

# HYDRAULIC FILTRATION PRODUCTS

LOW & MEDIUM PRESSURE FILTERS



PASSION TO PERFORM







## A WORLDWIDE LEADER IN THE FIELD OF HYDRAULIC FILTRATION EQUIPMENT.

Our company started life in 1964, when Bruno Pasotto decided to attempt to cater for the requests of a market still to be fully explored, with the study, design, development, production and marketing of a vast range of filters for hydraulic equipment, capable of satisfying the needs of manufacturers in all sectors. The quality of our products, our extreme competitiveness compared with major international producers and our constant activities of research, design and development has made us a worldwide leader in the field of hydraulic circuit filtering. Present for 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.

## MARKET LEADER



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.



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

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 **8 business branches**



## TECHNOLOGY

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



## AND PRODUCTION

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





### SUCTION FILTERS

Flow rates up to 875 l/min

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

### RETURN FILTERS

Flow rates up to 3000 l/min

- Pressure up to 20 bar
- Mounting:
- In-Line
  - Tank top
  - In single and duplex designs

### RETURN / SUCTION FILTERS

Flow rates up to 300 l/min

- Pressure up to 80 bar
- Mounting:
- In-Line
  - Tank top

### SPIN-ON FILTERS

Flow rates up to 365 l/min

- Pressure up to 35 bar
- Mounting:
- In-Line
  - Tank top

### LOW & MEDIUM PRESSURE FILTERS

Flow rates up to 3000 l/min

- Pressure up to 80 bar
- Mounting:
- In-Line
  - Parallel manifold version
  - In single and duplex designs

### HIGH PRESSURE FILTERS

Flow rates up to 750 l/min

- Pressure from 110 bar up to 560 bar
- 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, in-line, pressure, stainless steel, spin-on and return) and structural components (motor/pump bell housings, transmission couplings, flexible inserts, damper rings, support feet, aluminium tanks, inspection hatches).

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 complete hydraulic circuits.



### STAINLESS STEEL HIGH PRESSURE FILTERS

Flow rates up to 125 l/min  
Pressure from 320 bar  
up to 1000 bar

Mounting:

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

### CONTAMINATION MONITORING PRODUCTS

- Calibrated on test rigs manufactured and certified to ISO 11943 based on methods from ISO 11171
- Off-line and In-line particles counting up to 400 bar
- Bottle samplers
- RS 232 - RS 485 digital bus interfaces

### MOBILE FILTRATION UNITS

Flow rates from 15 l/min  
up to 200 l/min

### POWER TRANSMISSION PRODUCTS

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

### ACCESSORIES

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

# HYDRAULIC FILTRATION PRODUCTS

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<b>24</b>	<b>page</b>	<b>SUCTION FILTERS</b>	<b>up to Q<sub>max</sub></b>	
			<b>l/min</b>	<b>gpm</b>
27	STR - MPA - MPM	Submerged suction filter, with bypass or magnetic column	875	231
35	SF2 250 - 350	Semi-submerged positive head suction filter	160	43
43	SF2 500	Semi-submerged positive head suction filter	800	211
53	CLOGGING INDICATORS			

<b>56</b>	<b>page</b>	<b>RETURN FILTERS</b>	<b>up to P<sub>max</sub></b>		<b>up to Q<sub>max</sub></b>	
			<b>bar</b>	<b>psi</b>	<b>l/min</b>	<b>gpm</b>
59	MPFX	Tank top semi-immersed filter, standard filter element disassembly	8	116	750	198
87	MPTX	Tank top semi-immersed filter, easy filter element disassembly	8	116	300	80
105	MFBX	Bowl assembly fully immersed filter			500	132
111	MPF	Tank top semi-immersed filter, standard filter element disassembly	8	116	750	198
139	MPT	Tank top semi-immersed filter, easy filter element disassembly	8	116	300	80
157	MFB	Bowl assembly fully immersed filter			500	132
163	MPH - MPI	Tank top semi-immersed filter with internal / external oil flow	10	145	3000	792
193	FRI	Tank top semi-immersed filter, easy filter element disassembly, it can be used also as in-line filter	20	290	1500	397
207	RF2	Semi-immersed under-head filter, easy filter element disassembly	20	290	350	92
214	CLOGGING INDICATORS					
224	ACCESSORIES					

<b>226</b>	<b>page</b>	<b>RETURN / SUCTION FILTERS</b>	<b>up to P<sub>max</sub></b>		<b>up to Q<sub>max</sub></b>	
			<b>bar</b>	<b>psi</b>	<b>l/min</b>	<b>gpm</b>
229	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	300	80
239	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	200	52
245	CLOGGING INDICATORS					

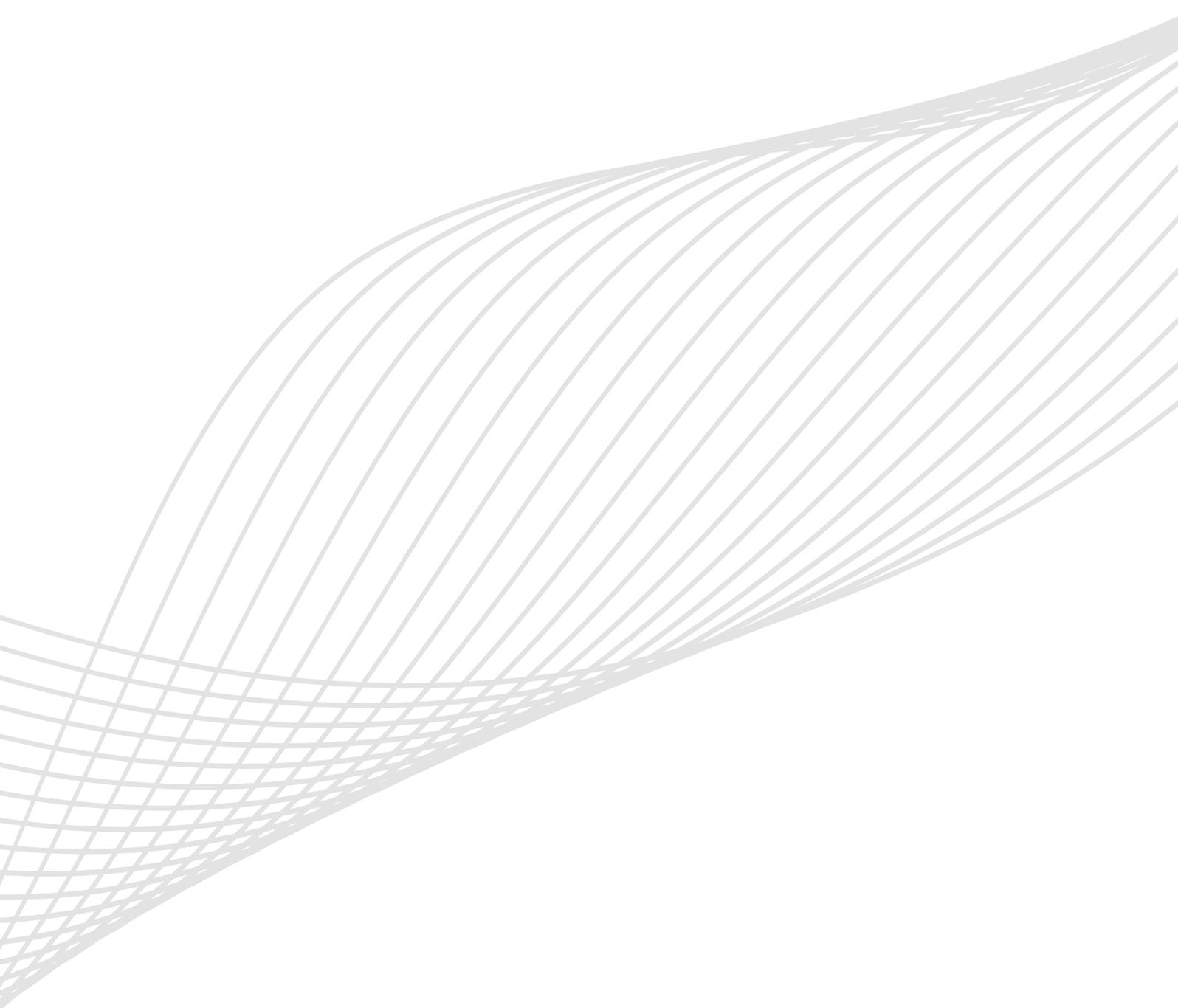
<b>258</b>	<b>page</b>	<b>SPIN-ON FILTERS</b>	<b>up to P<sub>max</sub></b>		<b>up to Q<sub>max</sub></b>	
			<b>bar</b>	<b>psi</b>	<b>l/min</b>	<b>gpm</b>
261	MPS	Low pressure filter, available with single cartridge for in-line or flange mounting or with two cartridge on the same axis on the opposite sides	12	300	365	96
277	MSH	In-line low and medium pressure filter available with single cartridge	35	508	195	52
285	MST	Low pressure tank mounted filter	12	300	195	52
291	CLOGGING INDICATORS					

302 page	LOW & MEDIUM PRESSURE FILTERS	up to P <sub>max</sub>		up to Q <sub>max</sub>		
		bar	psi	l/min	gpm	
305	LMP MULTIPOINT 110 - 120 - 123	In-line filter with Multiport design for multiple choice connection	80	1160	200	53
321	LMP 210 - 211	In-line low & medium pressure filter	60	870	330	87
331	LMP 400 - 401 - 430 - 431	In-line low & medium pressure filter	60	870	740	195
343	LMP 900 - 901	In-line low pressure filter, filter elements designed according to DIN 24550	30	435	2000	528
351	LMP 902 - 903	In-line filter specifically designed to be mounted in series, filter elements designed according to DIN 24550	20	290	3000	792
359	LMP 950 - 951	In-line modular filter, available with 2 and up to 6 different heads	30-25	435-362	2400	634
367	LMP 952 - 953 - 954	In-line low pressure filter specifically designed to be mounted in series	25	362	3000	792
379	LMD 211	In-line duplex medium pressure filter	60	870	330	88
387	LMD 400 - 401 - 431	In-line duplex low pressure filter	16	232	590	156
401	LMD 951	In-line duplex modular filter, available with 2 up to 6 different heads	16-25	232-362	1200	315
409	LDP - LDD	In-line and duplex medium pressure filter, filter elements designed according to DIN 24550	60	870	330	88
418	CLOGGING INDICATORS					

424 page	HIGH PRESSURE FILTERS	up to P <sub>max</sub>		up to Q <sub>max</sub>		
		bar	psi	l/min	gpm	
427	FMP 039	Versatile filter for high pressure - low flow rate applications	110	1595	80	21
435	FMP	Versatile filter for high pressure - high flow rate applications	320	4641	475	125
445	FHP	Typical high pressure filter for mobile applications	420	6091	750	198
459	FMM 050	FMM 050: Typical high pressure filter for mobile applications	420	6091	150	40
	FHA 051	FHA 051: Filter optimized for use in high pressure operating systems	560	8122	140	37
467	FHM	High pressure filter with intermediate plate construction	320	4641	450	119
483	FHB	High pressure for block mounting	320	4641	485	128
495	FHF 325	In-line manifold top mounting	350	5076	500	133
505	FHD	In-line duplex high pressure filter	350	5076	345	92
516	CLOGGING INDICATORS					

522 page	STAINLESS STEEL HIGH PRESSURE FILTERS	up to P <sub>max</sub>		up to Q <sub>max</sub>		
		bar	psi	l/min	gpm	
525	FZP	In-line pressure filter with threaded mount	420	6091	150	40
535	FZH	In-line pressure filter with threaded mount for higher pressure	700	10152	50	13
543	FZX	In-line pressure filter with threaded mount up to 1000 bar	1000	14504	10	2.6
551	FZB	Manifold side mounting	320	4641	75	20
559	FZM	Manifold top mounting	320	4641	70	18
567	FZD	Duplex pressure filter for continuous operation requirements	350	5076	90	24
577	CLOGGING INDICATORS					

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# 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 popular classification criterion divides them into the following families:

- MINERAL OILS

Commonly used oil deriving fluids.

- FIRE RESISTANT FLUIDS

Fluids with intrinsic characteristics of incombustibility or high flash point.

- SYNTHETIC FLUIDS

Modified chemical products to obtain specific optimized features.

- ECOLOGICAL FLUIDS

Synthetic or vegetable origin fluids with high biodegradability characteristics.

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.

- CINEMATIC 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.

Cinematic 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

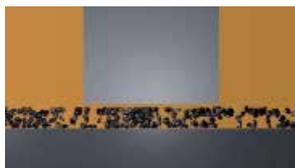
- GASEOUS CONTAMINATION

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 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.

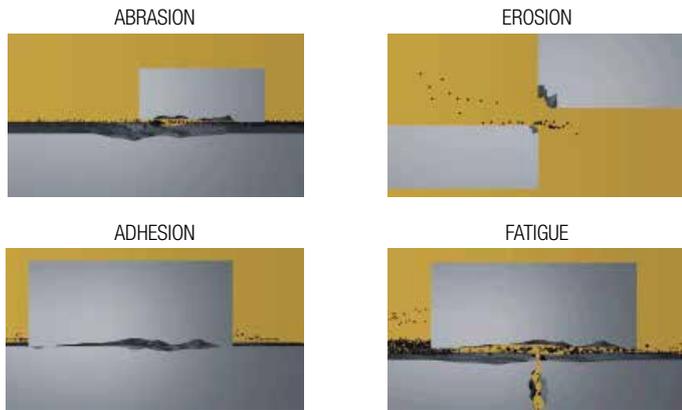
- ABRASION OF SURFACES

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 stem 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.

Gaseous contamination mainly results in decay of system performance.

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



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

## 4 MEASURING THE SOLID CONTAMINATION LEVEL

The level of contamination of a system identifies the amount of contaminant contained in a fluid.

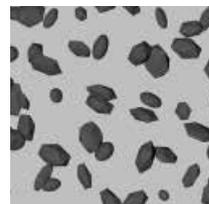
This parameter refers to a unit volume of fluid.

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.

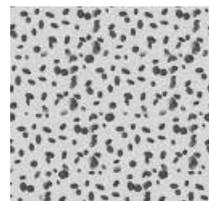
What is the size of the contaminating particles that we must handle in our hydraulic circuit?



HUMAN HAIR  
(75 μm)



MINIMUM DIMENSION  
VISIBLE 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.

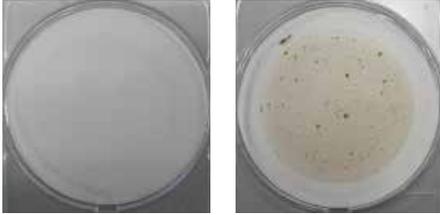
To this end, ISO has issued a set of standards that allow to conduct tests and express the measured values in the following ways.

# CONTAMINATION MANAGEMENT

## - 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.



## - 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 Automatic Particle Counters (APC).

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 code refers to the number of particles of the same size or greater than 4, 6 or 14  $\mu\text{m}$  in a 1 ml fluid.

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

> 4  $\mu\text{m}_{(c)}$  = 350 particles

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

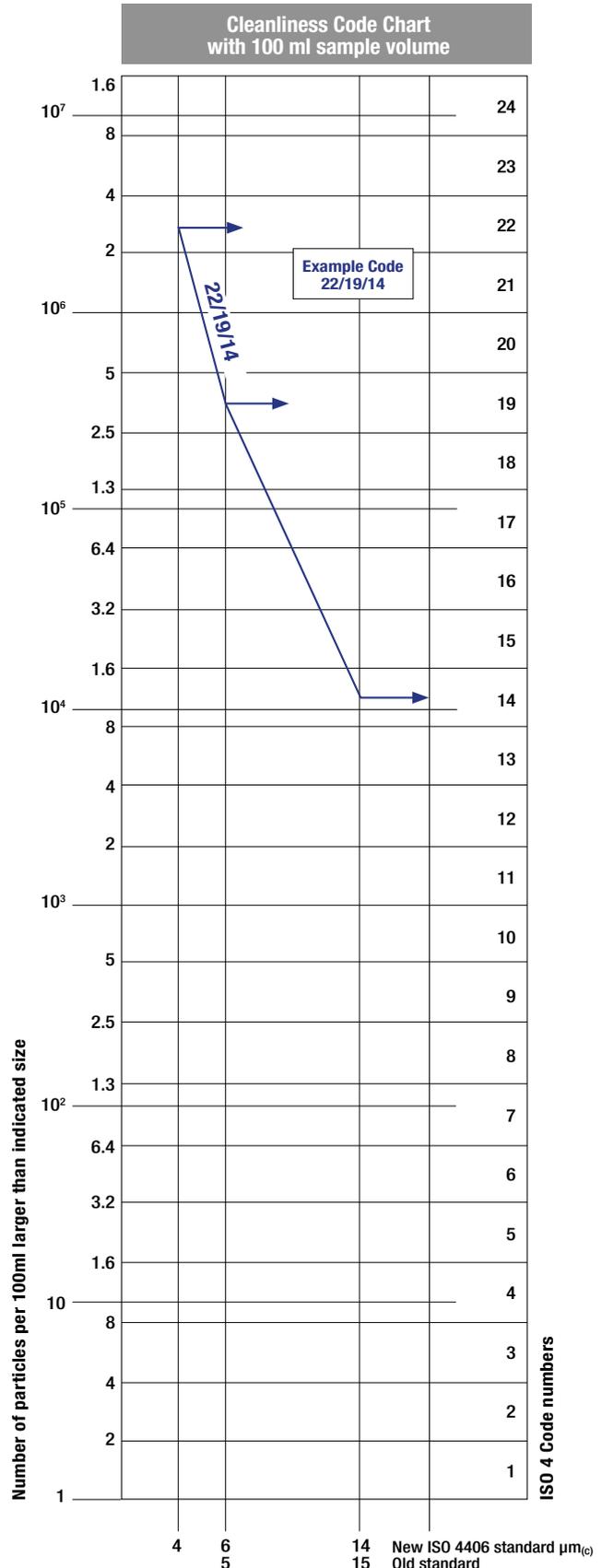
> 14  $\mu\text{m}_{(c)}$  = 25 particles

16 / 14 / 12

## ISO 4406:1999 Cleanliness Code System

Microscope counting examines the particles differently to APCs and the code is given with two scale numbers only.

These are at 5  $\mu\text{m}$  and 15  $\mu\text{m}$  equivalent to the 6  $\mu\text{m}_{(c)}$  and 14  $\mu\text{m}_{(c)}$  of APCs.



- CUMULATIVE DISTRIBUTION OF THE PARTICLES SIZE - SAE AS 4059-1 and SAE AS 4059-2

### Classification example according to SAE AS 4059-1 and SAE AS 4059-2

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).

It can be made a differential measurement (Table 1) or a cumulative measurement (Table 2)

Table 1 - Class for differential measurement

Class	Dimension of contaminant				
	6÷14 µm <sub>(c)</sub>	14÷21 µm <sub>(c)</sub>	21÷38 µm <sub>(c)</sub>	38÷70 µm <sub>(c)</sub>	>70 µm <sub>(c)</sub>
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 µm <sub>(c)</sub> = 15 000 particles
14÷21 µm <sub>(c)</sub> = 2 200 particles
21÷38 µm <sub>(c)</sub> = 200 particles
38÷70 µm <sub>(c)</sub> = 35 particles
> 70 µm <sub>(c)</sub> = 3 particles
Class 6

Table 2 - Class for cumulative measurement

Class	Dimension of contaminant					
	>4 µm <sub>(c)</sub> A	>6 µm <sub>(c)</sub> B	>14 µm <sub>(c)</sub> C	>21 µm <sub>(c)</sub> D	>38 µm <sub>(c)</sub> E	>70 µm <sub>(c)</sub> F
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 µm <sub>(c)</sub> = 45 000 particles
> 6 µm <sub>(c)</sub> = 15 000 particles
> 14 µm <sub>(c)</sub> = 1 500 particles
> 21 µm <sub>(c)</sub> = 250 particles
> 38 µm <sub>(c)</sub> = 15 particles
> 70 µm <sub>(c)</sub> = 3 particle
Class from 2F to 4E

- 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 100ml volume at various size intervals (differential counts) rather than using cumulative counts as in ISO 4406:1999. 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 APC's.

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)

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

5÷15 µm <sub>(c)</sub> = 42 000 particles
15÷25 µm <sub>(c)</sub> = 2 200 particles
25÷50 µm <sub>(c)</sub> = 150 particles
50÷100 µm <sub>(c)</sub> = 18 particles
> 100 µm <sub>(c)</sub> = 3 particles
Class NAS 8

- CUMULATIVE DISTRIBUTION OF THE PARTICLES SIZE - ISO 4407

The level of contamination is defined by counting the number of particles collected by a laboratory membrane per unit of fluid volume. The measurement is done by a microscope.

The membrane must be cleaned, dried and desiccated, with fluid and conditions defined by the Standard. The fluid volume is filtered through the membrane, using a suitable suction system.

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

MICROSCOPE CONTROL AND MEASUREMENT



COMPARISON PHOTOGRAPH'S

1 graduation = 10µm



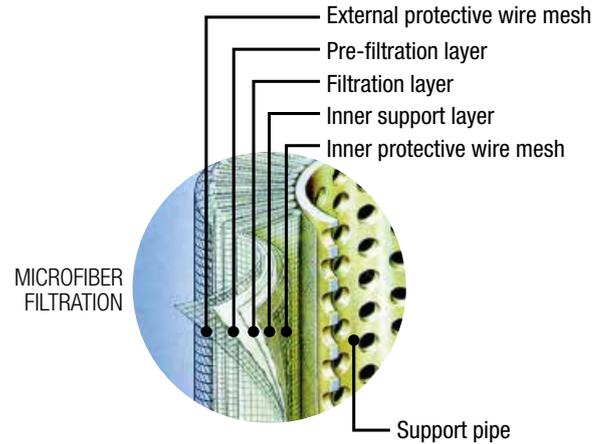
ISO 4406:1999	Class 16/14/11	Class 22/20/17
SAE AS4059E Table 1	Class 5	Class 11
NAS 1638	Class 5	Class 11
SAE AS4059E Table 2	Class 6A/5B/5C	Class 12A/11B/11C

# CONTAMINATION MANAGEMENT

## - CLEANLINESS CODE COMPARISON

Although ISO 4406:1999 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 4406:1999	SAE AS4059 Table 2	SAE AS4059 Table 1	NAS 1638				
> 4 $\mu\text{m}_{(c)}$ 6 $\mu\text{m}_{(c)}$ 14 $\mu\text{m}_{(c)}$	> 4 $\mu\text{m}_{(c)}$ 6 $\mu\text{m}_{(c)}$ 14 $\mu\text{m}_{(c)}$	4-6 6-14 14-21 21-38 38-70 >70	5-15 15-25 25-50 50-100 >100				
23 / 21 / 18	13A / 12B / 12C	12	12				
22 / 20 / 17	12A / 11B / 11C	11	11				
21 / 19 / 16	11A / 10B / 10C	10	10				
20 / 18 / 15	10A / 9B / 9B	9	9				
19 / 17 / 14	9A / 8B / 8C	8	8				
18 / 16 / 13	8A / 7B / 7C	7	7				
17 / 15 / 12	7A / 6B / 6C	6	6				
16 / 14 / 11	6A / 5B / 5C	5	5				
15 / 13 / 10	5A / 4B / 4C	4	4 </tr <tr> <td>14 / 12 / 09</td> <td>4A / 3B / 3C</td> <td>3</td> <td>3</td> </tr>	14 / 12 / 09	4A / 3B / 3C	3	3
14 / 12 / 09	4A / 3B / 3C	3	3				



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

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

## 5 FILTRATION TECHNOLOGIES

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

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

### - SURFACE FILTRATION

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

### - DEPTH FILTERING

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

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

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



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

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

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

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

WIRE MESH FILTRATION



PAPER FILTRATION



Filtration ISO Standard Comparison

MP Filtri Filter media code	$\beta_{x(c)} > 1000$ ISO 16889
A03	5 $\mu\text{m}_{(c)}$
A06	7 $\mu\text{m}_{(c)}$
A10	10 $\mu\text{m}_{(c)}$
A16	15 $\mu\text{m}_{(c)}$
A25	21 $\mu\text{m}_{(c)}$

## 6 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

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

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

### 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 ÷ 125 µm. 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 ÷ 25 µm.

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.

They are mainly produced with filtration depths of 10 ÷ 25 µm.

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.

## 7 FILTER CHOICE 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 OLEODINAMIC PLANTS FROM ENVIRONMENTAL WASTE
- PROTECTION OF OLEODINAMIC PLANTS FROM CONTAMINATION CAUSED BY COMPONENTS' FAILURES

The advantages of proper positioning and sizing of the filters are

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

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

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

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

- **PRESSURE DROP ( $\Delta P$ )**

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

- **WORKING TEMPERATURE ( $T$ )**

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

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

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

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

- **FLUID TYPE**

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

- **PLACEMENT IN THE PLANT**

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

## 8 APPLICABLE STANDARDS FOR FILTER DEVELOPMENT

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

### ISO 2941

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

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

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

### ISO 2942

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

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

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

### ISO 2943

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

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

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

### ISO 3723

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

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

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

### ISO 3968

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

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

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

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

### ISO 16889

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

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

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

## **ISO 23181**

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

This Standard describes the method for testing the fatigue resistance of the filter elements.

The test is carried out by subjecting the filter to continuous flow variations, thus differential pressure, using a high viscosity fluid.

## **ISO 11170**

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

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

## **ISO 10771-1**

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

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

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

The correct filter sizing have to be based on the variable pressure drop depending by the application. For example, for the return filter the pressure drop have to be in the range 0.4 - 0.6 bar.

The pressure drop calculation is performed by adding together the value of the housing with the value of the filter element. The pressure drop in the housing is proportional to the fluid density (kg/dm<sup>3</sup>); all the graphs in the catalogue are referred to mineral oil with density of 0.86 kg/dm<sup>3</sup>.

The filter element pressure drop is proportional to its viscosity (mm<sup>2</sup>/s), the corrective factor Y is related to an oil viscosity different than 30 mm<sup>2</sup>/s.

### Sizing data for single cartridge, head at top

$\Delta p_c$  = Filter housing pressure drop [bar]

$\Delta p_e$  = Filter element pressure drop [bar]

**Y** = Multiplication factor Y (see correspondent table), depending on the filter element size, on the filter element lenght and on the filter media

**Q** = flow rate (l/min)

**V1 reference viscosity** = 30 mm<sup>2</sup>/s (cSt)

**V2** = operating viscosity in mm<sup>2</sup>/s (cSt)

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

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

### Calculation examples with HLP Mineral oil Variation in viscosity

Application data:

Top tank return filter

Filter with in-line connections

Pressure Pmax = 10 bar

Flow rate Q = 120 l/min

Viscosity V2 = 46 mm<sup>2</sup>/s (cSt)

Oil viscosity = 0.86 kg/dm<sup>3</sup>

Required filtration efficiency = 25 µm with absolute filtration

With bypass valve and 1 1/4" inlet connection

From the working pressure and the flow rate we understand it should be possible using the following top tank return filter series: MPT, MPH and FRI. Let's proceed with MPT series.

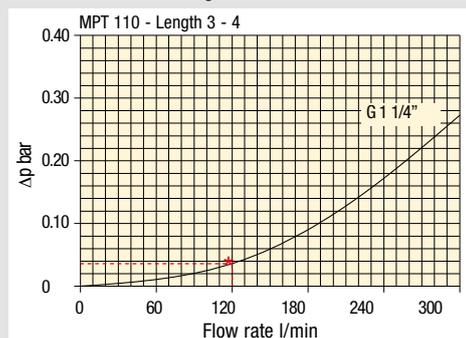
The size 20 doesn't achieve the required flow rate, therefore we have to consider the size 100. The final version of size 100 (101, 104, 110, 120 and 114) will be then defined in function of the mounting characteristics.

$\Delta p_c = 0.03 \text{ bar}$  (\* see graphic below, considering size 100 with the max available lenght to get the lowest pressure drop)

$\Delta p_e = (2.0 : 1000) \times 120 \times (46/30) = 0.37 \text{ bar}$

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

The selection is correct because the total pressure drop value is inside the admissible range for top tank return filters. It is of course possible trying to find a different solution, according to the mounting position or to other commercial need, repeating the previous steps while using a different series or lenght.



### Filter housings $\Delta p$ pressure drop.

The curves are plotted using mineral oil with density of 0.86 kg/dm<sup>3</sup> in compliance with ISO 3968.  $\Delta p$  varies proportionally with density.

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

Reference viscosity 30 mm<sup>2</sup>/s

### Return filters

Filter element	Absolute filtration H Series					Nominal filtration N Series			
	Type	A03	A06	A10	A16	A25	P10	P25	M25 M60 M90
MF 020	1	74.00	50.08	20.00	16.00	9.00	6.43	5.51	4.40
	2	29.20	24.12	8.00	7.22	5.00	3.33	2.85	2.00
	3	22.00	19.00	6.56	5.33	4.33	1.68	1.44	1.30
MF 030 MFX 030	1	74.00	50.08	20.00	16.00	9.00	6.43	5.51	3.40
MF 100 MFX 100	1	28.20	24.40	8.67	8.17	6.88	4.62	3.96	1.25
	2	17.33	12.50	6.86	5.70	4.00	3.05	2.47	1.10
	3	10.25	9.00	3.65	3.33	2.50	1.63	1.32	0.96
	4	6.10	5.40	2.30	2.20	2.00	1.19	0.96	0.82
MF 180 MFX 180	1	3.67	3.05	1.64	1.56	1.24	1.18	1.06	0.26
	2	1.69	1.37	0.68	0.54	0.51	0.43	0.39	0.12
MF 190 MFX 190	2	1.69	1.37	0.60	0.49	0.44	0.35	0.31	0.11
MF 400 MFX 400	1	3.20	2.75	1.39	1.33	1.06	0.96	0.87	0.22
	2	2.00	1.87	0.88	0.85	0.55	0.49	0.45	0.13
	3	1.90	1.60	0.63	0.51	0.49	0.39	0.35	0.11
MF 750 MFX 750	1	1.08	0.84	0.49	0.36	0.26	0.21	0.19	0.06
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	0.42	0.42	0.36	0.09
CU 850		1.06	0.84	0.42	0.33	0.17	0.17	0.13	0.04
MR 100	1	19.00	17.00	6.90	6.30	4.60	2.94	2.52	1.60
	2	11.70	10.80	4.40	4.30	3.00	2.94	2.52	1.37
	3	7.80	6.87	3.70	3.10	2.70	2.14	1.84	1.34
	4	5.50	4.97	2.60	2.40	2.18	1.72	1.47	1.34
	5	4.20	3.84	2.36	2.15	1.90	1.60	1.37	1.34
MR 250	1	5.35	4.85	2.32	1.92	1.50	1.38	1.20	0.15
	2	4.00	3.28	1.44	1.10	1.07	0.96	0.83	0.13
	3	2.60	2.20	1.08	1.00	0.86	0.77	0.64	0.12
	4	1.84	1.56	0.68	0.56	0.44	0.37	0.23	0.11
MR 630	1	3.10	2.48	1.32	1.14	0.92	0.83	0.73	0.09
	2	2.06	1.92	0.82	0.76	0.38	0.33	0.27	0.08
	3	1.48	1.30	0.60	0.56	0.26	0.22	0.17	0.08
	4	1.30	1.20	0.48	0.40	0.25	0.21	0.16	0.08
	5	0.74	0.65	0.30	0.28	0.13	0.10	0.08	0.04
MR 850	1	0.60	0.43	0.34	0.25	0.13	0.12	0.09	0.03
	2	0.37	0.26	0.23	0.21	0.11	0.08	0.07	0.03
	3	0.27	0.18	0.17	0.17	0.05	0.04	0.04	0.02
	4	0.23	0.16	0.13	0.12	0.04	0.03	0.03	0.02

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

Reference viscosity 30 mm<sup>2</sup>/s

## Suction filters

Filter element	Nominal filtration N Series	
	P10	P25
<b>SF 250</b>	65	21

## Return / Suction filters

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

## Low & Medium pressure filters

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

# FILTER SIZING Corrective factor

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

Reference viscosity 30 mm<sup>2</sup>/s

## High pressure filters

Filter element	Absolute filtration N - R Series					Nominal filtration N Series	
	Type	A03	A06	A10	A16		A25
HP 011	1	332.71	250.07	184.32	152.36	128.36	-
	2	220.28	165.56	74.08	59.13	37.05	-
	3	123.24	92.68	41.48	33.08	20.72	-
	4	77.76	58.52	28.37	22.67	16.17	-
HP 039	1	70.66	53.20	25.77	20.57	14.67	4.90
	2	36.57	32.28	18.00	13.38	8.00	2.90
	3	26.57	23.27	12.46	8.80	5.58	2.20
HP 050	1	31.75	30.30	13.16	12.3	7.29	1.60
	2	24.25	21.26	11.70	9.09	4.90	1.40
	3	17.37	16.25	8.90	7.18	3.63	1.25
	4	12.12	10.75	6.10	5.75	3.08	1.07
	5	7.00	6.56	3.60	3.10	2.25	0.80
HP 065	1	58.50	43.46	23.16	19.66	10.71	1.28
	2	42.60	25.64	16.22	13.88	7.32	1.11
	3	20.50	15.88	8.18	6.81	3.91	0.58
HP 135	1	20.33	18.80	9.71	8.66	4.78	2.78
	2	11.14	10.16	6.60	6.38	2.22	1.11
	3	6.48	6.33	3.38	3.16	2.14	1.01
HP 320	1	10.88	9.73	5.02	3.73	2.54	1.04
	2	4.40	3.83	1.75	1.48	0.88	0.71
	3	2.75	2.11	1.05	0.87	0.77	0.61
	4	2.12	1.77	0.98	0.78	0.55	0.47
HP 500	1	4.44	3.67	2.30	2.10	1.65	0.15
	2	3.37	2.77	1.78	1.68	1.24	0.10
	3	2.22	1.98	1.11	1.09	0.75	0.08
	4	1.81	1.33	0.93	0.86	0.68	0.05
	5	1.33	1.15	0.77	0.68	0.48	0.04

Filter element	Absolute filtration N Series					Nominal filtration N Series	
	Type	A03	A06	A10	A16		A25
HF 320	1	3.65	2.95	2.80	1.80	0.90	0.38
	2	2.03	1.73	1.61	1.35	0.85	0.36
	3	1.84	1.42	1.32	1.22	0.80	0.35

## Stainless steel high pressure filters

Filter element	Absolute filtration N Series					
	Type	A03	A06	A10	A16	A25
HP 011	1	332.71	250.07	184.32	152.36	128.36
	2	220.28	165.56	74.08	59.13	37.05
	3	123.24	92.68	41.48	33.08	20.72
	4	77.76	58.52	28.37	22.67	16.17
HP 039	2	70.66	53.20	25.77	20.57	14.67
	3	36.57	32.28	18.00	13.38	8.00
	4	26.57	23.27	12.46	0.88	5.58
	1	31.75	30.30	13.16	12.3	7.29
HP 050	2	24.25	21.26	11.70	9.09	4.90
	3	17.37	16.25	8.90	7.18	3.63
	4	12.12	10.75	6.10	5.75	3.08
	5	7.00	6.56	3.60	3.10	2.25
	1	20.33	18.80	9.71	8.66	4.78
HP 135	2	11.14	10.16	6.60	6.38	2.22
	3	6.48	6.33	3.38	3.16	2.14

Filter element	Absolute filtration H - U Series					
	Type	A03	A06	A10	A16	A25
HP 011	1	424.58	319.74	235.17	194.44	163.78
	2	281.06	211.25	94.53	75.45	47.26
	3	130.14	97.50	43.63	34.82	21.81
	4	109.39	82.25	36.79	29.37	18.40
HP 039	2	70.66	53.20	25.77	20.57	14.67
	3	36.57	32.28	18.00	13.38	8.00
	4	26.57	23.27	12.46	8.80	5.58
	1	47.33	34.25	21.50	20.50	14.71
HP 050	2	29.10	25.95	14.04	10.90	5.88
	3	20.85	19.50	10.68	8.61	4.36
	4	14.55	12.90	7.32	6.90	3.69
	5	9.86	9.34	6.40	4.80	2.50
	1	29.16	25.33	13.00	12.47	5.92
HP 135	2	14.28	11.04	7.86	7.60	4.44
	3	8.96	7.46	4.89	4.16	3.07

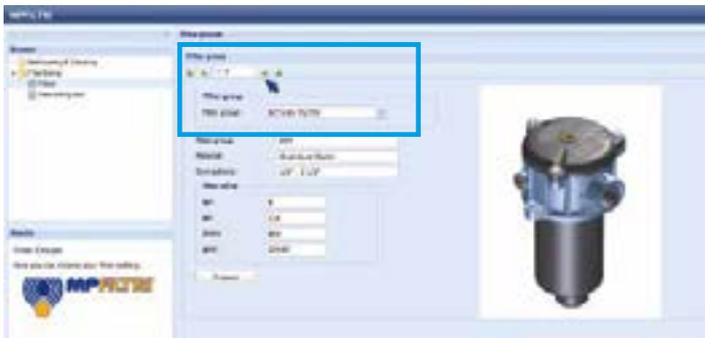
**Step 1** Select "FILTERS"



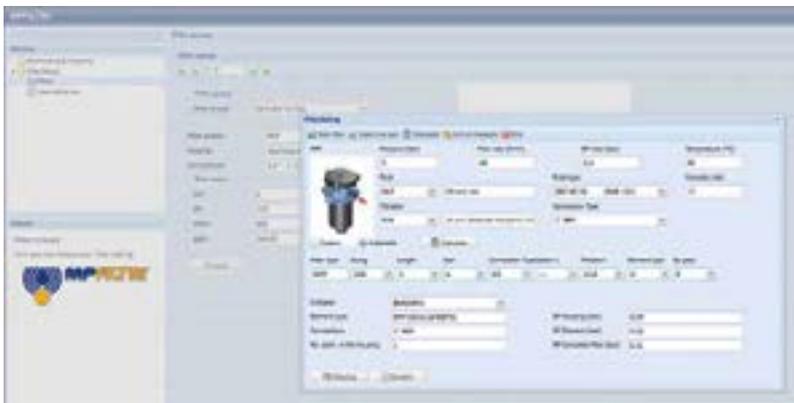
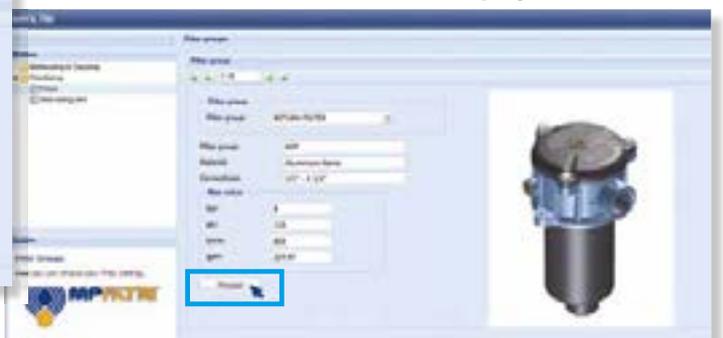
**Step 2** Choose filter group (Return Filter, Pressure Filter, etc.)



**Step 3** Choose filter type (MPF, MPT, etc.) in function of the max working pressure and the max flow rate



**Step 4** Push "PROCEED"



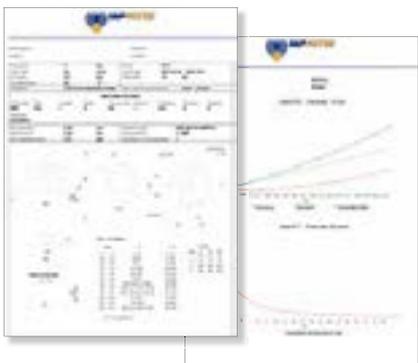
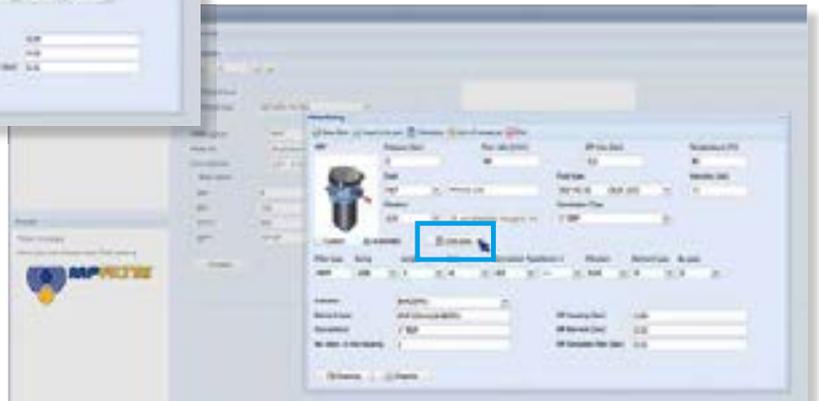
**Step 5**

Insert all application data to calculate the filter size following the sequence:

- working pressure
- working flow rate
- working pressure drop
- working temperature
- fluid material and fluid type
- filtration media
- connection type

**Step 6**

Push "CALCULATE" to have result; in case of any mistake, the system will advice which parameter is out of range to allow to modify/adjust the selection



**Step 7**

Download PDF Datasheet "Report.aspx" pushing the button "Drawing"

**LMP - low and medium pressure filters are used as process filters to protect pumps, pressure reducers and hydraulic circuits from damage due to oil contamination as per ISO 4406.**

**LMP series is available in 5 different sizes: 100, 200, 400, 900 and 950 and a wide range of versions.**

**LMP filters are available with several working pressures suitable for all hydraulic circuits as:**

- **return filters in external tank mounting construction for medium and high flow rates in single and duplex versions**
- **in-line filters for low and medium pressures for off-line applications**
- **in-line process filters for medium pressures, for example, for forced lubrication applications, in single or duplex versions**
- **in-line filters for medium pressures for filtering hydraulic boost circuits**
- **in-line filters as high holding capacity filters on test beds**

**LMP filters are thus specifically designed to be suitable for a wide range of application: from steel plants to mobile equipments, from test benches to naval application, providing the right solution for filtering requirements in all sectors.**

**LMP filters are available in single, manifold and duplex versions.**

## FILTER SIZING

For the proper corrective factor Y see chapter at page 21

# Low & Medium Pressure filters



LMP 110 - 120 MULTIPOINT	page 305	LMD 211	page 379
LMP 210 - 211	321	LMD 400 - 401 - 431	387
LMP 400 - 401 - 430 - 431	331	LMD 951	401
LMP 900 - 901	343	LDP - LDD	page 409
LMP 902 - 903	351	Filter element according to DIN 24550	
LMP 950 - 951	359	INDICATORS	page 418
LMP 952 - 953 - 954	367		



# LMP 110-120 series

## MULTI PORT

Maximum pressure up to 80 bar - Flow rate up to 200 l/min



Technical data

**Low & Medium Pressure filters** Maximum pressure up to 80 bar - Flow rate up to 200 l/min

**Filter housing materials**

- Head: Aluminium
- Housing: Cathaphoresis - Painted Steel
- Bypass valve: Brass - Aluminium

**Seals**

- Standard NBR series A
- Optional FPM series V

**Pressure**

- Working pressure: 8 MPa (80 bar)
- Test pressure: 12 MPa (120 bar)
- Burst pressure:
  - LMP 110: 29 MPa (290 bar)
  - LMP 120/130: 38 MPa (380 bar)
- Pulse pressure fatigue test: 1 000 000 cycles with pressure from 0 to 8 MPa (80 bar)

**Temperature**

From -25 °C to +110 °C

**Note**

LMP MULTIPOINT filters are provided for vertical mounting

**Bypass valve**

- Opening pressure 3.5 bar ±10%
- Other opening pressures on request.

