



New Headquarters:

MP FILTRI S.p.A. Italy

Via 1° Maggio, n. 3
20060 Pessano con Bornago
(Milano) Italy
Tel. +39.02/95703.1
Fax +39.02/95741497-95740188
email: sales@mpfiltri.com
<http://www.mpfiltri.com>

GREAT BRITAIN

MP FILTRI U.K. Ltd.

Bourton Industrial Park
Bourton on the Water
Gloucestershire GL54 2HQ UK
Phone: +44.01451-822522
Fax: +44.01451-822282
email: sales@mpfiltri.co.uk
<http://www.mpfiltri.com>

GERMANY

MP FILTRI D GmbH

Am Wasserturm 5
D-66265 Heusweiler/Holz
Phone: +49.06806-85022.0
Fax: +49.06806-85022.18
email: service@mpfiltri.de
<http://www.mpfiltri.com>

FRANCE

MP FILTRI FRANCE Sas

Parc d'activités des Chanteraines
8 rue du Commandant d'Estienne
d'Orves, Immeuble D3
92390 Villeneuve la Garenne - France
Phone: +33(0)1.40.86.47.00
Fax: +33(0)1.40.86.47.09
e-mail: sales@mpfiltrifrance.com
<http://www.mpfiltri.com>

USA

MP FILTRI USA Inc.

2055 Quaker Pointe Drive
Quakertown, PA 18951
Phone: +1.215-529-1300
Fax: +1.215-529-1902
email: sales@mpfiltriusa.com
<http://www.mpfiltriusa.com>

CANADA

MP FILTRI CANADA Inc.

380 Four Valley Drive Concord
Ontario Canada L4K 5Z1
Phone: +1.905-303-1369
Fax: +1.905-303-7256
email: mail@mpfiltricanada.com
<http://www.mpfiltricanada.com>

RUSSIAN FEDERATION

MP FILTRI RUSSIA

Phone/Fax: +7(495)220-94-60
P.O. Box 44 127562 Moscow, Russia
email: mpfiltrirusia@yahoo.com
<http://www.mpfiltri.ru>

CHINA

MP FILTRI (Shanghai) Co. Ltd.

1280 Lianxi Road, 8 Bld - 2 Floor
Shanghai, Pudong
201204 P.R. China
Phone: + 86.21-58919916
Fax: + 86.21-58919667
email: sales@mpfiltrishanghai.com
<http://www.mpfiltri.com>

Pressure filter

SERIES



Maximum working pressure 420 bar
Flow rates to 700 l/min



Production Programme



Contamination monitoring products

- Particle counters calibrated to ISO 11171
- On-line and In-line counting
- Bottle sampler options
- Remote operating capability
- Windows based software package RS 232 - RS 485 digital bus



Suction Filters

- Flow rate to 620 l/min
- Mounting:
- Tank immersed
 - In-line external
 - In tank with shut off valve



Return Filters

- Flow rates to 1500 l/min
 - Pressure to 20 bar
- Mounting:
- In-line external
 - Tank top
 - In single and duplex designs



Pressure Filters

- Flow rates to 700 l/min
 - Pressure from 110 bar to 420 bar
- Mounting:
- In-line
 - Manifold
 - In single and duplex designs



Spin-On filters

- Flow rates to 300 l/min
 - Pressure to 35 bar
- Mounting:
- In-line
 - Tank top



Stainless Steel Pressure Filters

- Flow rates to 100 l/min
- Pressure from 350 bar to 700 bar

Mounting:

- In-line
- Manifold
- In single and duplex designs



In-line Filters

- Flow rates to 3000 l/min
- Pressures to 60 bar

Mounting:

- In-line
- Parallel manifold version
- In single and duplex designs



Filtration units

- Flow rates from 15 l/min to 200 l/min
- In static and mobile designs



Accessories

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



Mechanical Products

- Aluminium bell housings for motors from 0.12 Kw to 400 Kw
- Couplings in aluminium - cast iron - steel
- Damping rings
- Support feet
- Aluminium tanks
- Inspection doors

Foreword

Filters are essential components in hydraulic systems as they perform a role of primary importance, **“Cleaning of the fluid”**. Hydraulic systems require filtration products in order to reduce and maintain particulate contamination in-line with the ISO 4406 cleanliness code.

Filters in the medium and high pressure series are designed and built to meet market demands for applications in high pressure hydraulic systems.

Studies conducted by our R&D department on filter housings and filter elements led to the development of a line of products offering excellent technical features including a reduction in pressure drops combined with high dirt holding capacity of the filter elements.

The choice of filter for a given application must take into account all the technical characteristics of the hydraulic system and its components in relation to the work to be performed.

Filter selection and sizing parameters

1. Application type
2. Type of filter(s)
3. Sensitivity of components: **to ISO 4406 class x/x/x**
4. Filtration efficiency: **$\mu\text{m } \beta_x (c) \geq 1.000$**
5. Fluid type: **HLP - HFC - HFD**
6. Kinematic viscosity: **$\text{mm}^2/\text{sec (cSt)}$**
7. Operating temperature: **min - max °C (°K)**
8. Working pressure: **bar (MPa)**
9. Effective flow rate: **l/min**
10. Maximum pressure drop: **Δp bar (MPa)**
11. Bypass valve: **with / without**
12. Clogging indicator: **pressure differential type Δp bar (MPa)**



CONTENTS

Page

Introduction	6
Filter element	9
Filter sizing	12
Differential indicators	15
Indicators/Cartridges combination	22
SAE flanges	23

FILTER TYPE

FMP 038	In-line filter Pressure	110 bar	24
FMM 050	In-line filter Pressure	280 bar	30
FMP	In-line filter Pressure	280 bar	36
FHA 051	In-line filter Pressure	420 bar	46
FHP	In-line filter Pressure	420 bar	52
FHM	Top manifold filter	320 bar	68
FHB	Side manifold filter	320 bar	82
FHF 320	HF4 In-line filters and flange	350 bar	92
FHZ 320	Reversible filtration filter	420 bar	98
FHD	Duplex in-line filter	350 bar	104

Operation and maintenance

118

Introduction

Installation in open circuits with the following functions:

Working filter

Contamination control of the major components in-line with the ISO cleanliness level specified.

Safety filter

Individual component protection in order to avoid catastrophic failure of components.

Positioning

Down-stream from the pump

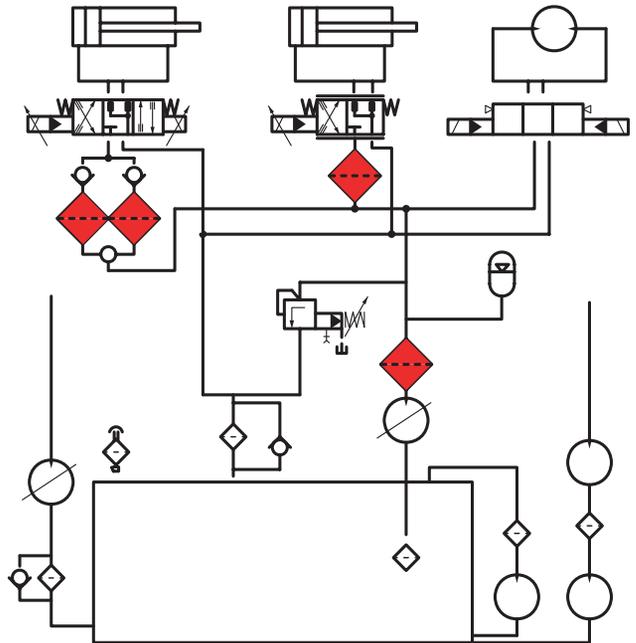
As a working filter for small size systems, with limited extension of the tube core.

Protection of the system as a safety filter.

Up-stream from the components

Protection of individual components as a safety or working filter, for large size systems with extensive use of flexible hoses.

On valve banks, blocks, at inlet and/or pilot line of servo valves with both a safety and working function, for large size systems and/or systems with high in sensitive components and in duplex style for systems with continuous operation.



Installations in closed circuits with the following functions:

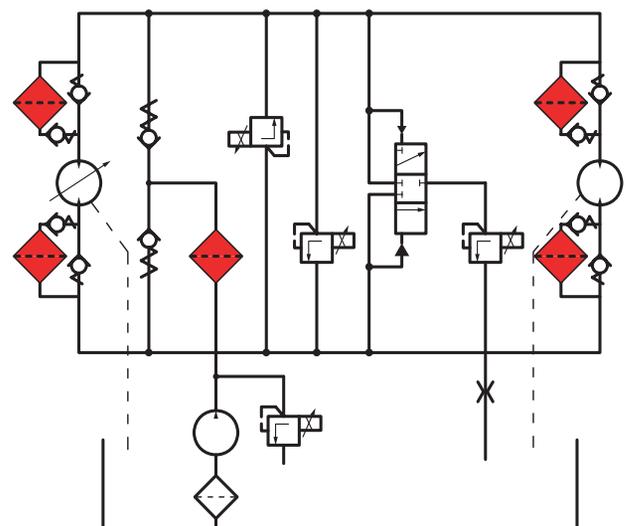
Service filter: on machines with flexible hoses connected with quick couplers.

Safety filter: protecting pump and motor for systems with large actuators.

Flushing: the filters are installed exclusively during the flushing phase.

Filters with Reverse Flow valves Reversible filters for bi-directional filtration

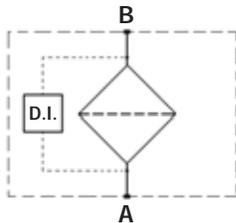
Service filter: down-stream from the hydrostatic transmission boost pump.



In-line filters for medium and high pressures can be equipped with internal valves to make them compatible with a large range of application conditions.

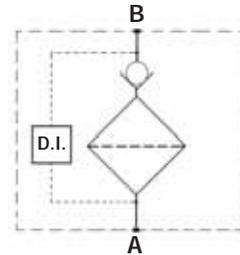
HYDRAULIC SCHEMATICS

Style S



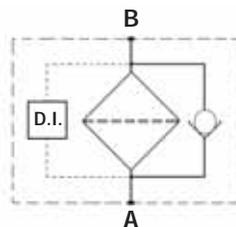
Filter without bypass valve, the entire flow must pass through the cartridge for maximum protection of the system in all operating conditions.

Style T



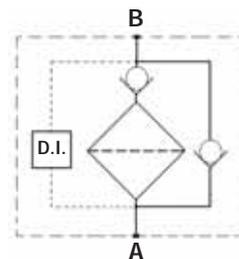
Filter without bypass valve + check valve, this style protects the cartridge from reverse flows and makes it possible to renew the cartridge without having to drain the oil from the pipelines or manifolds.

Style B



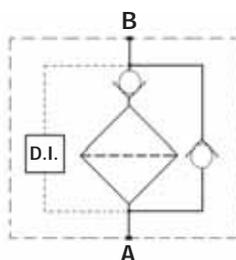
Filter with bypass valve, standard opening Δp 6 bar, filtration cannot be assured in all operating conditions. The flow that passes through the bypass valve is proportional to the differential pressure caused by clogging of the cartridge and variations in fluid viscosity related to temperature (see cold starts).

Style D



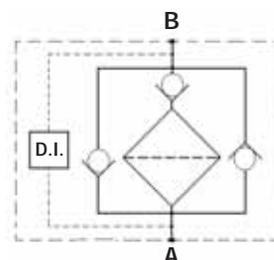
Filter with bypass valve + check valve.

Style V



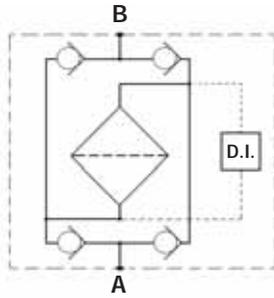
Filter with Reverse Flow valve, this style makes it possible to guarantee the oil flow inside the head in both directions. Filtration is performed in only one direction of flow.

Style Z



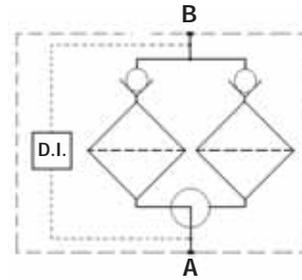
Filter with Reverse Flow valve + bypass valve.

Reversible filtration



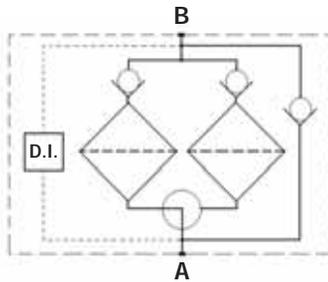
Filter with valve for reversible filtration, this style makes it possible to achieve fluid filtration in both directions of flow.

Style S

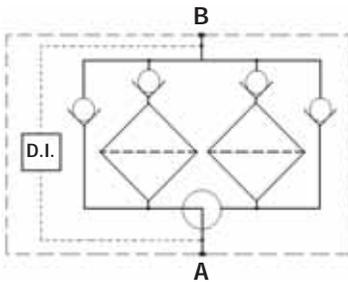


Double filter without bypass valve, the entire flow must pass through the cartridge for maximum protection of the system in all operating conditions.

Style B
Series FHD 051



Style B
Series FHD 325/332



Double filter with bypass valve, standard opening Δp 6 bar, filtration cannot be assured in all operating conditions, the flow that passes through the bypass valve is proportional to the differential pressure caused by clogging of the cartridge and variations in fluid viscosity related to temperature (see cold starts).

Description

The filter elements are available with surface and depth filtration media.

Surface media are made of stainless steel wire mesh, nominal filtration.

Depth filtration media are made of inorganic fibre impregnated with epoxy resins, absolute filtration.

Differential collapse pressure

Mesh M Δp 20 bar Series N

Mesh T Δp 210 bar Series H

Fibre A Δp 20 bar Series N

Fibre A Δp 20 bar Series R

Fibre A Δp 210 bar Series H

Fibre A Δp 210 bar Series S

Elements with Δp value of 20 bar are utilized in filters with bypass valves.

Elements with Δp value of 210 bar are utilized in filters without bypass valves.

The use of filter elements with Δp value of 20 bar is permitted in filters without bypass valves exclusively during the system start-up phase.

Elements types R and S must be utilized when the filters are equipped with Reverse Flow valves, with or without bypass valve.

Materials

Support tubes - steel with heat-chemical treatment.

Inner support tube - steel with heat-chemical treatment.

Compatibility with fluids, filter elements series N-R-H-S-T

- The filter elements are compatible with:
 - Mineral oils to ISO 2943 - 4
 - Aqueous emulsions
 - Synthetic fluids, water glycol.
- Seals, standard in NBR compatible with:
 - Mineral oils to ISO 2943 - 4
 - Aqueous emulsions
 - Synthetic fluids, water glycol.
- FPM seals compatible with:
 - Synthetic fluids type HS-HFDR-HFDS-HFDU To ISO 6743-4.
 - To ISO 2943

Composition of filtration media

Series: mesh N

Internal support mesh, stainless steel filtration mesh, external support mesh.

Series: fibre N

Internal support mesh, filter media support, filtration media, prefilter media, external support mesh.

Series: fibre R

Internal support mesh, filtration media support, filtration media, prefilter media, external support mesh, external support tube (stainless steel).

Series: fibre H

Stainless steel support tube, stainless steel internal support mesh, filtration media support, filtration media, prefilter media, external support mesh.

Series: fibre S

Stainless steel support tube, stainless steel internal support mesh, filtration media support, filtration media, prefilter media, external support mesh, stainless steel external support tube.

Series: mesh H

Stainless steel support tube, stainless steel internal support mesh, filtration media, stainless steel filtration mesh, external support mesh.

Reference standards

All filter elements comply with the following ISO standards:

ISO 2941 - Collapse and burst resistance.

ISO 2942 - Bubble point test resistance.

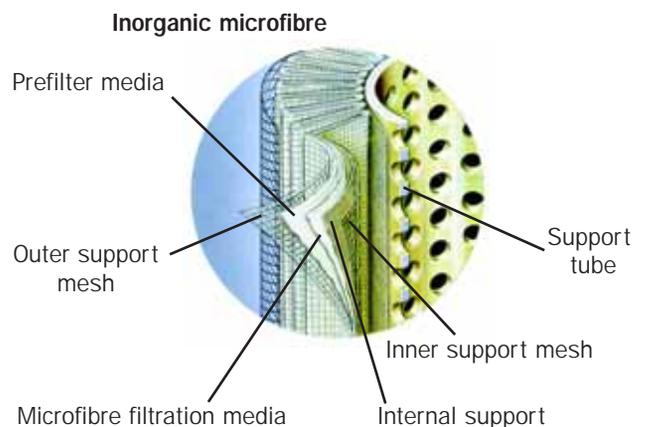
ISO 2943 - Compatibility with fluids.

ISO 3723 - Resistance to axial deformation.

ISO 3724 - Fatigue test with flow.

ISO 3968 - Pressure drop.

ISO 16889 - Filtration efficiency by means of Multipass.



Multipass test in compliance with new ISO 16889 standard. Contaminant ISO MTD

Multipass test
in compliance with original ISO 4572
standard.
Contaminant ACFTD

Value β	2	10	75	100	200	1000	Value β	200
Filtration efficiency in %	50%	90%	98.70%	99%	99.50%	99.90%	Filtration efficiency in %	99.50%
Filter element	(µm ©)							µm
A03	<3	<3	<3	<3	3.30	4.2	A03 3 µm	3
A06	<3	<3	4.31	4.53	5.07	6.3	A06 6 µm	6
A10	<6	<6	6.12	6.41	7.12	9.0	A10 10 µm	10
A16	<7	<7	10.45	10.97	12.13	13.9	A16 16 µm	16
A25	<9	12.34	15.82	16.30	17.46	19.3	A25 25 µm	25

The above data are referred to a final Δp value of 16 bar

Characteristics of filter elements with nominal filtration, M / T series

For the square stainless steel wire mesh filtration degree is defined as the maximum diameter of a sphere corresponding to the mesh size, in microns.

International standards for fluid contamination control

Components	Recommended filtration									
Servo valves			●	●	●					
Proportional Valves				●	●	●				
Variable displacement Pumps					●	●	●			
Cartridge valves						●	●	●		
Piston pumps						●	●	●		
Vane pumps							●	●	●	
Pressure / flow rate control valves							●	●	●	
Solenoid valves							●	●	●	
ISO code	12/10/7	13/11/8	14/12/9	15/13/10	16/14/11	17/15/12	18/16/13	19/17/14	20/18/15	
NAS code	1	2	3	4	5	6	7	8	9	
Absolute filtration recommended	3 micron			6 micron			10 micron		>10	

Microfibre filter elements tested in collaboration with the following independent institutes.

Institute of Filtration
(France)



I.F.T.S.



KUNGL
TEKNISKA
HÖGSKOLAN

Royal Institute of Technology

Filter sizing

Correct sizing of the filter, having in-line or manifold connections must be based on a total pressure drop of between 0.8 and 1.5 bar.

For styles with reverse flow valves, reversible flow, and duplex filters, the total pressure drop can be between 1.5 and 3 bar.

The pressure drop calculation is performed by adding together the value for the housing and the value for the filter element.

The pressure drop in the housing is proportional to the fluid density kg/dm^3 . All the graphs in the catalogue are based on a mineral oil with density of 0.86 kg/dm^3 .

The filter element pressure drop value is proportional to viscosity mm^2/s (cSt), the Y values in the catalogue are referred to viscosity of $30 \text{ mm}^2/\text{s}$ (cSt).

Sizing

Δp Total

Δp_c Filter body

Δp_e Filter element

Y Multiplication factor (see pages 13 to 14)

Q l/min = flow rate

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

V2 = operating viscosity in mm^2/s

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

$\Delta p_e = Y : 1000 \times Q \times (V_2/V_1)$

Calculation example with HLP fluid Variation in viscosity

Data:

Filter with in-line connections

Pressure = 380 bar

Flow rate = 150 l/min

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

Density = 0.86 kg/dm^3

Filtration = 10μ absolute

With bypass valve

Filter type - FHP 135 3 (see bodies pressure drop graphs on page 54)

Practical example

Q = 150 l/min

$V_2 = 46 \text{ mm}^2/\text{s}$

Pmax = 380 bar

Filtration = 10μ absolute

$\Delta p_{\text{Tot. max}} = 1.5 \text{ bar}$ (max. recommended value)

Filter element series N, Δp max 20 bar

$\Delta p_c = 0.657 \text{ bar}$ (* see diagram)

$\Delta p_e = (3.38 : 1000) \times 150 \times (46/30) = 0.777 \text{ bar}$

$\Delta p_{\text{Tot.}} = 0.657 + 0.777 = 1.434 \text{ bar}$

Sized filter type:

FHP 135 3 S A G2 A10 N P01

Calculation examples with HFD fluid Variations in viscosity and density

Data:

Filter with in-line connections

Pressure = 380 bar

Flow rate = 150 l/min

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

Density = 1.1 kg/dm^3

Filtration = 10μ absolute

With bypass valve

Filter type - FHP 135 3 (see bodies pressure drop graphs on page 54)

Practical example

Q = 150 l/min

$V_2 = 46 \text{ mm}^2/\text{s}$

Pmax = 380 bar

Filtration = 10μ absolute

$\Delta p_{\text{Tot. max}} = 1.5 \text{ bar}$ (max. recommended value)

Filter element N series, Δp max 20 bar

$\Delta p_c = 0.657 \times (1.1/0.86) = 0.84$

$\Delta p_e = (3.38 : 1000) \times 150 \times (46/30) = 0.777 \text{ bar}$

$\Delta p_{\text{Tot.}} = 0.84 + 0.777 = 1.62 \text{ bar}$

Filter type:

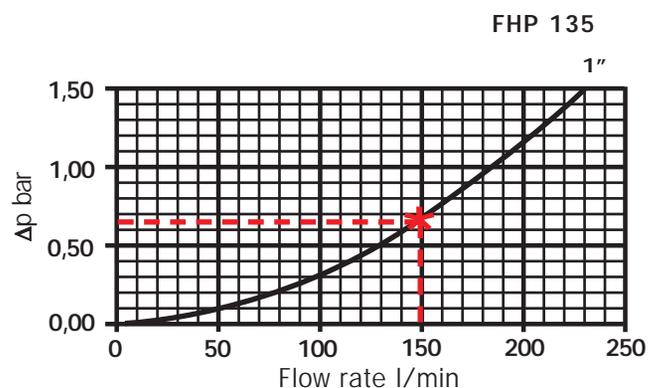
FHP 135 3 S A G2 A10 N P01 (Δp max exceeded)

Switch to next size up FHP 320...

Pressure drops Δp Body

The curves are plotted using mineral oil with density of 0.86 kg/dm^3 to ISO 3968.

Δp varies proportional with density.



For Y values see next page:

Filter Element	Series N - R					Series N
	F i l t r a t i o n					
Type	A 0 3	A 0 6	A 1 0	A 1 6	A 2 5	M 2 5
HP 037 1	70,66	53,20	25,77	20,57	14,67	04,90
2	26,57	23,27	12,46	09,88	05,58	02,20
5	36,57	32,28	18,00	13,38	08,00	02,90
HP 050 1	31,75	33,00	13,16	12,33	07,29	01,60
2	24,25	21,26	11,70	09,09	04,90	01,40
3	17,37	16,25	08,90	07,18	03,63	01,25
4	12,12	10,75	06,10	05,75	03,08	01,07
5	07,00	06,56	03,60	03,10	02,25	00,80
HP 065 1	58,50	43,46	26,66	19,66	10,71	01,28
2	42,60	25,64	17,66	13,88	07,32	01,11
3	20,50	15,88	08,18	06,81	03,91	00,58
HP 135 1	20,33	18,80	09,71	08,66	04,78	02,78
2	11,14	10,16	06,60	06,38	02,22	01,11
3	06,48	06,33	03,38	03,16	02,14	01,01
HP 320 1	10,88	09,73	05,02	03,73	02,54	01,04
2	04,40	03,83	01,75	01,48	00,88	00,71
3	02,75	02,11	01,05	00,87	00,77	00,61
4	02,12	01,77	00,98	00,78	00,55	00,47
HP 500 1	4,44	3,67	2,3	2,1	1,65	0,15
2	3,37	2,77	1,775	1,68	1,24	0,10
3	2,22	1,98	1,114	1,09	0,75	0,075
4	1,81	1,33	0,93	0,86	0,68	0,050
5	1,33	1,15	0,766	0,676	0,48	0,040

HP series filter elements

Multiplication factor "Y" for definition of the pressure drop of filter elements.

Reference viscosity 30 mm²/s

Filter Element	Series N					Series N
	F i l t r a t i o n					
Type	A 0 3	A 0 6	A 1 0	A 1 6	A 2 5	M 2 5
HF 320 1	03,65	02,95	02,80	01,80	00,90	-
2	02,03	01,73	01,61	01,35	00,85	-
3	01,84	01,42	01,42	01,22	00,80	-

HF series filter elements

Multiplication factor "Y" for definition of the pressure drop of filter elements.

Reference viscosity 30 mm²/s



To properly maintain your system to the correct ISO 4406 contamination class, MP recommends the use of filters provided with the correct clogging indicator.

The trip threshold of the indicator must be selected taking account of the maximum differential pressure indicated for each type of filter element and the trip pressure of the bypass valve, if incorporated in the filter.

Indicator body (Material)

- Brass

Pressure

- Max. working pressure: 420 bar (42 MPa)

Temperature

- From -35°C to +110°C

Seals

- HNBR
- FPM

Compatibility

- Bodies compatible with:
Mineral oils to ISO 2943 - aqueous emulsions
Synthetic fluids, water/glycol.
- V and H series FPM and HNBR seals, compatible with:
Mineral oils to ISO 2943 - aqueous emulsions
Synthetic fluids, water/glycol.
For synthetic fluids type HS-HFDR-HFDS-HFDU, seals in FPM V series.

Order code

1	2	3

Example: E 7

1 - Styles

- | | |
|---|---|
| V | Visual |
| E | Electric-Visual |
| J | Electrical-Visual-Thermostat controlled |

2 - Differential trip pressure

- | | |
|---|--------------|
| 6 | 2 bar ± 10% |
| 7 | 5 bar ± 10% |
| 8 | 7 bar ± 10% |
| 9 | 10 bar ± 10% |

3 - Seals

FPM Standard

- | | |
|---|------------------------------|
| x | Other information on request |
|---|------------------------------|

Seal for indicator/filter head, Bonded Seal.

ADAPTER

Order code
ICPAP01



Order code

1	2	3	4	5	6	7	8

Example: NM 8 C 11 P01

1 - Styles

- | | |
|----|-------------------|
| NR | Electrical |
| KR | Electric-Visual |
| NM | Electric IP 67 |
| Z | Visual |
| N | Electric |
| K | Electric - Visual |
| NE | Electronic |

2 - Differential trip pressure

- | | |
|---|--------------|
| 6 | 2 bar ± 10% |
| 7 | 5 bar ± 10% |
| 8 | 7 bar ± 10% |
| 9 | 10 bar ± 10% |

3 - Power supply voltage*

(only for style K - KR)

- | | |
|---|---------------------------------|
| 1 | 24 Volt |
| 2 | 110 Volt (DC only for KR) |
| 3 | 220 Volt (not available for KR) |

4 - Seals

- | | |
|---|-------------------|
| H | HNBR Standard |
| V | FPM |
| x | Others on request |

5 - Thermostat (only for NM style)

- | | |
|---|---------|
| A | Without |
| C | 50° |

6 - Electrical connector (only for NM style)

- | | |
|----|-------------------------|
| 11 | AMP Superseal connector |
|----|-------------------------|

7 - Options (only for style NE)

- | | |
|---|--|
| S | Standard |
| T | Double contact 75% - 100%
6 sec. signalling delay |

8 - Options

- | | |
|-----|-------------|
| P01 | MP standard |
|-----|-------------|

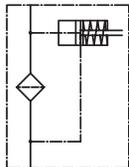
Seal for indicator/filter head, flat profiled.

* Other supply voltage on request.

STYLE

TECHNICAL CHARACTERISTICS

SERIES Z VISUAL



Standard visual indicator with manual reset.

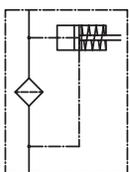
Nylon signalling button.

Button depressed position = cartridge clean.
 Button raised position, Red = cartridge clogged.

Weight: 118 g

Tightening torque: 60 Nm.

SERIES V VISUAL



Cover and lens in nylon.

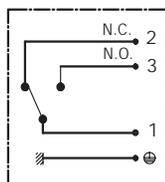
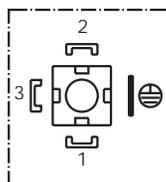
Visual indicator green = cartridge clean.
 Visual indicator red = cartridge clogged.

Weight: 137 g

Tightening torque: 60 Nm.

SERIES E ELECTRIC / VISUAL

Connector EN 175301-803 A/ISO 4400



Protection rating IP 65
 Max. contact rating 5 A/250V-
 Voltage 230 V~

Connector DIN 43650 Microswitch contact
 Cable gland PG 9

Cover and lens in nylon.

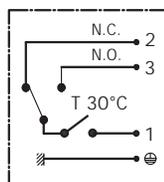
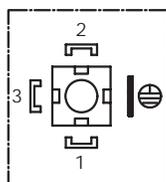
Visual indicator green = cartridge clean.
 Visual indicator red = cartridge clogged.

Weight: 188 gr.

Tightening torque: 60 Nm.

SERIES J ELECTRIC / VISUAL WITH THERMOSTAT CONTROL

Connector EN 175301-803 A/ISO 4400



Protection rating IP 65
 Max. contact rating 5 A/250V-
 Voltage 230 V~

Connector DIN 43650 Microswitch contact
 Cable gland PG 9

Cover and lens in nylon.

