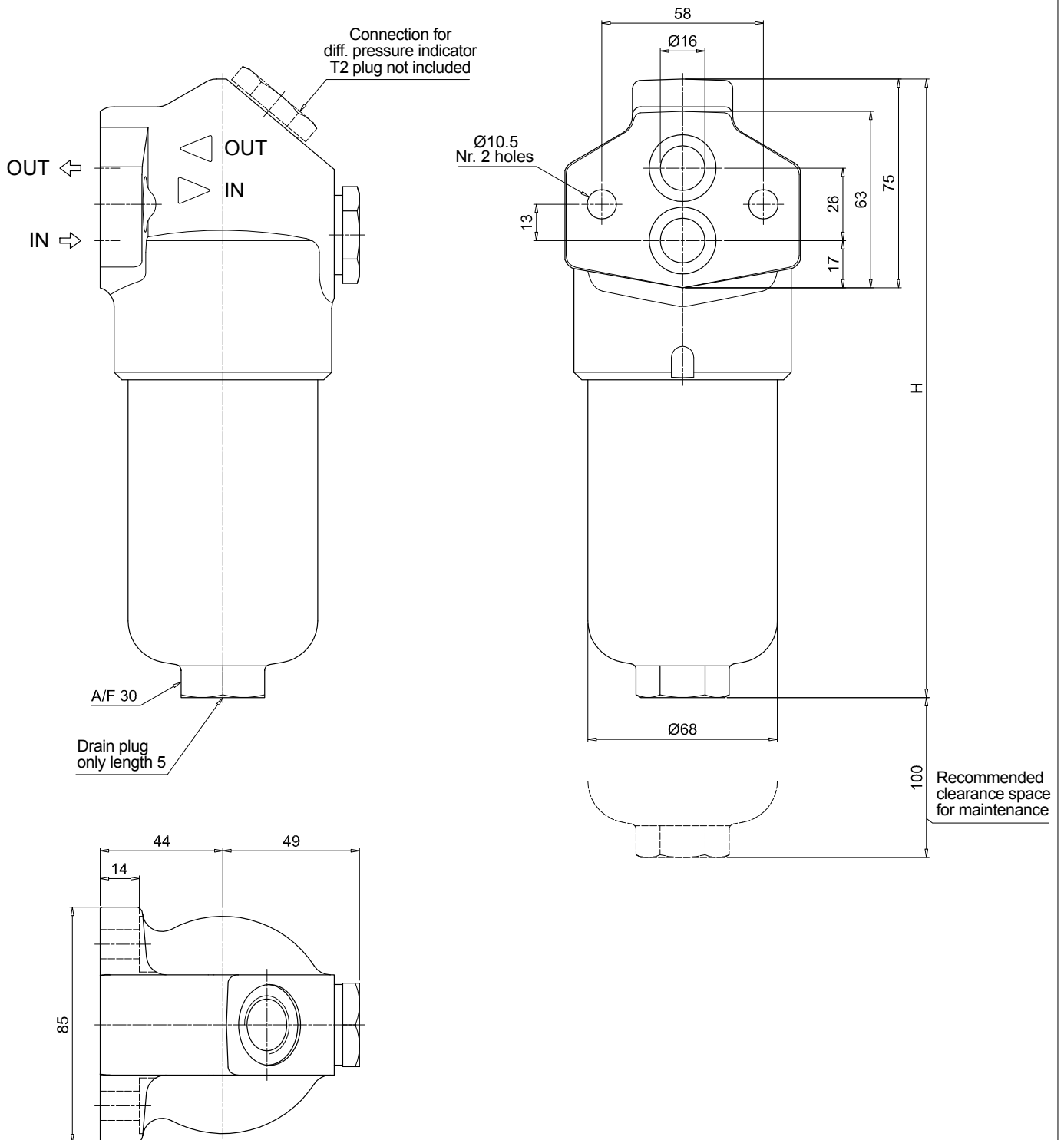
Designation & Ordering code

COMPLETE FILTER

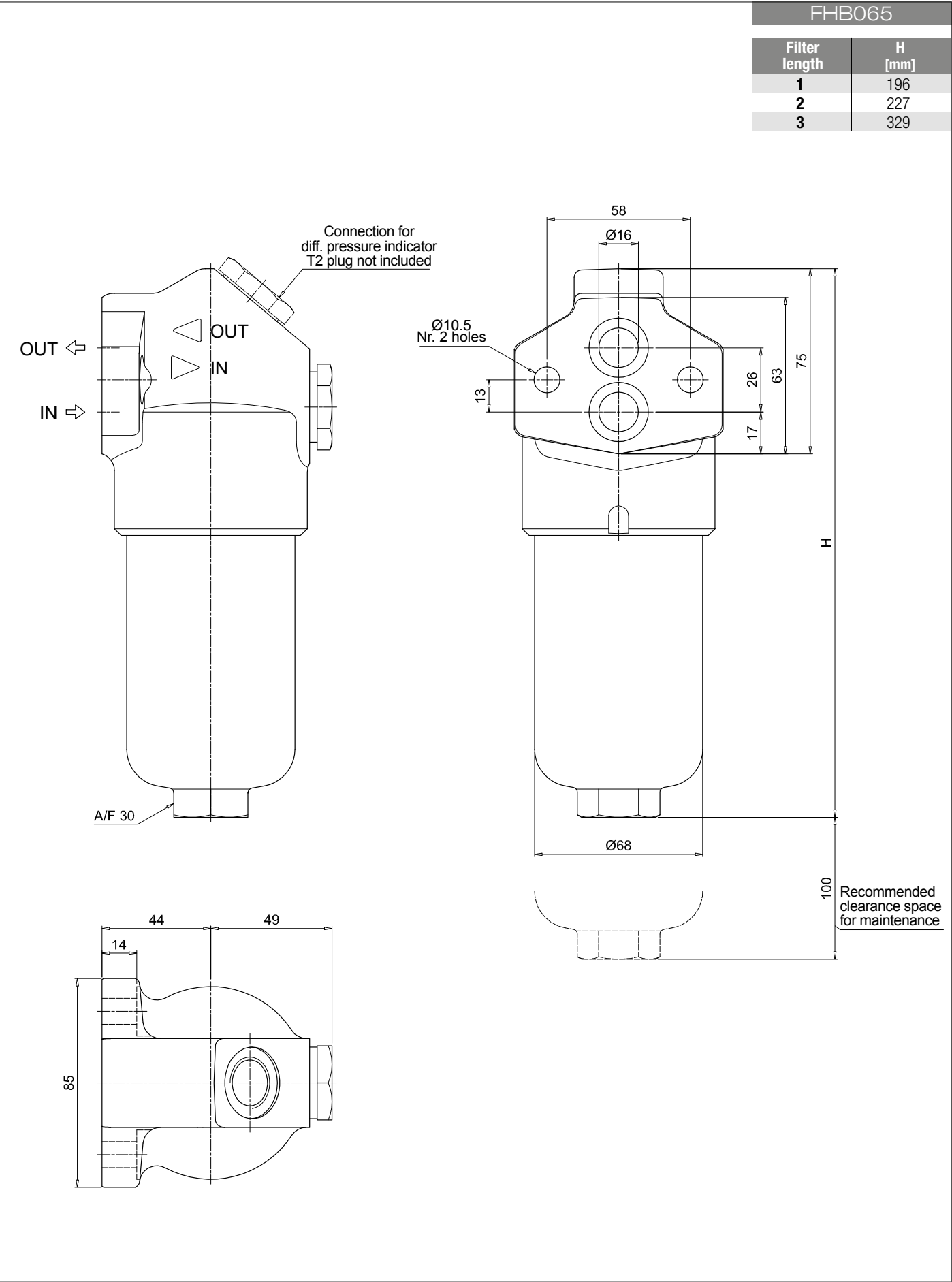
Series and size					Configuration example: FHB320 4 S A F1 A06 H P01									
FHB050 FHB065 FHB135 FHB320														
Length	FHB050	FHB065	FHB135	FHB320										
1	•	•	•	•										
2	•	•	•	•										
3	•	•	•	•										
4	•	-	-	•										
5	•	-	-	-										
Valves														
S Without bypass														
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														

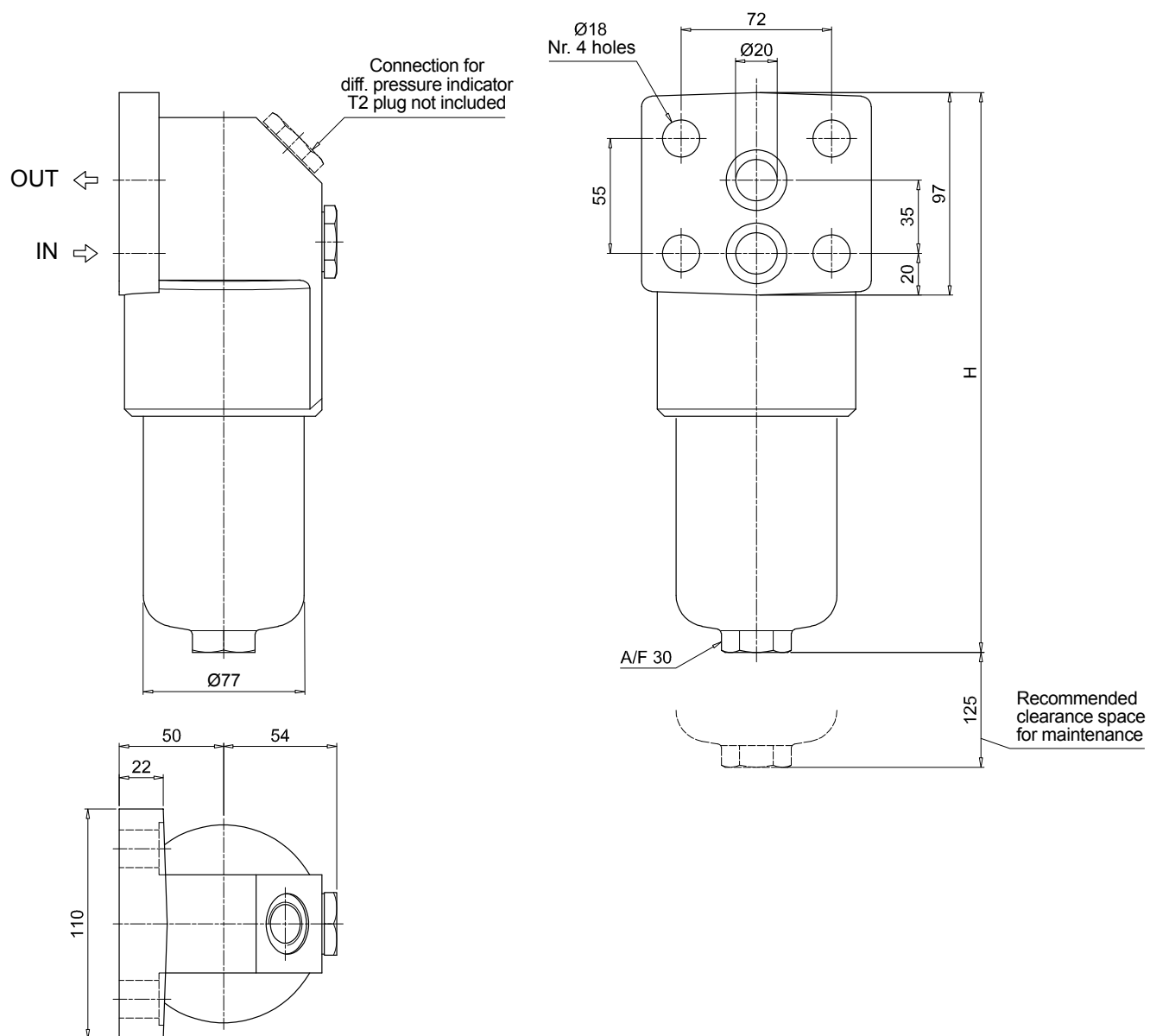
FHB050

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



Dimensions

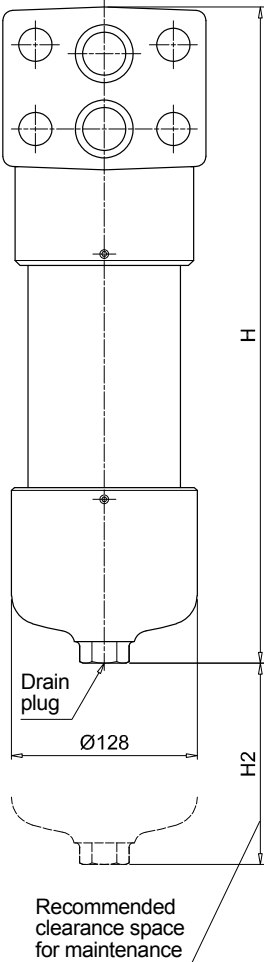
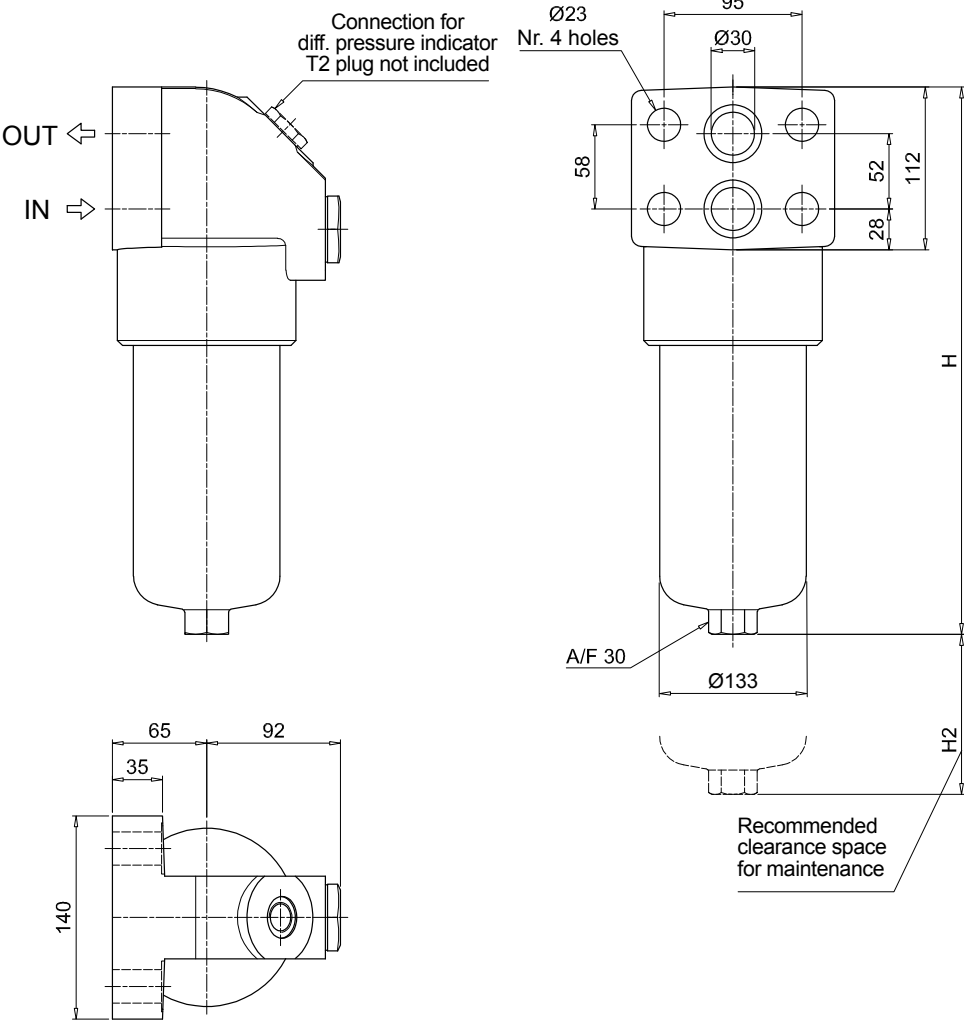




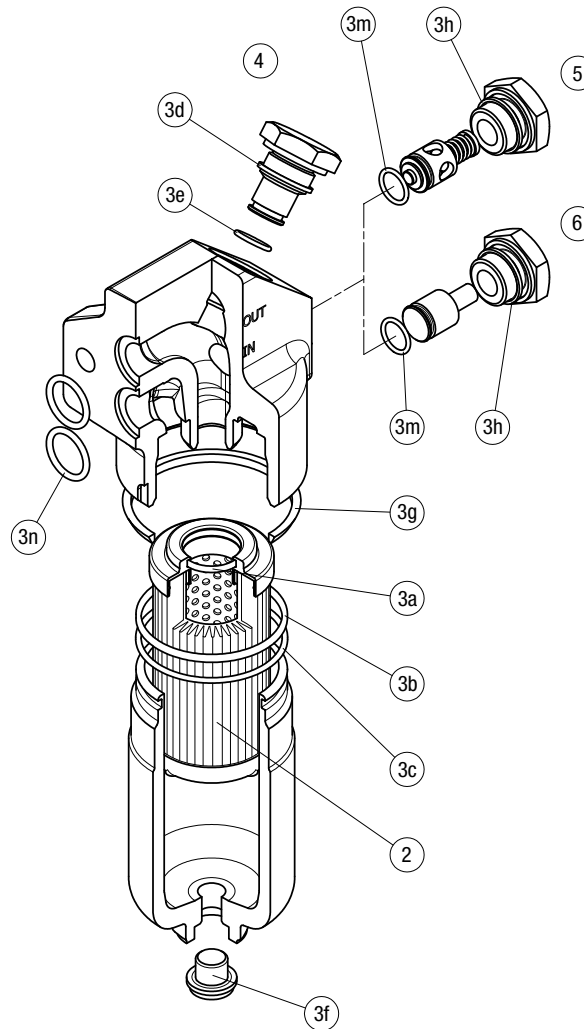
FHB320			
Filter length	H [mm]	H2 [mm]	
		Execution P01	Execution P02
1	301	150	-
2	424	150	-
3	556	150	-
4	709	150	550

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



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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

- Working pressure: 35 MPa (350 bar)
- Test pressure: 52.5 MPa (525 bar)
- 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 600 kPa (6 bar) $\pm 10\%$
- Other opening pressures on request.