**Δp element type**

- Microfibre filter elements - series N - W: 20 bar
- Wire mesh filter elements - series N: 20 bar
- Fluid flow through the filter element from OUT to IN.

Weights [kg] and volumes [dm<sup>3</sup>]

	Weights [kg]					Volumes [dm <sup>3</sup> ]				
	Length	1	2	3	4	Length	1	2	3	4
<b>LMP 110</b>		1.60	1.80	2.10	2.60		0.75	0.81	1.11	1.53
<b>LMP 120</b>		1.90	2.10	2.40	2.90		0.75	0.81	1.11	1.53
<b>LMP 123</b>		1.70	1.90	2.20	2.70		0.75	0.81	1.11	1.53

Multiport

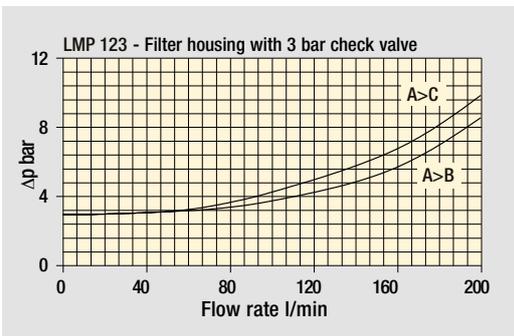
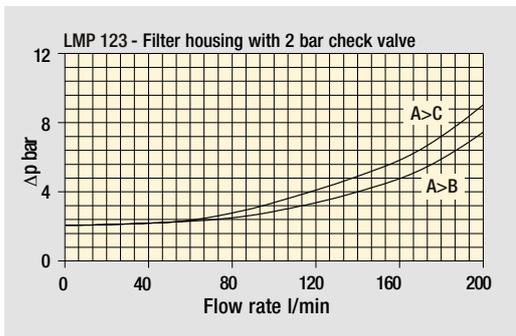
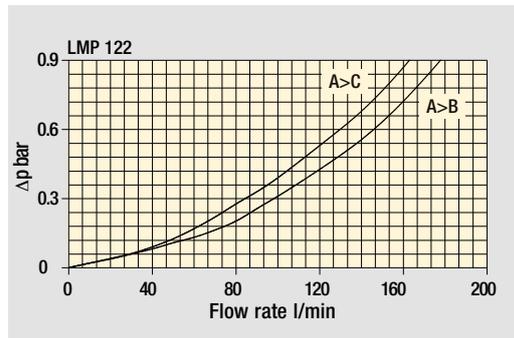
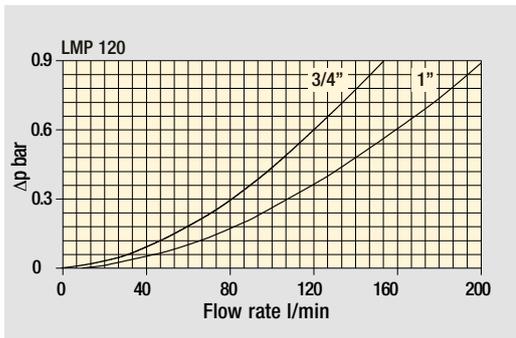
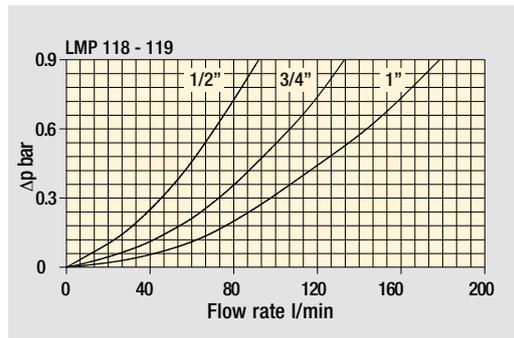
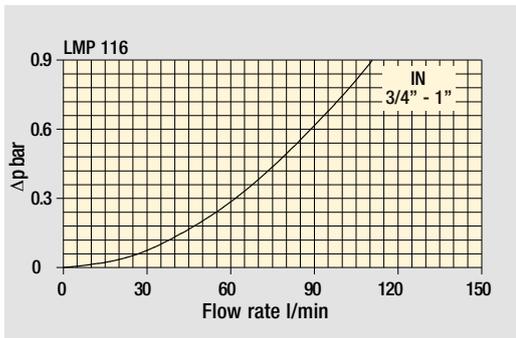
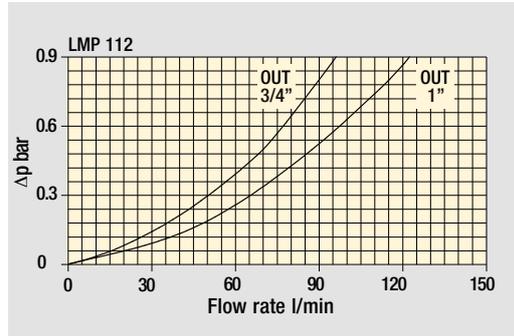
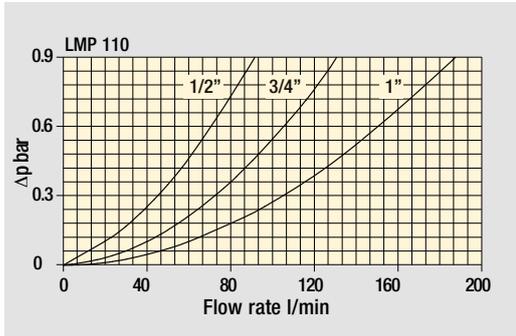
	<p><b>LMP 110</b> In-Line filter</p>			<p><b>LMP 120</b> Port IN-OUT on the same side</p>	
	<p><b>LMP 112</b> Double IN port</p>			<p><b>LMP 122</b> Lateral OUT port high flow</p>	
	<p><b>LMP 116</b> Double OUT port</p>		<p>Type 1</p>	<p><b>LMP 123</b> Bypass valve for heat exchanger high flow</p>	
	<p><b>LMP 118</b> Bypass lateral. Always cleaning fluid in OUT port</p>		<p>Type 2</p>		
	<p><b>LMP 119</b> Safety valve 6 bar for heat exchanger</p>				

## Pressure drop

The curves are plotted using mineral oil with density of 0.86 kg/dm<sup>3</sup> in compliance with ISO 3968.

**$\Delta p$  varies proportionally with density.**

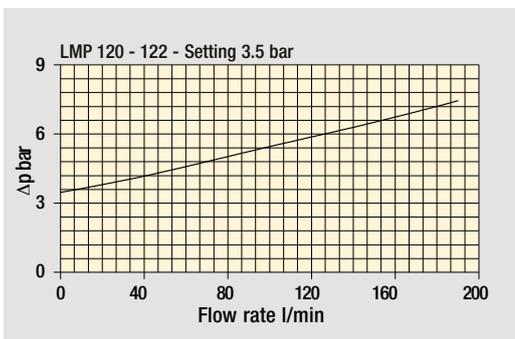
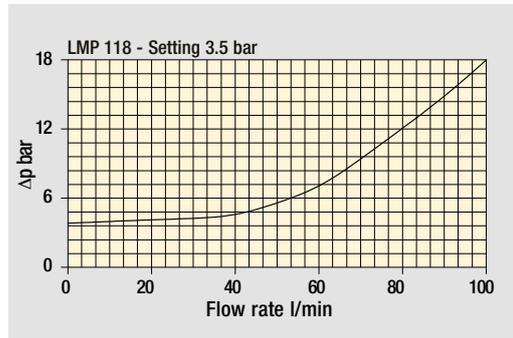
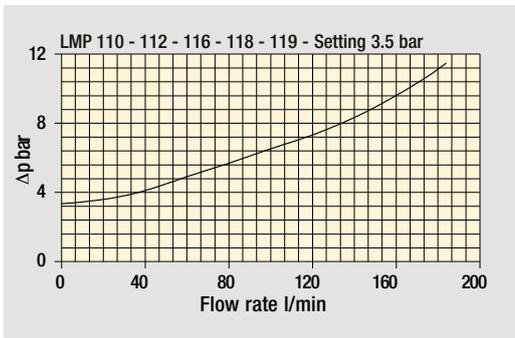
Filter housings  $\Delta p$  pressure drop



The curves are plotted using mineral oil with density of 0.86 kg/dm<sup>3</sup> in compliance with ISO 3968.  
 $\Delta p$  varies proportionally with density.

Pressure drop

Bypass valve pressure drop



## Designation & Ordering code

### COMPLETE FILTER

Series and size		Configuration example: <b>LMP112</b>   <b>4</b>   <b>B</b>   <b>A</b>   <b>D</b>   <b>1</b>   <b>A10</b>   <b>N</b>   <b>P01</b>									
<b>LMP110</b>   <b>LMP112</b>   <b>LMP116</b>											
Length		1   2   3   4									
Bypass valve		S Without bypass   B 3.5 bar									
Seals and treatments		Filtration rating									
A NBR		Axx	Mxx	Pxx							
V FPM		•	•	•							
W NBR compatible with fluids HFA-HFB-HFC		•	•								
Connections		Aux (only LMP 112 - 116)									
A	G3/4"	G3/4"									
B	G1"	G3/4"									
C	3/4" NPT	3/4" NPT									
D	1" NPT	3/4" NPT									
E	SAE 12 - 1 1/16" - 12 UN	SAE 12 - 1 1/16" - 12 UN									
F	SAE 16 - 1 5/16" - 12 UN	SAE 12 - 1 1/16" - 12 UN									
Connection for differential indicator											
1 Without											
2 With standard connection											
3 With connection on the opposite side											
6 With two connections on both sides											
Filtration rating (filter media)											
A03 Inorganic microfiber 3 µm		M25 Wire mesh 25 µm									
A06 Inorganic microfiber 6 µm		M60 Wire mesh 60 µm									
A10 Inorganic microfiber 10 µm		M90 Wire mesh 90 µm									
A16 Inorganic microfiber 16 µm		P10 Resin impregnated paper 10 µm									
A25 Inorganic microfiber 25 µm		P25 Resin impregnated paper 25 µm									
		Element Δp			Execution						
		N 20 bar			P01 MP Filtri standard						
					Pxx Customized						

### FILTER ELEMENT

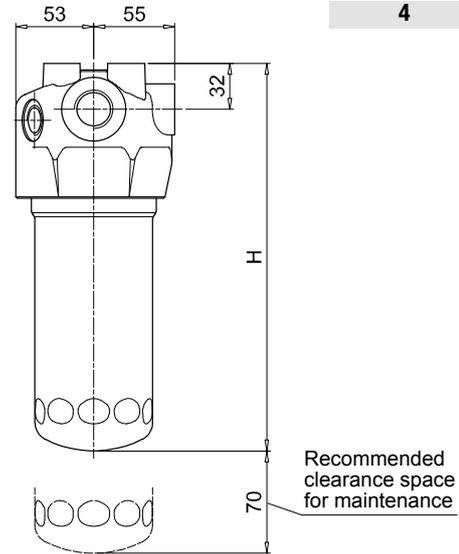
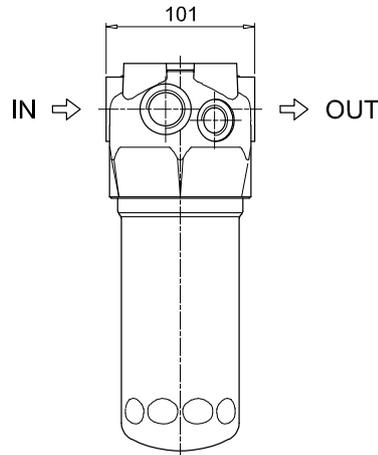
Element series and size		Configuration example: <b>CU110</b>   <b>4</b>   <b>A10</b>   <b>A</b>   <b>N</b>   <b>P01</b>								
<b>CU110</b>										
Element length		1   2   3   4								
Filtration rating (filter media)										
A03 Inorganic microfiber 3 µm		M25 Wire mesh 25 µm								
A06 Inorganic microfiber 6 µm		M60 Wire mesh 60 µm								
A10 Inorganic microfiber 10 µm		M90 Wire mesh 90 µm								
A16 Inorganic microfiber 16 µm		P10 Resin impregnated paper 10 µm								
A25 Inorganic microfiber 25 µm		P25 Resin impregnated paper 25 µm								
Seals		Filtration rating								
A NBR		Axx	Mxx	Pxx						
V FPM		•	•	•						
W NBR compatible with fluids HFA-HFB-HFC		•	•							
		Element Δp			Execution					
		N 20 bar			P01 MP Filtri standard					
					Pxx Customized					

### ACCESSORIES

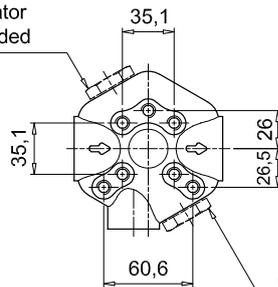
Differential indicators		page			page
DEA	Electrical differential indicator	419	DTA	Electronic differential indicator	422
DEM	Electrical differential indicator	419-420	DVA	Visual differential indicator	422
DLA	Electrical / visual differential indicator	420-421	DVM	Visual differential indicator	422
DLE	Electrical / visual differential indicator	421			
Additional features		page			
T2	Plug	423			

LMP110 - LMP112  
LMP116

Filter length	H [mm]
1	182
2	215
3	265
4	365

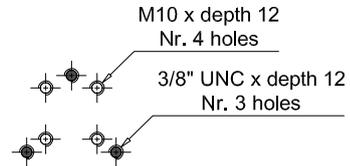


2 - Standard connection for differential indicator  
T2 plug not included

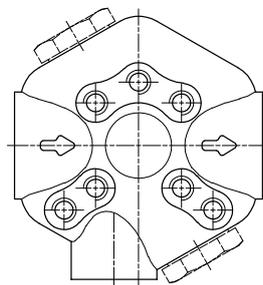


3 - Connection for differential indicator  
on the opposite side  
T2 plug not included

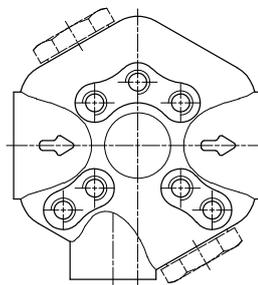
**Fixing holes**  
Option for Metric and UNC screws



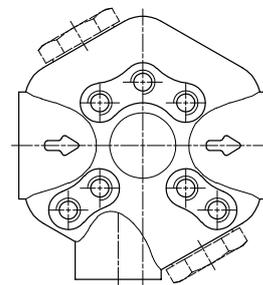
LMP110



LMP112



LMP116



↑  
Aux  
IN

↓  
Aux  
OUT

## Designation & Ordering code

### COMPLETE FILTER

<b>Series and size</b>		Configuration example: <b>LMP118</b>   <b>4</b>   <b>B</b>   <b>A</b>   <b>D</b>   <b>1</b>   <b>A10</b>   <b>N</b>   <b>P01</b>									
<b>LMP118</b>   <b>LMP119</b>											
<b>Length</b>											
<b>1</b>   <b>2</b>   <b>3</b>   <b>4</b>											
<b>Bypass valve</b>											
<b>B</b> 3.5 bar											
<b>Seals and treatments</b>		<b>Filtration rating</b>									
		<b>Axx</b>	<b>Mxx</b>	<b>Pxx</b>							
<b>A</b>	NBR	•	•	•							
<b>V</b>	FPM	•	•	•							
<b>W</b>	NBR compatible with fluids HFA-HFB-HFC	•	•								
<b>Connections</b>											
		<b>Aux OUT</b>									
<b>A</b>	G3/4"	G3/4"									
<b>B</b>	G1"	G3/4"									
<b>C</b>	3/4" NPT	3/4" NPT									
<b>D</b>	1" NPT	3/4" NPT									
<b>E</b>	SAE 12 - 1 1/16" - 12 UN	SAE 12 - 1 1/16" - 12 UN									
<b>F</b>	SAE 16 - 1 5/16" - 12 UN	SAE 12 - 1 1/16" - 12 UN									
<b>Connection for differential indicator</b>											
<b>1</b> Without											
<b>2</b> With standard connection											
<b>Filtration rating (filter media)</b>											
<b>A03</b>	Inorganic microfiber 3 µm	<b>M25</b> Wire mesh 25 µm									
<b>A06</b>	Inorganic microfiber 6 µm	<b>M60</b> Wire mesh 60 µm									
<b>A10</b>	Inorganic microfiber 10 µm	<b>M90</b> Wire mesh 90 µm									
<b>A16</b>	Inorganic microfiber 16 µm	<b>P10</b> Resin impregnated paper 10 µm									
<b>A25</b>	Inorganic microfiber 25 µm	<b>P25</b> Resin impregnated paper 25 µm									
		<b>Element Δp</b>		<b>Execution</b>							
		<b>N</b> 20 bar		<b>P01</b> MP Filtri standard							
				<b>Pxx</b> Customized							

### FILTER ELEMENT

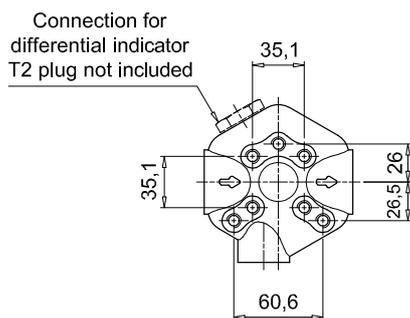
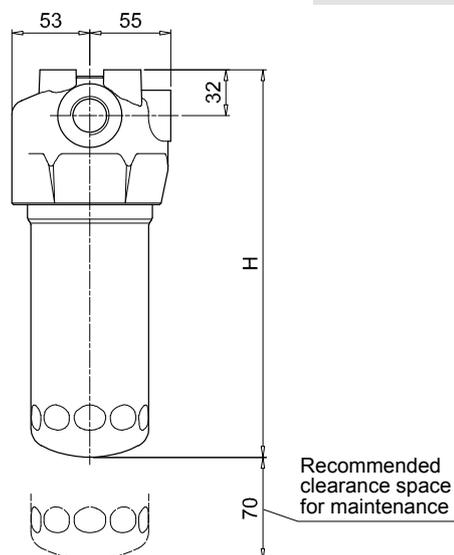
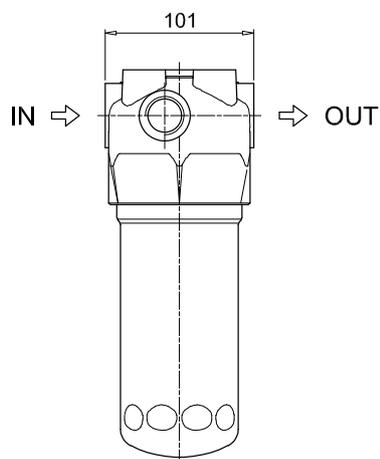
<b>Element series and size</b>		Configuration example: <b>CU110</b>   <b>4</b>   <b>A10</b>   <b>A</b>   <b>N</b>   <b>P01</b>									
<b>CU110</b>											
<b>Element length</b>											
<b>1</b>   <b>2</b>   <b>3</b>   <b>4</b>											
<b>Filtration rating (filter media)</b>											
<b>A03</b>	Inorganic microfiber 3 µm	<b>M25</b> Wire mesh 25 µm									
<b>A06</b>	Inorganic microfiber 6 µm	<b>M60</b> Wire mesh 60 µm									
<b>A10</b>	Inorganic microfiber 10 µm	<b>M90</b> Wire mesh 90 µm									
<b>A16</b>	Inorganic microfiber 16 µm	<b>P10</b> Resin impregnated paper 10 µm									
<b>A25</b>	Inorganic microfiber 25 µm	<b>P25</b> Resin impregnated paper 25 µm									
<b>Seals</b>		<b>Filtration rating</b>									
		<b>Axx</b>	<b>Mxx</b>	<b>Pxx</b>							
<b>A</b>	NBR	•	•	•							
<b>V</b>	FPM	•	•	•							
<b>W</b>	NBR compatible with fluids HFA-HFB-HFC	•	•								
		<b>Element Δp</b>		<b>Execution</b>							
		<b>N</b> 20 bar		<b>P01</b> MP Filtri standard							
				<b>Pxx</b> Customized							

### ACCESSORIES

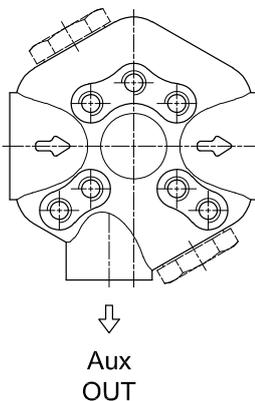
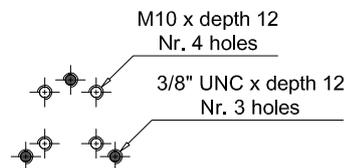
<b>Differential indicators</b>		page		page	
<b>DEA</b>	Electrical differential indicator	419	<b>DTA</b>	Electronic differential indicator	422
<b>DEM</b>	Electrical differential indicator	419-420	<b>DVA</b>	Visual differential indicator	422
<b>DLA</b>	Electrical / visual differential indicator	420-421	<b>DVM</b>	Visual differential indicator	422
<b>DLE</b>	Electrical / visual differential indicator	421			
<b>Additional features</b>		page			
<b>T2</b>	Plug	423			

LMP118 - LMP119

Filter length	H [mm]
1	182
2	215
3	265
4	365



**Fixing holes**  
Option for Metric and UNC screws



## Designation & Ordering code

### COMPLETE FILTER

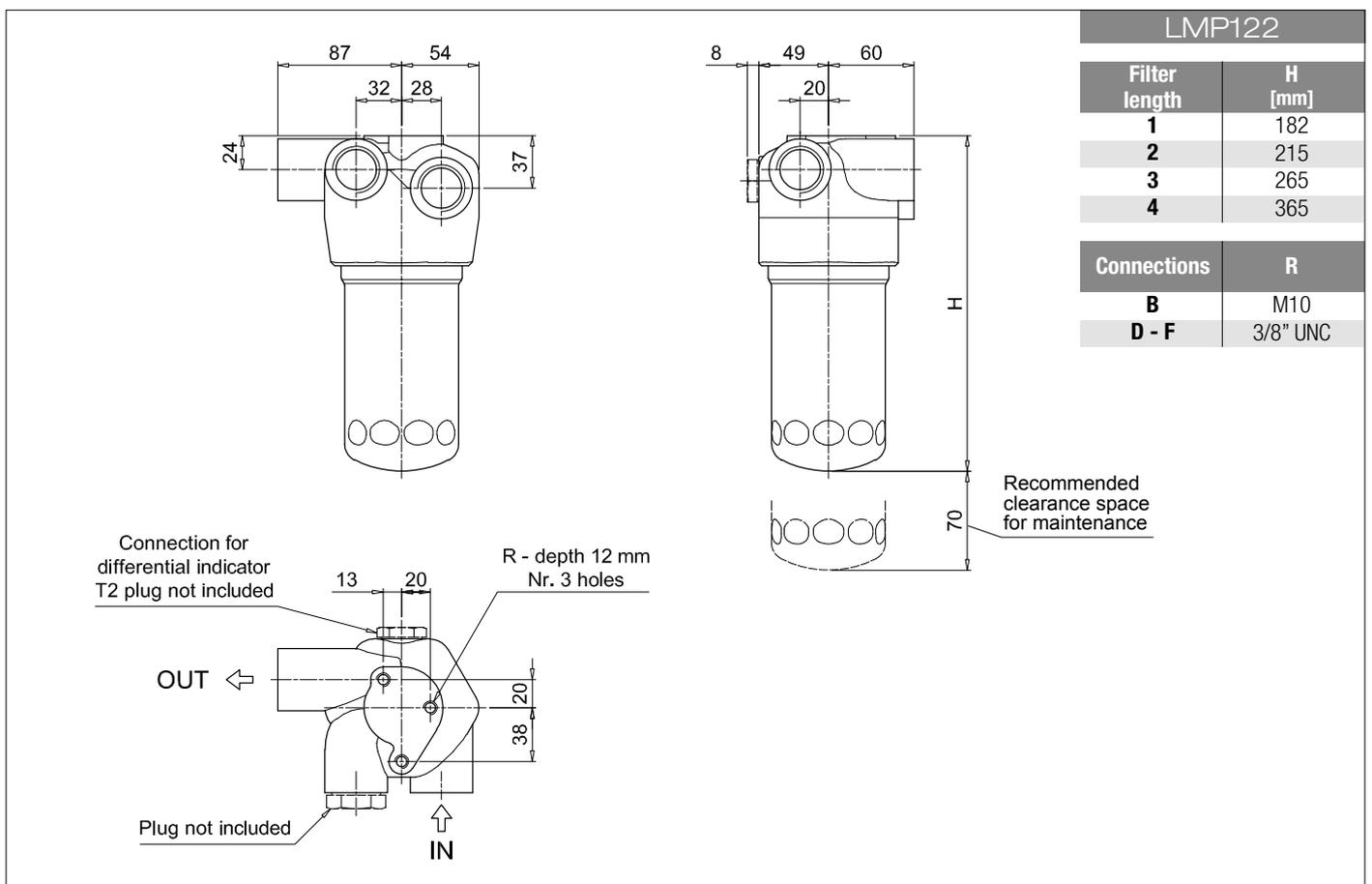
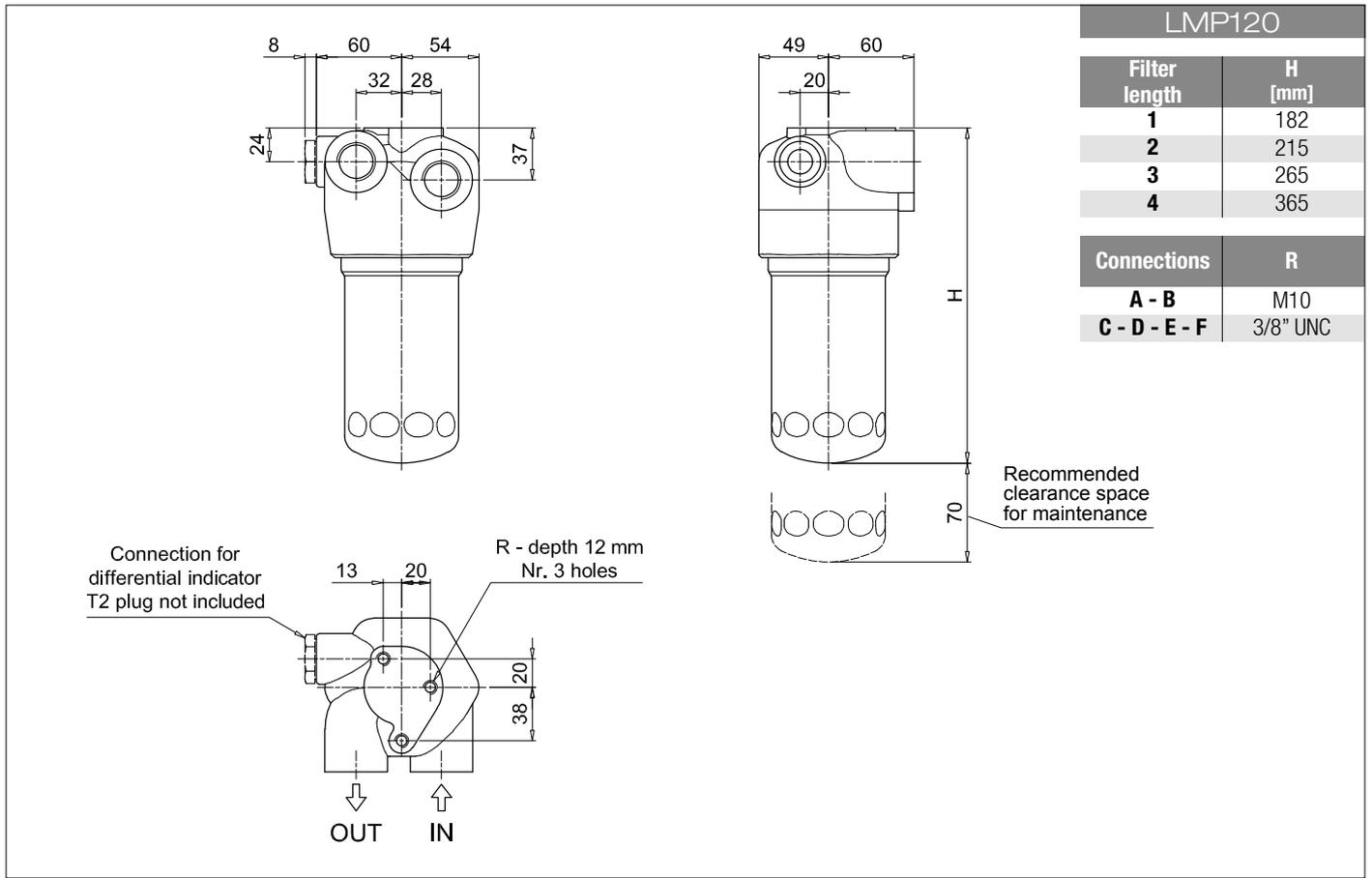
Series and size		Configuration example: <b>LMP112</b>   <b>4</b>   <b>B</b>   <b>A</b>   <b>D</b>   <b>1</b>   <b>A10</b>   <b>N</b>   <b>P01</b>									
<b>LMP120</b>   <b>LMP122</b>											
Length		1   2   3   4									
Bypass valve		S Without bypass   B 3.5 bar									
Seals and treatments		Filtration rating									
		Axx	Mxx	Pxx							
A NBR		•	•	•							
V FPM		•	•	•							
W NBR compatible with fluids HFA-HFB-HFC		•	•								
Connections		LMP120	LMP122								
A G3/4"		•									
B G1"		•	•								
C 3/4" NPT		•									
D 1" NPT		•	•								
E SAE 12 - 1 1/16" - 12 UN		•									
F SAE 16 - 1 5/16" - 12 UN		•	•								
Connection for differential indicator											
1 Without											
2 With standard connection											
Filtration rating (filter media)											
A03 Inorganic microfiber 3 µm		M25 Wire mesh 25 µm									
A06 Inorganic microfiber 6 µm		M60 Wire mesh 60 µm									
A10 Inorganic microfiber 10 µm		M90 Wire mesh 90 µm									
A16 Inorganic microfiber 16 µm		P10 Resin impregnated paper 10 µm									
A25 Inorganic microfiber 25 µm		P25 Resin impregnated paper 25 µm									
		Element Δp		Execution							
		N 20 bar		P01 MP Filtri standard							
				Pxx Customized							

### FILTER ELEMENT

Element series and size		Configuration example: <b>CU110</b>   <b>4</b>   <b>A10</b>   <b>A</b>   <b>N</b>   <b>P01</b>									
<b>CU110</b>											
Element length		1   2   3   4									
Filtration rating (filter media)											
A03 Inorganic microfiber 3 µm		M25 Wire mesh 25 µm									
A06 Inorganic microfiber 6 µm		M60 Wire mesh 60 µm									
A10 Inorganic microfiber 10 µm		M90 Wire mesh 90 µm									
A16 Inorganic microfiber 16 µm		P10 Resin impregnated paper 10 µm									
A25 Inorganic microfiber 25 µm		P25 Resin impregnated paper 25 µm									
Seals		Filtration rating									
		Axx	Mxx	Pxx							
A NBR		•	•	•							
V FPM		•	•	•							
W NBR compatible with fluids HFA-HFB-HFC		•	•								
		Element Δp		Execution							
		N 20 bar		P01 MP Filtri standard							
				Pxx Customized							

### ACCESSORIES

Differential indicators		page			page
DEA	Electrical differential indicator	419	DTA	Electronic differential indicator	422
DEM	Electrical differential indicator	419-420	DVA	Visual differential indicator	422
DLA	Electrical / visual differential indicator	420-421	DVM	Visual differential indicator	422
DLE	Electrical / visual differential indicator	421			
Additional features		page			
T2	Plug	423			



Designation & Ordering code

**COMPLETE FILTER**

Series and size **LMP123** Configuration example: **LMP123** | **4** | **R** | **A** | **F** | **1** | **A10** | **N** | **P01**

**Length**  
1 | 2 | 3 | 4

Valves	Bypass	OUT to cooler	Check valve
<b>C</b>	without	front	2 bar
<b>D</b>			3 bar
<b>G</b>		side	2 bar
<b>H</b>			3 bar
<b>M</b>	3.5 bar	front	2 bar
<b>N</b>			3 bar
<b>Q</b>		side	2 bar
<b>R</b>			3 bar

Seals and treatments	Filtration rating		
	Axx	Mxx	Pxx
<b>A</b> NBR	•	•	•
<b>V</b> FPM	•	•	•
<b>W</b> NBR compatible with fluids HFA-HFB-HFC	•	•	

**Connections**  
**B** G1"  
**F** SAE 16 - 1 5/16" - 12 UN

**Connection for differential indicator**  
**1** Without  
**2** With standard connection

Filtration rating (filter media)	
<b>A03</b> Inorganic microfiber 3 µm	<b>M25</b> Wire mesh 25 µm
<b>A06</b> Inorganic microfiber 6 µm	<b>M60</b> Wire mesh 60 µm
<b>A10</b> Inorganic microfiber 10 µm	<b>M90</b> Wire mesh 90 µm
<b>A16</b> Inorganic microfiber 16 µm	<b>P10</b> Resin impregnated paper 10 µm
<b>A25</b> Inorganic microfiber 25 µm	<b>P25</b> Resin impregnated paper 25 µm

Element Δp	Execution
<b>N</b> 20 bar	<b>P01</b> MP Filtri standard
	<b>Pxx</b> Customized

**FILTER ELEMENT**

Element series and size **CU110** Configuration example: **CU110** | **4** | **A10** | **A** | **N** | **P01**

**Element length**  
1 | 2 | 3 | 4

Filtration rating (filter media)	
<b>A03</b> Inorganic microfiber 3 µm	<b>M25</b> Wire mesh 25 µm
<b>A06</b> Inorganic microfiber 6 µm	<b>M60</b> Wire mesh 60 µm
<b>A10</b> Inorganic microfiber 10 µm	<b>M90</b> Wire mesh 90 µm
<b>A16</b> Inorganic microfiber 16 µm	<b>P10</b> Resin impregnated paper 10 µm
<b>A25</b> Inorganic microfiber 25 µm	<b>P25</b> Resin impregnated paper 25 µm

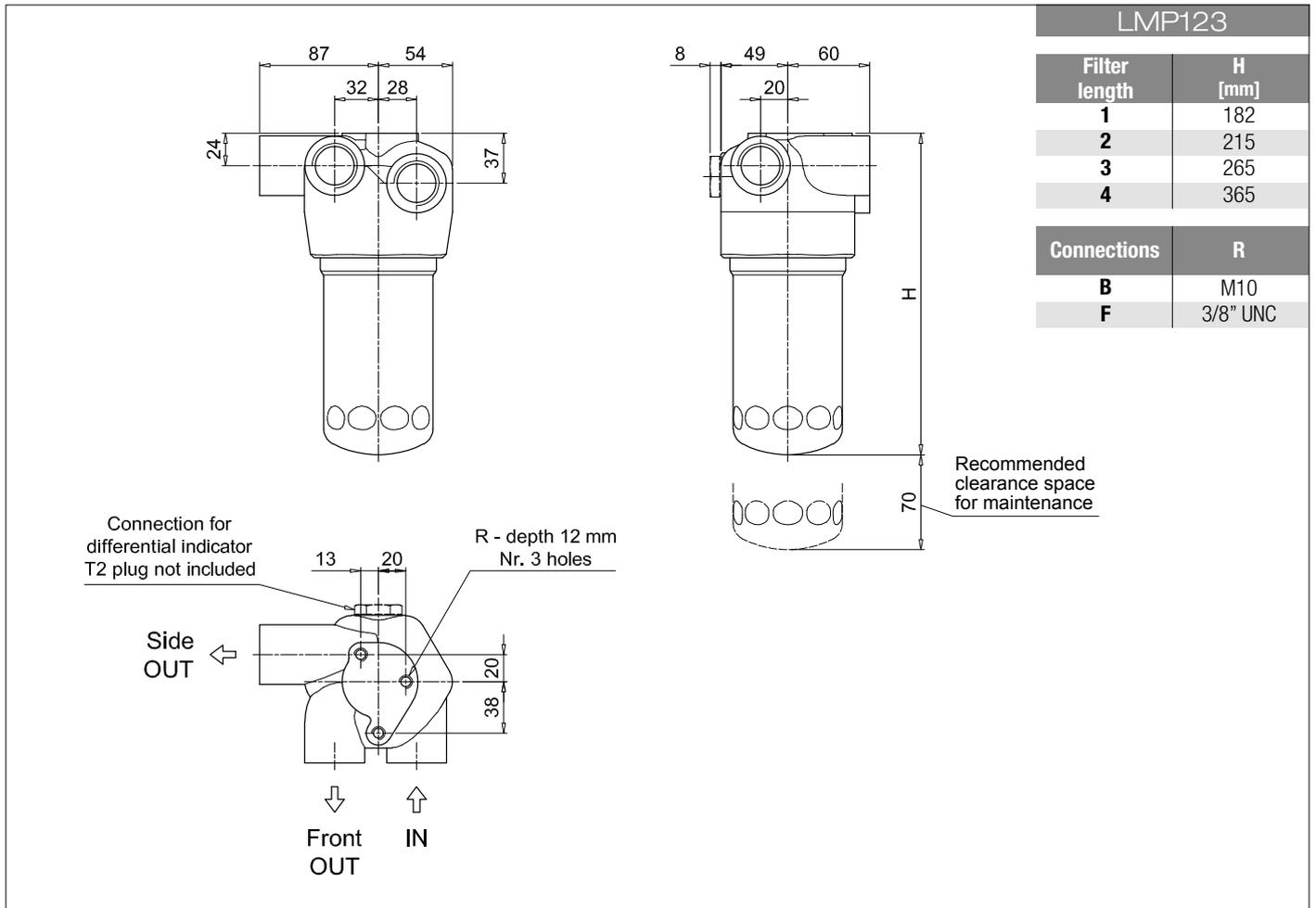
Seals	Filtration rating		
	Axx	Mxx	Pxx
<b>A</b> NBR	•	•	•
<b>V</b> FPM	•	•	•
<b>W</b> NBR compatible with fluids HFA-HFB-HFC	•	•	

Element Δp	Execution
<b>N</b> 20 bar	<b>P01</b> MP Filtri standard
	<b>Pxx</b> Customized

**ACCESSORIES**

Differential indicators	page		page
<b>DEA</b> Electrical differential indicator	419	<b>DTA</b> Electronic differential indicator	422
<b>DEM</b> Electrical differential indicator	419-420	<b>DVA</b> Visual differential indicator	422
<b>DLA</b> Electrical / visual differential indicator	420-421	<b>DVM</b> Visual differential indicator	422
<b>DLE</b> Electrical / visual differential indicator	421		

Additional features	page
<b>T2</b> Plug	423



Order number for spare parts

LMP 110 - 112 - 116 - 118 - 119		LMP 120		LMP 122 - 123	
<b>Item:</b>	Q.ty: 1 pc. <b>2</b>	Q.ty: 1 pc. <b>3</b> (3a ÷ 3d)		Q.ty: 1 pc. <b>4</b>	
<b>Filter series</b>	<b>Filter element</b>	<b>Seal Kit code number</b>		<b>Indicator connection plug</b>	
<b>LMP 110 - 112 - 116 - 118 - 119</b>	See order table	<b>NBR</b>	<b>FPM</b>	<b>NBR</b>	<b>FPM</b>
<b>LMP 120</b>		02050478	02050479	T2H	T2V
<b>LMP 122 - 123</b>					





# LMP 210-211

Maximum pressure up to 60 bar - Flow rate up to 330 l/min



# LMP210-211 GENERAL INFORMATION

## Technical data

**Low & Medium Pressure filters** Maximum pressure up to 60 bar - Flow rate up to 330 l/min

### Filter housing materials

- Head: Aluminium
- Bowl: Cathaphoretic Painted Steel
- Bypass valve: AISI 304 - Nylon

### Seals

- Standard NBR series A
- Optional FPM series V

### Pressure

- Working pressure: 6 MPa (60 bar)
- Test pressure: 9 MPa (90 bar)
- Burst pressure: 21 MPa (210 bar)
- Pulse pressure fatigue test: 1 000 000 cycles with pressure from 0 to 6 MPa (60 bar)

### Temperature

From -25 °C to +110 °C

### Connections

Inlet/Outlet In-Line

### Bypass valve

- Opening pressure 3.5 bar  $\pm$ 10%
- Other opening pressures on request.

### Note

LMP 210 - 211 filters are provided for vertical mounting

### $\Delta p$ element type

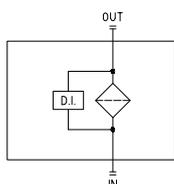
- Microfibre filter elements - series N: 20 bar
- Fluid flow through the filter element from OUT to IN.

## Weights [kg] and volumes [dm<sup>3</sup>]

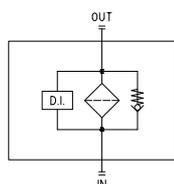
	Weights [kg]			Volumes [dm <sup>3</sup> ]				
	Length	1	2	3	Length	1	2	3
<b>LMP 210 - 211</b>		3.10	4.80	6.40		1.60	2.10	2.80

## Hydraulic symbols

LMP 210-400-900-950  
execution **S**



LMP 210-400-900-950  
execution **B**

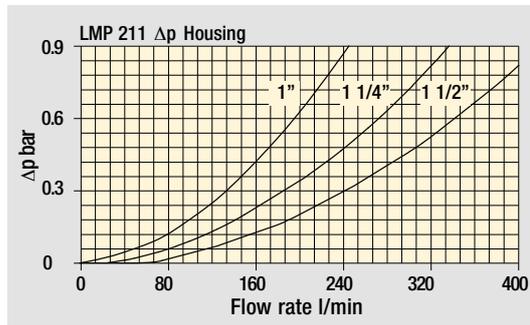
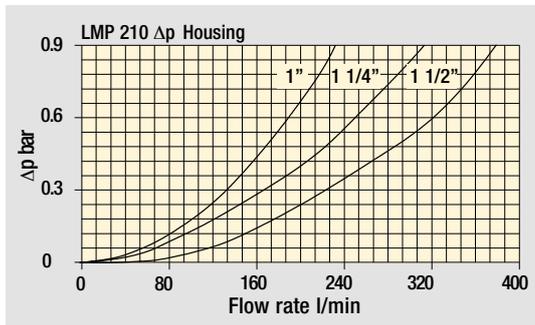


# GENERAL INFORMATION LMP210-211

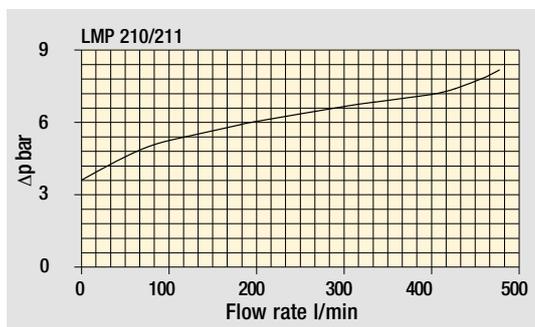
The curves are plotted using mineral oil with density of 0.86 kg/dm<sup>3</sup> in compliance with ISO 3968.

$\Delta p$  varies proportionally with density.