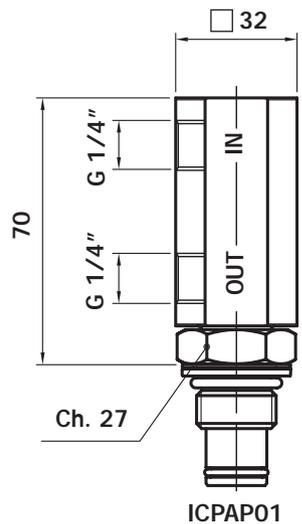
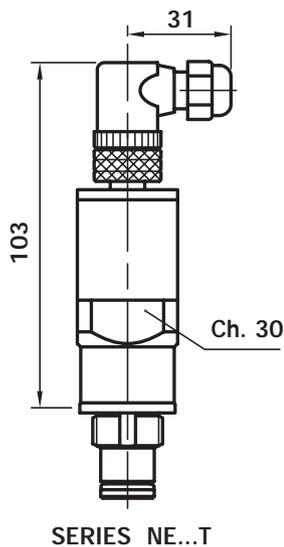
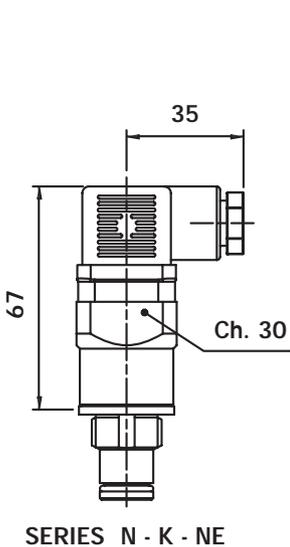
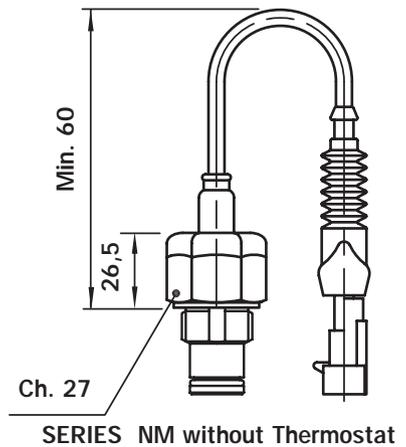
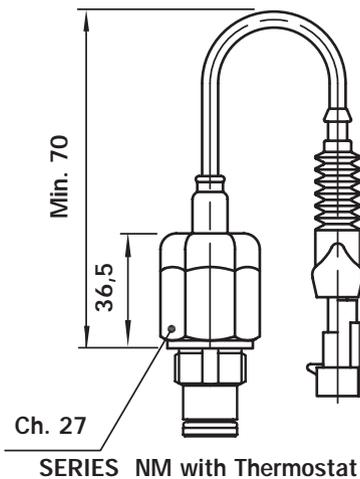
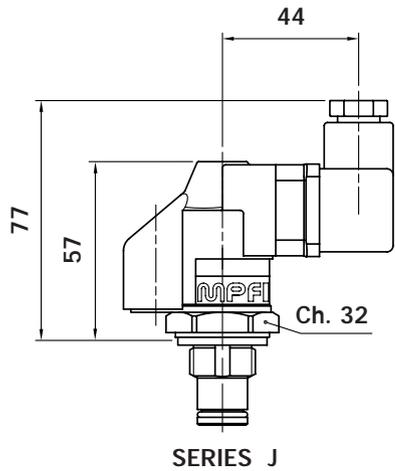
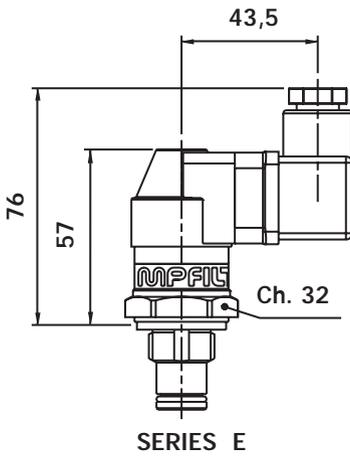
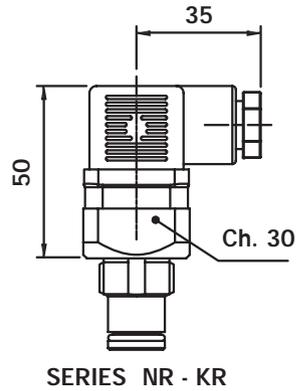
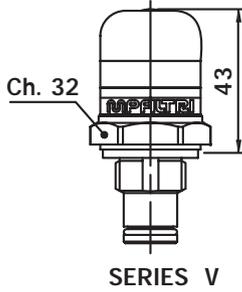
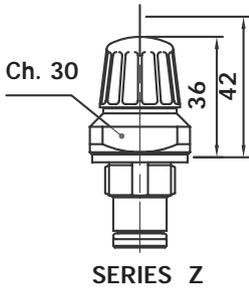
Visual indicator green = cartridge clean.
 Visual indicator red = cartridge clogged.
 CONTACT N.O.

Operation on reaching temperature of + 30°C

Weight: 198 gr.

Tightening torque: 60 Nm.

Differential indicator dimensions

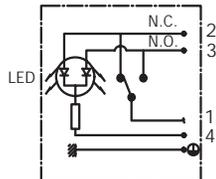
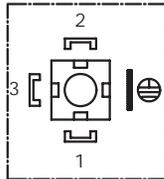


STYLE

TECHNICAL CHARACTERISTICS

SERIES K ELECTRIC / VISUAL

Connector EN 175301-803 A/ISO 4400



Protection rating IP 65
Max. contact rating 5 A/24V~
Voltage 24V DC - 115V DC/AC - 230V AC

Connector DIN 43650 Microswitch contact
Cable gland PG 9

SIGNALLING LEDES :

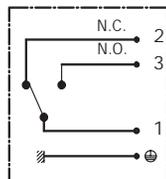
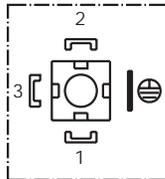
GREEN LED = Cartridge clean.
RED LED = Cartridge clogged.

Weight: 183 gr.

Tightening torque: 60 Nm.

SERIES N ELECTRIC

Connector EN 175301-803 A/ISO 4400



Protection rating IP 65
Max. contact rating 5 A/250V~
Voltage 230 V~

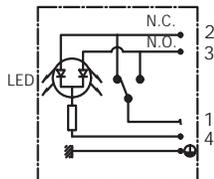
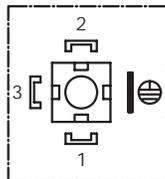
Connector DIN 43650 Microswitch contact
Cable gland PG 9

Weight: 183 gr.

Tightening torque: 60 Nm.

SERIES KR ELECTRIC / VISUAL

Connector EN 175301-803 A/ISO 4400



Protection rating IP 65
Max. contact rating 0,8 A/24V DC
0,17 A/115V DC
Max. contact rating 24V - 115V DC

Connector DIN 43650 Reed switch
Cable gland PG 9

SIGNALLING LEDES :

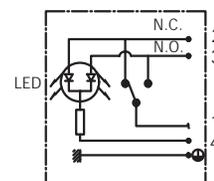
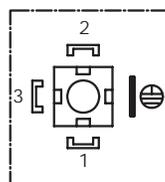
GREEN LED = Cartridge clean.
RED LED = Cartridge clogged.

Weight: 123 gr.

Tightening torque: 60 Nm.

SERIES NR ELECTRIC

Connector EN 175301-803 A/ISO 4400



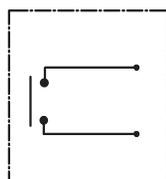
Protection rating IP 65
Max. contact rating 0,17 A/115V DC
Voltage max 120V DC

Connector DIN 43650 Reed switch
Cable gland PG 9

Weight: 123 gr.

Tightening torque: 60 Nm.

SERIES NM.A



Connector AMP Superseal
Cable and cable gland PVC
Max. contact rating 0,17 A/115V DC
Voltage max 120V DC
Protection rating IP 67
Contacts N.O.

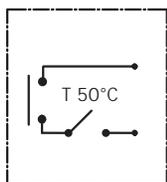
Weight: 110 gr.

Tightening torque: 60 Nm.

STYLE

TECHNICAL CHARACTERISTICS

SERIES NM.C ELECTRIC/THERMOSTAT



Connector AMP Superseal
 Cable and cable gland PVC
 Max. contact rating 0,17 A/115V DC
 Voltage max 120V DC
 Protection rating IP 67
 Contacts N.O.
 Thermostat (N.O.) Switching + 50°C

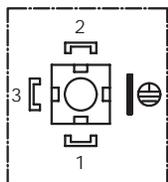
Weight: 136 gr.
 Tightening torque: 60 Nm.

SERIES NE ELECTRIC

Connector EN 175301-803 A/ISO 4400



1= + 24 VDC
 2= Out 4 - 20 mA



Protection rating IP 65
 Voltage From 19 to 28 VDC
 Output signal 4 - 20 mA
 Input impedance 100 Ohm
 Non-linearity + hysteresis ≤ 10% of full scale
 Thermal deviation from zero < 5% of full scale from 0°C to + 60°C
 Operating temperature From -20°C a +80°C
 Storage temperature From -35°C a +110°C

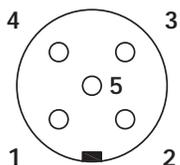
Connector DIN 43650
 Cable gland PG 9

Weight: 200 gr.
 Tightening torque: 60 Nm.

INDICATOR NE...T



1= + 24 VDC
 2= Out 4 > 20 mA
 3= - 24 VDC
 4= Out NA 16 mA
 5= Out NA 20 mA



Protection rating IP 67
 Power supply voltage From 19 to 28 VDC
 Output signal 4 - 20 mA
 Input impedance 100 Ohm
 Non-linearity + hysteresis ≤ 10% of full scale
 Thermal deviation from zero < 5% of full scale from 0°C to + 70°C
 N° 1 N.O. alarm threshold NA a 16 mA (75% of full scale)
 N° 2 N.O. alarm threshold NA a 20 mA (100% of full scale)
 Fixed timer interval threshold N° 1 and N° 2 6 seconds
 Operating temperature From -20°C to +80°C
 Storage temperature From -35°C to +110°C

Connector M12 5 pin IEC 60947-5-2
 Weight: 350 gr.
 Tightening torque: 60 Nm.

ADAPTER ICPAP01



Adapter for oil outlet and pressure sensing up-stream and down-stream from the filter element.

IN/OUT connections G 1/4"

Orientation: IN/OUT connections 360°

Material: Phosphated steel

Seals: NBR (others on request)

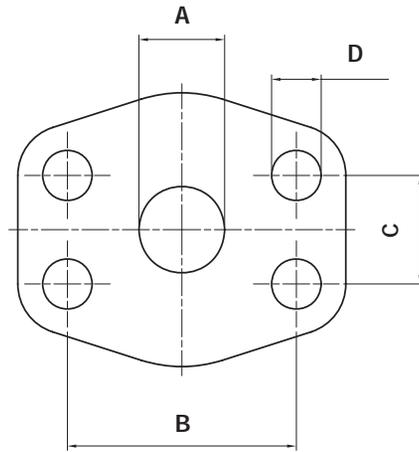
INDICATORS/CARTRIDGES Combination

Efficient operation and application safety are guaranteed when the filter components are selected correctly. The correct style of cartridge and relative indicator pressure value for each filter layout can be selected using the following table. H - S - T series cartridges (Δp 210 bar) can be replaced with N and R series cartridges (Δp 20 bar) during system flushing phases.

Filter layout (single)	Cartridge Series	Indicator Trip
S without bypass	H mesh cartridges H fibre cartridges S FHP 500 filters only	7 bar
B with bypass	N mesh and fibre cartridges	5 bar
T with check valve, without bypass valve	H mesh cartridges H fibre cartridges S FHP 500 filters only	7 bar
D with check valve, with bypass valve	N mesh and fibre cartridges	5 bar
V with Reverse Flow valves, without bypass valve	S fibre cartridge	7 bar
Z with Reverse Flow valve, with bypass valve	R mesh and fibre cartridges	5 bar
V with valve for reversible filtration	S mesh and fibre cartridges	7 bar

Double filter layout	Cartridge Series	Indicator Trip in bar
B with bypass	R mesh and fibre cartridges	5 bar
S without bypass	H (only for FHD 020 series) S mesh and fibre cartridges	7 - 10 bar 7 - 10 bar

Sizes / Connections to SAE flange



Connection to 3000 psi SAE flange

Size	3/4" SAE 3000 PSI M	3/4" SAE 3000 PSI UNC	1" SAE 3000 PSI M	1" SAE 3000 PSI UNC	1 1/4" SAE 3000 PSI M	1 1/4" SAE 3000 PSI UNC	1 1/2" SAE 3000 PSI M	1 1/2" SAE 3000 PSI UNC	2" SAE 3000 PSI M	2" SAE 3000 PSI UNC
A	19	19	25,5	25,5	32	32	38	38	51	51
B	47,63	47,63	52,37	52,37	58,72	58,72	69,85	69,85	77,77	77,77
C	22,23	22,23	26,19	26,19	30,18	30,18	35,71	35,71	42,88	42,88
D	M10	3/8" UNC	M10	3/8" UNC	M10	7/16" UNC	M12	1/2" UNC	M12	1/2" UNC

Connection to 6000 psi SAE flange

Size	3/4" SAE 6000 PSI M	3/4" SAE 6000 PSI UNC	1 1/4" SAE 6000 PSI M	1 1/4" SAE 6000 PSI UNC	1 1/2" SAE 6000 PSI M	1 1/2" SAE 6000 PSI UNC	2" SAE 6000 PSI M	2" SAE 6000 PSI UNC
A	19	19	32	32	38	38	51	51
B	50,80	50,80	66,68	66,68	79,38	79,38	96,82	96,82
C	23,80	23,80	31,75	31,75	36,50	36,50	44,45	44,45
D	M10	3/8" UNC	M14	1/2" UNC	M16	5/8" UNC	M20	3/4" UNC

SAE flange connections available on in-Line filters

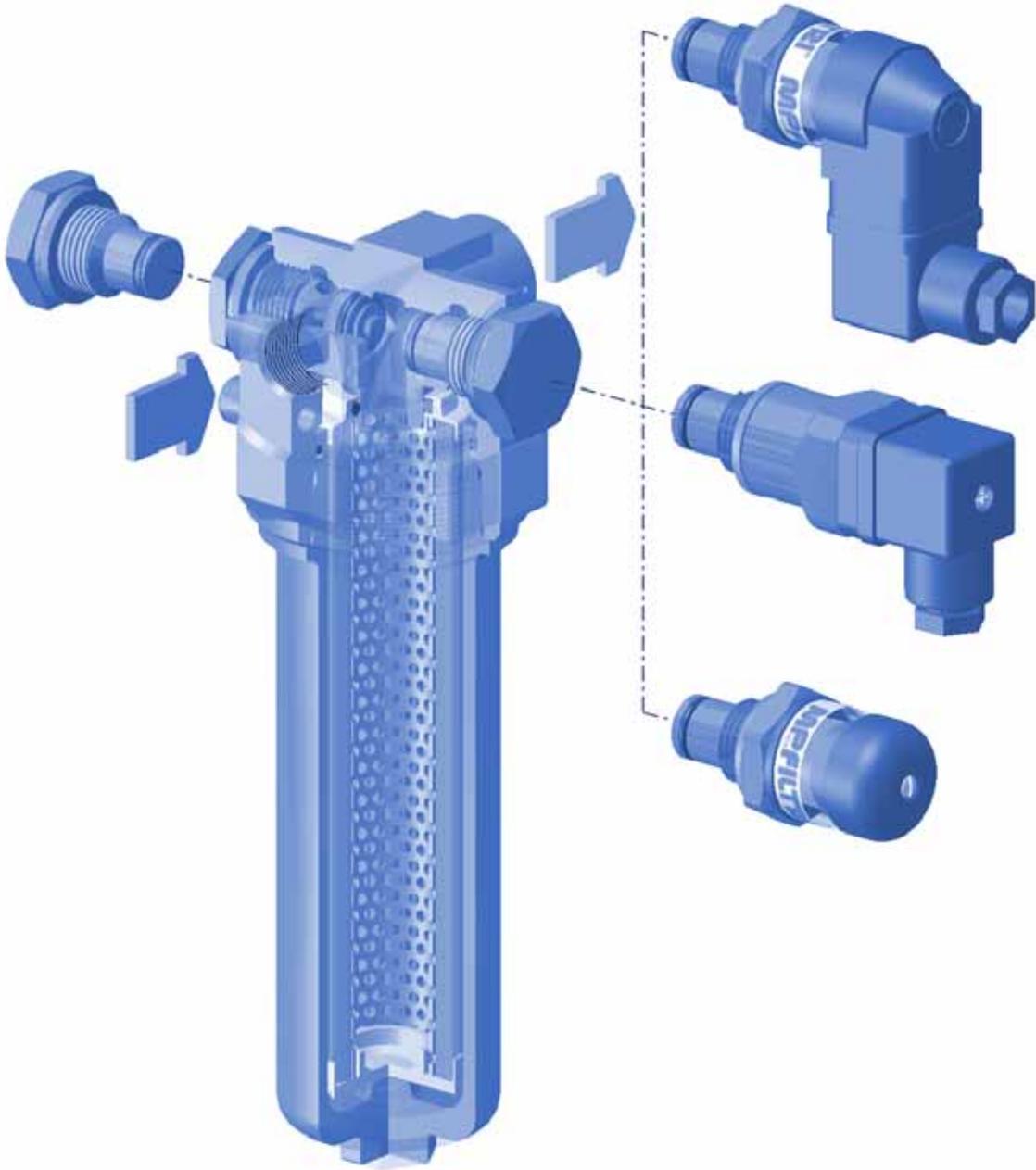
Filter	SAE 3000 PSI					SAE 6000 PSI			
	3/4"	1"	1 1/4"	1 1/2"	2"	3/4"	1 1/4"	1 1/2"	2"
FMP 135	x								
FMP 320		x	x	x					
FHP 135	x					x			
FHP 320		x	x	x			x		
FHP 500				x	x			x	x
FHF 320								x	
FHD 332								x	

FMP 038



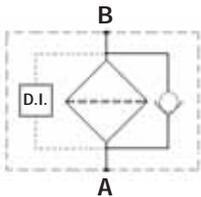
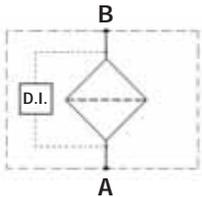
SERIES FMP 038

Working pressure
110 bar



Style S

Style B



Technical data

Filter body (Materials)

- Head: Anodized Aluminum
- Housing: Anodized Aluminum
- Bypass valve: Brass

Pressure

- Working pressure: 110 bar (11 MPa)
- Test pressure: 160 bar (16 MPa)
- Burst pressure: 330 bar (33 MPa)
- Pulsed pressure fatigue test: 1,000,000 of cycles with variable pressure from 0 to 110 bar (11 MPa)

Temperature

- From -25°C to +110°C

Bypass valve

- Opening pressure 6 bar \pm 10%
- Other opening pressures on request.

Elements type Δp

- Microfibre filter elements series N: 20 bar
- Stainless steel mesh elements series N: 20 bar
- Oil flow from exterior to interior.

Seals

- Standard Nitrile (NBR) series A
- Optional FPM series V

Weights without filter elements (kg.)

Length

- FMP038 -1 0.8
- FMP038 -2 1.3
- FMP038 -5 1.1

Filter internal volumes (dm³)

Length

- FMP038 -1 0.28
- FMP038 -2 0.43
- FMP038 -5 0.35

Connections

In-line Inlet/Outlet

Compatibility

- Bodies compatible with:
Mineral oils to ISO 2943 - aqueous emulsions
Synthetic fluids, water/glycol.
- Filter elements compatible with:
Mineral oils to ISO 2943 - aqueous emulsions
Synthetic fluids, water/glycol.
- Nitrile (NBR) seals series A, compatible with:
Mineral oils to ISO 2943 - aqueous emulsions
Synthetic fluids, water/glycol.
- V series FPM seals, compatible with:
Synthetic fluids type HS-HFDR-HFDS-HFDU
To ISO 2943

Filter Element Area

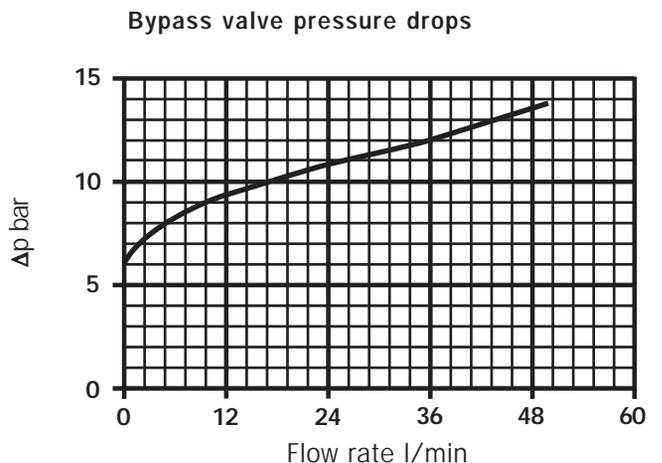
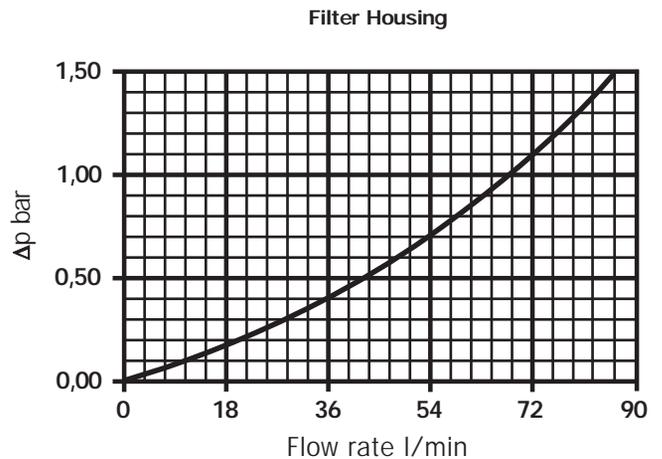
Filter element in stainless steel mesh
Length

Type	1	5	2
HP037	350	570	700
Values expressed in cm ²			

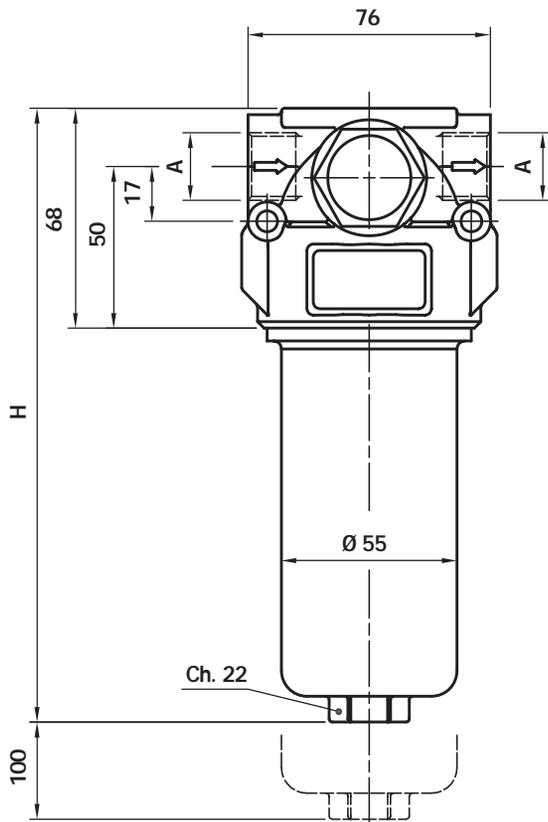
Pressure drops Δp Housing

The curves are plotted using mineral oil with density of 0.86 kg/dm³ to ISO 3968.

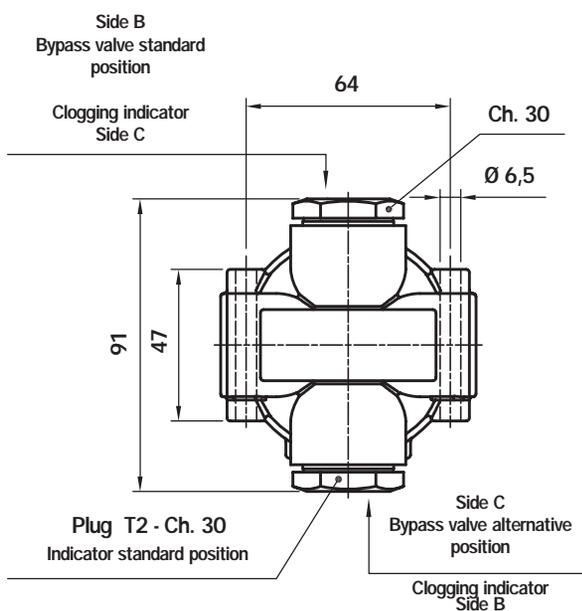
Δp varies proportional with density.



FMP 038



Indicator and bypass valve positions can be interchanged.



Recommended maximum flow rate

- Pressure drop of complete filter equal to Δp 1.5 bar.
- Oil kinematic viscosity 30 mm²/s (cSt).
- Density 0.86 kg/dm³.
- Connections of filter under test G 1/2".

Filter element type	Flow rate l/min Series N	Filter Length
A03	20	1
A06	25	
A10	45	
A16	46	
A25	54	
M25	72	
A03	32	5
A06	35	
A10	50	
A16	58	
A25	66	
M25	86	
A03	40	2
A06	43	
A10	58	
A16	62	
A25	71	
M25	90	

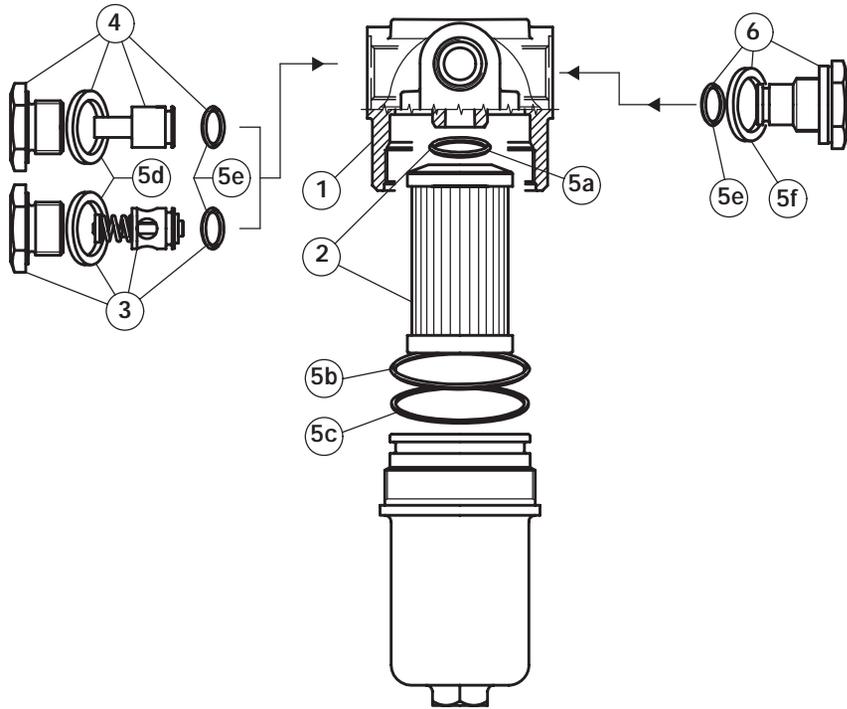
A

Threaded Connections

G 1/2"
1/2" NPT
SAE 8 - 3/4" - 16 UNF

Filter Length	H mm
1	150
5	193
2	237

Spare parts FMP038



Pos.	Description	Qty.	Series FMP 038 FILTER 038 1 - 5 - 2	
1	Complete filter	1	See order table	
2	Filter Element	1	See order table	
3	Bypass Assembly	1	02001312 (NBR) 02001385 (FPM)	
4	No Bypass Assembly	1	02001314 (NBR) 02001386 (FPM)	
5	Seal kits	1	NBR 02050310	FPM 02050311
5a	Filter element O-Ring	1	OR 4087 Ø 21.82 x 3.53	
5b	O-Ring for housing	1	OR 3200 Ø 50.47 x 2.62	
5c	Anti-extrusion ring	1	Parbak 136 Ø 51.26 x 2.18	
5d	Bonded seal	1	G 1/2"	
5e	O-Ring	2	OR 2050 Ø 12.42 x 1.78	
5f	Gasket	1	01030058 (HNBR)	01030046 (FPM)
6	Indicator plug	1	T2H	T2V
-	Indicator	1	See order table	

Ordering information FMP038

Filter assembly FMP 038

Example: FMP038

1	2	3	4	5	6	7 _a
<input type="checkbox"/>						
2	B	A	G1	A10	N	P01

Filter element HP 037

Example: HP037

1	5	3	6	7 _b
<input type="checkbox"/>				
2	A10	A	N	P01

1 - Filter length

1
5
2

2 - Bypass valve

B	With bypass side B
C	With bypass side C
D	Without bypass with plug T2 side B
E	Without bypass with plug T2 side C
F	Without connection to bypass valve

3 - Seals

A	NBR
V	FPM

4 - Connections

G1	G 1/2"
G2	1/2" NPT
G3	SAE 8 (3/4" - 16 UNF)

5 - Filter element

A03	3 µ Inorganic microfibre
A06	6 µ Inorganic microfibre
A10	10 µ Inorganic microfibre
A16	16 µ Inorganic microfibre
A25	25 µ Inorganic microfibre
M25	Stainless steel mesh 25 m (in N style only)

β_x (c) ≥ 1000
see page 10

6 - Filter elements differential pressure

N	20 bar
---	--------

7 - Options

a) Filter

P01	Threaded connection for indicator (without plug T2)
P02	Threaded connection for indicator (with plug T2)
P03	Filters without connection for indicator
Pxx	Customer request

b) Filter element

P01	MP Filtri standard
Pxx	Customer request

DIFFERENTIAL INDICATORS (see page 15)

MP Filtri - The filter functions as described in this bulletin are valid exclusively for original MP Filtri filter elements and replacement parts. All rights reserved

The data in this publication is marketing information. MP Filtri reserves the right to make changes to the product described herein at any time it deems fit in relation to technical or commercial requirements. The colors of the products shown on the cover are for illustration purposes only.
Copyright. All rights reserved.