Δp element type

- Microfibre filter elements - series N: 20 bar
- Wire mesh filter elements - series N: 20 bar
- Fluid flow 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

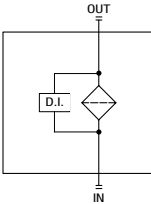
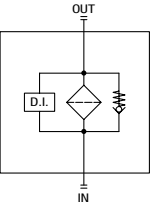
Maximum flow rate for a complete pressure filter with a pressure drop $\Delta p = 1.5$ bar.

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.

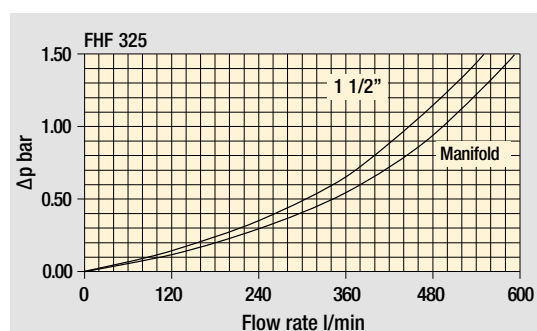
You can also calculate the right size using the formulas present on the FILTER SIZING paragraph at the beginning of the full catalogue or at the beginning of the filter family brochure. Please, contact our Sales Department for further additional information.

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																												
			<table border="1"> <thead> <tr> <th colspan="2">Element Δp</th> <th colspan="2">Execution</th> </tr> </thead> <tbody> <tr> <td>N</td> <td>20 bar</td> <td>P01</td> <td>MP Filtri standard</td> </tr> <tr> <td>Pxx</td> <td></td> <td></td> <td>Customized</td> </tr> </tbody> </table>																Element Δp		Execution		N	20 bar	P01	MP Filtri standard	Pxx			Customized
Element Δp		Execution																												
N	20 bar	P01	MP Filtri standard																											
Pxx			Customized																											

Configuration example: **HF325**

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

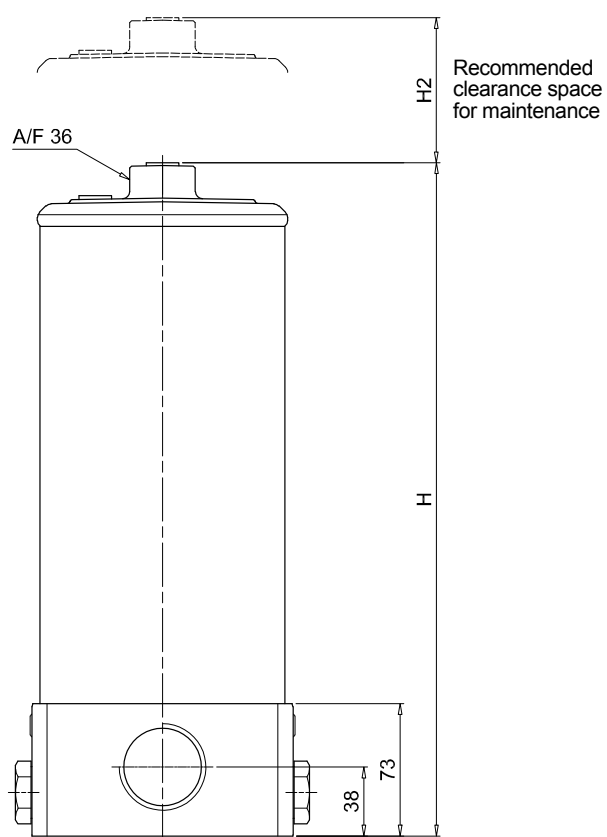
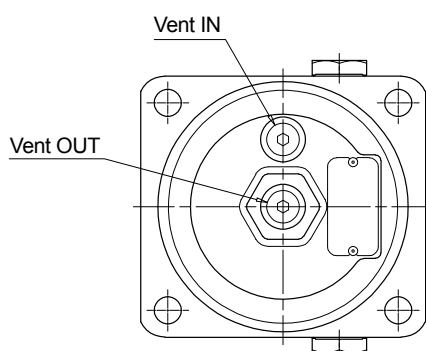
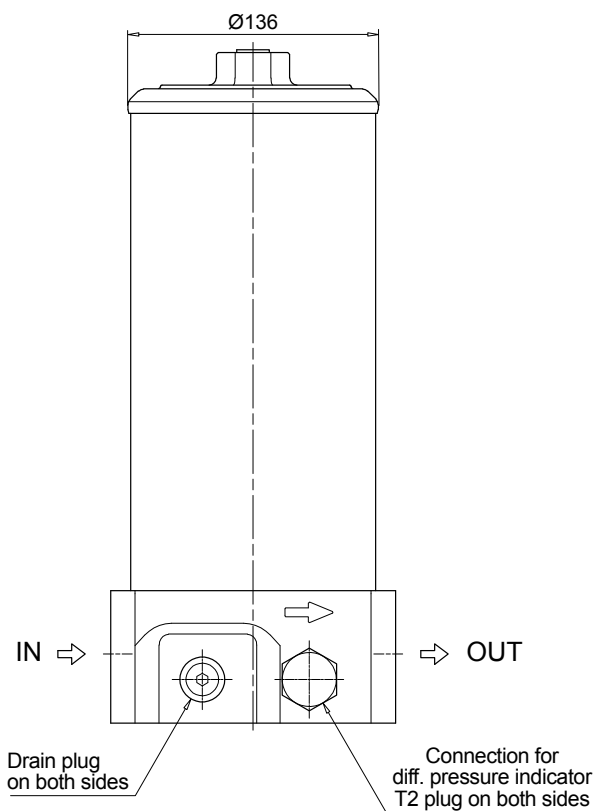
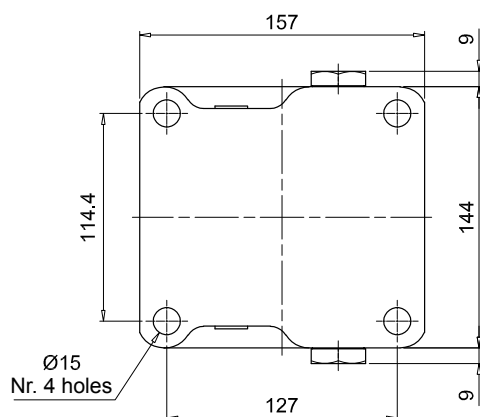
Seals
A NBR
V FPM

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)

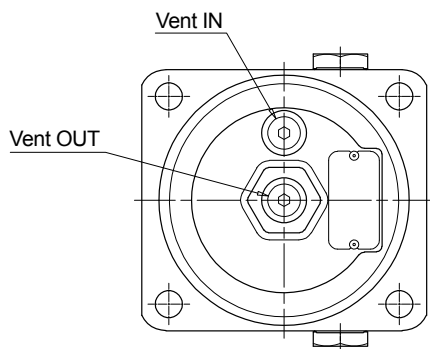
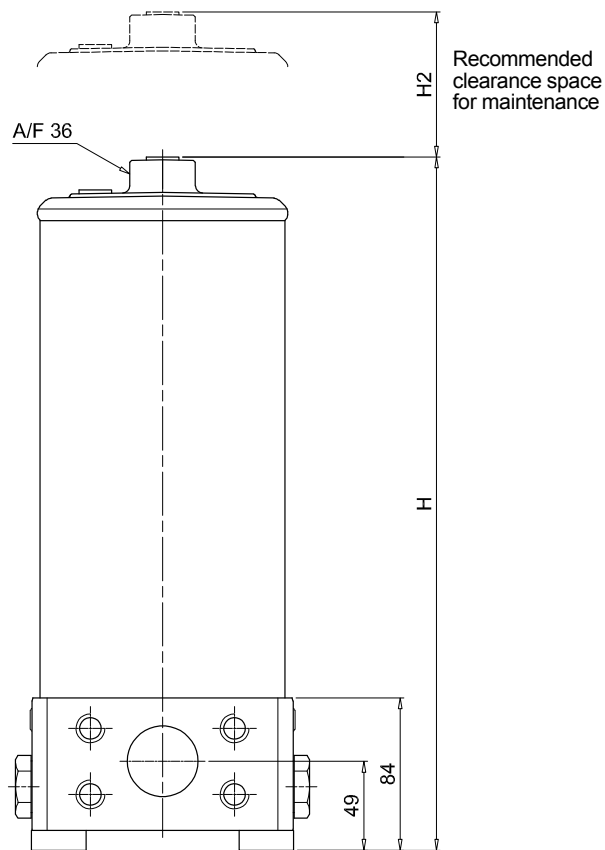
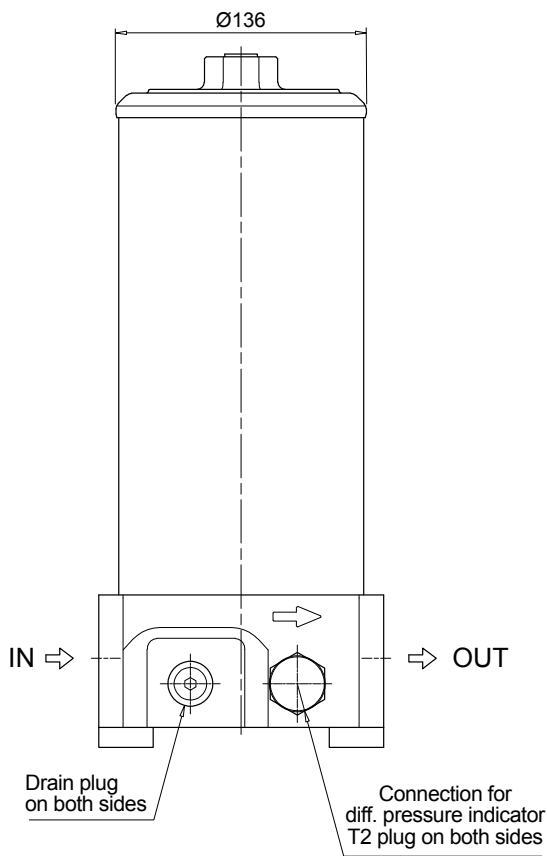
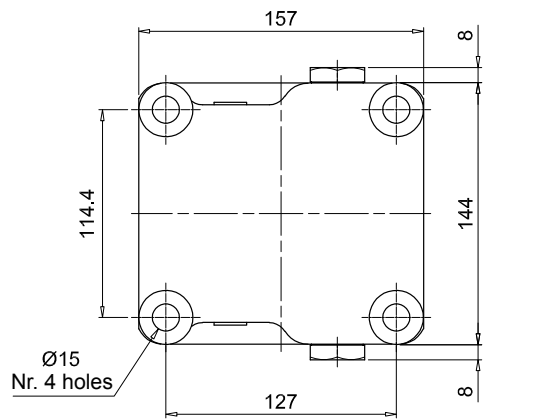


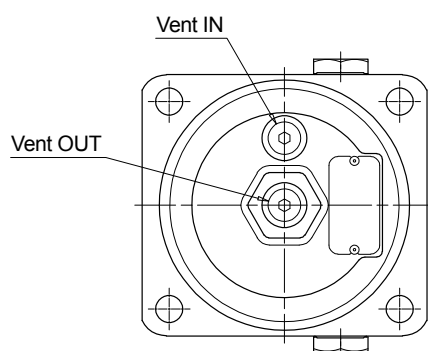
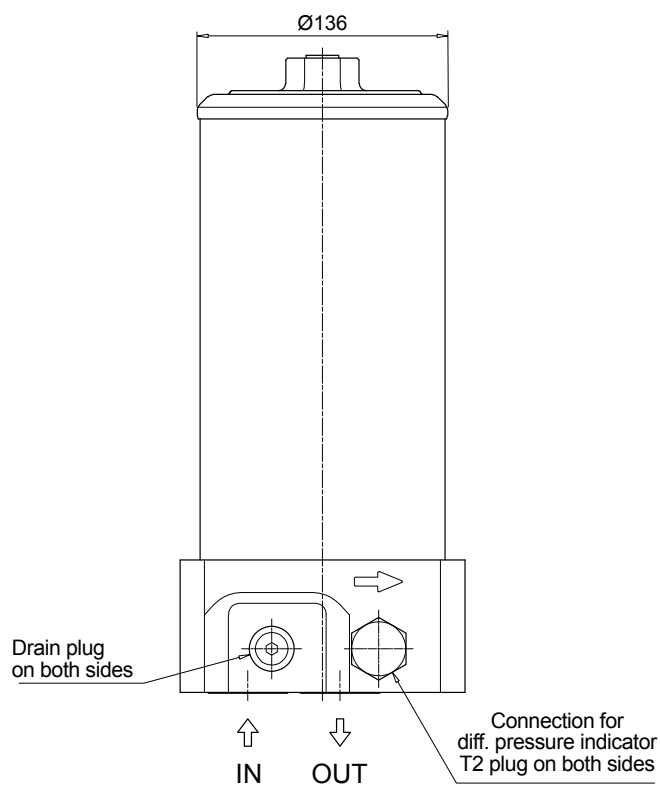
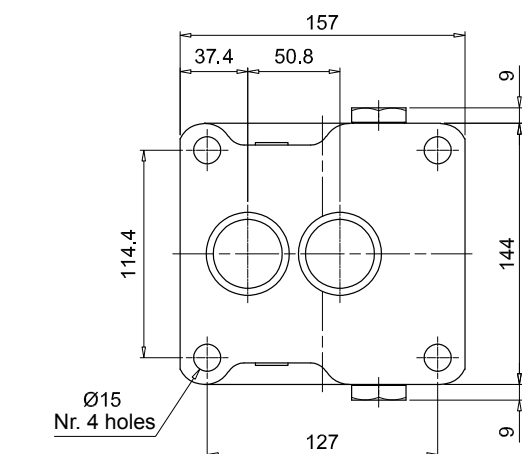
FHF325		
Connection A - B - C		
Filter length	H [mm]	H2 [mm]
1	452	250
2	690	485
3	928	725

FHF 325

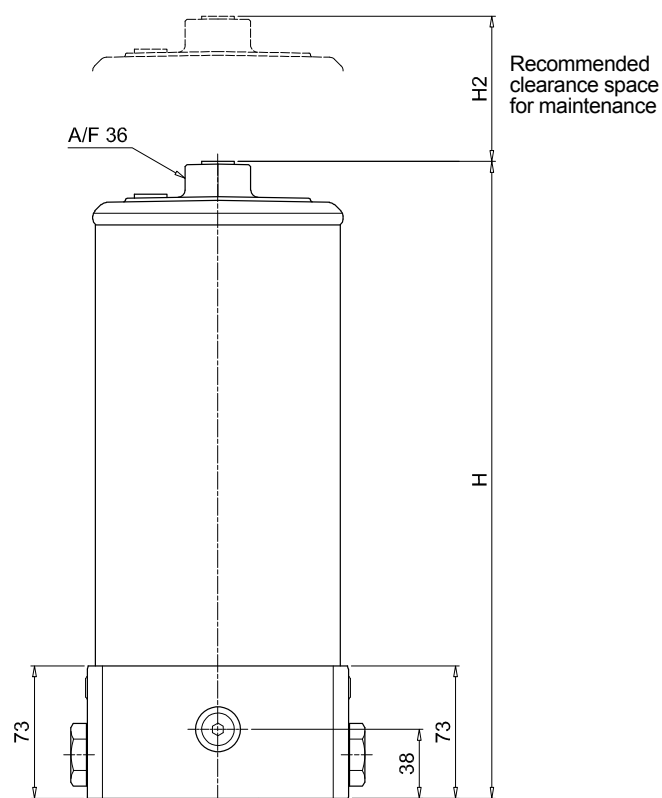
Dimensions

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





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)
- 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 600 kPa (6 bar) $\pm 10\%$
- Other opening pressures on request.

Δp element type

- Microfibre filter elements - series R: 20 bar (not available for FHD 021)
- Microfibre filter elements - series H: 210 bar (only for FHD 021)
- Microfibre filter elements - series S: 210 bar (not available for FHD 021)
- Wire mesh filter elements - series N: 20 bar
- Fluid flow 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 90°

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.

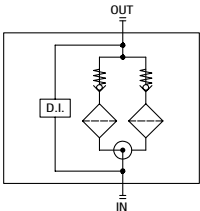
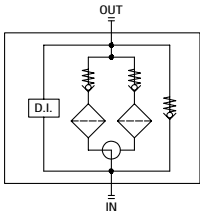
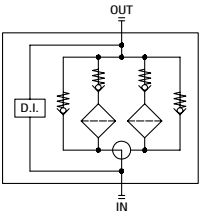
The reference fluid has a kinematic viscosity of 30 mm²/s (cSt) and a density of 0.86 kg/dm³.