Pressure drop



Filter housings  $\Delta p$  pressure drop



Bypass valve pressure drop

# LMP210

## Designation & Ordering code

### COMPLETE FILTER

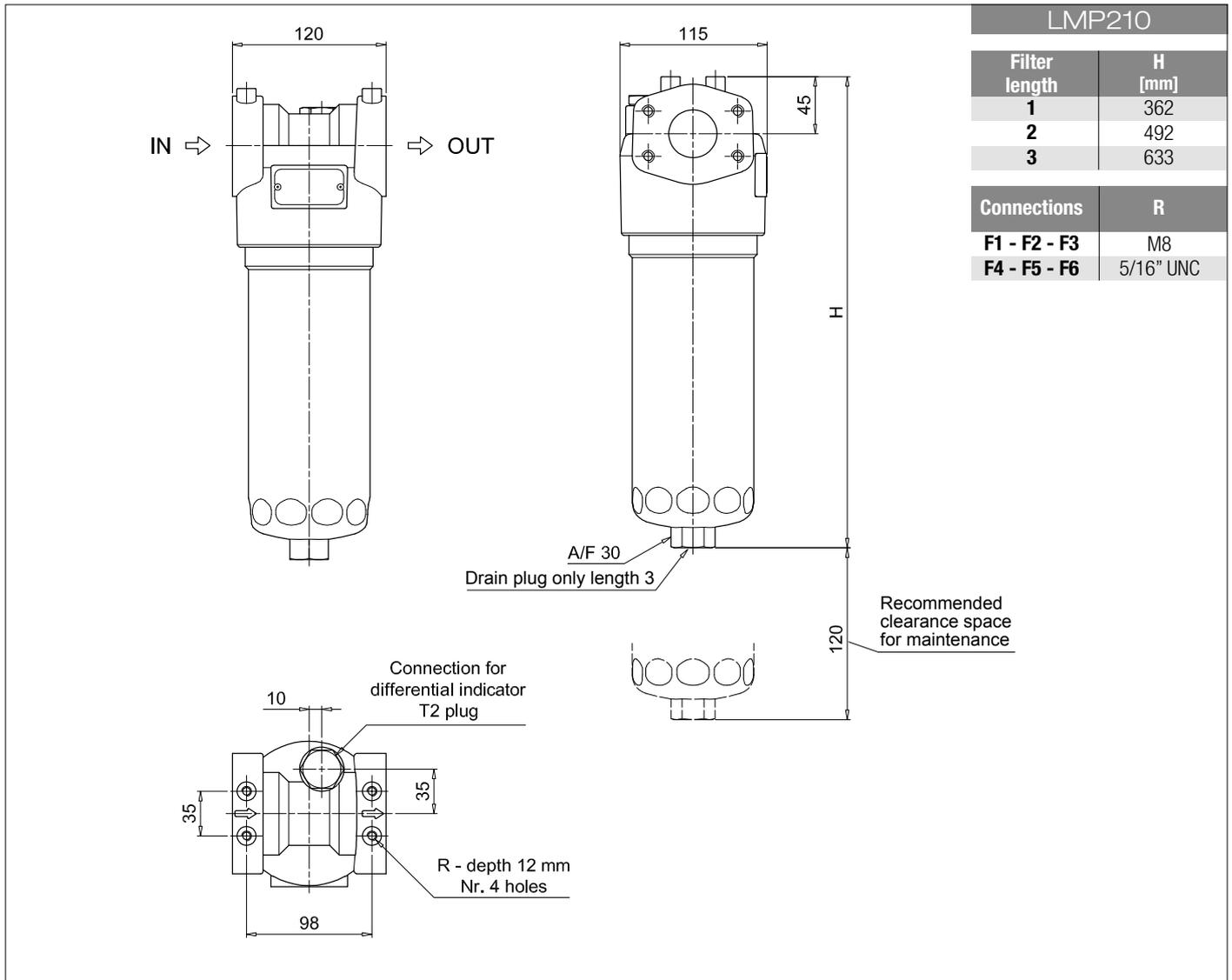
<b>Series and size</b> <b>LMP210</b>	Configuration example: <b>LMP210</b>   <b>3</b>   <b>B</b>   <b>A</b>   <b>F1</b>   <b>A10</b>   <b>N</b>   <b>P01</b>									
<b>Length</b> <b>1</b>   <b>2</b>   <b>3</b>										
<b>Bypass valve</b> <b>S</b> Without bypass   <b>B</b> 3.5 bar										
<b>Seals and treatments</b>	Filtration rating									
<b>A</b> NBR	<b>Axx</b>	<b>Mxx</b>	<b>Pxx</b>							
<b>V</b> FPM	•	•	•							
<b>W</b> NBR compatible with fluids HFA-HFB-HFC	•	•								
<b>Connections</b>										
<b>F1</b> 1" SAE 3000 psi/M										
<b>F2</b> 1 1/4" SAE 3000 psi/M										
<b>F3</b> 1 1/2" SAE 3000 psi/M										
<b>F4</b> 1" SAE 3000 psi/UNC										
<b>F5</b> 1 1/4" SAE 3000 psi/UNC										
<b>F6</b> 1 1/2" SAE 3000 psi/UNC										
<b>Filtration rating (filter media)</b>										
<b>A03</b> Inorganic microfiber 3 µm										
<b>A06</b> Inorganic microfiber 6 µm										
<b>A10</b> Inorganic microfiber 10 µm										
<b>A16</b> Inorganic microfiber 16 µm										
<b>A25</b> Inorganic microfiber 25 µm										
<b>M25</b> Wire mesh 25 µm										
<b>M60</b> Wire mesh 60 µm										
<b>M90</b> Wire mesh 90 µm										
<b>P10</b> Resin impregnated paper 10 µm										
<b>P25</b> Resin impregnated paper 25 µm										
				<b>Element Δp</b> <b>N</b> 20 bar						
				<b>Execution</b> <b>P01</b> MP Filtri standard <b>Pxx</b> Customized						

### FILTER ELEMENT

<b>Element series and size</b> <b>CU210</b>	Configuration example: <b>CU210</b>   <b>3</b>   <b>A10</b>   <b>A</b>   <b>N</b>   <b>P01</b>						
<b>Element length</b> <b>1</b>   <b>2</b>   <b>3</b>							
<b>Filtration rating (filter media)</b>							
<b>A03</b> Inorganic microfiber 3 µm							
<b>A06</b> Inorganic microfiber 6 µm							
<b>A10</b> Inorganic microfiber 10 µm							
<b>A16</b> Inorganic microfiber 16 µm							
<b>A25</b> Inorganic microfiber 25 µm							
<b>M25</b> Wire mesh 25 µm							
<b>M60</b> Wire mesh 60 µm							
<b>M90</b> Wire mesh 90 µm							
<b>P10</b> Resin impregnated paper 10 µm							
<b>P25</b> Resin impregnated paper 25 µm							
<b>Seals</b>	Filtration rating						
<b>A</b> NBR	<b>Axx</b>	<b>Mxx</b>	<b>Pxx</b>				
<b>V</b> FPM	•	•	•				
<b>W</b> NBR compatible with fluids HFA-HFB-HFC	•	•					
				<b>Element Δp</b> <b>N</b> 20 bar			
				<b>Execution</b> <b>P01</b> MP Filtri standard <b>Pxx</b> Customized			

### ACCESSORIES

<b>Differential indicators</b>	page		page
<b>DEA</b> Electrical differential indicator	419	<b>DTA</b> Electronic differential indicator	422
<b>DEM</b> Electrical differential indicator	419-420	<b>DVA</b> Visual differential indicator	422
<b>DLA</b> Electrical / visual differential indicator	420-421	<b>DVM</b> Visual differential indicator	422
<b>DLE</b> Electrical / visual differential indicator	421		
<b>Additional features</b>	page		
<b>T2</b> Plug	423		



# LMP211

## Designation & Ordering code

### COMPLETE FILTER

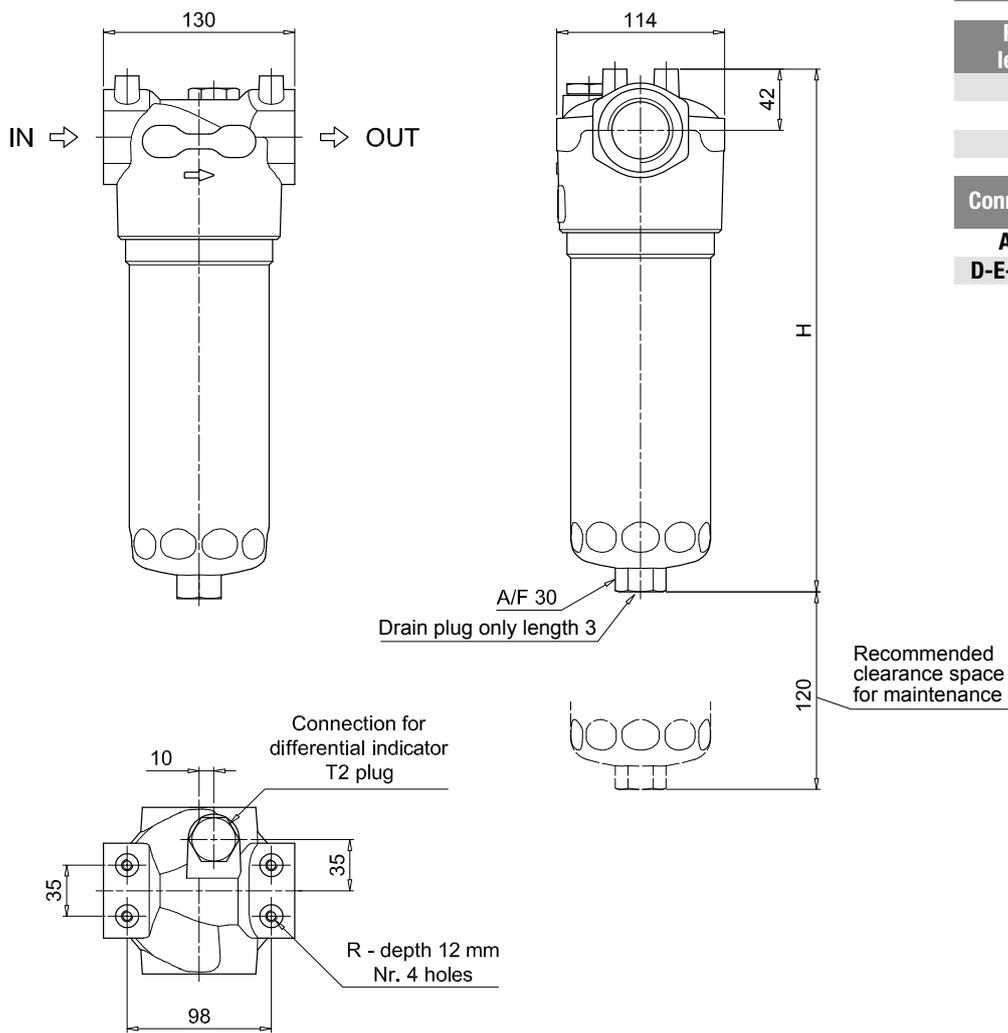
<b>Series and size</b>	Configuration example: <b>LMP211</b>   <b>3</b>   <b>B</b>   <b>A</b>   <b>D</b>   <b>6</b>   <b>A10</b>   <b>N</b>   <b>P01</b>									
<b>LMP211</b>										
<b>Length</b>	1   2   3									
<b>Bypass valve</b>	S Without bypass   B 3.5 bar									
<b>Seals and treatments</b>	Filtration rating									
A NBR	Axx	Mxx	Pxx							
V FPM	•	•	•							
W NBR compatible with fluids HFA-HFB-HFC	•	•								
<b>Connections</b>										
A G1"										
B G1 1/4"										
C G1 1/2"										
D 1" NPT										
E 1 1/4" NPT										
F 1 1/2" NPT										
G SAE 16 - 1 5/16" - 12 UN										
H SAE 20 - 1 5/8" - 12 UN										
I SAE 24 - 1 7/8" - 12 UN										
<b>Connection for differential indicator</b>	6 With plugged connection									
<b>Filtration rating (filter media)</b>										
A03 Inorganic microfiber 3 µm	M25 Wire mesh 25 µm									
A06 Inorganic microfiber 6 µm	M60 Wire mesh 60 µm									
A10 Inorganic microfiber 10 µm	M90 Wire mesh 90 µm									
A16 Inorganic microfiber 16 µm	P10 Resin impregnated paper 10 µm									
A25 Inorganic microfiber 25 µm	P25 Resin impregnated paper 25 µm									
			<b>Element Δp</b>			<b>Execution</b>				
			N 20 bar			P01 MP Filtri standard				
						Pxx Customized				

### FILTER ELEMENT

<b>Element series and size</b>	Configuration example: <b>CU210</b>   <b>3</b>   <b>A10</b>   <b>A</b>   <b>N</b>   <b>P01</b>						
<b>CU210</b>							
<b>Element length</b>	1   2   3						
<b>Filtration rating (filter media)</b>							
A03 Inorganic microfiber 3 µm	M25 Wire mesh 25 µm						
A06 Inorganic microfiber 6 µm	M60 Wire mesh 60 µm						
A10 Inorganic microfiber 10 µm	M90 Wire mesh 90 µm						
A16 Inorganic microfiber 16 µm	P10 Resin impregnated paper 10 µm						
A25 Inorganic microfiber 25 µm	P25 Resin impregnated paper 25 µm						
<b>Seals</b>	Filtration rating						
A NBR	Axx	Mxx	Pxx				
V FPM	•	•	•				
W NBR compatible with fluids HFA-HFB-HFC	•	•					
			<b>Element Δp</b>		<b>Execution</b>		
			N 20 bar		P01 MP Filtri standard		
					Pxx Customized		

### ACCESSORIES

<b>Differential indicators</b>	page		page
DEA Electrical differential indicator	419	DTA Electronic differential indicator	422
DEM Electrical differential indicator	419-420	DVA Visual differential indicator	422
DLA Electrical / visual differential indicator	420-421	DVM Visual differential indicator	422
DLE Electrical / visual differential indicator	421		
<b>Additional features</b>	page		
T2 Plug	423		



### LMP211

Filter length	H [mm]
1	358
2	488
3	629

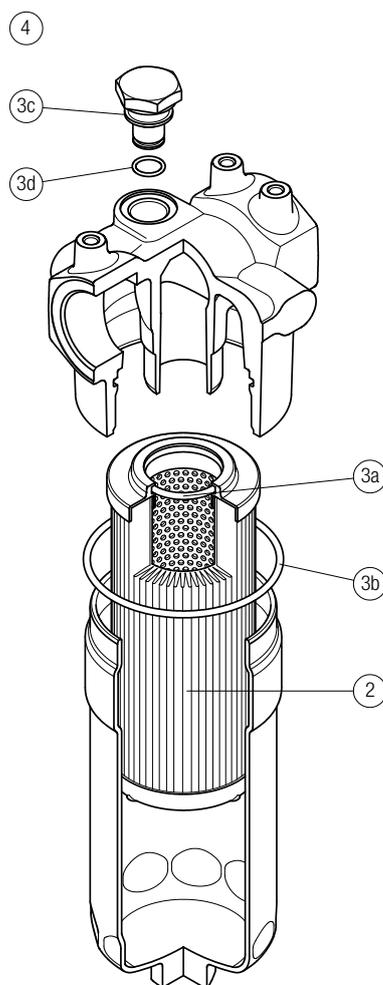
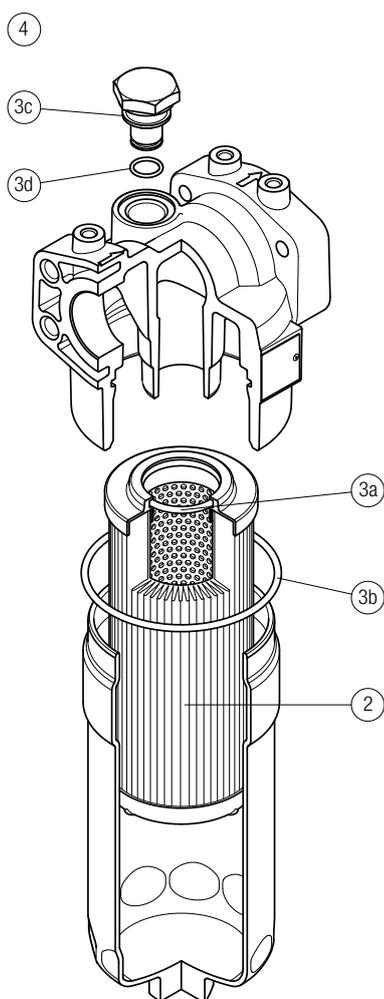
Connections	R
A-B-C	M8
D-E-F-G-H-I	5/16" UNC

# LMP210-211 SPARE PARTS

Order number for spare parts

LMP 210

LMP 211



Item:	Q.ty: 1 pc. <b>2</b>	Q.ty: 1 pc. <b>3</b> (3a ÷ 3d)		Q.ty: 1 pc. <b>4</b>	
Filter series	Filter element	Seal Kit code number		Indicator connection plug	
		NBR	FPM	NBR	FPM
<b>LMP 210 - 211</b>	See order table	02050435	02050436	T2H	T2V





# LMP 400-401 & 430-431 series

Maximum pressure up to 60 bar - Flow rate up to 740 l/min



## Technical data

**Low & Medium Pressure filters** Maximum pressure up to 60 bar - Flow rate up to 740 l/min

### Filter housing materials

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

### Seals

- Standard NBR series A
- Optional FPM series V

### Pressure LMP 400 length 2 - 3 - 4

- Working pressure: 6 MPa (60 bar)
- Test pressure: 9 MPa (90 bar)
- Burst pressure: 21 MPa (210 bar)
- Pulse pressure fatigue test: 1 000 000 cycles with pressure from 0 to 6 MPa (60 bar)

### Temperature

From -25 °C to +110 °C

### Connections

LMP 400 - 430: In-line Inlet/Outlet  
LMP 401 - 431: 90° Inlet/Outlet

### Pressure LMP 400 length 5 - 6

- Working pressure: 5 MPa (50 bar)
- Test pressure: 7.5 MPa (75 bar)
- Burst pressure: 15 MPa (150 bar)
- Pulse pressure fatigue test: 1 000 000 cycles with pressure from 0 to 5 MPa (50 bar)

### Note

LMP 400 filters are provided for vertical mounting

### Bypass valve

- Opening pressure 3.5 bar  $\pm$ 10%
- Other opening pressures on request.

### $\Delta p$ element type

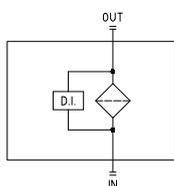
- Microfibre filter elements - series N - W: 20 bar
- Fluid flow through the filter element from OUT to IN.

## Weights [kg] and volumes [dm<sup>3</sup>]

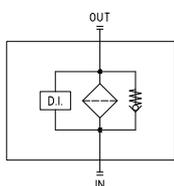
	Weights [kg]						Volumes [dm <sup>3</sup> ]					
	Length	2	3	4	5	6	Length	2	3	4	5	6
<b>LMP 400 - 401 - 430 - 431</b>		7.20	8.10	8.80	11.90	14.40		3.50	5.00	6.50	9.50	13.50

## Hydraulic symbols

LMP 210-400-900-950  
execution **S**



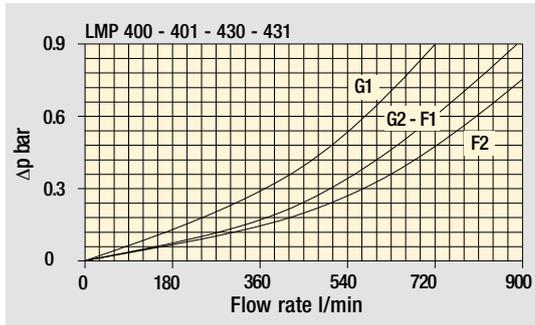
LMP 210-400-900-950  
execution **B**



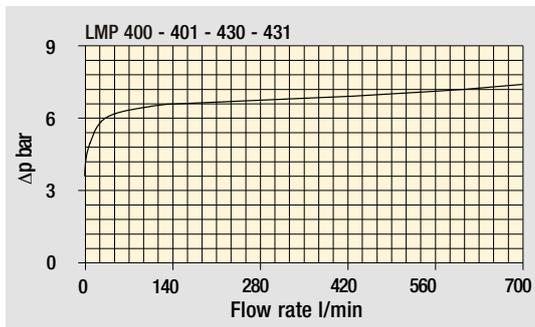
The curves are plotted using mineral oil with density of 0.86 kg/dm<sup>3</sup> in compliance with ISO 3968.  
 $\Delta p$  varies proportionally with density.

Pressure drop

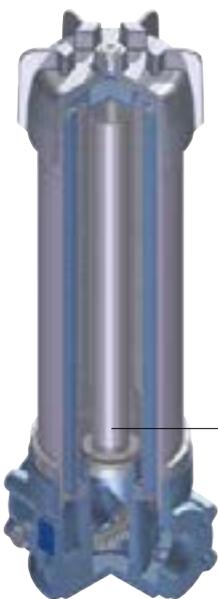
Filter housings  $\Delta p$  pressure drop



Bypass valve pressure drop



**EXECUTION P2**



Execution P02  
 "Internal tube for reduced flow rate"  
 is recommended for flow rate  
 values below 100/150 l/min.

The use of option P02  
 makes it easier to fill the housing  
 with the operating fluid.

"Internal tube for reduced flow rates"

# LMP400-401

## Designation & Ordering code

### COMPLETE FILTER

Series and size <b>LMP400</b>   <b>LMP401</b>		Configuration example: <b>LMP401</b>   <b>3</b>   <b>B</b>   <b>A</b>   <b>G1</b>   <b>A10</b>   <b>N</b>   <b>P01</b>												
Length <b>2</b>   <b>3</b>   <b>4</b>   <b>5</b>   <b>6</b>														
Bypass valve <b>S</b> Without bypass   <b>B</b> 3.5 bar														
Seals and treatments		Filtration rating												
		<b>Axx</b>	<b>Mxx</b>	<b>Pxx</b>										
<b>A</b> NBR		•	•	•										
<b>V</b> FPM		•	•	•										
<b>W</b> NBR compatible with fluids HFA-HFB-HFC		•	•											
Connections														
<b>G1</b> G1/2"		<b>F1</b> 2" SAE 3000 psi/M												
<b>G2</b> G2"		<b>F2</b> 2 1/2" SAE 3000 psi/M												
<b>G3</b> 1 1/2" NPT		<b>F3</b> 2" SAE 3000 psi/UNC												
<b>G4</b> 2" NPT		<b>F4</b> 2 1/2" SAE 3000 psi/UNC												
<b>G5</b> SAE 24 - 1 7/8" - 12 UN														
<b>G6</b> SAE 32 - 2 1/2" - 12 UN														
Filtration rating (filter media)														
<b>A03</b> Inorganic microfiber 3 µm		<b>M25</b> Wire mesh 25 µm												
<b>A06</b> Inorganic microfiber 6 µm		<b>M60</b> Wire mesh 60 µm												
<b>A10</b> Inorganic microfiber 10 µm		<b>M90</b> Wire mesh 90 µm												
<b>A16</b> Inorganic microfiber 16 µm		<b>P10</b> Resin impregnated paper 10 µm												
<b>A25</b> Inorganic microfiber 25 µm		<b>P25</b> Resin impregnated paper 25 µm												
Element Δp <b>N</b> 20 bar		Execution		Filter length										
		<b>P01</b> MP Filtri standard		<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>						
		<b>P02</b> Maintenance from the bottom of the housing					•	•						
		<b>Pxx</b> Customized							•	•				

### FILTER ELEMENT

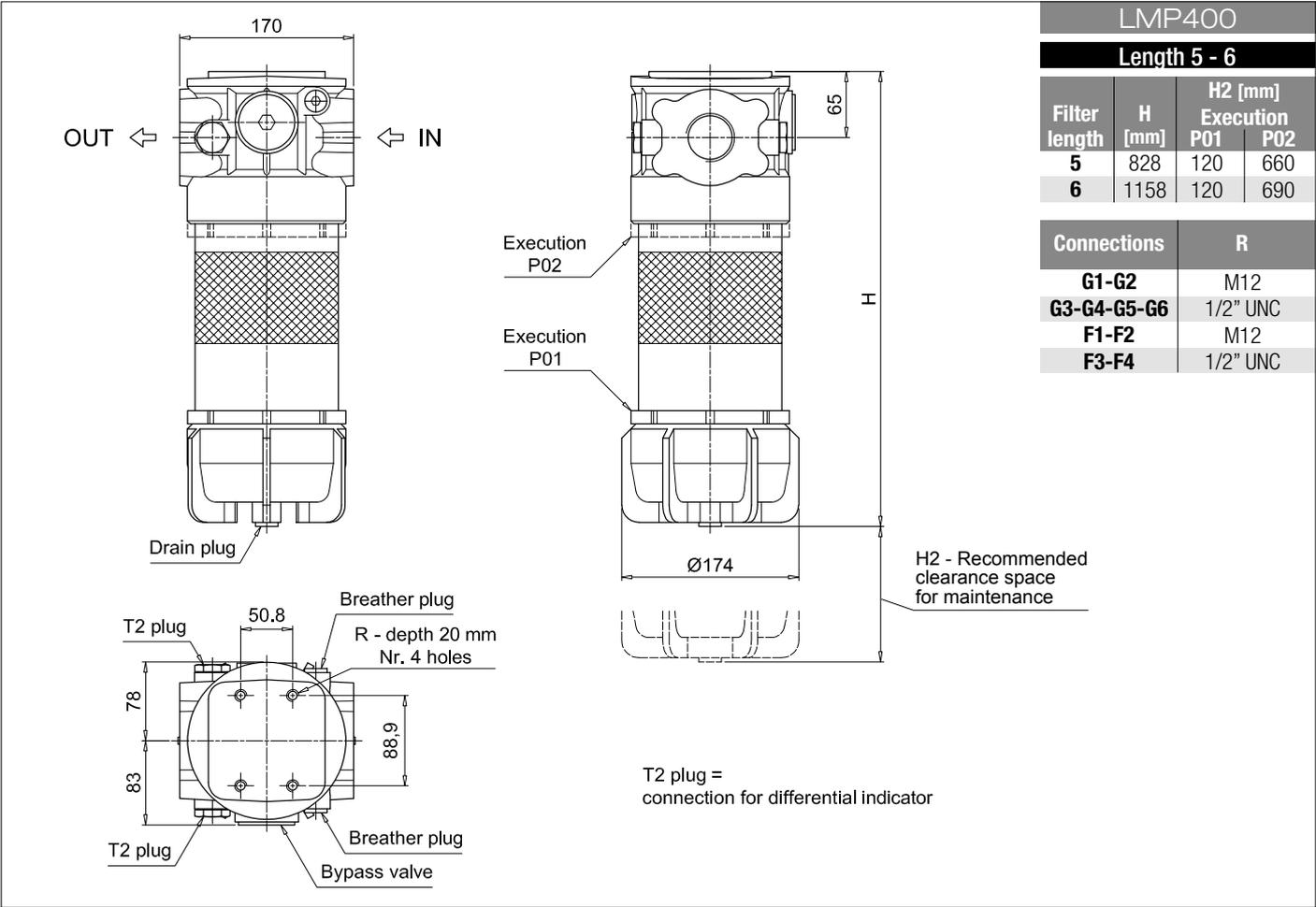
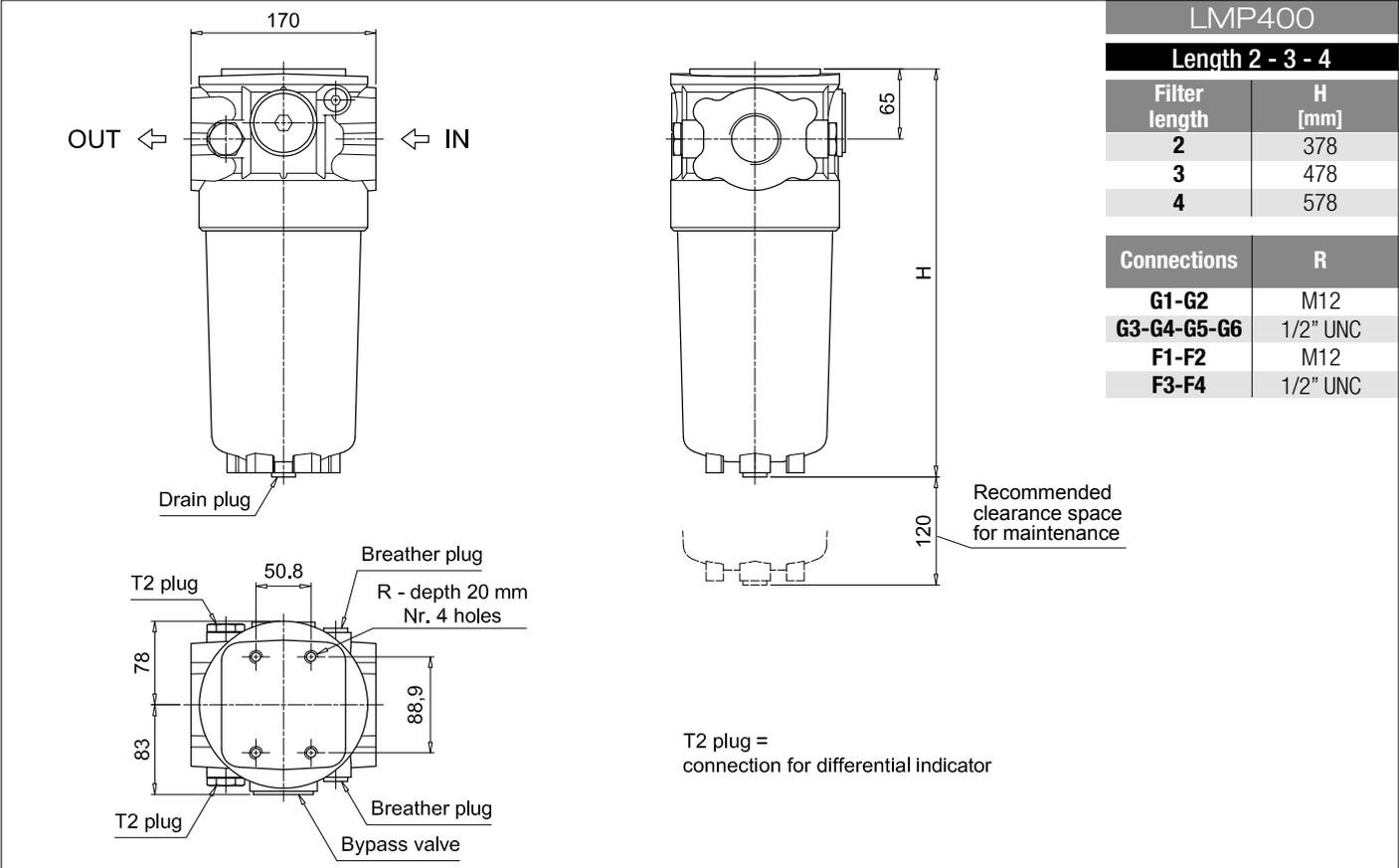
Element series and size <b>CU400</b>		Configuration example: <b>CU400</b>   <b>3</b>   <b>A10</b>   <b>A</b>   <b>N</b>   <b>P01</b>												
Element length <b>2</b>   <b>3</b>   <b>4</b>   <b>5</b>   <b>6</b>														
Filtration rating (filter media)														
<b>A03</b> Inorganic microfiber 3 µm		<b>M25</b> Wire mesh 25 µm												
<b>A06</b> Inorganic microfiber 6 µm		<b>M60</b> Wire mesh 60 µm												
<b>A10</b> Inorganic microfiber 10 µm		<b>M90</b> Wire mesh 90 µm												
<b>A16</b> Inorganic microfiber 16 µm		<b>P10</b> Resin impregnated paper 10 µm												
<b>A25</b> Inorganic microfiber 25 µm		<b>P25</b> Resin impregnated paper 25 µm												
Seals		Filtration rating												
		<b>Axx</b>	<b>Mxx</b>	<b>Pxx</b>										
<b>A</b> NBR		•	•	•										
<b>V</b> FPM		•	•	•										
<b>W</b> NBR compatible with fluids HFA-HFB-HFC		•	•											
Element Δp <b>N</b> 20 bar		Execution												
		<b>P01</b> MP Filtri standard												
		<b>Pxx</b> Customized												

### ACCESSORIES

Differential indicators		page			page
<b>DEA</b> Electrical differential indicator		419	<b>DTA</b> Electronic differential indicator		422
<b>DEM</b> Electrical differential indicator		419-420	<b>DVA</b> Visual differential indicator		422
<b>DLA</b> Electrical / visual differential indicator		420-421	<b>DVM</b> Visual differential indicator		422
<b>DLE</b> Electrical / visual differential indicator		421			
Additional features		page			
<b>T2</b> Plug		423			

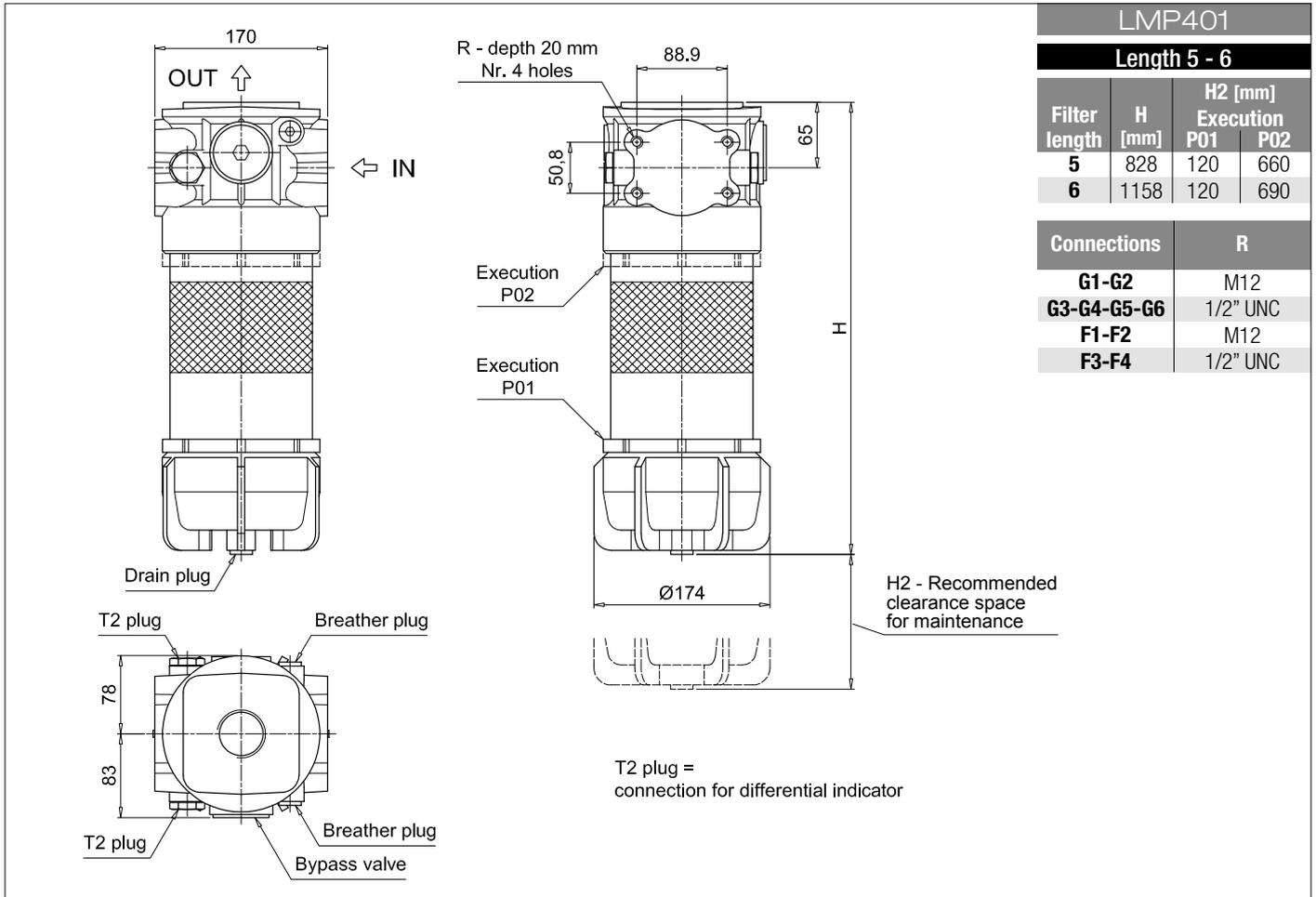
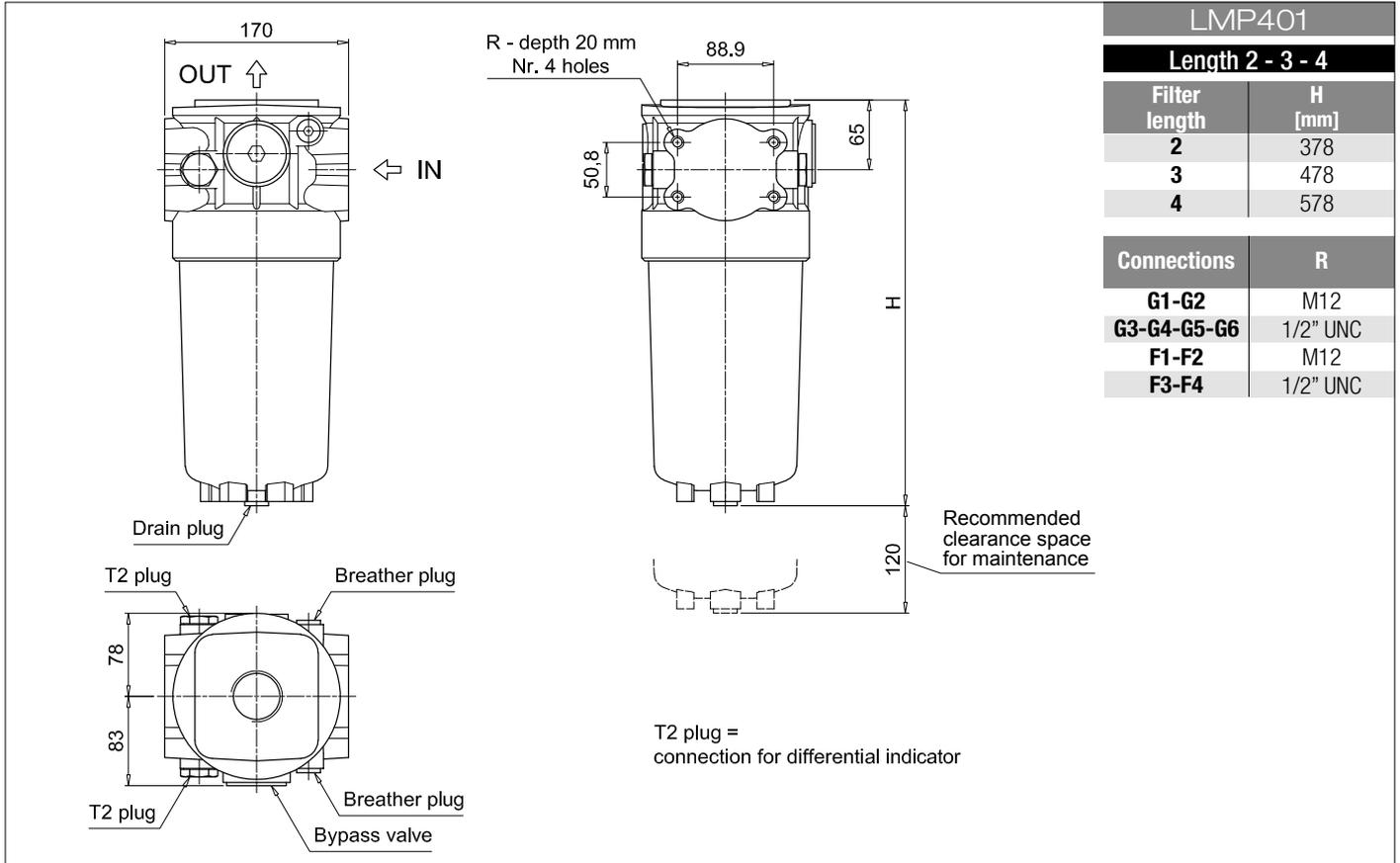
# LMP400-401

## Dimensions



# LMP400-401

## Dimensions





# LMP430-431

## Designation & Ordering code

### COMPLETE FILTER

<b>Series and size</b> <b>LMP430   LMP431</b>		Configuration example: <b>LMP431</b>   <b>5</b>   <b>B</b>   <b>A</b>   <b>G1</b>   <b>A10</b>   <b>N</b>   <b>P01</b>							
<b>Length</b> <b>5</b>   <b>6</b>									
<b>Bypass valve</b> <b>S</b> Without bypass   <b>B</b> 3.5 bar									
<b>Seals and treatments</b>		Filtration rating							
<b>A</b> NBR		Axx	Mxx	Pxx					
<b>V</b> FPM		•	•	•					
<b>W</b> NBR compatible with fluids HFA-HFB-HFC		•	•						
<b>Connections</b>									
<b>G1</b> G1 1/2"	<b>F1</b> 2" SAE 3000 psi/M								
<b>G2</b> G2"	<b>F2</b> 2 1/2" SAE 3000 psi/M								
<b>G3</b> 1 1/2" NPT	<b>F3</b> 2" SAE 3000 psi/UNC								
<b>G4</b> 2" NPT	<b>F4</b> 2 1/2" SAE 3000 psi/UNC								
<b>G5</b> SAE 24 - 1 7/8" - 12 UN									
<b>G6</b> SAE 32 - 2 1/2" - 12 UN									
<b>Filtration rating (filter media)</b>									
<b>A03</b> Inorganic microfiber 3 µm	<b>M25</b> Wire mesh 25 µm								
<b>A06</b> Inorganic microfiber 6 µm	<b>M60</b> Wire mesh 60 µm								
<b>A10</b> Inorganic microfiber 10 µm	<b>M90</b> Wire mesh 90 µm								
<b>A16</b> Inorganic microfiber 16 µm	<b>P10</b> Resin impregnated paper 10 µm								
<b>A25</b> Inorganic microfiber 25 µm	<b>P25</b> Resin impregnated paper 25 µm								
		<b>Element Δp</b>		<b>Execution</b>					
		<b>N</b> 20 bar		<b>P01</b> MP Filtri standard					
				<b>P02</b> With internal reduced flow rate tube					
				<b>Pxx</b> Customized					