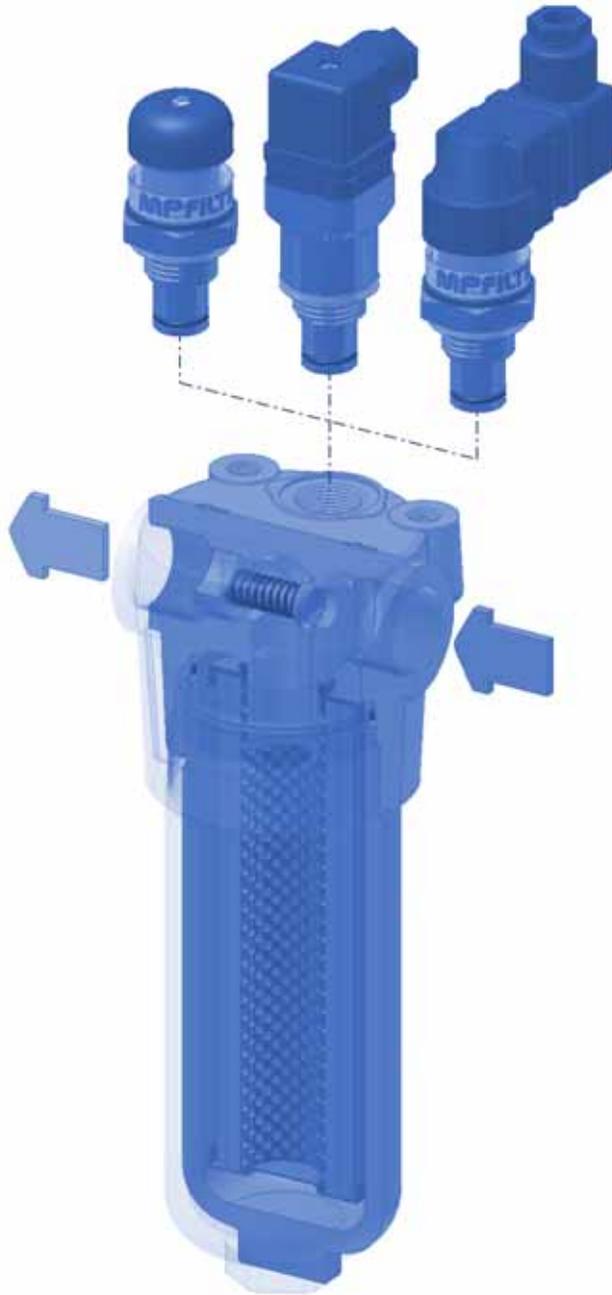
FMM 050



FMM

SERIES 050

Working pressure
280 bar

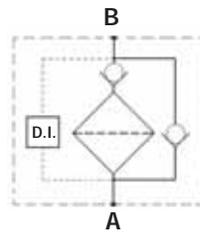
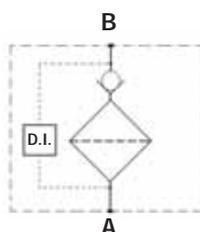
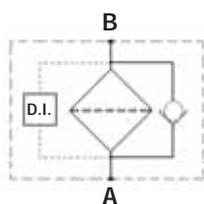
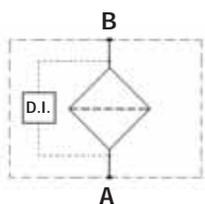


Style S

Style B

Style T

Style D



Technical data

Filter body (Materials)

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

Pressure

- Working pressure: 280 bar (28 MPa)
- Test pressure: 420 bar (42 MPa)
- Burst pressure: 840 bar (84 MPa)
- Pulsed pressure fatigue test 1,000,000 of cycles with variable pressure from 0 to 280 bar (28 MPa)

Temperature

- From -25°C to +110°C

Bypass valve

- Opening pressure 6 bar \pm 10%
- Other opening pressures on request.

Elements type Δp

- Microfibre filter elements series N: 20 bar
- Microfibre filter elements series H: 210 bar
- Stainless steel mesh elements series N: 20 bar
- Oil flow from exterior to interior.

Seals

- Standard Nitrile (NBR) series A
- Optional FPM series V

Weights without filter elements (kg)

Length

- FMM050-1 2.6
- FMM050-2 3.6
- FMM050-3 3.9
- FMM050-4 4.5
- FMM050-5 6.1

Filter internal volumes (dm³)

Length

- FMM050-1 0.38
- FMM050-2 0.48
- FMM050-3 0.58
- FMM050-4 0.69
- FMM050-5 0.86

Connections

In-line Inlet/Outlet

Compatibility

- Bodies compatible with: Mineral oils to ISO 2943 - aqueous emulsions Synthetic fluids, water/glycol.
- Filter elements compatible with: Mineral oils to ISO 2943 - aqueous emulsions Synthetic fluids, water/glycol.

- Nitrile (NBR) seals series A, compatible with: Mineral oils to ISO 2943 - aqueous emulsions Synthetic fluids, water/glycol.
- V series FPM seals, compatible with: Synthetic fluids type HS-HFDR-HFDS-HFDU. To ISO 2943

Filter Element Area

Filter element in stainless steel mesh
Length

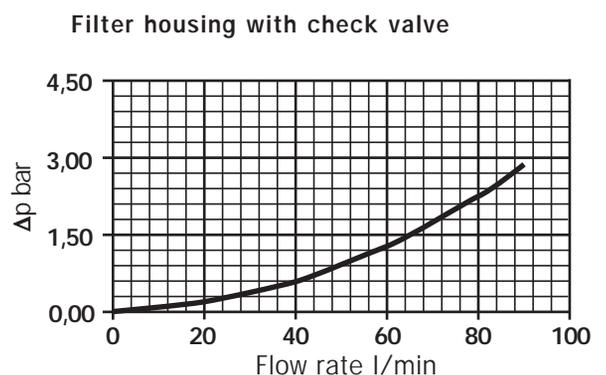
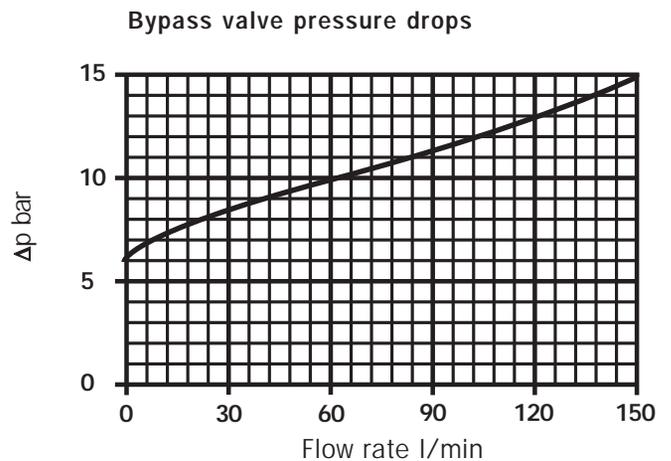
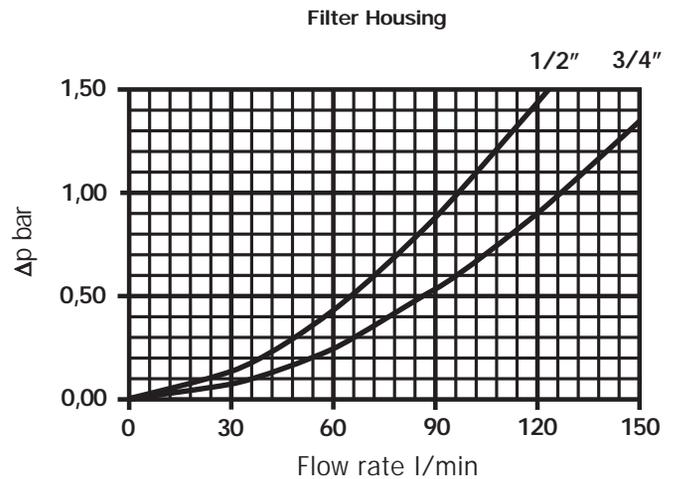
Type	1	2	3	4	5
HP050	450	700	1000	1300	2100

Values expressed in cm²

Pressure drops Δp Housing

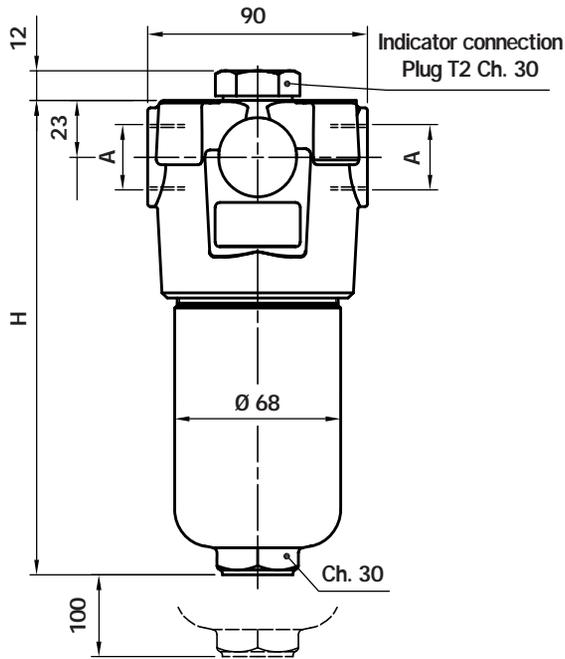
The curves are plotted using mineral oil with density of 0.86 kg/dm³ to ISO 3968.

Δp varies proportional with density.

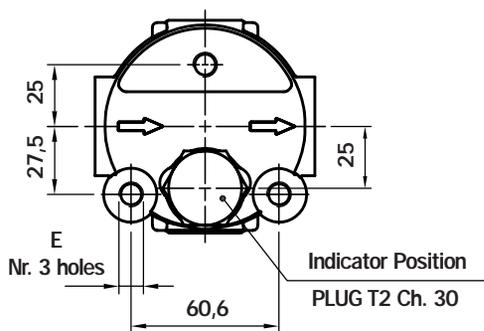


FMM 050

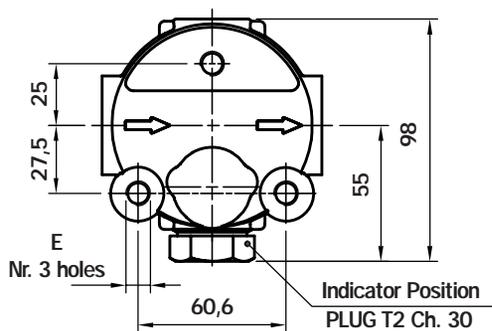
Dimensions



With standard indicator



Option P03 with indicator at 90°



Note. Differential indicator versions are supplied with plug T2.

Recommended maximum flow rate

- Pressure drop of complete filter equal to Δp 1.5 bar.
- Oil kinematic viscosity 30 mm²/s (cSt).
- Density 0.86 kg/dm³.
- Connections of filter under test G 3/4".

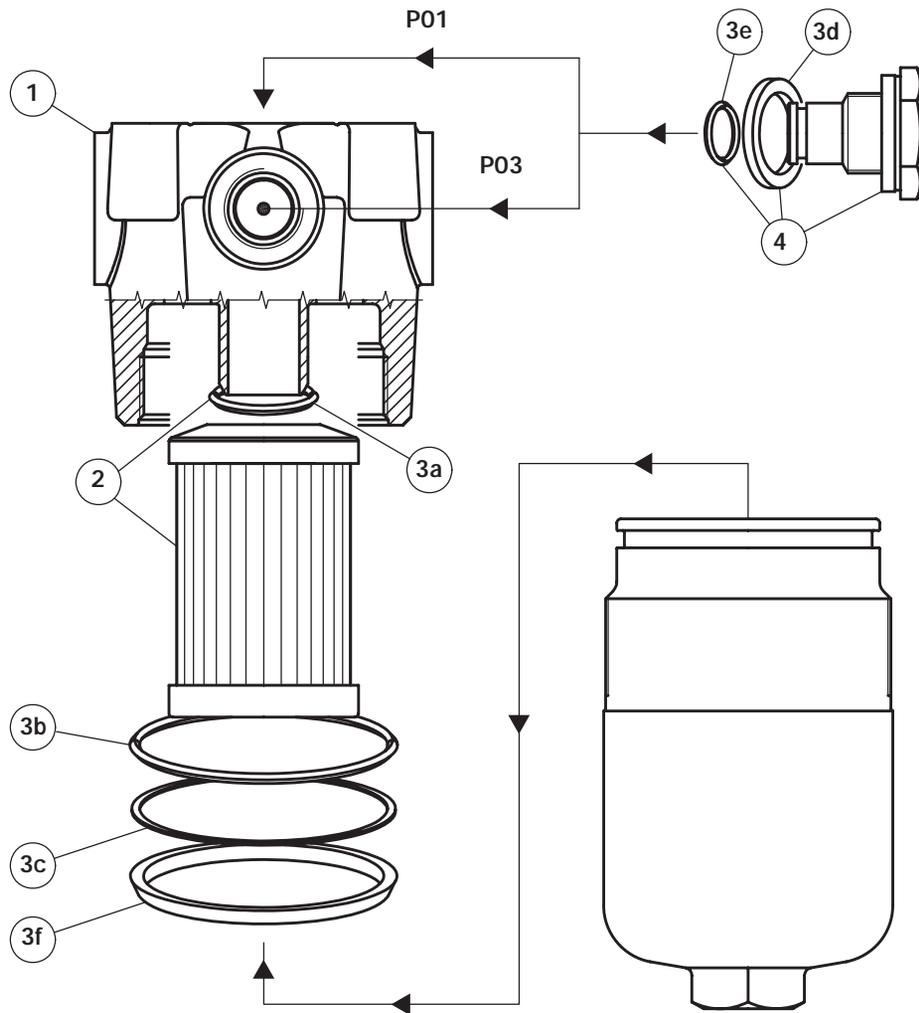
Filter element type	Flow rate l/min Series N	Flow rate l/min Series H	Filter Length
A03	44	30	1
A06	44	40	
A10	80	58	
A16	82	60	
A25	110	75	
M25	140	-	2
A03	53	45	
A06	58	50	
A10	87	78	
A16	100	90	
A25	125	119	3
M25	140	-	
A03	68	59	
A06	71	62	
A10	100	92	
A16	110	100	4
A25	135	130	
M25	140	-	
A03	85	75	
A06	92	82	
A10	118	106	5
A16	120	112	
A25	135	135	
M25	145	-	
A03	110	94	
A06	112	98	5
A10	130	112	
A16	135	120	
A25	140	140	
M25	152	-	

A Threaded Connections E Depth 15 mm

18x1,5	ISO 6149	M10
22x1,5	ISO 6149	M10
G 1/2"		M10
G 3/4"		M10
1/2" NPT		3/8" UNC
3/4" NPT		3/8" UNC
SAE 8 (3/4" - 16 UNF)		3/8" UNC
SAE 12 (1 1/16" - 12 UN)		3/8" UNC

Filter Length	H mm
1	158
2	195
3	237
4	285
5	407

Spare parts FMM050



Pos.	Description	Qty.	FMM 050 series FILTER 050 1 - 2 - 3 - 4 - 5	
1	Complete filter	1	See order table	
2	Filter Element	1	See order table	
3	Seal kits	1	NBR 02050314	FPM 02050315
3a	O-Ring for filter element	1	OR 3093 Ø 23.67 x 2.62	
3b	O-Ring for housing	1	OR 3225 Ø 56.82 x 2.62	
3c	Anti-extrusion ring	1	Parbak 139 Ø 56.03 x 2.18	
3d	Gasket	1	01030058 (HNBR)	01030046 (FPM)
3e	O-Ring	1	OR 2050 Ø 12.42 x 1.78	
3f	Protection seal	1	01026521	
4	Indicator plug	1	T2H	T2V
-	Indicator	1	See order table	

Ordering information FMM050

Filter assembly FMM 050

Example: HP050

1	2	3	4	5	6	7a
<input type="checkbox"/>						
2	B	A	C	A10	N	P01

Filter element HP 050

Example: HP050

1	5	3	6	7b
<input type="checkbox"/>				
2	A10	A	N	P01

1 - Filter lengths

1
2
3
4
5

2 - Bypass valve

S	Without bypass
B	With bypass
T	Without bypass + check valve*
D	With bypass + check valve*

*Reduced cross-section oilways

3 - Seals

A	NBR
V	FPM

4 - Threaded connections

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

5 - Filter elements

A03	Inorganic microfibre 3 μ
A06	Inorganic microfibre 6 μ
A10	Inorganic microfibre 10 μ
A16	Inorganic microfibre 16 μ
A25	Inorganic microfibre 25 μ
M25	Stainless steel mesh 25 μ (N style only)

} $\beta_x(c) \geq 1000$
see page 10

6 - Filter elements differential pressure

N	20 bar
S	210 bar

7 - Options

a) Filter

P01	Standard threaded connection for indicator
P02	Without threaded connection for indicator
P03	Threaded connection for indicator at 90°
Pxx	Customer request

b) Filter element

P01	MP Filtri standard
Pxx	Customer request

DIFFERENTIAL INDICATORS (see page 15)

MP Filtri - The filter functions as described in this bulletin are valid exclusively for original MP Filtri filter elements and replacement parts. All rights reserved

The data in this publication is marketing information. MP Filtri reserves the right to make changes to the product described herein at any time it deems fit in relation to technical or commercial requirements. The colors of the products shown on the cover are for illustration purposes only.

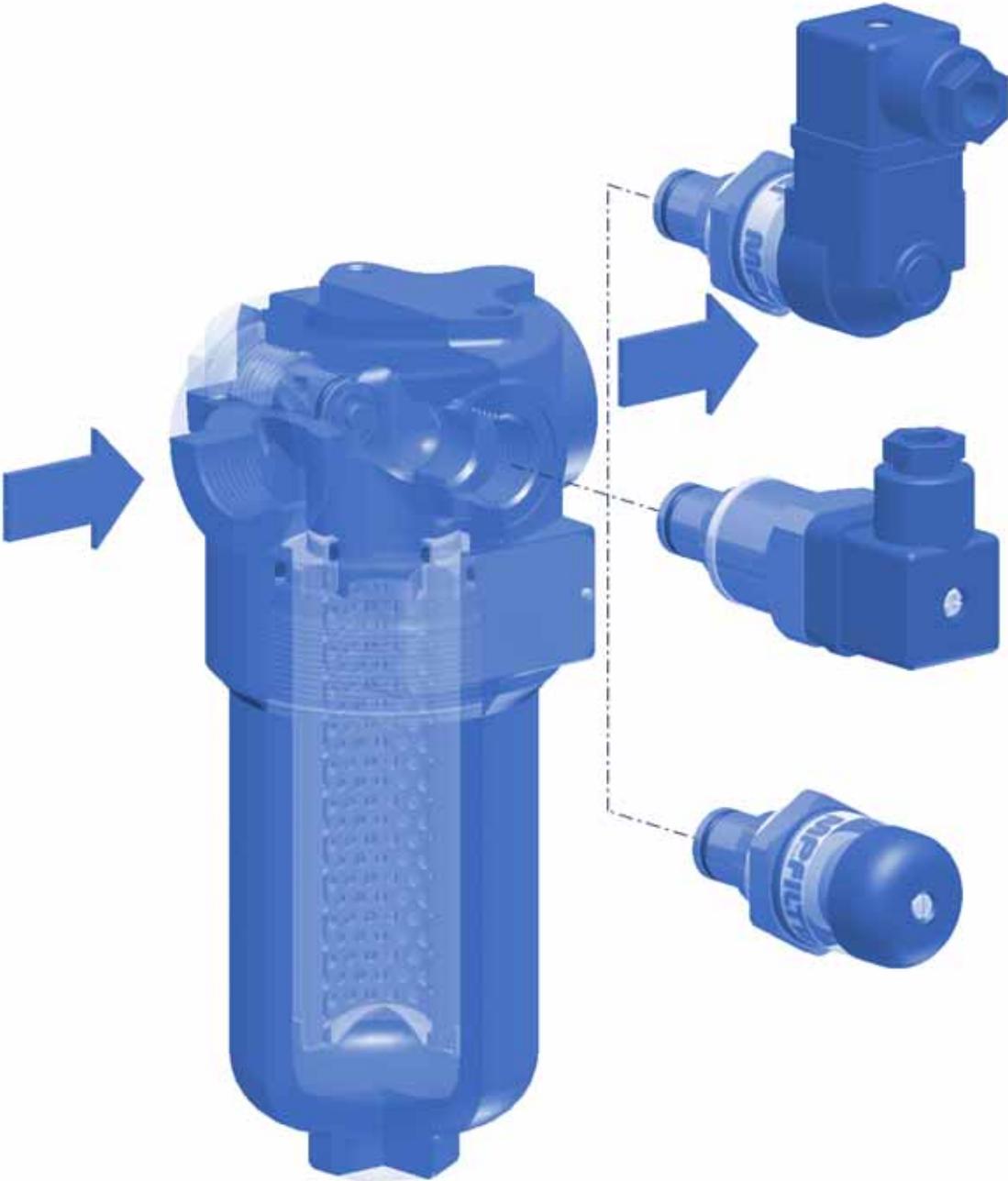
Copyright. All rights reserved.

FMP



SERIES FMP

Working pressure
280 bar



Style S

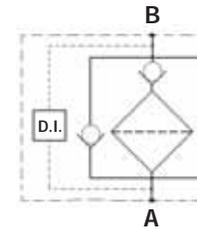
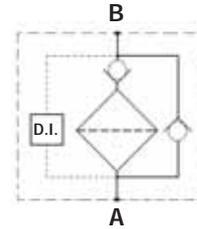
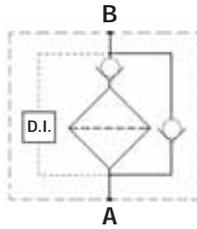
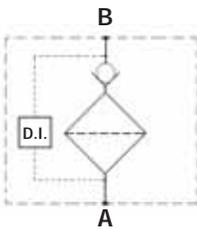
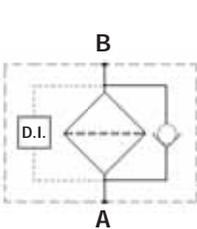
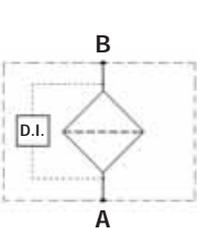
Style B

Style T

Style D

Style V

Style Z



Technical data

Filter body (Materials)

- Head: Cast iron (chemical heat treatment)
- Housing: Cast iron (chemical heat treatment)
- Bypass valve: Brass
- Reverse Flow: Steel (series 135 - 320 only)
- Check valve: Steel

Pressure

- Maximum operating pressure: 280 bar (28 MPa)
- Test pressure: 420 bar (42 MPa)
- Burst pressure: 840 bar (84 MPa)
- Pulsed pressure fatigue test 1,000,000 cycles with pressure from 0 to 280 bar (28 MPa)

Temperature

- From -25°C to +110°C

Bypass valve

- Opening pressure 6 bar \pm 10%
- Other opening pressures on request.

Elements type Δp

- Microfibre elements series N-R: 20 bar
- Elements in stainless steel mesh series N: 20 bar
- Elements in microfibre series H-S: 210 bar
- Oil flow from exterior to interior.

Seals

- Standard Nitrile (NBR) series A
- Optional FPM series V

Weights without filter elements (kg)

Length	1	2	3	4
• FMP 065	3.0	3.4	5.2	—
• FMP 135	6.0	8.2	12.0	—
• FMP 320	12.7	14.7	20.7	23.7

Filter internal volumes (dm³)

Length	1	2	3	4
• FMP 065	0.38	0.45	0.67	—
• FMP 135	0.40	1.02	1.24	—
• FMP 320	1.61	2.61	3.27	4.20

Connections

In-line Inlet/Outlet

Compatibility

- Bodies compatible with:
 - Mineral oils to ISO 2943 - aqueous emulsions
 - Synthetic fluids, water/glycol.
- Filter elements compatible with:
 - Mineral oils to ISO 2943 - aqueous emulsions
 - Synthetic fluids, water/glycol.
- Nitrile (NBR) seals series A, compatible with:
 - Mineral oils to ISO 2943 - aqueous emulsions
 - Synthetic fluids, water/glycol.
- V series FPM seals, compatible with:
 - Synthetic fluids type HS-HFDR-HFDS-HFDU.
 - To ISO 2943

Filter Element Area

Filter element in stainless steel mesh
Length

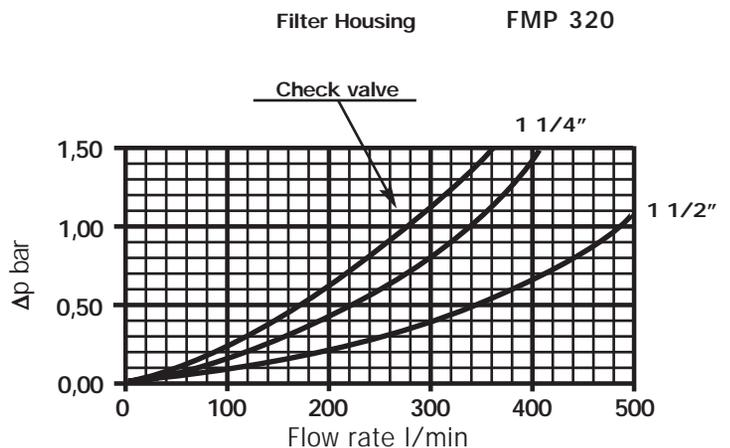
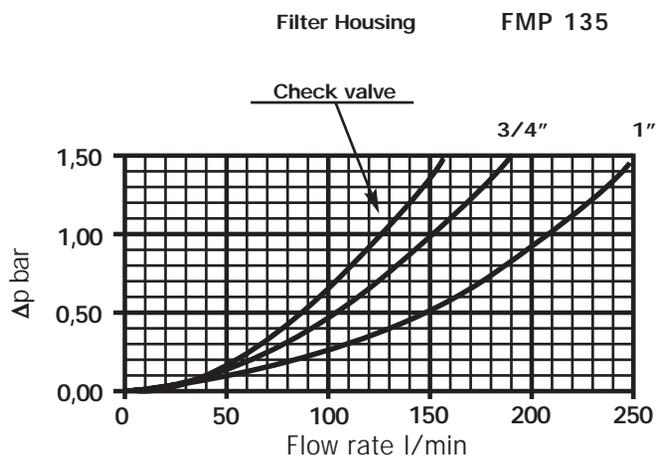
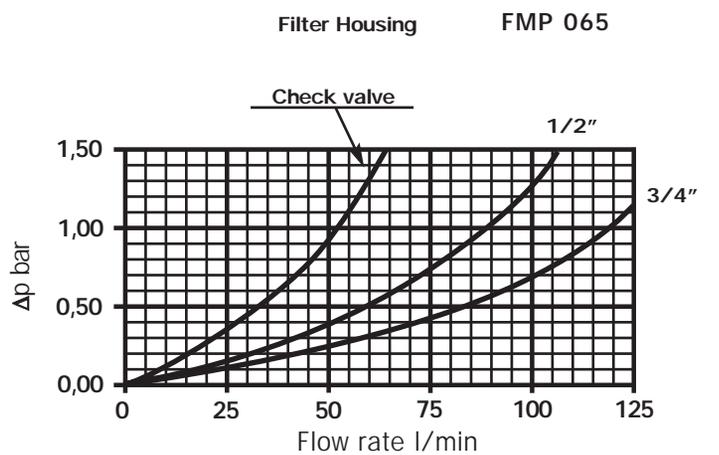
Type	1	2	3	4
HP065	374	530	1064	-
HP135	950	2020	2700	-
HP320	1650	3645	5970	8280

Values expressed in cm²

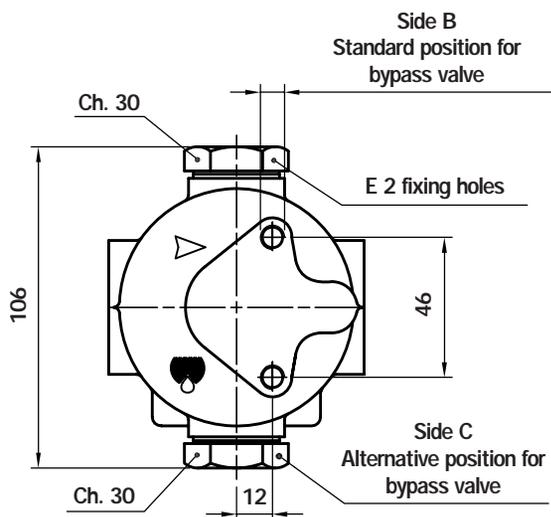
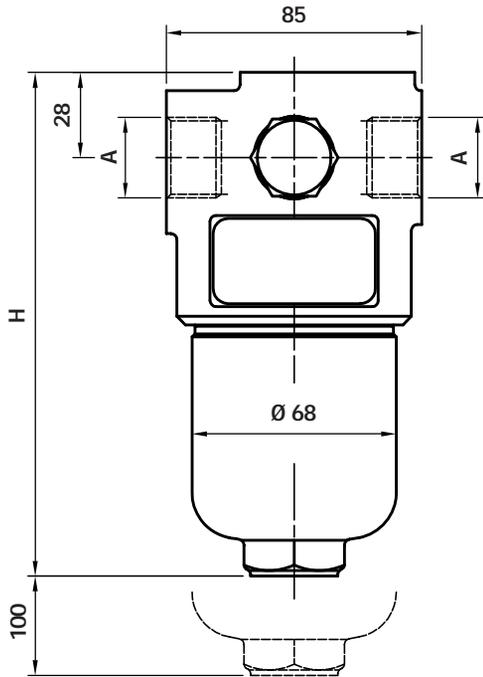
Pressure drops Δp Housing

The curves are plotted using mineral oil with density of 0.86 kg/dm³ to ISO 3968.

Δp varies proportional with density.



FMP 065



Indicator and bypass valve positions can be inverted.

Recommended maximum flow rate

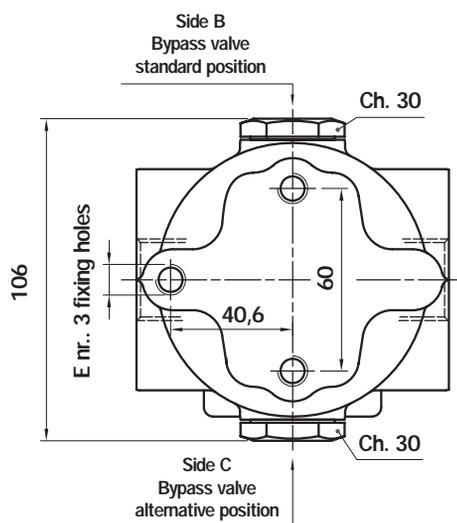
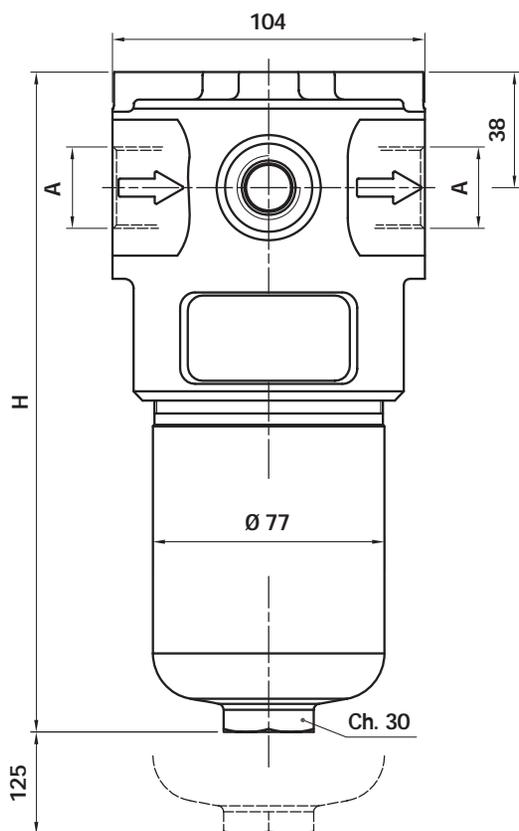
- Pressure drop of complete filter equal to Δp 1.5 bar.
- Oil kinematic viscosity 30 mm²/s (cSt).
- Density 0.86 kg/dm³.
- Connections of filter under test G 3/4".

