





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 p	ge INTRODUCTION
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4	COMPANY PROFILE
8	PRODUCT RANGE
11	CONTAMINATION MANAGEMENT
21	FILTER SIZING

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

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

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

			up 1	O P _{max}	up to	Q _{max}
294) p	age	SPIN-ON FILTERS	bar	psi	l/min	gpm
297	MPS	Low pressure filter, available with single cartridge (CS) for in-line or flange mounting or with two cartridge on the same axis on the opposite sides	12	174	365	96
313	MSH	In-line low and medium pressure filter available with single cartridge (CH)	35	508	195	52
724	CLOGGING INDICATORS					





714 QUICK REFERENCE GUIDE

730 TECHNICAL DATA

718 DESIGNATION AND ORDERING CODES



			up to	o P _{max}	up to	Q _{max}
320 p	age	LOW & MEDIUM PRESSURE FILTERS	bar	psi	I/min	gpm
323	LFEX	In-line filter with plastic bowl	16	232	300	79
333	LPH 630	Off-line low pressure filter	10	145	1600	352
341	LMP 110	In-line low & medium pressure filter, low to medium flow rate	80	1160	165	44
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) p	age	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
563	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) p	age	STAINLESS STEEL HIGH PRESSURE FILTERS	bar	psi	I/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	Supran procedure med not contamadad openation requiremente		00.0		
			up to	P _{max}	up to	Q _{max}
668) p	age	FILTERS FOR POTENTIALLY EXPLOSIVE ATMOSPHERE	bar	psi	I/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 p	age	CLOGGING INDICATORS				



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 **EADER** Our customer-oriented philosophy, which enables us to satisfy all customer requests rapidly and with personalized products, makes us a dynamic and flexible enterprise. The possibility of constantly controlling and monitoring the entire production process is essential to allow us to guarantee the quality of our products.

WORLDWIDE PRESENCE



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

The Group boasts **9** business branches



TECHNOLOGY



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.

NUMBER OF STREET

LIT MIN















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 I/min up to 200 I/min



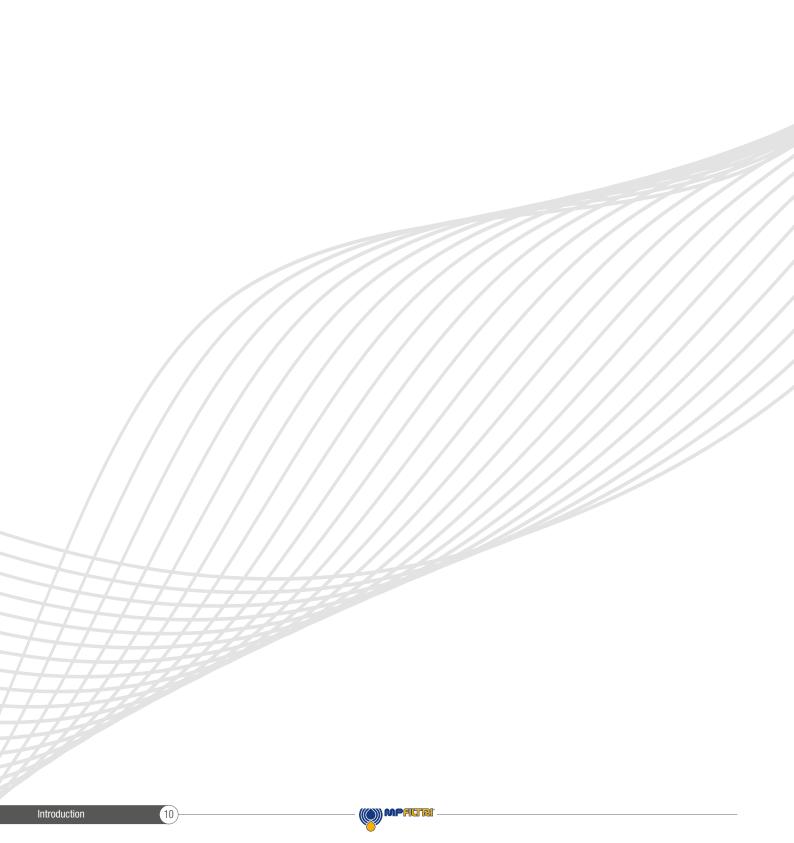
POWER TRANSMISSION PRODUCTS

- 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:



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(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

ADHESION

EROSION

A).01

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.

MODIFICATION OF FLUID PROPERTIES

- FLUID OXIDATION
 Cause of corrosion acceleration of metal parts.
- (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



- 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 μ m_(c) per millilitre of fluid;

The second scale number represents the number of particles equal to or larger than $6 \mu m_{(c)}$ per millilitre of fluid;

The third scale number represents the number of particles equal to or larger than $14~\mu m_{(c)}$ per millilitre of fluid.

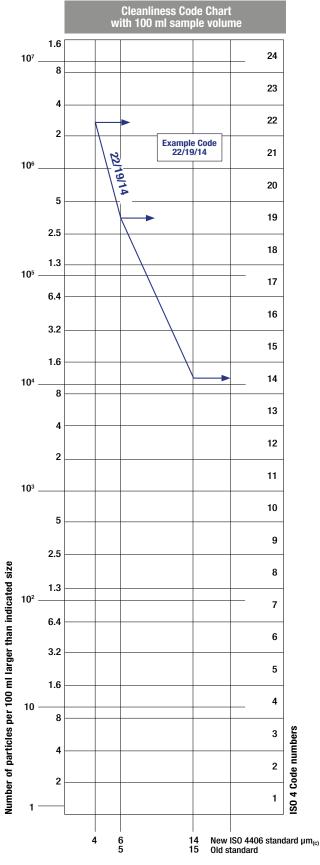
ISO 4406 - Allocation of Scale Numbers

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			

> $4 \mu m_{(c)} = 350 \text{ particles}$ > $6 \mu m_{(c)} = 100 \text{ particles}$ > $14 \mu m_{(c)} = 25 \text{ particles}$ 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 μ m and 15 μ m equivalent to the 6 μ m_(c) and 14 μ 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							
	5-15 μm	15-25 μm	25-50 μm	50-100 μm	>100 µm	(1)		
	6-14 μm _(c)	14-21 μm _(c)	21-38 μm _(c)	38-70 μm _(c)	>70 µm _(c)	(2)		
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			

6 - 14 μ m_(c) = 15 000 particles 14 - 21 μ m_(c) = 2 200 particles 21 - 38 μ m_(c) = 200 particles $38 - 70 \, \mu m_{(c)} =$ 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 µm	>5 µm	>15 µm	>25 µm	>50 µm	>100 µm	(1)	
	>4 µm _(c)	>6 µm _(c)	>14 µm _(c)	>21 µm _(c)	>38 µm _(c)	>70 µm _(c)	(2)	
000	195	76	14	3	1	0		
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		

 $> 4 \mu m_{(c)} = 45 000 \text{ particles}$ $> 6 \mu m_{(c)} = 15 000 \text{ particles}$

 $> 14 \, \mu m_{(c)} = 1500 \, particles$ $> 21 \, \mu m_{(c)} =$ 250 particles

SAE AS4059 REV G cpc* Class 6 6/6/5/5/4/2

cumulative particle count

(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.

- 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		

 $5-15 \, \mu m = 42 \, 000 \, particles$ $15-25 \, \mu m = 2 \, 200 \, particles$ 25-50 μm = 150 particles $50-100 \, \mu m =$ 18 particles

- 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 = 10um



Fig. 1



Fig. 2



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

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- CLEANLINESS CODE COMPARISON

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

ISO 4406	SAE AS4059 Table 2	SAE AS4059 Table 1	NAS 1638
> 4 μm _(c) 6 μm _(c) 14 μm _(c)	> 4 μm _(c) 6 μm _(c) 14 μm _(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

Microfibre filtration technology Microfibre TRATION Polyester Microfibre RE-FILTRATION LAYER

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 $(B_{\mathrm{X(C)}})$ is defined as the ratio between the number of particles of certain dimensions detected upstream and downstream of the filter.

Upstream particles number $> X \mu m_{(c)}$ $= \beta_{X(C)}$ Downstream particles number $> X \mu m_{(c)}$



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

- SURFACE FILTRATION It is by direct interception. The filter prevents particles larger than the pores

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

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

from continuing in the plant / system. Surface filters are generally manufactured with metal canvases or meshes.

- DEPTH FILTERING

of contamination.

ways:

(6) FILTRATION TECHNOLOGIES

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.

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

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 FILIRATION									
		-	1						
	-								
	7								
3.									

WIDE MEOU EUTDATION





Filtration ISO Standard Comparison									
$\beta_{\rm X(C)} > 1000$	$\beta_{\rm X(C)} > 1000$ $\beta_{\rm X} > 200$								
ISÓ 16889	ISO 4572	Filter media code							
5 μm _(c)	3 μm	A03							
7 μm _(c)	6 μm	A06							
10 μm _(c)	10 μm	A10							
16 μm _(C)	18 μm	A16							
21 μm _(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.

Distance and a						
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	B _{21(c)}	B _{15(c)}	B _{10(c)}	B7(c)	B7(c)	B _{5(c)}
filtration $\beta x(c) \ge 1.000$	>1000	>1000	>1000	>1000	>1000	>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 $60 \div 125 \,\mu m$. 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 CASUALITIES

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

• MAXIMUM WORKING PRESSURE (Pmax)

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 (Bx(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.



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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.

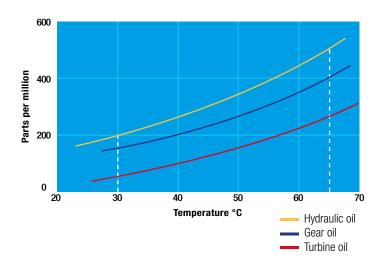
(11) WATER IN HYDRAULIC AND LUBRICATING FLUIDS

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.



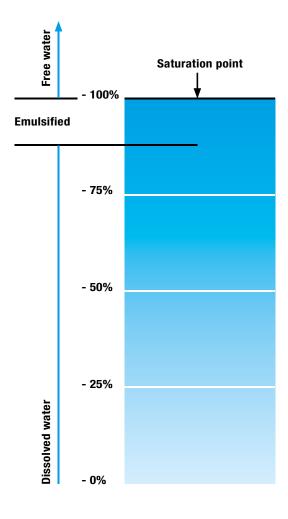
Saturation Levels

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



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 $B_{X(C)} = 1000$.

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).

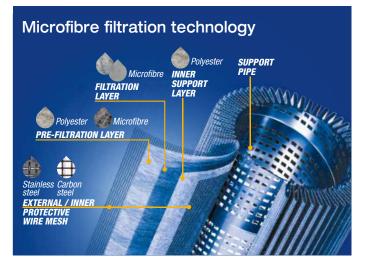


Absorber media layer



The Filter Media has absorbed water

Fabric that absorbs 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





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

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(12) THE ANTI-STATIC 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.

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.



1. Contact



2. Distance ≤ 10 mm





4. Electrostatic charged bodies







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

Scan or click me!





FILTER SIZING

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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 Δpc of the housing is proportional to the fluid density (kg/dm³/lb/ft³).

The filter element pressure drop Δpe is proportional to its viscosity (mm²/s / SUS), the corrective factor Y have to be used in case of an oil viscosity different than 30 mm²/s (cSt) / 150 SUS.

Sizing data for single filter element, head at top

 Δpc = Filter housing pressure drop [bar / psi]

 Δpe = 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 mm²/s (cSt) /150 SUS

V2 = operating oil viscosity in mm²/s (cSt) / SUS

Filter element pressure drop calculation with an oil viscosity different than 30 mm²/s (cSt) / 150 SUS

International system:

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

Imperial system:

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

 Δp Tot. = $\Delta pc + \Delta pe$

Verification formula

 Δp Tot. $\leq \Delta p$ 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

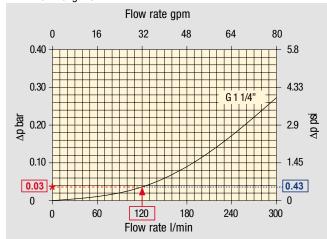
Required filtration efficiency = $25 \mu m$ absolute filtration with microfibre

Pressure Pmax = 10 bar / 145.03 psi Flow rate Q = 120 l/min / 31.7 gpm Viscosity V2 = 46 mm²/s (cSt) / 216 SUS Oil density = 0.86 kg/dm^3 / 53.68 lb/ft^3

Calculation:

 $\Delta pc = 0.03 \, bar / 0.43 \, psi$ (see graphic below)

MPT 110 - Length 3 - 4

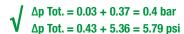


Filter housings Δp pressure drop.

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					inal filtr N Series	
Туре		A03	A06	A10	A16	A25	P(00)10	P(00)25	M(00)25 M(00)60 M(00)90
Return filte	rs	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
MF 020	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
	1	28.20	24.40	8.67	8.17	6.88	4.62	3.96	1.25
MF 100	2	17.33	12.50	6.86	5.70	4.00	3.05	2.47	1.10
MFX 100	3	10.25	9.00	3.65	3.33	2.50	1.63	1.32	0.96
-	4	6.10	5.40	2.30	2.20	2.00	1.19	0.96	0.82

 $\Delta pe = (2.00: 1000) \times 120 \times (46: 30) = 0.37 \text{ bar}$ $\Delta pe = (2.00: 17.2) \times 32 \times (216: 150) = 5.36 \text{ psi}$



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					
Туре	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
FEX 000	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
LEV 110	20	0.90	0.76	0.15	0.10	0.09	0.09

RETURN FILTERS

Reference oil viscosity 30 mm²/s

Filter elemer	nt		Absolute filtration Filter element ΔP Series: H					Nominal filtration Filter Element ΔP Series: N		
Туре	Length	A03	A06	A10	A16	A25	P10	P25	M25 - M60 - M90	
	1	74.00	50.08	20.00	16.00	9.00	6.43	5.51	4.40	
MF 020	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	
MFX 030 MF 030	1	74.00	50.08	20.00	16.00	9.00	6.43	5.51	3.40	
	1	28.20	24.40	8.67	8.17	6.88	4.62	3.96	1.25	
MF 100	2	17.33	12.50	6.86	5.70	4.00	3.05	2.47	1.10	
MFX 100	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	1	3.67	3.05	1.64	1.56	1.24	1.18	1.06	0.26	
MFX 180	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	
	1	3.20	2.75	1.39	1.33	1.06	0.96	0.87	0.22	
MF 400 MFX 400	2	2.00	1.87	0.88	0.85	0.55	0.49	0.45	0.13	
X 100	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	
		0.00	0.01	1110	11.20	1.17			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.



FILTER SIZING Corrective factor

RETURN FILTERS

Filter eleme	nt			bsolute filtratio element ∆P Ser			Fi	Nominal filt Iter Element ΔP	
Туре	Length	A03	A06	A10	A16	A25	P10	P25	M25 - M60 - M90
									M25
MR 250	2	3.61	4.08	1.81	1.71	1.35	-	-	0.55
IVIN 200	4	2.10	1.70	1.14	0.77	0.53	-	-	0.60
	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
MR 100	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
	1	5.35	4.85	2.32	1.92	1.50	1.38	1.20	0.15
MR 250	2	4.00	3.28	1.44	1.10	1.07	0.96	0.83	0.13
IVIN 230	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
	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
MR 630	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
	1	0.60	0.43	0.34	0.25	0.13	0.12	0.09	0.03
MR 850	2	0.37	0.26	0.23	0.21	0.11	0.08	0.07	0.03
11111 000	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 elemer	nt			
Туре	Length	A10	A16	A25
RSX 116	1	5.12	4.33	3.85
NOV 110	2	2.22	1.87	1.22
BOV 405	1	2.06	1.75	1.46
RSX 165 RSX 166	2	1.24	1.05	0.96
110A 100	3	0.94	0.86	0.61

Filter elemen	t	Absolute filtration Filter Element ΔP Series: N							
Туре	Length	A03	A06	A10	A16	A25	P10	P25	M25 - M60 - M90
	1	16.25	15.16	8.75	8.14	5.87	2.86	2.65	0.14
011440	2	12.62	10.44	6.11	6.02	4.16	1.60	1.49	0.12
CU 110	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

LOW & MEDIUM PRESSURE FILTERS

Filter element		Absolute filtration Filter Element ΔP Series: N - W					Nominal filtration Filter Element ΔP Series: N		
Туре	Length	A03	A06	A10	A16	A25	P10	P25	M25
	1	16.25	15.16	8.75	8.14	5.87	2.86	2.65	0.14
CU 110	2	12.62	10.44	6.11	6.02	4.15	1.60	1.49	0.12
00 110	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
	1	5.30	4.80	2.00	1.66	1.32	0.56	0.43	0.12
CU 210	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
	016	7.95	7.20	3.00	2.49	1.98	0.84	0.65	0.18
DN	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
	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
CU 400	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
011.050	2	1.03	0.80	0.59	0.40	0.26	-	-	0.05
CU 950	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	i ,		Nominal filtration Filter El. ΔP Series: N				
Туре	Length	A03	A06	A10	A16	A25	M25
	1	332.71	250.07	184.32	152.36	128.36	-
HP 010	2	220.28	165.56	74.08	59.13	37.05	-
HP 011	3	123.24	92.68	41.48	33.08	20.72	-
	4	77.76	58.52	28.37	22.67	16.17	-
	2	70.66	53.20	25.77	20.57	14.67	4.90
HP 039	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
	1	31.75	30.30	13.16	12.3	7.29	1.60
UD 050	2	24.25	21.26	11.70	9.09	4.90	1.40
HP 050 HPX 050	3	17.37	16.25	8.90	7.18	3.63	1.25
III X 030	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
	1	58.50	43.46	23.16	19.66	10.71	1.28
HP 065	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
	1	20.33	18.80	9.71	8.66	4.78	2.78
HP 135	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
UD 450	1	17.53	15.91	7.48	6.96	5.94	1.07
HP 150 HPX 150	2	8.60	8.37	3.54	3.38	3.15	0.58
111 ⁻ A 150	3	6.53	5.90	2.93	2.79	2.12	0.49