### FILTER ELEMENT

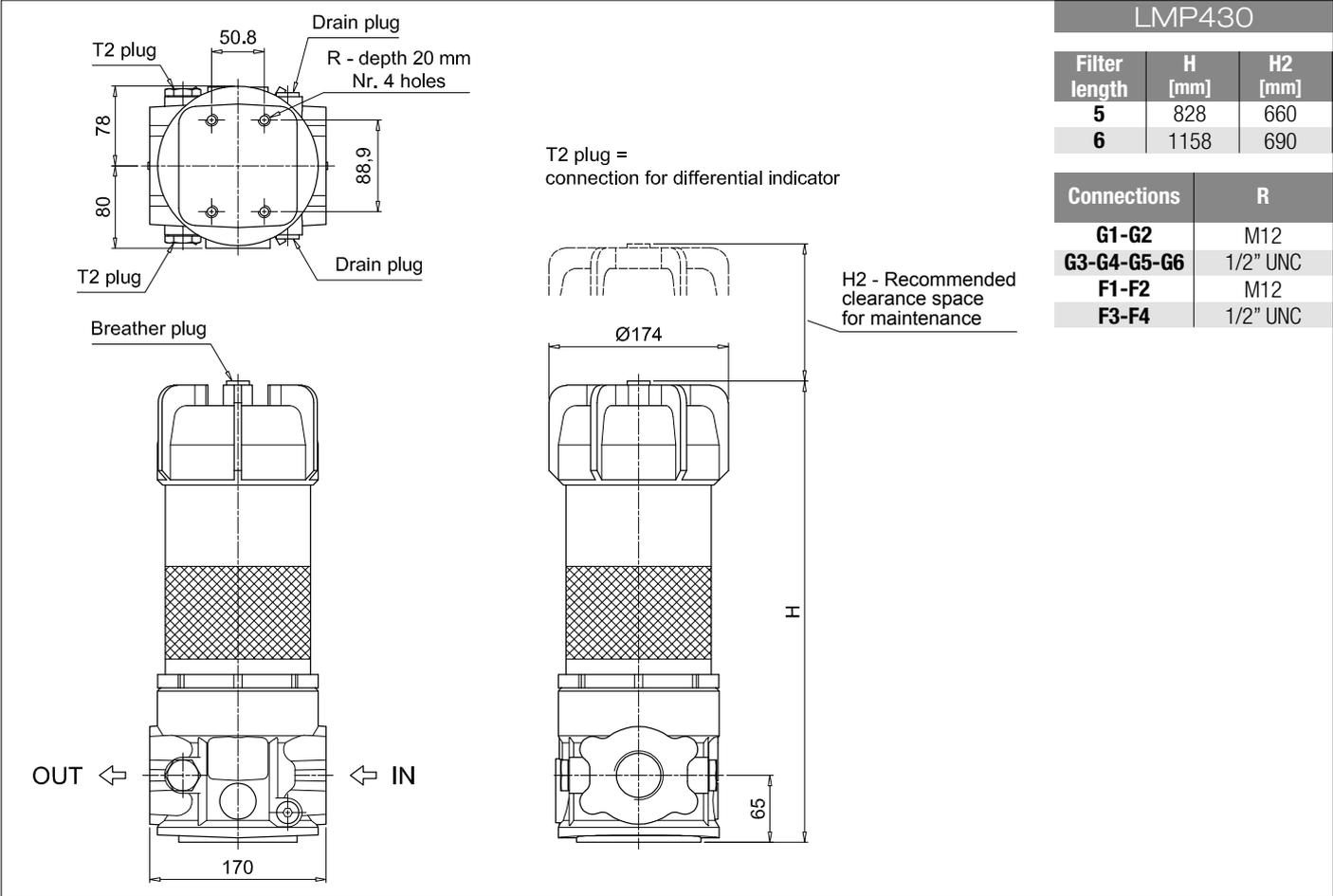
<b>Element series and size</b> <b>CU400</b>		Configuration example: <b>CU400</b>   <b>5</b>   <b>A10</b>   <b>A</b>   <b>N</b>   <b>P01</b>					
<b>Element length</b> <b>5</b>   <b>6</b>							
<b>Filtration rating (filter media)</b>							
<b>A03</b> Inorganic microfiber 3 µm	<b>M25</b> Wire mesh 25 µm						
<b>A06</b> Inorganic microfiber 6 µm	<b>M60</b> Wire mesh 60 µm						
<b>A10</b> Inorganic microfiber 10 µm	<b>M90</b> Wire mesh 90 µm						
<b>A16</b> Inorganic microfiber 16 µm	<b>P10</b> Resin impregnated paper 10 µm						
<b>A25</b> Inorganic microfiber 25 µm	<b>P25</b> Resin impregnated paper 25 µm						
<b>Seals</b>		Filtration rating					
<b>A</b> NBR		Axx	Mxx	Pxx			
<b>V</b> FPM		•	•	•			
<b>W</b> NBR compatible with fluids HFA-HFB-HFC		•	•				
		<b>Element Δp</b>		<b>Execution</b>			
		<b>N</b> 20 bar		<b>P01</b> MP Filtri standard			
				<b>Pxx</b> Customized			

### ACCESSORIES

<b>Differential indicators</b>		page			page
<b>DEA</b> Electrical differential indicator		419	<b>DTA</b> Electronic differential indicator		422
<b>DEM</b> Electrical differential indicator		419-420	<b>DVA</b> Visual differential indicator		422
<b>DLA</b> Electrical / visual differential indicator		420-421	<b>DVM</b> Visual differential indicator		422
<b>DLE</b> Electrical / visual differential indicator		421			
<b>Additional features</b>		page			
<b>T2</b> Plug		423			

# LMP430-431

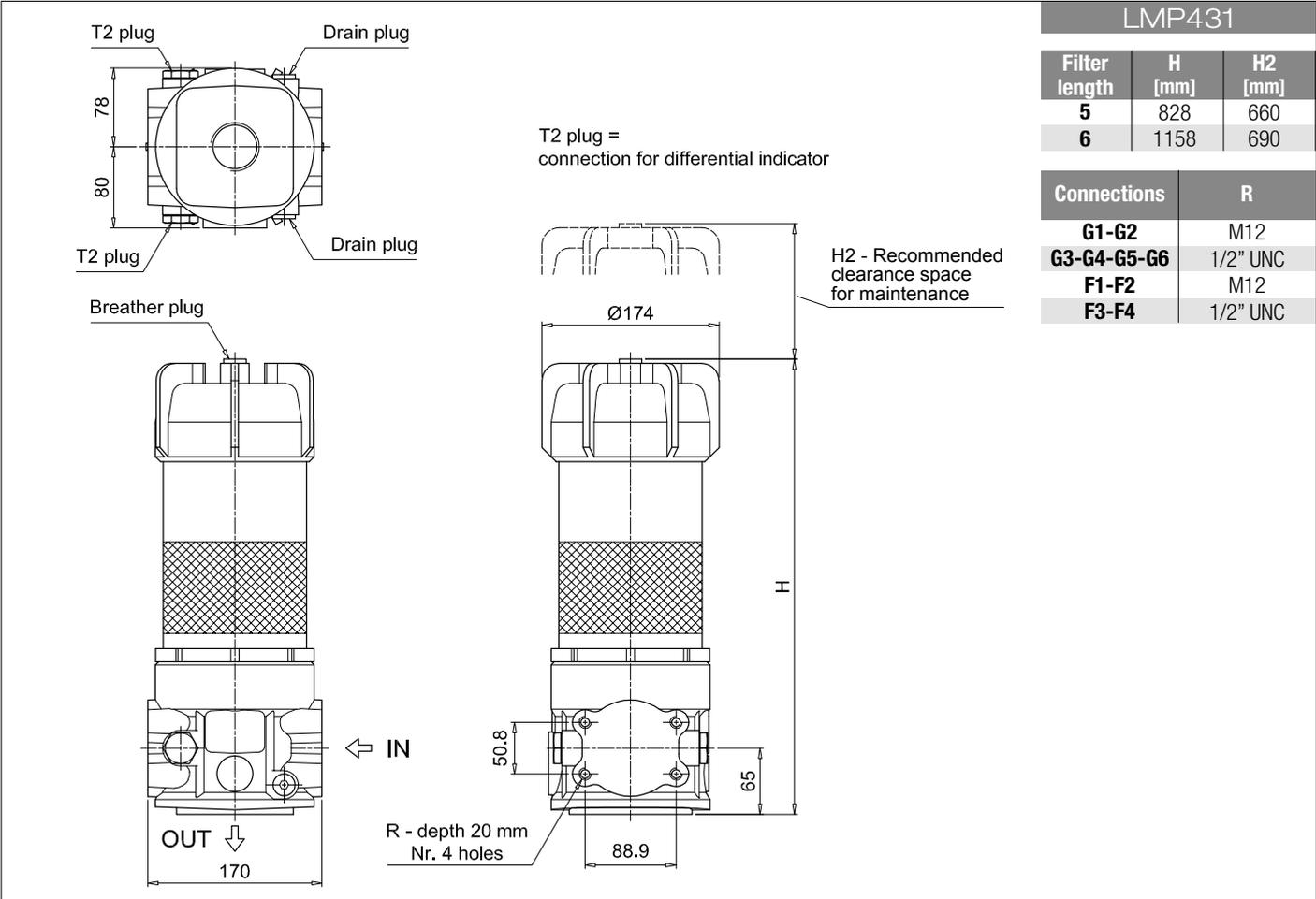
## Dimensions



LMP430		
Filter length	H [mm]	H2 [mm]
5	828	660
6	1158	690

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



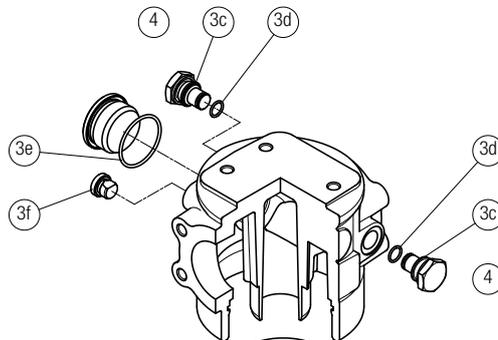
LMP431		
Filter length	H [mm]	H2 [mm]
5	828	660
6	1158	690

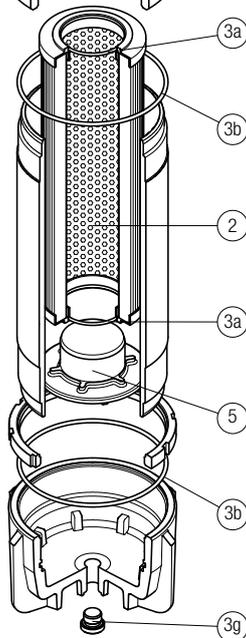
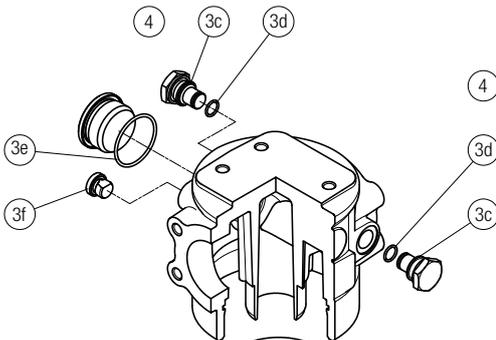
Connections	R
G1-G2	M12
G3-G4-G5-G6	1/2" UNC
F1-F2	M12
F3-F4	1/2" UNC

Order number for spare parts

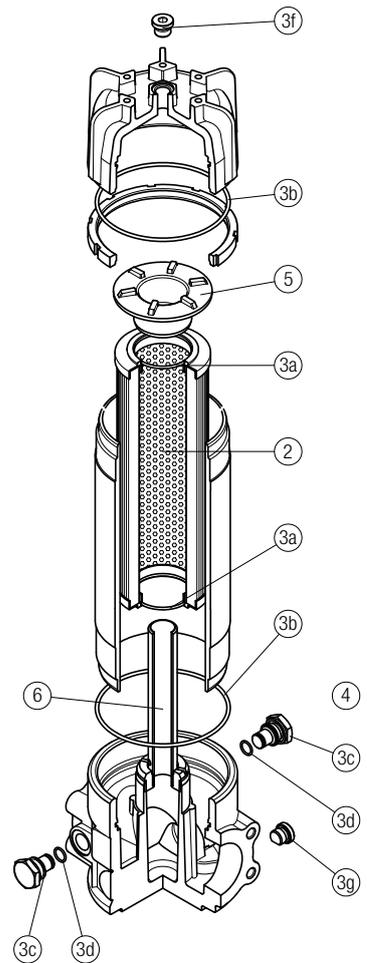
**LMP 400 - 401**  
length 2 - 3 - 4



**LMP 400 - 401**  
length 5 - 6



**LMP 430 - 431**  
length 5 - 6



Item:	Q.ty: 1 pc.	Q.ty: 1 pc.	Q.ty: 2 pcs.	Q.ty: 2 pcs.	Q.ty: 1 pc.
Filter series	2	3 (3a ÷ 3g)	4	5	6
Filter element	See order table				
Seal Kit code number		NBR 02050391 FPM 02050392			
Indicator connection plug			NBR T2H FPM T2V		
Housing spigot				no bypass 01044108 with bypass 02001414	
Tube assembly					Length 5: 02025041   Length 6: 02025042
<b>LMP 400 - 401 length 2 - 3 - 4</b>					
<b>LMP 400 - 401 length 5 - 6</b>					
<b>LMP 430 - 431 length 5 - 6</b>					





# LMP 900-901 series

Filter element according to DIN 24550

Maximum pressure up to 30 bar - Flow rate up to 2000 l/min



# LMP900-901 GENERAL INFORMATION

## Technical data

### Low & Medium Pressure filters

Maximum pressure up to 30 bar - Flow rate up to 2000 l/min  
Filter element according to DIN 24550

#### Filter housing materials

- Head: Anodized Aluminium
- Housing: Anodized Aluminium
- Manifolds: Anodized Aluminium
- Bypass valve: Steel

#### Pressure

- Working pressure: 3 MPa (30 bar)
- Test pressure: 4.5 MPa (45 bar)
- Burst pressure: 12 MPa (120 bar)
- Pulse pressure fatigue test: 1 000 000 cycles with pressure from 0 to 3 MPa (30 bar)

#### Bypass valve

- Opening pressure 3.5 bar  $\pm$ 10%
- Other opening pressures on request.

#### Number of filter elements

- LMP 900-1: 1 filter element CU900
- LMP 900-2: 2 filter elements CU900

#### Filter elements

- Filter element in according to with DIN 24550
- Size: 1000

#### $\Delta p$ element type

- Microfibre filter elements - series N: 20 bar
- Fluid flow through the filter element from OUT to IN.

#### Connections

- LMP 900: In-line Inlet/Outlet
- LMP 901: 90° Inlet/Outlet

#### Seals

- Standard NBR series A
- Optional FPM series V

#### Temperature

- From -25 °C to +110 °C

#### Note

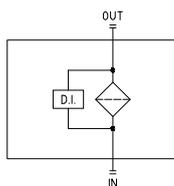
- LMP 900 - 901 filters are provided for vertical mounting

## Weights [kg] and volumes [dm<sup>3</sup>]

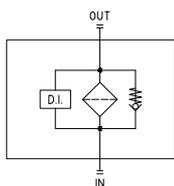
	Weights [kg]			Volumes [dm <sup>3</sup> ]		
	Length	1	2	Length	1	2
<b>LMP 900 - 901</b>		19.2	30.4		16	24

## Hydraulic symbols

LMP 210-400-900-950  
execution S



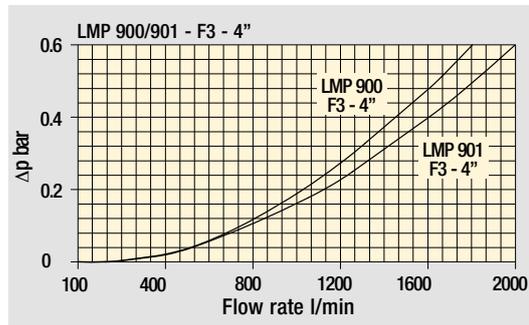
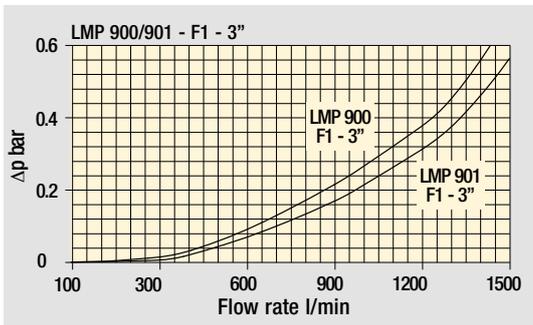
LMP 210-400-900-950  
execution B



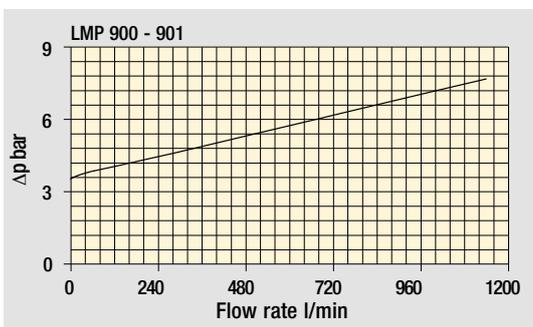
# GENERAL INFORMATION LMP900-901

The curves are plotted using mineral oil with density of 0.86 kg/dm<sup>3</sup> in compliance with ISO 3968.  
 **$\Delta p$  varies proportionally with density.**

Pressure drop

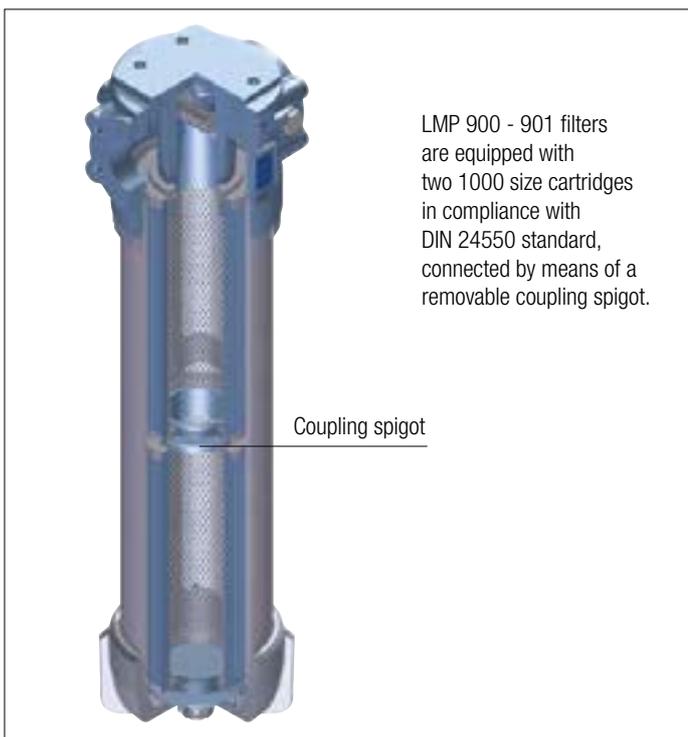


Filter housings  $\Delta p$  pressure drop



Bypass valve pressure drop

## P2 EXECUTION



# LMP900-901

## Designation & Ordering code

### COMPLETE FILTER

<b>Series and size</b> <b>LMP900   LMP901</b>	Configuration example: <b>LMP901</b> <b>2</b> <b>B</b> <b>A</b> <b>F2</b> <b>A10</b> <b>N</b> <b>P01</b>							
<b>Length</b> <b>1</b>   <b>2</b>								
<b>Bypass valve</b> <b>S</b> Without bypass   <b>B</b> 3.5 bar								
<b>Seals and treatments</b> <b>A</b> NBR <b>V</b> FPM								
<b>Connections</b> <b>F1</b> 3" SAE 3000 psi/M <b>F2</b> 3" SAE 3000 psi/UNC <b>F3</b> 4" SAE 3000 psi/M <b>F4</b> 4" SAE 3000 psi/UNC								
<b>Filtration rating (filter media)</b> <b>A03</b> Inorganic microfiber 3 µm <b>A06</b> Inorganic microfiber 6 µm <b>A10</b> Inorganic microfiber 10 µm <b>A16</b> Inorganic microfiber 16 µm <b>A25</b> Inorganic microfiber 25 µm <b>M25</b> Wire mesh 25 µm <b>M60</b> Wire mesh 60 µm <b>M90</b> Wire mesh 90 µm								
<b>Element Δp</b> <b>N</b> 20 bar	<b>Execution</b>						<b>Filter length</b>	
	<b>P01</b> MP Filtri standard						<b>1</b>	<b>2</b>
	<b>P02</b> Maintenance from the bottom of the housing							
	<b>Pxx</b> Customized							

### FILTER ELEMENT

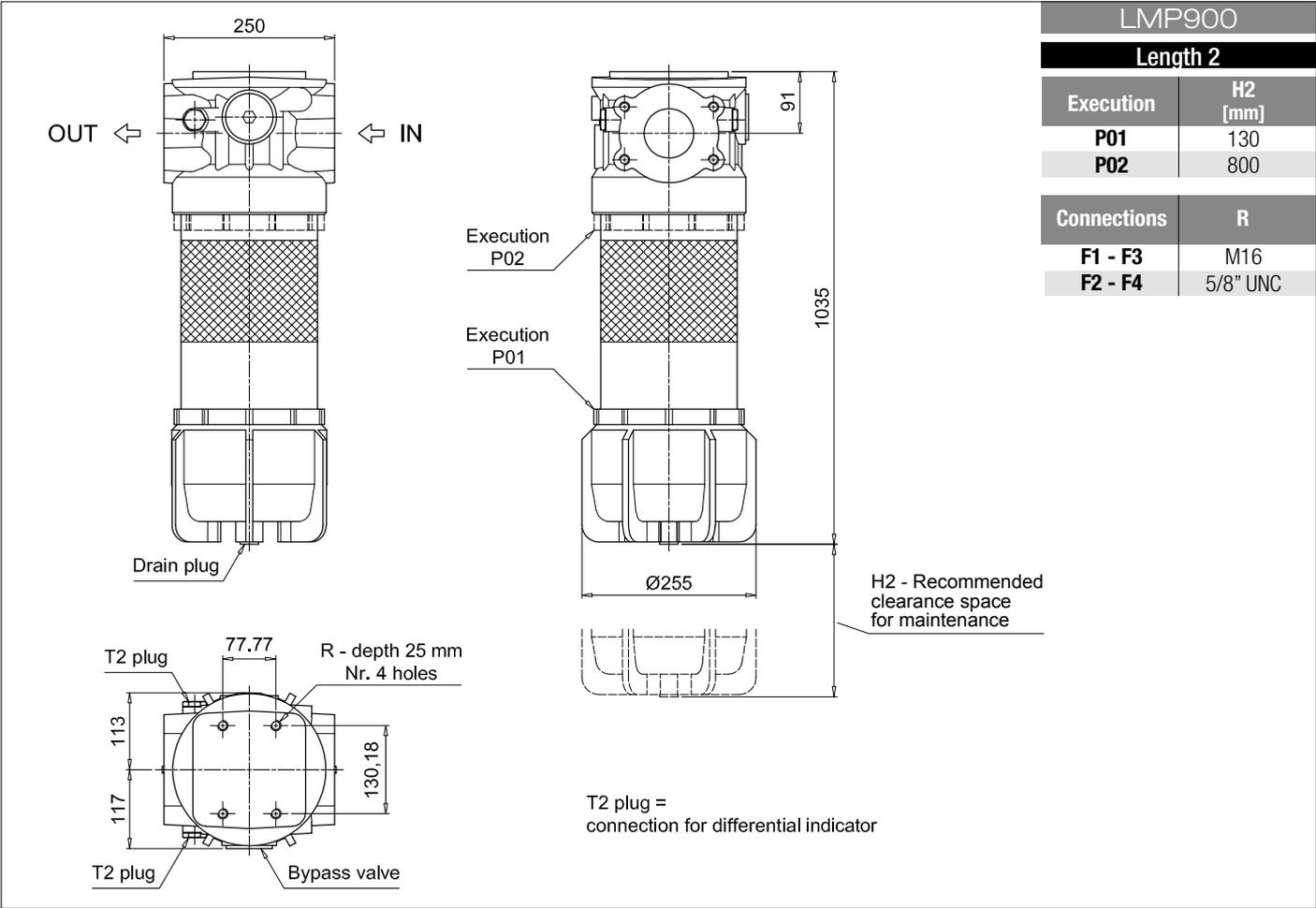
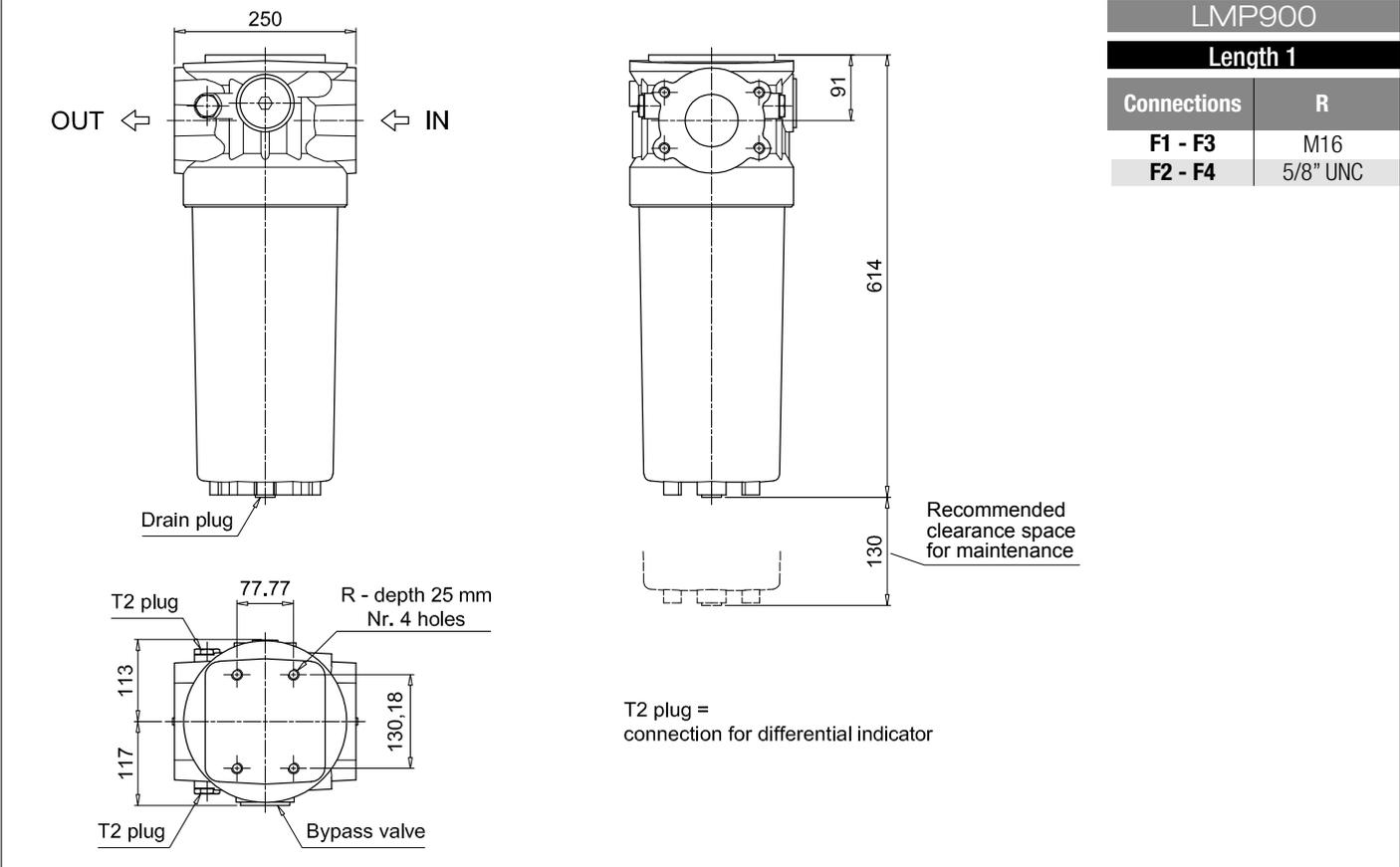
<b>Element series and size</b> <b>CU900</b>	Configuration example: <b>CU900</b> <b>A10</b> <b>A</b> <b>N</b> <b>P01</b>				
<b>Length</b> <b>1</b> Nr. 1 filter element <b>2</b> Nr. 2 filter elements					
<b>Filtration rating (filter media)</b> <b>A03</b> Inorganic microfiber 3 µm <b>A06</b> Inorganic microfiber 6 µm <b>A10</b> Inorganic microfiber 10 µm <b>A16</b> Inorganic microfiber 16 µm <b>A25</b> Inorganic microfiber 25 µm <b>M25</b> Wire mesh 25 µm <b>M60</b> Wire mesh 60 µm <b>M90</b> Wire mesh 90 µm					
<b>Seals</b> <b>A</b> NBR <b>V</b> FPM					
<b>Element Δp</b> <b>N</b> 20 bar	<b>Execution</b>				
	<b>P01</b> MP Filtri standard				
	<b>Pxx</b> Customized				

### ACCESSORIES

<b>Differential indicators</b>	page		page
<b>DEA</b> Electrical differential indicator	419	<b>DTA</b> Electronic differential indicator	422
<b>DEM</b> Electrical differential indicator	419-420	<b>DVA</b> Visual differential indicator	422
<b>DLA</b> Electrical / visual differential indicator	420-421	<b>DVM</b> Visual differential indicator	422
<b>DLE</b> Electrical / visual differential indicator	421		
<b>Additional features</b>	page		
<b>T2</b> Plug	423		

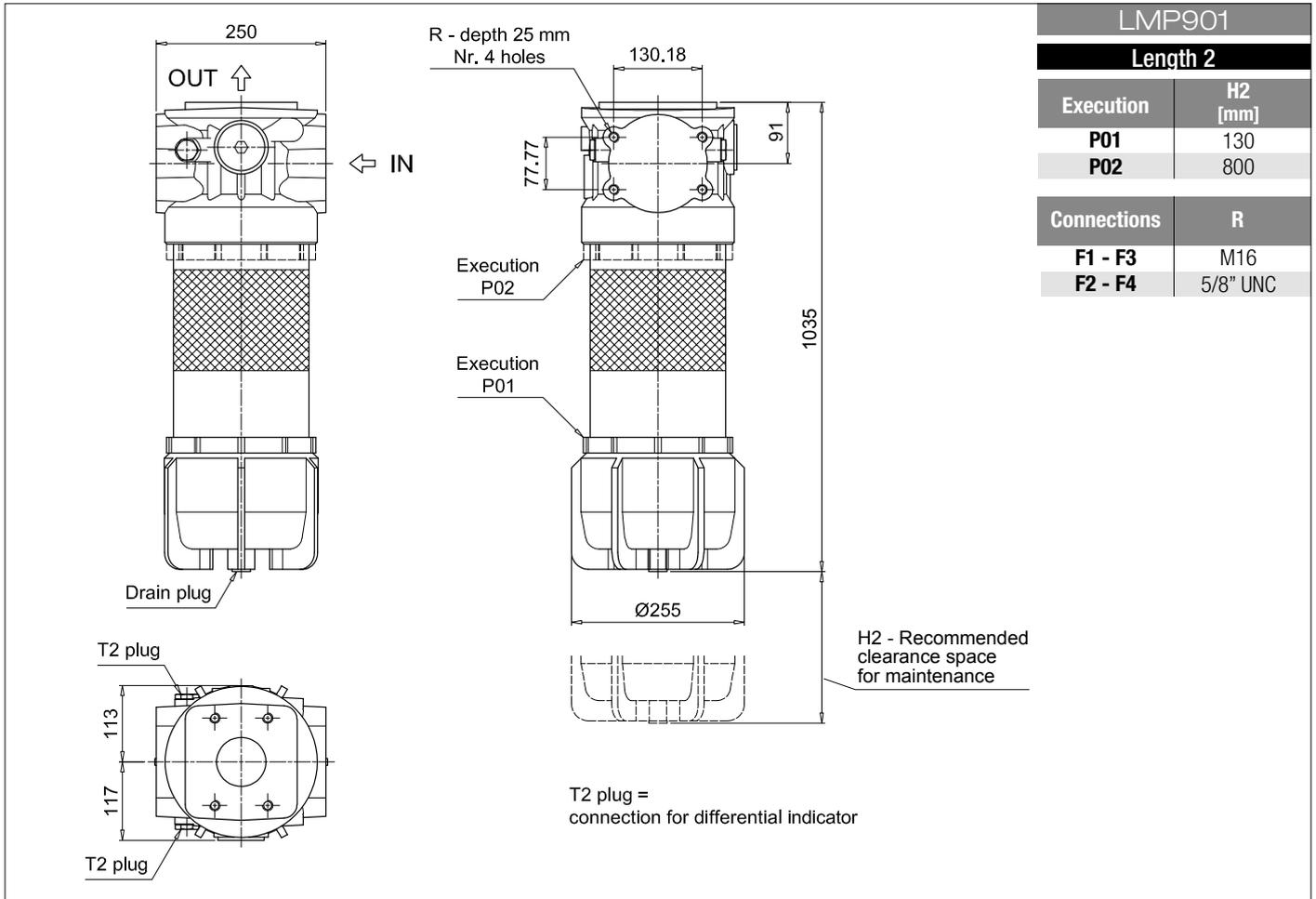
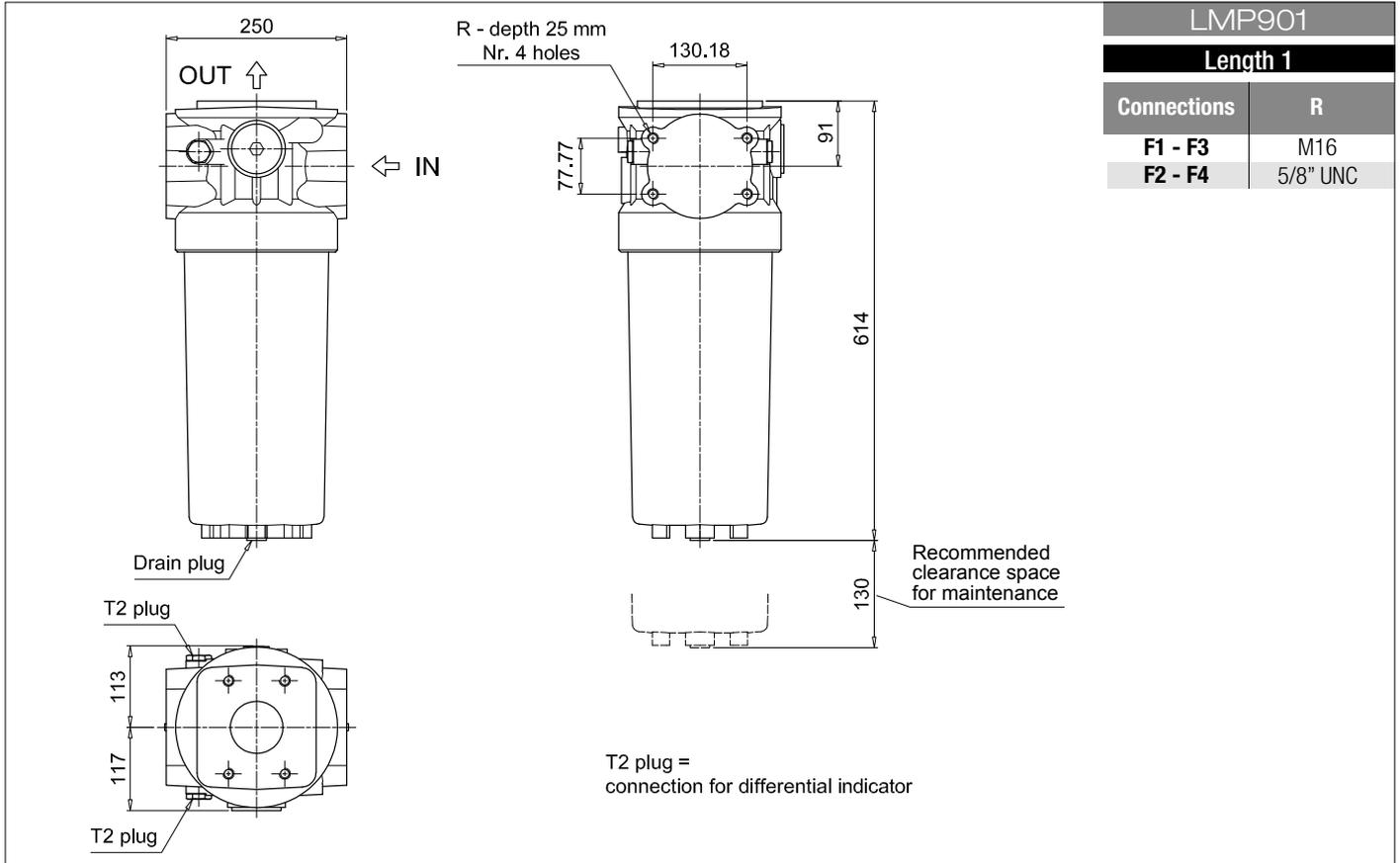
# LMP900-901

## Dimensions



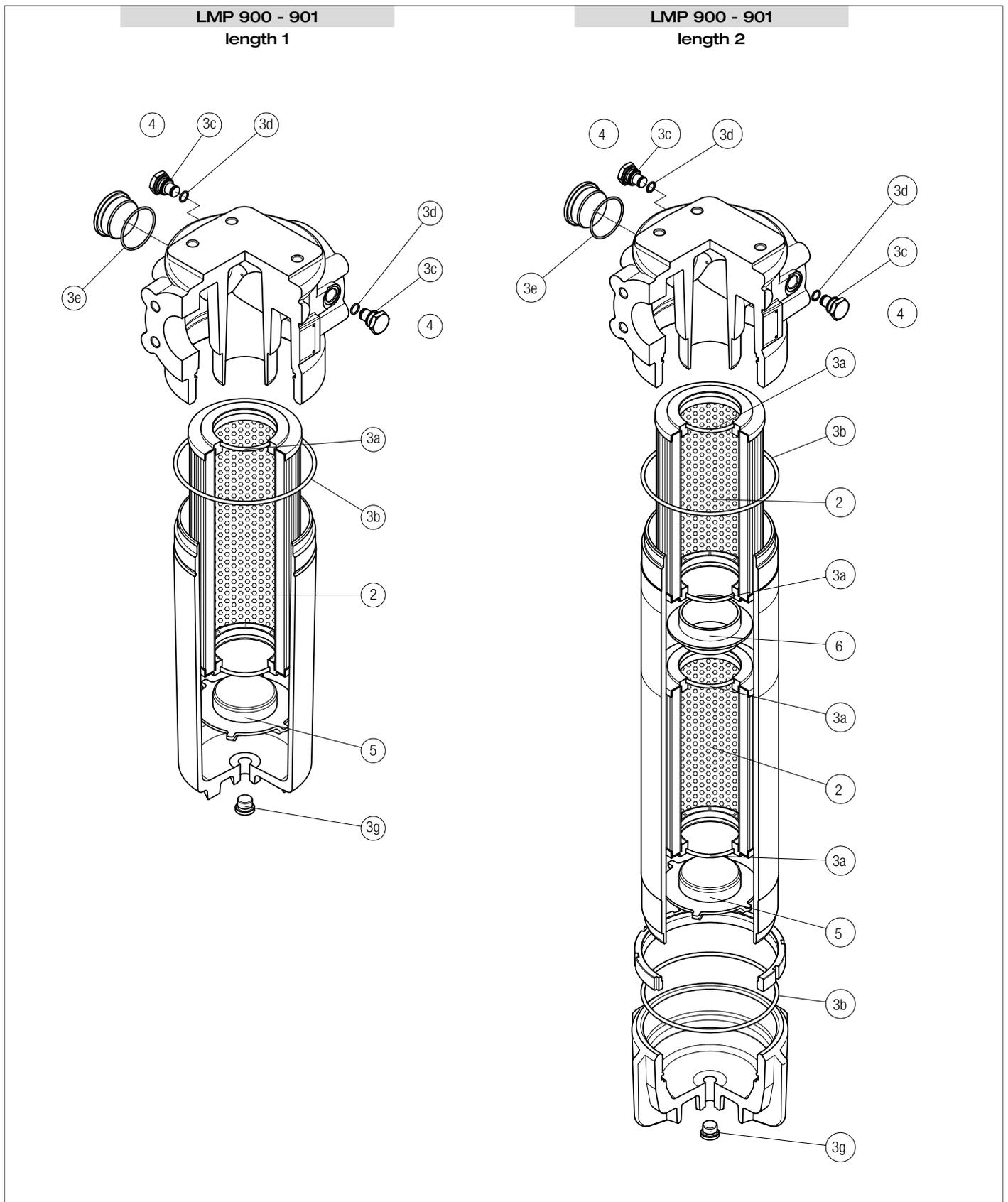
# LMP900-901

## Dimensions



# SPARE PARTS LMP900-901

Order number for spare parts



Item:	2		3 (3a ÷ 3g)			4		5		6		
Filter series	Filter element	Seal Kit code number	Indicator connection plug		Housing spigot		Coupling spigot					
	Q.ty	Q.ty	NBR	FPM	Q.ty	NBR	FPM	Q.ty	Q.ty	Q.ty		
LMP 900 - 901 length 1	1 pc.	See order table	1 pc.	02050363	02050364	2 pcs.	T2H	T2V	1 pc.	01044104	-	01044099
LMP 900 - 901 length 2	2 pcs.	See order table	1 pc.	02050365	02050366	2 pcs.	T2H	T2V	1 pc.	01044104	1 pc.	01044099



# LMP 902-903 series

Filter element according to DIN 24550

Maximum pressure up to 20 bar - Flow rate up to 3000 l/min



# LMP902-903 GENERAL INFORMATION

## Technical data

### Low & Medium Pressure filters

Maximum pressure up to 20 bar - Flow rate up to 3000 l/min  
Filter element according to DIN 24550

#### Filter housing materials

- Head: Anodized Aluminium
- Housing: Anodized Aluminium
- Manifolds: Welded - Phosphated Steel
- Bypass valve: Steel
- Size 1000 filter elements complying with DIN 24550 standard

#### Number of filter elements

- LMP 902: 4 filter elements CU900
- LMP 903: 6 filter elements CU900

#### Seals

- Standard NBR series A
- Optional FPM series V

#### Filter elements

- Filter element in according to with DIN 24550
- Size: 1000

#### Temperature

- From -25 °C to +110 °C

#### Pressure

- Working pressure: 2.5 MPa (25 bar)
- Test pressure: 3.5 MPa (35 bar)

#### Δp element type

- Microfibre filter elements - series N: 20 bar
- Fluid flow through the filter element from OUT to IN.

#### Note

- LMP 902 - 903 filters are provided for vertical mounting

#### Bypass valve

- Opening pressure 3.5 bar ±10%
- Other opening pressures on request.

#### Connections

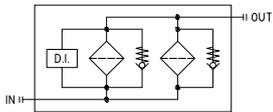
- LMP 902-903: In-line Inlet/Outlet

## Weights [kg] and volumes [dm<sup>3</sup>]

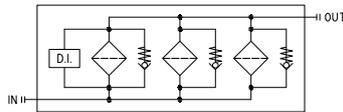
	Weights [kg]		Volumes [dm <sup>3</sup> ]	
	Length	1	Length	1
<b>LMP 902</b>		89.6		58
<b>LMP 903</b>		129.2		87

## Hydraulic symbols

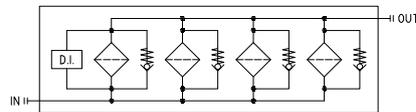
LMP 902 - 952



LMP 903 - 953



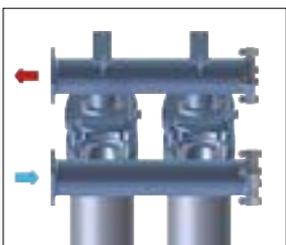
LMP 954



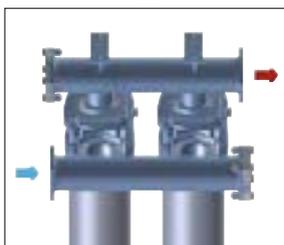
## Manifolds

Position of manifolds IN - OUT connections

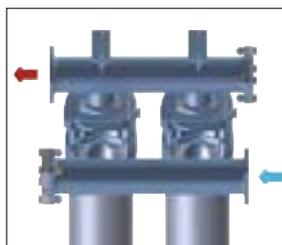
FA



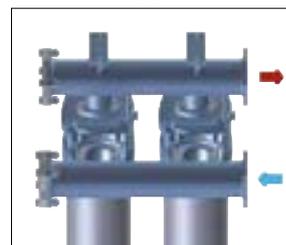
FB



FC



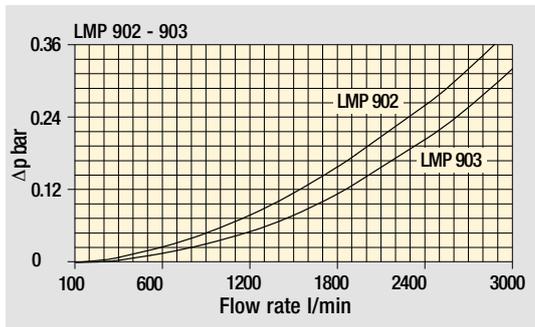
FD



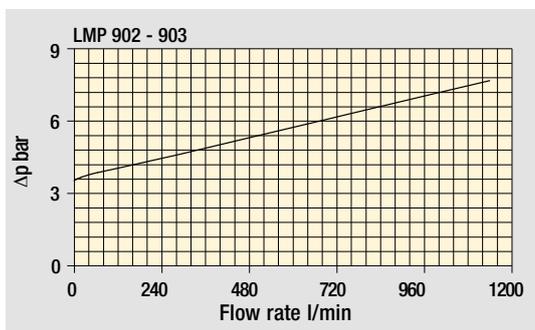
# GENERAL INFORMATION LMP902-903

The curves are plotted using mineral oil with density of 0.86 kg/dm<sup>3</sup> in compliance with ISO 3968.  
 $\Delta p$  varies proportionally with density.