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.

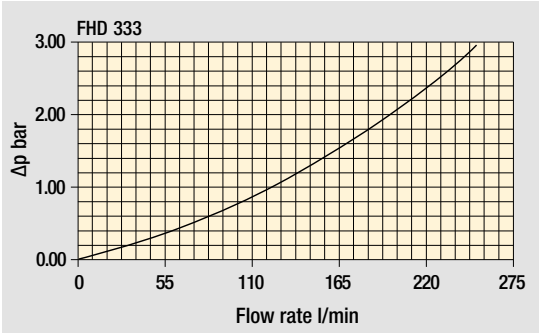
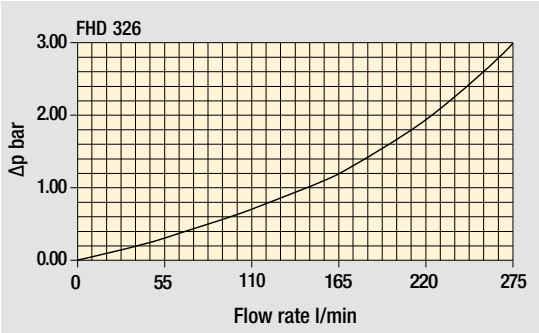
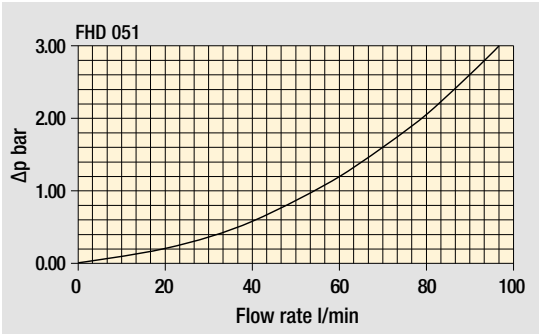
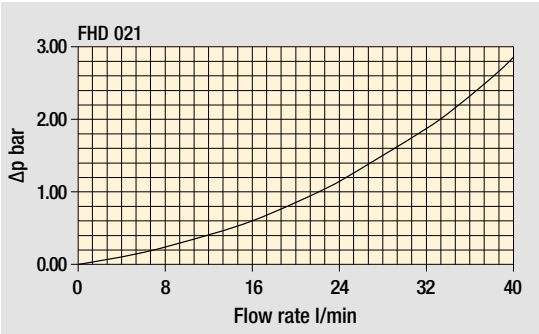
Hydraulic symbols

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

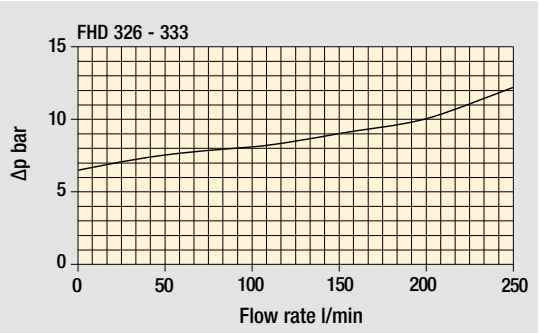
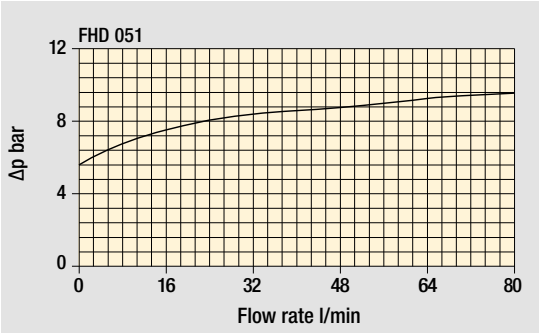




Pressure drop

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							

FILTER ELEMENT

Element series and size HP011	Configuration example: HP011	4	A06	A	H	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																																		
<table> <tr> <th colspan="2">Seals</th><th colspan="3">Filtration rating</th><th colspan="2">Execution</th></tr> <tr> <th>A</th><th>V</th><th>Element Δp</th><th>Axx</th><th>M25</th><th>P01</th><th>Pxx</th></tr> <tr> <td>NBR</td><td>FPM</td><td>N 20 bar</td><td>-</td><td>•</td><td>MP Filtri standard</td><td>Customized</td></tr> <tr> <td></td><td></td><td>H 210 bar</td><td>•</td><td>•</td><td></td><td></td></tr> </table>							Seals		Filtration rating			Execution		A	V	Element Δp	Axx	M25	P01	Pxx	NBR	FPM	N 20 bar	-	•	MP Filtri standard	Customized			H 210 bar	•	•		
Seals		Filtration rating			Execution																													
A	V	Element Δp	Axx	M25	P01	Pxx																												
NBR	FPM	N 20 bar	-	•	MP Filtri standard	Customized																												
		H 210 bar	•	•																														

CLOGGING INDICATORS

See page 727

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

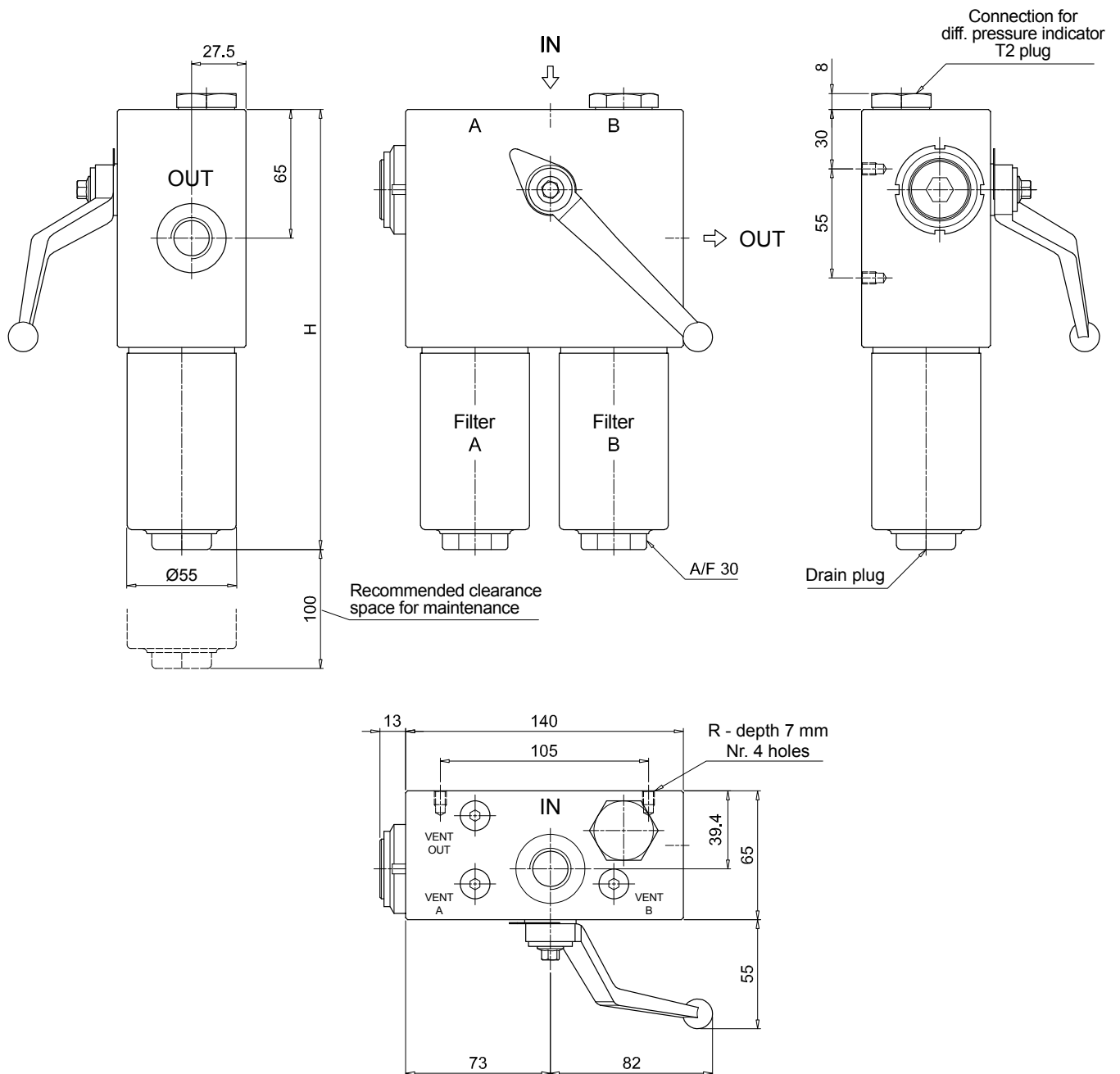
See page 747

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: FHD326 3 S A G1 M25 N P01							
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			
				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

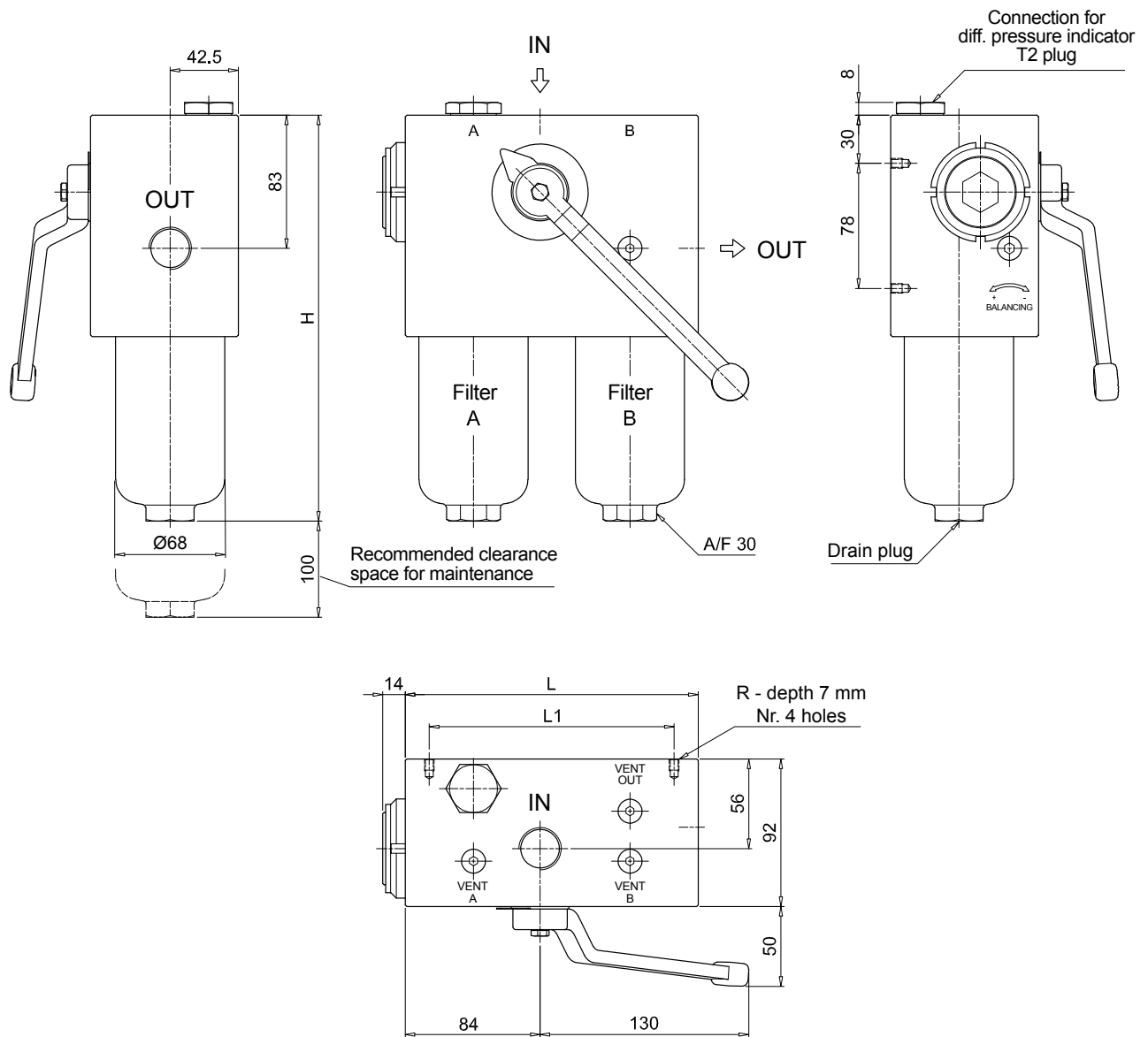
See page 727

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 747

T2 Plug (not included)



FHD051

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

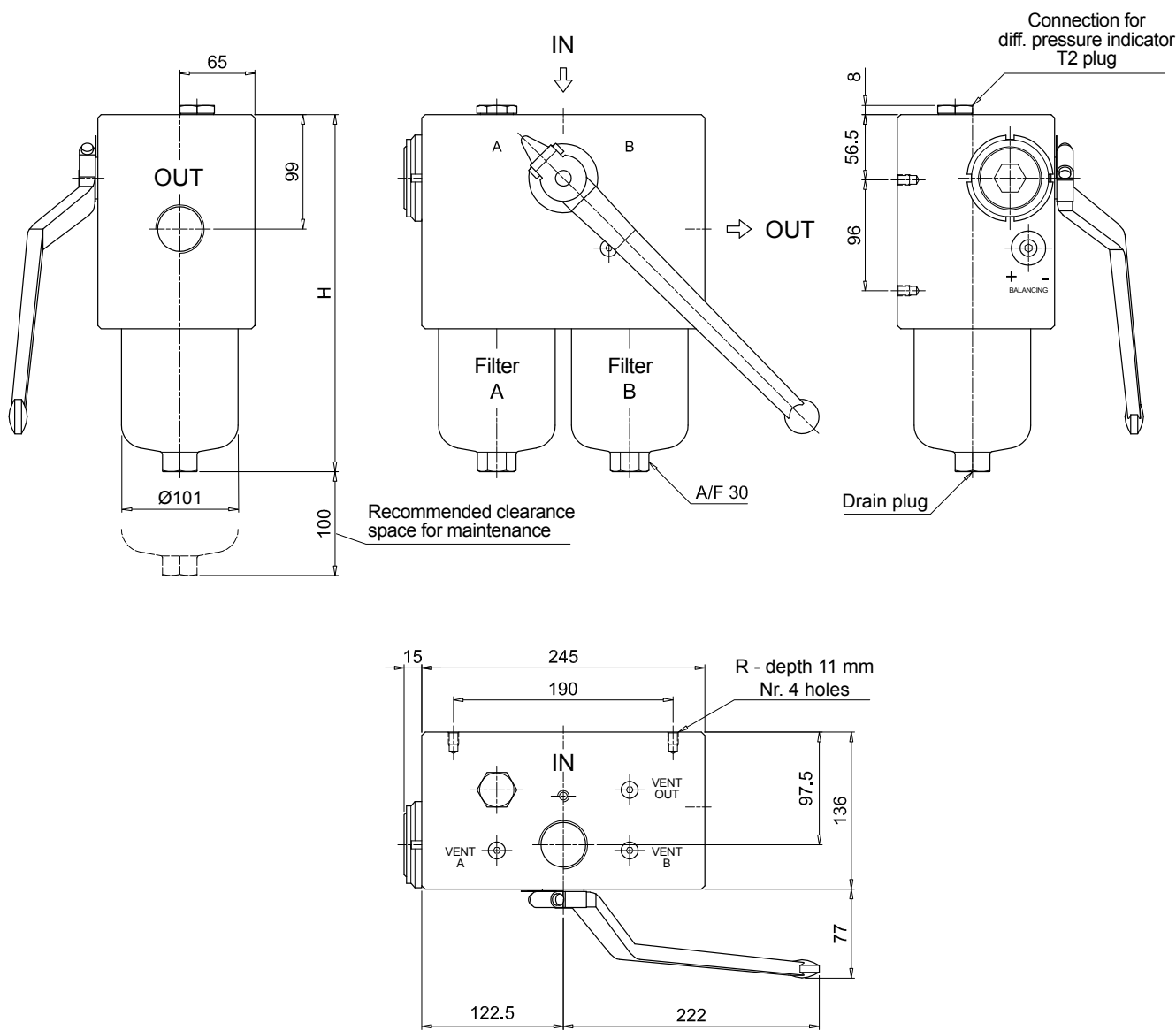
Connections	R
G1	M6
G2	1/4" UNC
G3	M6
G4-G5-G6	1/4" UNC