Filter element type	Flow rate l/min Series N	Flow rate l/min Series H	Filter Length
A03	23	22	1
A06	30	23	
A10	48	43	
A16	53	50	
A25	72	68	
M25	105	-	2
A03	31	30	
A06	45	35	
A10	60	57	
A16	64	63	
A25	82	77	3
M25	106	-	
A03	53	52	
A06	61	58	
A10	79	78	
A16	84	83	3
A25	94	93	
M25	108	-	

A Threaded Connections	E Depth 15 mm
G 1/2"	M8
1/2" NPT	5/16" UNC
G 3/4"	M8
3/4" NPT	5/16" UNC
SAE 8 (3/4" - 16 UNF)	5/16" UNC
SAE 12 (1 1/16" - 12 UN)	5/16" UNC

Filter Length	H mm
1	169
2	200
3	302

FMP 135



Indicator and bypass valve positions can be inverted.

Recommended maximum flow rate

- Pressure drop of complete filter equal to Δp 1.5 bar.
- Oil kinematic viscosity 30 mm²/s (cSt).
- Density 0.86 kg/dm³.
- Connections of filter under test G 1".

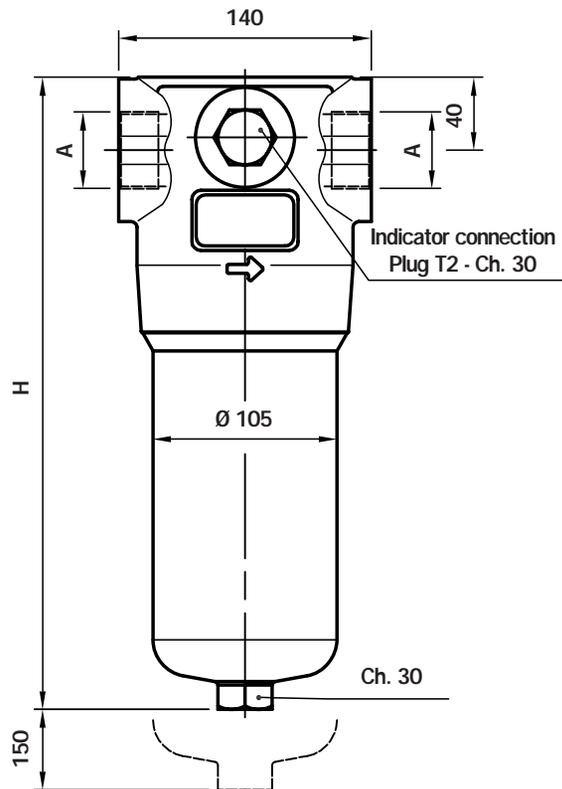
Filter element type	Flow rate I/min Series N	Flow rate I/min Series H	Filter Length
A03	69	50	1
A06	74	57	
A10	120	98	
A16	129	101	
A25	171	156	
M25	200	-	
A03	110	91	2
A06	117	110	
A10	148	136	
A16	151	139	
A25	208	175	
M25	230	-	
A03	150	126	3
A06	153	140	
A10	192	170	
A16	195	179	
A25	213	196	
M25	232	-	

A Threaded Connections	E Depth 15 mm
G 3/4"	M10
3/4" NPT	3/8" UNC
G 1"	M10
1" NPT	3/8" UNC
SAE 12 (1 1/16"- 12 UN)	3/8" UNC
SAE 16 (1 5/16"- 12 UN)	3/8" UNC

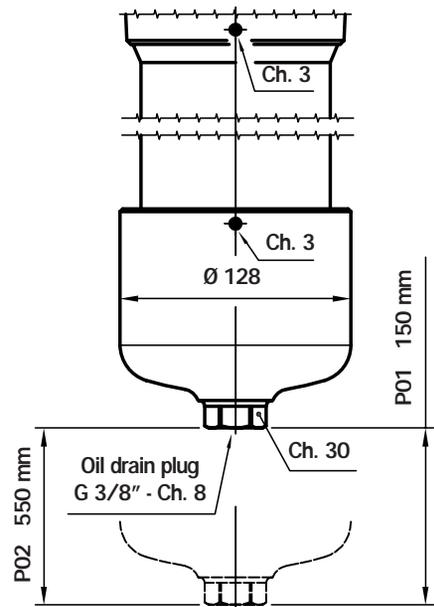
A Flanged Connections	B Depth 15 mm
3/4" SAE 3000 psi/M	M10
3/4" SAE 3000 psi/UNC	3/8" UNC
1" SAE 3000 psi/M	M10
1" SAE 3000 psi/UNC	3/8" UNC

Filter Length	H mm
1	220
2	333
3	408

FMP 320

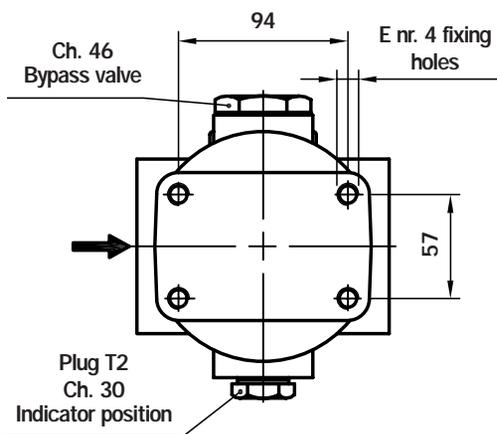


Only for FMP 320 length 4

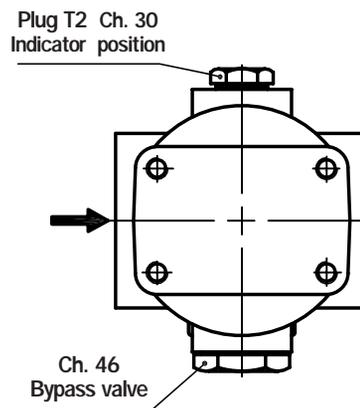


Style P01 standard maintenance from head.
Style P02 maintenance option from housing base.

Side B
Bypass valve standard
position



Side C
Bypass valve alternative
position



FMP 320

Recommended maximum flow rate

- Pressure drop of complete filter equal to Δp 1.5 bar.
- Oil kinematic viscosity 30 mm²/s (cSt).
- Density 0.86 kg/dm³.
- Connections of filter under test G 1 1/2".

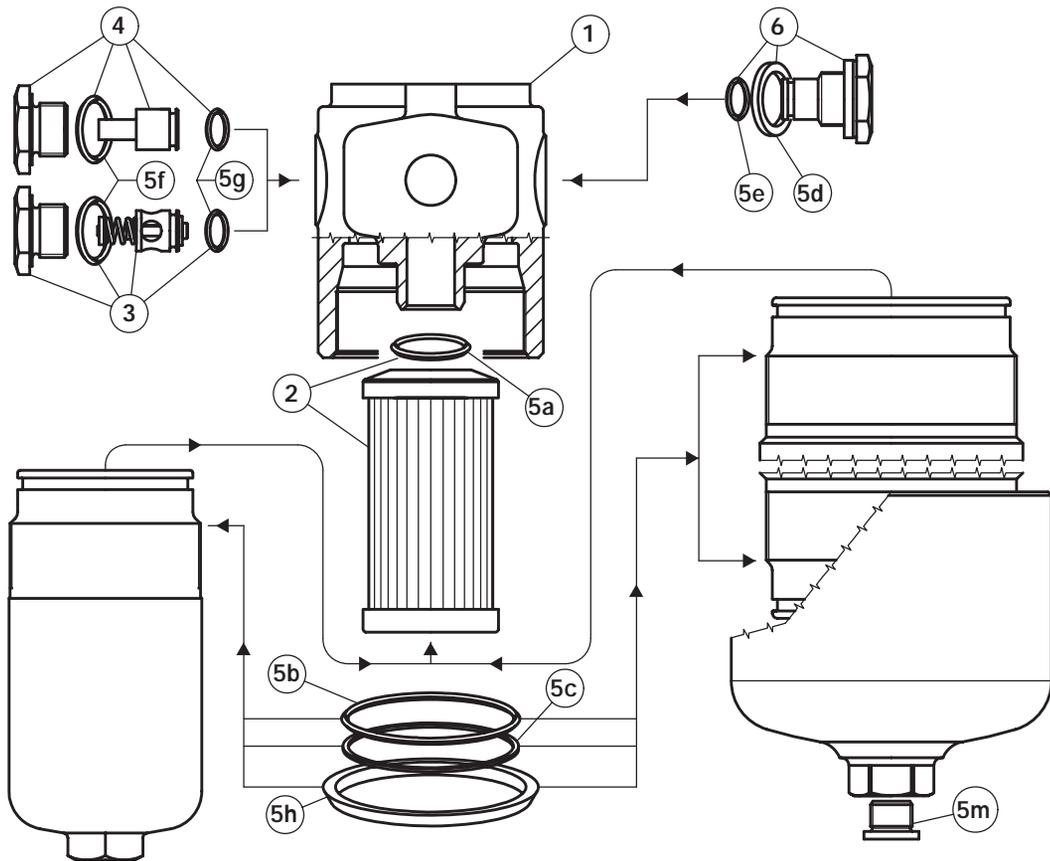
Filter element type	Flow rate l/min Series N	Flow rate l/min Series H	Filter Length
A03	126	107	1
A06	137	112	
A10	230	185	
A16	274	193	
A25	330	292	
M25	425	-	
A03	248	192	2
A06	270	220	
A10	376	300	
A16	395	312	
A25	440	378	
M25	445	-	
A03	319	255	3
A06	353	300	
A10	427	367	
A16	440	375	
A25	450	417	
M25	465	-	
A03	354	298	4
A06	375	320	
A10	430	375	
A16	447	382	
A25	467	422	
M25	475	-	

A Threaded Connections	E Depth 15 mm
G 1 1/4"	M12
1 1/4" NPT	1/2" UNC
G 1 1/2"	M12
1 1/2" NPT	1/2" UNC
SAE 20 (1 5/8" 12 UN)	1/2" UNC
SAE 24 (1 7/8" 12 UN)	1/2" UNC

A Flanged Connections	E Depth 15 mm
1 1/4" SAE 3000 psi/M	M12
1 1/4" SAE 3000 psi/UNC	1/2" UNC
1 1/2" SAE 3000 psi/M	M12
1 1/2" SAE 3000 psi/UNC	1/2" UNC

Filter Length	H mm
1	263
2	386
3	518
4	673

Spare parts FMP



Pos.	Description	Qty.	FMP Series FILTER						
			065 1 - 2 - 3		135 1 - 2 - 3		320 1 - 2 - 3 - 4		
1	Complete filter	1	See order table						
2	Filter element	1	See order table						
3	Bypass assembly	1	02001312 (NBR) 02001385 (FPM)				02001396 (NBR) 02001397 (FPM)		
4	Non bypass assembly	1	02001314 (NBR) 02001386 (FPM)				02001398 (NBR) 02001399 (FPM)		
5	Seal kits	1	NBR 02050267	FPM 02050278	NBR 02050293	FPM 02050294	NBR 02050274	FPM 02050285	
5a	Filter element O-Ring	1	OR 4100 Ø 24.99 x 3.53		OR 3106 Ø 26.65 x 2.62		OR 144 Ø 39.69 x 3.53		
5b	O-Ring for housing	1	OR 159 Ø 55.56 x 3.53		OR 3256 Ø 64.77 x 2.62		2 pcs.	OR 3350 Ø 88.57 x 2.62	
5c	Anti-extrusion ring	1	Parbak 227 Ø 54.53 x 3		Parbak 144 Ø 63.96 x 2.18		2 pcs.	Parbak 153 Ø 89.36 x 2.18	
5d	Gasket	1	01030058 (HNBR)	01030046 (FPM)	01030058 (HNBR)	01030046 (FPM)	01030058 (HNBR)	01030046 (FPM)	
5e	O-Ring	1	O-R 2050 Ø 12.42 x 1.78						
5f	Bp or Non Bp O-Ring	1	Bonded seal G 1/2" - FPM					O-R 3143 (NBR 90 Sh A) Ø 36,14 x 2,62	
5g	Bp or Non Bp O-Ring	1	OR 2050 Ø 12.42 x 1.78					OR 3106 Ø 26,65 x 2,62	
5h	Protective seal	1	01026521		01026509		01026510		
5m	Oil drain plug (not all model)	1	-		-		G 3/8" with bonded seal		
6	Indicator plug	1	T2H	T2V	T2H	T2V	T2H	T2V	
-	Indicators	1	See order table						

Ordering information FMP

Filter assembly FMP

Example: FMP

1	2	3	4	5	6	7	8a
<input type="checkbox"/>							
065	2	B	A	G1	A03	N	P01

Filter element HP

Example: HP

1	2	6	4	7	8b
<input type="checkbox"/>					
065	2	A03	A	N	P01

1 - Size

- 065
- 135
- 320

2 - Filter length

- 1
- 2
- 3
- 4

(only for FMP 320)

3 - Valves

- S** Without bypass side B - Optional
- B** With bypass side B - Standard
- C** With bypass side C - Optional
- D** With bypass side B + check valve*
- V** With Reverse Flow* (Only for size 320)
- Z** With Reverse Flow + bypass* (Only for size 320)
- T** Without bypass + check valve*
- E** Without bypass side C - Optional

*Reduced cross-section oilways

4 - Seals

- A** NBR
- V** FPM

5 - Connections

Type	065	135	320
<input type="checkbox"/> G1	G 1/2"	G 3/4"	G 1 1/4"
<input type="checkbox"/> G2	G 3/4"	G 1"	G 1 1/2"
<input type="checkbox"/> G3	1/2" NPT	3/4" NPT	1 1/4" NPT
<input type="checkbox"/> G4	3/4" NPT	1" NPT	1 1/2" NPT
<input type="checkbox"/> G5	SAE 8 (3/4" 16 UNF)	SAE 12 (1 - 1/16" 12 UN)	SAE 20 (1 5/8" 12 UN)
<input type="checkbox"/> G6	SAE 12 (1 - 1/16" 12 UN)	SAE 16 (1 - 5/16" 12 UN)	SAE 24 (1 7/8" 12 UN)
<input type="checkbox"/> F1	-	3/4" SAE 3000 PSI/M	1 - 1/4" SAE 3000 PSI/M
<input type="checkbox"/> F2	-	1" SAE 3000 PSI/M	1 - 1/2" SAE 3000 PSI/M
<input type="checkbox"/> F3	-	3/4" SAE 3000 PSI/UNC	1 - 1/4" SAE 3000 PSI/UNC
<input type="checkbox"/> F4	-	1" SAE 3000 PSI/UNC	1 - 1/2" SAE 3000 PSI/UNC

DIFFERENTIAL INDICATORS
(see page 15)

6 - Filter elements

- A03** Inorganic microfibre 3 μ
 - A06** Inorganic microfibre 6 μ
 - A10** Inorganic microfibre 10 μ
 - A16** Inorganic microfibre 16 μ
 - A25** Inorganic microfibre 25 μ
 - M25** Stainless steel mesh 25 μ (style N only)
- Bx (c) \geq 1000
See page 10

7 - Filter elements collapse pressure

- N** 20 bar
- H** 210 bar
- R** 20 bar (Filter with reverse flow + bypass)
- S** 210 bar (Filter with reverse flow)

8 - Options

a) Filter

- P01** MP Standard filters
- P02** Maintenance from housing base (only for FMP 320 - 4)
- Pxx** Customer request

b) Filter element

- P01** MP Filtri standard
- Pxx** Customer request

MP Filtri - The filter functions as described in this bulletin are valid exclusively for original MP Filtri filter elements and replacement parts. All rights reserved

The data in this publication is marketing information. MP Filtri reserves the right to make changes to the product described herein at any time it deems fit in relation to technical or commercial requirements. The colors of the products shown on the cover are for illustration purposes only.
Copyright. All rights reserved.

FHA 051



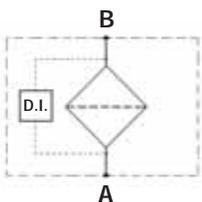
FHA

SERIES 051

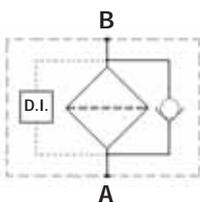
Working pressure
420 bar



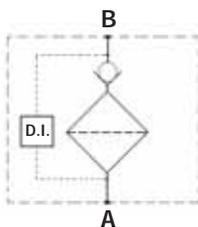
Style S



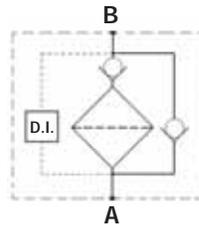
Style B



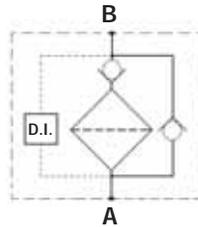
Style T



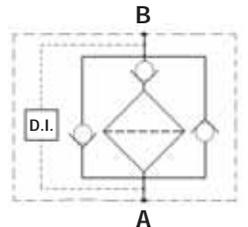
Style D



Style V



Style Z



Technical data

Filter body (Materials)

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

Pressure

- Maximum operating pressure: 420 bar (42 MPa)
- Test pressure: 630 bar (63 MPa)
- Burst pressure: 1250 bar (125 MPa)
- Pulsed pressure fatigue test 1,000,000 of cycles from 0 to 420 bar (42 MPa)

Temperature

- From -25°C to +110°C

Bypass valve

- Opening pressure 6 bar \pm 10%
- Other opening pressures on request.

Elements type Δp

- Elements in microfibre series N-R: 20 bar
- Elements in microfibre series H-S: 210 bar
- Elements in stainless steel mesh series N: 20 bar
- Oil flow from exterior to interior.

Seals

- Standard Nitrile (NBR) series A
- Optional FPM series V

Weights without filter elements (kg.)

Length

- FHA051 -1 3.0
- FHA051 -2 3.6
- FHA051 -3 3.9
- FHA051 -4 4.5
- FHA051 -5 6.1

Filter internal volumes (dm³)

Length

- FHA051 -1 0.38
- FHA051 -2 0.47
- FHA051 -3 0.57
- FHA051 -4 0.68
- FHA051 -5 0.88

Connections

In-line Inlet/Outlet

Compatibility

- Bodies compatible with:
Mineral oils to ISO 2943 - aqueous emulsions
Synthetic fluids, water/glycol.
- Filter elements compatible with:
Mineral oils to ISO 2943 - aqueous emulsions
Synthetic fluids, water/glycol.

- Nitrile (NBR) seals series A, compatible with:
Mineral oils to ISO 2943 - aqueous emulsions
Synthetic fluids, water/glycol.
- V series FPM seals, compatible with:
Synthetic fluids type HS-HFDR-HFDS-HFDU.
To ISO 2943

Filter Element Area

Filter element in stainless steel mesh

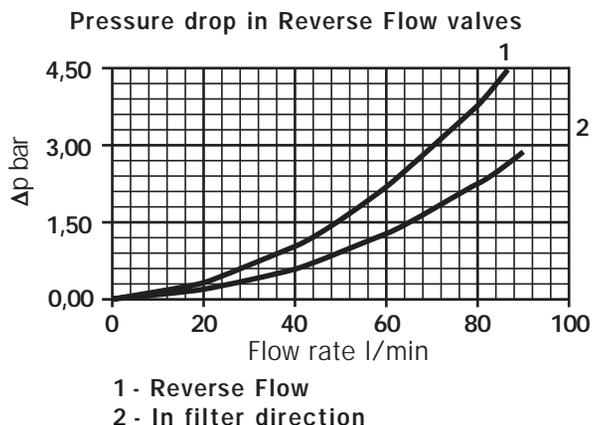
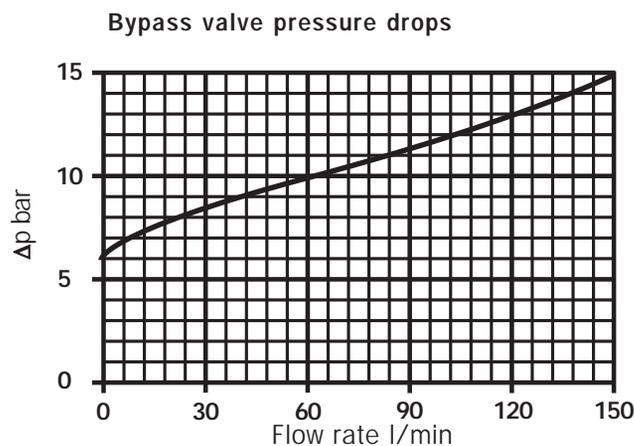
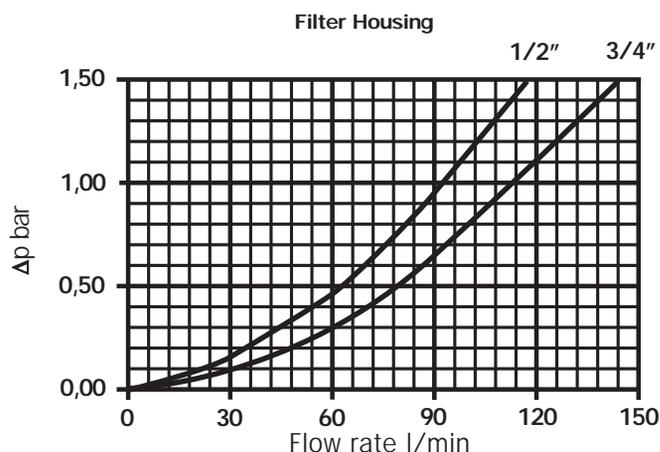
Type	Length				
	1	2	3	4	5
HP050	450	700	1000	1300	2100

Values expressed in cm²

Pressure drops Δp Housing

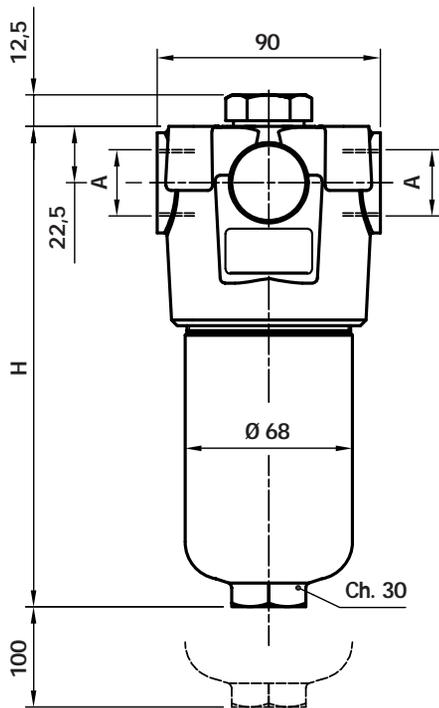
The curves are plotted using mineral oil with density of 0.86 kg/dm³ to ISO 3968.

Δp Varies proportional with density.

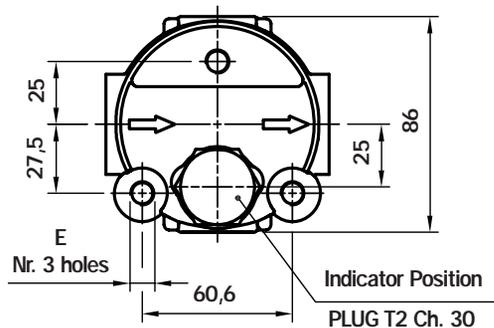


FHA 051

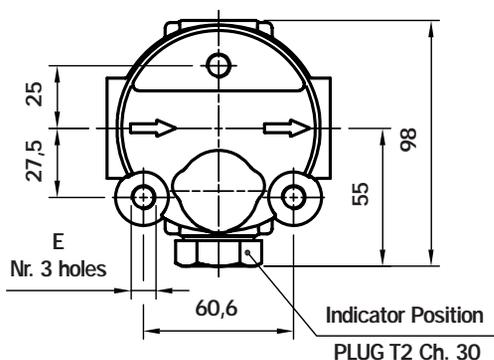
Dimensions



With standard indicator



Option P03 with 90° indicator



NB. Versions with differential indicator are supplied with plug T2.

Recommended maximum flow rate

- Pressure drop of complete filter equal to Δp 1.5 bar.
- Oil kinematic viscosity 30 mm²/s (cSt).
- Density 0.86 kg/dm³.
- Connections of filter under test G 3/4".

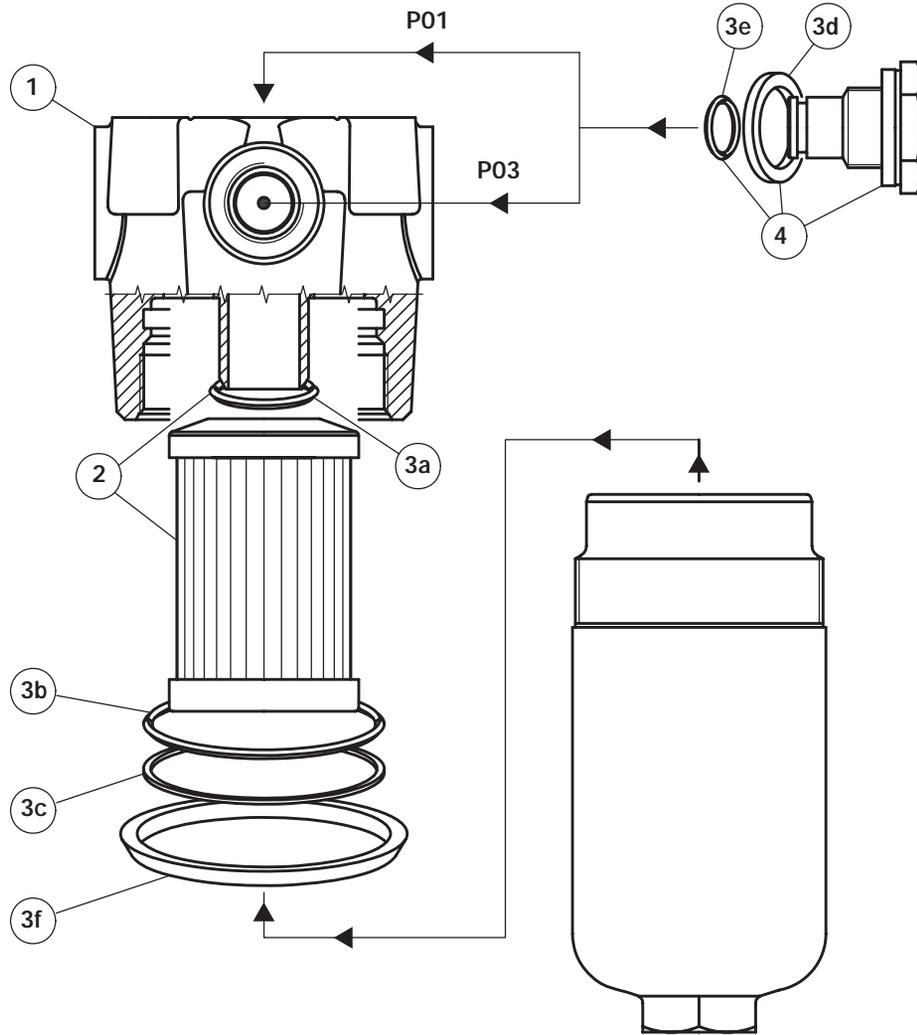
Filter element type	Flow rate l/min Series N	Flow rate l/min Series H	Filter Length
A03	42	30	1
A06	44	39	
A10	77	57	
A16	78	58	
A25	98	72	
M25	132	-	2
A03	52	45	
A06	55	49	
A10	82	74	
A16	91	84	
A25	112	105	
M25	135	-	3
A03	66	58	
A06	68	61	
A10	92	85	
A16	100	93	
A25	118	112	
M25	135	-	4
A03	80	75	
A06	85	78	
A10	105	98	
A16	108	105	
A25	120	115	
M25	135	-	5
A03	102	87	
A06	105	90	
A10	120	105	
A16	124	112	
A25	130	115	
M25	140	-	

A E Threaded Connections Depth 15 mm

M18x1,5	ISO 6149	M10
M22x1,5	ISO 6149	M10
G 1/2"		M10
G 3/4"		M10
1/2" NPT		3/8" UNC
3/4" NPT		3/8" UNC
SAE 8 (3/4" - 16 UNF)		3/8" UNC
SAE 12 (1 1/16" - 12 UN)		3/8" UNC

Filter Length	H mm
1	157
2	192
3	234
4	282
5	409

Spare parts FHA051



Pos.	Description	Qty.	Series FHA 051 FILTER 051 1 - 2 - 3 - 4 - 5	
1	Complete filter	1	See order table	
2	Filter element	1	See order table	
3	Seal kits	1	NBR 02050288	FPM 02050305
3a	O-Ring for filter element	1	OR 3093 Ø 23.67 x 2.62	
3b	O-Ring for housing	1	O-R 3237 Ø 60 x 2.62	
3c	Anti-extrusion ring	1	Parbak 141 Ø 59.21 x 2.18	
3d	Gasket	1	01030058 (HNBR)	01030046 (FPM)
3e	O-Ring	1	OR 2050 Ø 12.42 x 1.78	
3f	Protection seal	1	01026521	
4	Indicator plug	1	T2H	T2V
-	Indicator	1	See order table	

Ordering information FHA 051

Filter assembly

FHA 051

Example: FHA051

Filter element

HP 050

Example: HP050

1	2	3	4	5	6	7 _a
<input type="checkbox"/>						
2	B	A	C	A10	N	P01
1	5	3	6	7 _b		
<input type="checkbox"/>						
2	A10	A	N	P01		

1 - Filter lengths

1
2
3
4
5

2 - Bypass valve

S	Without bypass
B	With bypass
D	With bypass + check valve*
V	With Reverse Flow*
Z	With Reverse Flow + bypass*
T	Without bypass + check valve*

*Reduced cross-section oilways

3 - Seals

A	NBR
V	FPM

4 - Threaded connections

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

5 - Filter elements

A03	Inorganic microfibre 3 µ	} Bx (c) ≥ 1000 see page 10
A06	Inorganic microfibre 6 µ	
A10	Inorganic microfibre 10 µ	
A16	Inorganic microfibre 16 µ	
A25	Inorganic microfibre 25 µ	
M25	Stainless steel mesh 25 µ (style N only)	

6 - Filter elements collapse pressure

N	20 bar
R	20 bar (Filter with reverse flow + bypass)
S	210 bar

7 - Options

a) Filter

P01	Standard threaded connection for indicator
P02	Without threaded connection for indicator
P03	Threaded connection for 90° indicator
Pxx	Customer request

b) Filter element

P01	MP Filtri standard
Pxx	Customer request

DIFFERENTIAL INDICATORS (see page 15)

MP Filtri - The filter functions as described in this bulletin are valid exclusively for original MP Filtri filter elements and replacement parts. All rights reserved

The data in this publication is marketing information. MP Filtri reserves the right to make changes to the product described herein at any time it deems fit in relation to technical or commercial requirements. The colors of the products shown on the cover are for illustration purposes only.