TO BE CONTINUED >>





FILTER SIZING Corrective factor

HIGH PRESSURE FILTERS

Filter element			Nominal filtration Filter El. ΔP Series: N				
Туре	Length	A03	A06	A10	A16	A25	M25
	1	10.88	9.73	5.02	3.73	2.54	1.04
HP 320	2	4.40	3.83	1.75	1.48	0.88	0.71
NF 320	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
	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
HP 500	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
	1	3.65	2.95	2.80	1.80	0.90	0.38
HP 325	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						
Туре	Length	A03	A06	A10	A16	A25		
	1	424.58	319.74	235.17	194.44	163.78		
HP 010	2	281.06	211.25	94.35	75.45	47.26		
HP 011	3	130.14	97.50	43.63	34.82	21.81		
	4	109.39	82.25	36.79	29.37	18.40		
	2	73.00	57.00	28.00	24.00	17.20		
HP 039	3	40.90	36.33	21.88	18.80	11.20		
	4	31.50	28.22	17.22	9.30	6.70		
	1	47.33	34.25	21.50	20.50	14.71		
UD OFO	2	29.10	25.95	10.04	10.90	5.88		
HP 050 HPX 050	3	20.85	19.50	10.68	8.61	4.36		
III X 050	4	14.55	12.90	7.32	6.90	3.69		
	5	9.86	9.34	6.40	4.80	2.50		
	1	29.16	25.33	13.00	12.47	5.92		
HP 135	2	14.28	11.04	7.86	7.90	4.44		
	3	8.96	7.46	4.89	4.16	3.07		
	1	13.00	12.19	6.80	6.40	3.32		
HP 320	2	6.45	5.31	3.01	2.89	1.73		
HF 320	3	4.13	3.14	1.90	1.78	1.17		
	4	3.17	2.71	1.80	1.70	1.10		
	1	9.70	8.81	4.55	4.47	2.80		
	2	5.46	4.63	2.88	2.68	2.20		
HP 500	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		

STAINLESS STEEL HIGH PRESSURE FILTERS

Filter element			Nominal filtration Filter El. ΔP Series: N				
Туре	Length	A03	A06	A10	A16	A25	M25
	1	332.71	250.07	184.32	152.36	128.36	-
HP 010	2	220.28	165.56	74.08	59.13	37.05	-
HP 011	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
	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
HP 050	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
	1	20.33	18.80	9.71	8.66	4.78	2.78
HP 135	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						
Туре	Length	A03	A06	A10	A16	A25		
	1	424.58	319.74	235.17	194.44	163.78		
HP 010	2	281.06	211.25	94.35	75.45	47.26		
HP 011	3	130.14	97.50	43.63	34.82	21.81		
	4	109.39	82.25	36.79	29.37	18.40		
	2	73.00	57.00	28.00	24.00	17.20		
HP 039	3	40.90	36.33	21.88	18.80	11.20		
	4	31.50	28.22	17.22	9.30	6.70		
	1	47.33	34.25	21.50	20.50	14.71		
	2	29.10	25.95	10.04	10.90	5.88		
HP 050	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		
	1	29.16	25.33	13.00	12.47	5.92		
HP 135	2	14.28	11.04	7.86	7.90	4.44		
	3	8.96	7.46	4.89	4.16	3.07		

FILTER SIZING Corrective factor

FILTERS FOR POTENTIALLY EXPLOSIVE ATMOSPHERE

Filter elemer	nt		Nominal filtration Filter El. ΔP Series: N				
Туре	Length	A03	A06	A10	A16	A25	M25
	1	332.71	250.07	184.32	152.36	128.36	-
HP 010	2	220.28	165.56	74.08	59.13	37.05	-
HP 011	3	123.24	92.68	41.48	33.08	20.72	-
	4	77.76	58.52	28.37	22.67	16.17	-
	2	70.66	53.20	25.77	20.57	14.67	4.90
HP 039	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
	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
HPX 050	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
	1	20.33	18.80	9.71	8.66	4.78	2.78
HP 135	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
	1	17.53	15.91	7.48	6.96	5.94	1.07
HP 150	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	Filter element		Absolute filtration Filter Element ΔP Series: S - H - U							
Туре	Length	A03	A06	A10	A16	A25				
	1	424.58	319.74	235.17	194.44	163.78				
HP 010	2	281.06	211.25	94.35	75.45	47.26				
HP 011	3	130.14	97.50	43.63	34.82	21.81				
	4	109.39	82.25	36.79	29.37	18.40				
	2	73.00	57.00	28.00	24.00	17.20				
HP 039	3	40.90	36.33	21.88	18.80	11.20				
	4	31.50	28.22	17.22	9.30	6.70				
	1	47.33	34.25	21.50	20.50	14.71				
	2	29.10	25.95	10.04	10.90	5.88				
HPX 050	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				
	1	29.16	25.33	13.00	12.47	5.92				
HP 135	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.

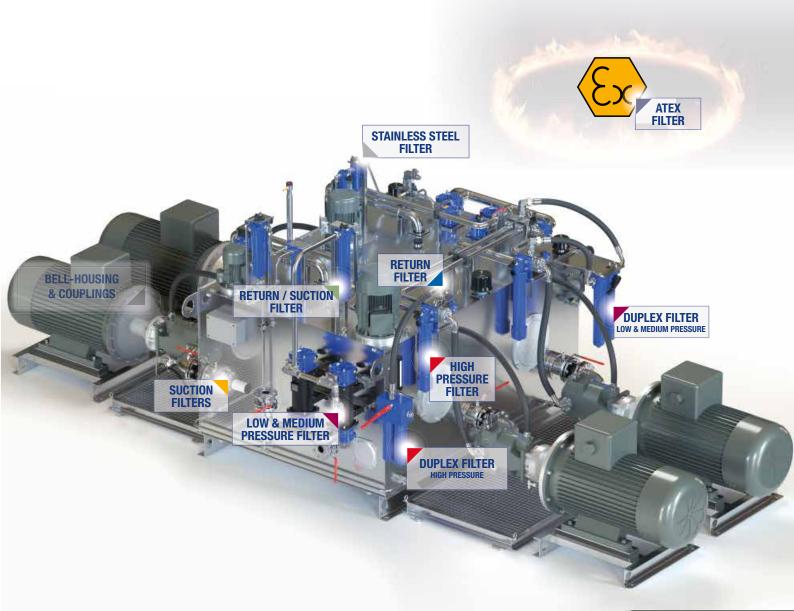
The MP Filtri Selection Tool software program is easy to use with a flexible fast design method and provides improved layout formats with full descriptions.

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!



Spin-On filters are used as process and safety filters to protect individual pumps, valves or the entire hydraulic circuit from contamination as per ISO 4406.

In-line Spin-On filters can be used for the following purposes:

- Suction filters
- On the raturn circuit, for mounting on the line or on the leave
- In-line for low and medium pressure arphications

Spin-On filters are available in 4 configurations:

- Single cartridge in-line
- In-line with two parallel partriage. // .ne same axis
- In line with two parallel cartriar // rounted side by side

All versions may be equipped // visual and/or electrical blockage indicators



Spin-on filters



MPS	page 2	97
MSH	3	13
INDICATORS	724-7	 25



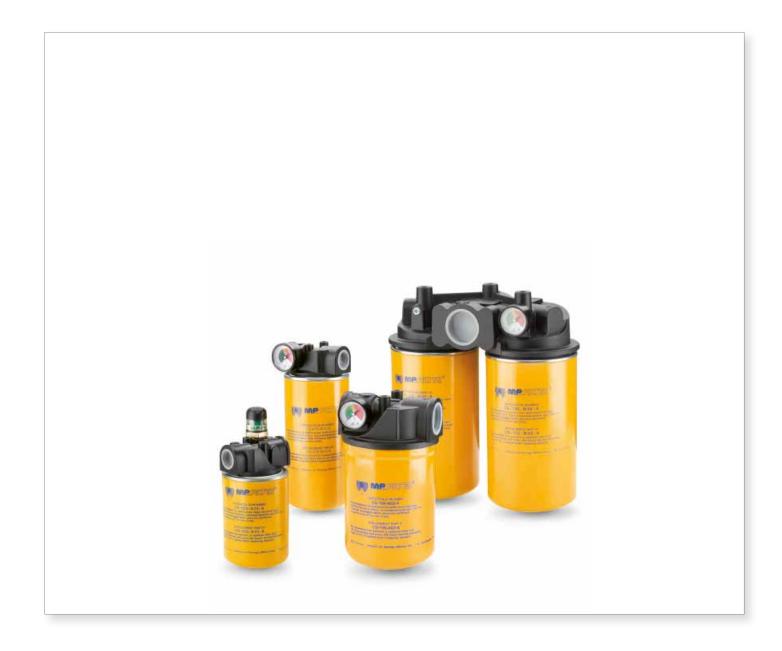






MPS series

Maximum working pressure up to 1.2 MPa (12 bar) - Flow rate up to 365 l/min



Description

Spin-on filters

Maximum working pressure up to 1.2 MPa (12 bar) Flow rate up to 365 l/min

MPS is a range of spin-on filters suitable to be used in suction, return and low pressure lines.

They offer a good balance between performances, dimensions and prices. 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 365 l/min
- Fine filtration rating, to get a good cleanliness level into the reservoir
- Water removal elements (CW), to remove the free water from the hydraulic fluid
- Double connection for the cans, to fit both European and American standard elements
- Double cans fitting, to increase the life time of the filter
- Bypass valve, to relieve excessive pressure drop across the filter media
- Visual, electrical and electronic clogging indicators for suction and return applications
- Visual, electrical and electronic differential clogging indicators for low pressure applications

Common applications:

- Suction lines, Return lines, Delivery lines, in economic industrial equipment or mobile machines.
- Off-line filtration tank in economic industrial equipment or mobile machines

Technical data

Filter housing materials

- Head: Aluminium
- Bypass valve: Polyamide Steel
- Element: Zinc-Plated Steel Painted steel

Bypass valve

- Inline / Return filter opening pressure: 175 kPa (1.75 bar) ±10%
- Inline / Suction filter opening pressure: 30 kPa (0.3 bar) ±10%

Δp element type

- ∆p: 5 bar
- Fluid flow through the filter element from OUT to IN

Seals

Standard NBR - series A

Temperature

From -20 °C to +110 °C

Note

MPS filters are provided for vertical mounting

Weights [kg] and volumes [dm³]

Filter series	Weights [kg]	Volumes [dm³]
MPS 050	1.00	0.70
MPS 051	1.05	0.70
MPS 070	1.20	0.95
MPS 071	1.25	0.95
MPS 100	2.10	1.65
MPS 101	2.20	1.65
MPS 150	2.40	2.00
MPS 151	2.50	2.00
MPS 200	3.90	3.00
MPS 250	4.60	3.70
MPS 300-301	5.30	3.40
MPS 350-351	6.00	4.10

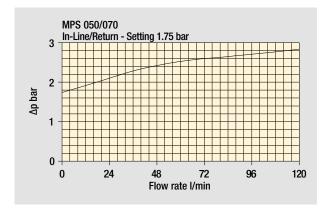
GENERAL INFORMATION MPS

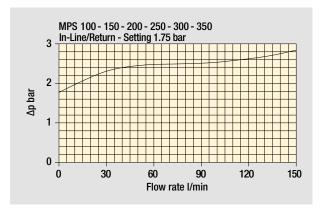
Hydraulic symbols

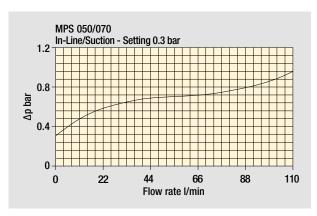
Filter series					
MPS 050	•	-	-	-	-
MPS 051	-	•	-	-	-
MPS 070	•	-	-	-	-
MPS 071	-	•	-	-	-
MPS 100	•	-	-	-	-
MPS 101	-	•	-	-	-
MPS 150	•	-	-	-	-
MPS 151	-	•	-	-	-
MPS 200	-	-	•	-	-
MPS 250	-	-	•	-	-
MPS 300	-	-	-	•	-
MPS 301	-	-	-	-	•
MPS 350	-	-	-	•	-
MPS 351	-	-	-	-	•
	Style U/P	Style U/P	Style U	Style U/P	Style U/P
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	Style R/S	Style R/S	Style R/S	Style R/S	Style R/S
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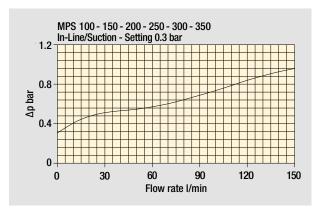
Pressure drop

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.

(300)

CS 050 - 070 - 100 - 150 **CG - CW** 050 - 070







CW

This series of cartridge removes water from oil while filtering the oil at the same time.

Water absorbent polymers up to 800 times their own weight provide this major feature.

Water holding capacities: CW 050= 240 ml Ordering code: **CW050P10AP01**

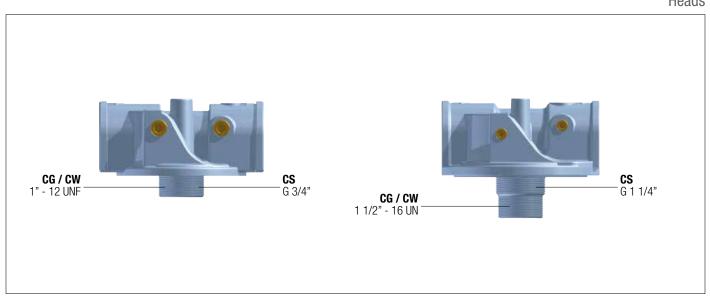
CW 150= 788 ml

Ordering code: CW150P10AP01

Thread connections		
Element	Connection	
CS 050 - 070	G 3/4"	
CS 100 - 150	G 1 1/4"	
CG / CW 050 - 070	1" - 12 UNF	
CG / CW 100 - 150	1 1/2" - 16 UN	

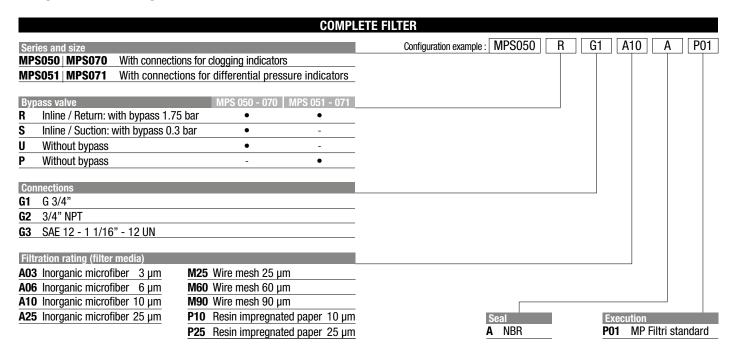
Water holding capacities CW		
	good	poor
Viscosity	30/46 mm ² /s (cSt)	> 46 mm ² /s (cSt)
H ₂ O p.p.m.	600/800 p.p.m.	> 800 p.p.m.
Flow rate	CW050 7/15 I/min CW150 20/40 I/min	CW050 > 20 I/min CW150 > 50 I/min
Temperature	40/60 °C	< 30 °C