Pressure drop

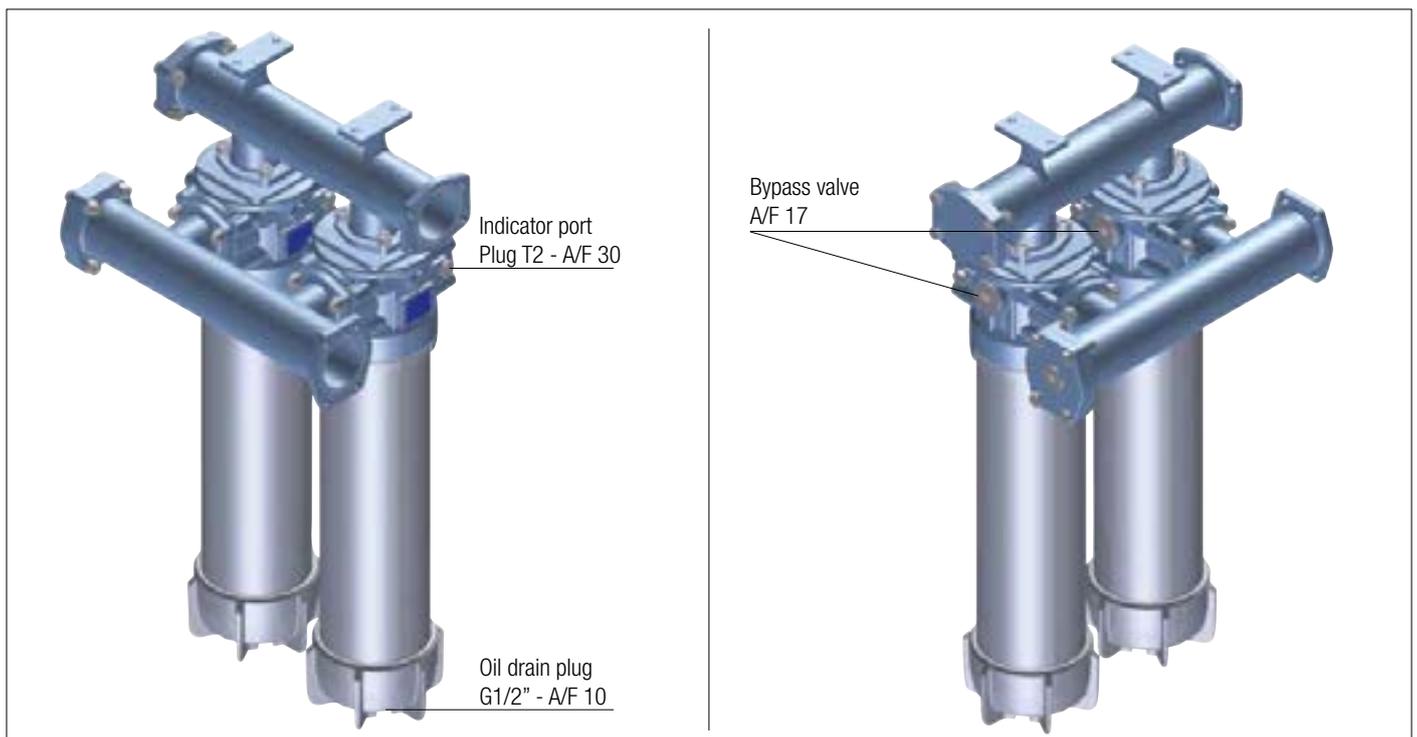


Filter housings  $\Delta p$  pressure drop

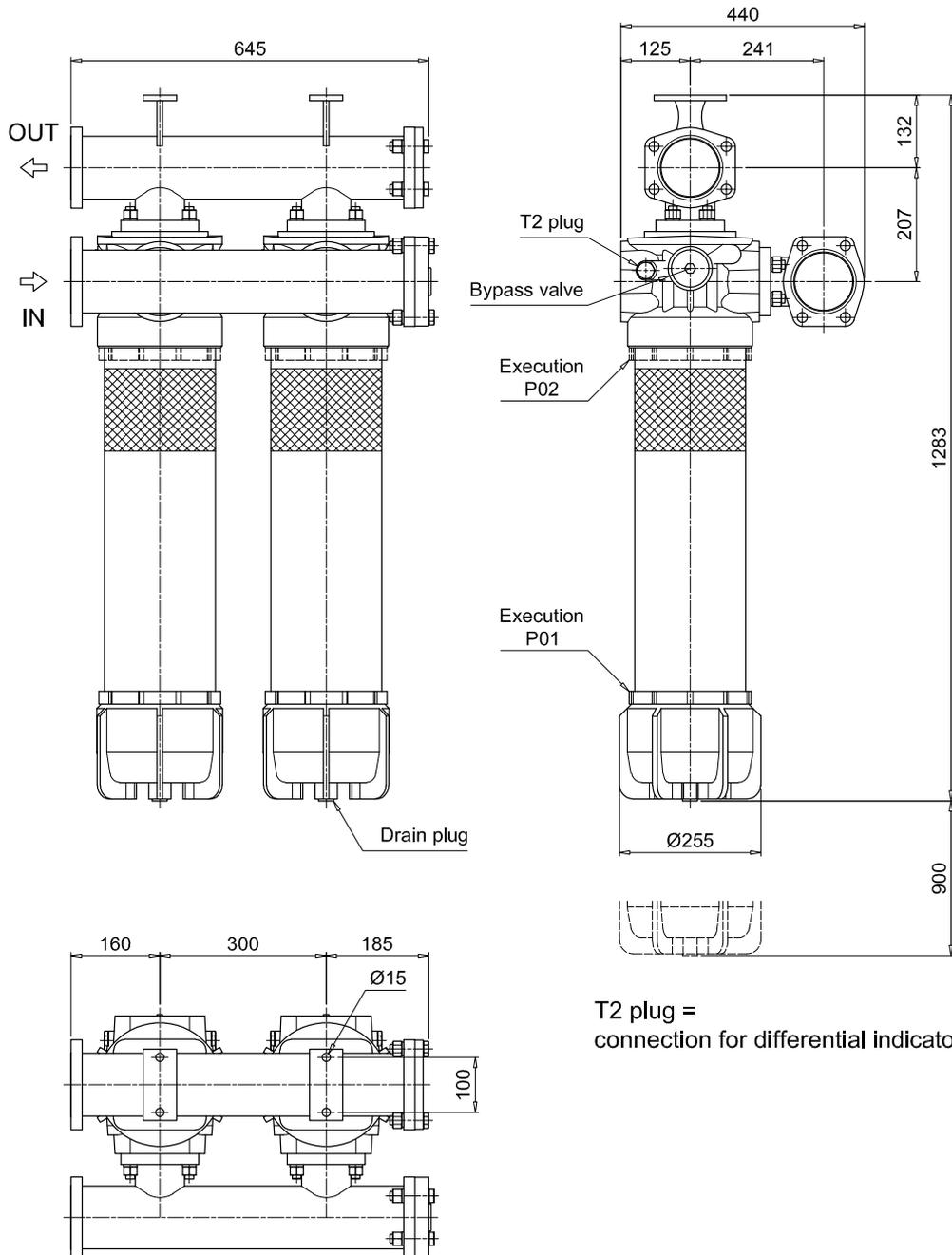


Bypass valve pressure drop

Focus on:



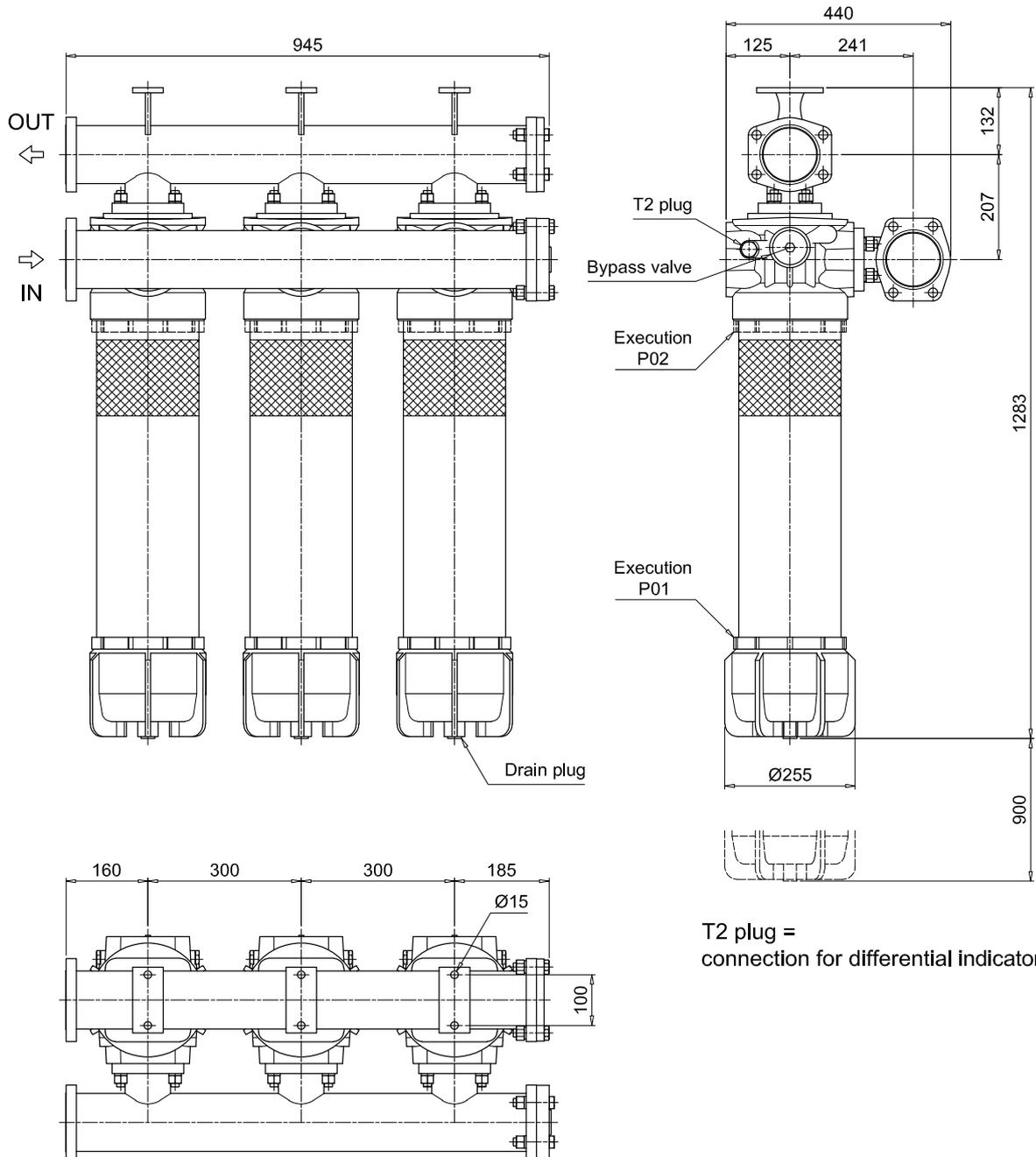




# LMP902-903

## Dimensions

LMP903

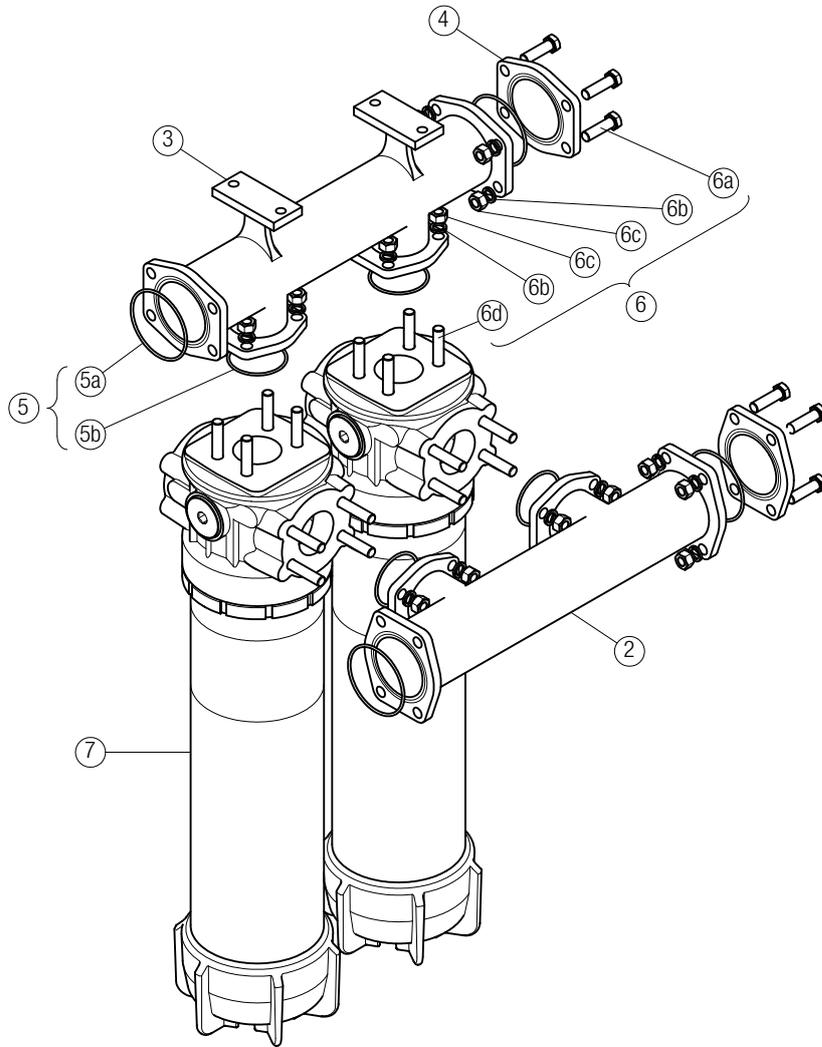


T2 plug =  
connection for differential indicator

# SPARE PARTS LMP902-903

Order number for spare parts

LMP 902 - 903



Item 7:  
for complete filter code and  
spare parts, see  
LMP 900 - 901 series chapter

Quantity:  
- filter spare parts:  
LMP 902 - 2 pcs.  
LMP 903 - 3 pcs.

- filter seal kit:  
LMP 902 - 2 pcs.  
LMP 903 - 3 pcs.

Item:	2		3	4		5 (5a-5b)			6 (6a ÷ 6d)		7	
Filter series	Q.ty	Manifold IN	OUT	4" SAE 3000 psi plugged flange	Q.ty	Manifolds seal kit		Threaded fasteners kit		Q.ty	Filter	
						NBR	FPM	Q.ty				
LMP 902	1 pc.	01039270	01039271	2 pcs.	01042012	1 pc.	02050404	02050405	1 pc.	02049051	2 pcs.	LMP9012xxF1xxxNP02
LMP 903	1 pc.	01039337	01039338	2 pcs.		1 pc.	02050404	02050405	1 pc.	02049052	3 pcs.	



# LMP 950-951 series

Maximum pressure up to 30 bar - Flow rate up to 2400 l/min



# LMP950-951 GENERAL INFORMATION

## Technical data

**Low & Medium Pressure filters** Maximum pressure up to 30 bar - Flow rate up to 2400 l/min

### Filter housing materials

- Head: Anodized Aluminium
- Housing: Anodized Aluminium
- Bypass valve: Anodized Aluminium

### Seals

- Standard NBR series A
- Optional FPM series V

### Pressure

- Working pressure: 3 MPa (30 bar)
- Test pressure: 4,5 MPa (45 bar)
- Burst pressure: 12 MPa (120 bar)
- Pulse pressure fatigue test: 1 000 000 cycles with pressure from 0 to 3 MPa (30 bar)

### Temperature

From -25 °C to +110 °C

### Connections

LMP 950: In-line Inlet/Outlet  
LMP 951: 90° Inlet/Outlet

### Bypass valve

- Opening pressure 3.5 bar  $\pm$ 10%
- Other opening pressures on request.

### Note

LMP 950 - 951 filters are provided for vertical mounting

### $\Delta p$ element type

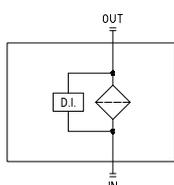
- Microfibre filter elements - series N: 20 bar
- Fluid flow through the filter element from OUT to IN.

## Weights [kg] and volumes [dm<sup>3</sup>]

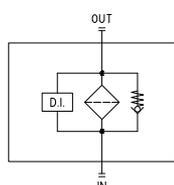
	Weights [kg]			Volumes [dm <sup>3</sup> ]		
	Length	1	2	Length	1	2
<b>LMP 950</b>		25.1	33.5		15	28

## Hydraulic symbols

LMP 210-400-900-950  
execution **S**



LMP 210-400-900-950  
execution **B**

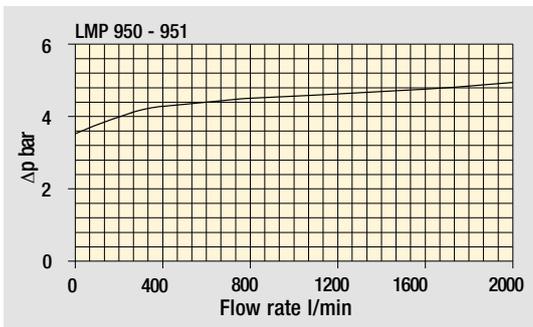
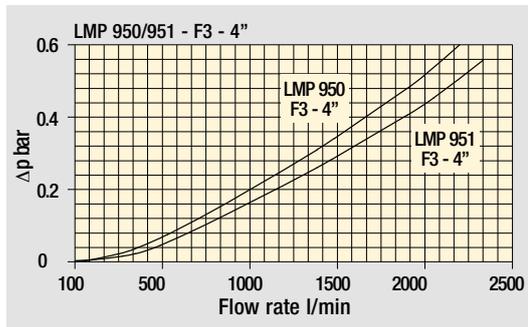
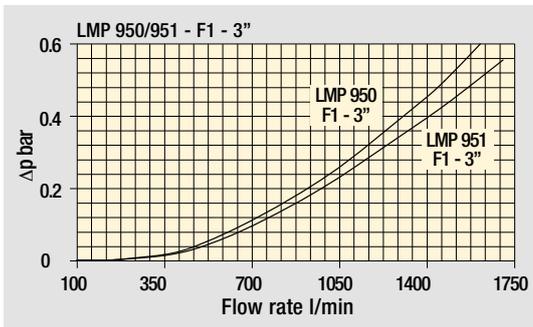


# GENERAL INFORMATION LMP950-951

The curves are plotted using mineral oil with density of 0.86 kg/dm<sup>3</sup> in compliance with ISO 3968.  
 $\Delta p$  varies proportionally with density.

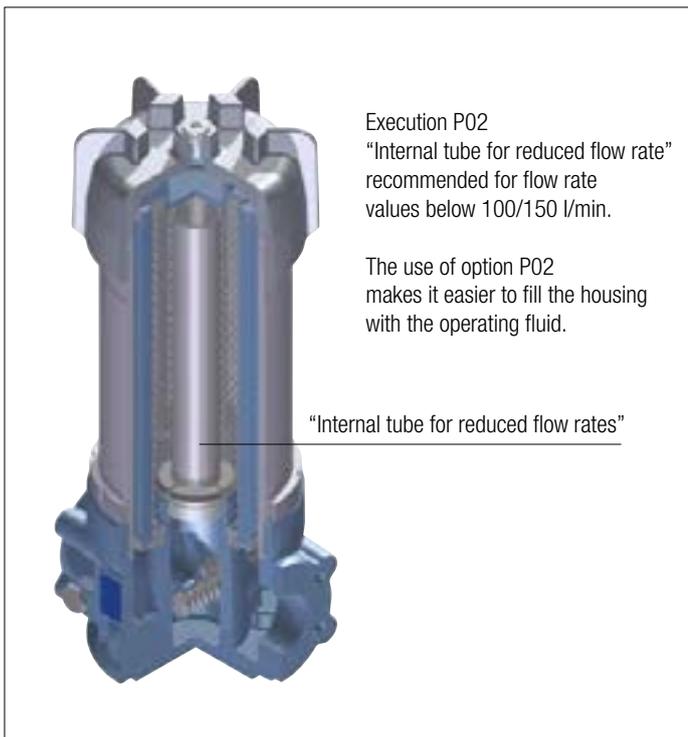
Pressure drop

Filter housings  $\Delta p$  pressure drop



Bypass valve pressure drop

## P2 EXECUTION



# LMP950-951

## Designation & Ordering code

### COMPLETE FILTER

<b>Series and size</b> <b>LMP950</b>   <b>LMP951</b>	Configuration example: <b>LMP951</b> <b>2</b> <b>B</b> <b>A</b> <b>F2</b> <b>A10</b> <b>N</b> <b>P01</b>						
<b>Length</b> <b>2</b>   <b>3</b>							
<b>Bypass valve</b> <b>S</b> Without bypass   <b>B</b> 3.5 bar							
<b>Seals and treatments</b> <b>A</b> NBR <b>V</b> FPM							
<b>Connections</b> <b>F1</b> 3" SAE 3000 psi/M <b>F2</b> 3" SAE 3000 psi/UNC <b>F3</b> 4" SAE 3000 psi/M <b>F4</b> 4" SAE 3000 psi/UNC							
<b>Filtration rating (filter media)</b> <b>A03</b> Inorganic microfiber 3 µm <b>A06</b> Inorganic microfiber 6 µm <b>A10</b> Inorganic microfiber 10 µm <b>A16</b> Inorganic microfiber 16 µm <b>A25</b> Inorganic microfiber 25 µm <b>M25</b> Wire mesh 25 µm <b>M60</b> Wire mesh 60 µm <b>M90</b> Wire mesh 90 µm							
<b>Element Δp</b> <b>N</b> 20 bar	<b>Execution</b> <b>P01</b> MP Filtri standard <b>P02</b> With internal reduced flow rate tube <b>Pxx</b> Customized						

### FILTER ELEMENT

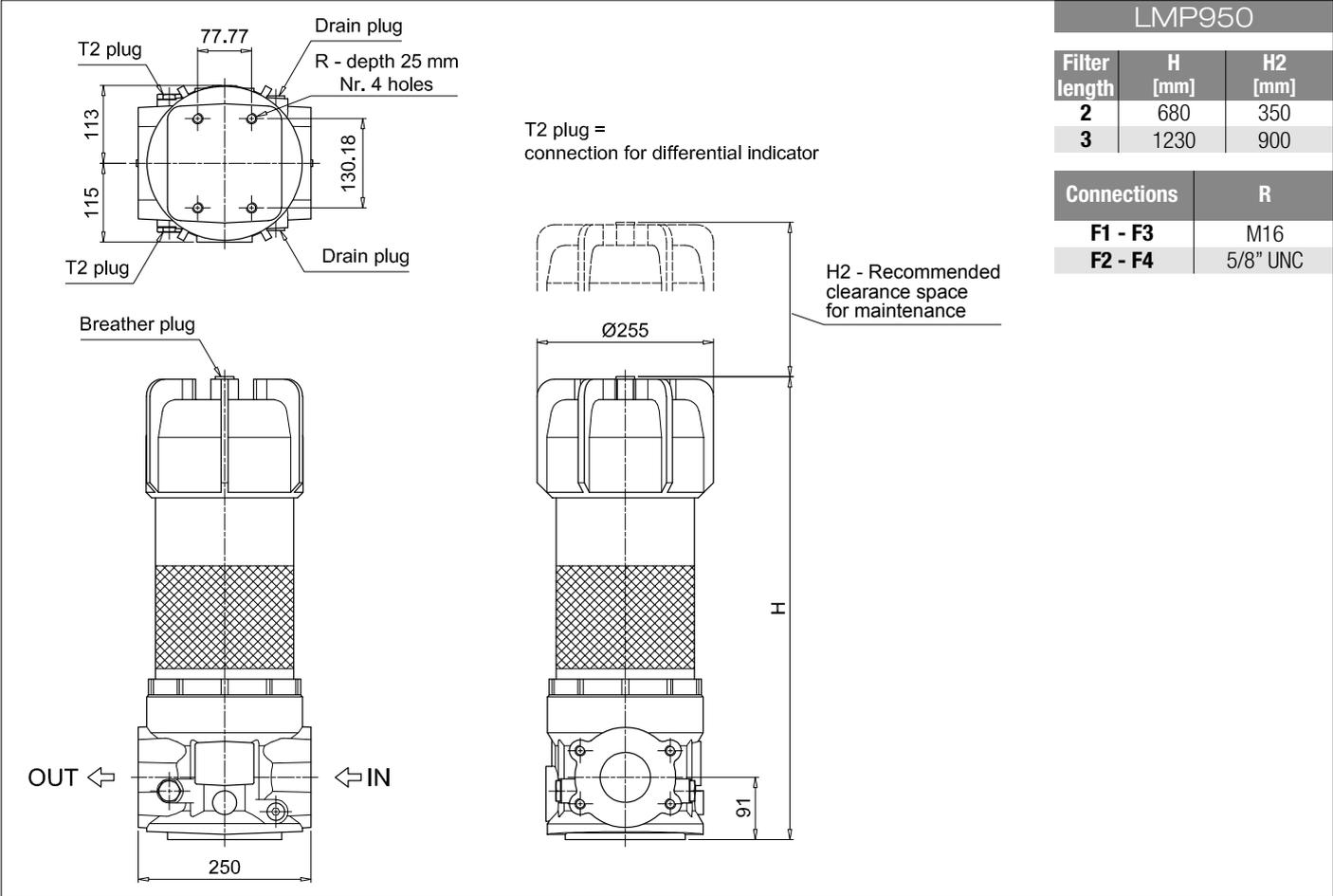
<b>Element series and size</b> <b>CU950</b>	Configuration example: <b>CU950</b> <b>2</b> <b>A10</b> <b>A</b> <b>N</b> <b>P01</b>						
<b>Element length</b> <b>2</b>   <b>3</b>							
<b>Filtration rating (filter media)</b> <b>A03</b> Inorganic microfiber 3 µm <b>A06</b> Inorganic microfiber 6 µm <b>A10</b> Inorganic microfiber 10 µm <b>A16</b> Inorganic microfiber 16 µm <b>A25</b> Inorganic microfiber 25 µm <b>M25</b> Wire mesh 25 µm <b>M60</b> Wire mesh 60 µm <b>M90</b> Wire mesh 90 µm							
<b>Seals</b> <b>A</b> NBR <b>V</b> FPM							
<b>Element Δp</b> <b>N</b> 20 bar	<b>Execution</b> <b>P01</b> MP Filtri standard <b>Pxx</b> Customized						

### ACCESSORIES

<b>Differential indicators</b>	page		page
<b>DEA</b> Electrical differential indicator	419	<b>DTA</b> Electronic differential indicator	422
<b>DEM</b> Electrical differential indicator	419-420	<b>DVA</b> Visual differential indicator	422
<b>DLA</b> Electrical / visual differential indicator	420-421	<b>DVM</b> Visual differential indicator	422
<b>DLE</b> Electrical / visual differential indicator	421		
<b>Additional features</b>	page		
<b>T2</b> Plug	423		

# LMP950-951

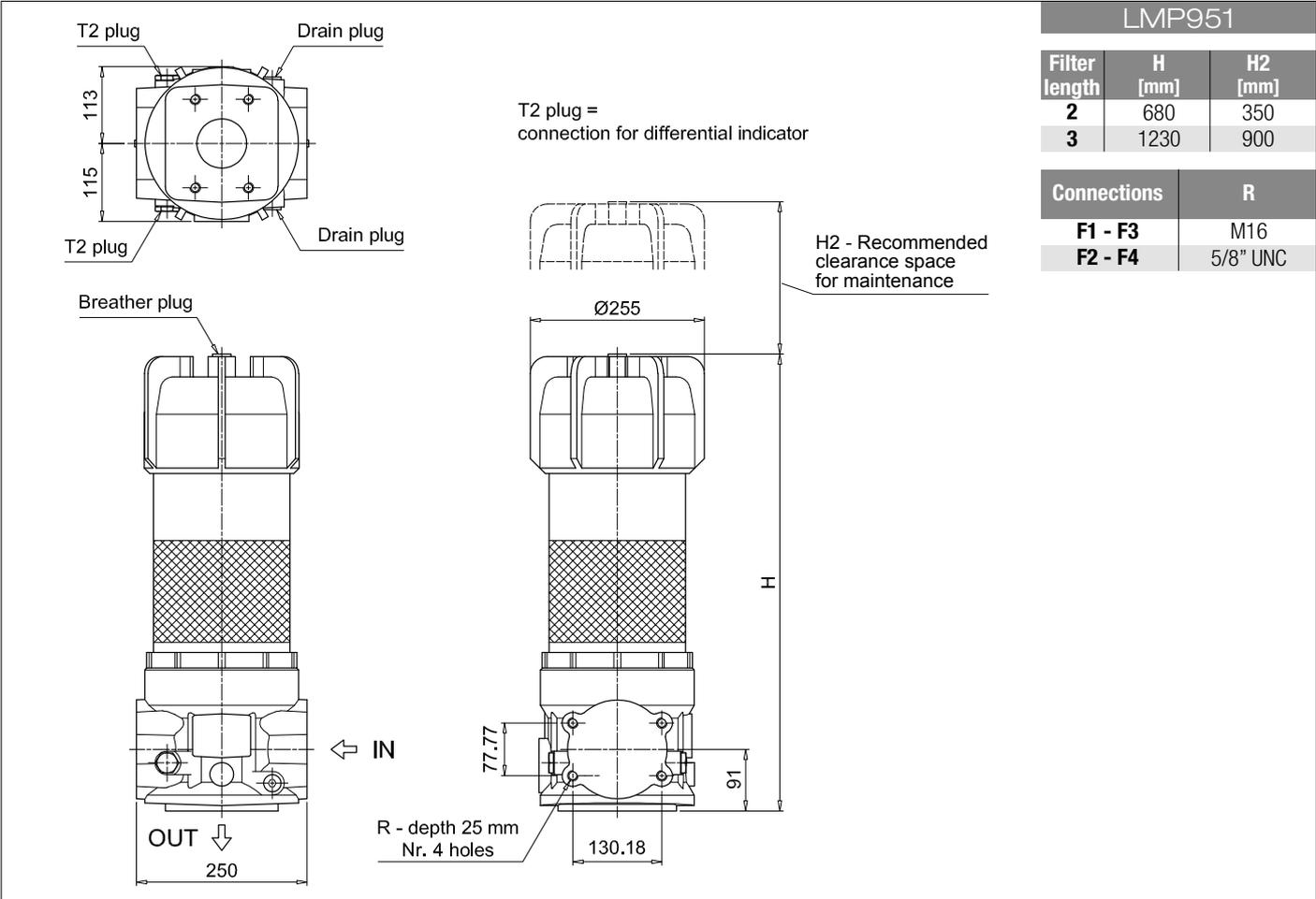
## Dimensions



LMP950		
Filter length	H [mm]	H2 [mm]
2	680	350
3	1230	900

Connections	R
F1 - F3	M16
F2 - F4	5/8" UNC



LMP951		
Filter length	H [mm]	H2 [mm]
2	680	350
3	1230	900

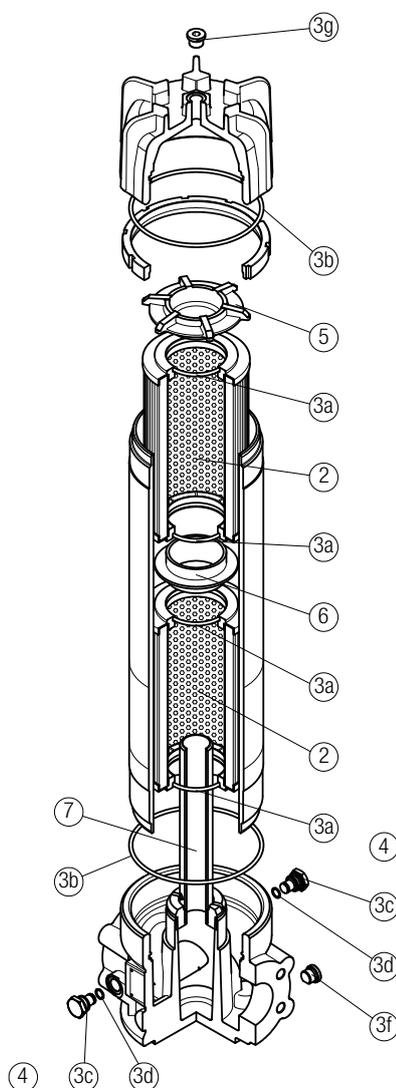
  

Connections	R
F1 - F3	M16
F2 - F4	5/8" UNC

# LMP950-951 SPARE PARTS

Order number for spare parts

LMP 950 - 951



Item:	Q.ty: 2 pcs.		Q.ty: 1 pc.		Q.ty: 2 pcs.		Q.ty: 1 pc.		Q.ty: 1 pc.		Q.ty: 1 pc.	
Filter series	Filter element	Seal Kit code number		Indicator connection plug		Housing spigot		Coupling spigot	Tube assembly			
		NBR	FPM	NBR	FPM	no bypass	with bypass		length 2	length 3		
LMP 950 - 951 length 2 - 3	See order table	02050367	02050368	T2H	T2V	01044106	02001379	01044099	02025032	02025033		





# LMP 952-953-954 series

Maximum pressure up to 25 bar - Flow rate up to 3000 l/min



# LMP952-953-954 GENERAL INFORMATION

## Technical data

**Low & Medium Pressure filters** Maximum pressure up to 25 bar - Flow rate up to 3000 l/min

### Filter housing materials

- Head: Anodized Aluminium
- Housing: Anodized Aluminium
- Manifolds: Welded - Phosphated Steel
- Bypass valve: Anodized Aluminium

### Number of filter elements

- LMP 952: 2 filter elements CU950-3
- LMP 953: 3 filter elements CU950-3
- LMP 954: 4 filter elements CU950-3

### Seals

- Standard NBR series A
- Optional FPM series V

### Pressure

- Working pressure: 2.5 MPa (25 bar)
- Test pressure: 3.5 MPa (35 bar)

### Temperature

From -25 °C to +110 °C

### Bypass valve

- Opening pressure 3.5 bar  $\pm$ 10%
- Other opening pressures on request.

### Connections

LMP 952-953-954:  
In-line Inlet/Outlet

### $\Delta p$ element type

- Microfibre filter elements - series N: 20 bar
- Fluid flow through the filter element from OUT to IN.

### Note

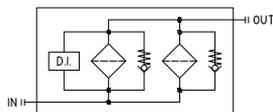
LMP 952 - 953 - 954 filters  
are provided for vertical mounting

## Weights [kg] and volumes [dm<sup>3</sup>]

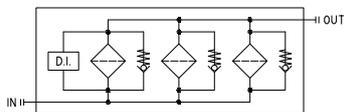
	Weights [kg]		Volumes [dm <sup>3</sup> ]	
	Length	3	Length	3
<b>LMP 952</b>		96		66
<b>LMP 953</b>		138		99
<b>LMP 954</b>		192		132

## Hydraulic symbols

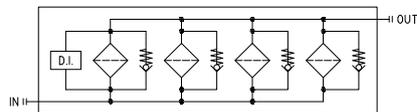
LMP 902 - 952



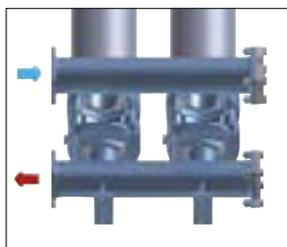
LMP 903 - 953



LMP 954



## Manifolds



### FA

Position of manifolds  
IN - OUT connections

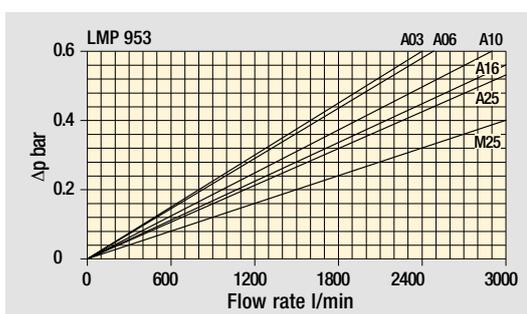
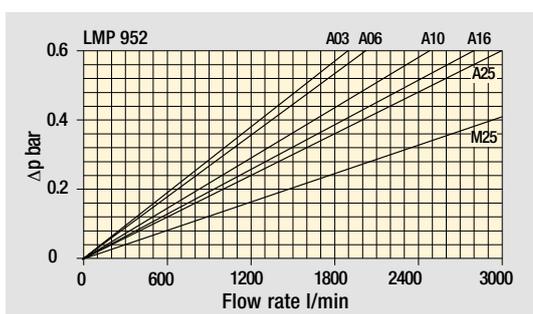
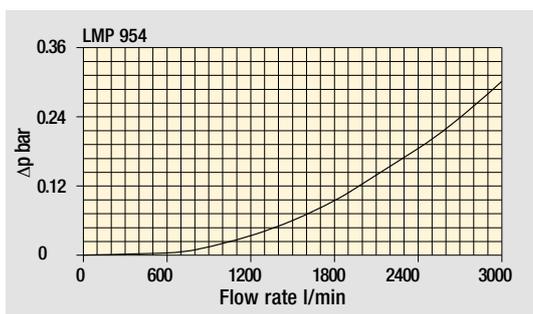
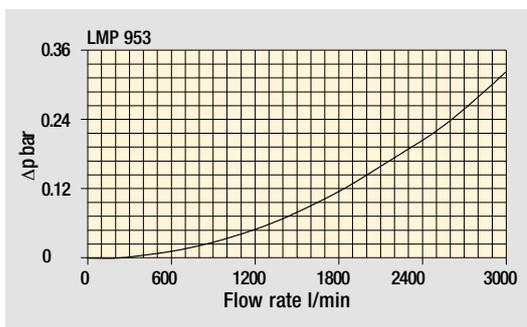
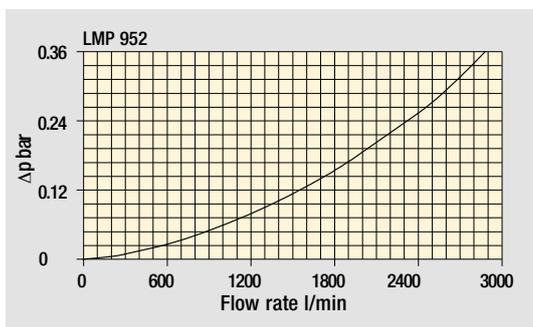
# GENERAL INFORMATION LMP952-953-954

The curves are plotted using mineral oil with density of 0.86 kg/dm<sup>3</sup> in compliance with ISO 3968.

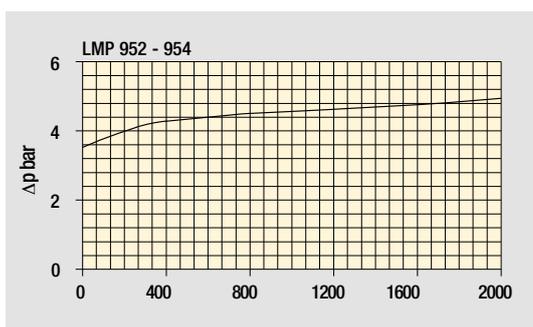
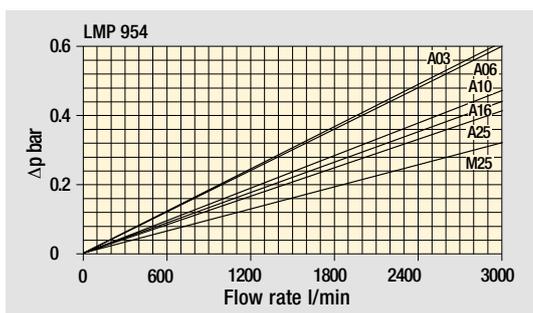
$\Delta p$  varies proportionally with density.

Pressure drop

Filter housings  $\Delta p$  pressure drop



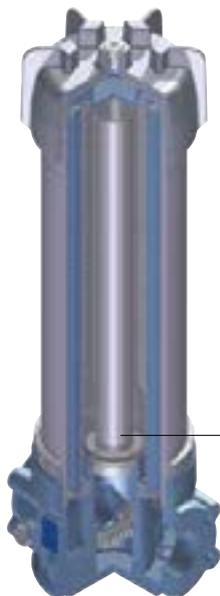
Pressure drop of filter complete with cartridge, oil viscosity 30 mm<sup>2</sup>/s (cSt)



Bypass valve pressure drop

## Options

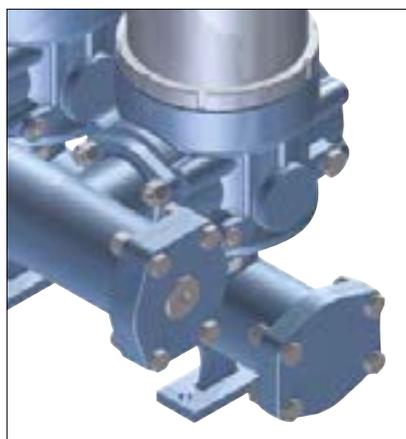
### P2 EXECUTION



Execution P02  
 "Internal tube for reduced flow rate"  
 is recommended for flow rate  
 values below:  
 LMP 952 - 300 l/min  
 LMP 953 - 450 l/min  
 LMP 954 - 600 l/min

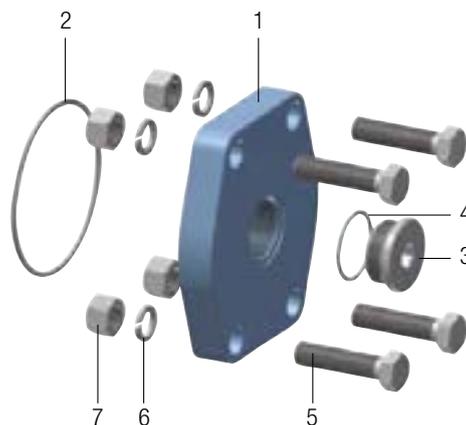
The use of option P02  
 makes it easier to fill the housing  
 with the operating fluid.