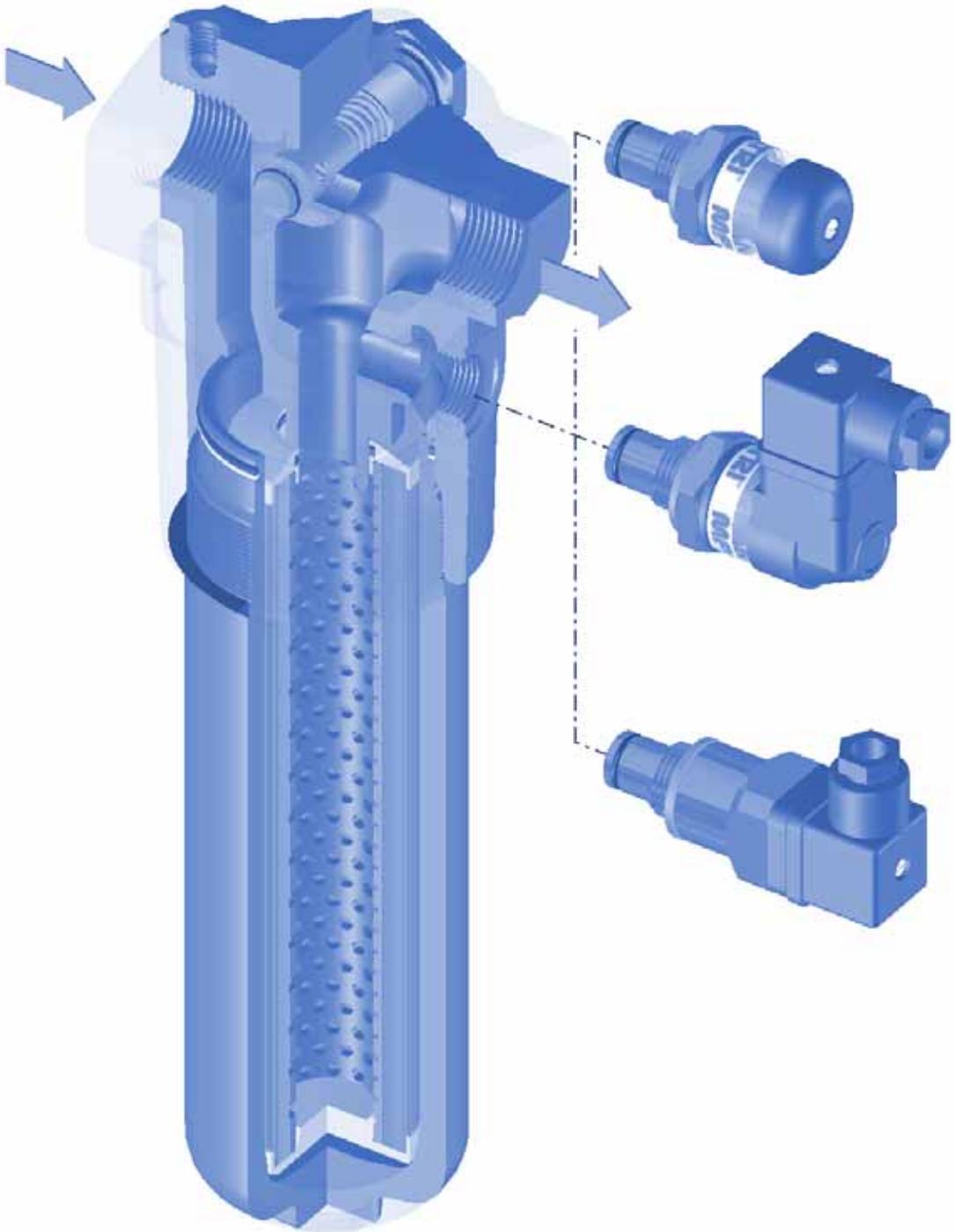
Copyright. All rights reserved.

FHP

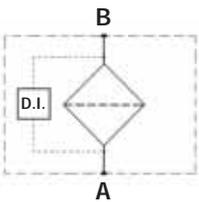


SERIES FHP

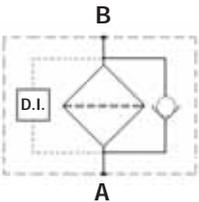
Working pressure
420 bar



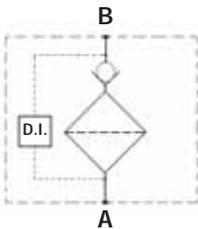
Style S



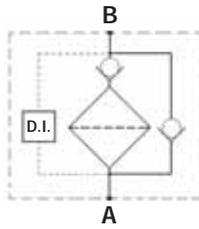
Style B



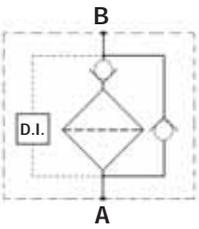
Style T



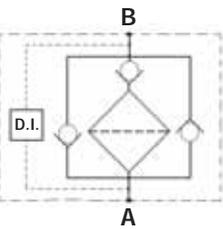
Style D



Style V



Style Z



Technical data

Filter body (Materials)

- Head: Cast iron (chemical heat treatment)
- Housing: Steel (chemical heat treatment)
- Bypass valve: Brass
- Reverse Flow: Steel (only for series 320)

Pressure

- Maximum operating pressure: 420 bar (42 MPa)
- Test pressure: 630 bar (63 MPa)
- Burst pressure: 1250 bar (125 MPa)
- Pulsed pressure fatigue test 1,000,000 of cycles with pressure from 0 to 420 bar (42 MPa)

Temperature

- From -25°C to +110°C

Bypass valve

- Opening pressure 6 bar \pm 10%
- Other opening pressures on request.

Elements type Δp

- Elements in microfibre series N-R: 20 bar
- Elements in microfibre series H-S: 210 bar
- Elements in stainless steel mesh series N: 20 bar
- Oil flow from exterior to interior.

Seals

- Standard Nitrile (NBR) series A
- Optional FPM series V

Weights without filter elements (kg.)

Length	1	2	3	4
• FHP 065	3.9	4.2	5.7	—
• FHP 135	7.5	9.4	12	—
• FHP 320/321	14.5	16.5	22.5	25.5

Filter internal volumes (dm³)

Length	1	2	3	4
• FHP 065	0.35	0.40	0.60	—
• FHP 135	0.55	0.85	1.20	—
• FHP 320/321	1.25	1.95	2.80	3.50

Connections

In-line Inlet/Outlet
Style FHP 321 inlet/outlet 90°

Compatibility

- Bodies compatible with:
Mineral oils to ISO 2943 - aqueous emulsions
Synthetic fluids, water/glycol.
- Filter elements compatible with:
Mineral oils to ISO 2943 - aqueous emulsions
Synthetic fluids, water/glycol.
- Nitrile (NBR) seals series A, compatible with:
Mineral oils to ISO 2943 - aqueous emulsions
Synthetic fluids, water/glycol.
- V series FPM seals, compatible with:
Synthetic fluids type HS-HFDR-HFDS-HFDU.
To ISO 2943

Filter Element Area

Filter element in stainless steel mesh
Length

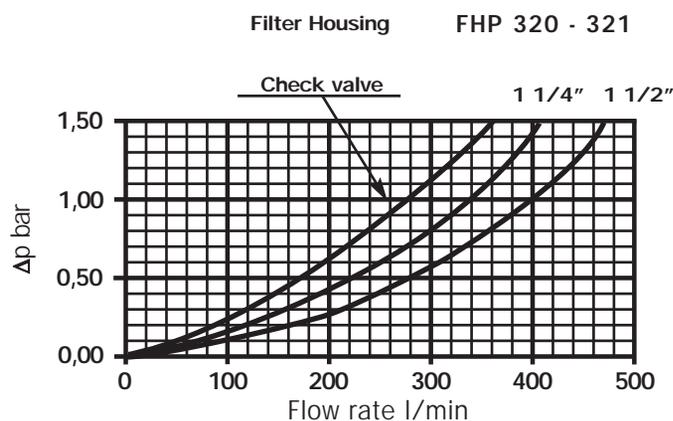
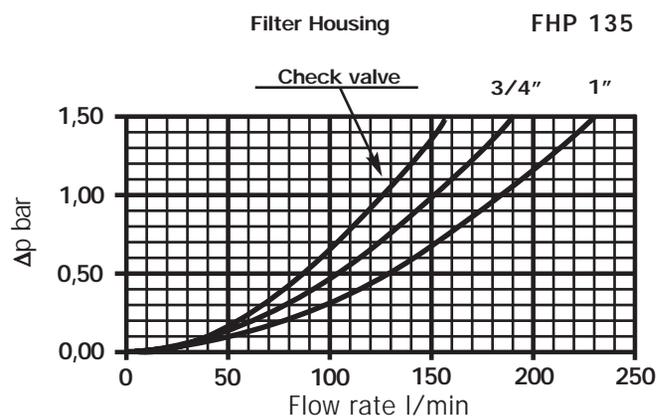
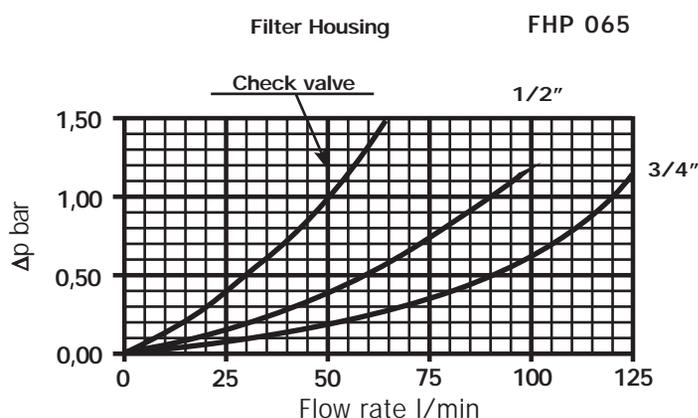
Type	1	2	3	4
HP065	374	530	1064	-
HP135	950	2020	2700	-
HP320	1650	3645	5970	8280

Values expressed in cm²

Pressure drops Δp Housing

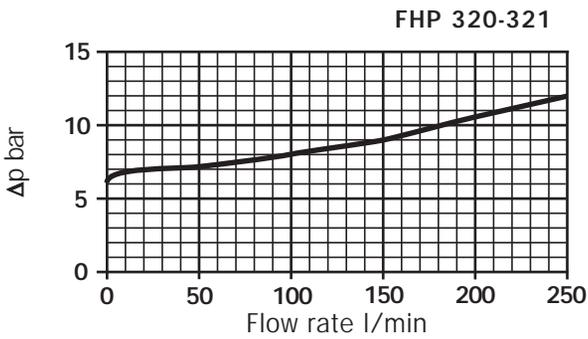
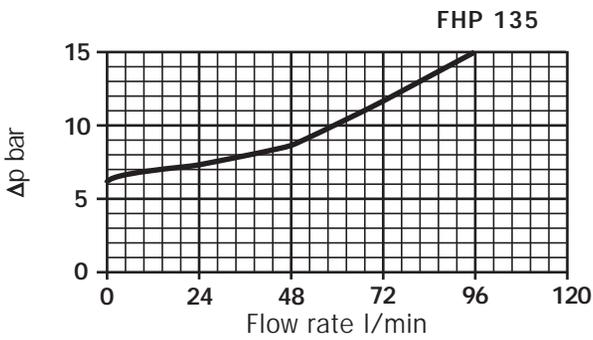
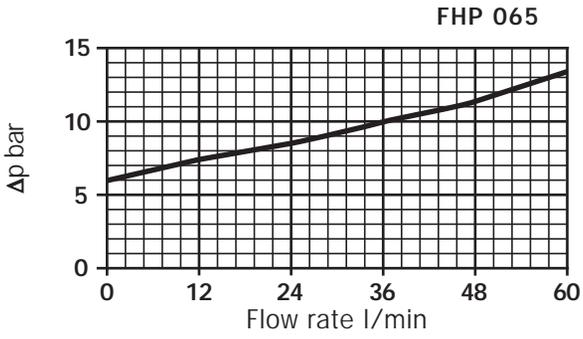
The curves are plotted using mineral oil with density of 0.86 kg/dm³ to ISO 3968.

Δp varies proportional with density.

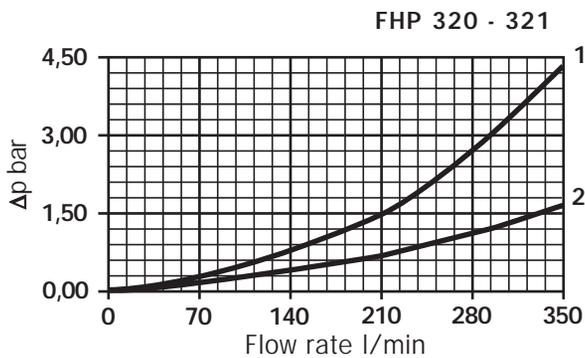


Valves

Pressure drop in bypass valve

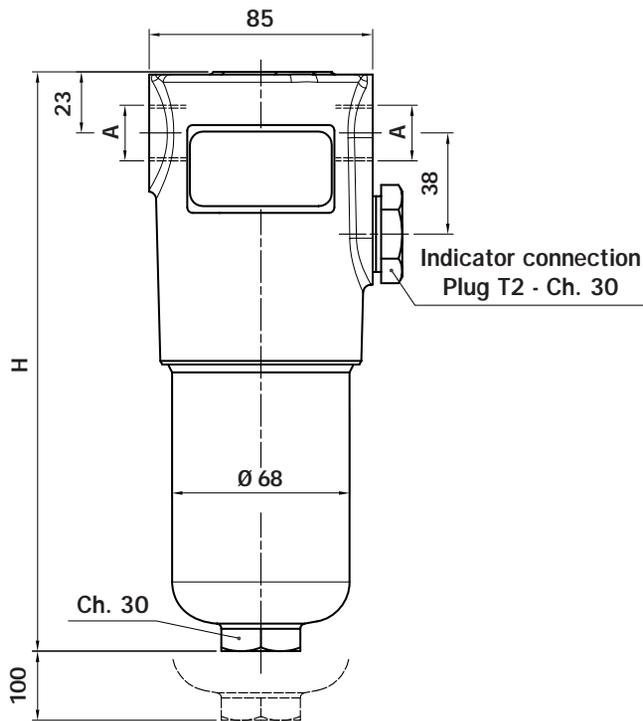


Pressure drop in reverse flow valves



- 1 - Reverse Flow
- 2 - In filter direction

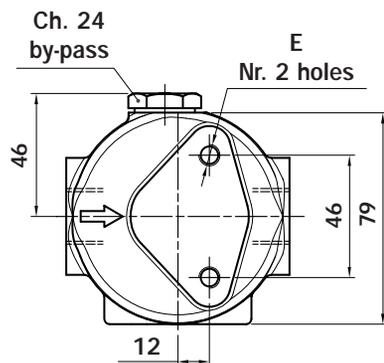
FHP065



Recommended maximum flow rate

- Pressure drop of complete filter equal to Δp 1.5 bar.
- Oil kinematic viscosity 30 mm²/s (cSt).
- Density 0.86 kg/dm³.
- Connections of filter under test G 3/4".

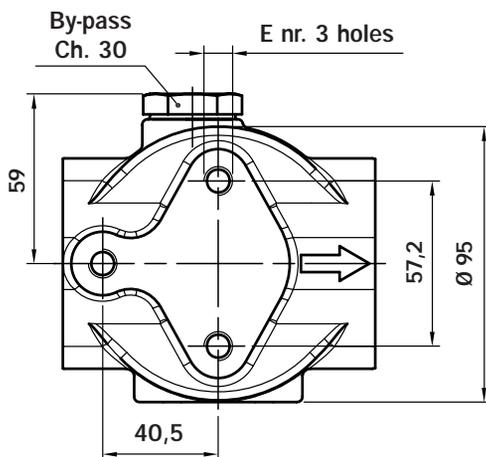
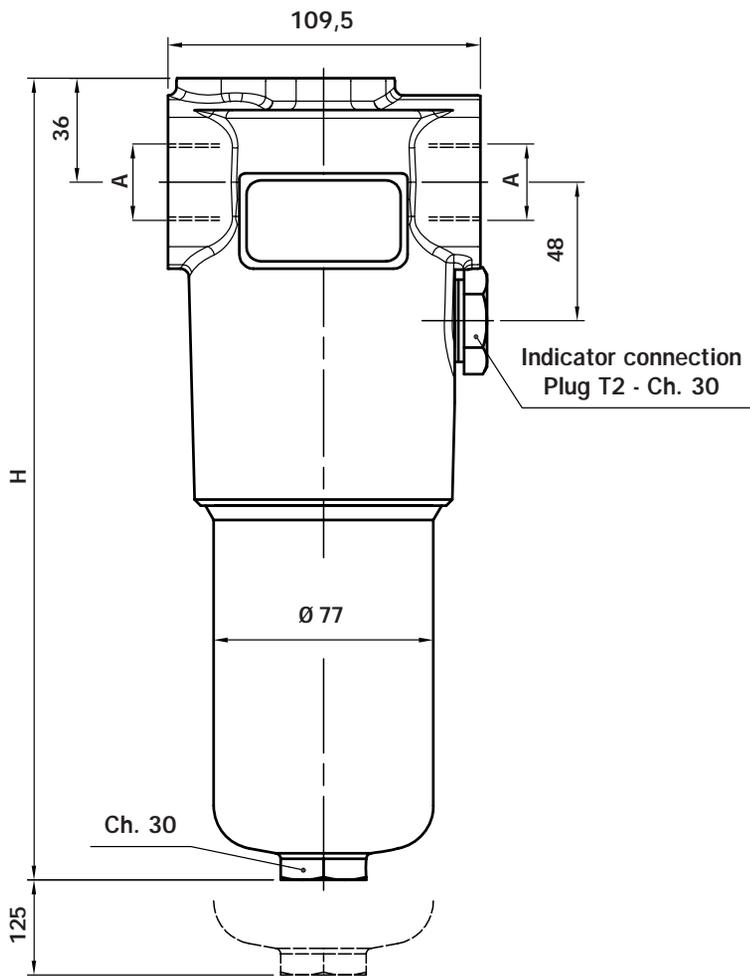
Filter element type	Flow rate l/min Series N	Flow rate l/min Series H	Filter Length
A03	23	22	1
A06	30	23	
A10	48	43	
A16	53	50	
A25	72	68	
M25	105	-	
A03	31	30	2
A06	45	35	
A10	60	57	
A16	64	63	
A25	82	77	
M25	106	-	
A03	53	52	3
A06	61	58	
A10	79	78	
A16	84	83	
A25	94	93	
M25	108	-	



A Threaded Connections	E Depth 15 mm
G 1/2"	M8
G 3/4"	M8
1/2" NPT	5/16" UNC
3/4" NPT	5/16" UNC
SAE 8 (3/4"- 16 UNF)	5/16" UNC
SAE 12 (1 1/16"- 12 UN)	5/16" UNC

Filter Length	H mm
1	200
2	230
3	330

FHP135



Recommended maximum flow rate

- Pressure drop of complete filter equal to Δp 1.5 bar.
- Oil kinematic viscosity 30 mm²/s (cSt).
- Density 0.86 kg/dm³.
- Connections of filter under test G 1".

Filter element type	Flow rate l/min Series N	Flow rate l/min Series H	Filter Length
A03	69	50	1
A06	74	57	
A10	120	98	
A16	129	101	
A25	171	156	
M25	200	-	
A03	110	91	2
A06	117	110	
A10	148	136	
A16	151	139	
A25	208	175	
M25	230	-	
A03	150	126	3
A06	153	140	
A10	192	170	
A16	195	179	
A25	213	196	
M25	232	-	

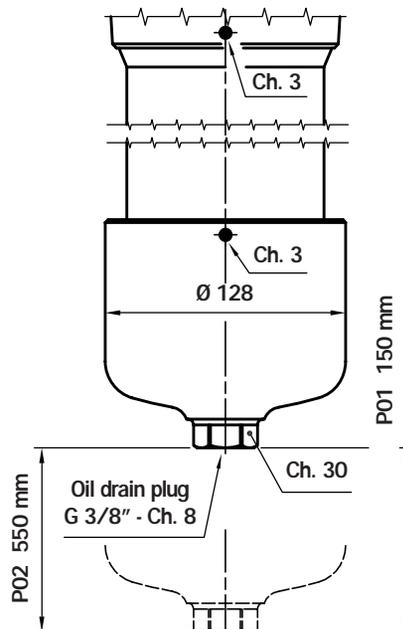
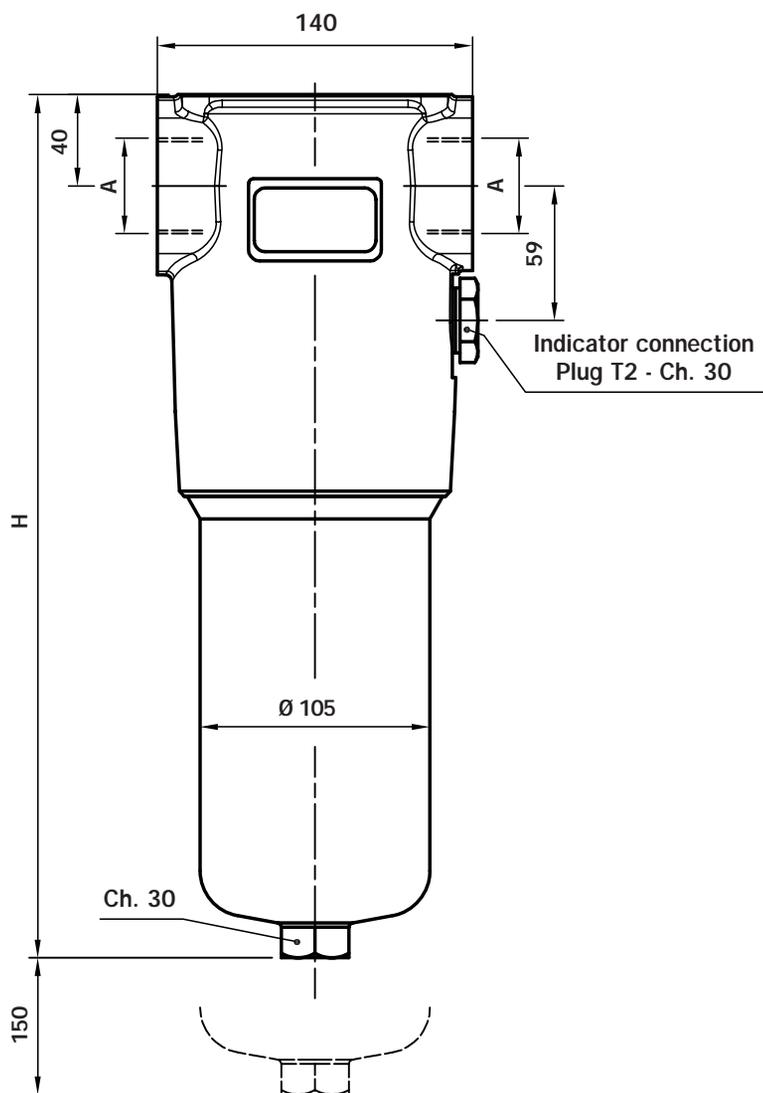
A Threaded Connections	E Depth 15 mm
G 3/4"	M10
G 1"	M10
3/4" NPT	3/8" UNC
1 NPT	3/8" UNC
SAE 12 (1 1/16"- 12 UN)	3/8" UNC
SAE 16 (1 5/16"- 12 UN)	3/8" UNC

A Flanged Connections	E Depth 15 mm
3/4" SAE 3000 psi/M	M10
1" SAE 3000 psi/M	M10
3/4" SAE 3000 psi/UNC	3/8" UNC
1" SAE 3000 psi/UNC	3/8" UNC
3/4" SAE 6000 psi/M	M10
3/4" SAE 6000 psi/UNC	3/8" UNC

Filter Length	H mm
1	260
2	373
3	448

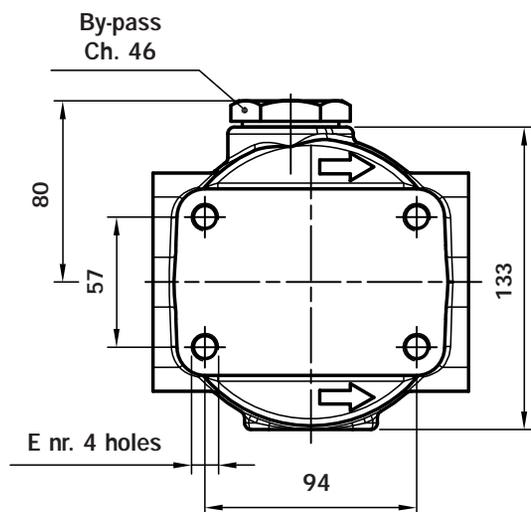
FHP320/321

Only for FHP 320 length 4

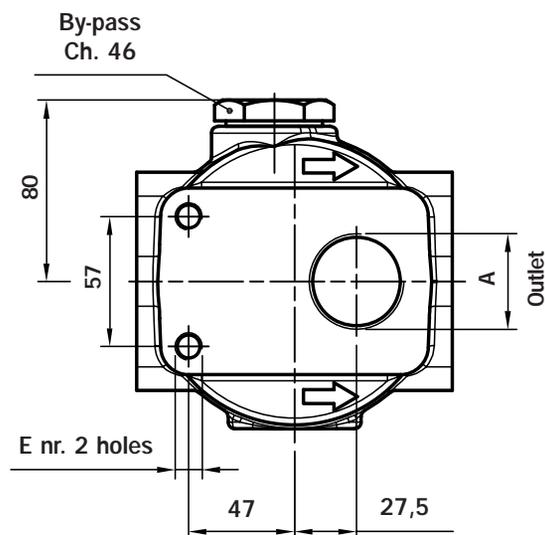


Style P01 standard maintenance from head.
Style P02 maintenance option from housing base.

FHP 320



FHP 321
Top Outlet



Recommended maximum flow rate

- Pressure drop of complete filter equal to Δp 1.5 bar.
- Oil kinematic viscosity 30 mm²/s (cSt).
- Density 0.86 kg/dm³.
- Connections of filter under test G 1 1/2".