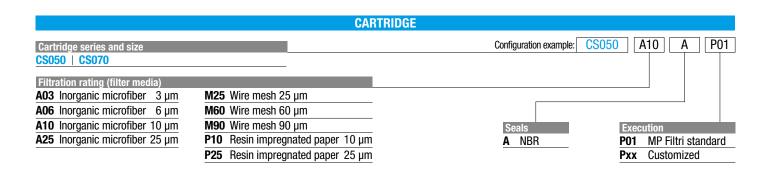
Heads



MPS MPS050 - MPS070 MPS051 - MPS071

Designation & Ordering code

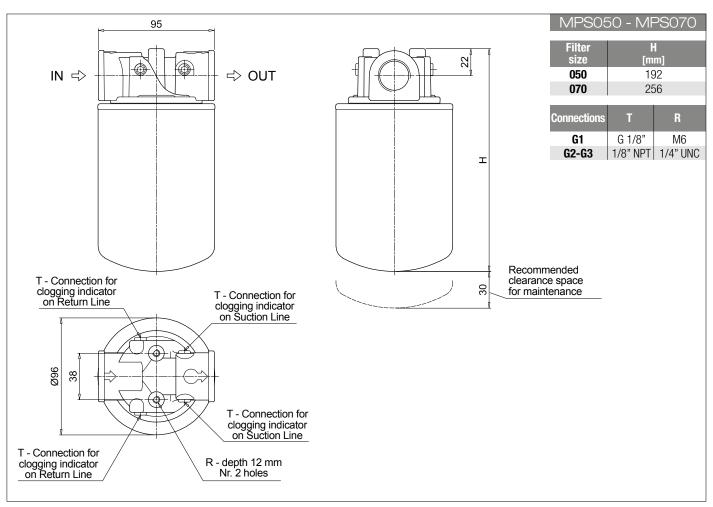


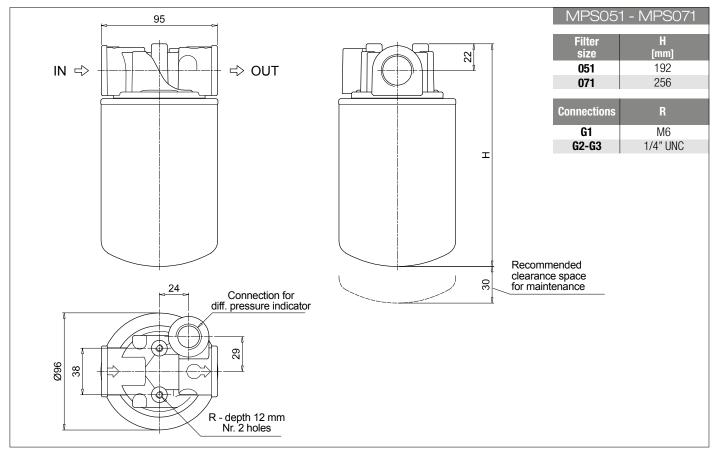


		IUAIU	CLOGGING INDICATORS		
	ng indicators on RETURN line				
BVA A	Axial pressure gauge	BEA	Electrical pressure indicator		
BVR F	Radial pressure gauge	BEM	Electrical pressure indicator		
BVP \	Visual pressure indicator with automatic reset	BLA	Electrical / visual pressure indicator		
BVQ \	Visual pressure indicator with manual reset				
Cloggii	ng indicators on SUCTION line				
VVB /	Axial pressure gauge	VEB	Electrical vacuum indicator		
VVS F	Radial pressure gauge	VLB	Electrical / visual vacuum indicator		
Differe	ential pressure indicators				
DEA E	Electrical differential pressure indicator	DLE	Electrical / visual differential pressure indica	tor	
DEM E	Electrical differential pressure indicator	DTA	Electronic differential pressure indicator		
DEU E	Electrical differential pressure indicator	DVA	Visual differential pressure indicator		
DLA E	Electrical / visual differential pressure indicator	DVM	Visual differential pressure indicator		

(()) MPFILTRI

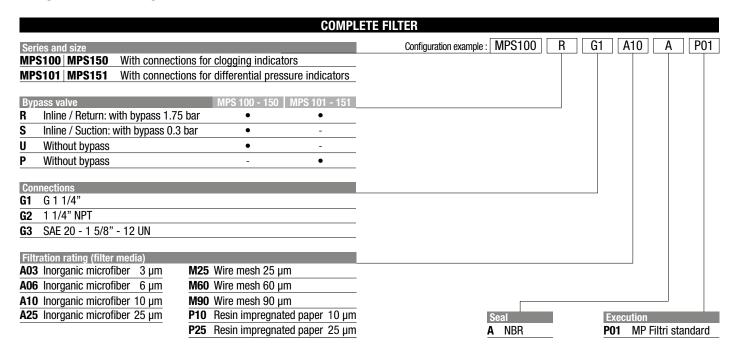
Dimensions

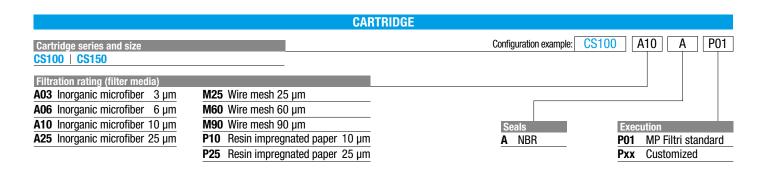




MPS MPS100 - MPS150 MPS101 - MPS151

Designation & Ordering code



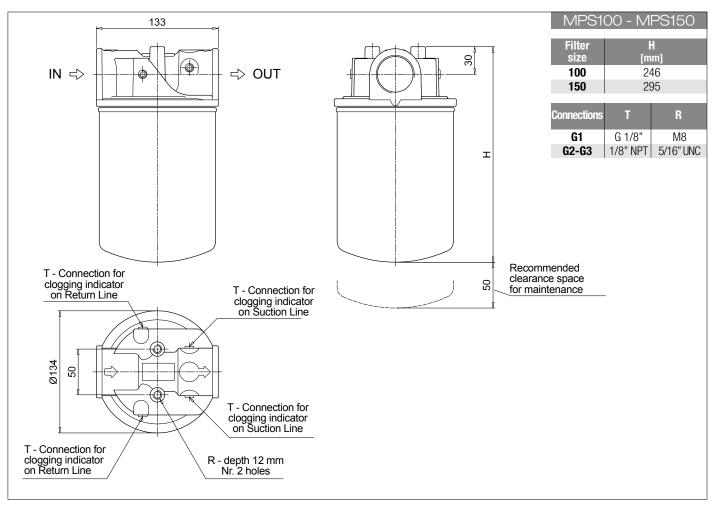


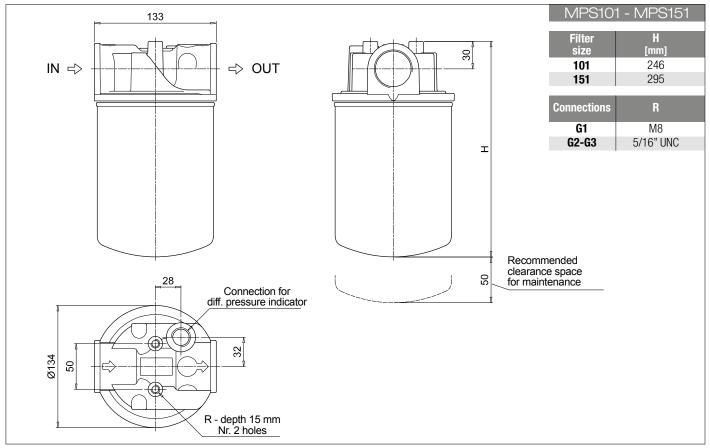
CLOGGING INDICATORS			See page 724-725
Clog	ging indicators on RETURN line		
BVA	Axial pressure gauge	BEA Electrical pressure indicator	
BVR	Radial pressure gauge	BEM Electrical pressure indicator	
BVP	Visual pressure indicator with automatic reset	BLA Electrical / visual pressure indicator	
BVQ	Visual pressure indicator with manual reset		
Clog	ging indicators on SUCTION line		
VVB	Axial pressure gauge	VEB Electrical vacuum indicator	
VVS	Radial pressure gauge	VLB Electrical / visual vacuum indicator	
Diffe	erential pressure indicators		
DEA	Electrical differential pressure indicator	DLE Electrical / visual differential pressure	indicator
DEM	Electrical differential pressure indicator	DTA Electronic differential pressure indicate	tor
DEU	Electrical differential pressure indicator	DVA Visual differential pressure indicator	
DLA	Electrical / visual differential pressure indicator	DVM Visual differential pressure indicator	

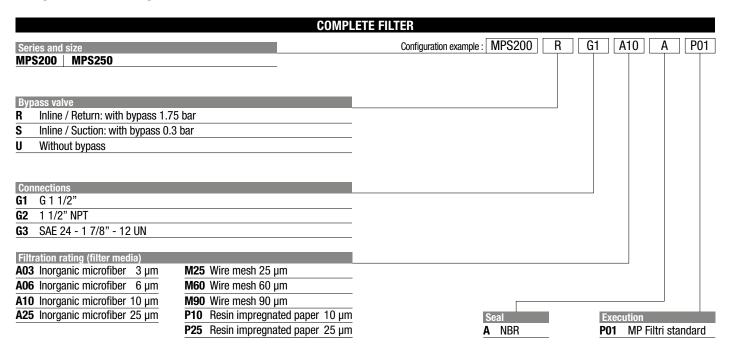
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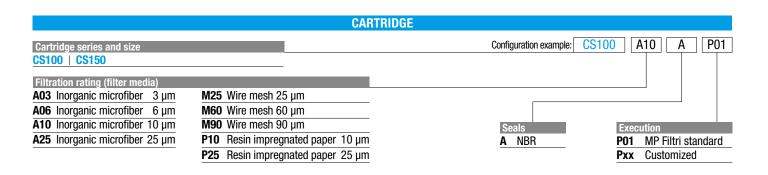
MPS100 - MPS150 MPS101 - MPS151 MPS

Dimensions





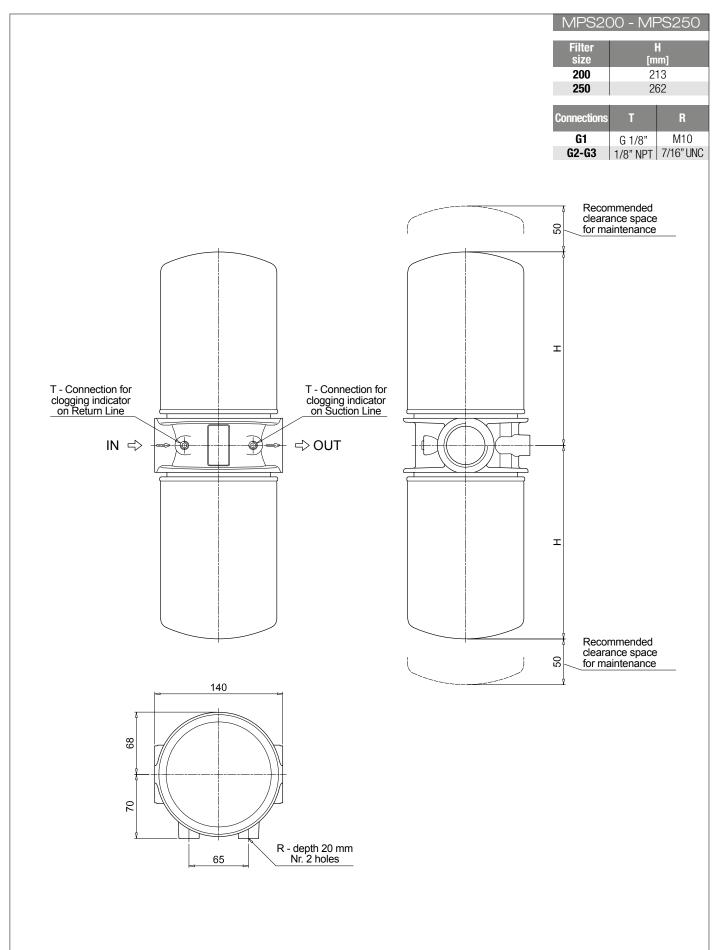




	CLOGGING INDICATORS		See page	724-725	
Clogg	ging indicators on RETURN line				
BVA	Axial pressure gauge	BEA	Electrical pressure indicator		
BVR	Radial pressure gauge	BEM	Electrical pressure indicator		
BVP	Visual pressure indicator with automatic reset	BLA	Electrical / visual pressure indicator		
BVQ	Visual pressure indicator with manual reset				
Clogg	Clogging indicators on SUCTION line				
VVB	Axial pressure gauge	VEB	Electrical vacuum indicator		
VVS	Radial pressure gauge	VLB	Electrical / visual vacuum indicator		

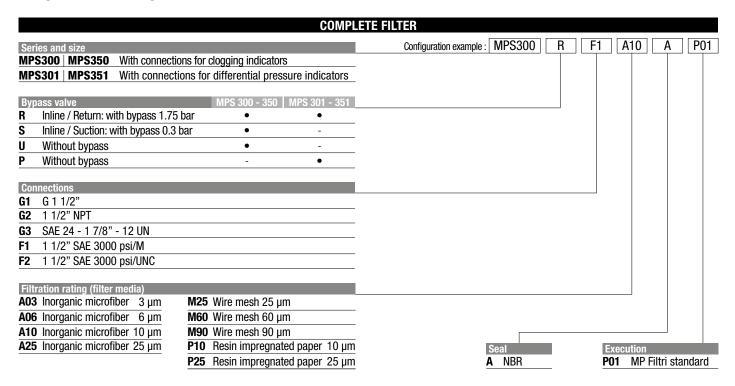
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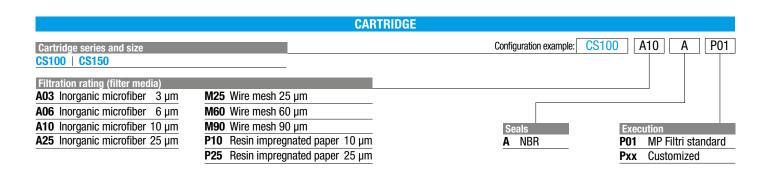
Dimensions



MPS MPS300 - MPS350 MPS301 - MPS351

Designation & Ordering code





	CLOGGI	NG INDI	CATO	RS	See page	724-725
Clogg	ging indicators on RETURN line					
BVA	Axial pressure gauge		BEA	Electrical pressure indicator		
BVR	Radial pressure gauge		BEM	Electrical pressure indicator		
BVP	Visual pressure indicator with automatic reset		BLA	Electrical / visual pressure indicator		
BVQ	Visual pressure indicator with manual reset					
Clogg	ging indicators on SUCTION line					
VVB	Axial pressure gauge		VEB	Electrical vacuum indicator		
VVS	Radial pressure gauge		VLB	Electrical / visual vacuum indicator		
Differ	rential indicators					
DEA	Electrical differential pressure indicator		DLE	Electrical / visual differential pressure indicate	or	
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)					

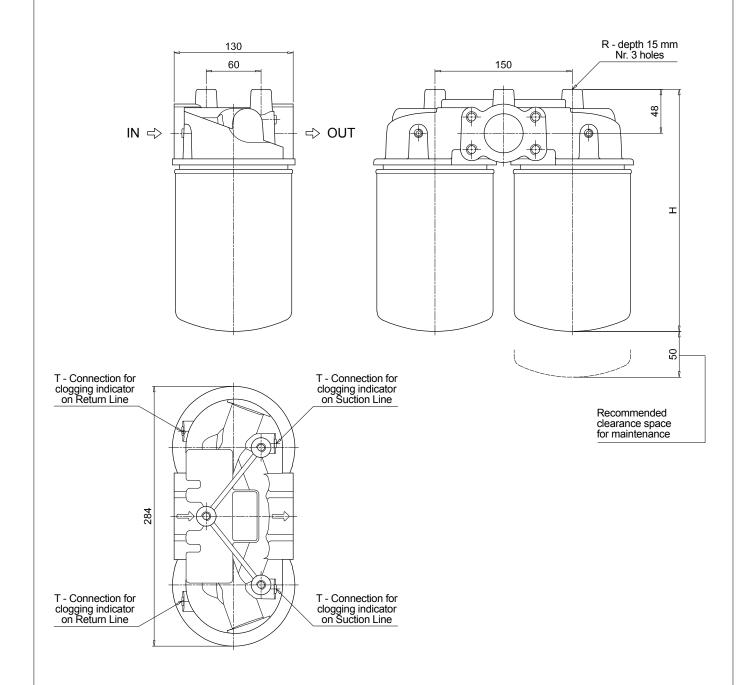
(308)

Dimensions

MPS300 - MPS350

Filter size	H [mm]
300	266
350	315

Connections	Т	R
G1	G 1/8"	M10
G2-G3	1/8" NPT	7/16" UNC
F1	G 1/8"	M10
F2	1/8" NPT	7/16" UNC

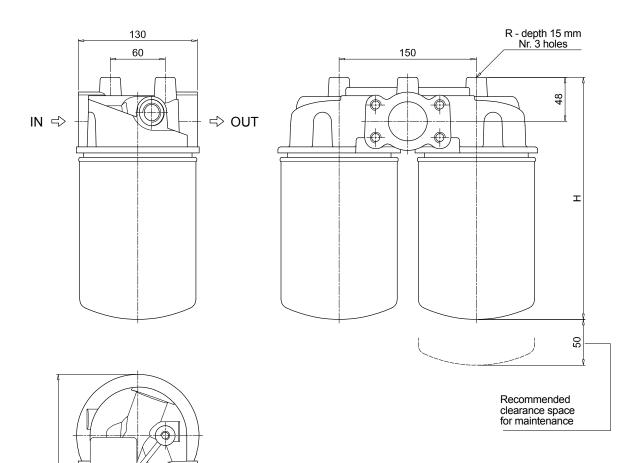


Dimensions

MPS301 - MPS351

Filter size	H [mm]
301	266
351	315

Connections	R
G1	M10
G2-G3	7/16" UNC
F1	M10
F2	7/16" LINC



284

(6

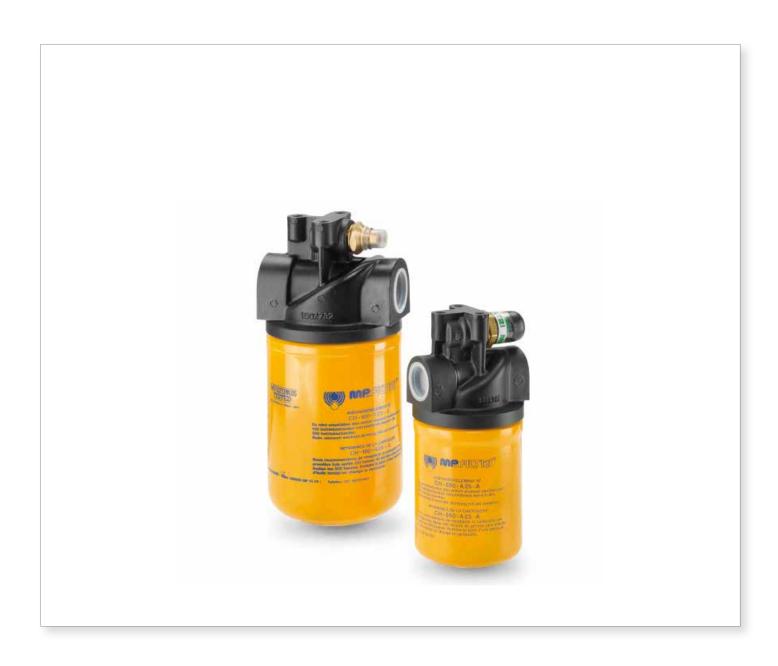
(310)