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

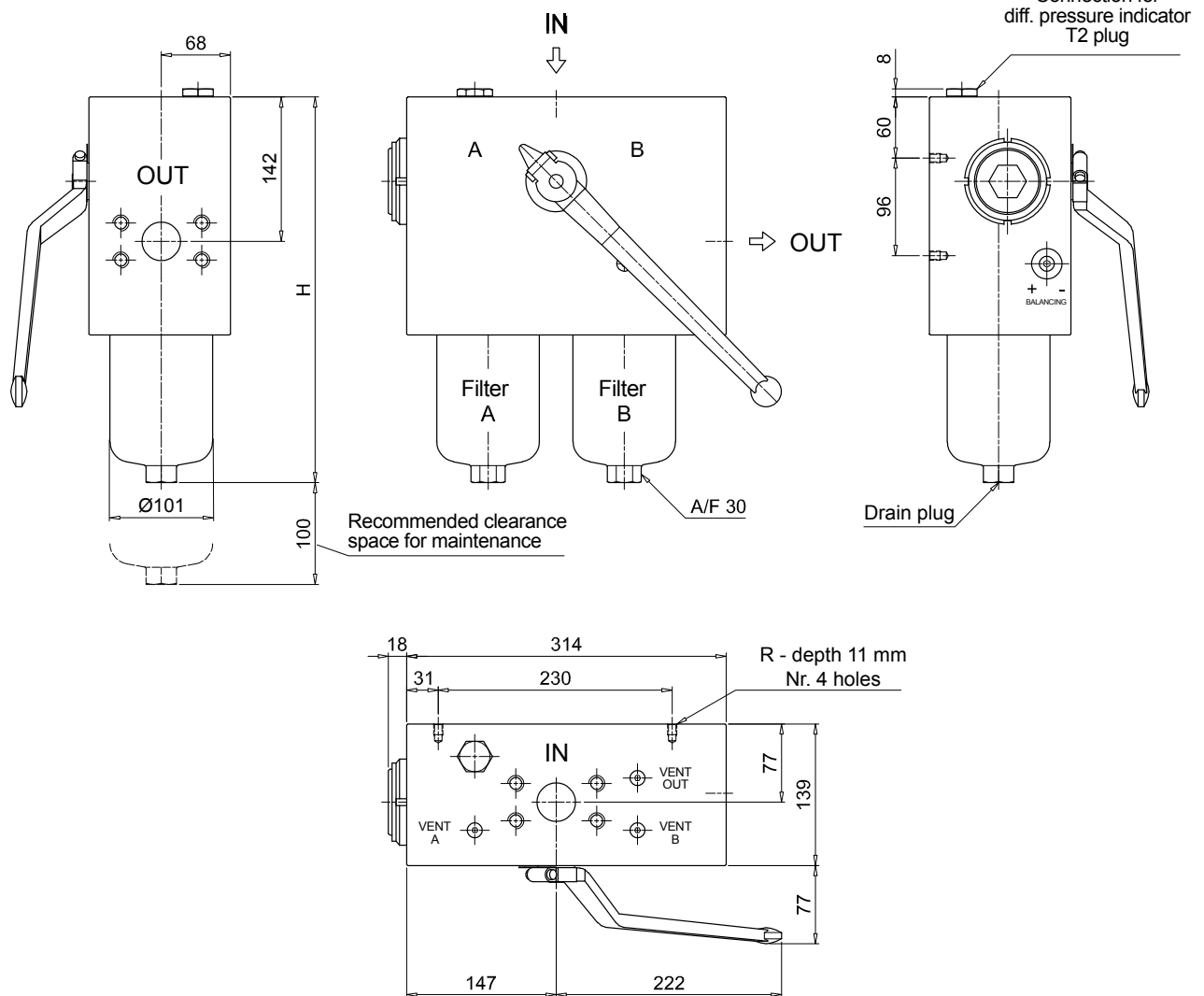
FHD FHD051 - FHD326 - FHD333

Dimensions

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



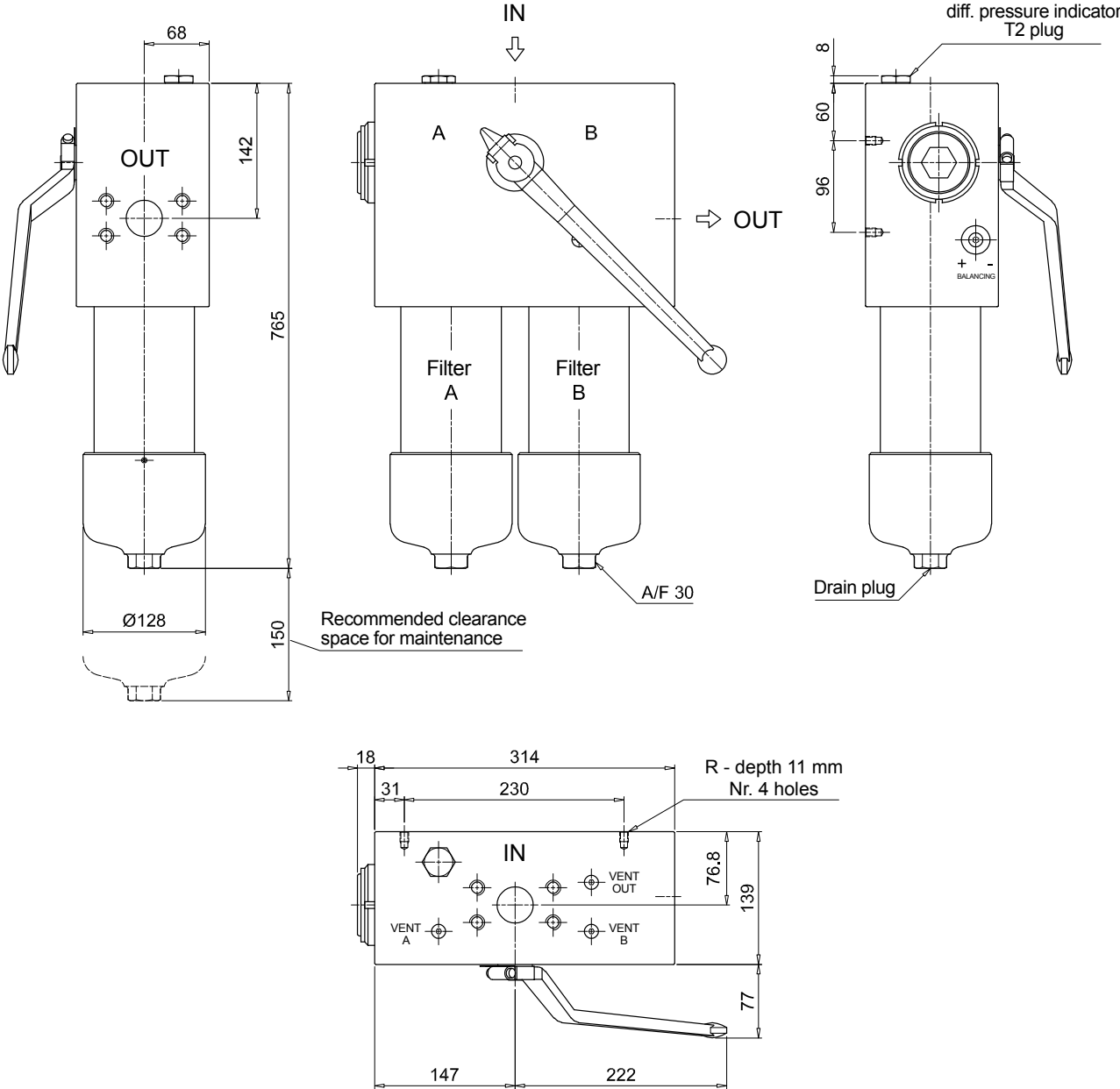
FHD333	
Length 2 - 3	
Filter length	H [mm]
2	479
3	612
Connections	R
F1	M10
F2	3/8" UNC



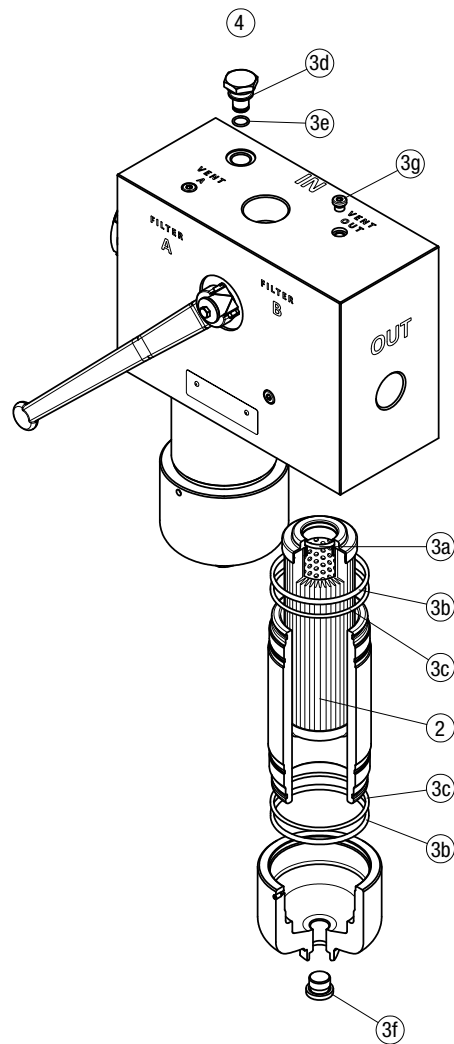
FHD FHD051 - FHD326 - FHD333

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)	
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!

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

Filter housing materials

- Housing: Phosphatized 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)

Δp element type

- Microfibre / Wire mesh filter elements - series N: 20 bar
- Microfibre filter elements - series S: 210 bar
- Fluid flow 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.

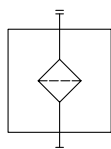
For different pressure drop or fluid viscosity we recommend to use our selection software available on www.mpfiltri.com.

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

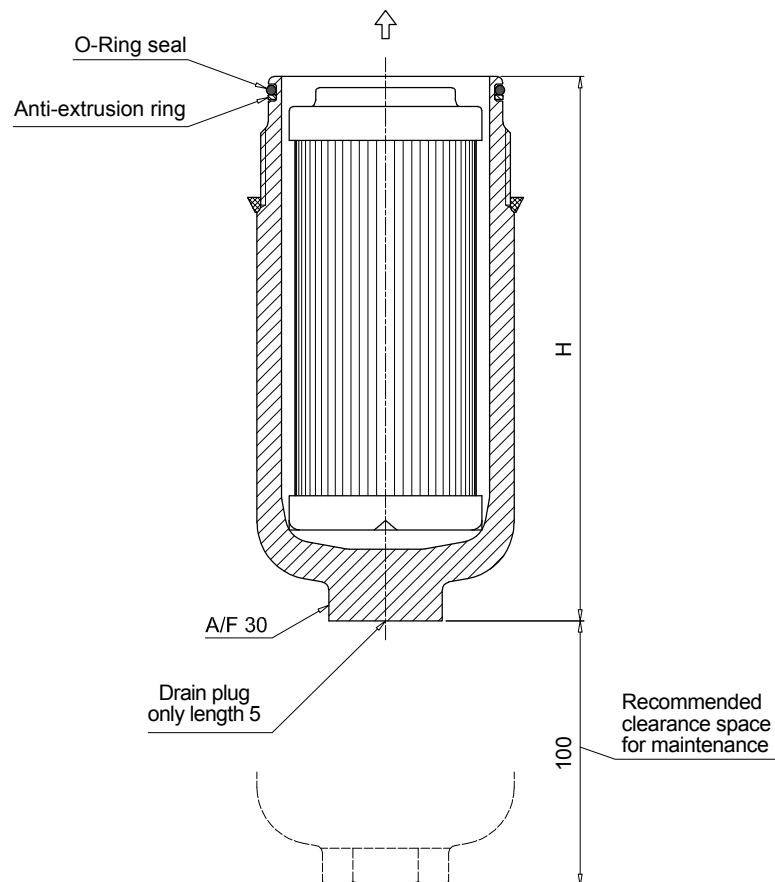
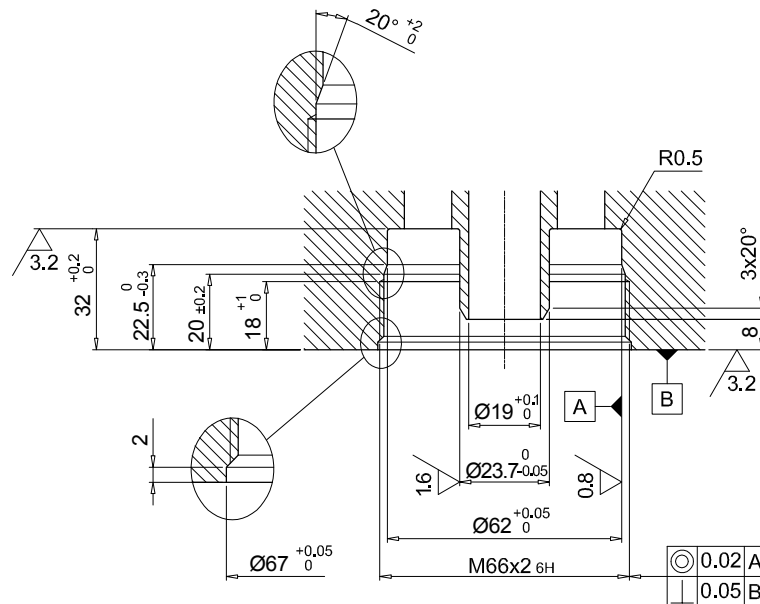
Seals **A** NBR **V** FPM

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

Designation & Ordering code

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** |

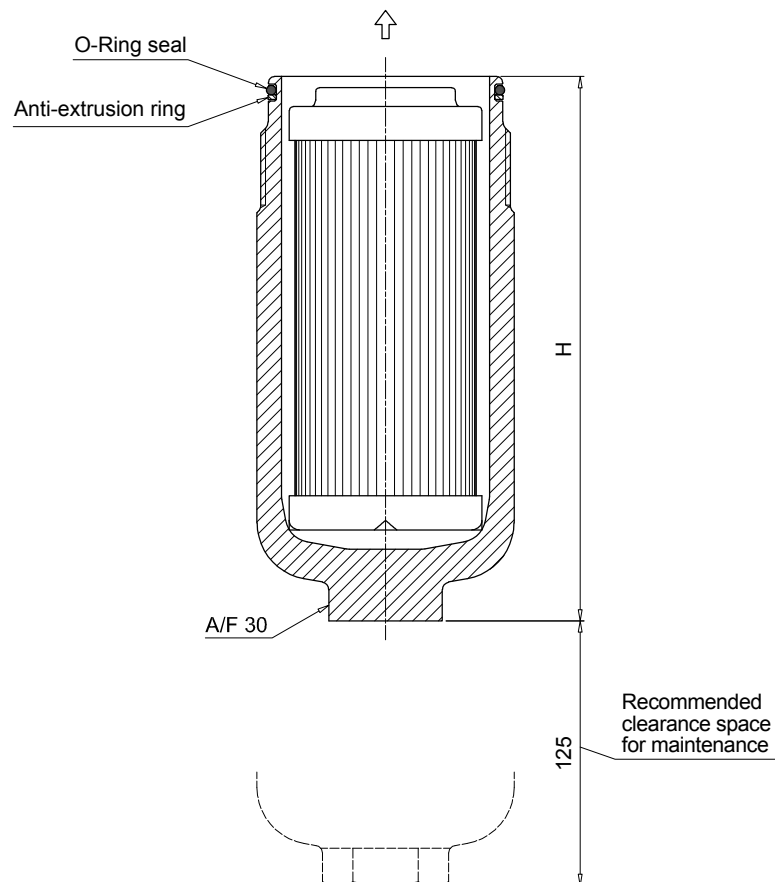
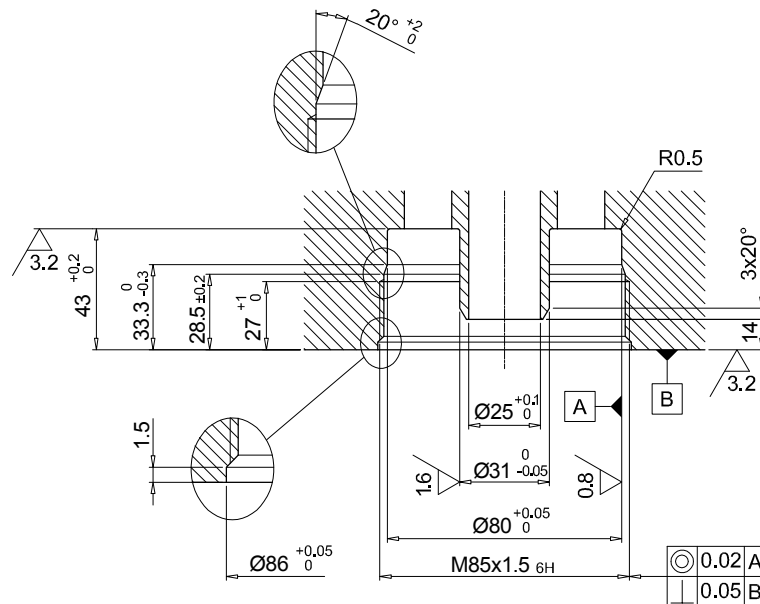
Filtration rating (filter media)