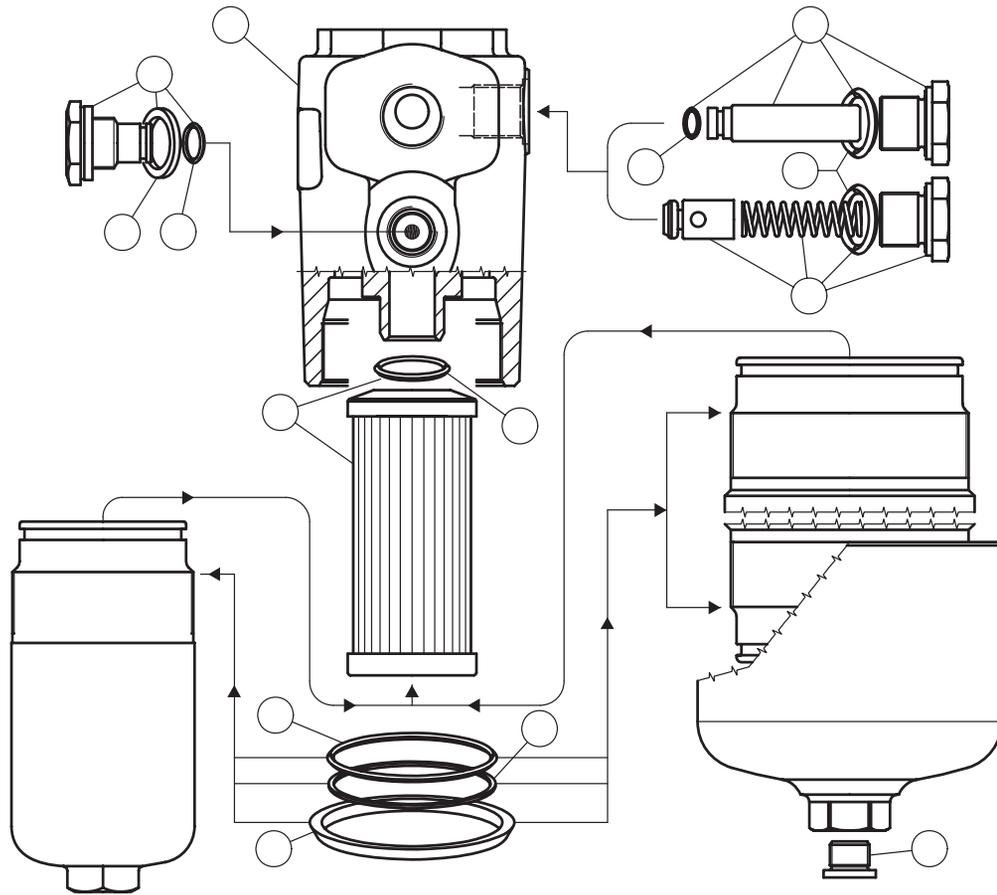
Filter element type	Flow rate l/min Series N	Flow rate l/min Series H	Filter Length
A03	126	107	1
A06	137	112	
A10	230	185	
A16	274	193	
A25	330	292	
M25	425	-	
A03	248	192	2
A06	270	220	
A10	376	300	
A16	395	312	
A25	440	378	
M25	445	-	
A03	319	255	3
A06	353	300	
A10	427	367	
A16	440	375	
A25	450	417	
M25	465	-	
A03	354	298	4
A06	375	320	
A10	430	375	
A16	447	382	
A25	467	422	
M25	475	-	

A Threaded Connections	E Depth 15 mm
G 1 1/4"	M12
G 1 1/2"	M12
1 1/4" NPT	1/2" UNC
1 1/2" NPT	1/2" UNC
SAE 20 (1 5/8"- 12 UN)	1/2" UNC
SAE 24 (1 7/8"- 12 UN)	1/2" UNC

A Flanged Connections (For FHP 320)	E Depth 15 mm
1 1/4" SAE 3000 psi/M	M12
1 1/2" SAE 3000 psi/M	M12
1 1/4" SAE 3000 psi/UNC	1/2" UNC
1 1/2" SAE 3000 psi/UNC	1/2" UNC
1 1/4" SAE 6000 psi/M	M12
1 1/4" SAE 6000 psi/UNC	1/2" UNC

Filter Length	H mm
1	298
2	422
3	554
4	709

Spare parts FHP



Pos.	Description	Qty.	FHP Series FILTER					
			065 1 - 2 - 3		135 1 - 2 - 3		320 1 - 2 - 3 - 4	
1	Complete filter	1	See order table					
2	Filter element	1	See order table					
3	Bypass assembly	1	02001116 (NBR) 02001136 (FPM)		02001117 (NBR) 02001137 (FPM)		02001118 (NBR) 02001138 (FPM)	
4	Non bypass assembly	1	02001142 (NBR) 02001139 (FPM)		02001143 (NBR) 02001392 (FPM)		02001144 (NBR) 02001395 (FPM)	
5	Seal kits	1	NBR 02050265	FPM 02050276	NBR 02050269	FPM 02050280	NBR 02050272	FPM 02050283
5a	Filter element O-Ring	1	OR 4100 Ø 24.99 x 3.53		OR 3106 Ø 26.65 x 2.62		OR 144 Ø 39.69 x 3.53	
5b	O-Ring for housing	1	OR 159 Ø 55.56 x 3.53		OR 3256 Ø 64.77 x 2.62		2 pcs.	OR 3350 Ø 88.57 x 2.62
5c	Anti-extrusion ring	1	Parbak 227 Ø 54.53 x 3		Parbak 144 Ø 63.96 x 2.18		2 pcs.	Parbak 153 Ø 89.36 x 2.18
5d	Gasket	1	01030058 (HNBR)	01030046 (FPM)	01030058 (HNBR)	01030046 (FPM)	01030058 (HNBR)	01030046 (FPM)
5e	O-Ring	1	O-R 2050 Ø 12.42 x 1.78					
5f	Bp or Non Bp O-Ring	1	OR 121 Ø 15.88 x 2.62		OR 3087(NBR 90 Sh A) Ø 21.89 x 2.62		OR 3143 (NBR 90 Sh A) Ø 36.14 x 2.62	
5g	Bp or Non Bp O-Ring	1	OR 2031 Ø 7.65 x 1.78		OR 2037 Ø 9.25 x 1.78		OR 2081 Ø 20.35 x 1.78	
5h	Protective seal	1	01026521		01026509		01026510	
5m	Drain plug	1					G 3/8" with seal	
6	Indicator plug	1	T2H			T2V		
-	Indicators	1	See order table					

Ordering information FHP

Filter assembly FHP

Example: FHP

1	2	3	4	5	6	7	8a
<input type="text"/>							
135	1	S	A	G1	A03	H	P01

Filter element HP

Example: HP

1	2	4	6	7	8b
<input type="text"/>					
135	1	A	A03	H	P01

1 - Size

065
135
320
321

2 - Filter length

1
2
3
4

(only for FHP 320-321)

3 - Valves

S
B
D
V
Z
T

Without bypass

With bypass

With bypass + chek valve*

With Reverse Flow*
(only for FHP 320)

With Reverse Flow + bypass
(only for FHP 320)

With bypass + chek valve*
(only for FHP 320)

*Reduced cross-section oilways

4 - Seals

A
V

NBR

FPM

6 - Filter elements

A03
A06
A10
A16
A25
M25

Inorganic microfibre 3 μ

Inorganic microfibre 6 μ

Inorganic microfibre 10 μ

Inorganic microfibre 16 μ

Inorganic microfibre 25 μ

Stainless steel mesh 25 μ (style N only)

$\beta_x(c) \geq 1000$
See page 10

7 - Filter elements differential pressure

N
H

20 bar

210 bar

R
S

(Filter with Reverse Flow + bypass)

(Filter with Reverse Flow)

8 - Options

a) Filter

P01
P02
Pxx

MP Standard filters

Maintenance from base of housing (FHP 320 - 4 only)

Customer request

b) Filter element

P01
Pxx

MP Filtri standard

Customer request

5 - Connections

Type	065	135	320	321
G1	G 1/2"	G 3/4"	G 1 1/4"	G 1 1/4"
G2	G 3/4"	G 1"	G 1 1/2"	G 1 1/2"
G3	1/2" NPT	3/4" NPT	1 1/4" NPT	1 1/4" NPT
G4	3/4" NPT	1" NPT	1 1/2" NPT	1 1/2" NPT
G5	SAE 8	SAE 12	SAE 20	SAE 20
G6	SAE 12	SAE 16	SAE 24	SAE 24
F1	-	3/4" SAE 3000 PSI/M	1 1/4" SAE 3000 PSI/M	-
F2	-	1" SAE 3000 PSI/M	1 1/2" SAE 3000 PSI/M	-
F3	-	3/4" SAE 3000 PSI/UNC	1 1/4" SAE 3000 PSI/UNC	-
F4	-	1" SAE 3000 PSI/UNC	1 1/2" SAE 3000 PSI/UNC	-
F5	-	3/4" SAE 6000 PSI/M	1 1/4" SAE 6000 PSI/M	-
F6	-	3/4" SAE 6000 PSI/UNC	1 1/4" SAE 6000 PSI/UNC	-

DIFFERENTIAL INDICATORS
(see page 15)

MP Filtri - The filter functions as described in this bulletin are valid exclusively for original MP Filtri filter elements and replacement parts. All rights reserved

The data in this publication is marketing information. MP Filtri reserves the right to make changes to the product described herein at any time it deems fit in relation to technical or commercial requirements. The colors of the products shown on the cover are for illustration purposes only.

Copyright. All rights reserved.

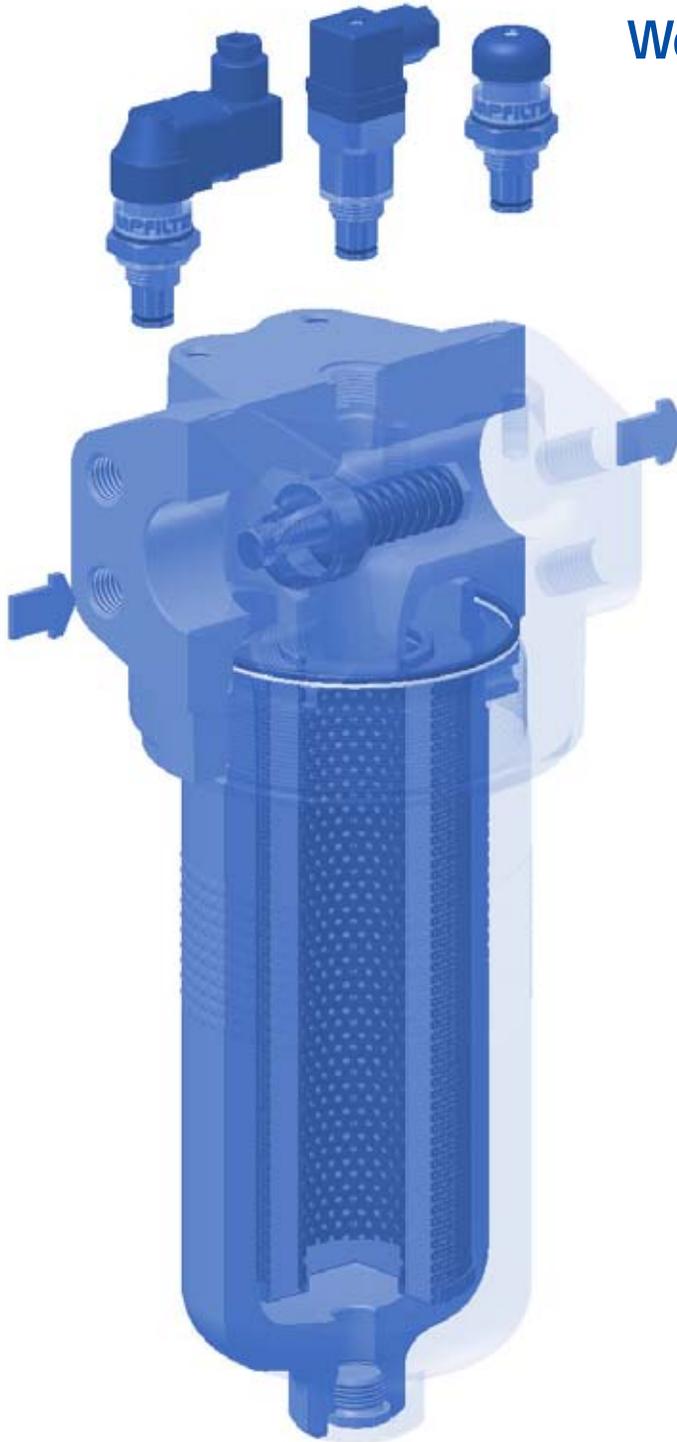
FHP 500



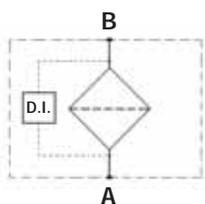
FHP

SERIES 500

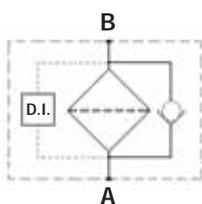
Working pressure
420 bar



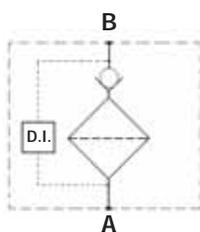
Style S



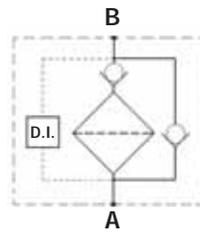
Style B



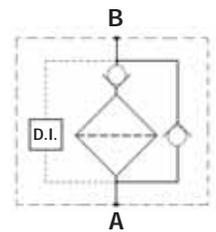
Style T



Style D



Style V



Technical data

Filter body (Materials)

- Head: Cast iron (chemical heat treatment)
- Housing: Steel (chemical heat treatment)
- Bypass valve: Steel
- Reverse Flow: Steel
- Check valve: Steel

Pressure

- Maximum operating pressure: 420 bar (42 MPa)
- Test pressure: 630 bar (63 MPa)
- Burst pressure: 1250 bar (125 MPa)
- Pulsed pressure fatigue test 1,000,000 of cycles with pressure from 0 to 420 bar (42 MPa)

Temperature

- From -25°C to +110°C

Bypass valve

- Opening pressure 6 bar \pm 10%
- Other opening pressures on request.

Elements type Δp

- Elements in microfibre series N: 20 bar
- Elements in microfibre series S: 210 bar
- Elements in stainless steel mesh series N: 20 bar
- Oil flow from exterior to interior.

Seals

- Standard Nitrile (NBR) series A
- Optional FPM series V

Weights without filter elements (kg.)

Length	1	2	3	4	5
• FHP 500	27	31	35	46	53

Filter internal volumes (dm³)

Length	1	2	3	4	5
• FHP 500	2.66	3.39	4.02	5.26	6.59

Connections

In-line Inlet/Outlet

Compatibility

- Bodies compatible with:
Mineral oils to ISO 2943 - aqueous emulsions
Synthetic fluids, water/glycol.
- Filter elements compatible with:
Mineral oils to ISO 2943 - aqueous emulsions
Synthetic fluids, water/glycol.
- Nitrile (NBR) seals series A, compatible with:
Mineral oils to ISO 2943 - aqueous emulsions
Synthetic fluids, water/glycol.
- V series FPM seals, compatible with:
Synthetic fluids type HS-HFDR-HFDS-HFDU.
To ISO 2943

Filter Element Area

Filter element in stainless steel mesh

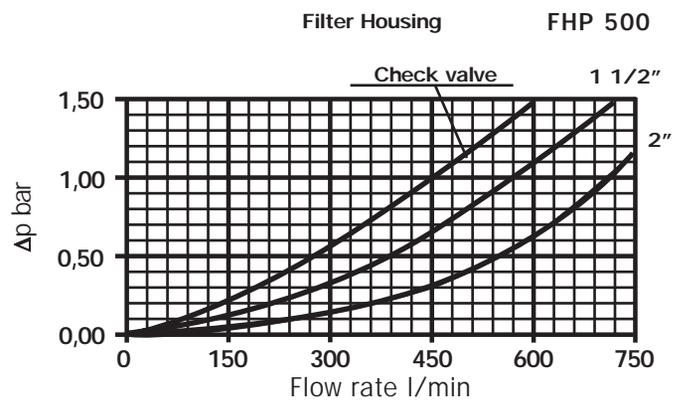
Type	Length				
	1	2	3	4	5
HP500	3030	4900	6500	9800	13000

Values expressed in cm²

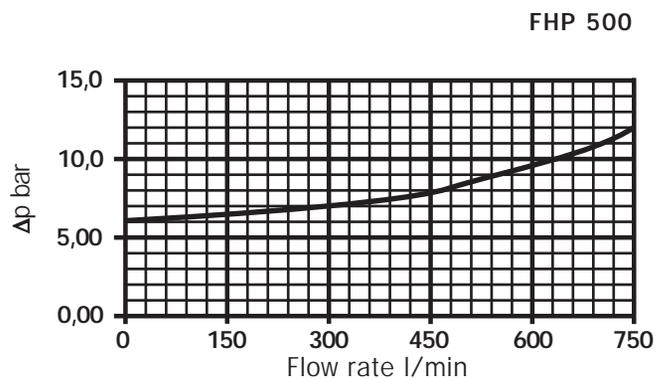
Pressure drops Δp Housing

The curves are plotted using mineral oil with density of 0.86 kg/dm³ to ISO 3968.

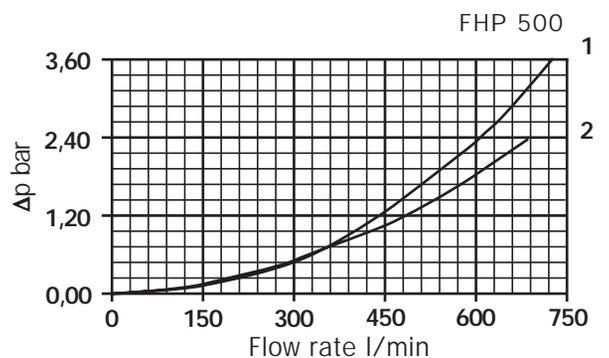
Δp varies proportional with density.



Bypass valve pressure drop



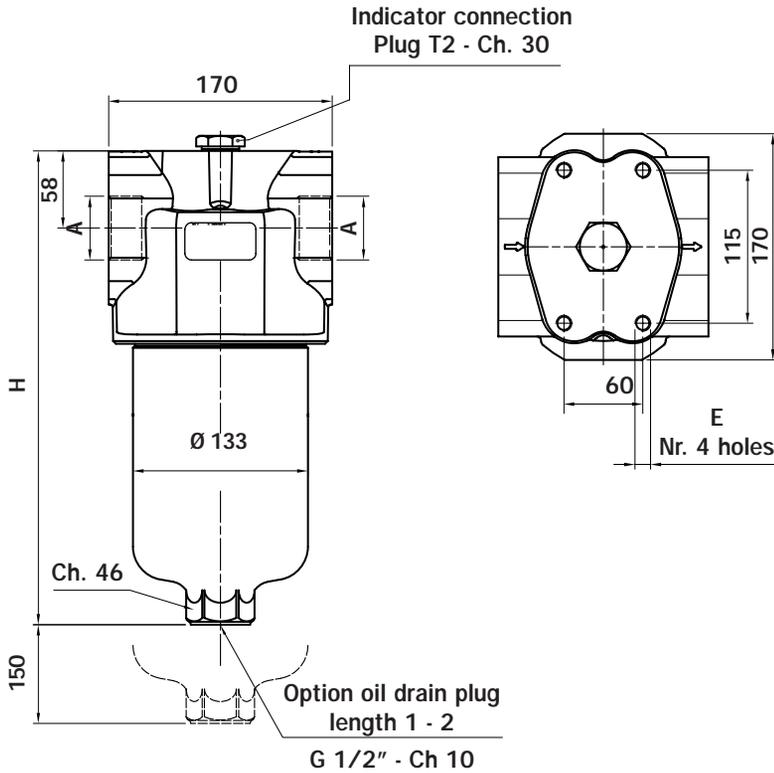
Bypass valve pressure drop



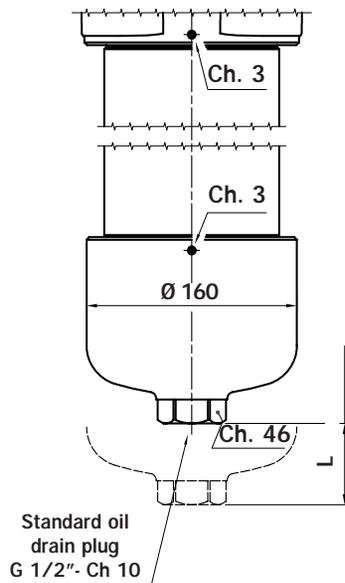
- 1 - Reverse Flow
- 2 - In filter direction

FHP 500

Dimensions



Only for FHP 500 length 4/5



Style P01	
L mm	Filter length
150	4/5

Style P02	
L mm	Filter length
480	4
650	5

Style P01 standard maintenance from head.
Style P02 maintenance option from housing base.

Filter Length	H mm
1	335
2	424
3	500
4	657
5	823

A	E
Threaded Connections	Depth 15 mm
G 1 1/2"	M12
1 1/2" NPT	1/2" UNC
SAE 24 (1 7/8" - 12 UN)	1/2" UNC

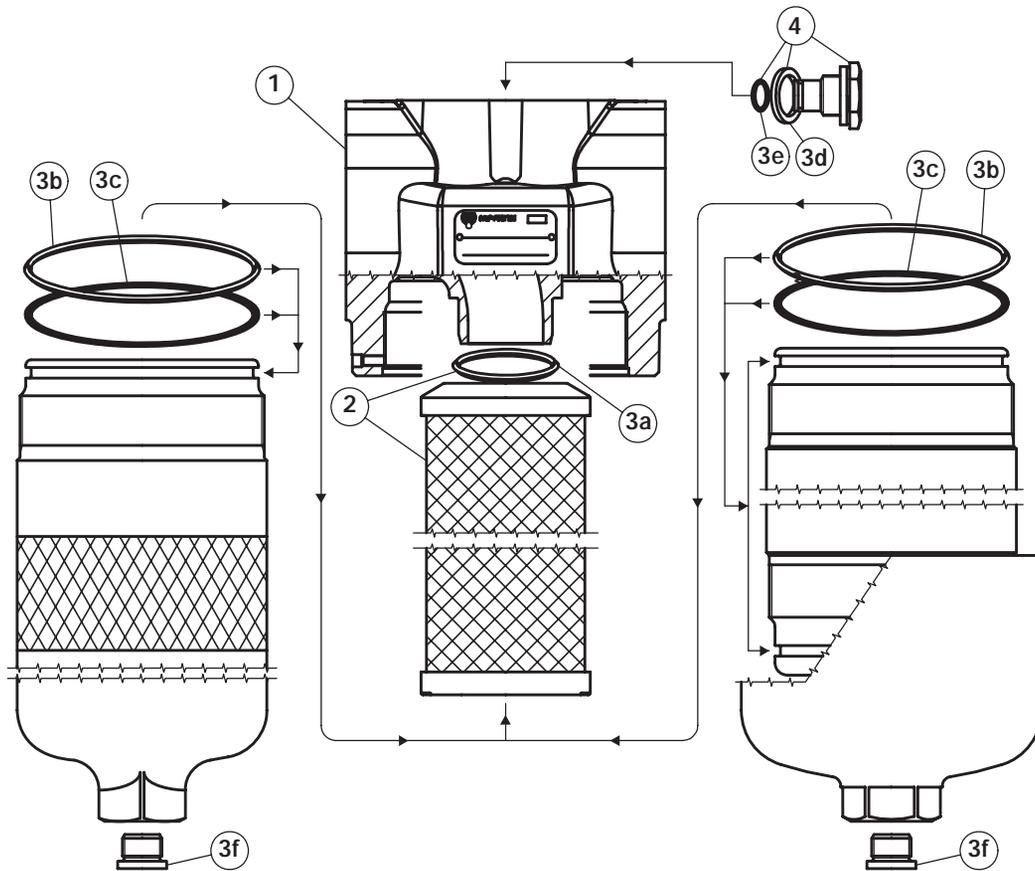
Recommended maximum flow rate

- Pressure drop of complete filter equal to Δp 1.5 bar.
- Oil kinematic viscosity 30 mm²/s (cSt).
- Density 0.86 kg/dm³.
- Connections of filter under test FLANGE 2" SAE 6000 PSI.

Filter element type	Flow rate l/min Series N	Flow rate l/min Series S	Filter Length
A03	280	140	1
A06	300	165	
A10	370	260	
A16	370	275	
A25	430	370	
M25	650	-	
A03	315	240	2
A06	325	270	
A10	425	350	
A16	450	360	
A25	480	425	
M25	700	-	
A03	390	290	3
A06	400	300	
A10	465	390	
A16	470	410	
A25	500	450	
M25	700	-	
A03	550	390	4
A06	600	450	
A10	650	465	
A16	650	600	
A25	700	650	
M25	750	-	
A03	600	515	5
A06	645	520	
A10	680	645	
A16	710	650	
A25	750	720	
M25	750	-	

A	E
Flanged Connections	Depth 15 mm
1 1/2" SAE 3000 psi/M	M12
1 1/2" SAE 3000 psi/UNC	1/2" UNC
2" SAE 3000 psi/M	M12
2" SAE 3000 psi/UNC	1/2" UNC
1 1/2" SAE 6000 psi/M	M12
1 1/2" SAE 6000 psi/UNC	1/2" UNC
2" SAE 6000 psi/M	M12
2" SAE 6000 psi/UNC	1/2" UNC

Spare parts FHP 500



Pos.	Description	Qty.	FHP 500 Series FILTER 500 1 - 2 - 3 - 4 - 5	
1	Complete filter	1	See order table	
2	Filter element	1	See order table	
3	Seal kits	1	NBR 02050330	FPM 02050331
3a	Filter element O-Ring	1	OR 153 Ø 49,21 x 3,53	
3b	O-Ring for housing	2	OR 4462 Ø 117,10 x 3,53	
3c	Anti-extrusion ring	2	Parbak 247 Ø 117,63 x 3	
3d	Gasket	1	01030058 (HNBR)	01030046 (FPM)
3e	O-Ring	1	OR 2050 Ø 12,42 x 1,78	
3f	Oil drain plug	1	G 1/2" with seal	
4	Indicator plug	1	T2H	T2V
-	Indicators	1	See order table	

Ordering information FHP 500

Filter assembly

FHP 500

Example: FHP500

Filter element

HP 500

Example: HP500

	1	2	3	4	5	6	7a
Filter assembly	<input type="checkbox"/>						
Filter element	4	B	A	G1	A10	N	P01
Filter element	1	5	3	6	7b		
Filter element	<input type="checkbox"/>						
Filter element	4	A10	A	N	P01		

1 - Filter length

- 1
- 2
- 3
- 4
- 5

2 - Bypass valve

- S Without bypass
- B With bypass
- V With Reverse Flow*
- D With bypass + check valve*
- T Without bypass + check valve*

*Reduced cross-section oilways

3 - Seals

- A NBR
- V FPM

4 - Connections

<input type="checkbox"/> G1	G 1 1/2"
<input type="checkbox"/> G2	1 1/2" NPT
<input type="checkbox"/> G3	SAE 24 (1 7/8" 12 UN)
<input type="checkbox"/> F1	1 1/2"SAE - 3000 PSI/M
<input type="checkbox"/> F2	1 1/2"SAE - 3000 PSI/UNC
<input type="checkbox"/> F3	2"SAE - 3000 PSI/M
<input type="checkbox"/> F4	2"SAE - 3000 PSI/UNC
<input type="checkbox"/> F5	1 1/2"SAE - 6000 PSI/M
<input type="checkbox"/> F6	1 1/2"SAE - 6000 PSI/UNC
<input type="checkbox"/> F7	2"SAE - 6000 PSI/M
<input type="checkbox"/> F8	2"SAE - 6000 PSI/UNC

5 - Filter elements

- A03 Inorganic microfibre 3 μ
 - A06 Inorganic microfibre 6 μ
 - A10 Inorganic microfibre 10 μ
 - A16 Inorganic microfibre 16 μ
 - A25 Inorganic microfibre 25 μ
 - M25 Stainless steel mesh 25 μ (style N only)
- Bx (c) \geq 1000
See page 10

6 - Filter elements collapse pressure

- N 20 bar
- S 210 bar

7 - Options

a) Filter

- P01 MP Filtri standard
- P02 MP with replacement of the filter element from the cap (only for length 4 and 5)
- P03 Oil drain plug (only for length 1 and 2) (standard only for length 3 - 4 - 5)
- Pxx Customer request

b) Filter element

- P01 MP Filtri standard
- Pxx Customer request

DIFFERENTIAL INDICATORS (see page 15)

MP Filtri - The filter functions as described in this bulletin are valid exclusively for original MP Filtri filter elements and replacement parts. All rights reserved

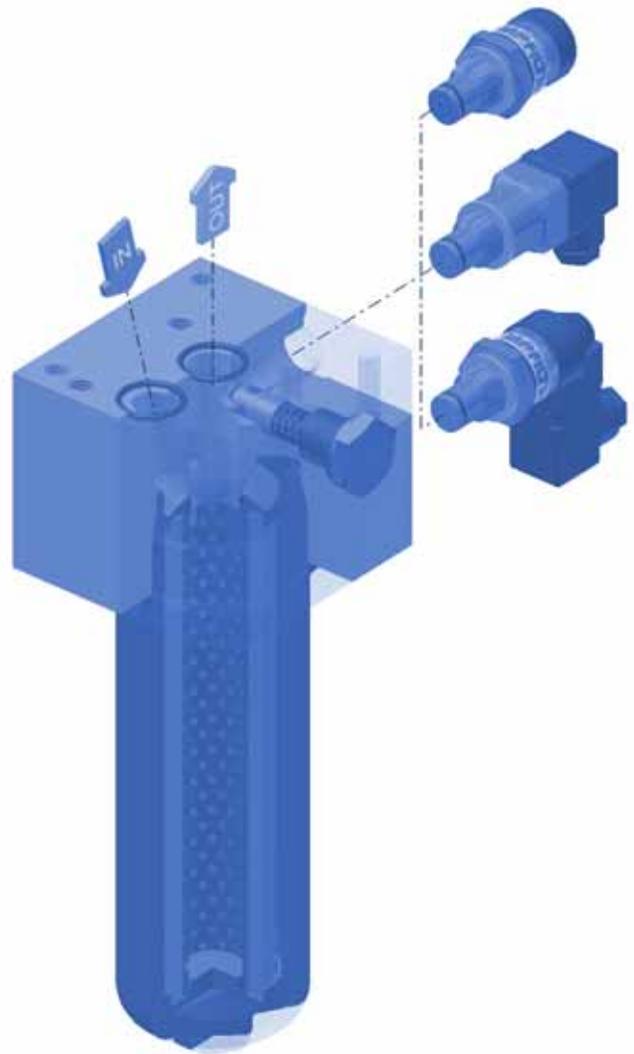
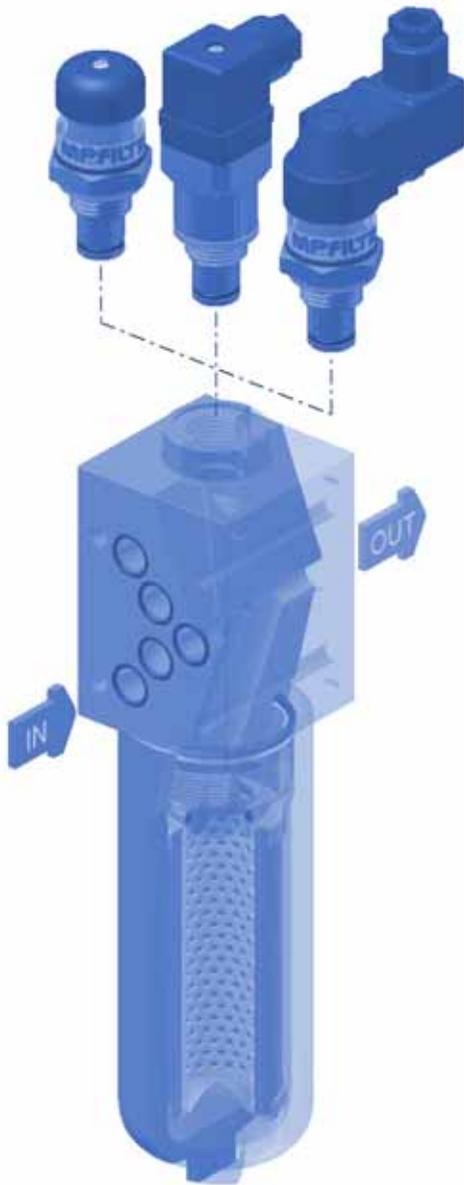
The data in this publication is marketing information. MP Filtri reserves the right to make changes to the product described herein at any time it deems fit in relation to technical or commercial requirements. The colors of the products shown on the cover are for illustration purposes only.
Copyright. All rights reserved.

FHM



SERIES FHM

Working pressure
320 bar

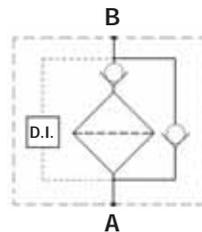
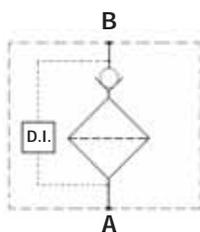
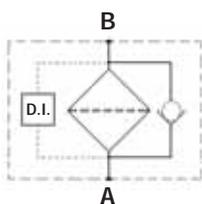
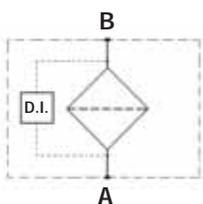


Style S

Style B

Style T

Style D



Technical data

Filter body (Materials)

- Head: Steel for size 006-010-065-135-320
- Housing: Steel (chemical heat treatment)
- Bypass valve: Brass
- Reverse Flow: Steel
- Check valve: Steel

Pressure

- Maximum operating pressure: 320 bar (32 MPa)
- Test pressure: 420 bar (42 MPa)
- Burst pressure: 840 bar (84 MPa)
- Pulsed pressure fatigue test 1,000,000 cycles with pressure from 0 to 320 bar (32 MPa)

Temperature

- From -25°C to +110°C

Bypass valve

- Opening pressure 6 bar \pm 10%
- Other opening pressures on request.