MSH series

Maximum working pressure up to 3.5 MPa (35 bar) - Flow rate up to 195 l/min



MSH GENERAL INFORMATION

Description

Spin-on filters

Maximum working pressure up to 3.5 MPa (35 bar) Flow rate up to 195 l/min

MSH is a range of spin-on filters suitable to be used in low pressure lines. They offer a good balance between performances, dimensions and prices. 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 195 l/min
- Fine filtration rating, to get a good cleanliness level into the reservoir
- Strong sealing between the housing and cans, to be used in heavy applications
- Bypass valve, to relieve excessive pressure drop across the filter media
- Visual, electrical and electronic differential clogging indicators for low pressure applications

Common applications:

- Delivery lines, in economic industrial equipment or mobile machines

Technical data

Filter housing materials

- Head: Anodized Aluminium
- Bypass valve: Nylon Steel
- Element: Aluminium Painted Steel

Bypass valve

Opening pressure: 250 kPa (2.5 bar) $\pm 10\%$

Δp element type

- ∆p: 5 bar
- Oil flow from OUT to IN

Seals

- Standard NBR series A
- Optional FPM series V

Temperature

From -20 °C to +110 °C

Note

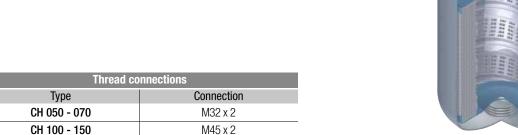
MSH filters are provided for vertical mounting



Weights [kg] and volumes [dm³]

Filter series	Weights [kg]	Volumes [dm³]
MSH 050	1.50	0.65
MSH 070	1.90	0.95
MSH 100	3.30	1.80
MSH 150	3.80	2.20

Cartridge



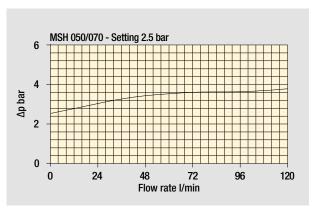


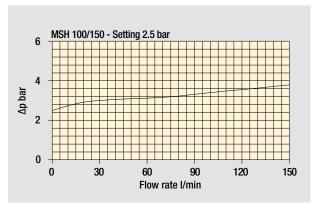
Hydraulic symbols

Filter series	Style S	Style B
MSH 050	•	•
MSH 070	•	•
MSH 100	•	•
MSH 150	•	•
	D.I.	OUT TO THE PROPERTY OF THE PRO

Pressure drop

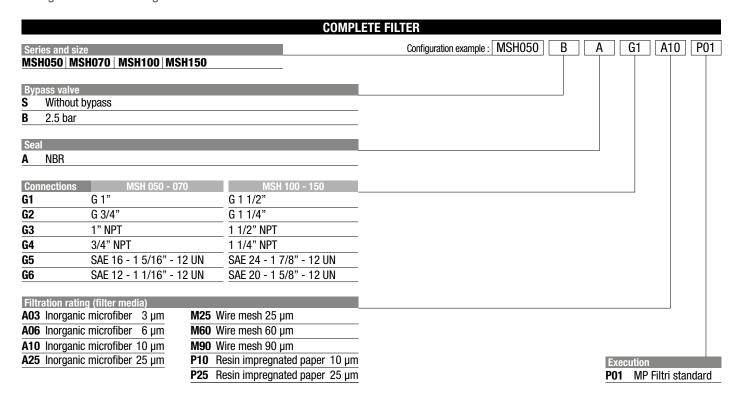
Bypass valve pressure drop

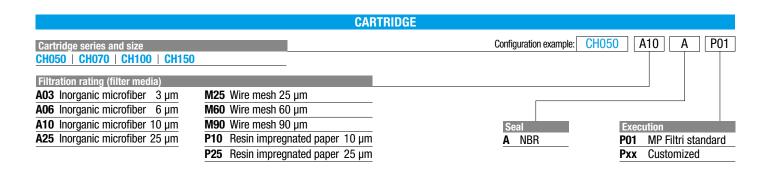




The curves are plotted using mineral oil with density of 0.86 kg/dm³ in compliance with ISO 3968. Δp varies proportionally with density.

MSH MSH050 - MSH070 MSH100 - MSH150

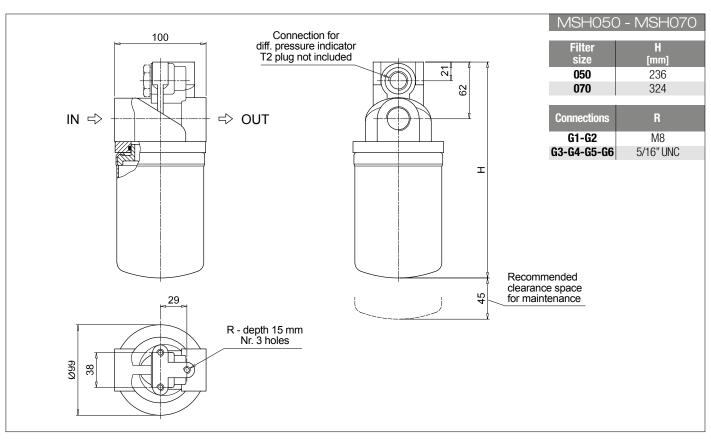


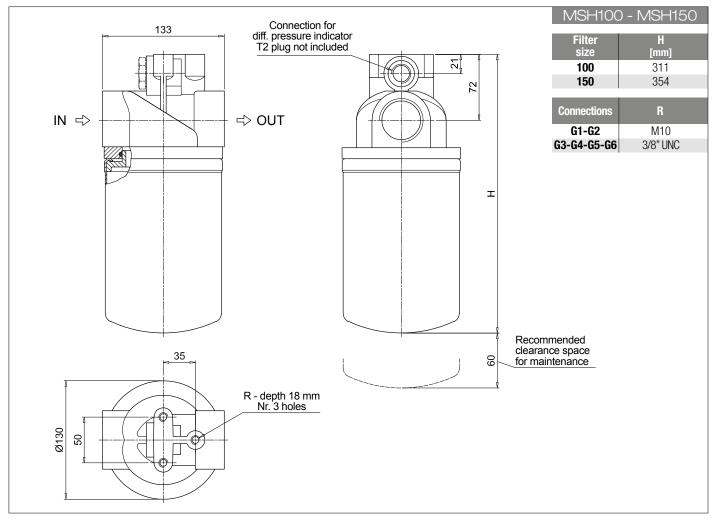


	CLOGGING INDICATORS							
Diffe								
DEA	Electrical differential pressure indicator		DTA	Electronic differential pressure indicator				
DEM	Electrical differential pressure indicator		DVA	Visual differential pressure indicator				
DLA	Electrical / visual differential pressure indicator		DVM	Visual differential pressure indicator				
DLE	Electrical / visual differential pressure indicator							

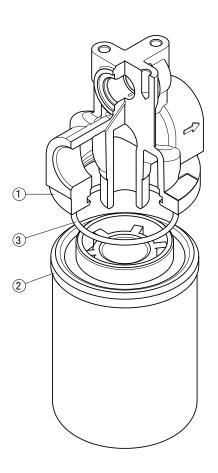
	PLUGS	See page 747
T2	Plug (not included)	

Dimensions





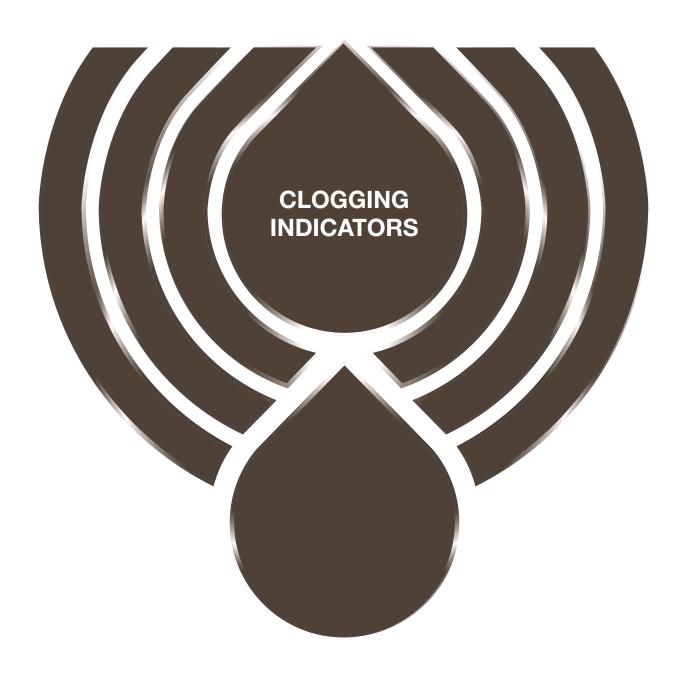
Order number for spare parts



	Q.ty: 1 pc.	Q.ty: 1 pc.	Q.ty: 1 pc.
Item:	1	2	3
Filter series	Filter assembly	Cartridge	Seal code number
MSH 050-070	See order	See order	O-R 167 (ø 63.50 x 3.53)
MSH 100-150	table	table	O-R 4362 (ø 91.67 x 3.53)







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.





Clogging Indicators







DESIGNATION, ORDERING CODES & TECHNICAL DATA

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QUICK REFERENCE GUIDE

Ordering codes

Filter family	ter mily Filter series		Visual indicators	Electrical indicators	Electronic / Electrical-Visual indicators		
	Suction	Suction ine SFMC250		VEB21AA50P01	VLB21AA51P01 VLB21AA52P01 VLB21AA53P01 VLB21AA71P01		
SUCTION	Line			VEA21xA50P01 VEA21xA50P01UL	VLA21xA51P01 VLA21xA52P01 VLA21xA53P01 VLA21xA71P01		
	Without bypass	SFSC 500 - 503 - 504 - 505 SFSC 510 - 535 - 540	VVA20P01 VVR20P01	VEA21xA50P01 VEA21xA50P01UL	VLA21xA51P01 VLA21xA52P01 VLA21xA53P01 VLA21xA71P01		
	With bypass 1.75 bar	ELIXIR* RFEX060-080-110-160	BVA14P01 BVR14P01 BVP15HP01 BVQ15HP01	BEA15HA50P01 BEA15HA50P01UL BEM15HA41P01	BLA15HA51P01 BLA15HA52P01 BLA15HA53P01 BLA15HA71P01		
	Without bypass ELIXIR* RFEX060-080-110-160		BVA25P01 BVR25P01 BVP20HP01 BVQ20HP01	BEA20HA50P01 BEA20HA50P01UL BEM20HA41P01	BLA20HA51P01 BLA20HA52P01 BLA20HA53P01 BLA20HA71P01		
	With bypass 1.75 bar	MDH 250	BVA14P01 BVR14P01 BVP15HP01 BVQ15HP01 DVS12HP01	BEA15HA50P01 BEA15HA50P01UL BEM15HA41P01 DES12HA10P01 DES12HA30P01 DES12HA80P01	BLA15HA51P01 BLA15HA52P01 BLA15HA53P01 BLA15HA71P01		
RETURN FILTERS	With bypass 3 bar	BVA25P01 BVR25P01 BVP20HP01 BVQ20HP01 DVS25HP01		BEA20HA50P01 BEA20HA50P01UL BEM20HA41P01 DES25HA10P01 DES25HA30P01 DES25HA80P01	BLA20HA51P01 BLA20HA52P01 BLA20HA53P01 BLA20HA71P01		
αп	With bypass 1.75 bar	MPFX MPTX MPF MPT MPH	BVA14P01 BVR14P01 BVP15HP01 BVQ15HP01	BEA15HA50P01 BEA15HA50P01UL BEM15HA41P01	BLA15HA51P01 BLA15HA52P01 BLA15HA53P01 BLA15HA71P01		
	With bypass 3 bar With bypass 2.5 bar	MPFX MPTX MPF MPT	BVA25P01 BVR25P01 BVP20HP01 BVQ20HP01	BEA20HA50P01 BEA20HA50P01UL BEM20HA41P01	BLA20HA51P01 BLA20HA52P01 BLA20HA53P01 BLA20HA71P01		
	With bypass 4.5 bar	MPLX	DVA20xP01	DEA20xA50P01 DEA20xA50P01UL DEM20xx10P01	DLA20xA51P01 DLA20xA52P01 DLA20xA71P01		
	With bypass 2.4 bar	FRI	DVM20xP01	DEM20xx20P01 DEM20xx30P01 DEM20xx35P01 DEU20VA50P01UL	DLE20xA50P01 DLE20xF50P01 DTA20xF70P01		

714)

QUICK REFERENCE GUIDE

Ordering codes

Filter family	Filter seri	es	Visual indicators	Electrical indicators	Electronic / Electrical-Visual indicators
	With bypass valve	MRSX 116 - 165 - 166 Suction line "ith bypass valve"		VEB21AA50P01	VLB21AA51P01 VLB21AA52P01 VLB21AA53P01 VLB21AA71P01
UCTION	2.5 bar	MRSX 116 - 165 - 166 Return line	BVA25P01 BVR25P01 BVP20HP01 BVQ20HP01	BEA20HA50P01 BEA20HA50P01UL BEM20HA41P01 BET25HF10P01 BET25HF30P01 BET25HF50P01	BLA20HA51P01 BLA20HA52P01 BLA20HA53P01 BLA20HA71P01
	With bypass valve 2.5 bar	LMP 124 MULTIPORT	BVA25P01 BVR25P01 BVP20HP01 BVQ20HP01 DVA20xP01 DVM20xP01	BEA20HA50P01 BEA20HA50P01UL BEM20HA41P01 BET25HF10P01 BET25HF30P01 BET25HF50P01 DEA20xA50P01 DEM20xx10P01 DEM20xx20P01 DEM20xx30P01 DEM20xx35P01 DEU20VA50P01UL	BLA20HA51P01 BLA20HA52P01 BLA20HA53P01 BLA20HA71P01 DLA20xA51P01 DLA20xA52P01 DLA20xA71P01 DLE20xA50P01 DLE20xF50P01
	Suction line MPS 050 - 070 - 100 - 150 MPS 200 - 250 - 300 - 350		WB20P01 WS20P01	VEB21AA50P01	VLB21AA51P01 VLB21AA52P01 VLB21AA53P01 VLB21AA71P01
SPIN-ON FILTERS	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 DVA12xP0 MPS 301 - 351 MSH 050 - 070 - 100 - 150 DVA20xP0 DVM20xP		DEA12xA50P01 DEM12xAxxP01 DEA20xA50P01 DEM20xAxxP01 DEU20VA50P01UL	DLA12xA51P01 DLA12xA52P01 DLA12xA71P01 DLA20xA51P01 DLA20xA52P01 DLA20xA71P01 DLE12xA50P01 DLE12xF50P01 DLE12xF50P01 DLE20xF50P01 DLE20xF50P01 DTA12xF70P01 DTA12xF70P01

Ordering codes

Filter family	Filter s	eries	Visual indicators	Electrical indicators	Electronic / Electrical-Visual indicators
		ELIXIR° LFEX 060-080-110-160	DVS25HP01	DES25HA10P01 DES25HA30P01 DES25HA80P01	
JM ERS	With bypass valve 3.5 bar	LMP 110 LMP 112 - 116 - 118 - 119 MULTIPORT LMP 120 - 122 - 123 MULTIPORT LMP 210 - 211 - LDP LMP 400 - 401 & 430 - 431 LMP 900 - 901 LMP 902 - 903 LMP 950 - 951 LMP 952 - 953 - 954 LMD 211 - 400 - 401 - 431 - 951 - LDD	DVA20xP01 DVM20xP01	DEA20xA50P01 DEM20xx10P01 DEM20xx20P01 DEM20xx30P01 DEM20xx35P01 DEU20VA50P01UL	DLA20xA51P01 DLA20xA52P01 DLA20xA71P01 DLE20xA50P01 DLE20xF50P01 DTA20xF70P01
LOW & MEDIUM PRESSURE FILTERS	With bypass valve LPH 6: 2.5 bar	LPH 630	DVA20xP01 DVM20xP01	DEA20xA50P01 DEM20xx10P01 DEM20xx20P01 DEM20xx30P01 DEM20xx35P01 DEM20xx35P01	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 FHB 050 - 135 - 320 FHB 250 - 135 - 320 FHF 325 FHD 021 - 051 - 326 - 333	DVA50xP01	DEA50xA50P01 DEM50xx10P01 DEM50xx20P01 DEM50xx30P01 DEM50xx35P01 DEU50VA50P01UL	DLA50xA51P01 DLA50xA52P01 DLA50xA71P01 DLE50xA50P01 DLE50xF50P01
HIGH PRESSURE FILTERS	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	DEA70xA50P01 DEA95xA50P01 DEM95xx10P01 DEM70xx20P01 DEM70xx30P01 DEM70xx35P01 DEU70VA50P01UL DEM95xx10P01 DEM95xx20P01 DEM95xx30P01 DEM95xx35P01	DLA70xA51P01 DLA70xA52P01 DLA70xA71P01 DLA95xA51P01 DLA95xA52P01 DLA95xA71P01 DLE70xA50P01 DLE70xF50P01 DLE95xA50P01 DLE95xF50P01 DTA70xF70P01 DTA70xF70P01

QUICK REFERENCE GUIDE

Ordering codes

Filter family	lter mily Filter series		Visual indicators	Electrical indicators	Electronic / Electrical-Visual indicators
	With bypass valve 6 bar	FZH 012 - 040	DVZ50xP01	DEZ50xA50P01	DLZ50xA51P01 DLZ50xA52P01
SS STEEL URE FILTERS	Without bypass valve	FZH 012 - 040	DVZ70xP01 DVZ95xP01	DEZ70xA50P01 DEZ95xA50P01	DLZ70xA51P01 DLZ70xA52P01 DLZ95xA51P01 DLZ95xA52P01
STAINLESS STEEL HIGH PRESSURE FILTERS	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
	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	
TENTIALLY OSPHERE	With bypass valve 6 bar	FZP 039 - 136	DVX50xP01 DVY50xP01	DEH50xA48P01 DEH50xA49P01 DEH50xA70P01	
FILTERS FOR POTENTIALLY EXPLOSIVE ATMOSPHERE	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.