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

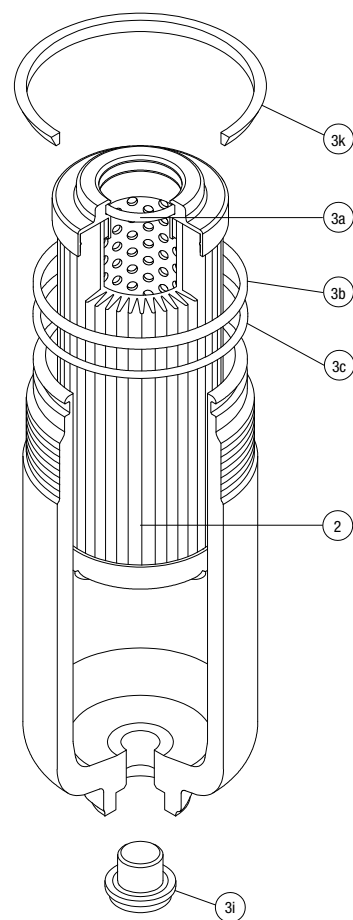


HPB150	
Filter length	H [mm]
1	161
2	271
3	346

HPB SPARE PARTS

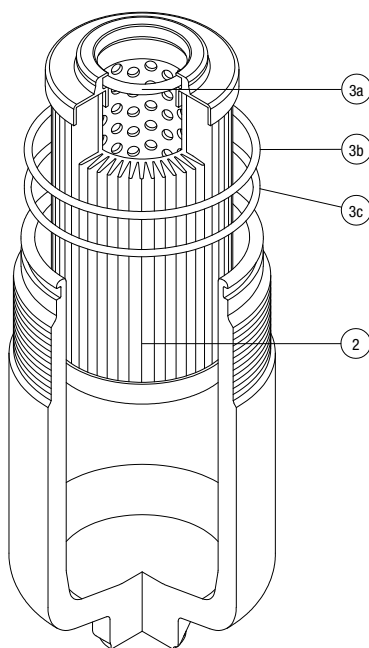
Order number for spare parts

HPB 050

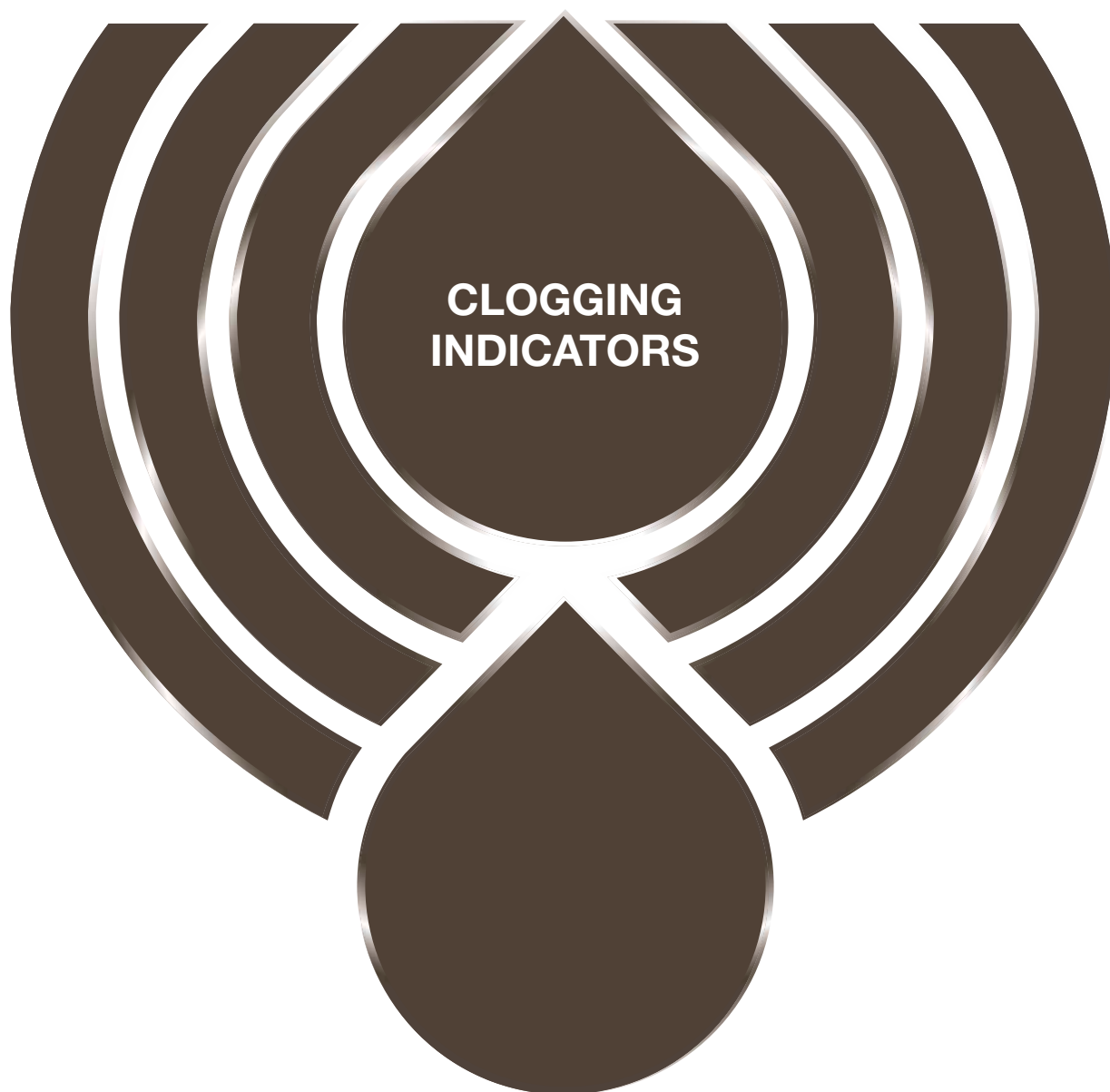


Item:		Q.ty: 1 pc. 2	Q.ty: 1 pc. 3 (3a ÷ 3i)
Filter series	Filter element	Seal Kit code number	
		NBR	FPM
HPB 050	See order table	02050813	02050823

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.

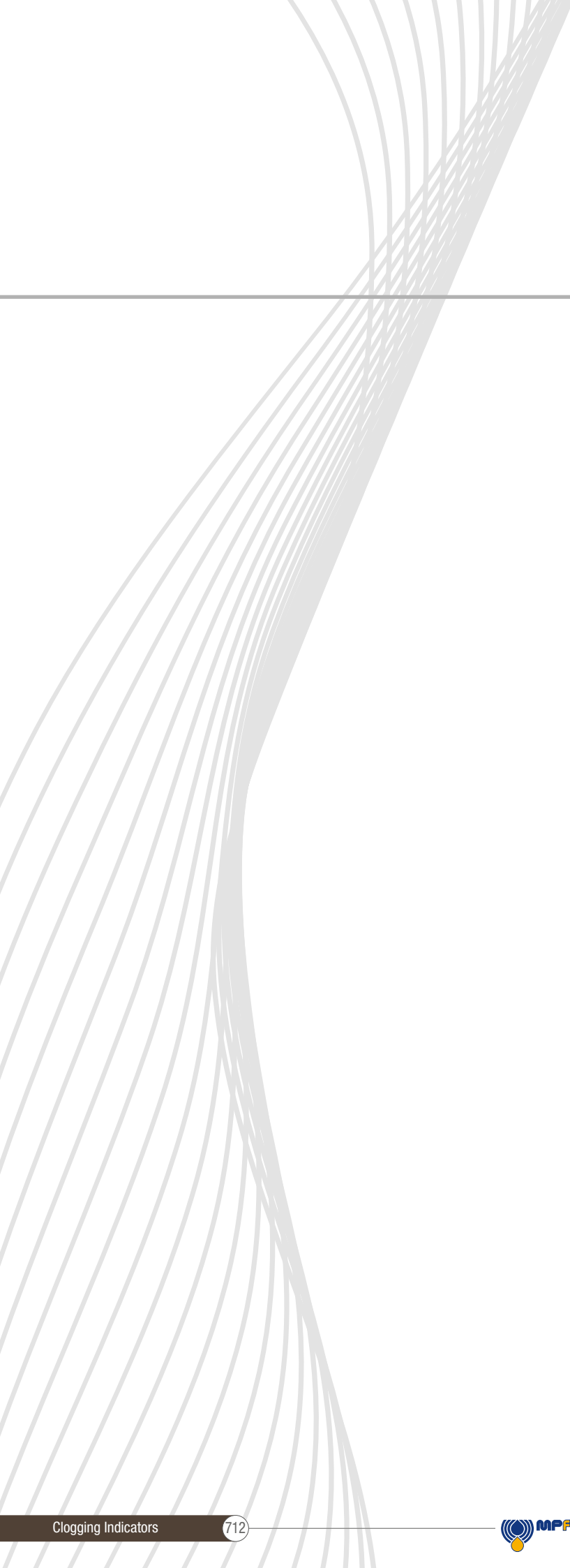
MP Filtri can supply indicators of the following designs:

- 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	VEB21AA50P01	VLB21AA51P01 VLB21AA52P01 VLB21AA53P01 VLB21AA71P01
		VVS20P01		
	SFMC250	VVA20P01	VEA21xA50P01 VEA21xA50P01UL	VLA21xA51P01 VLA21xA52P01 VLA21xA53P01 VLA21xA71P01
		VVR20P01		
RETURN FILTERS	Without bypass	SFSC 500 - 503 - 504 - 505 SFSC 510 - 535 - 540	VVA20P01 VVR20P01	VLA21xA51P01 VLA21xA52P01 VLA21xA53P01 VLA21xA71P01
	With bypass 1.75 bar	ELIXIR® RFEX060-080-110-160	BVA14P01 BVR14P01 BVP15HP01 BVQ15HP01	BEA15HA50P01 BEA15HA50P01UL BEM15HA41P01
	Without bypass	ELIXIR® RFEX060-080-110-160	BVA25P01 BVR25P01 BVP20HP01 BVQ20HP01	BEA20HA50P01 BEA20HA50P01UL BEM20HA41P01
	With bypass 1.75 bar	MDH 250	BVA14P01 BVR14P01 BVP15HP01 BVQ15HP01 DVS12HP01	BEA15HA50P01 BEA15HA50P01UL BEM15HA41P01 DES12HA10P01 DES12HA30P01 DES12HA80P01
	With bypass 3 bar	MDH 250	BVA25P01 BVR25P01 BVP20HP01 BVQ20HP01 DVS25HP01	BEA20HA50P01 BEA20HA50P01UL BEM20HA41P01 DES25HA10P01 DES25HA30P01 DES25HA80P01
	With bypass 1.75 bar	MPFX MPTX MPF MPT MPH	BVA14P01 BVR14P01 BVP15HP01 BVQ15HP01	BEA15HA50P01 BEA15HA50P01UL BEM15HA41P01
	With bypass 3 bar	MPFX MPTX MPF MPT	BVA25P01 BVR25P01 BVP20HP01 BVQ20HP01	BEA20HA50P01 BEA20HA50P01UL BEM20HA41P01
	With bypass 2.5 bar	MPH		
	With bypass 4.5 bar	MPLX	DVA20xP01	DEA20xA50P01 DEA20xA50P01UL DEM20xx10P01 DEM20xx20P01 DEM20xx30P01 DEM20xx35P01
	With bypass 2.4 bar	FRI	DVM20xP01	DLE20xA50P01 DLE20xF50P01 DTA20xF70P01
				DEU20VA50P01UL

Filter family	Filter series	Visual indicators	Electrical indicators	Electronic / Electrical-Visual indicators
RETURN / SUCTION FILTERS	MRSX 116 - 165 - 166 Suction line	VVB20P01	VEB21AA50P01	VLB21AA51P01 VLB21AA52P01 VLB21AA53P01 VLB21AA71P01
		VVS20P01		
	MRSX 116 - 165 - 166 Return line	BVA25P01	BEA20HA50P01 BEA20HA50P01UL	BLA20HA51P01 BLA20HA52P01 BLA20HA53P01 BLA20HA71P01
		BVR25P01	BEM20HA41P01	
		BVP20HP01	BET25HF10P01 BET25HF30P01 BET25HF50P01	
		BVQ20HP01		
	LMP 124 MULTIPORT		BEA20HA50P01 BEA20HA50P01UL	BLA20HA51P01 BLA20HA52P01 BLA20HA53P01 BLA20HA71P01
		BVA25P01	BEM20HA41P01	
		BVR25P01	BET25HF10P01 BET25HF30P01 BET25HF50P01	
		BVP20HP01		
		BVQ20HP01	DEA20xA50P01	DLA20xA51P01 DLA20xA52P01 DLA20xA71P01 DLE20xA50P01 DLE20xF50P01
		DVA20xP01	DEM20xx10P01 DEM20xx20P01 DEM20xx30P01 DEM20xx35P01	
		DVM20xP01		
			DEU20VA50P01UL	
SPIN-ON FILTERS	Suction line	MPS 050 - 070 - 100 - 150 MPS 200 - 250 - 300 - 350	WVB20P01 VVS20P01	VEB21AA50P01
	Return line	MPS 050 - 070 - 100 - 150 MPS 200 - 250 - 300 - 350 MST 050 - 070 - 100 - 150	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	DEA12xA50P01 DEM12xAxxP01
			DVA20xP01 DVM20xP01	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	DVA20xP01 DVM20xP01	DEA20xA50P01 DEM20xx10P01 DEM20xx20P01 DEM20xx30P01 DEM20xx35P01 DEU20VA50P01UL DLA20xA51P01 DLA20xA52P01 DLA20xA71P01 DLE20xA50P01 DLE20xF50P01		
	With bypass valve 2.5 bar	LMP 950 - 951 LMP 952 - 953 - 954 LMD 211 - 400 - 401 - 431 - 951 - LDD		DTA20xF70P01		
		LPH 630	DVA20xP01 DVM20xP01	DEA20xA50P01 DEM20xx10P01 DEM20xx20P01 DEM20xx30P01 DEM20xx35P01 DEU20VA50P01UL DLA20xA51P01 DLA20xA52P01 DLA20xA71P01 DLE20xA50P01 DLE20xF50P01 DTA20xF70P01		
	With bypass valve 1.75 bar	LPH 630	DVA12xP01 DVM12xP01	DEA12xA50P01 DEM12xx10P01 DEM12xx20P01 DEM12xx30P01 DEM12xx35P01 DLA12xA51P01 DLA12xA52P01 DLA12xA71P01 DLE12xA50P01 DLE12xF50P01 DTA12xF70P01		
	Without bypass valve	ELIXIR® LFEX 060-080-110-160	DVS40HP01	DES40HA10P01 DES40HA30P01 DES40HA80P01		
		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	DEA50xA50P01 DEM50xx10P01 DEM50xx20P01 DEM50xx30P01 DEM50xx35P01 DEU50VA50P01UL DLA50xA51P01 DLA50xA52P01 DLA50xA71P01 DLE50xA50P01 DLE50xF50P01 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 DEM50xx10P01 DEM50xx20P01 DEM50xx30P01 DEM50xx35P01 DEU50VA50P01UL DLA50xA51P01 DLA50xA52P01 DLA50xA71P01 DLE50xA50P01 DLE50xF50P01	
			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 DEM70xx10P01 DEM70xx20P01 DEM70xx30P01 DEM70xx35P01 DEU70VA50P01UL DEM95xx10P01 DEM95xx20P01 DEM95xx30P01 DEM95xx35P01 DLA70xA51P01 DLA70xA52P01 DLA70xA71P01 DLA95xA51P01 DLA95xA52P01 DLA95xA71P01 DLE70xA50P01 DLE70xF50P01 DLE95xA50P01 DLE95xF50P01 DTA70xF70P01 DTA95xF70P01

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 DVY50xP01	DEX50xA50P01	DLX50xA51P01 DLX50xA52P01
	Without bypass valve	FZP 039 - 136 FZB 039 FZM 039 FZD 010 - 021 - 051	DVX70xP01 DVX95xP01 DVY70xP01 DVY95xP01	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 DVY50xP01	DEH50xA48P01 DEH50xA49P01 DEH50xA70P01	
	Without bypass valve	FZP 039 - 136	DVX70xP01 DVX95xP01 DVY70xP01 DVY95xP01	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.

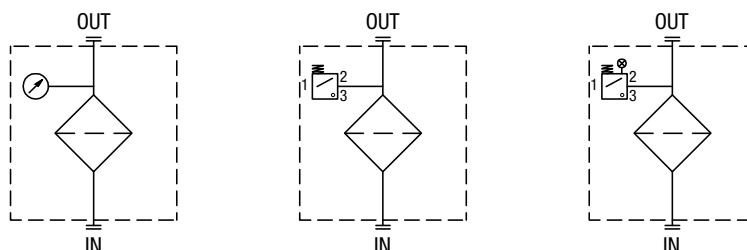
Standard items are produced with R 1/4" EN 10226 connection.

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.

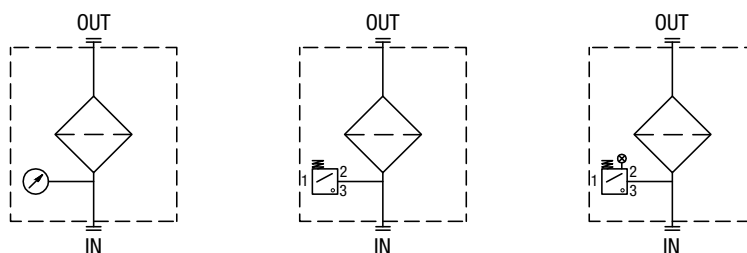
They measure the pressure upstream of the filter element.

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.

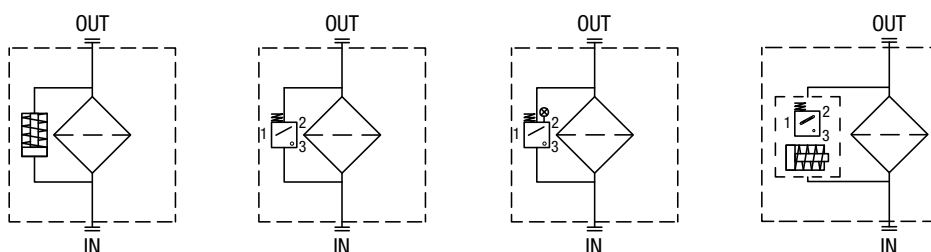
They measure the pressure upstream and downstream of the filter element (differential pressure).