Elements type Δp

- Elements in microfibre series N: 20 bar
- Elements in microfibre series H: 210 bar
- Elements in stainless steel mesh series N: 20 bar
- Oil flow from exterior to interior.

Seals

- Standard Nitrile (NBR) series A
- Optional FPM series V

Weights without filter elements (kg.)

Length	1	2	3	4	5
• FHM 006	2.5	-	-	-	-
• FHM 010	-	5.5	6	-	-
• FHM 050	5.5	5.8	6.3	8.9	11.5
• FHM 065	5.65	6.2	7.4	-	-
• FHM 135	13	15	16.5	-	-
• FHM 320	21	23.5	26	28.8	-
• FHM 500	35	40	46	58	67

Filter internal volumes (dm³)

Length	1	2	3	4	5
• FHM 006	0.02	-	-	-	-
• FHM 010	-	0.26	0.35	-	-
• FHM 050	0.32	0.38	0.58	0.65	0.98
• FHM 065	0.34	0.40	0.62	-	-
• FHM 135	0.61	0.95	1.17	-	-
• FHM 320	1.66	1.95	2.72	3.55	-
• FHM 500	2.64	3.43	4.10	5.05	-

Connections

Manifold Inlet/Outlet

Compatibility

- Bodies compatible with:
Mineral oils to ISO 2943 - aqueous emulsions
Synthetic fluids, water/glycol.
- Filter elements compatible with:
Mineral oils to ISO 2943 - aqueous emulsions
Synthetic fluids, water/glycol.
- Nitrile (NBR) seals series A, compatible with:
Mineral oils to ISO 2943 - aqueous emulsions
synthetic fluids, water/glycol.
- V series FPM seals, compatible with:
Synthetic fluids type HS-HFDR-HFDS-HFDU.
To ISO 2943

Filter Element Area

Filter element in stainless steel mesh

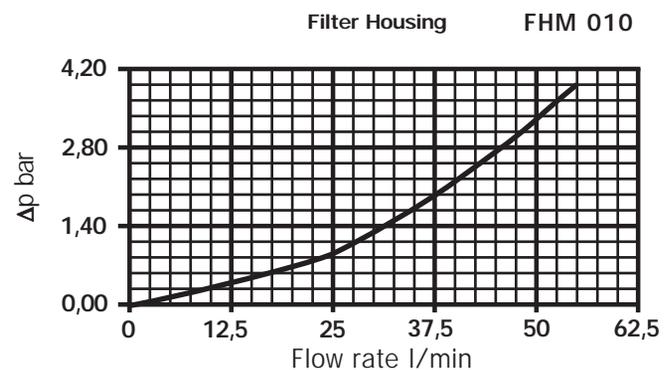
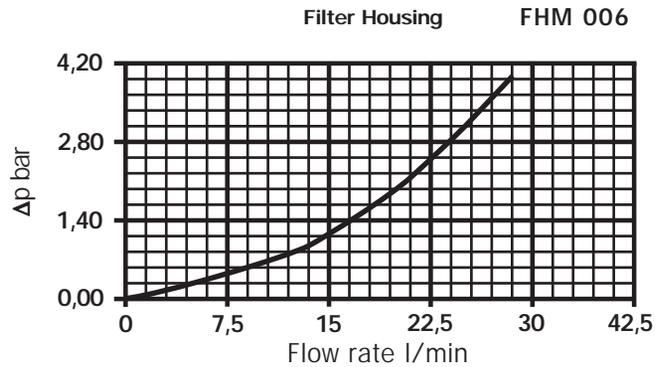
Type	Length				
	1	2	3	4	5
HP020	278				
HP050	450	700	1000	1300	2100
HP065	374	530	1064	-	
HP135	950	2020	2700	-	
HP320	1650	3645	5970	8280	
HP500	3030	4900	6500	9800	13000

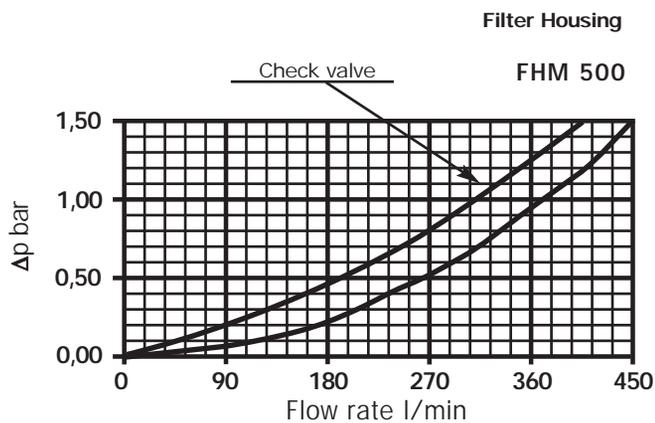
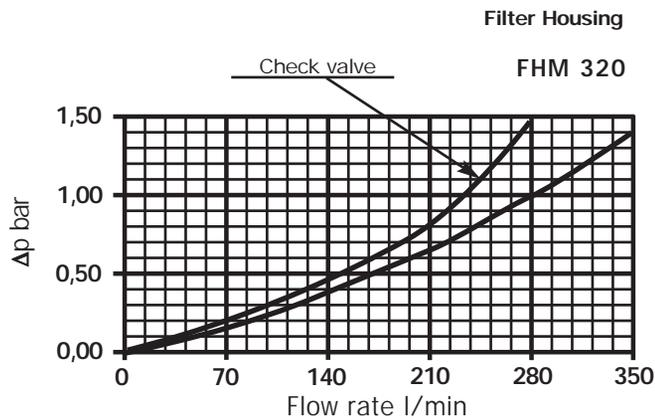
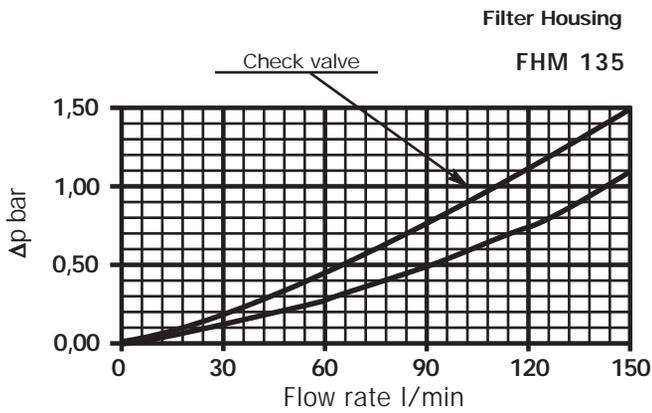
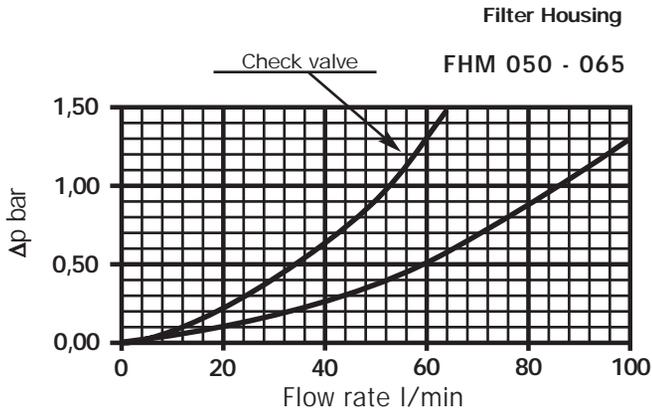
Values expressed in cm²

Pressure drops Δp Housing

The curves are plotted using mineral oil with density of 0.86 kg/dm³ to ISO 3968.

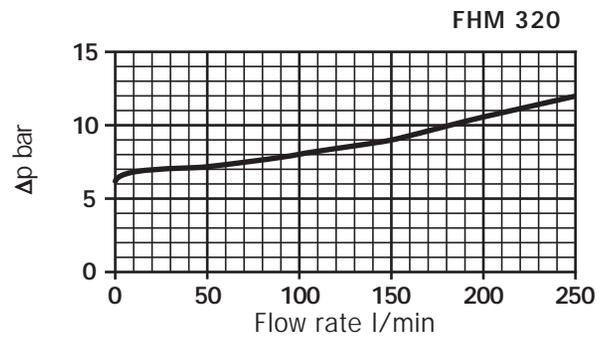
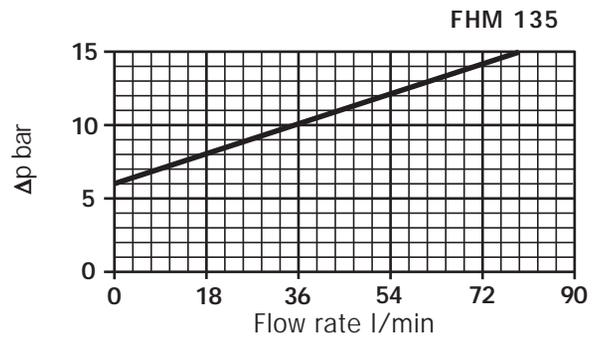
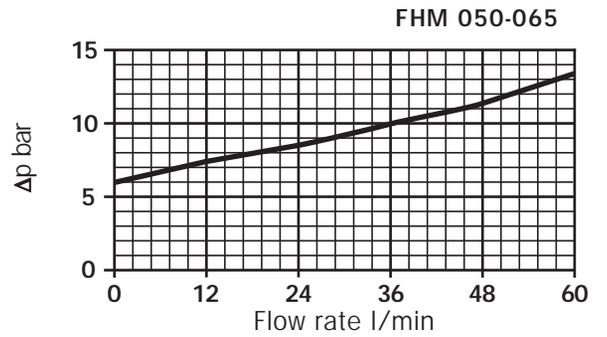
Δp varies proportional with density.





Valves

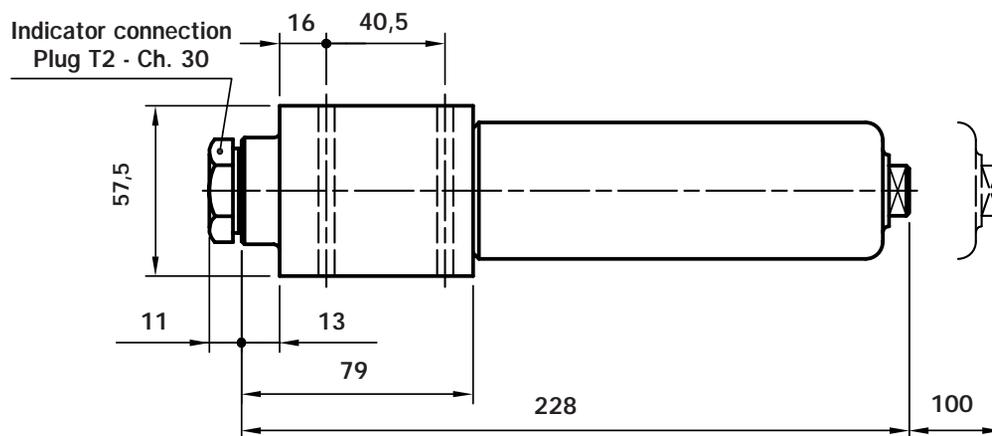
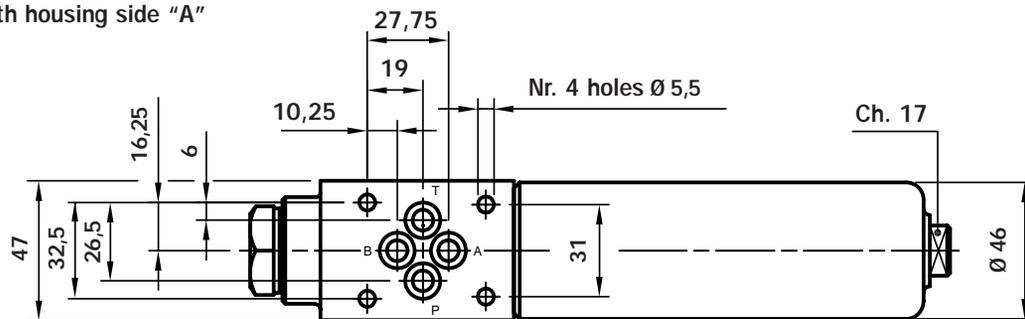
By-pass valve pressure drop



Dimensions

FHM 006

View with housing side "A"



Housing side "A" = G1
Housing side "B" = G2

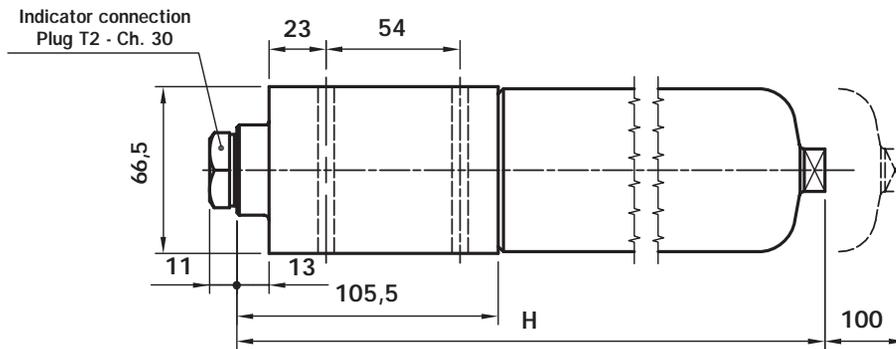
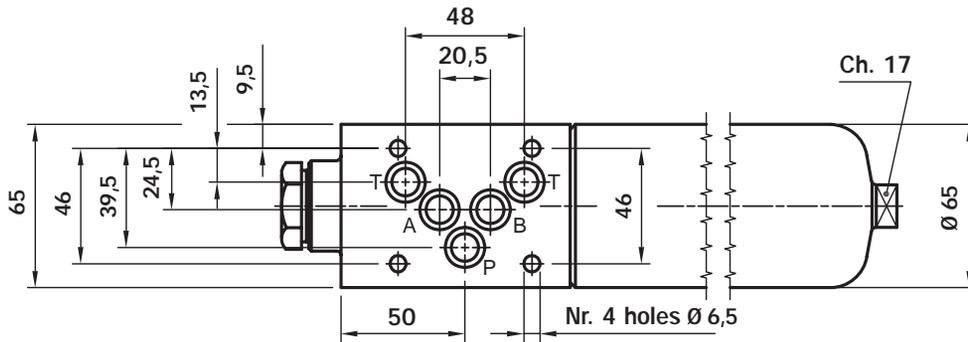
Recommended maximum flow rate

- Pressure drop of complete filter equal to Δp 1.5 bar.
- Oil kinematic viscosity 30 mm²/s (cSt).
- Density 0.86 kg/dm³.

Filter element type	Flow rate l/min Series H	Housing Length
A03	9	1
A06	10	
A10	13	
A16	13	
A25	15	
M25	17	

FHM 010

View with housing side "B"



Housing side "A"= G1
Housing side "B"= G2

Recommended maximum flow rate

- Pressure drop of complete filter equal to Δp 1.5 bar.
- Oil kinematic viscosity 30 mm²/s (cSt).
- Density 0.86 kg/dm³.

Filter Length	H mm
2	282
3	383

Filter element type	Flow rate l/min Series H	Housing Length
A03	19	2
A06	21	
A10	25	
A16	26	
A25	29	
M25	-	
A03	24	3
A06	26	
A10	29	
A16	29	
A25	31	
M25	-	

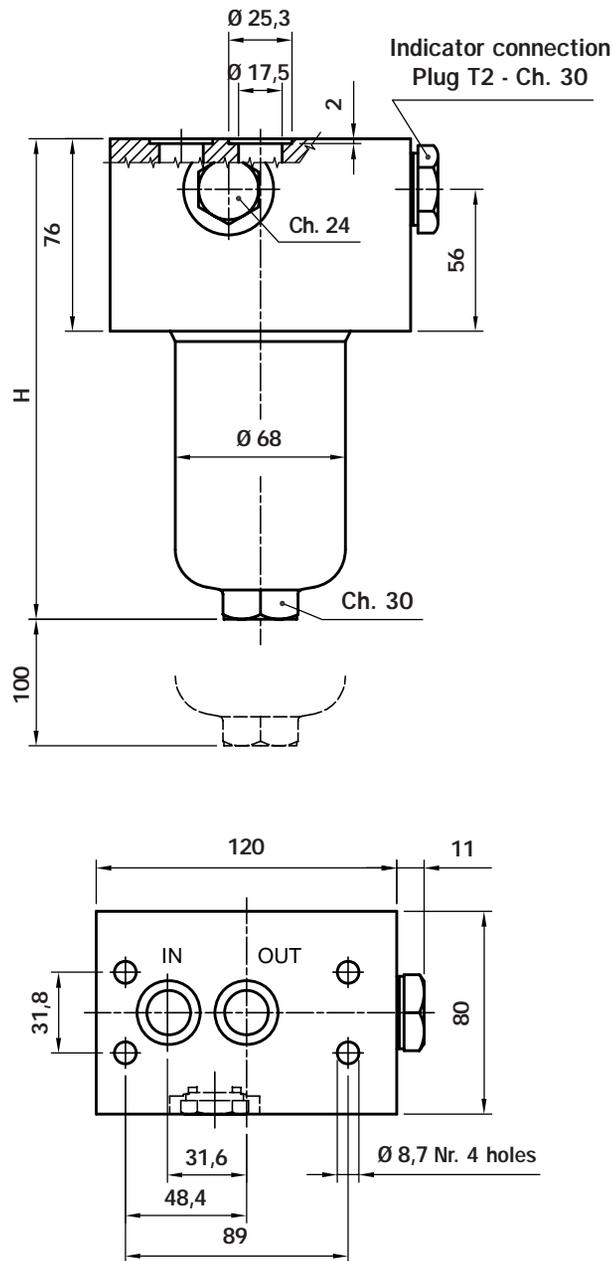
FHM 050

FHM 065

FHM 050

Recommended maximum flow rate

- Pressure drop of complete filter equal to Δp 1.5 bar.
- Oil kinematic viscosity 30 mm²/s (cSt).
- Density 0.86 kg/dm³.



Filter element type	Flow rate l/min Series N	Flow rate l/min Series H	Filter Length
A03	38	28	1
A06	38	36	
A10	65	50	
A16	67	52	
A25	80	62	
M25	102	-	2
A03	46	41	
A06	50	45	
A10	68	62	
A16	75	70	
A25	87	85	3
M25	105	-	
A03	56	50	
A06	60	55	
A10	76	72	
A16	80	78	4
A25	92	91	
M25	105	-	
A03	68	62	
A06	70	65	
A10	85	80	5
A16	86	82	
A25	95	92	
M25	105	-	
A03	82	73	
A06	83	75	5
A10	94	84	
A16	95	89	
A25	100	92	
M25	110	-	

Filter Length	H mm
1	154
2	191
3	233
4	281
5	403

FHM 065

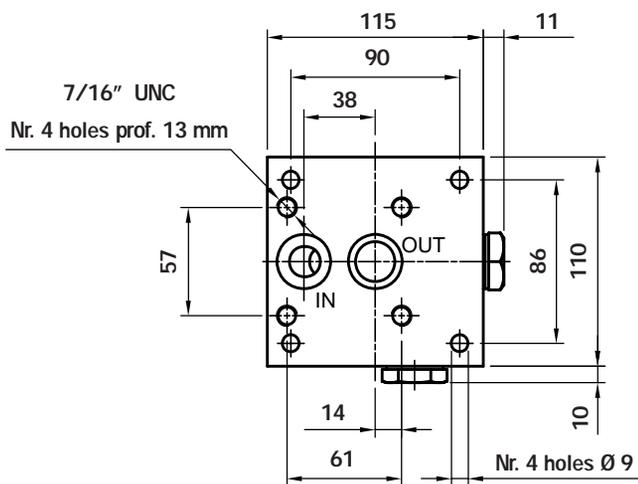
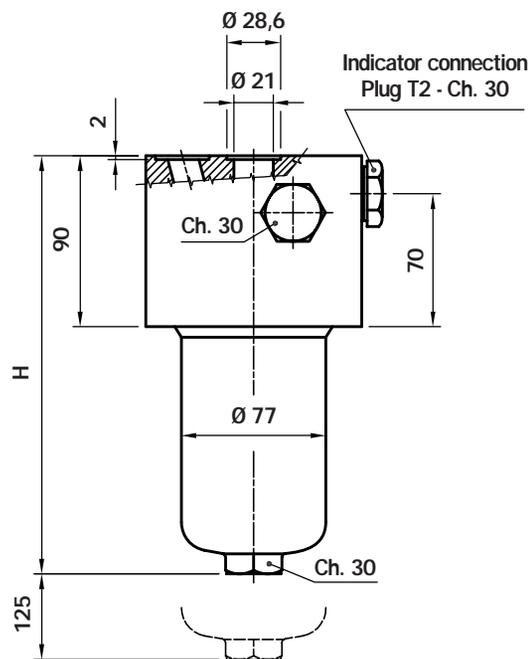
Recommended maximum flow rate

- Pressure drop of complete filter equal to Δp 1.5 bar.
- Oil kinematic viscosity 30 mm²/s (cSt).
- Density 0.86 kg/dm³.

Filter element type	Flow rate l/min Series N	Flow rate l/min Series H	Filter Length
A03	23	22	1
A06	30	23	
A10	48	43	
A16	53	50	
A25	71	67	
M25	102	-	
A03	30	30	2
A06	45	34	
A10	59	55	
A16	64	62	
A25	80	75	
M25	105	-	
A03	51	51	3
A06	59	57	
A10	78	76	
A16	82	80	
A25	92	91	
M25	107	-	

Filter Length	H mm
1	162
2	193
3	295

FHM 135



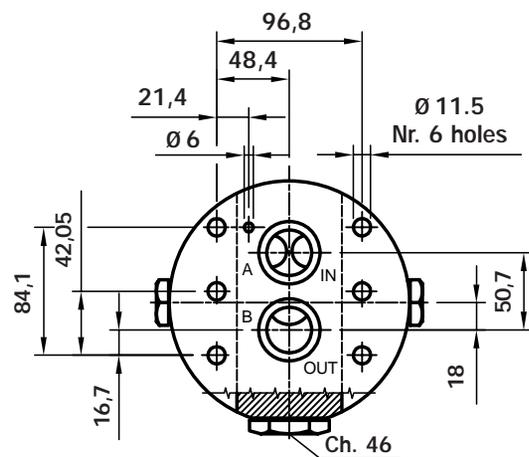
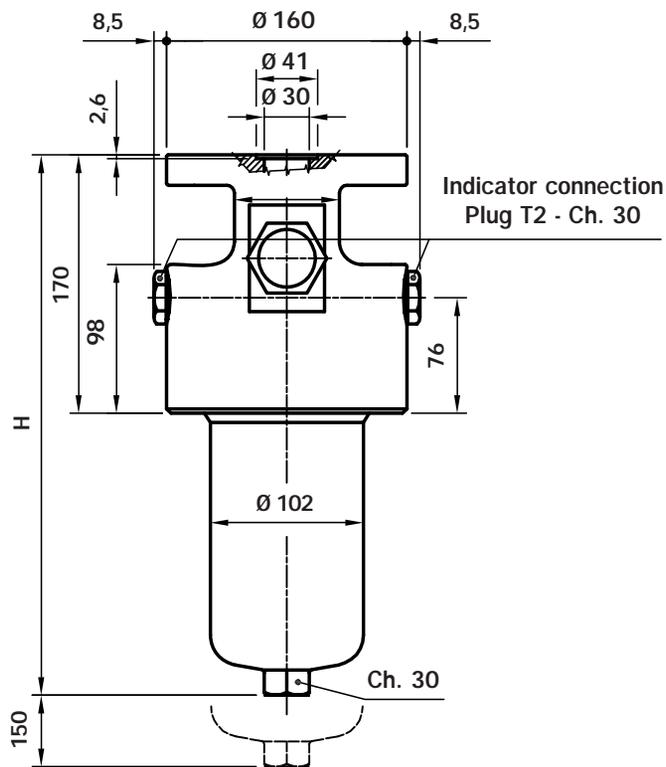
Recommended maximum flow rate

- Pressure drop of complete filter equal to Δp 1.5 bar.
- Oil kinematic viscosity 30 mm²/s (cSt).
- Density 0.86 kg/dm³.

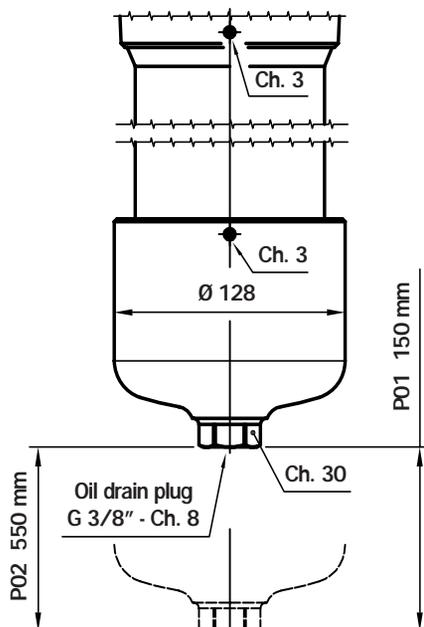
Filter element type	Flow rate l/min Series N	Flow rate l/min Series H	Filter Length
A03	60	46	1
A06	65	51	
A10	99	84	
A16	104	86	
A25	130	122	
M25	150	-	
A03	90	79	2
A06	97	92	
A10	118	110	
A16	120	112	
A25	155	135	
M25	165	-	
A03	118	102	3
A06	120	112	
A10	143	130	
A16	145	137	
A25	160	146	
M25	165	-	

Filter Length	H mm
1	202
2	315
3	390

FHM 320



Only for FHM 320 length 4



Style P01 standard maintenance from head.
Style P02 maintenance option from housing base.

Recommended maximum flow rate

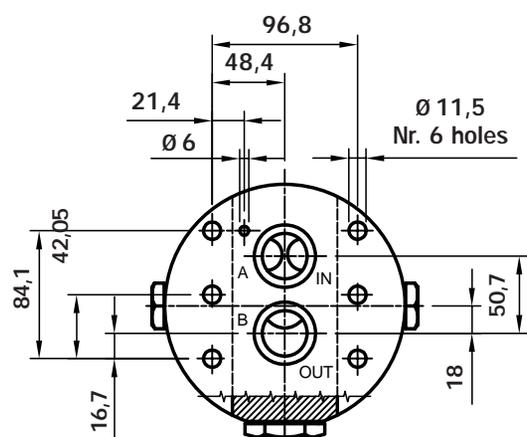
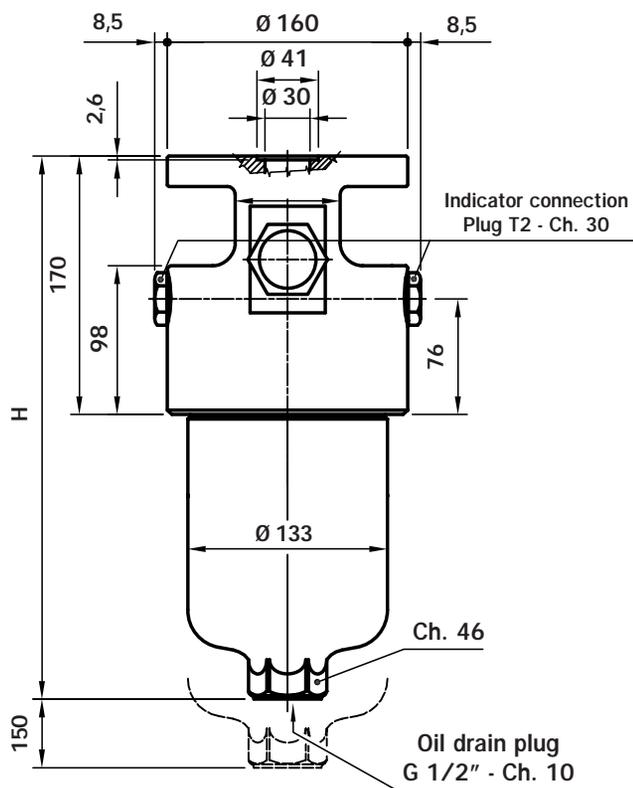
- Pressure drop of complete filter equal to Δp 1.5 bar.
- Oil kinematic viscosity 30 mm²/s (cSt).
- Density 0.86 kg/dm³.

Filter element type	Flow rate l/min Series N	Flow rate l/min Series H	Filter Length
A03	112	97	1
A06	121	104	
A10	187	156	
A16	217	162	
A25	252	228	
M25	310	-	2
A03	200	162	
A06	215	181	
A10	282	238	
A16	292	240	
A25	320	282	3
M25	330	-	
A03	246	206	
A06	268	233	
A10	311	275	
A16	320	280	4
A25	325	305	
M25	332	-	
A03	266	234	
A06	280	246	
A10	315	280	4
A16	325	285	
A25	336	313	
M25	345	-	

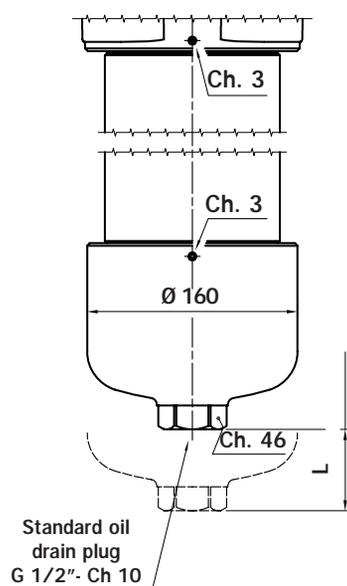
Filter Length H mm

1	293
2	416
3	548
4	702

FHM 500



Only for FHM 500 length 4/5



Recommended maximum flow rate

- Pressure drop of complete filter equal to Δp 1.5 bar.
- Oil kinematic viscosity 30 mm²/s (cSt).
- Density 0.86 kg/dm³.