"Internal tube for reduced flow rates"



Flange with oil drain plug for rapid discharge

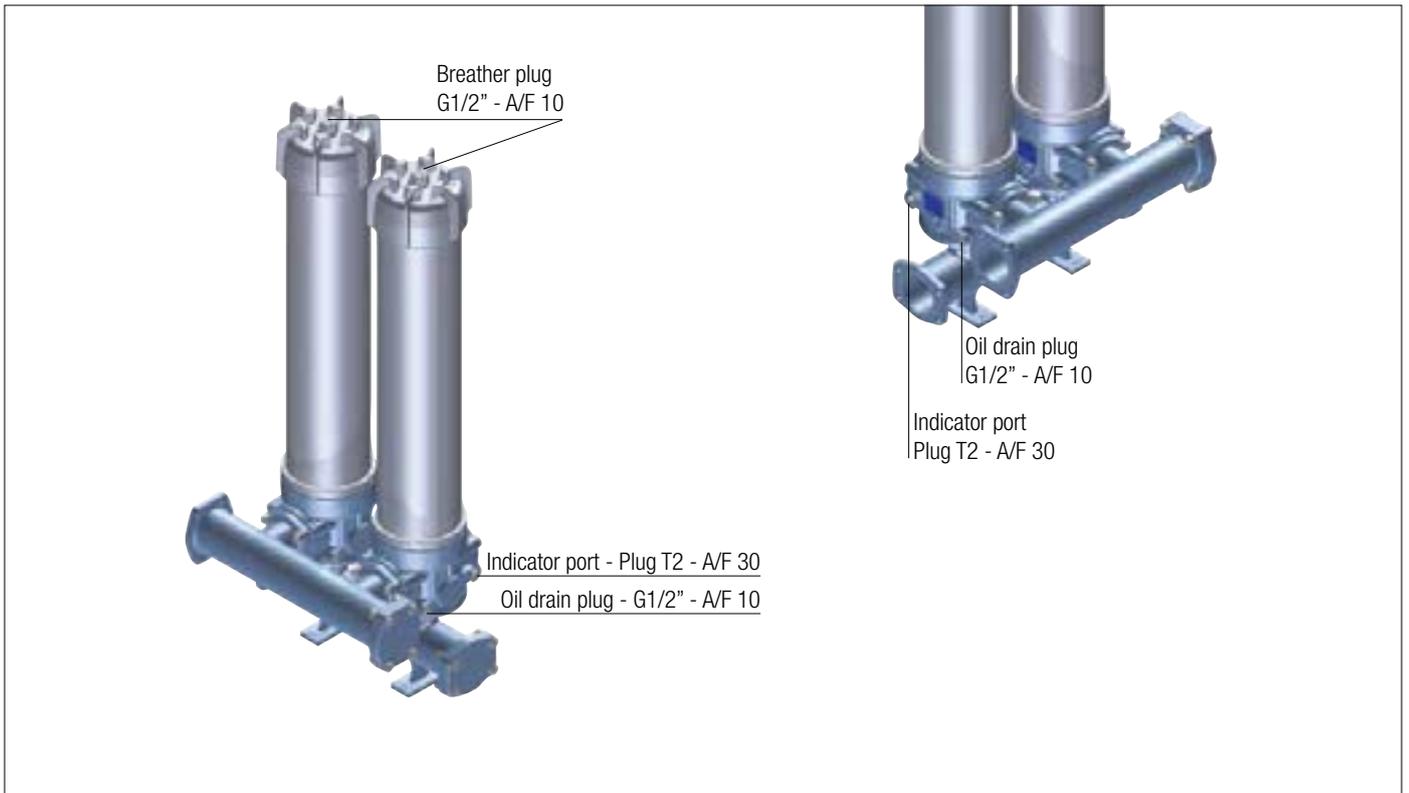
### CMV4 & CUV4 FLANGE OPTION



#### Oil drain plug

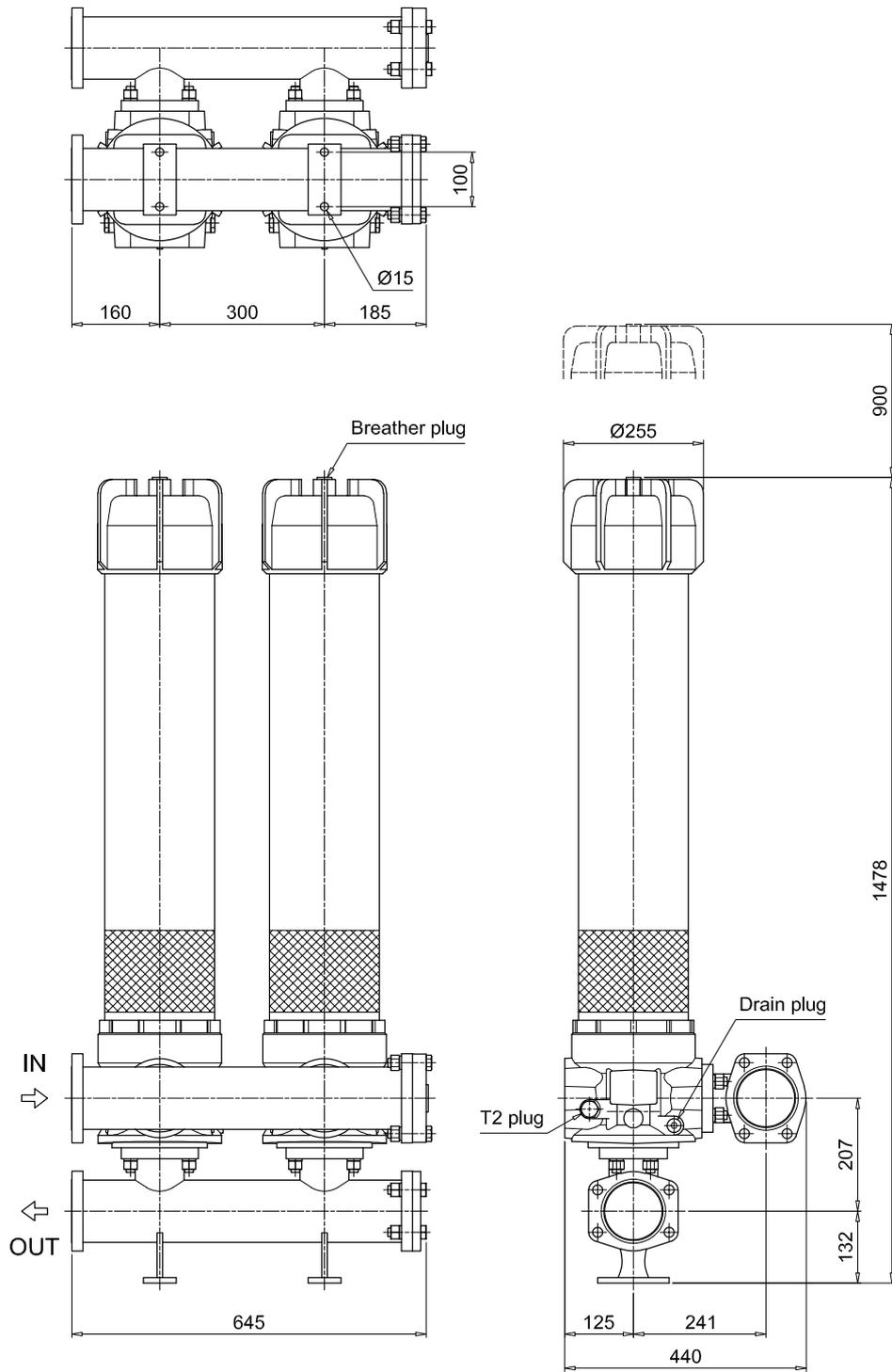
Code	CMV4	CUV4
Thread	G1 1/4"	SAE 20
Materials	1 - 4" SAE flange 2 - O-R 4437 (FPM) for flange 3 - Plug G 1-1/4" 4 - O-R 3168 for plug (FPM) 5 - No. 4 Hex bolt screws UNI-EN 24017 M16 x 65-10.9 6 - No. 4 Spring washers UNI 1751-B 16 7 - No. 4 Nuts UNI 5587 - M16	1 - 4" SAE flange 2 - O-R 4437 (FPM) for flange 3 - Plug SAE 20 1 5/8" - 12 UN 4 - 1147 O-R for plug (FPM) 5 - No. 4 Hex bolt screws 5/8" UNC x 2 1/2" 6 - No. 4 Spring washers UNI 1751-B 16 7 - No. 4 Nuts 5/8" UNC

Focus on:





LMP952

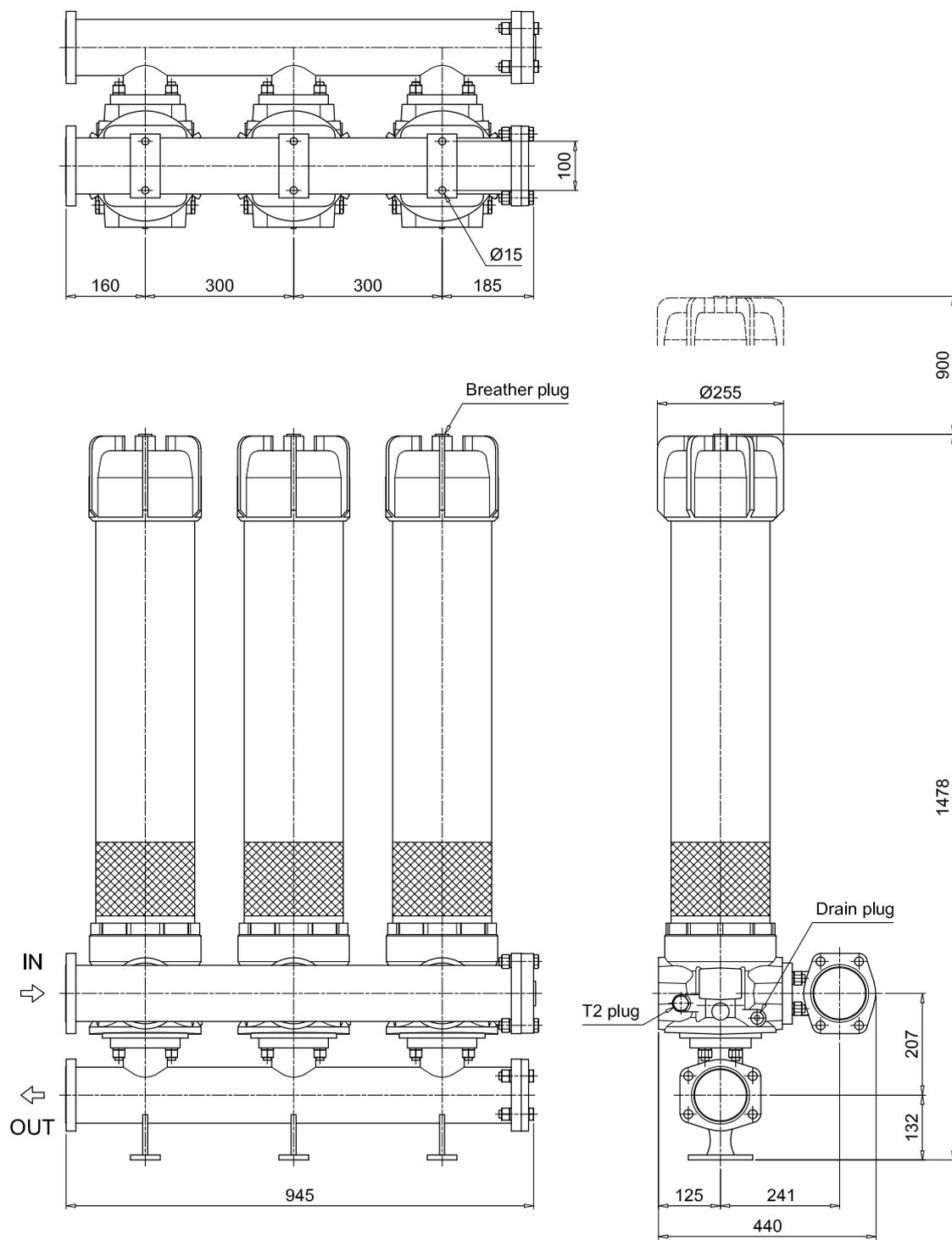


T2 plug =  
connection for differential indicator

# LMP952-953-954

## Dimensions

LMP953

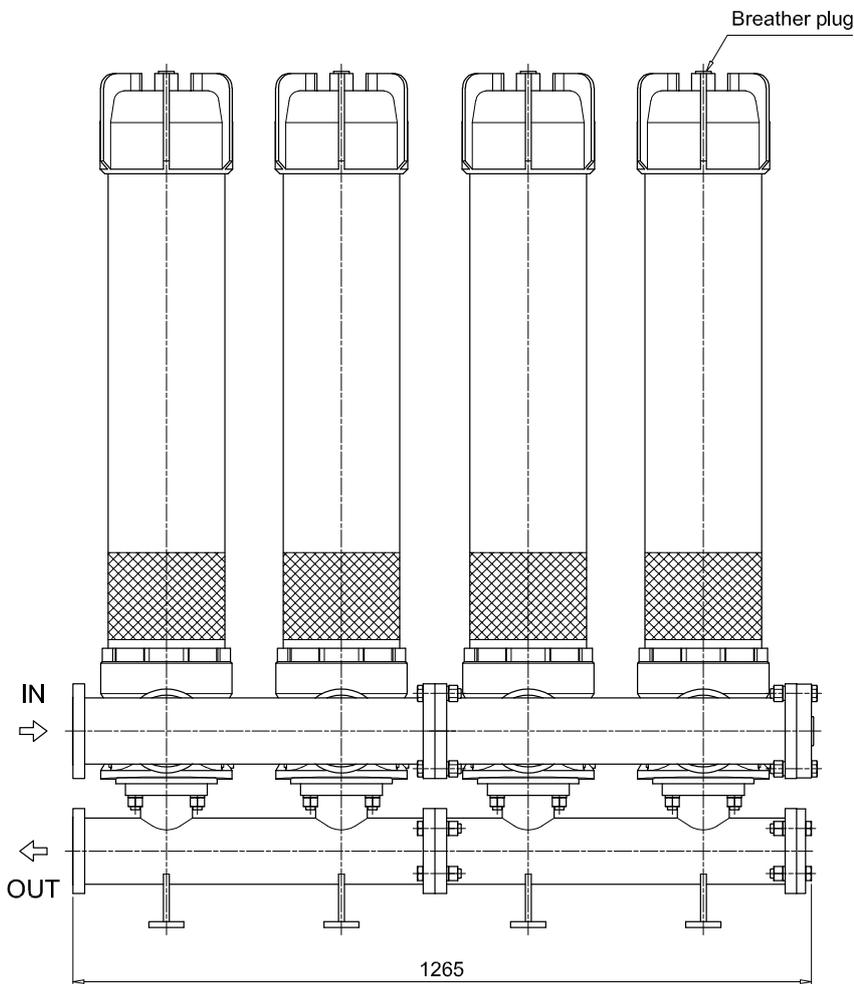
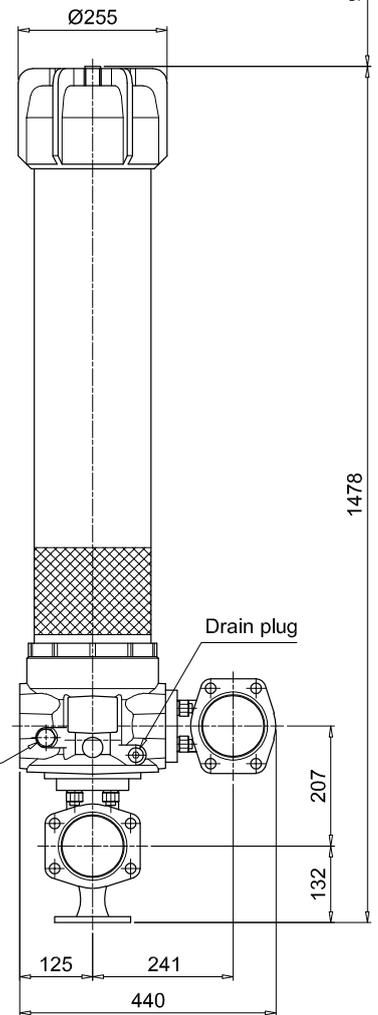
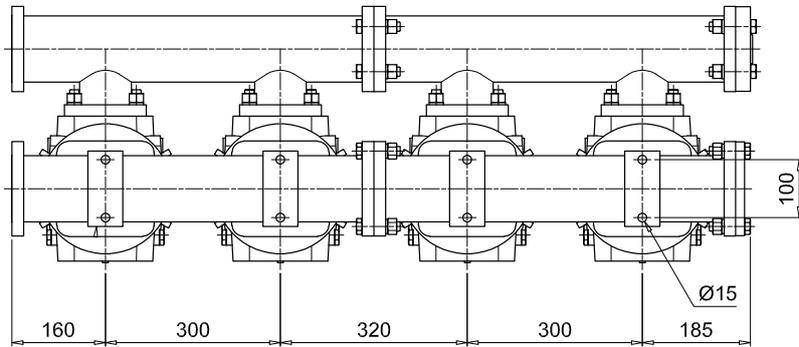


T2 plug =  
connection for differential indicator

# LMP952-953-954

Dimensions

LMP954

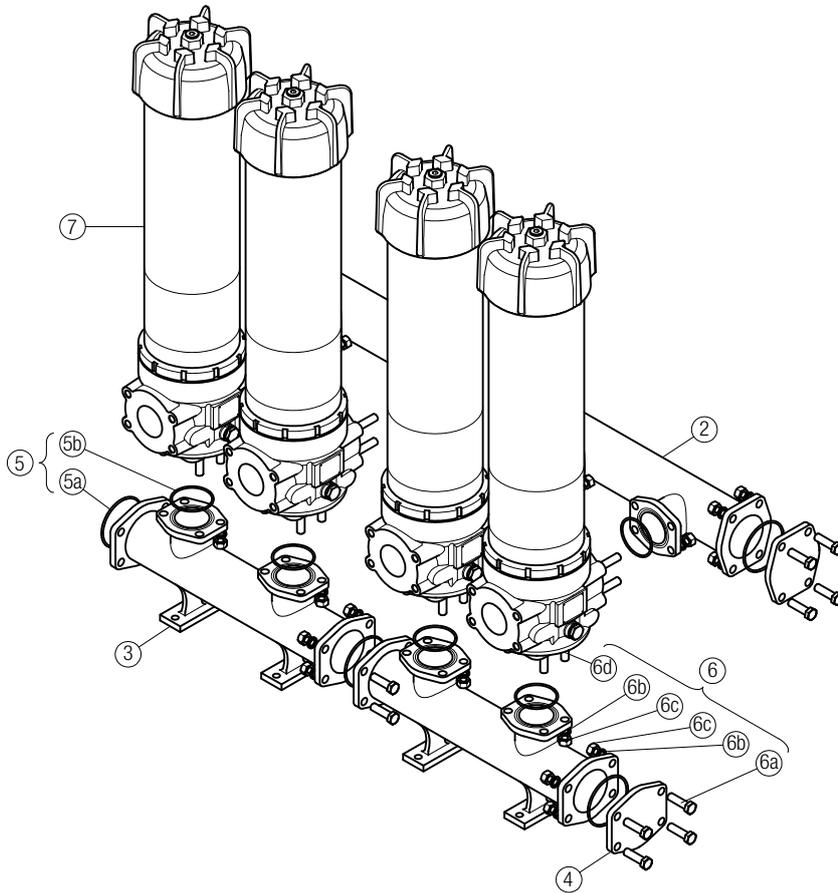


T2 plug =  
connection for differential indicator

# LMP952-953-954 SPARE PARTS

Order number for spare parts

LMP 952 - 953 - 954



Item 7:  
for complete filter code and  
spare parts, see  
LMP 950 - 951 series chapter

Quantity:  
- filter spare parts:  
LMP 952 - 2 pcs.  
LMP 953 - 3 pcs.  
LMP 954 - 4 pcs.

- filter seal kit:  
LMP 952 - 2 pcs.  
LMP 953 - 3 pcs.  
LMP 954 - 4 pcs.

Item:	2		3	4		5 (5a-5b)			6 (6a + 6d)		7
Filter series	Q.ty	Manifold IN	OUT	4" SAE 3000 psi plugged flange Q.ty		Manifolds seal kit		Threaded fasteners kit	Q.ty	Filter	
						Q.ty	NBR	FPM			
LMP 952	1 pc.	01039270	01039271	2 pcs.		1 pc.	02050404	02050405	1 pc.	02049051	2 pcs.
LMP 953	1 pc.	01039337	01039338	2 pcs.	01042012	1 pc.	02050404	02050405	1 pc.	02049052	3 pcs.
LMP 954	2 pcs.	01039270	01039271	2 pcs.		1 pc.	02050406	02050407	1 pc.	02049053	4 pcs.





# LMD 211 series

Maximum pressure up to 60 bar - Flow rate up to 330 l/min



# LMD211 GENERAL INFORMATION

## Technical data

**Low & Medium Pressure filters** Maximum pressure up to 60 bar - Flow rate up to 330 l/min

### Filter housing materials

- Head: Aluminium
- Bowl: Cataphoretic Painted Steel
- Bypass valve: AISI 304 - Nylon

### Seals

- Standard NBR series A
- Optional FPM series V

### Pressure

- Working pressure: 6 MPa (60 bar)
- Test pressure: 9 MPa (90 bar)
- Burst pressure: 21 MPa (210 bar)
- Pulse pressure fatigue test: 1 000 000 cycles with pressure from 0 to 6 MPa (60 bar)

### Temperature

From -25° C to +110° C

### Connections

Inlet/Outlet In-Line

### Bypass valve

- Opening pressure 3.5 bar  $\pm$ 10%
- Other opening pressures on request.

### Note

LMD 210 - 211 filters are provided for vertical mounting

### $\Delta p$ element type

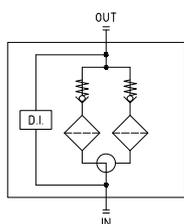
- Microfibre filter elements - series N: 20 bar
- Fluid flow through the filter element from OUT to IN.

## Weights [kg] and volumes [dm<sup>3</sup>]

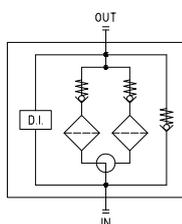
	Weights [kg]				Volumes [dm <sup>3</sup> ]			
	Length	1	2	3	Length	1	2	3
<b>LMD 211</b>		9.5	11.2	12.8		4.1	4.6	5.3

## Hydraulic symbols

Style S



Style B

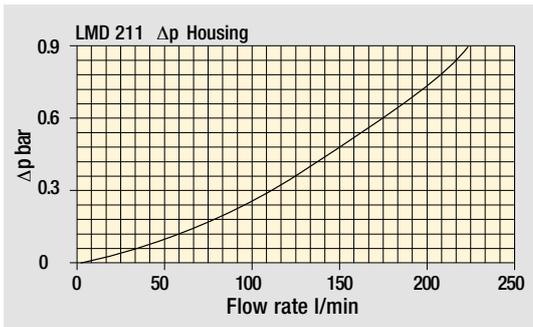


# GENERAL INFORMATION LMD211

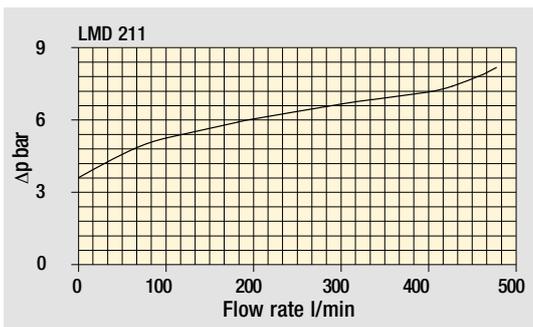
The curves are plotted using mineral oil with density of 0.86 kg/dm<sup>3</sup> in compliance with ISO 3968.  
 **$\Delta p$  varies proportionally with density.**

Pressure drop

Filter housings  $\Delta p$  pressure drop



Bypass valve pressure drop



# LMD211

## Designation & Ordering code

### COMPLETE FILTER

<b>Series and size</b> <b>LMD211</b>	Configuration example: <b>LMD211</b>   <b>3</b>   <b>B</b>   <b>A</b>   <b>C</b>   <b>6</b>   <b>A10</b>   <b>N</b>   <b>P01</b>									
<b>Length</b> <b>1</b>   <b>2</b>   <b>3</b>										
<b>Bypass valve</b> <b>S</b> Without bypass   <b>B</b> 3.5 bar										
<b>Seals and treatments</b>	Filtration rating									
<b>A</b> NBR	<b>Axx</b>	<b>Mxx</b>	<b>Pxx</b>							
<b>V</b> FPM	•	•	•							
<b>W</b> NBR compatible with fluids HFA-HFB-HFC	•	•								
<b>Connections</b>										
<b>C</b> G1 1/2"										
<b>F</b> 1 1/2" NPT										
<b>I</b> SAE 24 - 1 7/8" - 12 UN										
<b>L</b> 1 1/2" SAE 3000 psi/M + G1 1/4"										
<b>M</b> 1 1/2" SAE 3000 psi/UNC + 1 1/4" NPT										
<b>N</b> 1 1/2" SAE 3000 psi/UNC + SAE 20 - 1 5/8" UN										
<b>Connection for differential indicator</b> <b>6</b> With plugged connection										
<b>Filtration rating (filter media)</b>										
<b>A03</b> Inorganic microfiber 3 µm										
<b>A06</b> Inorganic microfiber 6 µm										
<b>A10</b> Inorganic microfiber 10 µm										
<b>A16</b> Inorganic microfiber 16 µm										
<b>A25</b> Inorganic microfiber 25 µm										
<b>M25</b> Wire mesh 25 µm										
<b>M60</b> Wire mesh 60 µm										
<b>M90</b> Wire mesh 90 µm										
<b>P10</b> Resin impregnated paper 10 µm										
<b>P25</b> Resin impregnated paper 25 µm										
	<b>Element Δp</b>			<b>Execution</b>						
	<b>N</b> 20 bar			<b>P01</b> MP Filtri standard <b>Pxx</b> Customized						

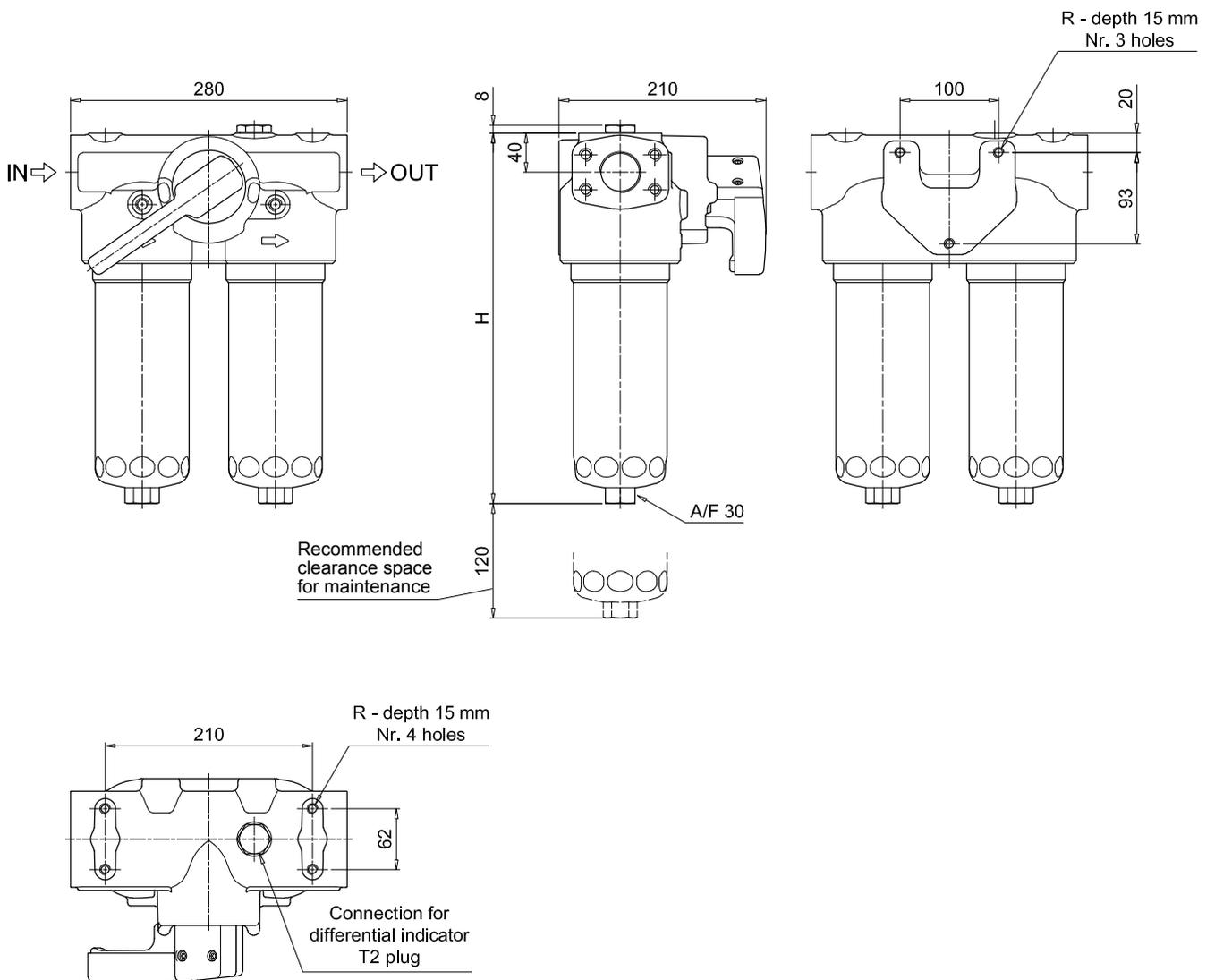
### FILTER ELEMENT

<b>Element series and size</b> <b>CU210</b>	Configuration example: <b>CU210</b>   <b>3</b>   <b>A10</b>   <b>A</b>   <b>N</b>   <b>P01</b>						
<b>Element length</b> <b>1</b>   <b>2</b>   <b>3</b>							
<b>Filtration rating (filter media)</b>							
<b>A03</b> Inorganic microfiber 3 µm							
<b>A06</b> Inorganic microfiber 6 µm							
<b>A10</b> Inorganic microfiber 10 µm							
<b>A16</b> Inorganic microfiber 16 µm							
<b>A25</b> Inorganic microfiber 25 µm							
<b>M25</b> Wire mesh 25 µm							
<b>M60</b> Wire mesh 60 µm							
<b>M90</b> Wire mesh 90 µm							
<b>P10</b> Resin impregnated paper 10 µm							
<b>P25</b> Resin impregnated paper 25 µm							
<b>Seals</b>	Filtration rating						
<b>A</b> NBR	<b>Axx</b>	<b>Mxx</b>	<b>Pxx</b>				
<b>V</b> FPM	•	•	•				
<b>W</b> NBR compatible with fluids HFA-HFB-HFC	•	•					
	<b>Element Δp</b>			<b>Execution</b>			
	<b>N</b> 20 bar			<b>P01</b> MP Filtri standard <b>Pxx</b> Customized			

### ACCESSORIES

<b>Differential indicators</b>	page		page
<b>DEA</b> Electrical differential indicator	419	<b>DTA</b> Electronic differential indicator	422
<b>DEM</b> Electrical differential indicator	419-420	<b>DVA</b> Visual differential indicator	422
<b>DLA</b> Electrical / visual differential indicator	420-421	<b>DVM</b> Visual differential indicator	422
<b>DLE</b> Electrical / visual differential indicator	421		
<b>Additional features</b>	page		
<b>T2</b> Plug	423		

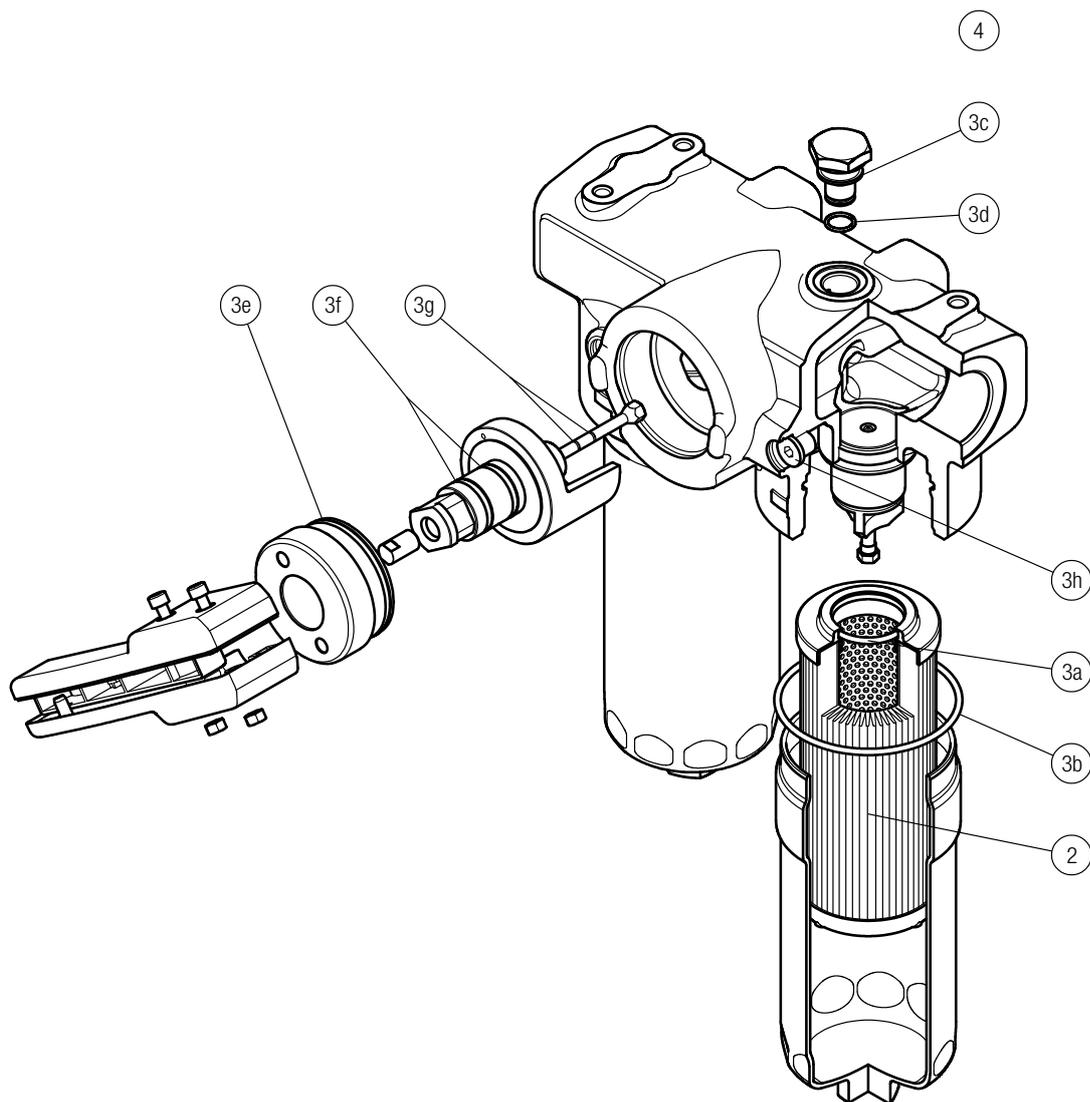
LMD211	
Filter length	H [mm]
<b>1</b>	380
<b>2</b>	510
<b>3</b>	648
Connections	R
<b>C</b>	M10
<b>F - I</b>	3/8" UNC
<b>L</b>	M10
<b>M - N</b>	3/8" UNC



# LMD211 SPARE PARTS

Order number for spare parts

LMD 211



Item:	Q.ty: 1 pc.		Q.ty: 1 pc.		Q.ty: 2 pcs.	
Filter series	Filter element	Seal Kit code number NBR	FPM	Indicator connection plug NBR	FPM	
<b>LDD</b>	See order table	02050671	02050672	T2H	T2V	





# LMD 400-401 & 431 series

Maximum pressure up to 16 bar - Flow rate up to 590 l/min



### Technical data

**Low & Medium Pressure filters** Maximum pressure up to 16 bar - Flow rate up to 590 l/min

#### Filter housing materials

- Head: Anodized Aluminium
- Housing: Anodized Aluminium
- Manifolds: Steel - Painted black
- Bypass valve: Steel
- 3-way ball valve: Steel housings - Stainless Steel ball
- Valve: Phosphated Steel - Stainless Steel

#### Pressure

- Working pressure: 1.6 MPa (16 bar)
- Test pressure: 2.5 MPa (25 bar)

#### Bypass valve

- Opening pressure 3.5 bar  $\pm$ 10%
- Other opening pressures on request.

#### $\Delta p$ element type

- Microfibre filter elements - series N - W: 20 bar
- Fluid flow through the filter element from OUT to IN.

#### Seals

FPM series V

#### Temperature

From -25° C to +110° C

#### Connections

- LMD 400-401: In-line Inlet/Outlet
- LMD 401: Same side
- LMD 400-401-431: In-Line

#### Note

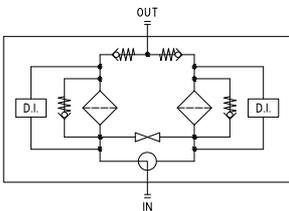
LMP 400 - 401 - 431 filters are provided for vertical mounting

### Weights [kg] and volumes [dm<sup>3</sup>]

	Weights [kg]			Volumes [dm <sup>3</sup> ]				
	Length	4	5	6	Length	4	5	6
<b>LMD 400 - 401</b>		60	65	72		20	28	33
<b>LMD 431</b>		-	68	78		-	28	33

### Hydraulic symbols

LMD 400-401-431-951



### P2 EXECUTION



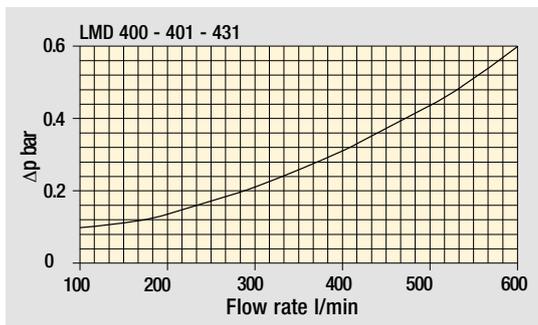
Execution P02 "Internal tube for reduced flow rate" is recommended for flow rate values below 150 l/min.

The use of option P02 makes it easier to fill the housing with the operating fluid.

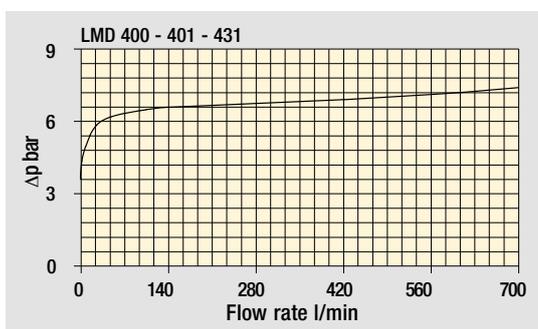
"Internal tube for reduced flow rates"

The curves are plotted using mineral oil with density of 0.86 kg/dm<sup>3</sup> in compliance with ISO 3968.  
 $\Delta p$  varies proportionally with density.

Pressure drop



Filter housings  $\Delta p$  pressure drop



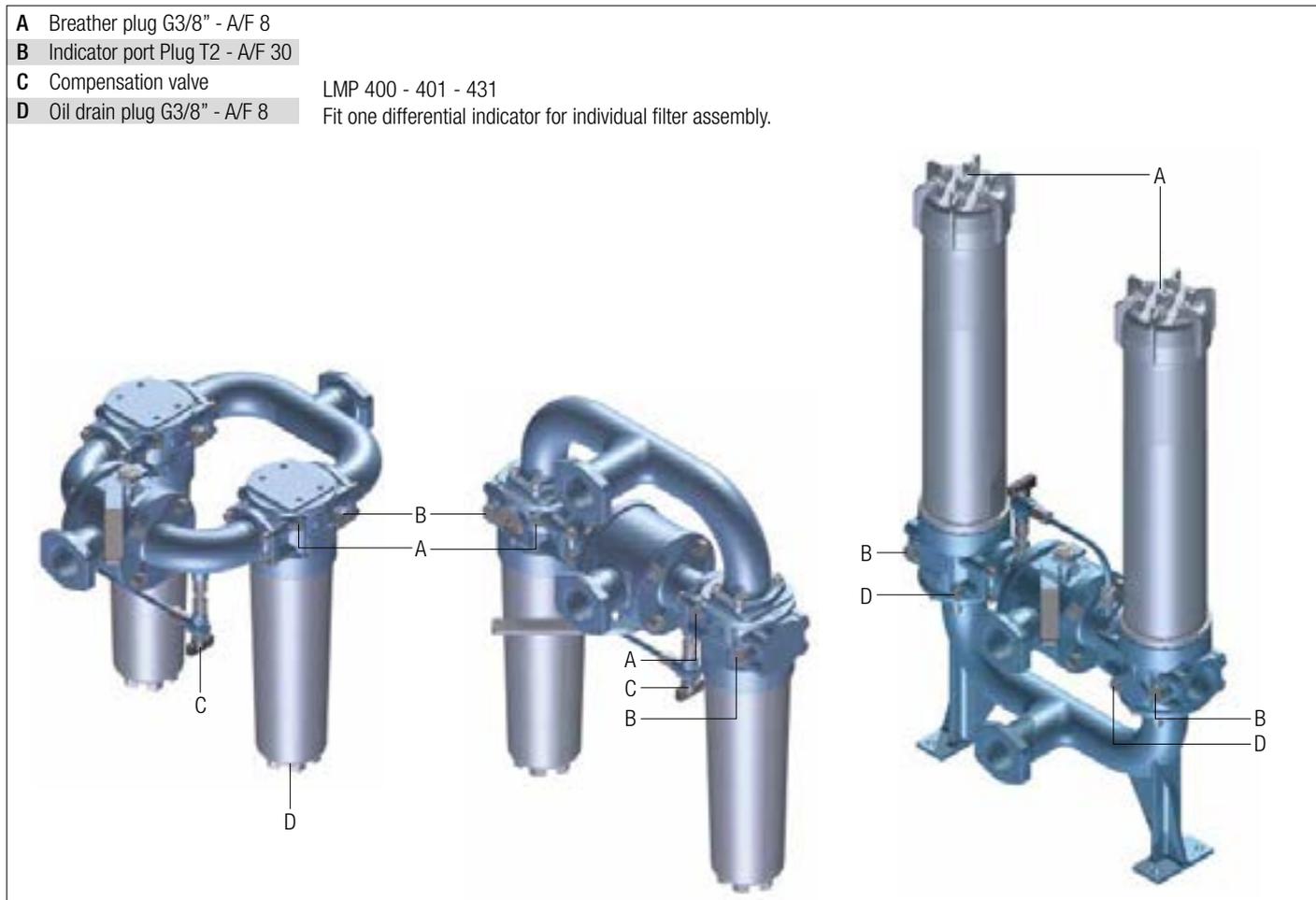
Bypass valve pressure drop

Focus on

- A Breather plug G3/8" - A/F 8
- B Indicator port Plug T2 - A/F 30
- C Compensation valve
- D Oil drain plug G3/8" - A/F 8

LMP 400 - 401 - 431

Fit one differential indicator for individual filter assembly.