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

VACUUM INDICATORS										
Series		Configuration example 1:								
VE Electrical vacuum indicator		VE	A	21	V	A	50	P01	EX	
VL Electrical/Visual vacuum indicator		Configuration example 2:								
VV Vacuum gauge		VL	B	21	A	A	71	P01		
		Configuration example 3:								
		VV	R	20						
Type VE - VL		Type VV		SFxC	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	VV						
20 -0.16 bar		-	-	•						
21 -0.21 bar		•	•	-						
Seals		VEA - VLA		VEB - VLB						
A NBR		•		•						
V FPM		•		-						
Thermostat		VE	VL							
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

BAROMETRIC (PRESSURE) INDICATORS

Series				Configuration example 1: BEA 15 H A 41 P01 EX									
BE Electrical pressure indicator				Configuration example 2: BLA 20 H A 71 P01									
BL Electrical/Visual pressure indicator				Configuration example 3: BVR 14 P01									
BV Visual pressure indicator				Configuration example 4: BVP 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	BVP-BVQ								
14 1.4 bar	-	-	-	•	-								
15 1.5 bar	•	-	•	-	•								
20 2.0 bar	•	•	•	-	•								
25 2.5 bar	-	•	-	•	-								
Seals	BE	BLA	BVA-BVR	BVP-BVQ									
H HNBR	•	•	-	•									
Thermostat	BEA-BEM	BET	BLA										
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					•	-	-	-					

DIFFERENTIAL PRESSURE INDICATORS

Series
DE Electrical differential pressure indicator
DL Electrical/Visual differential pressure indicator
DT Electrical differential pressure indicator
DV Visual differential pressure indicator

Configuration example 1:	DE	M	20	H	F	50	P01
Configuration example 2:	DE	U	50	V	A	50	P01
Configuration example 3:	DL	E	20	V	A	71	P01
Configuration example 4:	DT	A	20	H	F	70	P01
Configuration example 5:	DV	M	20	V			P01

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

DV
A With automatic reset
M With manual reset
S With automatic reset

Pressure setting	DEA	DEM	DEU	DES	DL	DT	DVA	DVM	DVS
12 1.2 bar	-	-	-	•	-	-	-	-	•
20 2.0 bar	•	•	•	-	•	•	•	•	-
25 2.5 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

Certifications	DEU	OTHERS
Without	-	•
UL UL certification	•	-

PLUGS

Series
T2 Plug
T4 Plug

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

Configuration example	T2	H
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Designation & Ordering code

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								
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	VV						
20 -0.16 bar	-	-	•						
21 -0.21 bar	•	•	-						
Seals	VEA - VLA	VEB - VLB							
A NBR	•	•							
V FPM	•	-							
Thermostat	VE	VL							
A Without thermostat	•	•							
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	•	-	-	-	-				

BAROMETRIC (PRESSURE) INDICATORS

Series	Configuration example 1:	BE	M	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	BVP-BVQ				
14 1.4 bar	-	-	-	•	-				
15 1.5 bar	•	-	•	-	-				
20 2.0 bar	•	•	•	-	•				
25 2.5 bar	-	•	-	•	-				
Seals	BE	BLA	BVP-BVQ						
H HNBR	•	•	•						
Thermostat	BEA-BEM	BET	BLA						
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	•	-	-	-					

DIFFERENTIAL PRESSURE INDICATORS

Series				Configuration example 1:									
DE Electrical differential pressure indicator				Configuration example 2:									
DL Electrical/Visual differential pressure indicator				Configuration example 3:									
DT Electronic differential pressure indicator				Configuration example 4:									
DV Visual differential pressure indicator				Configuration example 5:									
Type				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													
20 2.0 bar													
Seals													
H HNBR													
V FPM													
Thermostat													
A Without thermostat													
F With thermostat													
Electrical connections													
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		

Designation & Ordering code

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	VV						
20 -0.16 bar	-	-	•						
21 -0.21 bar	•	•	-						
Seals	VE	VL							
A NBR	•	•							
Thermostat	VE	VL							
A Without thermostat	•	•							
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	VEB	VL	VV						
Without	•	•	•						
EX ATEX certification	•	-	-						
UL UL certification	-	-	-						

BAROMETRIC (PRESSURE) INDICATORS

Series	Configuration example 1:									
BE Electrical pressure indicator	BE	M	15	H	A	41	P01			
BL Electrical/Visual pressure indicator	Configuration example 2:									
	BL	A	20	H	A	71	P01			
BV Visual pressure indicator	Configuration example 3:									
	BV	R	14				P01			
	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	BLA	BVA-BVR	BVP-BVQ						
14 1.4 bar	-	-	•	-						
15 1.5 bar	•	•	-	-						
20 2 bar	•	•	-	•						
25 2.5 bar	-	-	•	-						
Seals	BE	BLA	BVA-BVR	BVP-BVQ						
H HNBR	•	•	-	•						
Thermostat	BEA-BEM	BLA	BV							
A Without 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	•	-	-	-						

DIFFERENTIAL PRESSURE INDICATORS

Series	Configuration example 1:										DE	M	12	H	F	50	P01	UL
DE Electrical differential pressure indicator	Configuration example 2:										DE	U	50	V	A	50	P01	
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										
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			

CLOGGING INDICATORS LOW & MEDIUM PRESS. FILTERS

Designation & Ordering code

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)	-	-	-	-	-	-	•
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	

Certifications	DEU	OTHERS
Without	-	•
UL UL certification	•	-

PLUGS

Series	Configuration example	T2	H
T2 Plug			
T4 Plug			

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

DIFFERENTIAL PRESSURE INDICATORS

Series					Configuration example 1:					Configuration example 2:					Configuration example 3:					Configuration example 4:					Configuration example 5:																													
DE Electrical differential pressure indicator					DE					U					50					V					A					50					P01					UL														
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														
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					-					-					-					•					-					-					-																			
Option																																																						
P01 MP Filtri standard																																																						
Pxx Customized																																																						
Certifications					DEU																																																	
Without					-																																																	
UL UL certification					•																																																	

PLUGS

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

CLOGGING INDICATORS

STAINLESS STEEL HIGH PRESSURE FILTERS

Designation & Ordering code

DIFFERENTIAL PRESSURE INDICATORS

Series					Configuration example 1:						
DE Electrical differential pressure indicator					DE	Z	50	H	A	50	P01
DL Electrical / Visual differential pressure indicator					DL	X	70	V	A	52	P01
DV Visual differential pressure indicator											
Type											
X	Stainless steel standard type 420 bar	•	•	•							
Y	Stainless steel optional type 420 bar	-	-	•							
Z	Stainless steel 700 bar (only for FZH)	•	•	•							
Pressure setting											
50	5.0 bar	•	•	•							
70	7.0 bar	•	•	•							
95	9.5 bar	•	•	•							
Seals											
H	HNBR	•	•	•							
V	FPM	-	-	•							
F	MFQ	•	•	-							
Thermostat											
A	Without thermostat	•	•	•							
Electrical connections					DEX	DEZ	DL				
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	-	-	•							
Option											
P01 MP Filtri standard											
Pxx Customized											

PLUGS

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

FILTERS FOR POTENTIALLY EXPLOSIVE ATMOSPHERE

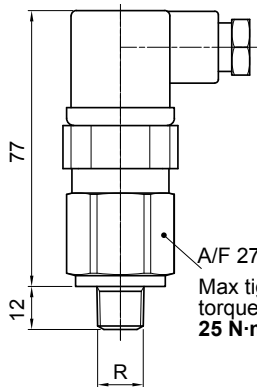
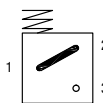
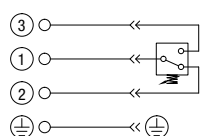
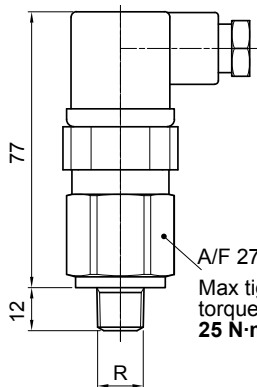
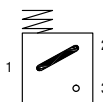
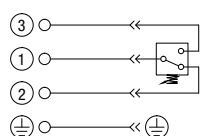
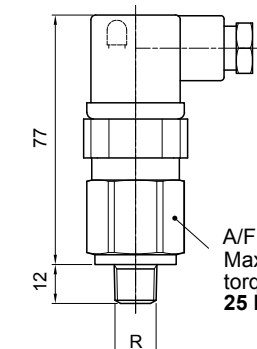
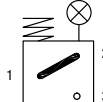
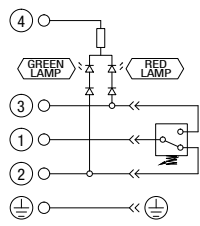
Designation & Ordering code

DIFFERENTIAL PRESSURE INDICATORS									
Series		Configuration example 1: DE H 50 F A 48 P01							
DE Electrical differential pressure indicator		Configuration example 2: DV X 70 V P01							
DV Visual differential pressure indicator									
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									

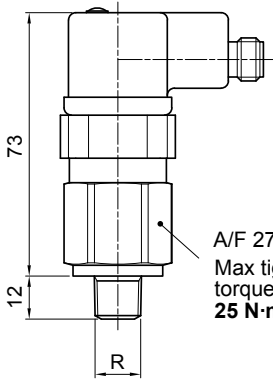
PLUGS			
Series		Configuration example X2 H	
T2 Plug			
X2 Stainless Steel plug 420 bar			
X3 Stainless Steel plug 700 bar (only for FZH)			
Seals	T2	X2	X3
H HNBR	•	•	•
V FPM	•	•	•
F MFQ	-	•	•

VACUUM INDICATORS

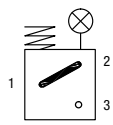
Technical data

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: Brass - Base: Black polyamide - Contacts: Silver - Seal: VEA: NBR/FPM VEB: NBR Technical data - Vacuum setting: 0.21 bar ±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: EN 175301-803 - Resistive load: 5 A / 14 Vdc 4 A / 30 Vdc 5 A / 125 Vac 4 A / 250 Vac - CE certification - Available Atex product: II 1GD Ex ia IIC Tx Ex ia IIIC Tx °C X
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 in EX version	Materials - Body: Brass - Base: Black polyamide - Contacts: Silver - Seal: VEA: NBR/FPM VEB: NBR Technical data - Vacuum setting: 0.21 bar ±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: EN 175301-803 - Resistive load: 5 A / 14 Vdc 4 A / 30 Vdc 5 A / 125 Vac 4 A / 250 Vac - CE certification - Available Atex product: II 1GD Ex ia IIC Tx Ex ia IIIC Tx °C X		
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: Brass - Base: Transparent polyamide - Contacts: Brass - Polyamide - Seal: VLA: NBR/FPM VLB: NBR Technical data - Vacuum setting: 0.21 bar ±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: 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
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								

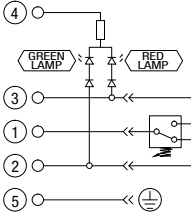
VL*71	
Electrical/Visual Vacuum Indicator Connection IEC 61076-2-101 D (M12), black base with lamps 24 Vdc	
Connections	Indicator code
EN 10226 - R1/4"	VL A 21 x A 71 P01
EN 10226 - R1/8"	VL B 21 A A 71 P01



Hydraulic symbol



Electrical symbol



Materials

- Body: Brass
- Base: Black polyamide
- Contacts: Silver
- Seal: VLA: NBR/FPM
VLB: NBR

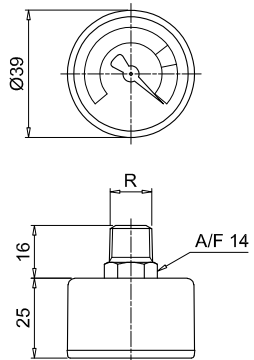
Technical data

- 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

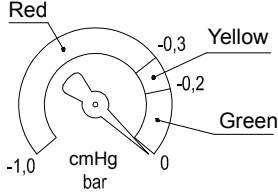
VVA - VVB	
Axial Vacuum Gauge	
R	Ordering code
EN 10226 - R1/4"	VVA 20 P01
EN 10226 - R1/8"	VVB 20 P01



Hydraulic symbol



Dial scale



Conversion to SI units

[cmHg]	[bar]
-12	-0.16
-18	-0.24
-76	-1.01

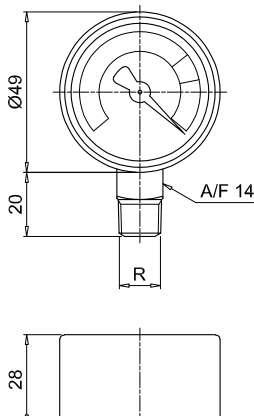
Materials

- 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

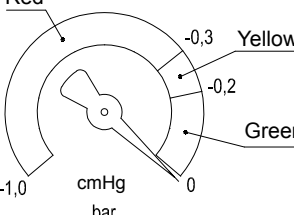
VVR - VVS		
Radial Vacuum Gauge		
R	A/F	Ordering code
EN 10226 - R1/4"	14	VVR 20 P01
EN 10226 - R1/8"	11	VVS 20 P01



Hydraulic symbol



Dial scale



Conversion to SI units

[cmHg]	[bar]
-12	-0.16
-18	-0.24
-76	-1.01

Materials

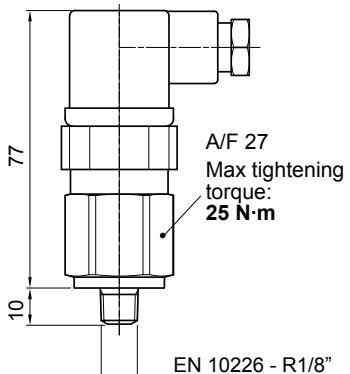
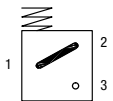
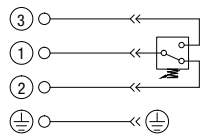
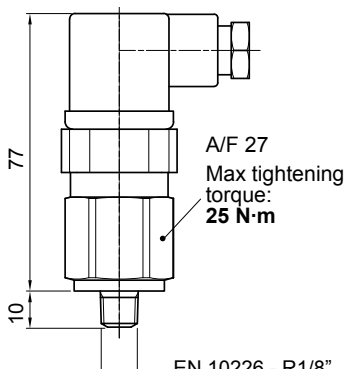
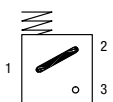
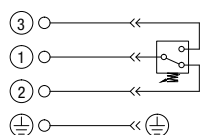
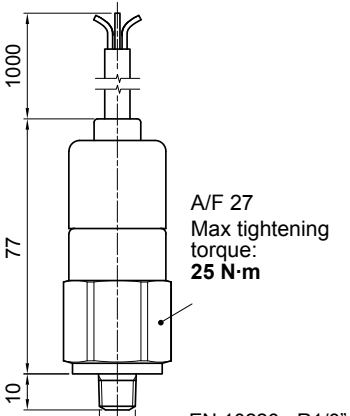
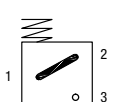
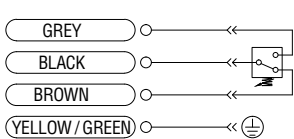
- Case: Black plastic
- Window: Clear plastic
- Dial: White plastic
- Pointer: Black plastic
- Pressure connection: Cu-alloy
- Pressure element: Bourdon tube Cu-alloy soft soldered, C type
- Movement: Cu-alloy

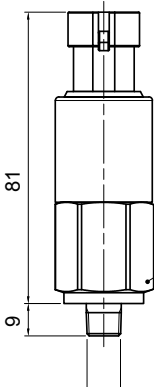
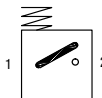
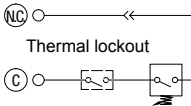
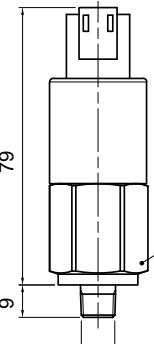
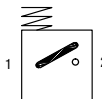
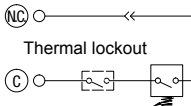
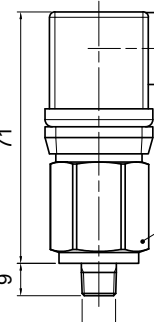
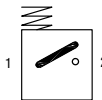
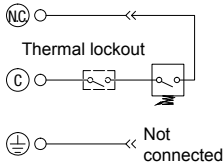
Technical data