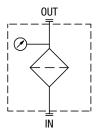
Standard items are produced with R 1/4" EN 10226 connection.

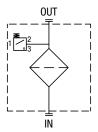
Available products with R 1/8" EN 10226 to be fitted on MPS series.

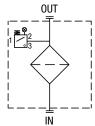
Vacuum indicators are identified in the Hydraulic Filtration catalogue and in the Quick Reference Guide table by the letter "V".

Example:









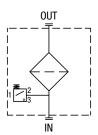
B AROMETRIC (PRESSURE) INDICATORS

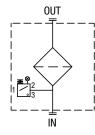
Pressure indicators are used on the Return line to check the efficiency of the filter element. They measure the pressure upstream of the filter element.

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"

OUT





Example:

B BVA14P01

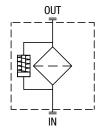
D IFFERENTIAL PRESSURE INDICATORS

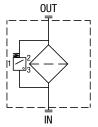
Differential pressure indicators are used on the Pressure line to check the efficiency of the filter element.

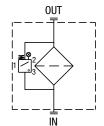
They measure the pressure upstream and downstream of the filter element (differential pressure).

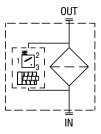
Standard items are produced with special connection G 1/2" size.

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"



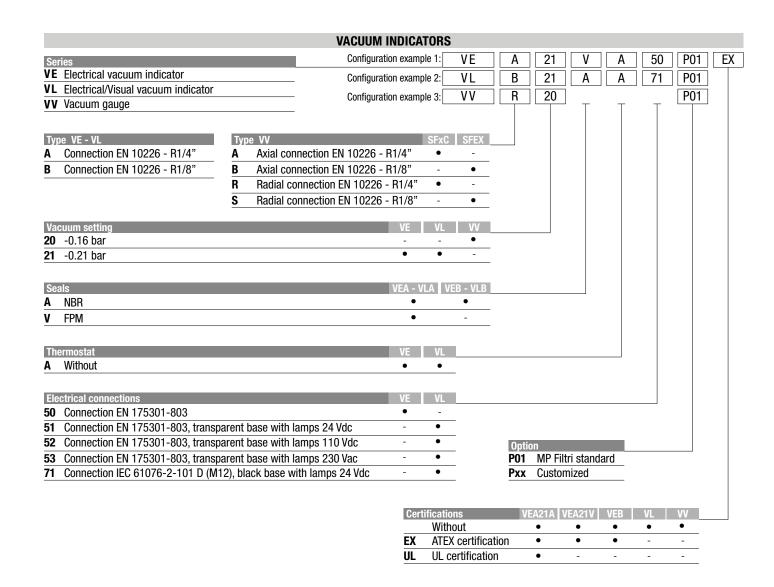


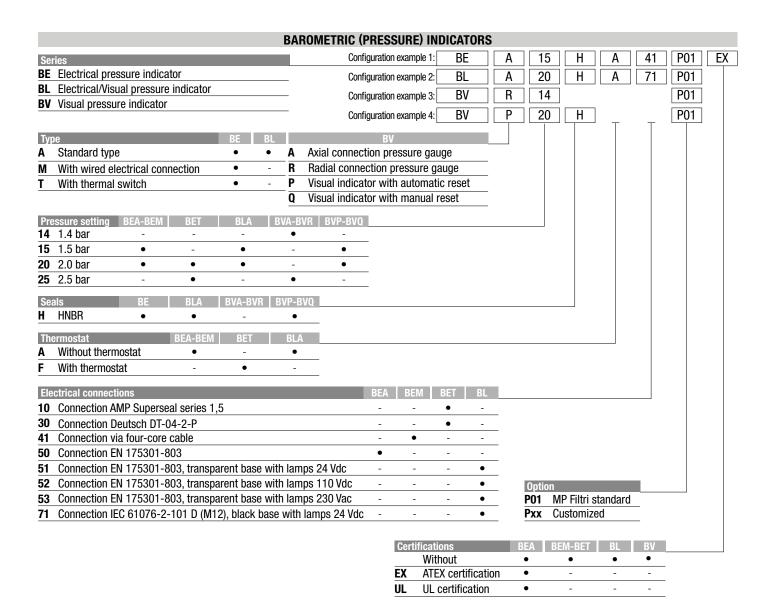




Example

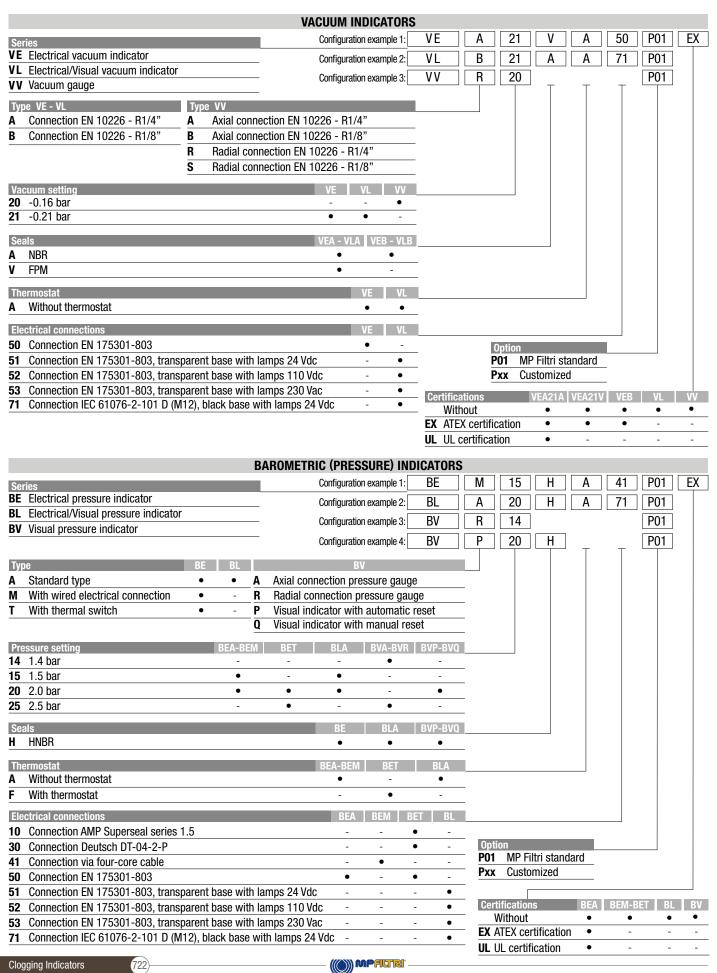
D DVA20xP01



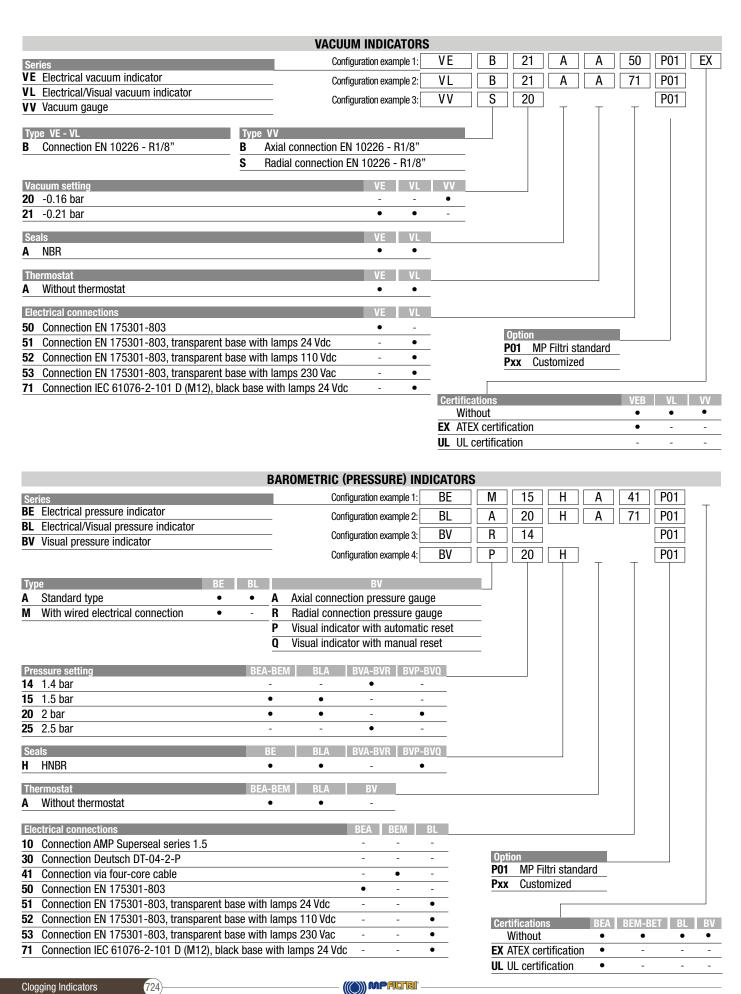


DIFFERENTIAL PRESSURE INDICATORS													
Ser	ies	Confi	guration exa	ample 1:	DE	M	20	Н		F	50	P01	
	Electrical differential pressure indicator	Confid	guration exa	ample 2:	DE	U	50	V	一一	A	50	P01	UL
	Electrical/Visual differential pressure indicator		guration exa		DL	Е	20				71	P01	
	Electrical differential pressure indicator		guration exa	. [DT	Α	20				70	P01	
DV	Visual differential pressure indicator		_							<u> </u>	10		
		Config	guration exa	ample 5: [DV	M	20	<u> </u>		Т	Т	P01	
Typ	e DE DL DT		DV		l								
Typ A	Standard type • • •	A With autor		ot .									
	With wired electrical connection	M With man		<i>,</i> ı	-								
	Standard type 210 bar, UL certified •	S With autor		et .	=								
_	For high power supply - • -												
	Compact version •	-											
Dro	ssure setting DEA DEM DEU DES DL DT	DVA DVM	DVS										
	1.2 bar •		•										
	2.0 bar • • • • •	• •											
	2.5 bar		•										
Sea	IS DEA DEM DEU DES DL DT	DVA DVM	DVS										
	HNBR • • - • • •	• •	•										
	FPM • • - • •	• •	-										
The	rmostat DEA DEM DEU DE	S DLA DLE	DT										
	Without thermostat • • • •	• •	-							J			
F	With thermostat - •	- •	•										
Elec			DEA	DEM I	DEU DES	DIA	DIE	DT					
	ctrical connections Connection AMP Superseal series 1.5		DEA	DEWI	- •	DLA -	DLE	ַ וע					
	Connection AMP Timer Junior		_	•									
	Connection Deutsch DT-04-2-P		-	•	- •	-	-						
	Connection Deutsch DT-04-3-P		-	•		-	-	-					
50	Connection EN 175301-803		•	-	• -	-	•	-					
	Connection EN 175301-803, transparent base with la		-	-		•	-						
	Connection EN 175301-803, transparent base with la	amps 110 Vdc	-	-		•	-	-					
	Connection IEC 61076-2-101 D (M12)	:Ha lawara 0.4 Vala	-	-		-	-	•					
	Connection IEC 61076-2-101 D (M12), black base wi	tn lamps 24 vac	-	-		•	-						
OU	CONTRECTION Stud #10-32 ONF												
								Oution					
								Option P01		tri stand	dard		
									Custor				
									cations		DE	J OT	HERS
									Vithout		-		•
								UL U	L certi	fication	•		
			DLUGG										
			PLUGS										
Ser								Cor	nfiguratio	n exampl	e	Γ2	H
	Plug												
14	Plug												
Sea													
	NBR - •												
	HNBR • -												
V	FPM • -												

LOGGING INDICATORS

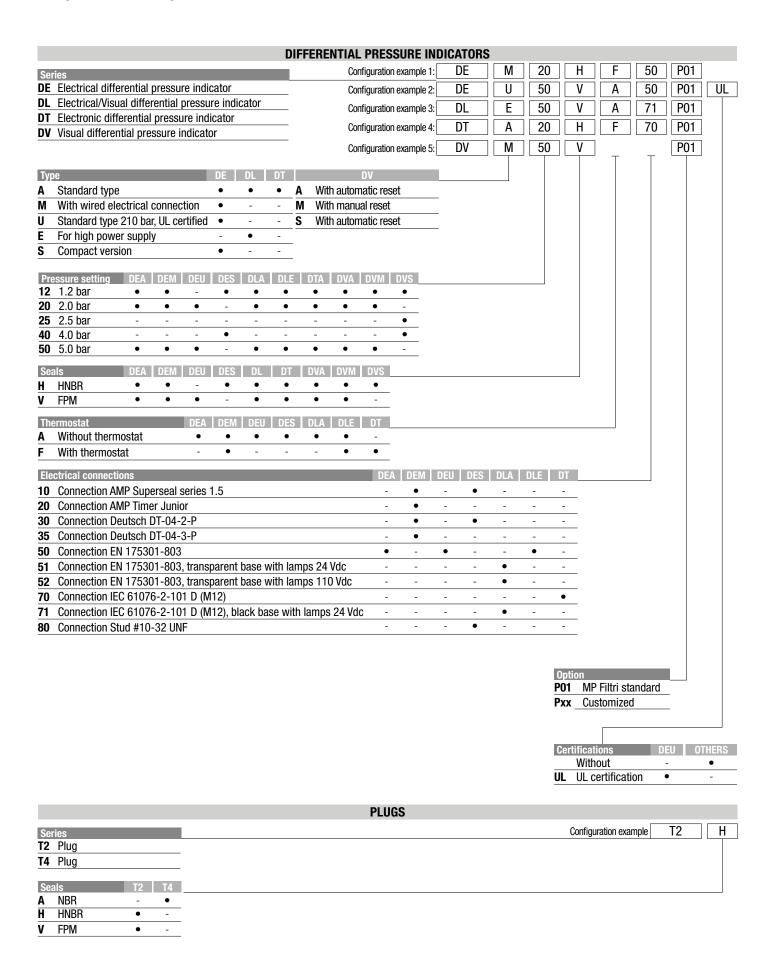


DIFFERENTIAL PRESSURE INDICATO	RS
Series Configuration example 1: DE	M 12 H F 50 P01
DE Electrical differential pressure indicator Configuration example 2: DE	U 50 V A 50 P01 UL
DL Electrical/Visual differential pressure indicator Configuration example 3: DL	E 20 V A 71 P01
DT Electronic differential pressure indicator	A 50 H F 70 P01
Visual unreferrial pressure indicator	
Configuration example 5: DV	M 70 V P01
Type DE DL DT DV	
A Standard type • • A With automatic reset	
M With wired electrical connection • M With manual reset	
U Standard type 210 bar, UL certified ●	
E For high power supply - • -	
Pressure setting DEA DEM DEU DLA DLE DTA DVA DVM	
20 2.0 bar • • • • • •	
Seals DEA DEM DEU DLA DLE DTA DVA DVM	
H HNBR	
<u>V FPM • • • • • • • • • • • • • • • • • • •</u>	
Thermostat DEA DEM DEU DLA DLE DT	
A Without thermostat • • • • • -	
F With thermostat - • • •	
Electrical connections DEA DEM DEU DL	A DLE DT
10 Connection AMP Superseal series 1.5 - •	
20 Connection AMP Timer Junior - •	<u> </u>
30 Connection Deutsch DT-04-2-P - •	· <u> </u>
35 Connection Deutsch DT-04-3-P	
50 Connection EN 175301-803 • - • - 51 Connection EN 175301-803, transparent base with lamps 24 Vdc • -	
51 Connection EN 175301-803, transparent base with lamps 24 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	
	Configuration example T2 H
Series T2 Plug	Ourngulation example 12
Seals H HNBR	
V FPM	



DIFFERENTIAL PRESSURE INDICATORS	
Series Configuration example 1: DE	M 12 H F 50 P01
	U 50 V A 50 P01 UL
DI Flootrice Micros differential procesure indicator	E 20 V A 71 P01
DT Electronic differential pressure indicator	
Visual unreferrial pressure indicator	A 50 H F 70 P01
Configuration example 5: DV	M 70 V P01
Type DE DL DT DV A Standard type	·
	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