# LMD400-401

## Designation & Ordering code

### COMPLETE FILTER

Series and size		Configuration example: <b>LMD401</b>   <b>4</b>   <b>B</b>   <b>V</b>   <b>F1</b>   <b>A10</b>   <b>N</b>   <b>P01</b>									
<b>LMD400</b>   <b>LMD401</b>											
Length		4   5   6									
Bypass valve		S Without bypass   B 3.5 bar									
Seals and treatments		Filtration rating									
V FPM		Axx	Mxx	Pxx							
Z FPM compatible with fluids HFA-HFB-HFC											
Connections		LMD400	LMD401								
F1 2 1/2" SAE 3000 psi/M											
F2 2 1/2" SAE 3000 psi/UNC											
F3 2 1/2" SAE 3000 psi/M, In-line connections											
F4 2 1/2" SAE 3000 psi/UNC, In-line connections											
Filtration rating (filter media)											
A03 Inorganic microfiber 3 µm		M25 Wire mesh 25 µm									
A06 Inorganic microfiber 6 µm		M60 Wire mesh 60 µm									
A10 Inorganic microfiber 10 µm		M90 Wire mesh 90 µm									
A16 Inorganic microfiber 16 µm		P10 Resin impregnated paper 10 µm									
A25 Inorganic microfiber 25 µm		P25 Resin impregnated paper 25 µm									
Element Δp		Execution			Filter length						
N 20 bar		P01 MP Filtri standard			4   5   6						
		P02 Maintenance from the bottom of the housing									
		Pxx Customized									

### FILTER ELEMENT

Element series and size		Configuration example: <b>CU400</b>   <b>4</b>   <b>A10</b>   <b>V</b>   <b>N</b>   <b>P01</b>									
<b>CU400</b>											
Element length		4   5   6									
Filtration rating (filter media)											
A03 Inorganic microfiber 3 µm		M25 Wire mesh 25 µm									
A06 Inorganic microfiber 6 µm		M60 Wire mesh 60 µm									
A10 Inorganic microfiber 10 µm		M90 Wire mesh 90 µm									
A16 Inorganic microfiber 16 µm		P10 Resin impregnated paper 10 µm									
A25 Inorganic microfiber 25 µm		P25 Resin impregnated paper 25 µm									
Seals		Filtration rating									
V FPM		Axx	Mxx	Pxx							
Z FPM compatible with fluids HFA-HFB-HFC											
Element Δp		Execution			Filter length						
N 20 bar		P01 MP Filtri standard			4   5   6						
		Pxx Customized									

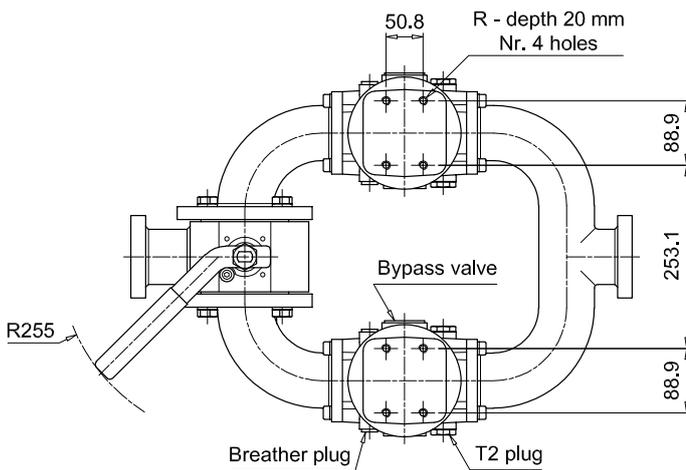
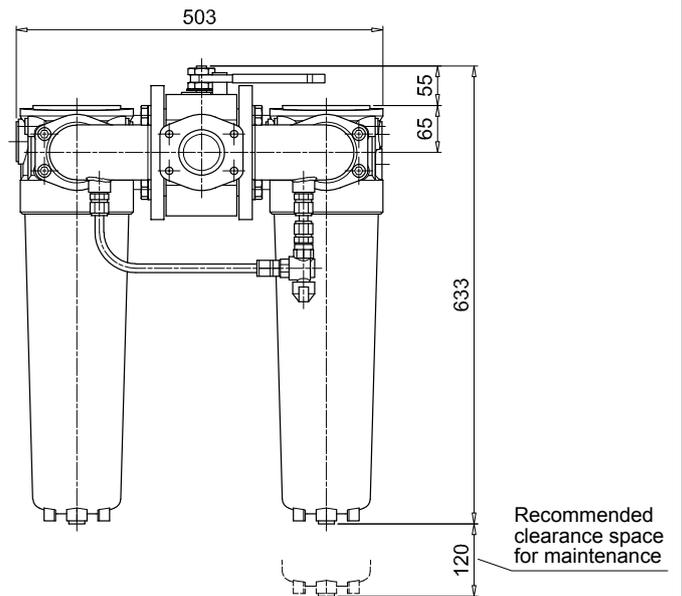
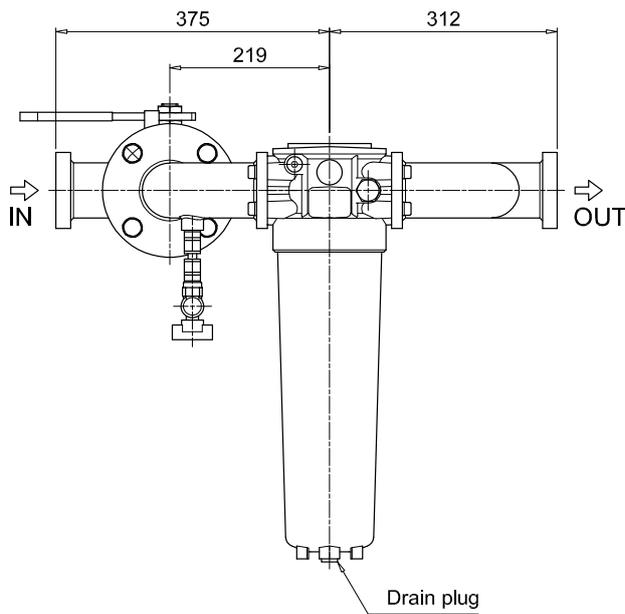
### ACCESSORIES

Differential indicators		page			page
DEA	Electrical differential indicator	419	DTA	Electronic differential indicator	422
DEM	Electrical differential indicator	419-420	DVA	Visual differential indicator	422
DLA	Electrical / visual differential indicator	420-421	DVM	Visual differential indicator	422
DLE	Electrical / visual differential indicator	421			
Additional features		page			
T2	Plug	423			

# LMD400-401

## Dimensions

LMD400	
Length 4	
Connections	R
<b>F1</b>	M12
<b>F2</b>	1/2" UNC
<b>F3</b>	M12
<b>F4</b>	1/2" UNC



T2 plug =  
connection for differential indicator

# LMD400-401

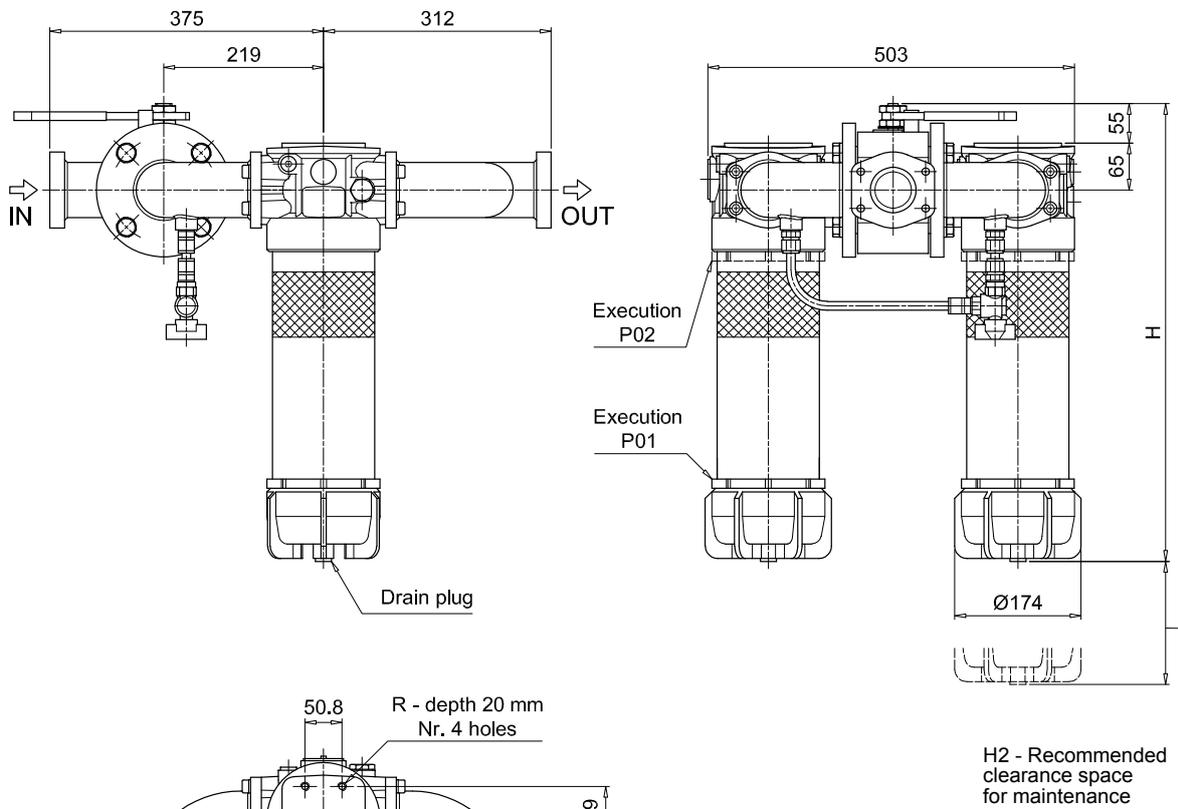
## Dimensions

### LMD400

#### Length 5 - 6

Filter length	H [mm]	H2 [mm]	
		Execution P01	Execution P02
5	883	120	660
6	1213	120	690

Connections	R
F1	M12
F2	1/2" UNC
F3	M12
F4	1/2" UNC

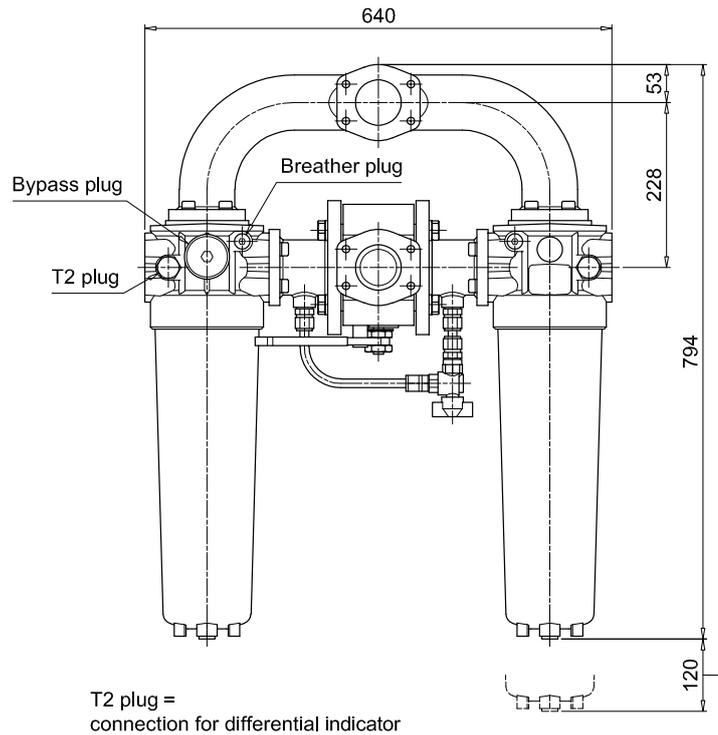
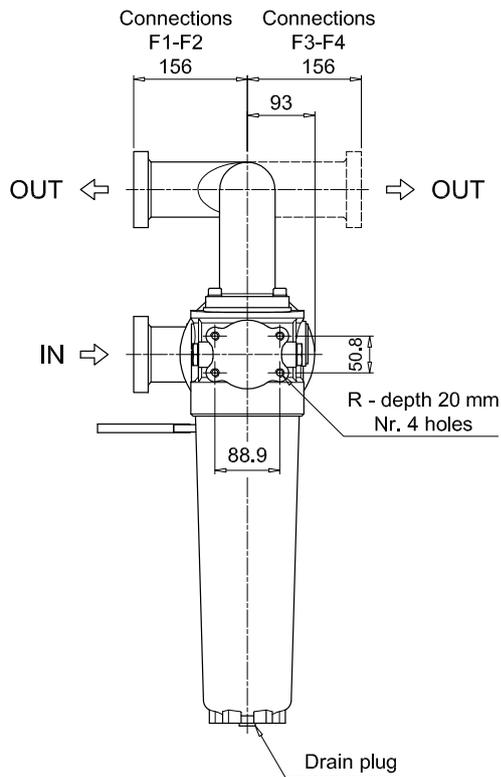


T2 plug =  
connection for differential indicator

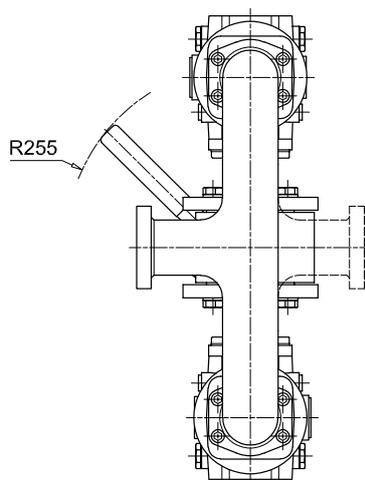
# LMD400-401

## Dimensions

LMD401	
Length 4	
Connections	R
<b>F1</b>	M12
<b>F2</b>	1/2" UNC
<b>F3</b>	M12
<b>F4</b>	1/2" UNC



Recommended  
clearance space  
for maintenance



# LMD400-401

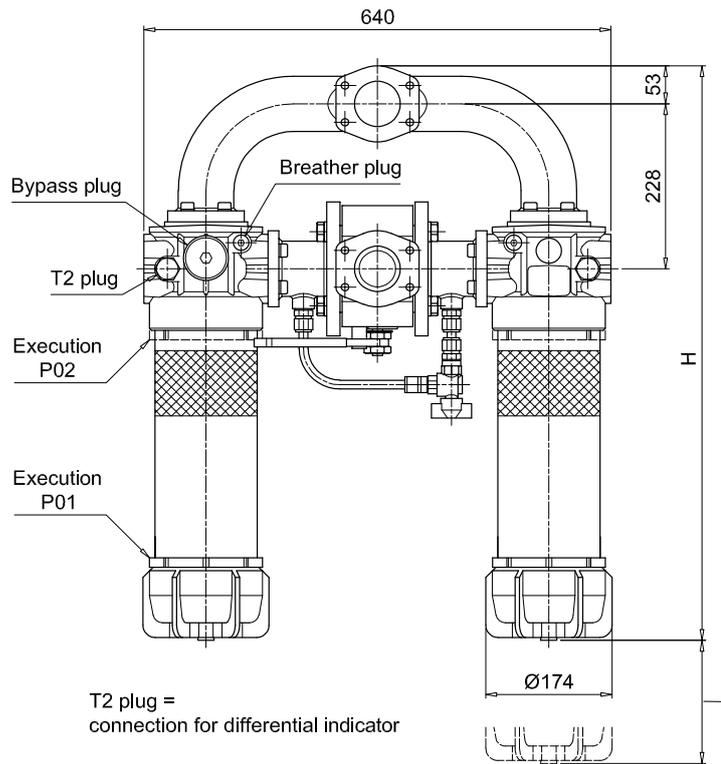
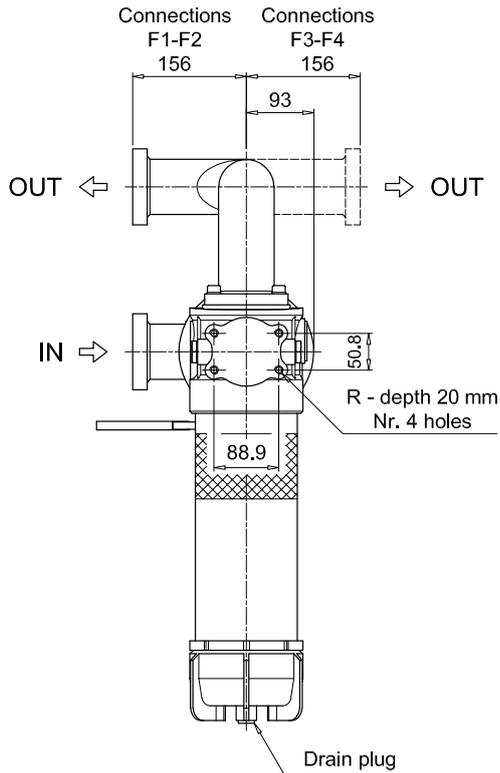
## Dimensions

LMD401

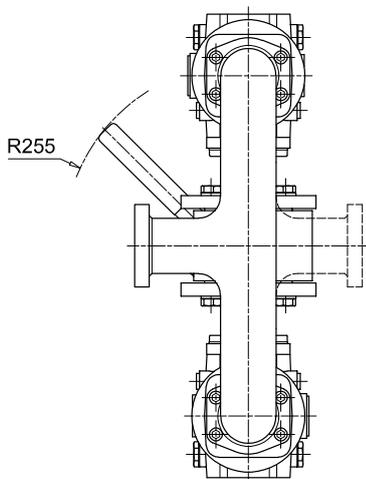
Length 5 - 6

Filter length	H [mm]	H2 [mm]	
		Execution P01	Execution P02
5	1044	120	660
6	1374	120	690

Connections	R
F1	M12
F2	1/2" UNC
F3	M12
F4	1/2" UNC



H2 - Recommended clearance space for maintenance





# LMD431

## Designation & Ordering code

### COMPLETE FILTER

<b>Series and size</b> <b>LMD431</b>	Configuration example: <b>LMD431</b>   <b>5</b>   <b>B</b>   <b>V</b>   <b>F1</b>   <b>A10</b>   <b>N</b>   <b>P01</b>									
<b>Length</b> <b>5</b>   <b>6</b>										
<b>Bypass valve</b> <b>S</b> Without bypass   <b>B</b> 3.5 bar										
<b>Seals and treatments</b>	Filtration rating									
<b>V</b> FPM	<b>Axx</b>	<b>Mxx</b>	<b>Pxx</b>							
<b>Z</b> FPM compatible with fluids HFA-HFB-HFC	•	•	•							
<b>Connections</b>										
<b>F1</b> 2 1/2" SAE 3000 psi/M										
<b>F2</b> 2 1/2" SAE 3000 psi/UNC										
<b>F3</b> 2 1/2" SAE 3000 psi/M, In-line connections										
<b>F4</b> 2 1/2" SAE 3000 psi/UNC, In-line connections										
<b>Filtration rating (filter media)</b>										
<b>A03</b> Inorganic microfiber 3 µm	<b>M25</b> Wire mesh 25 µm									
<b>A06</b> Inorganic microfiber 6 µm	<b>M60</b> Wire mesh 60 µm									
<b>A10</b> Inorganic microfiber 10 µm	<b>M90</b> Wire mesh 90 µm									
<b>A16</b> Inorganic microfiber 16 µm	<b>P10</b> Resin impregnated paper 10 µm									
<b>A25</b> Inorganic microfiber 25 µm	<b>P25</b> Resin impregnated paper 25 µm									
			<b>Element Δp</b>		<b>Execution</b>					
			<b>N</b> 20 bar		<b>P01</b> MP Filtri standard					
					<b>P02</b> With internal reduced flow rate tube					
					<b>Pxx</b> Customized					

### FILTER ELEMENT

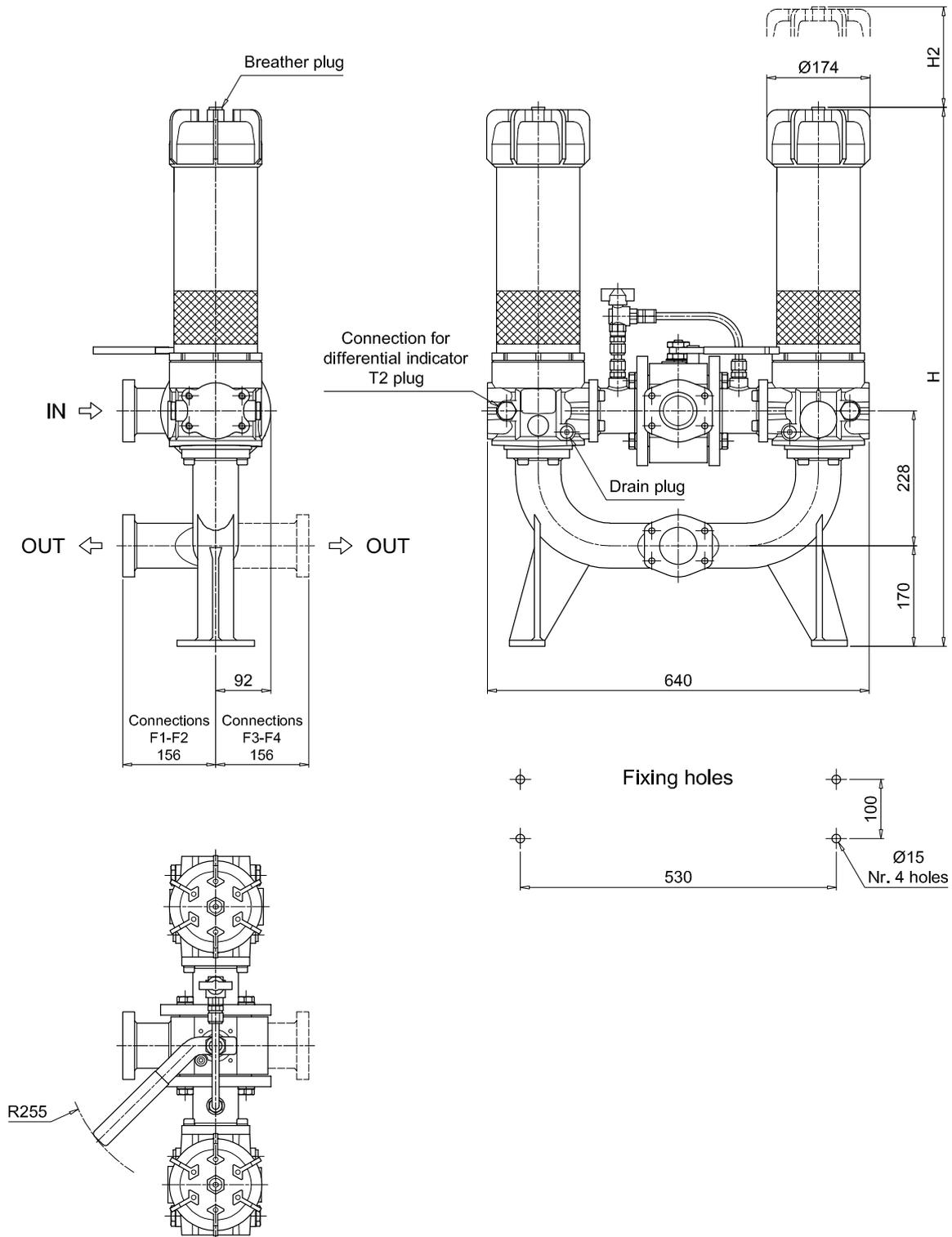
<b>Element series and size</b> <b>CU400</b>	Configuration example: <b>CU400</b>   <b>5</b>   <b>A10</b>   <b>V</b>   <b>N</b>   <b>P01</b>						
<b>Element length</b> <b>5</b>   <b>6</b>							
<b>Filtration rating (filter media)</b>							
<b>A03</b> Inorganic microfiber 3 µm	<b>M25</b> Wire mesh 25 µm						
<b>A06</b> Inorganic microfiber 6 µm	<b>M60</b> Wire mesh 60 µm						
<b>A10</b> Inorganic microfiber 10 µm	<b>M90</b> Wire mesh 90 µm						
<b>A16</b> Inorganic microfiber 16 µm	<b>P10</b> Resin impregnated paper 10 µm						
<b>A25</b> Inorganic microfiber 25 µm	<b>P25</b> Resin impregnated paper 25 µm						
<b>Seals</b>		Filtration rating					
<b>V</b> FPM	<b>Axx</b>	<b>Mxx</b>	<b>Pxx</b>				
<b>Z</b> FPM compatible with fluids HFA-HFB-HFC	•	•	•				
		<b>Element Δp</b>		<b>Execution</b>			
		<b>N</b> 20 bar		<b>P01</b> MP Filtri standard			
				<b>Pxx</b> Customized			

### ACCESSORIES

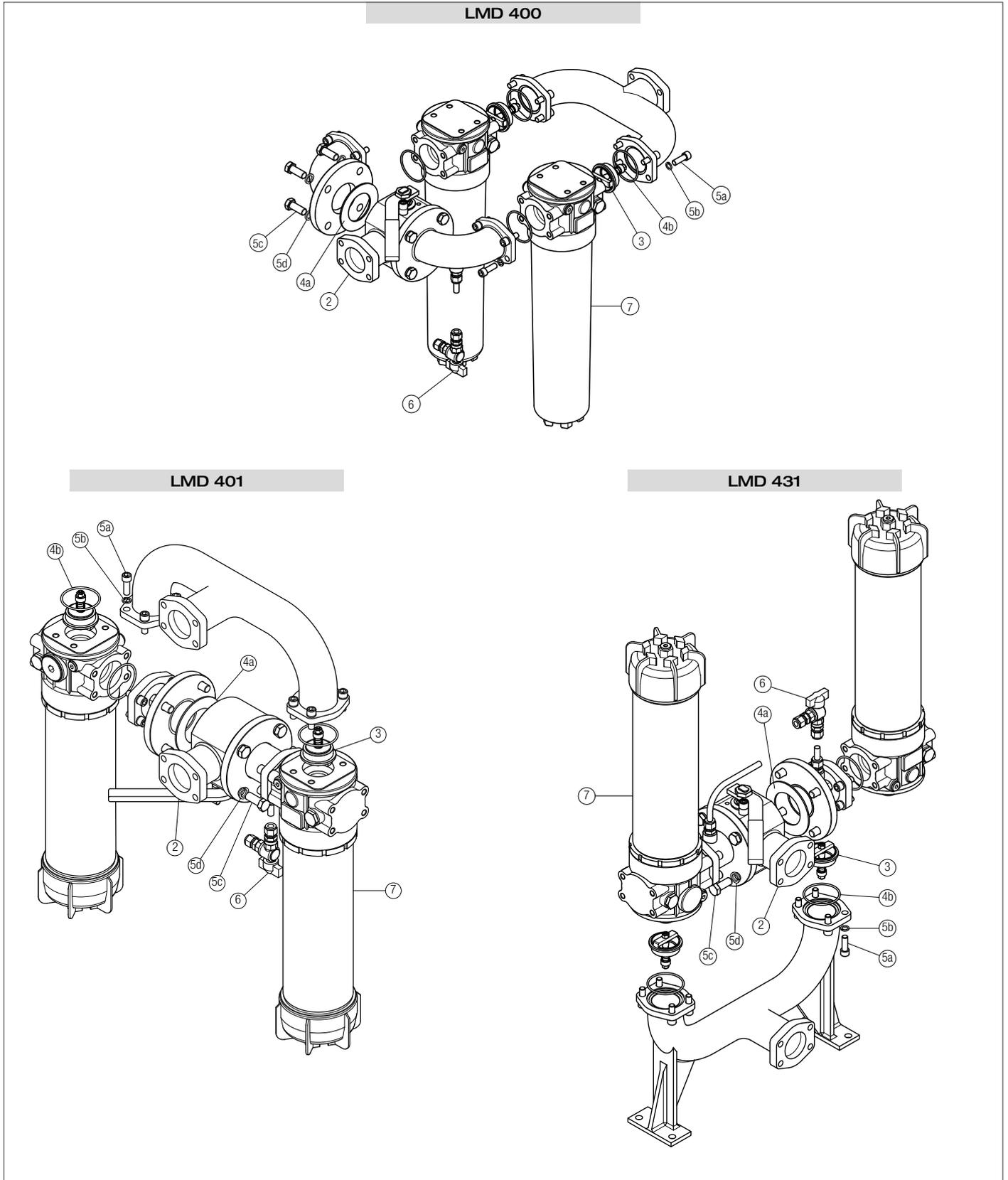
<b>Differential indicators</b>		page			page
<b>DEA</b> Electrical differential indicator		419	<b>DTA</b> Electronic differential indicator		422
<b>DEM</b> Electrical differential indicator		419-420	<b>DVA</b> Visual differential indicator		422
<b>DLA</b> Electrical / visual differential indicator		420-421	<b>DVM</b> Visual differential indicator		422
<b>DLE</b> Electrical / visual differential indicator		421			
<b>Additional features</b>		page			
<b>T2</b> Plug		423			

### LMD431

Filter length	H [mm]	H2 [mm]
5	1161	660
6	1491	690



Order number for spare parts



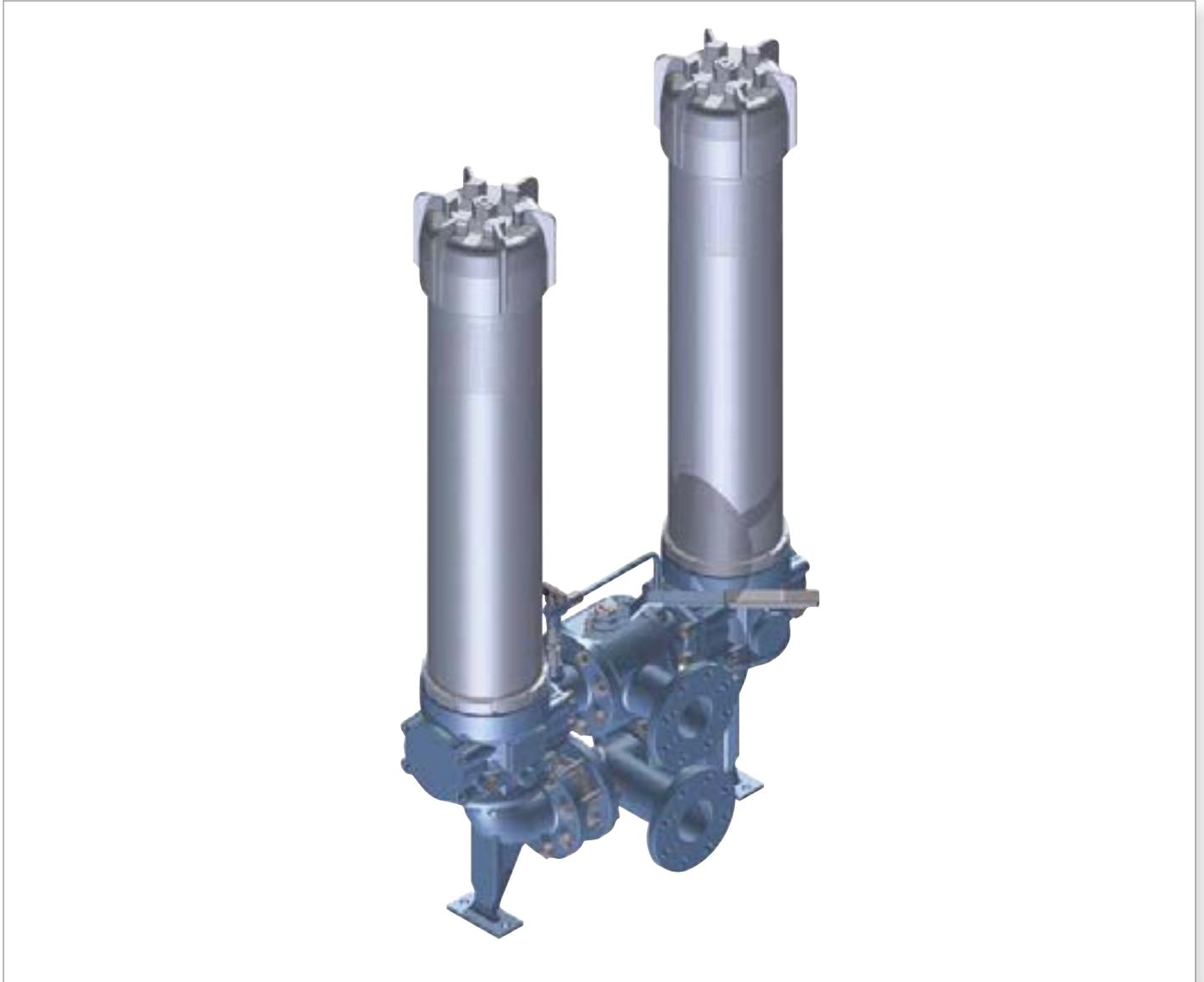
Item:	Q.ty: 1 pc. <b>2</b>		Q.ty: 2 pcs. <b>3</b>	Q.ty: 1 pc. <b>4</b> (4a ÷ 4b)	Q.ty: 1 pc. <b>5</b> (5a ÷ 5d)	Q.ty: 1 pc. <b>6</b>	Q.ty: 2 pcs. <b>7</b>
Filter series	<b>3-way ball valve PN 16</b> 2 1/2" SAE 3000 psi/M 2 1/2" SAE 3000 psi/UNC		<b>One-way valve</b>	<b>Seal Kit</b>	<b>Threaded fasteners kit</b>	<b>Kit ball valve with hose fitting</b>	<b>Filter</b> See order table
<b>LMD 400 - 401 - 431</b>	02001440	02001441	02001429	02050399	02049062	02025043	LMP400xF2.....





# LMD 951 series

Maximum pressure up to 16 bar - Flow rate up to 1200 l/min



# LMD951 GENERAL INFORMATION

## Technical data

**Low & Medium Pressure filters** Maximum pressure up to 16 - 25 bar - Flow rate up to 1200 l/min

### Filter housing materials

- Head: Anodized Aluminium
- Housing: Anodized Aluminium
- Manifolds: Welded - Painted black
- Bypass valve: Steel
- 3-way ball valve: Steel body - Stainless Steel ball
- Check valve: Cast Iron body - AISI 304 leaf

### Pressure

- SAE + DIN Flange
- Working pressure: 1.6 MPa (16 bar)
- Test pressure: 2.5 MPa (25 bar)

### Bypass valve

- Opening pressure 3.5 bar  $\pm$ 10%
- Other opening pressures on request.

### Number of filter elements

LMD 951: 2 filter elements CU950-3

### $\Delta p$ element type

- Microfibre filter elements - series N: 20 bar
- Fluid flow through the filter element from OUT to IN.

### Seals

FPM series V

### Temperature

From -25° C to +110° C

### Connections

- LMD 951: In-line Inlet/Outlet
- Same side

### Note

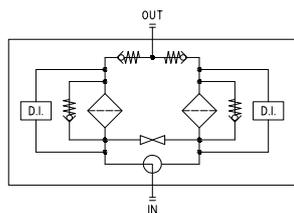
LMD 951 filters are provided for vertical mounting

## Weights [kg] and volumes [dm<sup>3</sup>]

	Weights [kg]		Volumes [dm <sup>3</sup> ]	
	DN 80	DN 100	DN 80	DN 100
<b>LMD 951</b>	102	130	62	66

## Hydraulic symbols

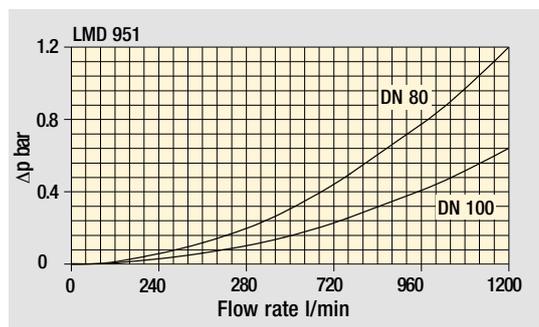
LMD 400-401-431-951



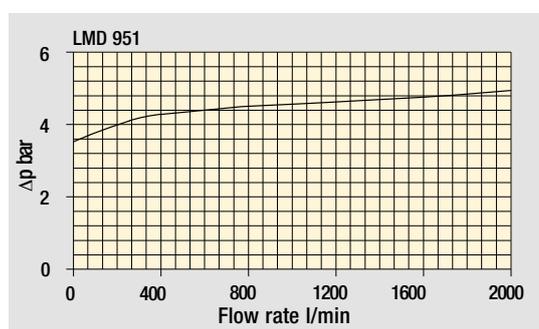
The curves are plotted using mineral oil with density of 0.86 kg/dm<sup>3</sup> in compliance with ISO 3968.

$\Delta p$  varies proportionally with density.

Pressure drop



Filter housings  $\Delta p$  pressure drop



Bypass valve pressure drop

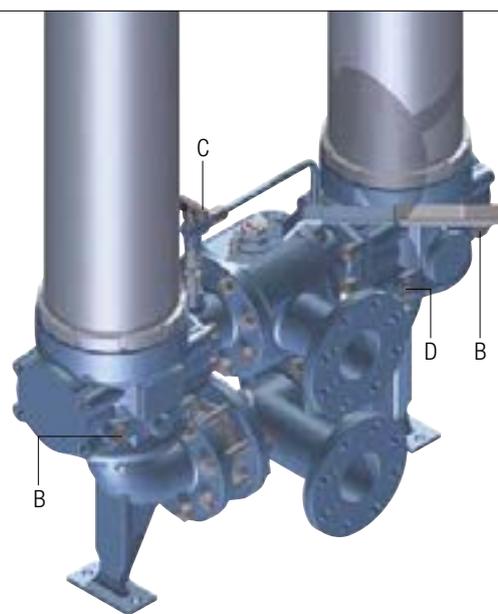
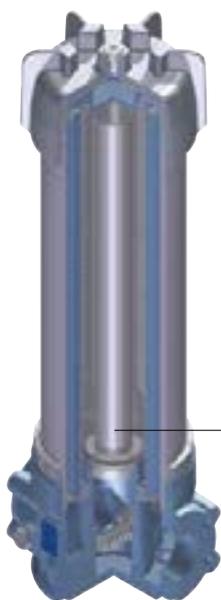
## Focus on

### P2 EXECUTION

Execution P02  
"Internal tube for reduced flow rate"  
is recommended for flow rates  
lower than 150 l/min.

The use of option P02  
makes it easier to fill the housing  
with the operating fluid.

"Internal tube for reduced flow rates"



LMD 951  
Fit one differential indicator  
for individual filter assembly.

- A** Breather plug G1/2" - A/F 10
- B** Indicator port Plug T2 - A/F 30
- C** Compensation valve
- D** Oil drain plug G1/2" - A/F 10

# LMD951

## Designation & Ordering code

### COMPLETE FILTER

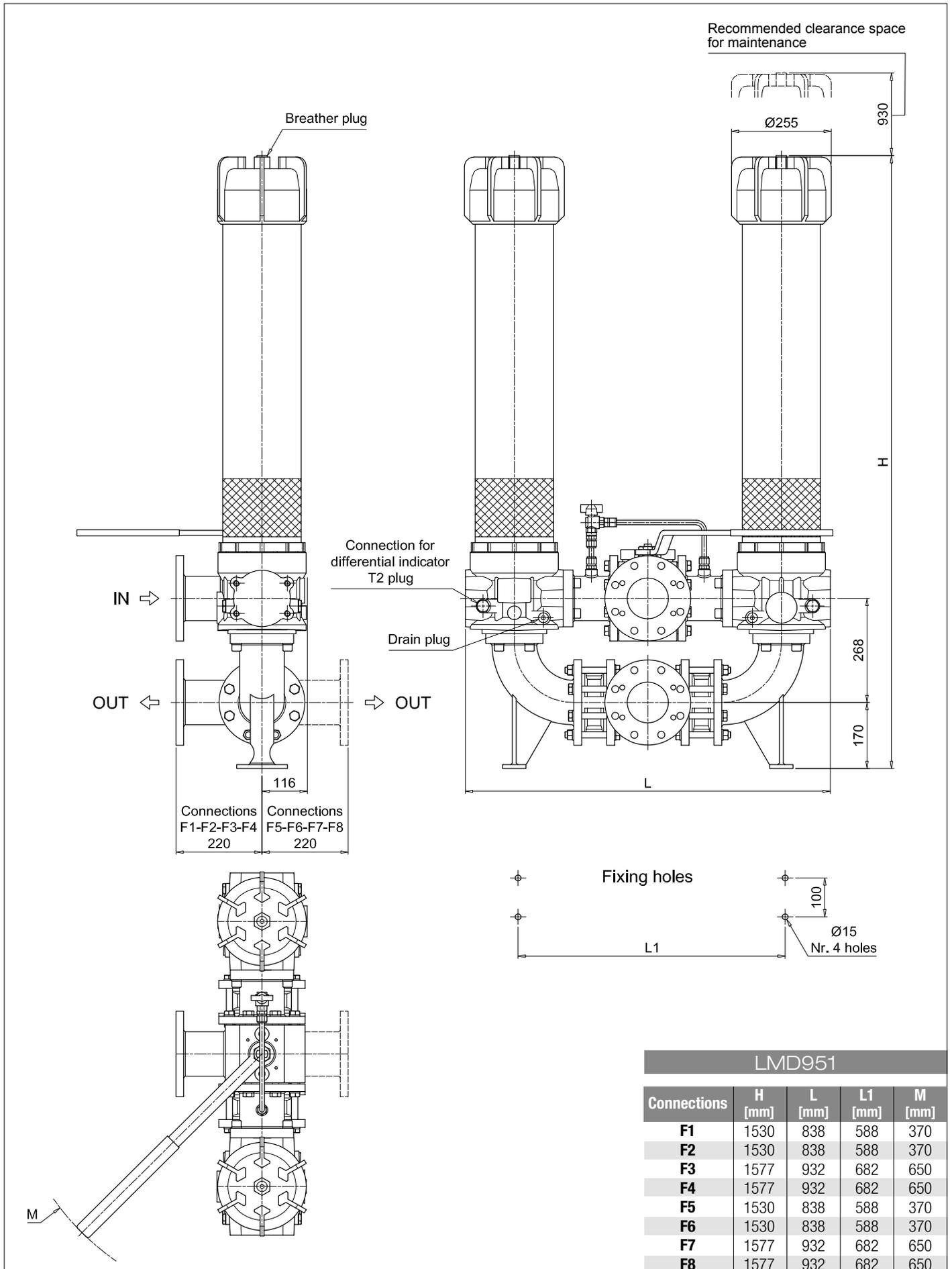
<b>Series and size</b> <b>LMD951</b>	Configuration example: <b>LMD951</b> <b>3</b> <b>B</b> <b>V</b> <b>F1</b> <b>A10</b> <b>N</b> <b>P01</b>							
<b>Length</b> <b>3</b>								
<b>Bypass valve</b> <b>S</b> Without bypass <b>B</b> 3.5 bar								
<b>Seals and treatments</b> <b>V</b> FPM								
<b>Connections</b> <b>F1</b> 3" SAE 3000 psi/M <b>F2</b> 3" SAE 3000 psi/UNC <b>F3</b> 4" SAE 3000 psi/M <b>F4</b> 4" SAE 3000 psi/UNC <b>F5</b> 3" SAE 3000 psi/M, In-line connections <b>F6</b> 3" SAE 3000 psi/UNC, In-line connections <b>F7</b> 4" SAE 3000 psi/M, In-line connections <b>F8</b> 4" SAE 3000 psi/UNC, In-line connections								
<b>Filtration rating (filter media)</b> <b>A03</b> Inorganic microfiber 3 µm <b>M25</b> Wire mesh 25 µm <b>A06</b> Inorganic microfiber 6 µm <b>M60</b> Wire mesh 60 µm <b>A10</b> Inorganic microfiber 10 µm <b>M90</b> Wire mesh 90 µm <b>A16</b> Inorganic microfiber 16 µm <b>P10</b> Resin impregnated paper 10 µm <b>A25</b> Inorganic microfiber 25 µm <b>P25</b> Resin impregnated paper 25 µm								
						<b>Element Δp</b> <b>N</b> 20 bar	<b>Execution</b> <b>P01</b> MP Filtri standard <b>P02</b> With internal reduced flow rate tube <b>Pxx</b> Customized	

### FILTER ELEMENT

<b>Element series and size</b> <b>CU950</b>	Configuration example: <b>CU950</b> <b>3</b> <b>A10</b> <b>V</b> <b>N</b> <b>P01</b>					
<b>Element length</b> <b>3</b>						
<b>Filtration rating (filter media)</b> <b>A03</b> Inorganic microfiber 3 µm <b>M25</b> Wire mesh 25 µm <b>A06</b> Inorganic microfiber 6 µm <b>M60</b> Wire mesh 60 µm <b>A10</b> Inorganic microfiber 10 µm <b>M90</b> Wire mesh 90 µm <b>A16</b> Inorganic microfiber 16 µm <b>P10</b> Resin impregnated paper 10 µm <b>A25</b> Inorganic microfiber 25 µm <b>P25</b> Resin impregnated paper 25 µm						
<b>Seals</b> <b>V</b> FPM						
					<b>Element Δp</b> <b>N</b> 20 bar	<b>Execution</b> <b>P01</b> MP Filtri standard <b>Pxx</b> Customized

### ACCESSORIES

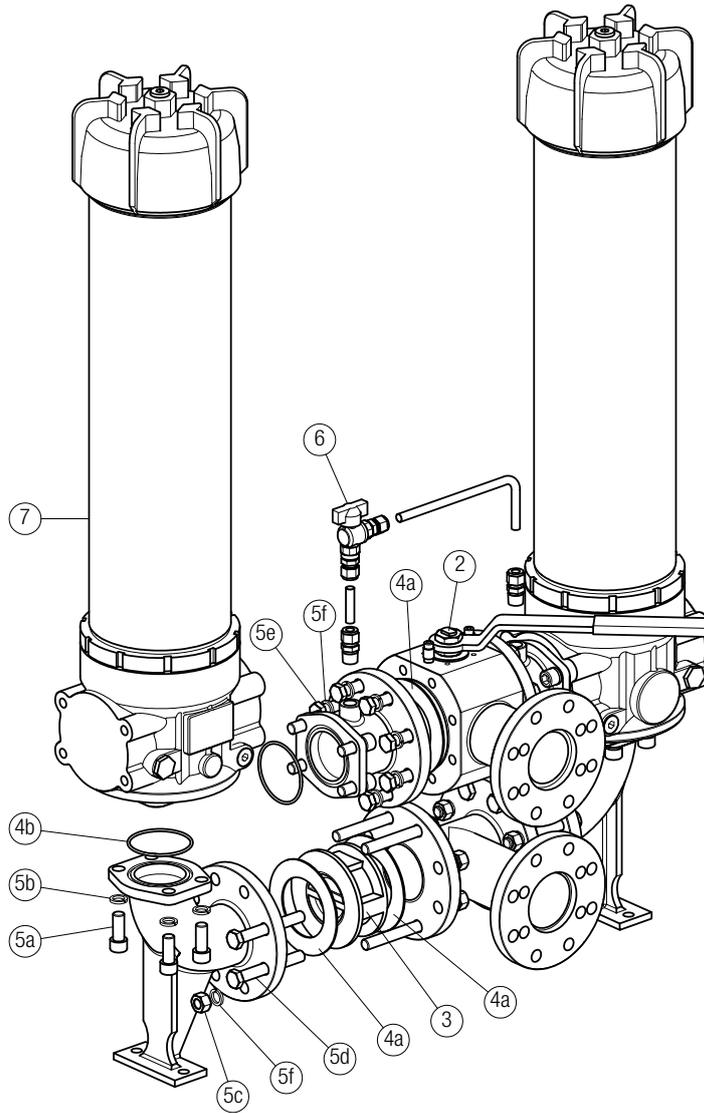
<b>Differential indicators</b>	page		page
<b>DEA</b> Electrical differential indicator	419	<b>DTA</b> Electronic differential indicator	422
<b>DEM</b> Electrical differential indicator	419-420	<b>DVA</b> Visual differential indicator	422
<b>DLA</b> Electrical / visual differential indicator	420-421	<b>DVM</b> Visual differential indicator	422
<b>DLE</b> Electrical / visual differential indicator	421		
<b>Additional features</b>	page		
<b>T2</b> Plug	423		



# LMD951 SPARE PARTS

Order number for spare parts

## LMD 951



Item 7:  
for complete filter code and  
spare parts, see  
LMP 950 - 951 series chapter

Quantity:  
- filter spare parts: 2 pcs.  
- filter seal kit: 2 pcs.