- 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 - CE certification - Available Atex product: I M1 Ex ia I Ma II 1GD Ex ia IIC Tx Ex ia IIIC Tx °C X
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 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 - CE certification - Available Atex product: I M1 Ex ia I Ma II 1GD Ex ia IIC Tx Ex ia IIIC Tx °C X
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>  A/F 24 Max tightening torque: 30 N·m EN 10226 - R1/8"	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: - Base: - Contacts: - Seal: Brass Black polyamide Silver HNBR Technical data - Max working pressure: - Proof pressure: - Working temperature: - Compatibility with fluids: - Degree of protection: 10 bar 15 bar From -25 °C to +100 °C Mineral oils, Synthetic fluids HFB and HFC according to ISO 2943 IP65 according to EN 60529 Electrical data - Electrical connection: - Resistive load: - Thermostat condition: - CE certification AMP Superseal series 1.5 0.5 A / 48 Vdc Open up to 30 °C
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>  A/F 24 Max tightening torque: 30 N·m EN 10226 - R1/8"	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: - Base: - Contacts: - Seal: Brass Black polyamide Silver HNBR Technical data - Max working pressure: - Proof pressure: - Working temperature: - Compatibility with fluids: - Degree of protection: 10 bar 15 bar From -25 °C to +100 °C Mineral oils, Synthetic fluids HFB and HFC according to ISO 2943 IP65 according to EN 60529 Electrical data - Electrical connection: - Resistive load: - Thermostat condition: - CE certification Deutsch DT-04-2-P 0.5 A / 48 Vdc Open up to 30 °C
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>  A/F 24 Max tightening torque: 30 N·m EN 10226 - R1/8"	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: - Base: - Contacts: - Seal: Brass Black polyamide Silver HNBR Technical data - Max working pressure: - Proof pressure: - Working temperature: - Compatibility with fluids: - Degree of protection: 10 bar 15 bar From -25 °C to +100 °C Mineral oils, Synthetic fluids HFB and HFC according to ISO 2943 IP65 according to EN 60529 Electrical data - Electrical connection: - Resistive load: - Thermostat condition: - CE certification EN 175301-803 0.5 A / 48 Vdc Open up to 30 °C
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

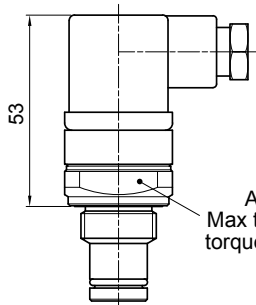
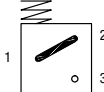
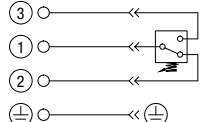
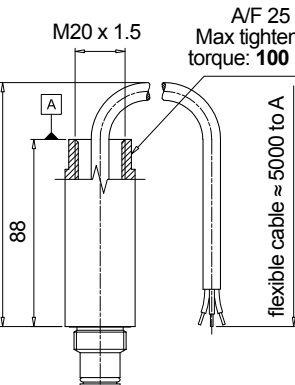
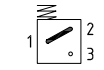
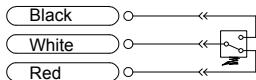
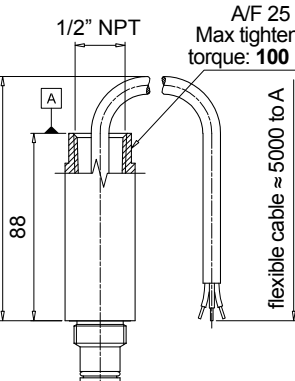
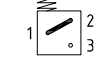
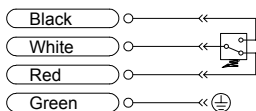
Hydraulic symbol	
Dial scale	
BV A 14 P01	
BV A 25 P01	

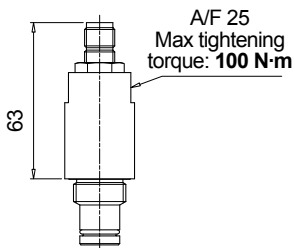
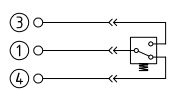
Materials	
- Case:	Painted Steel
- Window:	Clear plastic
- Dial:	Painted Steel
- Pointer:	Black plastic
- Pressure connection:	Brass
- Pressure element:	Bourdon tube Cu-alloy soft soldered, C type
Technical data	
- Max working pressure:	Static: 7 bar Fluctuating: 6 bar Short time: 10 bar
- Working temperature:	Ambient from -40 °C to +60 °C Fluid max +60 °C
- 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

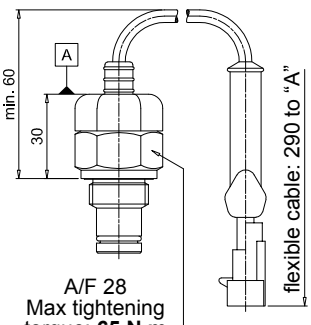
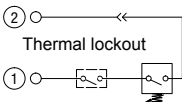
BVR Radial Pressure Gauge <table><tr><th>Settings</th><th>Ordering code</th></tr><tr><td>1.4 bar ±10%</td><td>BV R 14 P01</td></tr><tr><td>2.5 bar ±10%</td><td>BV R 25 P01</td></tr></table>		Settings	Ordering code	1.4 bar ±10%	BV R 14 P01	2.5 bar ±10%	BV R 25 P01	Hydraulic symbol Dial scale BV R 14 P01 BV R 25 P01	Materials - Case: - Window: - Dial: - Pointer: - Pressure connection: - Pressure element: Painted Steel Clear plastic Painted Steel Black plastic Brass Bourdon tube Cu-alloy soft soldered, C type Technical data - Max working pressure: - Working temperature: - Compatibility with fluids: - Accuracy: - Degree of protection: Static: 7 bar Fluctuating: 6 bar Short time: 10 bar Ambient from -40 °C to +60 °C Fluid max +60 °C Mineral oils, Synthetic fluids HFB and HFC according to ISO 2943 Class 2.5 according to EN 13190 IP31 according to EN 60529		
Settings	Ordering code										
1.4 bar ±10%	BV R 14 P01										
2.5 bar ±10%	BV R 25 P01										
BVP - BVQ Visual Pressure Indicator BVP - Automatic reset BVQ - Manual reset <table><tr><th>Setting</th><th>Ordering code</th></tr><tr><td rowspan="2">1.5 bar ±10%</td><td>BV P 15 H P01</td></tr><tr><td>BV Q 15 H P01</td></tr><tr><td rowspan="2">2.0 bar ±10%</td><td>BV P 20 H P01</td></tr><tr><td>BV Q 20 H P01</td></tr></table>		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: - Cover / internal parts: - Caps: - Seal: Brass Nylon VMQ HNBR Technical data - Reset: - Max working pressure: - Proof pressure: - Working temperature: - Compatibility with fluids: - Degree of protection: BVP - Automatic reset BVQ - Manual reset 10 bar 15 bar From -25 °C to +80 °C Mineral oils, Synthetic fluids HFB and HFC according to ISO 2943 IP45 according to EN 60529
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										
Signals Absence of pressure (no indicator) Presence of pressure (green button rises gradually) Clogged filter element (red button risen)											

DIFFERENTIAL PRESSURE INDICATORS

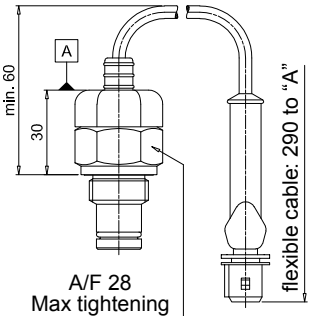
Dimensions

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>  A/F 30 Max tightening torque: 65 N·m		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>  A/F 25 Max tightening torque: 100 N·m flexible cable ≈ 5000 to A		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   - Certification / Approvals: ATEX, IECEx, EAC TR CU, INMETRO - Certification included as standard	Materials - Body: - Contacts: - Seal: AISI 316L Rhodium FPM - MFQ Technical data - Max working pressure: - Proof pressure: - Burst pressure: - Working temperature: - Compatibility with fluids: - Temperature class: - Degree of protection: - Connection type: - Contact type: 420 bar 630 bar 1260 bar From -60 °C to +125 °C Mineral oils, Synthetic fluids HFB and HFC according to ISO 2943 T4 (135 °C) and T6 (85 °C) IP 66/67/68 according to EN 60529 Three-core cable, fitting M20x1.5 SPCO/SPDT (Hermetically sealed - Volt-free contacts) Electrical data - Connection via three-core cable - fitting M20x1.5 - Resistive Load: - Electrical Ratings: - Available ATEX product: 830 mA / 24 Vdc - 180 mA / 110 Vac $U_i = 30$ Vdc / $I_i = 250$ mA / $P_i = 1.3$ W II 1 GD Ex ia IIC T6 Ga -60°C $\leq T_a \leq 80^\circ\text{C}$ Ex ia IIC T4 Ga -60°C $\leq T_a \leq 125^\circ\text{C}$ II 2 GD Ex db IIC T6* Gb Ex tb IIIC T85°C* Db (Tamb : = -60°C to +70°C)* IP66/67 * alternative T/Class and ambients T4, T135°C (Tamb = -60°C to +120°C)				
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>  A/F 25 Max tightening torque: 100 N·m flexible cable ≈ 5000 to A		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   - Certification / Approvals: ATEX, IECEx, EAC TR CU, INMETRO, UL/CSA Class I Division 1 Groups A-D, UL/CSA Class II Division 1 Groups E-G - Certification included as standard	Materials - Body: - Contacts: - Seal: AISI 316L Rhodium FPM - MFQ Technical data - Max working pressure: - Proof pressure: - Burst pressure: - Working temperature: - Compatibility with fluids: - Temperature class: - Degree of protection: - Connection type: - Contact type: 420 bar 630 bar 1260 bar From -60 °C to +120 °C : ATEX, IECEx, EAC TR CU, INMETRO From -60 °C to +105 °C : UL/CSA Mineral oils, Synthetic fluids HFB and HFC according to ISO 2943 T4 (135 °C) and T6 (85 °C) IP 66/67/68 according to EN 60529 Four-core cable, fitting 1/2" NPT SPCO/SPDT (Hermetically sealed - Volt-free contacts) Electrical data - Connection via four-core cable - fitting 1/2" NPT - Resistive Load: - Max voltage - Power - Available ATEX product: 830 mA / 24 Vdc - 180 mA / 110 Vac 150 Vac/dc 20 W II 1 GD Ex ia IIC T6 Ga -60°C $\leq T_a \leq 80^\circ\text{C}$ Ex ia IIC T4 Ga -60°C $\leq T_a \leq 125^\circ\text{C}$ II 2 GD Ex db IIC T6* Gb Ex tb IIIC T85°C* Db (Tamb : = -60°C to +70°C)* IP66/67 * alternative T/Class and ambients T4, T135°C (Tamb = -60°C to +120°C)				
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		
		  	Materials - Body: AISI 316L with internal engineered resin switch - Contacts: Rhodium - Seal: FPM - MFQ Technical data - Max working pressure: 420 bar - Proof pressure: 630 bar - Burst pressure: 1260 bar - Working temperature: From -60 °C to +80 °C - Compatibility with fluids: Mineral oils, Synthetic fluids - Temperature class: HFB and HFC according to ISO 2943 - Degree of protection: T6 (85 °C) - Connection type: IEC 61076-2-101 D (M12) - Contact type: SPCO/SPDT (Hermetically sealed - Volt-free contacts) Electrical data - Connection IEC 61076-2-101 D (M12) - Resistive Load: 830 mA / 24 Vdc - 180 mA / 110 Vdc - Electrical Ratings: U_i = 30 Vdc I_i = 250 mA P_i = 1.3 W - Available ATEX product: II 1 GD Ex ia IIC T6 Ga -60°C ≤ T_a ≤ 80°C Ex ia IIC T4 Ga -60°C ≤ T_a ≤ 125°C II 2 GD Ex db IIC T6* Gb Ex tb IIIC T85°C* Db (T_{amb} : = -60°C to +70°C)* IP66/67 * alternative T/Class and ambients T4, T135°C (T_{amb} = -60°C to +120°C)
</			

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 ±10%	DE M 12 x F 10 P01			
2.0 bar ±10%	DE M 20 x F 10 P01			
5.0 bar ±10%	DE M 50 x F 10 P01			
7.0 bar ±10%	DE M 70 x F 10 P01			
9.5 bar ±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 - Degree protection: 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	
Electrical Differential Pressure Indicator AMP Time junior	
Settings	Ordering code
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



min. 60

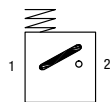
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A

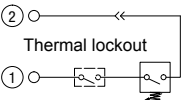
A/F 28
Max tightening torque: 65 N·m

flexible cable: 290 to "A"

Hydraulic symbol



Electrical symbol



Thermal lockout

Materials

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

Technical data

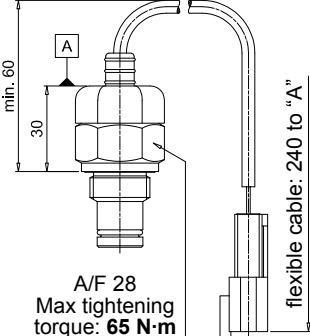
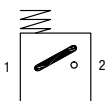
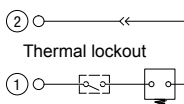
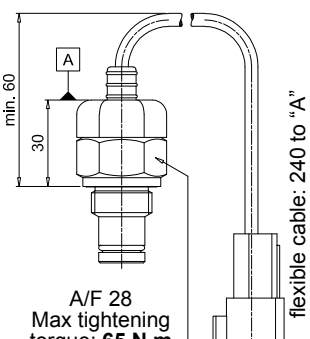
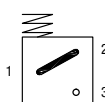
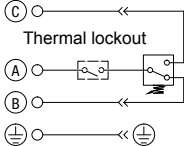
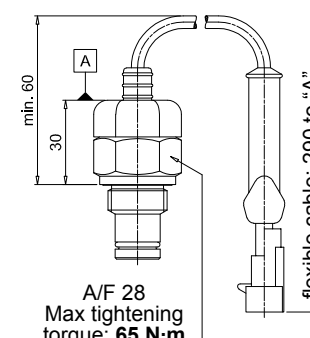
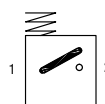
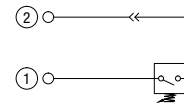
- Max working pressure: 420 bar
- Proof pressure: 630 bar
- Burst pressure: 1260 bar
- Working temperature: From -25 °C to +110 °C
- Compatibility with fluids: Mineral oils, Synthetic fluids
- Degree protection: HFB and HFC according to ISO 2943
- Degree protection: IP66 according to EN 60529

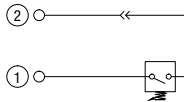
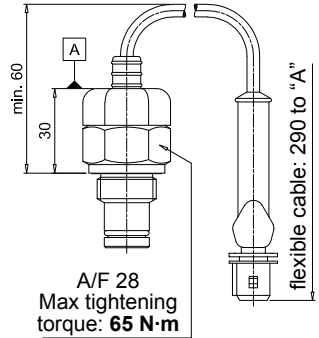
Electrical data

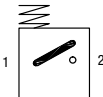
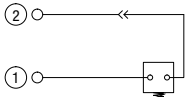
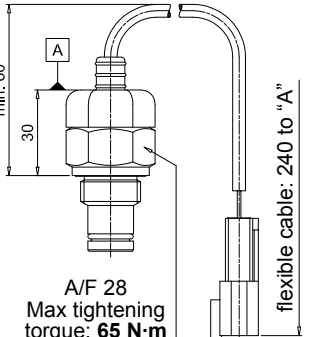
- Electrical connection: AMP Time junior
- Resistive load: 0.2 A / 115 Vdc
- Switching type: Normally open contacts (NC on request)
- Thermal lockout: Normally open up to 30 °C (option "F")

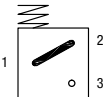
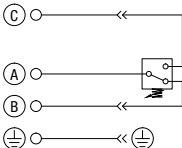
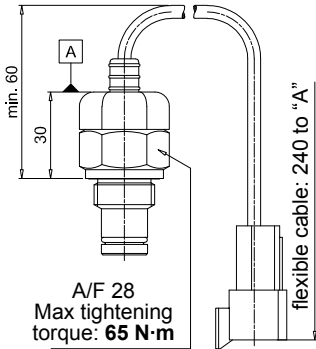
DIFFERENTIAL PRESSURE INDICATORS

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														

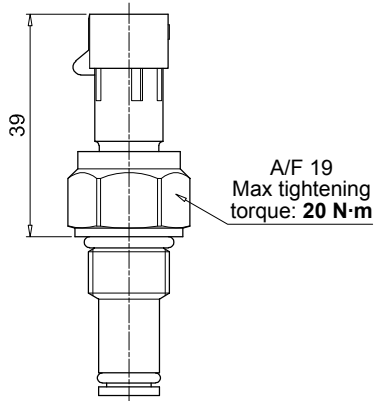
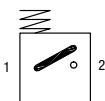
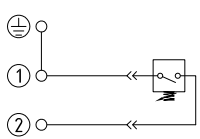
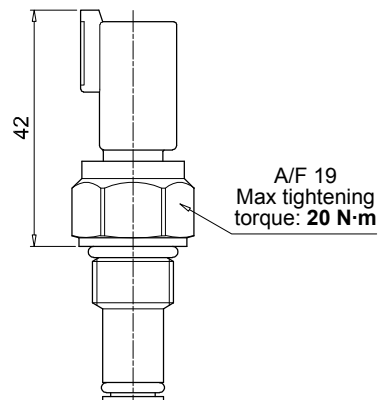
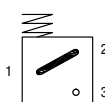
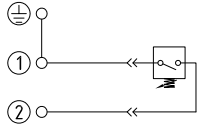
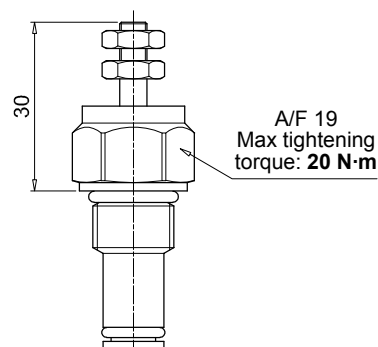
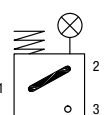
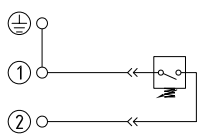
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Electrical Differential Pressure Indicator AMP Time junior									
Settings	Ordering code								
1.2 bar ±10%	DE M 12 x A 20 P01								
2.0 bar ±10%	DE M 20 x A 20 P01								
5.0 bar ±10%	DE M 50 x A 20 P01								
7.0 bar ±10%	DE M 70 x A 20 P01								
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								
1.2 bar ±10%	DE M 12 x A 30 P01								
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								
									