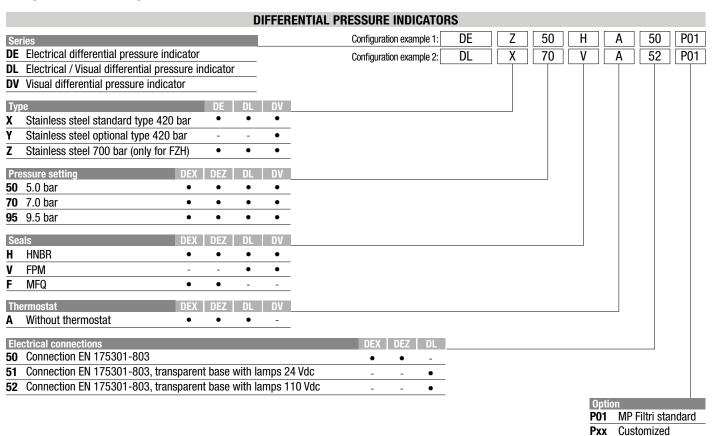


		DIFFI	ERENTIAL PI	RESSI	JRE IN	DICA	TORS								
Ser	AC.		Configu	ration ex	cample 1:	D	E	М	12	2	Н	F	50	P01]
	Electrical differential pressure indicator		Configu	ration ex	ample 2:	D	F	U	50	<u> </u>	٧	Α	50	P01	UL
	Electrical/Visual differential pressure indicator	_	J		ample 3:			E	20		٧	Α	71	P01	
DT	Electronic differential pressure indicator	_	_] 1
DV	Visual differential pressure indicator	_	Configu	ration ex	ample 4:	D.		Α	50		Н	F	70	P01]
			Configu	ration ex	cample 5:	D'	V	M	70) [V	_	_	P01	
17000	DE DI DI		DV												
Typ A	Standard type • • •	A	With automatic	rocot		_									
	With wired electrical connection •		With manual r			-									
	Standard type 210 bar, UL certified •		vviui iiiaiiuai ii	5301		-									
E	For high power supply - • -	_													
	* ' ' ' '	_													
	ssure setting DEA DEM DEU DLA 5.0 bar	DLE	DTA DVA	DVM											
	7.0 bar • • •	•	• •	•											
	9.5 bar • • - •	•	• •	•											
						_									
Sea		U DL	A DLE DTA	A DV	A DVM										
	<u>HNBR</u> • • - FPM • • •	•	• •	•	•	_									
<u>v</u>	FPIVI • •		• •		•	_									
	rmostat DEA DEM DE	U DL	A DLE DT												
Α	Without thermostat • • •	•	• -	_											
F	With thermostat - • -	-	• •	_											
Ele	trical connections			DEA	DEM	DEU	DLA	DLE	DT						
	Connection AMP Superseal series 1.5			-	•	-	-	-	-						
20	Connection AMP Timer Junior			-	•	-	-	-	-	-					
	Connection Deutsch DT-04-2-P			-	•	-	-	-	-	-					
	Connection Deutsch DT-04-3-P			-	•	-	-	-	-	_					
	Connection EN 175301-803			•	-	•	-	•	-	-					
	Connection EN 175301-803, transparent base with			-	-	-	•	-	-	-					
	Connection EN 175301-803, transparent base with	lamps	110 Vdc	-	-	-	•	-	-						
	Connection IEC 61076-2-101 D (M12)		041//	-	-	-	-	-	•	-					
71	Connection IEC 61076-2-101 D (M12), black base	with la	mps 24 Vdc	-	-	-	•	-	-	-					
										Opt					
										P01	MP	Filtri st	andard		
										Рхх	Cus	stomize	d	_	
										Cer	tificati Witho		D	EU 0	THERS
										Ш		ertificat	ion	•	
										<u> </u>	OL 00	o. unout			

	PLUGS	
Series	Configuration example T2	Н
T2 Plug		
Seals		
H HNBR		
V FPM	_	

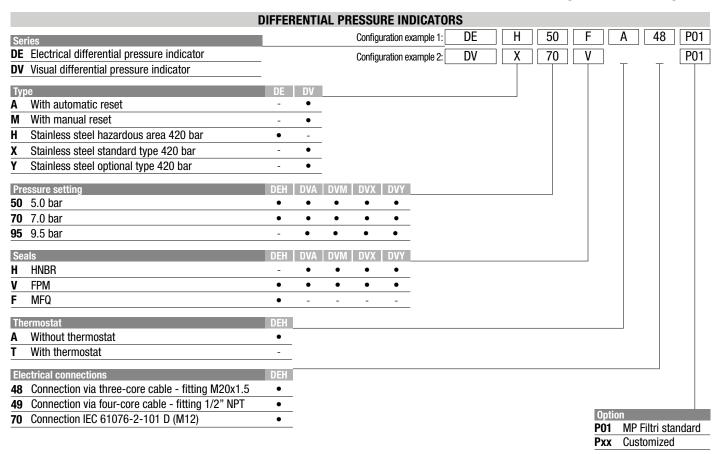
CLOGGING INDICATORS

STAINLESS STEEL HIGH PRESSURE FILTERS



	PLUGS			
Series	Configuration example	X2	H	1
X2 Stainless Steel plug 420 bar				
X3 Stainless Steel plug 700 bar (only for FZH)	- -			
Seals				
H HNBR				
V FPM	_			
F MFO	_			

FILTERS FOR POTENTIALLY EXPLOSIVE ATMOSPHERE



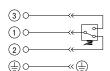
					PLUGS
Se	ries		-		Configuration example X2 H
T2	Plug				
X2	Stainless Steel plug 420 bar				
Х3	Stainless Steel plug 700 bar (only for FZH)				
Se	als	T2	Х2	Х3	
Н	HNBR	•	•	•	
V	FPM	•	•	•	_
F	MFQ	-	•	•	

Technical data

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:
 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

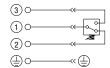
- Available Atex product: II 1GD Ex ia IIC Tx Ex ia IIIC Tx °C X

VEA50 UL Electrical Vacuum Indicator Connection: EN 175301-803 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:
 Compatibility with fluids:
 Degree of protection:
 From -25 °C to +80 °C
 Mineral oils, Synthetic fluids
 HFB and HFC according to ISO 2943
 IP65 according to EN 60529

Electrical data

- Electrical connection: EN 175301-803 - Resistive load: 5 A / 14 Vdc 4 A / 30 Vdc 5 A / 125 Vac

5 A / 125 Vac 4 A / 250 Vac

- CE certification

- Available Atex product: II 1GD Ex ia IIC Tx Ex ia IIIC Tx $^{\circ}$ C X

VL*51 - VL*52 - VL*53

R

Max tightening

Ordering code

torque:

25 N⋅m

Electrical/Visual Vacuum Indicator Connection: EN 175301-803

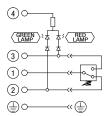
- 51: Transparent base with lamps 24 Vdc
- **52**: Transparent base with lamps 110 Vdc
- 53: Transparent base with lamps 230 Vac

EN 10226 - R1/4"	VL A 21 x A xx P01
EN 10226 - R1/8"	VL B 21 A A xx P01
77	
2	A/F 27 Max tightening torque: 25 N·m

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

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

730

R

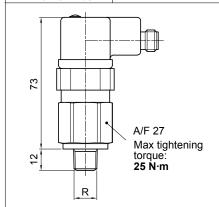
12

Technical data

VL*71

Electrical/Visual Vacuum Indicator Connection IEC 61076-2-101 D (M12), black base with lamps 24 Vdc

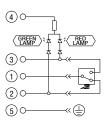
Connections	Indicator code
EN 10226 - R1/4"	VL A 21 x A 71 P01
EN 10226 - R1/8"	VL B 21 A A 71 P01



Hydraulic symbol



Electrical symbol



Materials

Body: BrassBase: Black polyamideContacts: Silver

- 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

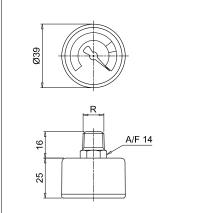
HFB and HFC according to ISO 2943

- Degree of protection: IP65 according to EN 60529

Electrical data

- Electrical connection: IEC 61076-2-101 D (M12)
- Lamps 24 Vdc (black base)
- Resistive load: 0.4 A / 24 Vdc

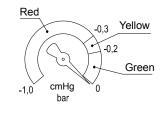
VVA - VVB Axial Vacuum Gauge R Ordering code EN 10226 - R1/4" VVA 20 P01 EN 10226 - R1/8" VVB 20 P01



Hydraulic symbol



Dial scale



Conversion	ı to SI units
[cmHg]	[bar]
-12	-0.16

-0.24 -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: Ambienti from -40 °C to +60 °C

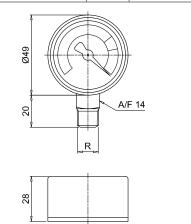
Fluid max + 60 °C

 $Storage\ from\ -40\ ^{\circ}C\ to\ +60\ ^{\circ}C$ - Compatibility with fluids: Mineral oils, Synthetic fluids

HFB and HFC according to ISO 2943 Class 2.5 according to EN 13190 IP31 according to EN 60529

VVR - VVS Radial Vacuum Gauge

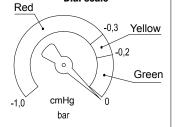
R	A/F	Ordering code
EN 10226 - R1/4"	14	VVR 20 P01
EN 10226 - R1/8"	11	VVS 20 P01



Hydraulic symbol



Dial scale



Conversion to SI units

[cmHg]	[bar]
-12	-0.16
-18	-0.24
-76	_1 01

Materials

- Accuracy:

- Degree of protection:

- 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

- Compatibility with fluids:

- Max working pressure: Steady: -0.7 bar

Fluctuating: -0.6 bar Short time: -1.0 bar

- Working temperature: Ambienti from -40 °C to +60 °C

Fluid max + 60 °C

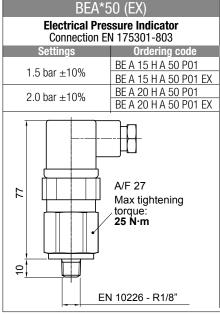
Storage from -40 °C to +60 °C

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

ROMETRIC (PRESSURE) INDICATORS

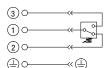
Dimensions



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

From -25 °C to +80 °C - Working temperature: - 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

BEA*50 UL **Electrical Pressure Indicator** Connection EN 175301-803 Ordering code 1.5 bar ±10% BE A 15 H A 50 P01 UL 2.0 bar ±10% BE A 20 H A 50 P01 UL

Max tightening

torque: 25 N·m

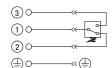
77

0

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

From -25 °C to +80 °C - Working temperature: - 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

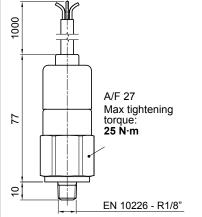
5 A / 125 Vac 4 A / 250 Vac

- CE certification

- Available Atex product: I M1 Ex ia I Ma

II 1GD Ex ia IIC Tx Ex ia IIIC Tx °C X

EN 10226 - R1/8" BEM*41 **Electrical Pressure Indicator** Connection via four-core cable Settings Ordering code 1.5 bar ±10% BE M 15 H A 41 P01 2.0 bar ±10% BE M 20 H A 41 P01



732

Hydraulic symbol



Electrical symbol



Materials

- Body: Brass - Base: Black polyamide

- Contacts: Silver **HNBR** - Seal:

Technical data

- Max working pressure: 40 bar - Proof pressure: 60 bar

- Working temperature: From -25 °C to +80 °C Mineral oils, Synthetic fluids - Compatibility with 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

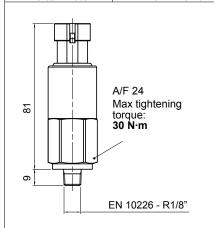
CE certification

On request this indicator can be provided with main connectors

in use for wirings.



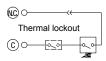
Settings	Ordering code
2.0 bar ±10%	BE T 20 H F 10 P01
2.5 bar ±10%	BE T 25 H F 10 P01



Hydraulic symbol



Electrical symbol



Materials

- Body: Brass - Base: Black polyamide

- Contacts: Silver - Seal: **HNBR**

Technical data

- Max working pressure: 10 bar - Proof pressure: 15 bar

From -25 °C to +100 °C - Working temperature: - Compatibility with fluids: Mineral oils, Synthetic fluids HFB and HFC according to ISO 2943 - Degree of protection: IP65 according to EN 60529

Electrical data

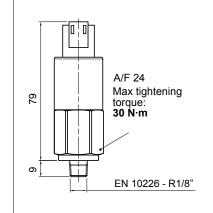
- Electrical connection: AMP Superseal series 1.5 0.5 A / 48 Vdc - Resistive load: - Thermostat condition: Open up to 30 °C

- CE certification

BET*F30

Electrical Pressure Indicator Deutsch DT-04-2-P

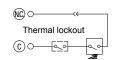
Settings	Ordering code
2.0 bar ±10%	BE T 20 H F 30 P01
2.5 bar +10%	BE T 25 H F 30 P01



Hydraulic symbol



Electrical symbol



Materials

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

Technical data

- Max working pressure: 10 bar - Proof pressure: 15 bar

From -25 °C to +100 °C - Working temperature: - Compatibility with fluids: Mineral oils. Synthetic fluids

HFB and HFC according to ISO 2943

- Degree of protection: IP65 according to EN 60529

Electrical data

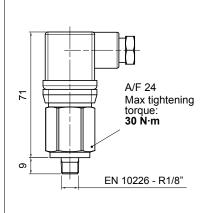
Deutsch DT-04-2-P - Electrical connection: - Resistive load: 0.5 A / 48 Vdc - Thermostat condition: Open up to 30 °C

- CE certification

BET*F50

Electrical Pressure Indicator Connection EN 175301-803

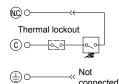
Settings	Ordering code
2.0 bar ±10%	BE T 20 H F 50 P01
2.5 har +10%	RE T 25 H E 50 P01



Hydraulic symbol



Electrical symbol



Materials

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

Technical data

- Max working pressure: 10 bar 15 bar - Proof pressure:

- Working temperature: From -25 °C to +100 °C Mineral oils, Synthetic fluids - Compatibility with fluids: HFB and HFC according to ISO 2943

- Degree of protection: IP65 according to EN 60529

Electrical data

- Electrical connection: EN 175301-803 - Resistive load: 0.5 A / 48 Vdc - Thermostat condition: Open up to 30 °C

- CE certification



connected

DMETRIC (PRESSURE) INDICATO

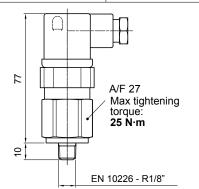
Dimensions

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

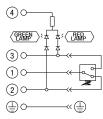
Settings	Ordering code
$1.5 \text{ bar } \pm 10\%$	BL A 15 H A xx P01
2.0 bar ±10%	BL A 20 H A xx P01



Hydraulic symbol



Electrical symbol



Materials

- Body: Brass

Transparent polyamide - Base:

- Contacts: Silver - Seal: **HNBR**

Technical data

- Max working pressure: 40 bar 60 bar - Proof pressure:

From -25 °C to +80 °C - Working temperature: - Compatibility with fluids: Mineral oils, Synthetic fluids HFB and HFC according to ISO 2943 - Degree of protection: IP65 according to EN 60529

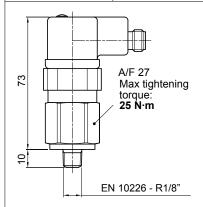
Electrical data

- 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

Electrical/Visual Pressure Indicator Connection IEC 61076-2-101 D (M12), black base with lamps 24 Vdc

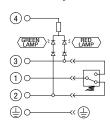
Settings	Ordering code
1.5 bar ±10%	BL A 15 H A 71 P01
2.0 bar ±10%	BL A 20 H A 71 P01



Hydraulic symbol



Electrical symbol



Materials

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

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

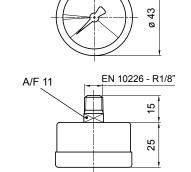
Electrical data

IEC 61076-2-101 D (M12) - Electrical connection: - Lamps: 24 Vdc (black base) - Resistive load: 0.4 A / 24 Vdc

BVA Hydraulic symbol

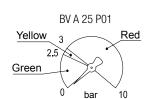
	•
Settings	Ordering code
1.4 bar ±10%	BV A 14 P01
2.5 har ±10%	RV A 25 PO1

Axial Pressure Gauge



Dial scale

BV A 14 P01 Red Yellow 1.7 Green 14 10 har



Materials

- Case: Painted Steel - Window: Clear plastic Painted Steel - Dial: Black plastic - Pointer: - Pressure connection:

Bourdon tube Cu-alloy sof t soldered, C type - Pressure element:

Technical data

- Accuracy:

- Degree of protection:

- 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

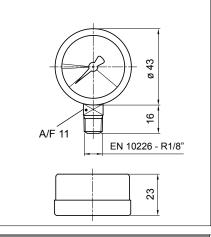
 $\label{eq:hfb} \text{HFB and HFC according to ISO } 2943$ Class 2.5 according to EN 13190 IP31 according to EN 60529

BAROMETRIC (PRESSURE) INDICATORS

Dimensions

BVR Radial Pressure Gauge

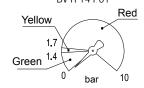
Settings	Ordering code
1.4 bar ±10%	BV R 14 P01
2.5 har +10%	BV B 25 P01