Item:	Q.ty: 1 pc. <b>2</b>		Q.ty: 2 pcs. <b>3</b>	Q.ty: 1 pc. <b>4</b>	Q.ty: 1 pc. <b>5</b> (5a ÷ 5f)	Q.ty: 1 pc. <b>6</b>	Q.ty: 2 pcs. <b>7</b>
Filter series LMD 951	3-way ball valve PN 16		One-way valve	Seal Kit	Threaded fasteners kit	G 1/2" Ball Valve Kit with straight fittings	Filter
<b>F1 - F2 - F5 - F6 / D1 - D3 (3" SAE / DIN PN16 DN 80)</b>	3" SAE 3000 psi/M 02001135	3" SAE 3000 psi/UNC 02001438	02001418	02050388	02049056	02025043	LMP9513xVF1xxxNP01
<b>F3 - F4 - F7 - F8 / D2 - D4 (4" SAE / DIN PN16 DN 100)</b>	4" SAE 3000 psi/M 02001162	4" SAE 3000 psi/UNC 02001439	02001419	02050389	02049057		LMP9513xVF3xxxNP01





# LDP & LDD series

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Maximum pressure up to 60 bar - Flow rate up to 330 l/min

# DIN 24550

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Filter element according to DIN 24550

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# LDP & LDD GENERAL INFORMATION

## Filter element according to DIN 24550

### Technical data

**Low & Medium Pressure filters** Maximum pressure up to 60 bar - Flow rate up to 330 l/min

#### Filter housing materials

- Head: Aluminium
- Bowl: Cathaphoretic Painted Steel
- Bypass valve: AISI 304 - Nylon

#### Pressure

- Working pressure: 6 MPa (60 bar)
- Test pressure: 9 MPa (90 bar)
- Burst pressure: 21 MPa (210 bar)
- Pulse pressure fatigue test: 1 000 000 cycles with pressure from 0 to 6 MPa (60 bar)

#### Bypass valve

- Opening pressure 3.5 bar  $\pm$ 10%
- Other opening pressures on request.

#### $\Delta p$ element type

- Microfibre filter elements - series N: 20 bar
- Fluid flow through the filter element from OUT to IN.

#### Seals

- Standard NBR series A
- Optional FPM series V

#### Temperature

From -25° C to +110° C

#### Connections

Inlet/Outlet In-Line

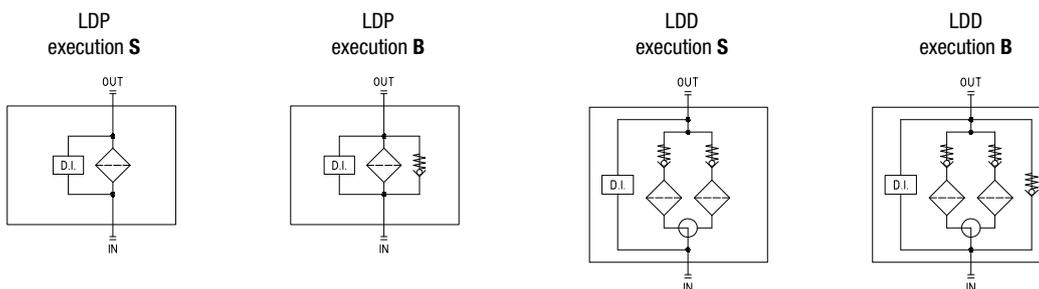
#### Note

LDP - LDD filters are provided for vertical mounting

### Weights [kg] and volumes [dm<sup>3</sup>]

	Weights [kg]		Volumes [dm <sup>3</sup> ]	
	Length	1	Length	1
<b>LDP - LDD 016</b>		9.3		3.6
<b>LDP - LDD 025</b>		9.5		4.1
<b>LDP - LDD 040</b>		11.3		4.8

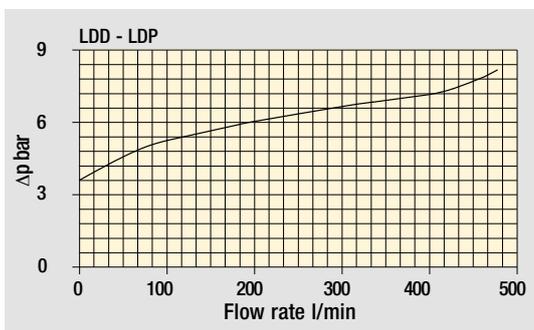
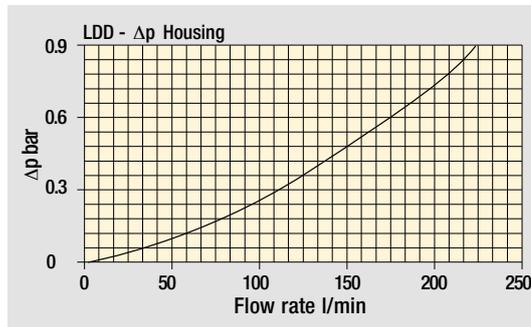
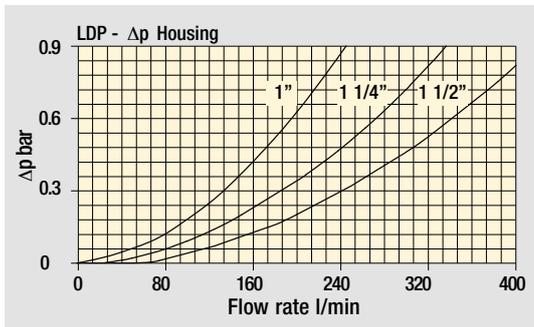
### Hydraulic symbols



The curves are plotted using mineral oil with density of 0.86 kg/dm<sup>3</sup> in compliance with ISO 3968.  
 $\Delta p$  varies proportionally with density.

Pressure drop

Filter housings  $\Delta p$  pressure drop



Bypass valve pressure drop

# LDP Filter element according to DIN 24550

## Designation & Ordering code

### COMPLETE FILTER

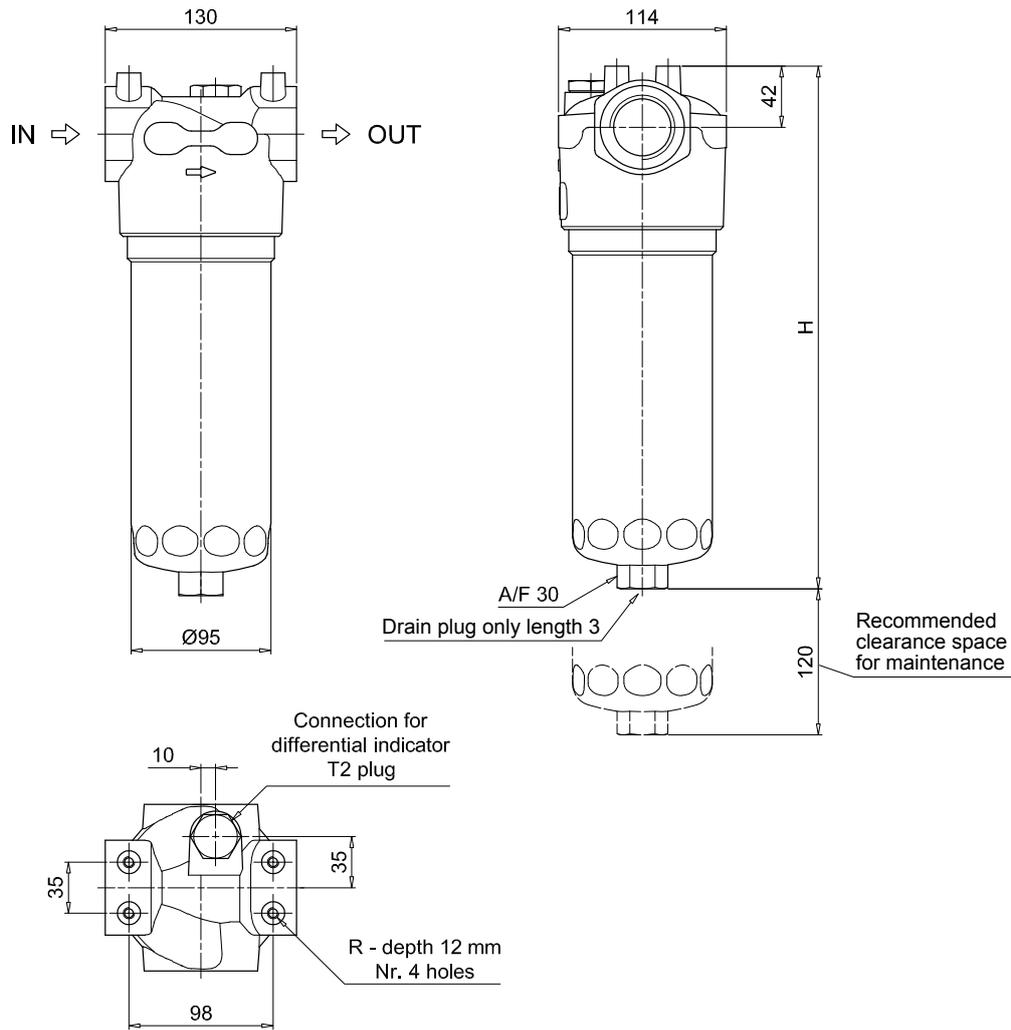
<b>Series and size</b>	Configuration example: <b>LDP</b> <b>025</b> <b>B</b> <b>A</b> <b>D</b> <b>6</b> <b>A10</b> <b>N</b> <b>P01</b>										
<b>LDP</b>											
<b>Size</b>											
<b>016</b>	Element according to DIN 24550 - T3 DN160										
<b>025</b>	Element according to DIN 24550 - T3 DN250										
<b>040</b>	Element according to DIN 24550 - T3 DN400										
<b>Bypass valve</b>											
<b>S</b>	Without bypass					<b>B</b>	3.5 bar				
<b>Seals and treatments</b>				Filtration rating							
<b>A</b>	NBR			<b>Axx</b>	<b>Mxx</b>	<b>Pxx</b>					
<b>V</b>	FPM			•	•	•					
<b>W</b>	NBR compatible with fluids HFA-HFB-HFC			•	•						
<b>Connections</b>											
<b>A</b>	G1"					<b>F</b>	1 1/2" NPT				
<b>B</b>	G1 1/4"					<b>G</b>	SAE 16 - 1 5/16" - 12 UN				
<b>C</b>	G1 1/2"					<b>H</b>	SAE 20 - 1 5/8" - 12 UN				
<b>D</b>	1" NPT					<b>I</b>	SAE 24 - 1 7/8" - 12 UN				
<b>E</b>	1 1/4" NPT										
<b>Connection for differential indicator</b>											
<b>6</b>	With plugged connection										
<b>Filtration rating (filter media)</b>											
<b>A03</b>	Inorganic microfiber 3 µm					<b>M25</b>	Wire mesh 25 µm				
<b>A06</b>	Inorganic microfiber 6 µm					<b>M60</b>	Wire mesh 60 µm				
<b>A10</b>	Inorganic microfiber 10 µm					<b>M90</b>	Wire mesh 90 µm				
<b>A16</b>	Inorganic microfiber 16 µm					<b>P10</b>	Resin impregnated paper 10 µm				
<b>A25</b>	Inorganic microfiber 25 µm					<b>P25</b>	Resin impregnated paper 25 µm				
<b>Element Δp</b>	<b>N</b>					20 bar					
<b>Execution</b>	<b>P01</b>					MP Filtri standard					
<b>Pxx</b>	Customized										

### FILTER ELEMENT

<b>Element series and size</b>	Configuration example: <b>DN</b> <b>025</b> <b>A10</b> <b>A</b> <b>N</b> <b>P01</b>								
<b>DN</b>									
<b>Element size</b>									
<b>016</b>	Element according to DIN 24550 - T3 DN160								
<b>025</b>	Element according to DIN 24550 - T3 DN250								
<b>040</b>	Element according to DIN 24550 - T3 DN400								
<b>Filtration rating (filter media)</b>									
<b>A03</b>	Inorganic microfiber 3 µm				<b>M25</b>	Wire mesh 25 µm			
<b>A06</b>	Inorganic microfiber 6 µm				<b>M60</b>	Wire mesh 60 µm			
<b>A10</b>	Inorganic microfiber 10 µm				<b>M90</b>	Wire mesh 90 µm			
<b>A16</b>	Inorganic microfiber 16 µm				<b>P10</b>	Resin impregnated paper 10 µm			
<b>A25</b>	Inorganic microfiber 25 µm				<b>P25</b>	Resin impregnated paper 25 µm			
<b>Seals</b>				Filtration rating					
<b>A</b>	NBR			<b>Axx</b>	<b>Mxx</b>	<b>Pxx</b>			
<b>V</b>	FPM			•	•	•			
<b>W</b>	NBR compatible with fluids HFA-HFB-HFC			•	•				
<b>Element Δp</b>	<b>N</b>				20 bar				
<b>Execution</b>	<b>P01</b>				MP Filtri standard				
<b>Pxx</b>	Customized								

### ACCESSORIES

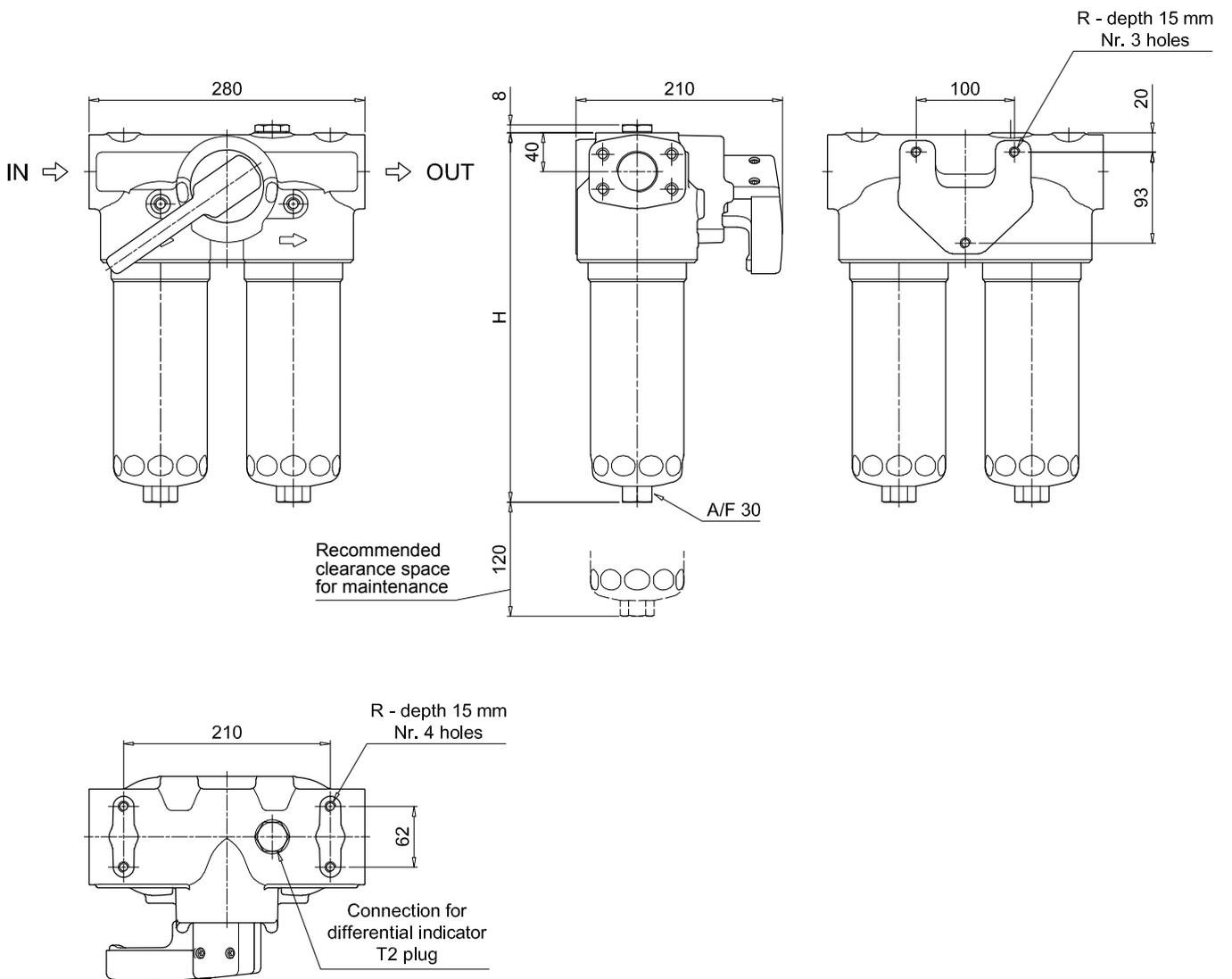
<b>Differential indicators</b>	page		page
<b>DEA</b>	Electrical differential indicator	419	<b>DTA</b> Electronic differential indicator 422
<b>DEM</b>	Electrical differential indicator	419-420	<b>DVA</b> Visual differential indicator 422
<b>DLA</b>	Electrical / visual differential indicator	420-421	<b>DVM</b> Visual differential indicator 422
<b>DLE</b>	Electrical / visual differential indicator	421	
<b>Additional features</b>	page		
<b>T2</b>	Plug	423	



LDP	
Filter size	H [mm]
<b>016</b>	268
<b>025</b>	358
<b>040</b>	508
Connections	R
<b>A-B-C</b>	M8
<b>D-E-F-G-H-I</b>	5/16" UNC



LDD	
Filter size	H [mm]
<b>016</b>	290
<b>025</b>	380
<b>040</b>	530
Connections	R
<b>C</b>	M10
<b>F - I</b>	3/8" UNC
<b>L</b>	M10
<b>M - N</b>	3/8" UNC



# LDP & LDD SPARE PARTS

Filter element according to DIN 24550

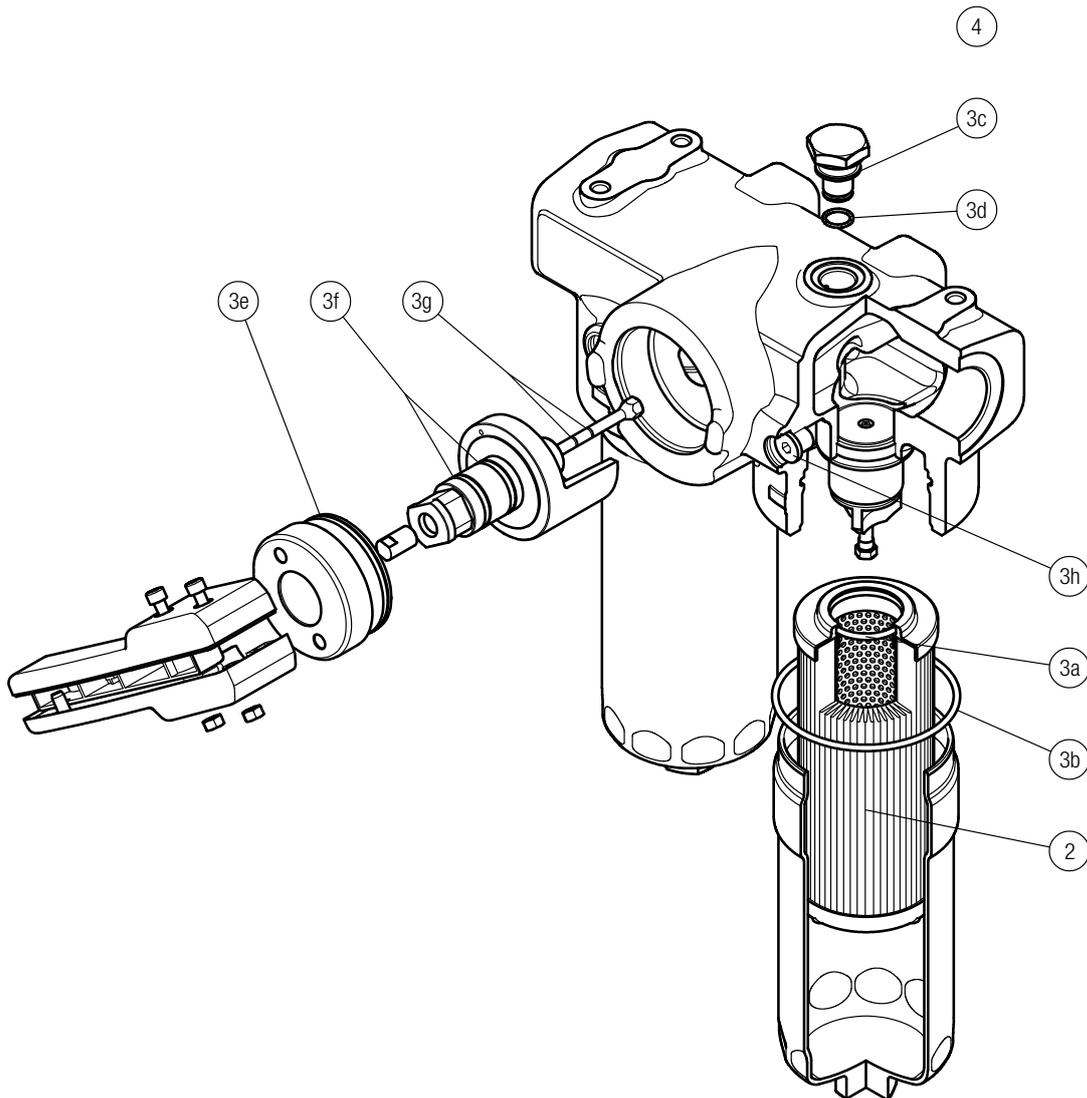
Order number for spare parts

LDP

	Q.ty: 1 pc.	Q.ty: 1 pc.	Q.ty: 1 pc.		
Item:	<b>2</b>	<b>3</b> (3a ÷ 3d)	<b>4</b>		
Filter series	Filter element	Seal Kit code number NBR	FPM	Indicator connection plug NBR	FPM
<b>LDP</b>	See order table	02050435	02050436	T2H	T2V

Order number for spare parts

LDD



Item:	Q.ty: 1 pc. <b>2</b>	Q.ty: 1 pc. <b>3</b> (3a ÷ 3h)		Q.ty: 2 pc. <b>4</b>	
Filter series	Filter element	Seal Kit code number NBR FPM		Indicator connection plug NBR FPM	
<b>LDD</b>	See order table	02050671	02050672	T2H	T2V

# Clogging indicators

## Differential indicators

### Introduction

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

These devices trip when the clogging of the filter element causes an increase in pressure drop across the filter element.

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

MP Filtri can supply differential pressure indicators with a visual, electrical or both signals.

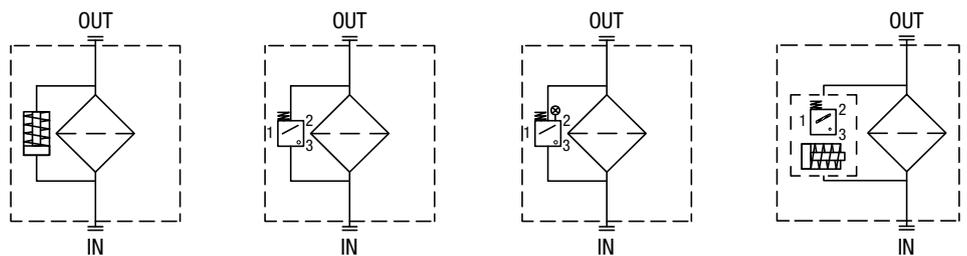
### Suitable indicator types

#### DIFFERENTIAL INDICATORS

Differential 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.



### Quick reference guide

Filter series	Visual indicator	Electrical indicator	Electrical / Visual indicator	Electronic indicator	
With bypass valve	LMP 110 - 112 - 116 - 118 - 119 LMP 120 - 122 - 123 LMP 210 - 211 - LDP LMP 400 - 401 - 430 - 431 LMP 902 - 903 - 952 - 953 - 954 LMD 211 - 400 - 401 - 431 - 951 - LDD	DVA20xP01 DVM20xP01	DEA20xA50P01 DEM20xAxxP01	DLA20xA51P01 DLA20xA52P01 DLA20xA71P01 DLE20xA50P01 DLE20xF50P01	DTA20xF70P01
Without bypass valve	LMP 110 - 112 - 116 - 118 - 119 LMP 120 - 122 - 123 LMP 210 - 211 - LDP LMP 400 - 401 - 430 - 431 LMP 902 - 903 - 952 - 953 - 954 LMD 211 - 400 - 401 - 431 - 951 - LDD	DVA50xP01 DVM50xP01	DEA50xA50P01 DEM50xAxxP01	DLA50xA51P01 DLA50xA52P01 DLA50xA71P01 DLE50xA50P01 DLE50xF50P01	DTA50xF70P01

DEA*50	
<b>Electrical Differential Indicator</b>	
Settings	Ordering code
2 bar $\pm 10\%$	DE A 20 x A 50 P01
5 bar $\pm 10\%$	DE A 50 x A 50 P01

**Hydraulic symbol**

**Electrical symbol**

**Materials**

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

**Technical data**

- Max working pressure: 420 bar
- Proof pressure: 630 bar
- Burst pressure: 1260 bar
- Working temperature: From -25 °C to +110 °C
- Compatibility with fluids: Mineral oil, 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

DEM*10	
<b>Electrical Differential Indicator</b>	
Settings	Ordering code
2 bar $\pm 10\%$	DE M 20 x x 10 P01
5 bar $\pm 10\%$	DE M 50 x x 10 P01

**Hydraulic symbol**

**Electrical symbol**

**Materials**

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

**Technical data**

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

**Electrical data**

- Electrical connection: AMP Superseal series 1.5
- Resistive load: 0.2 A / 115 Vdc
- Switching type: Normally open contacts (NC on request)
- Thermal lockout: Normally open up to 30 °C (option "F")

DEM*20	
<b>Electrical Differential Indicator</b>	
Settings	Ordering code
2 bar $\pm 10\%$	DE M 20 x x 20 P01
5 bar $\pm 10\%$	DE M 50 x x 20 P01

**Hydraulic symbol**

**Electrical symbol**

**Materials**

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

**Technical data**

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

**Electrical data**

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



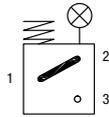
**DLA\*71**

**Electrical/Visual Differential Indicator**

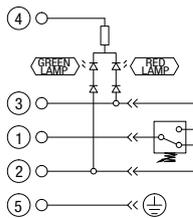
Settings	Ordering code
2 bar ±10%	DL A 20 x A 71 P01
5 bar ±10%	DL A 50 x A 71 P01

A/F 30  
Max tightening torque: 65 N·m

### Hydraulic symbol



### Electrical symbol



### Materials

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

### Technical data

- Max working pressure: 420 bar
- Proof pressure: 630 bar
- Burst pressure: 1260 bar
- Working temperature: From -25 °C to +110 °C
- Compatibility with fluids: Mineral oil, Synthetic fluids  
HFA, HFB, HFC according to ISO 2943
- Degree protection: IP65 according to EN 60529  
IP69K according to ISO 20653

### Electrical data

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

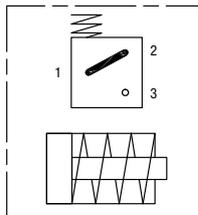
**DLE\*A50**

**Electrical/Visual Differential Indicator**

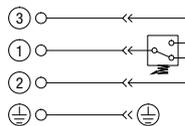
Settings	Ordering code
2 bar ±10%	DL E 20 x A 50 P01
5 bar ±10%	DL E 50 x A 50 P01

A/F 32  
Max tightening torque: 95 N·m

### Hydraulic symbol



### Electrical symbol



### Materials

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

### Technical data

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

### Electrical data

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

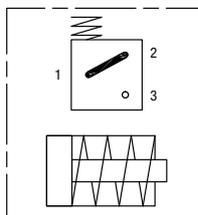
**DLE\*F50**

**Electrical/Visual Differential Indicator**

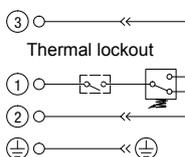
Settings	Ordering code
2 bar ±10%	DL E 20 x F 50 P01
5 bar ±10%	DL E 50 x F 50 P01

A/F 32  
Max tightening torque: 95 N·m

### Hydraulic symbol



### Electrical symbol



### Materials

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

### Technical data

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

### Electrical data

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

# DIFFERENTIAL INDICATORS

## Dimensions

DTA*70	
<b>Electronic Differential Indicator</b>	
Settings	Ordering code
2 bar $\pm 10\%$	DT A 20 x x 70 P01
5 bar $\pm 10\%$	DT A 50 x x 70 P01

47

A/F 30  
Max tightening torque: 50 N-m

**Hydraulic symbol**

**Electrical symbol**

①	○	○	+24 Vdc
②	○	○	4 $\div$ 20 mA
③	○	○	75% - N.O. Digital output
④	○	○	100% - N.O. Digital output
⑤	○	○	0 Vdc

**Materials**

- Body: Brass
- Internal parts: Brass - Nylon
- Contacts: Silver
- Seal: HNBR - FPM

**Technical data**

- Max working pressure: 420 bar
- Proof pressure: 630 bar
- Burst pressure: 1260 bar
- Compatibility with fluids: Mineral oil, Synthetic fluids HFA, HFB, 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	
<b>Visual Differential Indicator</b>	
Settings	Ordering code
2 bar $\pm 10\%$	DV A 20 x P01
5 bar $\pm 10\%$	DV A 50 x P01

39

Green / Red clogging indicator

A/F 28  
Max tightening torque: 65 N-m

**Hydraulic symbol**

**Materials**

- Body: Brass
- Internal parts: Brass - Nylon
- Contacts: Silver
- Seal: HNBR - FPM

**Technical data**

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

DVM	
<b>Visual Differential Indicator</b>	
Settings	Ordering code
2 bar $\pm 10\%$	DV M 20 x P01
5 bar $\pm 10\%$	DV M 50 x P01

34

Red clogging indicator

A/F 30  
Max tightening torque: 65 N-m

**Hydraulic symbol**

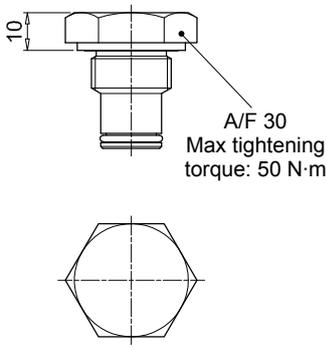
**Materials**

- Body: Brass
- Internal parts: Brass - Nylon
- Contacts: Silver
- Seal: HNBR - FPM

**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 oil, Synthetic fluids HFA, HFB, HFC according to ISO 2943
- Degree protection: IP65 according to EN 60529

T2	
Indicator plug	
Seal	Ordering code
HNBR	T2 H
FPM	T2 V



**Materials**

- Body: Phosphatized steel
- Seal: HNBR / FPM

### DESIGNATION & ORDERING CODE - DIFFERENTIAL INDICATORS

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

Type	DE	DL	DT	DV
<b>A</b> Standard type	•	•	•	<b>A</b> With automatic reset
<b>M</b> With wired electrical connection	•			<b>M</b> With manual reset
<b>E</b> For high power supply		•		

Pressure setting
<b>20</b> 2 bar
<b>50</b> 5 bar

Seals
<b>H</b> HNBR
<b>V</b> FPM

Thermostat	DEA	DEM	DLA	DLE	DT	DV
<b>A</b> Without	•	•	•	•		
<b>F</b> With thermostat				•	•	

Electrical connections	DEA	DEM	DLA	DLE	DT	DV
<b>10</b> Connection AMP Superseal series 1.5		•				
<b>20</b> Connection AMP Timer Junior		•				
<b>30</b> Connection Deutsch DT-04-2-P		•				
<b>35</b> Connection Deutsch DT-04-3-P		•				
<b>50</b> Connection EN 175301-803	•			•		
<b>51</b> Connection EN 175301-803, transparent base with lamps 24 Vdc			•			
<b>52</b> Connection EN 175301-803, transparent base with lamps 110 Vdc			•			
<b>70</b> Connection IEC 61076-2-101 D (M12)					•	
<b>71</b> Connection IEC 61076-2-101 D (M12), black base with lamps 24 Vdc			•			

Option
<b>P01</b> MP Filtri standard
<b>Pxx</b> Customized

### DESIGNATION & ORDERING CODE - DIFFERENTIAL INDICATOR PLUG

<b>Series</b>	Configuration example	T2	H
<b>T2</b> Indicator plug			

Seals
<b>H</b> HNBR
<b>V</b> FPM

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

These devices trip when the clogging of the filter element causes an increase in pressure drop across the filter element.

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.

# Clogging Indicators





# Clogging indicators



# CLOGGING INDICATORS

## Suitable indicator types

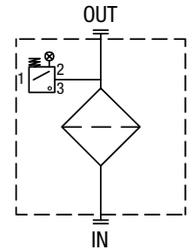
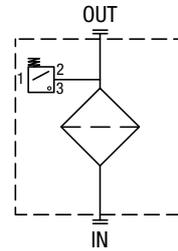
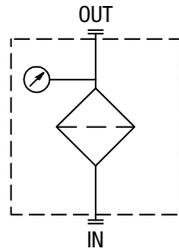
### VACUUM INDICATORS

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.

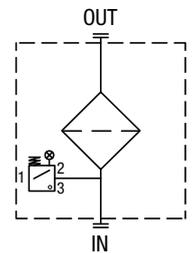
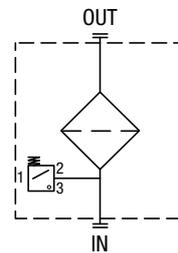
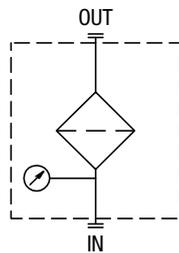


### BAROMETRIC INDICATORS

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.



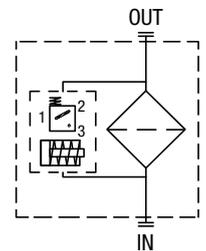
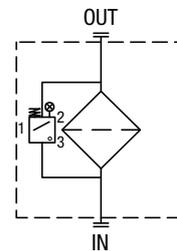
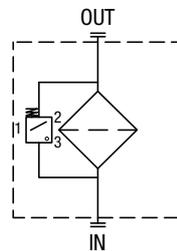
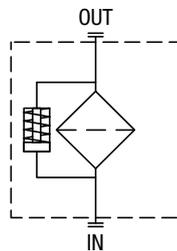
### DIFFERENTIAL INDICATORS

Differential 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.



Filter family	Filter series	Visual indicator	Electrical indicator	Electrical / Visual indicator	Electronic indicator
<b>SUCTION FILTERS</b>	SF2 250 - 350 SF2 500 - 501 - 503 - 504 - 505 SF2 510 - 535 - 540	VVA16P01 VVR16P01	VEA21AA50P01	VLA21AA51P01 VLA21AA52P01 VLA21AA53P01 VLA21AA71P01	
<b>RETURN FILTERS</b>	MPFX-MPTX-MPF-MPT with bypass 1.75 bar MPH with bypass 1.75 bar	BVA14P01 BVR14P01 BVP20HP01 BVQ20HP01	BEA15HA50P01 BEM15HA41P01	BLA15HA51P01 BLA15HA52P01 BLA15HA53P01 BLA15HA71P01	
	MPFX-MPTX-MPF-MPT with bypass 3 bar MPH with bypass 2.5 bar FRI 255	BVA25P01 BVR25P01 BVP20HP01 BVQ20HP01	BEA20HA50P01 BEM20HA41P01	BLA20HA51P01 BLA20HA52P01 BLA20HA53P01 BLA20HA71P01	
	FRI 025 - 040 - 100 - 250 - 630 - 850	DVA20xP01 DVM20xP01	DEA20xA50P01 DEM20xAxxP01	DLA20xA51P01 DLA20xA52P01 DLA20xA71P01 DLE20xA50P01 DLE20xF50P01	DTA20xF70P01
<b>RETURN / SUCTION FILTERS</b>	Suction line MRSX 116 - 165 - 166	WB16P01 VVS16P01	VEB21AA50P01	VLB21AA51P01 VLB21AA52P01 VLB21AA53P01 VLB21AA71P01	
	Return line MRSX 116 - 165 - 166 LMP 124	BVA25P01 BVR25P01 BVP20HP01 BVQ20HP01	BEA25HA50P01 BEM25HA41P01 BET25HF10P01 BET25HF30P01 BET25HF50P01	BLA25HA51P01 BLA25HA52P01 BLA25HA53P01 BLA25HA71P01	
<b>SPIN-ON FILTERS</b>	Suction line MPS 050 - 070 - 100 - 150 MPS 200 - 250 - 300 - 350	WB16P01 VVS16P01	VEB21AA50P01	VLB21AA51P01 VLB21AA52P01 VLB21AA53P01 VLB21AA71P01	
	Return line MPS 050 - 070 - 100 - 150 MPS 200 - 250 - 300 - 350 MST 050 - 070 - 100 - 150	BVA14P01 BVR14P01 BVP20HP01 BVQ20HP01	BEA15HA50P01 BEM15HA41P01	BLA15HA51P01 BLA15HA52P01 BLA15HA53P01 BLA15HA71P01	
	In-line MPS 051 - 071 - 101 - 151 MPS 301 - 351 MSH 050 - 070 - 100 - 150	DVA12xP01 DVM12xP01	DEA12xA50P01 DEM12xAxxP01	DLA12xA51P01 DLA12xA52P01 DLA12xA71P01 DLE12xA50P01 DLE12xF50P01	
<b>LOW &amp; MEDIUM PRESSURE FILTERS</b>	With bypass valve LMP 110 - 112 - 116 - 118 - 119 LMP 120 - 122 - 123 LMP 210 - 211 - LDP LMP 400 - 401 - 430 - 431 LMP 902 - 903 - 952 - 953 - 954 LMD 211 - 400 - 401 - 431 - 951 - LDD	DVA20xP01 DVM20xP01	DEA20xA50P01 DEM20xAxxP01	DLA20xA51P01 DLA20xA52P01 DLA20xA71P01 DLE20xA50P01 DLE20xF50P01	DTA20xF70P01
	Without bypass valve LMP 110 - 112 - 116 - 118 - 119 LMP 120 - 122 - 123 LMP 210 - 211 - LDP LMP 400 - 401 - 430 - 431 LMP 902 - 903 - 952 - 953 - 954 LMD 211 - 400 - 401 - 431 - 951 - LDD	DVA50xP01 DVM50xP01	DEA50xA50P01 DEM50xAxxP01	DLA50xA51P01 DLA50xA52P01 DLA50xA71P01 DLE50xA50P01 DLE50xF50P01	DTA50xF70P01
<b>HIGH PRESSURE FILTERS</b>	With bypass valve FMP 039 - 065 - 135 - 320 FHP 010 - 011 - 065 - 135 - 320 - 500 FMM 050 - FHA 051 FHM 006 - 007 - 010 - 050 - 065 - 135 - 320 - 500 FHB 050 - 135 - 320 FHF 325 FHD 021 - 051 - 326 - 333	DVA50xP01 DVM50xP01	DEA50xA50P01 DEM50xAxxP01	DLA50xA51P01 DLA50xA52P01 DLA50xA71P01 DLE50xA50P01 DLE50xF50P01	DTA50xF70P01
	Without bypass valve FMP 039 - 065 - 135 - 320 FHP 010 - 011 - 065 - 135 - 320 - 500 FMM 050 - FHA 051 FHM 006 - 007 - 010 - 050 - 065 - 135 - 320 - 500 FHB 050 - 135 - 320 FHF 325 FHD 021 - 051 - 326 - 333	DVA70xP01 DVM70xP01	DEA70xA50P01 DEM70xAxxP01	DLA70xA51P01 DLA70xA52P01 DLA70xA71P01 DLE70xA50P01 DLE70xF50P01	DTA70xF70P01
<b>STAINLESS STEEL HIGH PRESSURE FILTERS</b>	With bypass valve FZH 010 - 011 - 039 FZP 039 - 136 FZX 011 FZB 039 FZM 039 FZD 051	DVX50xP01 DVG50xP01	DEX50xA50P01	DLX50xA51P01 DLX50xA52P01	
	Without bypass valve FZH 010 - 011 - 039 FZP 039 - 136 FZB 039 FZM 039 FZD 010 - 021 - 051	DVX70xP01 DVG70xP01	DEX70xA50P01	DLX70xA51P01 DLX70xA52P01	

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