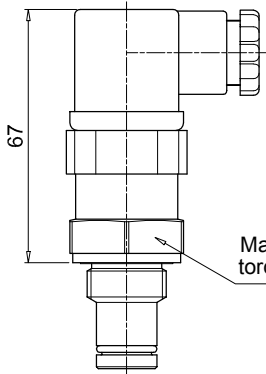
DEM*A35		Hydraulic symbol	Electrical symbol	Materials	Technical data	Electrical data			
Electrical Differential Pressure Indicator Deutsch DT-04-3-P									
Settings	Ordering code								
1.2 bar $\pm 10\%$	DE M 12 x A 35 P01								
2.0 bar $\pm 10\%$	DE M 20 x A 35 P01								
5.0 bar $\pm 10\%$	DE M 50 x A 35 P01								
7.0 bar $\pm 10\%$	DE M 70 x A 35 P01								
9.5 bar $\pm 10\%$	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: Brass - Internal parts: Brass - Polyamide - Contacts: Silver - Seal: HNBR Technical data - 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 - Degree protection: HFB and HFC according to ISO 2943 IP67 according to EN 60529 Electrical data - Electrical connection: AMP Superseal series 1.5 - Resistive load: 0.2 A / 24 Vdc - Switching type: 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: Brass - Internal parts: Brass - Polyamide - Contacts: Silver - Seal: HNBR Technical data - 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 - Degree protection: HFB and HFC according to ISO 2943 IP67 according to EN 60529 Electrical data - Electrical connection: Deutsch DT-04-2-P - Resistive load: 0.2 A / 24 Vdc - Switching type: 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: Brass - Internal parts: Brass - Polyamide - Contacts: Silver - Seal: HNBR Technical data - 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 - Degree protection: HFB and HFC according to ISO 2943 IP67 according to EN 60529 Electrical data - Electrical connection: Stud #10-32 UNF - Resistive load: 0.2 A / 24 Vdc - Switching type: 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									

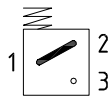
DEU*50 UL	
Electrical Differential Pressure Indicator	
Connection EN 175301-803	
Settings	Ordering code
2.0 bar ±10%	DE U 20 V A 50 P01 UL
5.0 bar ±10%	DE U 50 V A 50 P01 UL
7.0 bar ±10%	DE U 70 V A 50 P01 UL



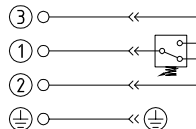
67

A/F 30
Max tightening
torque: 50 N·m

Hydraulic symbol



Electrical symbol





- Certification: UL
- Certification included as standard

Materials

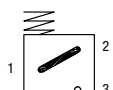
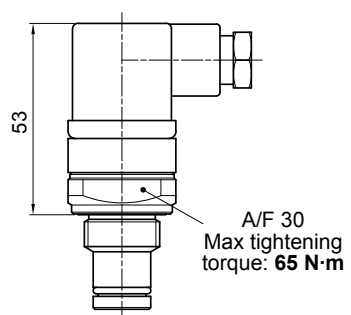
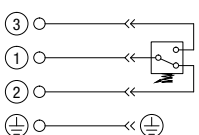
- Body: Brass
- Base: Black Polyamide
- Contacts: Silver
- Seal: FPM

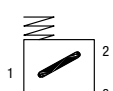
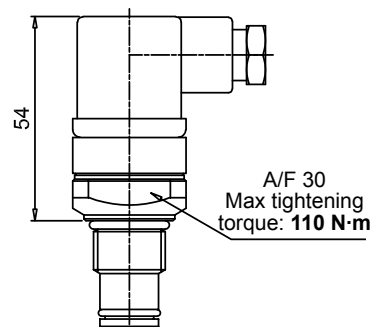
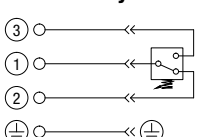
Technical data

- 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 data

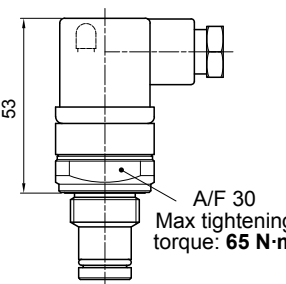
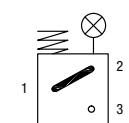
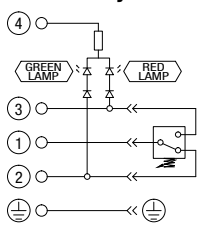
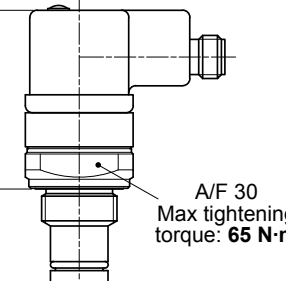
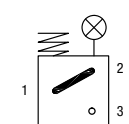
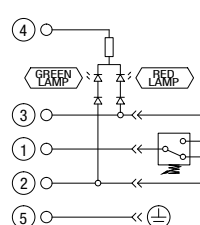
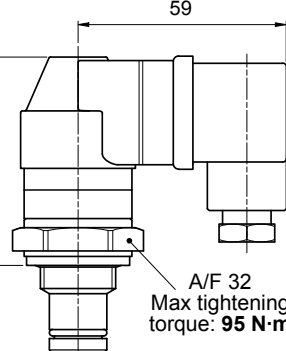
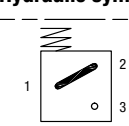
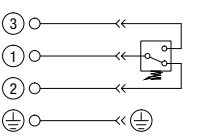
- Electrical connection: EN 175301-803
- Resistive load: 3 A / 30 Vdc
3 A / 125 Vac
3 (3) A / 250 Vac

DEX*50		Hydraulic symbol	Materials	
Electrical Differential Pressure Indicator Connection: EN 175301-803				
Settings	Ordering code		Materials - Body: AISI 316L - Base: Black 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 - Resistive load: 0.2 A / 115 Vdc	
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 symbol 		

DEZ*50		Hydraulic symbol	Materials	
Electrical Differential Pressure Indicator Connection: EN 175301-803				
Settings	Ordering code		Materials - Body: AISI 316L - Base: Black 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 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	
1.2 bar ±10%	DE Z 12 x A 50 P01			
2.5 bar ±10%	DE Z 25 x A 50 P01			
5.0 bar ±10%	DE Z 50 x A 50 P01			
7.0 bar ±10%	DE Z 70 x A 50 P01			
9.5 bar ±10%	DE Z 95 x A 50 P01			
		Electrical symbol 		

DIFFERENTIAL PRESSURE INDICATORS

Dimensions

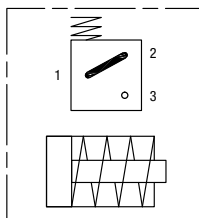
DLA*51 - DLA*52 Electrical/Visual Differential Pressure Indicator Connection: EN 175301-803 51: Transparent base with lamps 24 Vdc 52: Transparent base with lamps 110 Vdc <table><tr><th>Settings</th><th>Ordering code</th></tr><tr><td>1.2 bar ±10%</td><td>DL A 12 x A xx P01</td></tr><tr><td>2.0 bar ±10%</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

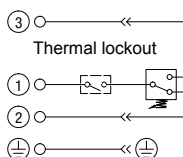
Settings	Ordering code
1.2 bar $\pm 10\%$	DL E 12 x F 50 P01
2.0 bar $\pm 10\%$	DL E 20 x F 50 P01
5.0 bar $\pm 10\%$	DL E 50 x F 50 P01
7.0 bar $\pm 10\%$	DL E 70 x F 50 P01
9.5 bar $\pm 10\%$	DL E 95 x F 50 P01

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

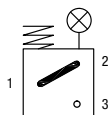
DLX*51 - DLX*52
Electrical/Visual Differential Pressure Indicator
 Connection: EN 175301-803

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

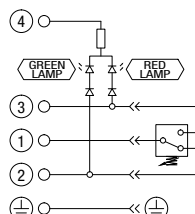
Settings	Ordering code
1.2 bar $\pm 10\%$	DL X 12 x A 5x P01
2.0 bar $\pm 10\%$	DL X 20 x A 5x P01
5.0 bar $\pm 10\%$	DL X 50 x A 5x P01
7.0 bar $\pm 10\%$	DL X 70 x A 5x P01
9.5 bar $\pm 10\%$	DL X 95 x A 5x P01

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

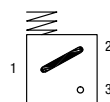
DLZ*51 - DLZ*52
Electrical/Visual Differential Pressure Indicator
 Connection: EN 175301-803

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

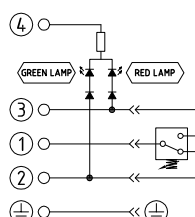
Settings	Ordering code
1.2 bar $\pm 10\%$	DL Z 12 x A 5x P01
2.5 bar $\pm 10\%$	DL Z 25 x A 5x P01
5.0 bar $\pm 10\%$	DL Z 50 x A 5x P01
7.0 bar $\pm 10\%$	DL Z 70 x A 5x P01
9.5 bar $\pm 10\%$	DL Z 95 x A 5x P01

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

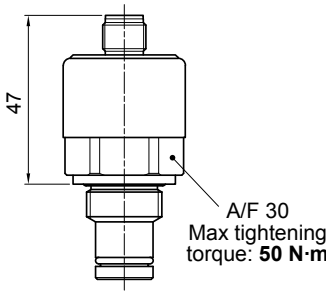
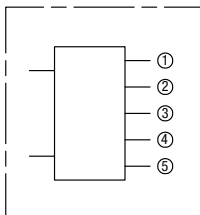
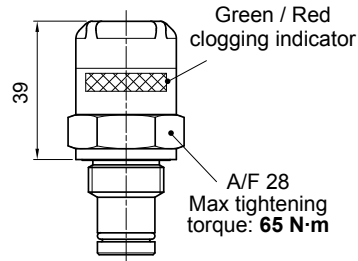
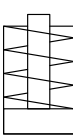
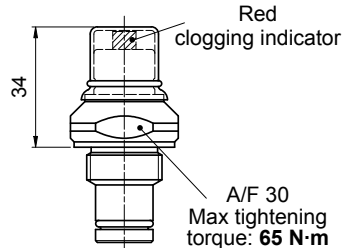
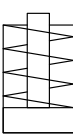
- Max working pressure: 700 bar
- Proof pressure: 1050 bar
- Burst pressure: 2100 bar
- Working temperature: From -25 °C to +110 °C
- Compatibility with fluids: Mineral oils, Synthetic fluids
HFB and HFC according to ISO 2943
- Degree protection: IP66 according to EN 60529
IP69K according to ISO 20653

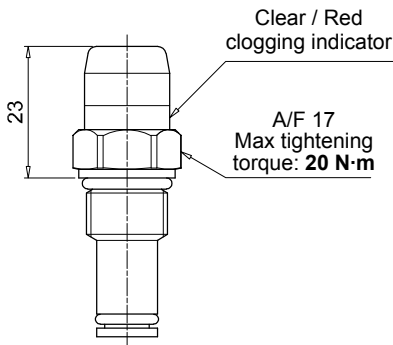
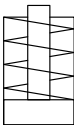
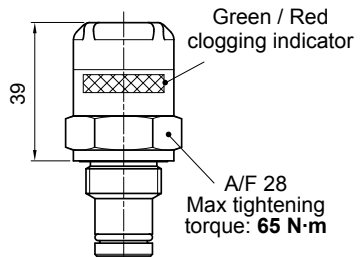
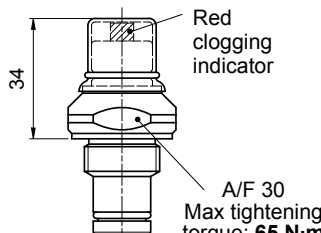
Electrical data

- 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>  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>  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>  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																																		
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																																		

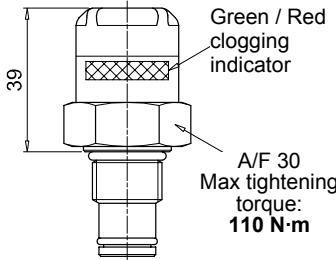
DVS Visual Differential Pressure Indicator <table><tr><th>Settings</th><th>Ordering code</th></tr><tr><td>1.2 bar ±10%</td><td>DV S 12 H P01</td></tr><tr><td>2.5 bar ±10%</td><td>DV S 25 H P01</td></tr><tr><td>4.0 bar ±10%</td><td>DV S 40 H P01</td></tr></table>  Clear / Red clogging indicator A/F 17 Max tightening torque: 20 N·m	Settings	Ordering code	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	Hydraulic symbol 	Materials - Body: - Internal parts: - Seal: Brass Brass - Polyamide HNBR Technical data - Reset: - Max working pressure: - Proof pressure: - Burst pressure: - Working temperature: - Compatibility with fluids: - Degree protection: Automatic reset 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				
Settings	Ordering code													
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													
DVX Visual Differential Pressure Indicator <table><tr><th>Settings</th><th>Ordering code</th></tr><tr><td>1.2 bar ±10%</td><td>DV X 12 x P01</td></tr><tr><td>2.0 bar ±10%</td><td>DV X 20 x P01</td></tr><tr><td>5.0 bar ±10%</td><td>DV X 50 x P01</td></tr><tr><td>7.0 bar ±10%</td><td>DV X 70 x P01</td></tr><tr><td>9.5 bar ±10%</td><td>DV X 95 x P01</td></tr></table>  Green / Red clogging indicator A/F 28 Max tightening torque: 65 N·m	Settings	Ordering code	1.2 bar ±10%	DV X 12 x P01	2.0 bar ±10%	DV X 20 x P01	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	Hydraulic symbol 	Materials - Body: - Internal parts: - Seal: AISI 316L AISI 316L - Polyamide HNBR - MFQ 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 X 12 x P01													
2.0 bar ±10%	DV X 20 x P01													
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													
DVY Visual Differential Pressure Indicator <table><tr><th>Settings</th><th>Ordering code</th></tr><tr><td>1.2 bar ±10%</td><td>DV Y 12 x P01</td></tr><tr><td>2.0 bar ±10%</td><td>DV Y 20 x P01</td></tr><tr><td>5.0 bar ±10%</td><td>DV Y 50 x P01</td></tr><tr><td>7.0 bar ±10%</td><td>DV Y 70 x P01</td></tr><tr><td>9.5 bar ±10%</td><td>DV Y 95 x P01</td></tr></table>  Red clogging indicator A/F 30 Max tightening torque: 65 N·m	Settings	Ordering code	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	Hydraulic symbol 	Materials - Body: - Internal parts: - Seal: AISI 316L AISI 316L - Polyamide HNBR - MFQ 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													
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													

DIFFERENTIAL PRESSURE INDICATORS

Dimensions

DVZ		Hydraulic symbol		Materials	
Visual Differential Pressure Indicator				- Body:	AISI 316L
				- Internal parts:	AISI 316L - Polyamide
				- Seal:	HNBR - MFQ
				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		

Settings	Ordering code
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

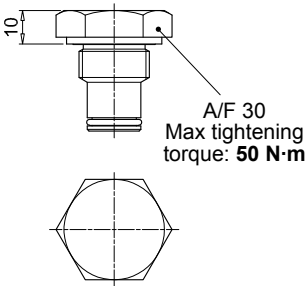


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Green / Red
clogging
indicator

A/F 30
Max tightening
torque:
110 N·m

T2	
Plug	
Seal	Ordering code
HNBR	T2 H
FPM	T2 V

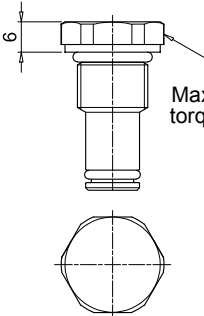


A/F 30
Max tightening
torque: **50 N·m**

Materials

- Body:
Phosphatized steel
- Seal:
HNBR / FPM

T4	
Plug	
Seal	Ordering code
NBR	T4 A

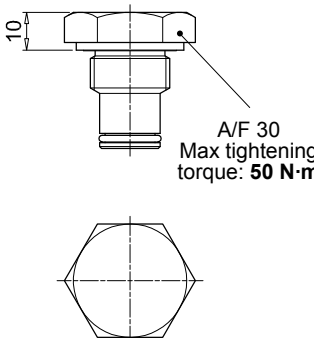


A/F 19
Max tightening
torque: **20 N·m**

Materials

- Body:
Anodized aluminium
- Seal:
NBR

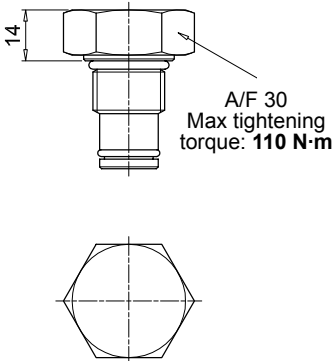
X2		Materials - Body: AISI 316L - Seal: HNBR / FPM / MFQ
Stainless Steel plug 420 bar		
Seal	Ordering code	
HNBR	X2 H	
FPM	X2 V	
MFQ	X2 F	



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

X3		Materials - Body: AISI 316L - Seal: HNBR / FPM / MFQ
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**

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