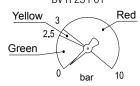
Hydraulic symbol



Dial scale BV R 14 P01



BV R 25 P01



Materials

Case: Painted Steel
Window: Clear plastic
Dial: Painted Steel
Pointer: Black plastic
Pressure connection: Brass

- Pressure element: Bourdon tube Cu-alloy sof t 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

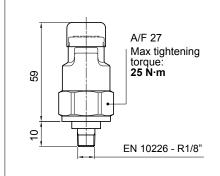
HFB and HFC according to ISO 2943 Class 2.5 according to EN 13190

Accuracy: Class 2.5 according to EN 1319
 Degree of protection: IP31 according to EN 60529

BVP - BVQ Visual Pressure Indicator

BVP - Automatic reset BVQ - Manual reset

Setting	Ordering code
1.5 bar ±10%	BV P 15 H P01
	BV Q 15 H P01
2.0 bar ±10%	BV P 20 H P01
	BV 0 20 H P01



Hydraulic symbol



Materials

- Body: Brass
- Cover / internal parts: Nylon
- Caps: VMQ
- Seal: HNBR

Technical data

- Reset: BVP - Automatic reset

BVQ - Manual reset

Max working pressure: 10 barProof pressure: 15 bar

Working temperature: From -25 °C to +80 °C
 Compatibility with fluids: Mineral oils, Synthetic fluids

HFB and HFC according to ISO 2943

- Degree of protection: IP45 according to EN 60529

Signals



Absence of pressure (no indicator)



Presence of pressure (green button rises gradually)



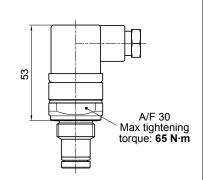
Clogged filter element (red button risen)

FERENTIAL PRESSURE INDICATORS

Dimensions

DEA*50 Electrical Differential Pressure Indicator Connection: EN 175301-803

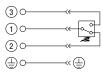
Settings	Ordering code
1.2 bar ±10%	DE A 12 x A 50 P01
2.0 bar ±10%	DE A 20 x A 50 P01
5.0 bar ±10%	DE A 50 x A 50 P01
7.0 bar ±10%	DE A 70 x A 50 P01
9.5 har +10%	DF A 95 x A 50 P01



Hydraulic symbol



Electrical symbol



Materials

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

Technical data

- Max working pressure: 420 bar - Proof pressure: 630 bar - Burst pressure: 1260 bar

From -25 °C to +110 °C - Working temperature: - Compatibility with fluids: Mineral oils, Synthetic fluids HFB and HFC according to ISO 2943

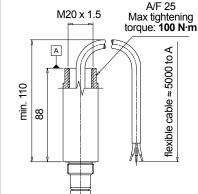
- Degree protection: IP66 according to EN 60529 IP69K according to ISO 20653

Electrical data

- Electrical connection: EN 175301-803 - Resistive load: 0.2 A / 115 Vdc

DEH*48 Hazardous Area Electrical Differential Pressure Indicator

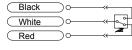
Connection via three-core cable - fitting ivizox r.s	
Settings	Ordering code
2.0 bar ±10%	DE H 20 x A 48 P01
5.0 bar ±10%	DE H 50 x A 48 P01
7.0 bar ±10%	DE H 70 x A 48 P01
	A/F 25



Hydraulic symbol



Electrical symbol









Certification / Approvals: ATEX, IECEx, EAC TR CU, INMETRO Certification included as standard

Materials

- Body: AISI 316L - Contacts: Rhodium - Seal: FPM - MFQ

Technical data

420 bar - Max working pressure: - Proof pressure: 630 har - Burst pressure: 1260 bar Working temperature:

From -60 °C to +125 °C - Compatibility with fluids: Mineral oils, Synthetic fluids HFB and HFC according to ISO 2943 T4 (135 °C) and T6 (85 °C) - Temperature class:

- Degree of protection: IP 66/67/68 according to EN 60529

- Connection type: Three-core cable, fitting M20x1.5

SPCO/SPDT (Hermetically sealed - Volt-free contacts) Contact type:

Electrical data

Connection via three-core cable - fitting M20x1.5

- Resistive Load: 830 mA / 24 Vdc - 180 mA / 110 Vac - Electrical Ratings: Ui = 30 Vdc / Ii = 250 mA / Pi = 1.3 W Available ATEX product: II 1 GD Ex ia IIC T6 Ga -60° C \leq Ta \leq 80 $^{\circ}$ C

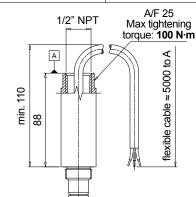
Ex ia IIC T4 Ga -60° C \leq Ta \leq 125 $^{\circ}$ C II 2 GD Ex db IIC T6* Gb Ex tb IIIC T85°C* Db $(Tamb := -60^{\circ}C to +70^{\circ}C)^{*} IP66/67$ alternative T/Class and ambients T4, T135°C

 $(Tamb = -60^{\circ}C \text{ to } +120^{\circ}C)$

DEH*49

Hazardous Area Electrical Differential Pressure Indicator Connection via four-core cable - fitting 1/2" NPT

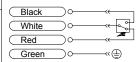
Settings	Ordering code
2.0 bar ±10%	DE H 20 x A 49 P01
5.0 bar ±10%	DE H 50 x A 49 P01
7.0 bar ±10%	DE H 70 x A 49 P01



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: AISI 316L - Contacts: Rhodium FPM - MFQ - Seal:

Technical data

- Max working pressure: 420 bar - Proof pressure: 630 har 1260 bar - Burst pressure:

From -60 °C to +120 °C : ATEX, IECEx, EAC TR CU, INMETRO From -60 °C to +105 °C : UL/CSA - Working temperature:

- Compatibility with fluids: Mineral oils, Synthetic fluids HFB and HFC according to ISO 2943

- Temperature class: T4 (135 °C) and T6 (85 °C) IP 66/67/68 according to EN 60529 - Degree of protection:

- Connection type:Four-core cable, fitting 1/2" NPT

SPCO/SPDT (Hermetically sealed - Volt-free contacts) Contact type:

Electrical data

Connection via four-core cable - fitting 1/2" NPT Resistive Load: 830 mA / 24 Vdc - 180 mA / 110 Vac - Resistive Load:

- Max voltage 150 Vac/dc - Power

- Available ATEX product:

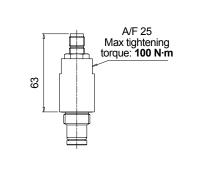
II 1 GD Ex ia IIC T6 Ga -60° C \leq Ta \leq 80 $^{\circ}$ C Ex ia IIC T4 Ga -60° C \leq Ta \leq 125 $^{\circ}$ C II 2 GD Ex db IIC T6* Gb Ex tb IIIC T85°C* Db $(Tamb : = -60^{\circ}C \text{ to } +70^{\circ}C)^{*} \text{ IP66/67}$ alternative T/Class and ambients T4, T135°C

 $(Tamb = -60^{\circ}C \text{ to } +120^{\circ}C)$

DEH*70 Hazardous Area Electrical Differential Pressure Indicator

Connection IEC 61076-2-101 D (M12)

Settings	Ordering code
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



Hvdraulic symbol



Electrical symbol



Materials

AISI 316L with internal engineered resin switch - Body: Contacts:

Rhodium FPM - MFQ

Seal: **Technical data**

Max working pressure: Proof pressure: 420 bar 630 bar Burst pressure: 1260 bar

Working temperature: Compatibility with fluids: From -60 °C to +80 °C Mineral oils, Synthetic fluids HFB and HFC according to ISO 2943

Temperature class: T6 (85 °C)

IP 66/67 according to EN 60529 Degree of protection:

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)

830 mA / 24 Vdc - 180 mA / 110 Vdc Resistive Load:

Ui = 30 VdcElectrical Ratings:

li = 250 mAPi = 1.3 W

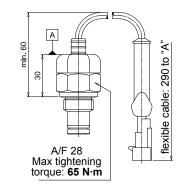
Available ATEX product:

FI = 1.3 W II 1 GD Ex ia IIC T6 Ga -60° C \leq Ta \leq 80°C Ex ia IIC T4 Ga -60° C \leq Ta \leq 125°C II 2 GD Ex db IIC T6* Gb Ex tb IIIC T85°C* Db (Tamb : = -60° C to $+70^{\circ}$ C)* IP66/67 * alternative T/Class and ambients T4, T135°C

 $(Tamb = -60^{\circ}C \text{ to } +120^{\circ}C)$

DEM*F10 **Electrical Differential Pressure Indicator** Connection: AMP Superseal series 1.5

Settings	Ordering code
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

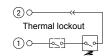


Hydraulic symbol

Certification / Approvals: ATEX, IECEX, EAC TR CU, INMETRO Certification included as standard



Electrical symbol



Materials

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

Technical data

- Max working pressure: 420 bar 630 bar - Proof pressure: - Burst pressure: 1260 bar

From -25 °C to +110 °C - Working temperature: - Compatibility with fluids: Mineral oils, Synthetic fluids HFB and HFC according to ISO 2943

IP66 according to EN 60529 - Degree protection:

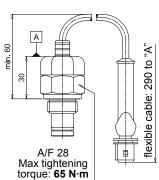
Electrical data

- Electrical connection: AMP Superseal series 1.5 - Resistive load: 0.2 A / 115 Vdc

- Switching type: Normally open contacts (NC on request) Normally open up to 30 °C (option "F") - Thermal lockout:

DEM*F20 **Electrical Differential Pressure Indicator AMP Time junior**

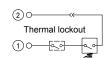
Settings	Ordering code
1.2 bar ±10%	DE M 12 x F 20 P01
2.0 bar ±10%	DE M 20 x F 20 P01
5.0 bar ±10%	DE M 50 x F 20 P01
7.0 bar ±10%	DE M 70 x F 20 P01
9.5 bar ±10%	DE M 95 x F 20 P01



Hydraulic symbol



Electrical symbol



Materials

- Body: Brass - Base:

Black polyamide - Contacts: Silver HNBR - FPM - Seal:

Technical data

420 bar - Max working pressure: 630 bar - Proof pressure: 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

AMP Time junior - Electrical connection: - Resistive load: 0.2 A / 115 Vdc

Switching type: Normally open contacts (NC on request) Normally open up to 30 °C (option "F") - Thermal lockout:

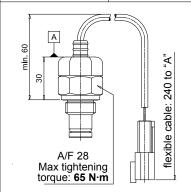


DIFFERENTIAL PRESSURE INDICATORS

Dimensions

DEM*F30 Electrical Differential Pressure Indicator Deutsch DT-04-2-P Settings Ordering code

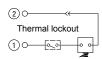
Settings	Ordering code
1.2 bar ±10%	DE M 12 x F 30 P01
2.0 bar ±10%	DE M 20 x F 30 P01
5.0 bar ±10%	DE M 50 x F 30 P01
7.0 bar ±10%	DE M 70 x F 30 P01
9.5 bar ±10%	DE M 95 x F 30 P01



Hydraulic symbol



Electrical symbol



Materials

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

Technical data

Max working pressure: 420 barProof pressure: 630 barBurst pressure: 1260 bar

Working temperature:
 Compatibility with fluids:
 Degree protection:
 From -25 °C to +110 °C
 Mineral oils, Synthetic fluids
 HFB and HFC according to ISO 2943
 IP66 according to EN 60529

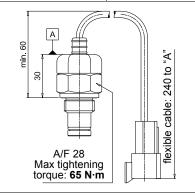
Electrical data

Electrical connection: Deutsch DT-04-2-P
 Resistive load: Deutsch DT-04-2-P
 0.2 A / 115 Vdc

Switching type: Normally open contacts (NC on request)
 Thermal lockout: Normally open up to 30 °C (option "F")

DEM*F35 Electrical Differential Pressure Indicator Deutsch DT-04-3-P

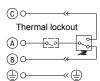
Boutoon Br or or	
Settings	Ordering code
1.2 bar ±10%	DE M 12 x F 35 P01
2.0 bar ±10%	DE M 20 x F 35 P01
5.0 bar ±10%	DE M 50 x F 35 P01
7.0 bar ±10%	DE M 70 x F 35 P01
9.5 bar ±10%	DE M 95 x F 35 P01



Hydraulic symbol



Electrical symbol



Materials

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

Technical data

Max working pressure: 420 barProof pressure: 630 barBurst 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

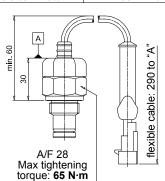
Electrical connection: Deutsch DT-04-3-P
 Resistive load: 0.2 A / 115 Vdc
 Switching type: SPDT contact

- Thermal lockout: Normally open up to 30 °C (option "F")

DEM*A10

Electrical Differential Pressure Indicator Connection: AMP Superseal series 1.5

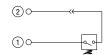
•	
Settings	Ordering code
1.2 bar ±10%	DE M 12 x A 10 P01
2.0 bar ±10%	DE M 20 x A 10 P01
5.0 bar ±10%	DE M 50 x A 10 P01
7.0 bar ±10%	DE M 70 x A 10 P01
9.5 bar ±10%	DE M 95 x A 10 P01



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

Working temperature:
 Compatibility with fluids:
 Degree protection:
 From -25 °C to +110 °C
 Mineral oils, Synthetic fluids
 HFB and HFC according to ISO 2943
 IP66 according to EN 60529

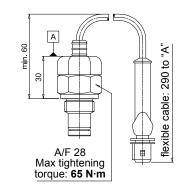
Electrical data

Electrical connection: AMP Superseal series 1.5
 Resistive load: 0.2 A / 115 Vdc

- Switching type: Normally open contacts (NC on request)

DEM*A20 Electrical Differential Pressure Indicator AMP Time junior

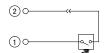
Settings	Ordering code
1.2 bar ±10%	DE M 12 x A 20 P01
2.0 bar ±10%	DE M 20 x A 20 P01
5.0 bar ±10%	DE M 50 x A 20 P01
7.0 bar ±10%	DE M 70 x A 20 P01
9.5 bar ±10%	DE M 95 x A 20 P01



Hydraulic symbol



Electrical symbol



Materials

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

Technical data

Max working pressure: 420 barProof pressure: 630 barBurst pressure: 1260 bar

Working temperature:
 Compatibility with fluids:
 Degree protection:
 From -25 °C to +110 °C
 Mineral oils, Synthetic fluids
 HFB and HFC according to ISO 2943
 IP66 according to EN 60529

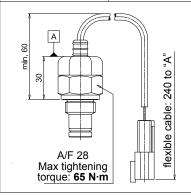
Electrical data

Electrical connection: AMP Time junior
 Resistive load: 0.2 A / 115 Vdc

- Switching type: Normally open contacts (NC on request)

DEM*A30 Electrical Differential Pressure Indicator Deutsch DT-04-2-P Settings Ordering code

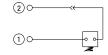
Settings	Ordering code
1.2 bar ±10%	DE M 12 x A 30 P01
2.0 bar ±10%	DE M 20 x A 30 P01
5.0 bar ±10%	DE M 50 x A 30 P01
7.0 bar ±10%	DE M 70 x A 30 P01
9.5 bar ±10%	DE M 95 x A 30 P01



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:
 Compatibility with fluids:
 Degree protection:
 From -25 °C to +110 °C
 Mineral oils, Synthetic fluids
 HFB and HFC according to ISO 2943
 IP66 according to EN 60529

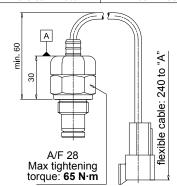
Electrical data

Electrical connection: Deutsch DT-04-2-P
 Resistive load: 0.2 A / 115 Vdc

- Switching type: Normally open contacts (NC on request)

DEM*A35 Electrical Differential Pressure Indicator Deutsch DT-04-3-P

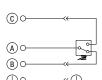
Bouldon B. G. G.	
Settings	Ordering code
1.2 bar ±10%	DE M 12 x A 35 P01
2.0 bar ±10%	DE M 20 x A 35 P01
5.0 bar ±10%	DE M 50 x A 35 P01
7.0 bar ±10%	DE M 70 x A 35 P01
9.5 bar ±10%	DE M 95 x A 35 P01



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 -255

Working temperature:
 Compatibility with fluids:
 Degree protection:
 From -25 °C to +110 °C
 Mineral oils, Synthetic fluids
 HFB and HFC according to ISO 2943
 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



ERENTIAL PRESSURE INDICATORS

Dimensions

DES*10 Electrical Differential Pressure Indicator AMP Superseal series 1.5 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 39 A/F 19 Max tightening torque: 20 N·m

Hydraulic symbol



Electrical symbol

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200

Materials - Body:

Brass Brass - Polyamide - Internal parts:

- Contacts: Silver - Seal: **HNBR**

Technical data

- Max working pressure: 16 bar - Proof pressure: 24 bar - Burst pressure: 48 har

- Working temperature: From -25 °C to +110 °C - Compatibility with fluids: Mineral oils, Synthetic fluids HFB and HFC according to ISO 2943

IP67 according to EN 60529 - Degree protection:

Electrical data

Electrical connection: AMP Superseal series 1.5

0.2 A / 24 Vdc - Resistive load:

- Switching type: Normally open contacts (NC on request)

DES*30 Electrical Differential Pressure Indicator Deutsch DT-04-2-P Ordering code 1.2 bar ±10% DE S 12 H A 30 P01

DE S 25 H A 30 P01

2.5 bar ±10%

4.0 bar ±10%	DE S 40 H A 30 P01
42	A/F 19 Max tightening torque: 20 N·m

Hydraulic 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

From -25 °C to +110 °C - Working temperature: - Compatibility with fluids: Mineral oils, Synthetic fluids HFB and HFC according to ISO 2943

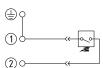
- Degree protection: IP67 according to EN 60529

Electrical data

- Electrical connection: Deutsch DT-04-2-P - Resistive load: 0.2 A / 24 Vdc

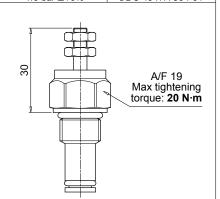
- Switching type: Normally open contacts (NC on request)

Electrical symbol



DES*80 Electrical Differential Pressure Indicator Stud #10-32 UNF

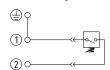
Stud # 10-32 UNI	
Settings	Ordering code
1.2 bar ±10%	DE S 12 H A 80 P01
2.5 bar ±10%	DE S 25 H A 80 P01
4.0 bar +10%	DE S 40 H A 80 P01



Hydraulic symbol



Electrical symbol



Materials

- Body: Brass

Brass - Polyamide - Internal parts:

- Contacts: Silver **HNBR** - Seal:

Technical data

- Max working pressure: 16 bar - Proof pressure: 24 bar - Burst pressure: 48 bar

From -25 °C to +110 °C - Working temperature: - Compatibility with fluids: Mineral oils, Synthetic fluids HFB and HFC according to ISO 2943 - Degree protection: IP67 according to EN 60529

Electrical data

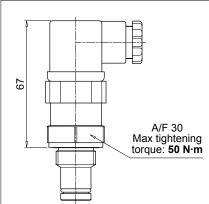
- Electrical connection: Stud #10-32 UNF - Resistive load: 0.2 A / 24 Vdc

- Switching type: Normally open contacts (NC on request)



DEU*50 UL Electrical Differential Pressure Indicator Connection EN 175301-803

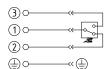
Settings	Ordering code
2.0 bar ±10%	DE U 20 V A 50 P01 UL
5.0 bar ±10%	DE U 50 V A 50 P01 UL
7.0 bar ±10%	DE U 70 V A 50 P01 UL



Hydraulic symbol



Electrical symbol





- Certification: UL
- Certification included as standard

Materials

Body: BrassBase: Black Polyamide

- Contacts: Silver - Seal: FPM

Technical data

Max working pressure: 210 barProof pressure: 220 barBurst pressure: 880 bar

Working temperature:
 Compatibility with fluids:
 Mineral oils, Synthetic fluids
 HFB and HFC according to ISO 2943

- Degree protection: IP65 according to EN 60529

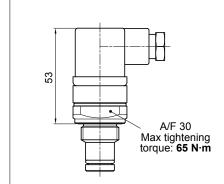
Electrical data

- Electrical connection: EN 175301-803 - Resistive load: 3 A / 30 Vdc

3 A / 125 Vac 3 (3) A / 250 Vac

DEX*50 Electrical Differential Pressure Indicator Connection: EN 175301-803 Settings Ordering code

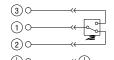
Settings	Ordering code
1.2 bar ±10%	DE X 12 x A 50 P01
2.0 bar ±10%	DE X 20 x A 50 P01
5.0 bar ±10%	DE X 50 x A 50 P01
7.0 bar ±10%	DE X 70 x A 50 P01
9.5 bar ±10%	DE X 95 x A 50 P01



Hydraulic symbol



Electrical symbol



Materials

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

Technical data

Max working pressure:
 Proof pressure:
 Burst pressure:
 Working temperature:

420 bar
630 bar
1260 bar
From -25 °C to +110 °C

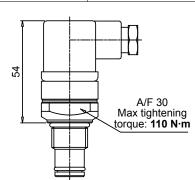
- Compatibility with fluids: Mineral oils, Synthetic fluids HFB and HFC according to ISO 2943
- Degree protection: IP66 according to EN 60529
IP69K according to ISO 20653

Electrical data

- Electrical connection: EN 175301-803 - Resistive load: 0.2 A / 115 Vdc

DEZ*50 **Electrical Differential Pressure Indicator**Connection: EN 175301-803

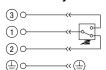
Settings	Ordering code
1.2 bar ±10%	DE Z 12 x A 50 P01
2.5 bar ±10%	DE Z 25 x A 50 P01
5.0 bar ±10%	DE Z 50 x A 50 P01
7.0 bar ±10%	DE Z 70 x A 50 P01
9.5 bar ±10%	DE Z 95 x A 50 P01



Hydraulic symbol



Electrical symbol



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

ERENTIAL PRESSURE INDICATORS

Dimensions

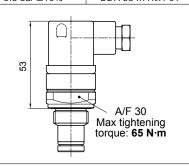
DLA*51 - DLA*52

Electrical/Visual Differential Pressure Indicator

Connection: EN 175301-803

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

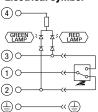
Settings	Ordering code
1.2 bar ±10%	DL A 12 x A xx P01
2.0 bar ±10%	DL A 20 x A xx P01
5.0 bar ±10%	DL A 50 x A xx P01
7.0 bar ±10%	DL A 70 x A xx P01
9.5 har +10%	DL A 95 x A xx P01



Hydraulic symbol



Electrical symbol



Materials

- Body: Brass - Base:

Transparent polyamide - Contacts: Silver HNBR - FPM - Seal:

Technical data

- Max working pressure: 420 bar - Proof pressure: 630 bar - Burst pressure: 1260 bar

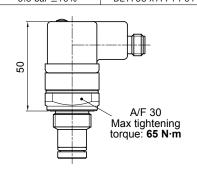
From -25 °C to +110 °C - Working temperature: - Compatibility with fluids: Mineral oils, Synthetic fluids HFB and HFC according to ISO 2943 - Degree protection: IP66 according to EN 60529 IP69K according to ISO 20653

Electrical data

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

Electrical/Visual Differential pressure indicator Connection IEC 61076-2-101 D (M12), black base with lamps 24 Vdc

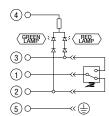
Settings	Ordering code
1.2 bar ±10%	DL A 12 x A 71 P01
2.0 bar ±10%	DL A 20 x A 71 P01
5.0 bar ±10%	DL A 50 x A 71 P01
7.0 bar ±10%	DL A 70 x A 71 P01
9.5 bar +10%	DLA 95 x A 71 P01



Hydraulic symbol



Electrical symbol



Materials

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

Technical data

- Max working pressure: 420 bar - Proof pressure: 630 bar 1260 bar - Burst pressure:

From -25 °C to +110 °C - Working temperature: - Compatibility with fluids: Mineral oils, Synthetic fluids HFB and HFC according to ISO 2943 IP65 according to EN 60529 - Degree protection:

IP69K according to ISO 20653

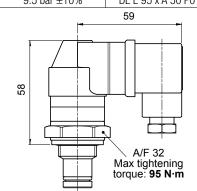
Electrical data

- Electrical connection: IEC 61076-2-101 D (M12) - Lamps 24 Vdc (black base) - Resistive load: 0.4 A / 24 Vdc

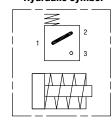
DLE*A50

Electrical/Visual Differential Pressure Indicator Without term. Connections: EN 175301-803

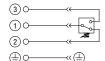
Settings	Ordering code	
1.2 bar ±10%	DL E 12 x A 50 P01	
2.0 bar ±10%	DL E 20 x A 50 P01	
5.0 bar ±10%	DL E 50 x A 50 P01	
7.0 bar ±10%	DL E 70 x A 50 P01	
9.5 har +10%	DL F 95 x A 50 P01	



Hydraulic symbol



Electrical symbol



Materials

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

Technical data

420 bar - Max working pressure: 630 bar - Proof pressure: - 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

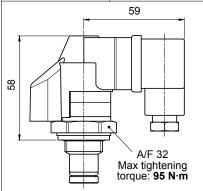
Electrical data

- Electrical connections: EN 175301-803 5 A / 250 Vac - Resistive load: - Available the connector with lamps

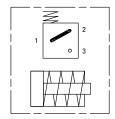


DLE*F50 Electrical/Visual Differential Pressure Indicator With term. Connections: EN 175301-803 Settings Ordering code

With tolling collinocations, Elv 17 ccc1 ccc		
Settings	Ordering code	
1.2 bar ±10%	DL E 12 x F 50 P01	
2.0 bar ±10%	DL E 20 x F 50 P01	
5.0 bar ±10%	DL E 50 x F 50 P01	
7.0 bar ±10%	DL E 70 x F 50 P01	
9.5 bar ±10%	DL E 95 x F 50 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:
 Compatibility with fluids:
 Degree protection:
 From -25 °C to +110 °C
 Mineral oils, Synthetic fluids
 HFB and HFC according to ISO 2943
 IP65 according to EN 60529

Electrical data

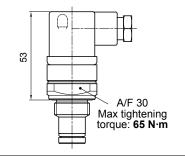
Electrical connections:
 Resistive load:
 Thermal lockout setting:
 +30 °C

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

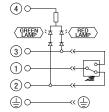
Settings	Ordering code
1.2 bar ±10%	DL X 12 x A 5x P01
2.0 bar ±10%	DL X 20 x A 5x P01
5.0 bar ±10%	DL X 50 x A 5x P01
7.0 bar ±10%	DL X 70 x A 5x P01
9.5 har +10%	DL X 95 x A 5x P01



Hydraulic symbol



Electrical symbol



Materials

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

Technical data

Max working pressure: 420 barProof pressure: 630 barBurst 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

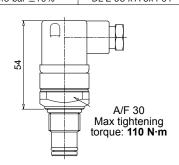
DLZ*51 - DLZ*52

Electrical/Visual Differential Pressure Indicator Connection: EN 175301-803

51: Transparent base with lamps 24 Vdc

52: Transparent base with lamps 110 Vdc

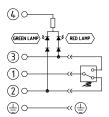
Settings	Ordering code
1.2 bar ±10%	DL Z 12 x A 5x P01
2.5 bar ±10%	DL Z 25 x A 5x P01
5.0 bar ±10%	DL Z 50 x A 5x P01
7.0 bar ±10%	DL Z 70 x A 5x P01
9.5 har +10%	DL 7 95 x A 5x P01



Hydraulic symbol



Electrical symbol



Materials

- Body: AISI 316L

Base: Transparent polyamideContacts: Silver

- 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

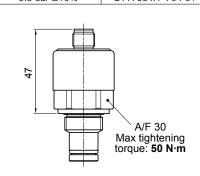


ERENTIAL PRESSURE INDICATORS

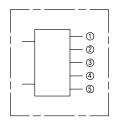
Dimensions

DTA*F70 **Electronic Differential Pressure Indicator** Connection: IEC 61076-2-101 D (M12)

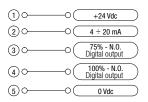
	, ,
Settings	Ordering code
1.2 bar ±10%	DT A 12 x F 70 P01
2.0 bar ±10%	DT A 20 x F 70 P01
5.0 bar ±10%	DT A 50 x F 70 P01
$7.0 \text{ bar } \pm 10\%$	DT A 70 x F 70 P01
9.5 bar ±10%	DT A 95 x F 70 P01



Hydraulic symbol



Electrical symbol



Materials

- Body: Brass - Internal parts:

Brass - Polyamide - Contacts: Silver - Seal: HNBR - FPM

Technical data

- Max working pressure: 420 bar 630 bar - Proof pressure: 1260 bar - Burst pressure:

- Compatibility with fluids: Mineral oils, Synthetic fluids HFB and HFC according to ISO 2943 - Degree protection: IP67 according to EN 60529

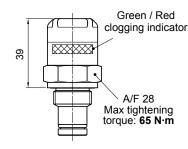
Electrical data

- Electrical connection: IEC 61076-2-101 D (M12)

- Power supply: 24 Vdc - Analogue output: From 4 to 20 mA

- Thermal lockout: 30 °C (all output signals stalled up to 30 °C)

DVA **Visual Differential Pressure Indicator** Ordering code Settings 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 DV A 70 x P01 7.0 bar ±10% 9.5 bar ±10% DV A 95 x P01



Hydraulic symbol



Materials

- Body: Brass - Internal parts: Brass - Polyamide HNBR - FPM - Seal:

Technical data

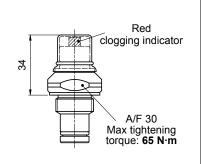
Automatic reset - Reset: - Max working pressure: 420 bar 630 bar - Proof pressure: - Burst pressure: 1260 bar

From -25 °C to +110 °C - Working temperature: - Compatibility with fluids: Mineral oils, Synthetic fluids HFB and HFC according to ISO 2943

IP65 according to EN 60529 - Degree protection:

DVM **Visual Differential Pressure Indicator**

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: Brass

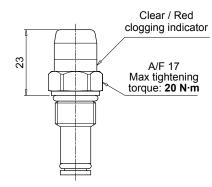
Brass - Polyamide - Internal parts: HNBR - FPM - Seal:

Technical data

Manual reset - Reset: - Max working pressure: 420 bar 630 bar - Proof pressure: - Burst pressure: 1260 bar

From -25 °C to +110 °C - Working temperature: - Compatibility with fluids: Mineral oils, Synthetic fluids HFB and HFC according to ISO 2943 - Degree protection: IP65 according to EN 60529

DVS Visual Differential Pressure Indicator 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: Brass

- Internal parts: Brass - Polyamide

- Seal: HNBR

Technical data

Reset: Automatic reset
Max working pressure: 16 bar
Proof pressure: 24 bar
Burst pressure: 48 bar

- Working temperature: From -25 °C to +110 °C - Compatibility with fluids: Mineral oils, Synthetic fluids

HFB and HFC according to ISO 2943
- Degree protection: IP67 according to EN 60529

DVX

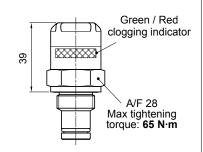
Visual Differential Pressure Indicator Settings Ordering code 1.2 bar ±10% DV X 12 x P01

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: AISI 316L
Internal parts: AISI 316L - Polyamide
Seal: HNBR - MFQ

Technical data

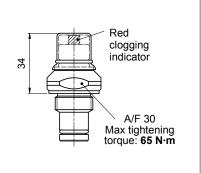
- Reset: Automatic reset
- Max working pressure: 420 bar
- Proof pressure: 630 bar
- Burst pressure: 1260 bar

Working temperature:
 Compatibility with fluids:
 Mineral oils, Synthetic fluids
 HFB and HFC according to ISO 2943

- Degree protection: IP65 according to EN 60529

DVY Visual Differential Pressure Indicator

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: AISI 316L - Internal parts: AISI 316L - Polyamide - Seal: HNBR - MFQ

Technical data

- Reset: Manual reset
- Max working pressure: 420 bar
- Proof pressure: 630 bar
- Burst pressure: 1260 bar

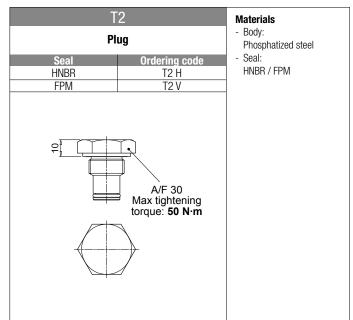
Working temperature: From -25 °C to +110 °C
 Compatibility with fluids: Mineral oils, Synthetic fluids HFB and HFC according to ISO 2943

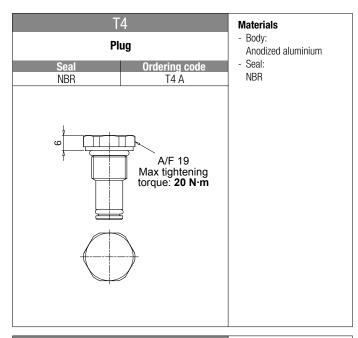
- Degree protection: IP65 according to EN 60529

DIFFERENTIAL PRESSURE INDICATORS

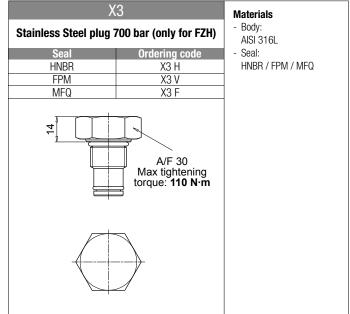
Dimensions

DVZ Materials **Hydraulic symbol** - Body: AISI 316L **Visual Differential Pressure Indicator** AISI 316L - Polyamide - Internal parts: Settings Ordering code - Seal: HNBR - MFQ 1.2 bar ±10% DV Z 12 x P01 DV Z 25 x P01 DV Z 50 x P01 2.5 bar ±10% **Technical data** - Reset: Automatic reset 5.0 bar ±10% DV Z 70 x P01 - Max working pressure: 700 bar 7.0 bar ±10% - Proof pressure: 1050 bar DV Z 95 x P01 9.5 bar ±10% - Burst pressure: 2100 bar - Working temperature: From -25 °C to +110 °C Mineral oils, Synthetic fluids - Compatibility with fluids: Green / Red HFB and HFC according to ISO 2943 clogging - Degree protection: IP65 according to EN 60529 indicator 39 A/F 30 Max tightening torque: 110 N·m





Х	2	Materials
Stainless Stee	el plug 420 bar	- Body: AISI 316L
Seal HNBR FPM MFQ	Ordering code X2 H X2 V X2 F	- Seal: HNBR / FPM / MFQ
A/F 30 Max tightening torque: 50 N·m		







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