Filter element type	Flow rate l/min Series N	Flow rate l/min Series H	Filter Length
A03	225	140	1
A06	250	155	
A10	272	235	
A16	272	235	
A25	300	295	
M25	350	-	
A03	250	210	2
A06	265	230	
A10	300	285	
A16	310	285	
A25	325	330	
M25	400	-	
A03	285	250	3
A06	290	265	
A10	315	315	
A16	320	330	
A25	330	360	
M25	400	-	
A03	350	287	4
A06	370	315	
A10	400	365	
A16	400	370	
A25	410	390	
M25	430	-	
A03	370	348	5
A06	380	350	
A10	400	385	
A16	410	395	
A25	420	410	
M25	430	-	

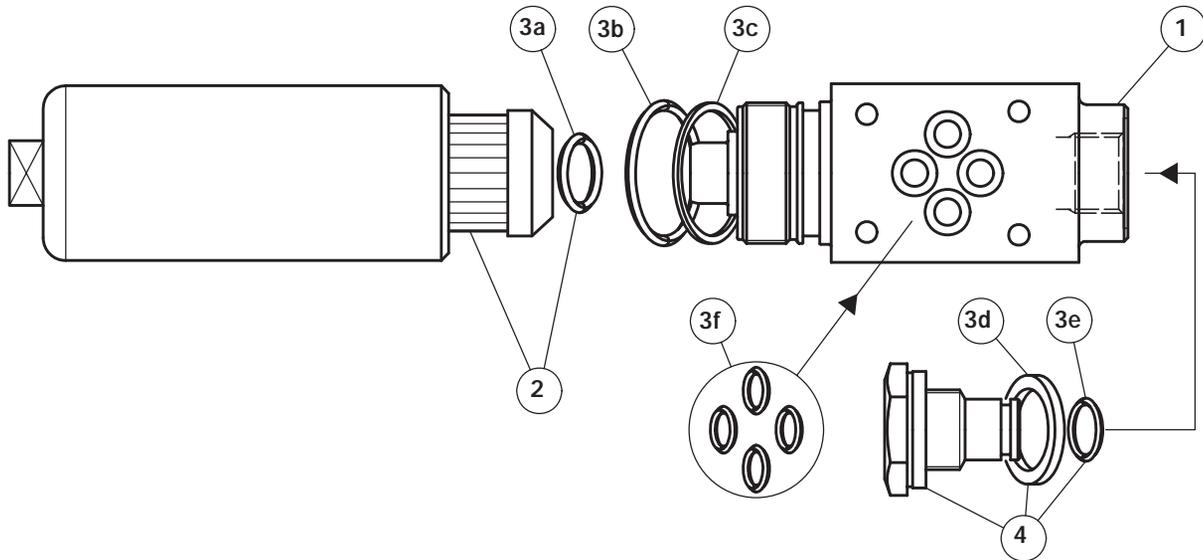
Filter Length **H mm**

1	358
2	448
3	524
4	680
5	846

Style P01		Style P02	
L mm	Filter Length	L mm	Filter Length
150	4/5	480	4
		650	5

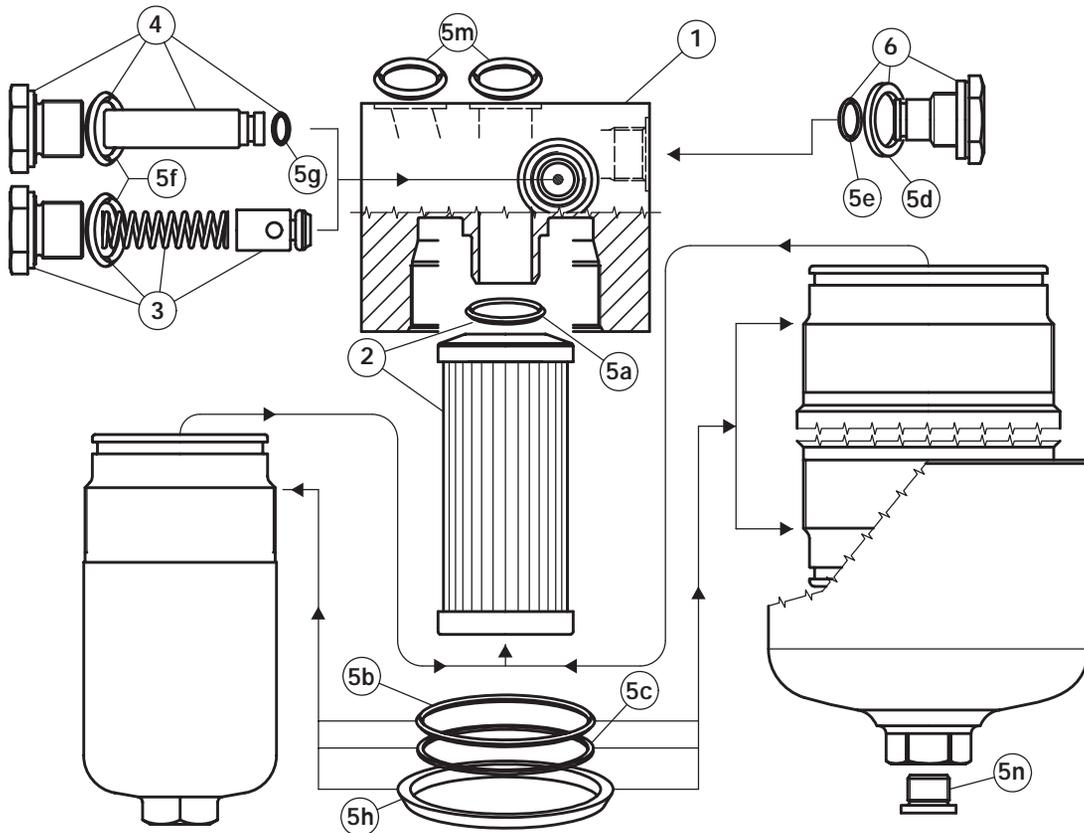
Style P01 standard maintenance from head.
Style P02 maintenance option from housing base.
See tables alongside.

Spare parts FHM 006 - 010



Pos.	Description	Qty.	Series FHM 006 - 010 FILTER			
			006 1		010 2 - 3	
1	Complete filter	1	See order table			
2	Filter element	1	See order table			
3	Seal kits	1	NBR 02050324	FPM 02050325	NBR 02050320	FPM 02050321
3a	O-Ring for filter element	1	OR 121 Ø 15.88 x 2.62		OR 4100 Ø 24.99 x 3.53	
3b	O-Ring for housing	1	OR 3125 Ø 31.42 x 2.62		OR 3187 Ø 47.29 x 2.62	
3c	Anti-extrusion ring	1	Parbak 124 Ø 32.21 x 2.18		Parbak 134 Ø 48.08 x 2.18	
3d	Gasket	1	01030058 (HNBR)		01030046 (FPM)	
3e	O-Ring	1	OR 2050 - Ø 12.42 x 1.78			
3f	O-Ring head	1	4 pz.	OR 108 Ø 8.73 x 1.78	5 pz.	OR 2050 Ø 12.42 x 1.78
4	Indicator plug	1	T2H		T2V	
-	Indicator	1	See order table			

Spare parts FHM



Pos.	Description	Qty.	Series FHM FILTER										
			050 1 - 2 - 3 - 4 - 5		065 1 - 2 - 3		135 1 - 2 - 3		320 1 - 2 - 3 - 4		500 1 - 2 - 3 - 4 - 5		
1	Complete filter	1	See order table										
2	Filter element	1	See order table										
3	Bypass assembly	1	02001400 (NBR) 02001401 (FPM)				02001404 (NBR) 02001405 (FPM)		02001408 (NBR) 02001409 (FPM)				
4	Non bypass assembly	1	02001402 (NBR) 02001403 (FPM)				02001406 (NBR) 02001407 (FPM)		02001410 (NBR) 02001411 (FPM)				
5	Seal kits	1	NBR 02050410	FPM 02050411	NBR 02050268	FPM 02050279	NBR 02050271	FPM 02050282	NBR 02050275	FPM 02050286	NBR 02050332	FPM 02050333	
5a	Filter element O-Ring	1	OR 3093 Ø 23.67 x 2.62		OR 4100 Ø 24.99 x 3.53		OR 3106 Ø 26.65 x 2.62		OR 144 Ø 39.69 x 3.53		OR 153 Ø 49.21 x 3.53		
5b	O-Ring for housing	1	OR 3225 Ø 56.82 x 2.62		OR 159 Ø 55.56 x 3.53		OR 3256 Ø 64.77 x 2.62		2 pcs.	OR 3350 Ø 88.57 x 2.62		2 pcs.	OR 4462 Ø 117.10 x 3.53
5c	Anti-extrusion ring	1	Parbak 139 Ø 56.03 x 2.18		Parbak 227 Ø 54.53 x 3		Parbak 144 Ø 63.96 x 2.18		2 pcs.	Parbak 153 Ø 89.36 x 2.18		2 pcs.	Parbak 247 Ø 117.63 x 3
5d	Gasket	1	01030058 (HNBR)	01030046 (FPM)	01030058 (HNBR)	01030046 (FPM)	01030058 (HNBR)	01030046 (FPM)	01030058 (HNBR)	01030046 (FPM)	01030058 (HNBR)	01030046 (FPM)	
5e	O-Ring	1	OR 2050 Ø 12.42 x 1.78										
5f	Bp or No Bp O-Ring	1	OR 121 (NBR 90 Sh A) Ø 15.88 x 2.62				OR 3087(NBR 90 Sh A) Ø 21.89 x 2.62		OR 3143 (NBR 90 Sh A) Ø 36.17 x 2.62				
5g	No Bp O-Ring	1	OR 2031 Ø 7.65 x 1.78				OR 2037 Ø 9.25 x 1.78		OR 3108 Ø 26.65 x 2.62				
5h	Protective seal	1	01026521				01026509		01026510				
5m	O-Ring for head	2	OR 3081 Ø 20.29 x 2.62				OR 3093 Ø 23.47 x 2.62		OR 4137 Ø 34.52 x 3.53				
5n	Oil drain plug	1	-				-		G 3/8" with seal		G 1/2" with seal		
6	Indicator plug	1	T2H	T2V	T2H	T2V	T2H	T2V	T2H	T2V	T2H	T2V	
-	Indicator	1	See order table										

Ordering information FHM

Filter assembly FHM

Example: FHM

1	2	3	4	5	6	7	8a
<input type="text"/>							
006	1	S	A	G1	A03	H	P01

Filter element HP

Example: HP

1	2	6	4	7	8b
<input type="text"/>					
020	1	A03	A	H	P01

1 - Size

Filter	Filter element
<input type="text"/>	<input type="text"/>
006	020
<input type="text"/>	<input type="text"/>
010	065
<input type="text"/>	<input type="text"/>
050	050
<input type="text"/>	<input type="text"/>
065	065
<input type="text"/>	<input type="text"/>
135	135
<input type="text"/>	<input type="text"/>
320	320
<input type="text"/>	<input type="text"/>
500	500

2 - Filter length

	006	010	050	065	135	320	500
<input type="text"/>	X		X	X	X	X	X
<input type="text"/>		X	X	X	X	X	X
<input type="text"/>		X	X	X	X	X	X
<input type="text"/>			X			X	X
<input type="text"/>			X				X

3 - Valves

<input type="text"/>	Without bypass
<input type="text"/>	With bypass
<input type="text"/>	without bypass + check valve*
<input type="text"/>	with bypass + check valve*

N.B Sizes 006-010 are available only in **S** version without bypass.

*Reduced cross-section oilways

4 - Seals

<input type="text"/>	NBR
<input type="text"/>	FPM

5 - Connections

<input type="text"/>	Housing side A (only for 006 and 010)
<input type="text"/>	Housing side B (only for 006 and 010)
<input type="text"/>	Only for 050-065-135-320-500

6 - Filter elements

<input type="text"/>	Inorganic microfibre 3 μ	} $\beta_x(c) \geq 1000$ See page 10
<input type="text"/>	Inorganic microfibre 6 μ	
<input type="text"/>	Inorganic microfibre 10 μ	
<input type="text"/>	Inorganic microfibre 16 μ	
<input type="text"/>	Inorganic microfibre 25 μ	
<input type="text"/>	Stainless steel mesh 25 μ (style N only)	

7 - Filter elements collapse pressure

<input type="text"/>	20 bar
<input type="text"/>	210 bar (only for size 500)
<input type="text"/>	210 bar

8 - Options

a) Filter

<input type="text"/>	MP Filtri standard
<input type="text"/>	Maintenance from base of housing (only FHM 320 4 - FHM 500 4 - 5)
<input type="text"/>	Customer request

b) Filter element

<input type="text"/>	MP Filtri standard
<input type="text"/>	Customer request

DIFFERENTIAL INDICATORS (see page 15)

MP Filtri - The filter functions as described in this bulletin are valid exclusively for original MP Filtri filter elements and replacement parts. All rights reserved

The data in this publication is marketing information. MP Filtri reserves the right to make changes to the product described herein at any time it deems fit in relation to technical or commercial requirements. The colors of the products shown on the cover are for illustration purposes only.

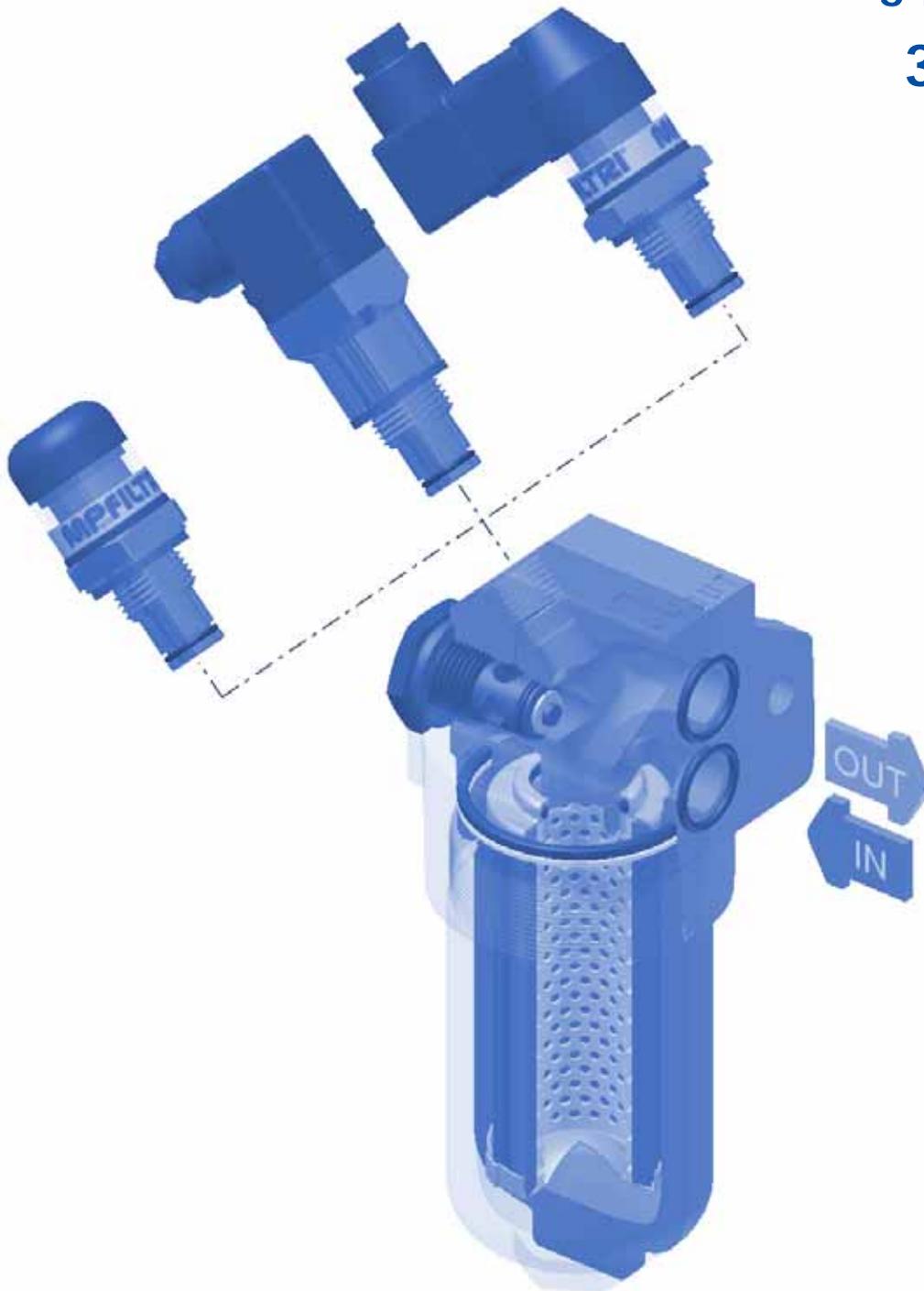
Copyright. All rights reserved.

FHB

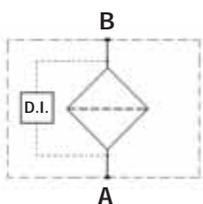


SERIES FHB

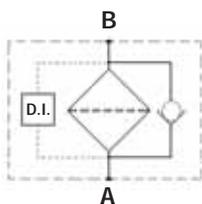
Working pressure
320 bar



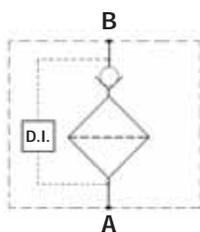
Style S



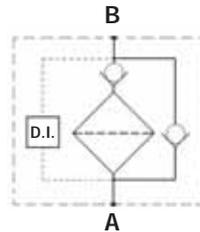
Style B



Style T



Style D



Technical data

Filter body (Materials)

- Head: Cast iron (chemical heat treatment)
- Housing: Steel (chemical heat treatment)
- Bypass valve: Brass
- Check valve: Steel

Pressure

- Maximum operating pressure: 320 bar (32 MPa)
- Test pressure: 420 bar (42 MPa)
- Burst pressure: 840 bar (84 MPa)
- Pulsed pressure fatigue test 1,000,000 of cycles with pressure from 0 to 320 bar (32 MPa)

Temperature

- From -25°C to +110°C

Bypass valve

- Opening pressure 6 bar \pm 10%
- Other opening pressures on request.

Elements type Δp

- Elements in microfibre series N: 20 bar
- Elements in microfibre series H: 210 bar
- Elements in stainless steel mesh series N: 20 bar
- Oil flow from exterior to interior.

Seals

- Standard Nitrile (NBR) series A
- Optional FPM series V

Weights without filter elements (kg.)

Length	1	2	3	4	5
• FHB 050	2.6	2.9	4.5	5.1	6.5
• FHB 065	2.8	3.2	4.9	-	-
• FHB 135	6.7	8.1	10.7	-	-
• FHB 320	13.0	15.0	21.0	24.0	-

Filter internal volumes (dm³)

Length	1	2	3	4	5
• FHB 050	0.33	0.43	0.52	0.63	0.93
• FHB 065	0.35	0.47	0.60	-	-
• FHB 135	0.55	0.85	1.20	-	-
• FHB 320	1.25	1.95	2.80	3.50	-

Connections

Side manifold Inlet/Outlet

Compatibility

- Bodies compatible with:
 - Mineral oils to ISO 2943 - aqueous emulsions
 - Synthetic fluids, water/glycol.
- Filter elements compatible with:
 - Mineral oils to ISO 2943 - aqueous emulsions
 - Synthetic fluids, water/glycol.

- Nitrile (NBR) seals series A, compatible with:
 - Mineral oils to ISO 2943 - aqueous emulsions
 - Synthetic fluids, water/glycol.
- V series FPM seals, compatible with:
 - Synthetic fluids type HS-HFDR-HFDS-HFDU.
 - To ISO 2943

Filter Element Area

Filter element in stainless steel mesh

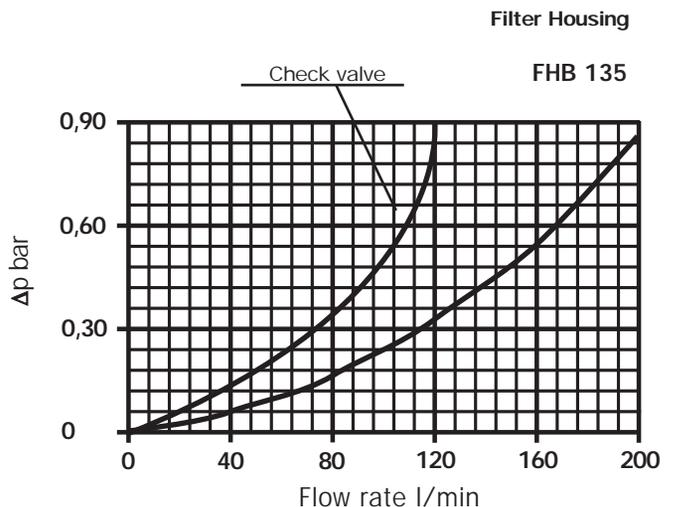
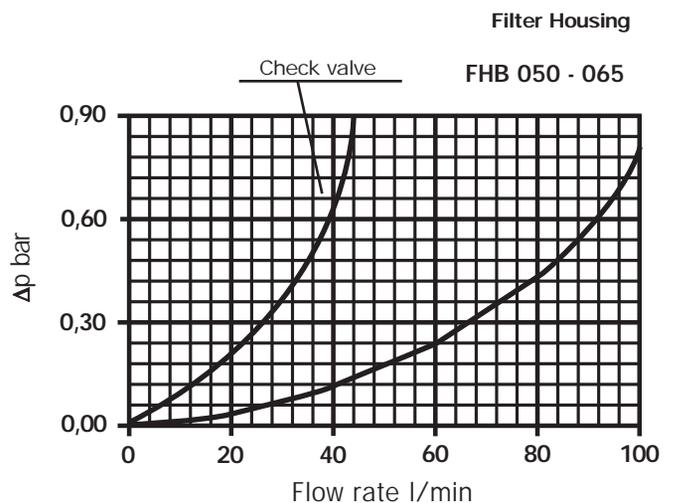
Type	Length				
	1	2	3	4	5
HP050	450	700	1000	1300	2100
HP065	374	530	1064	-	-
HP135	950	2020	2700	-	-
HP320	1650	3645	5970	8280	-

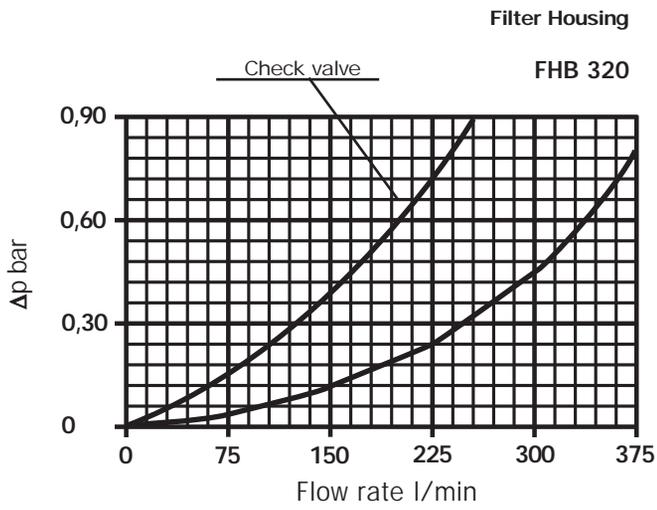
Values expressed in cm²

Pressure drops Δp Housing

The curves are plotted using mineral oil with density of 0.86 kg/dm³ to ISO 3968.

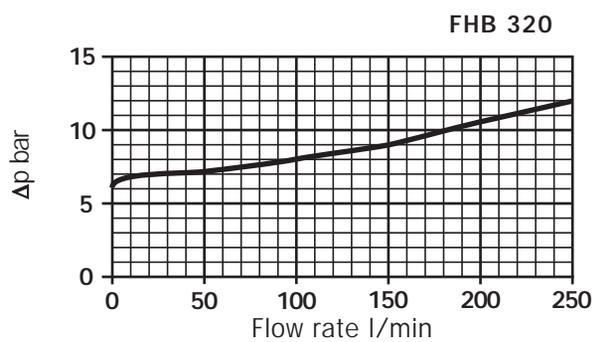
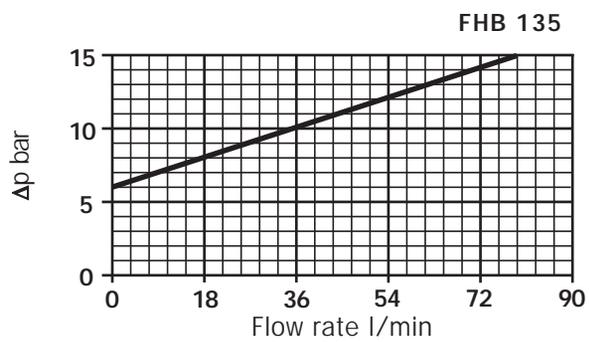
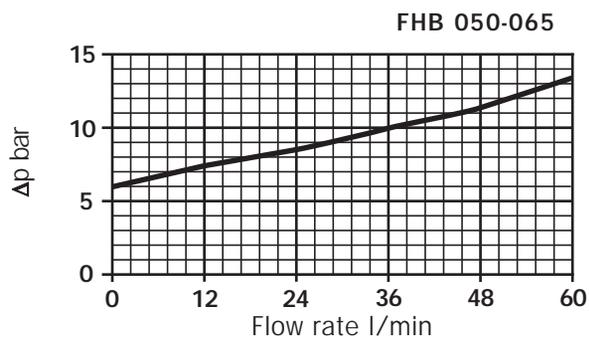
Δp varies proportional with density.





Valves

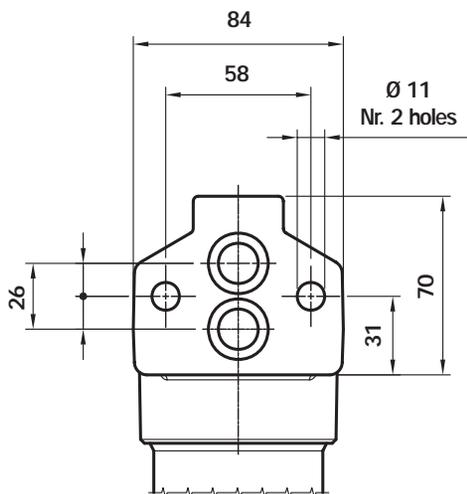
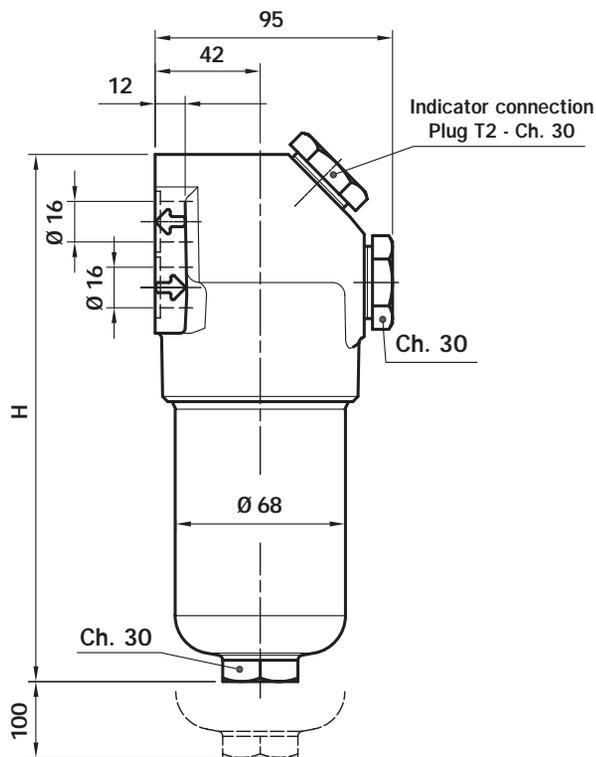
Bypass valve pressure drop



Dimensions

FHB 050

FHB 065



FHB 050

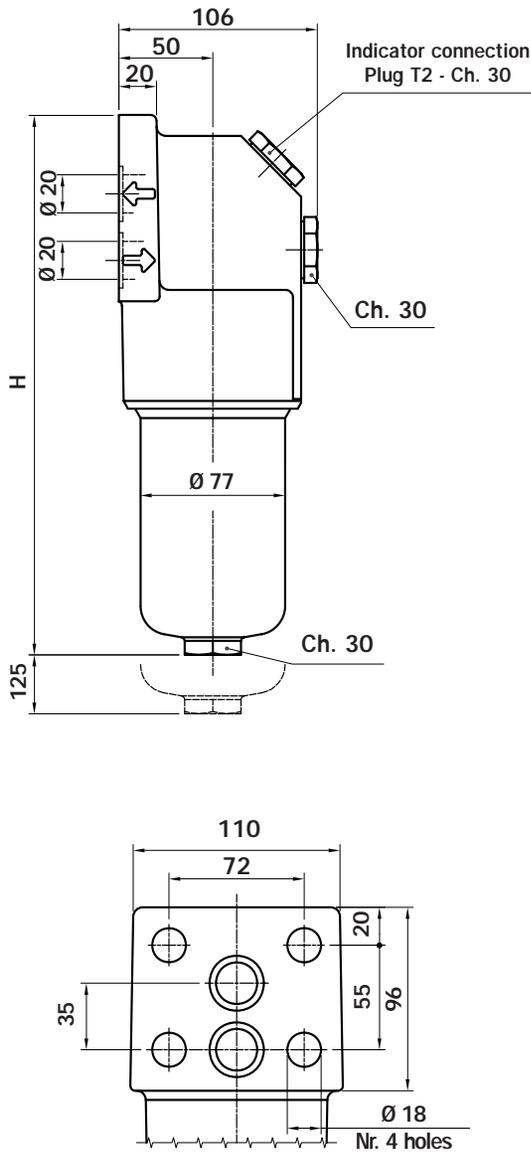
Recommended maximum flow rate

- Pressure drop of complete filter equal to Δp 1.5 bar.
- Oil kinematic viscosity 30 mm²/s (cSt).
- Density 0.86 kg/dm³.

Filter element type	Flow rate l/min Series N	Flow rate l/min Series H	Filter Length
A03	43	30	1
A06	43	40	
A10	78	58	
A16	80	60	
A25	100	74	
M25	130	-	
A03	52	45	2
A06	58	50	
A10	81	75	
A16	93	85	
A25	112	108	
M25	130	-	
A03	65	58	3
A06	70	62	
A10	93	87	
A16	99	96	
A25	118	115	
M25	135	-	
A03	82	73	4
A06	87	80	
A10	105	100	
A16	108	102	
A25	122	118	
M25	135	-	
A03	102	85	5
A06	104	92	
A10	120	105	
A16	122	112	
A25	128	115	
M25	140	-	

Filter Length	H mm
1	176
2	213
3	255
4	303
5	425

FHB 135



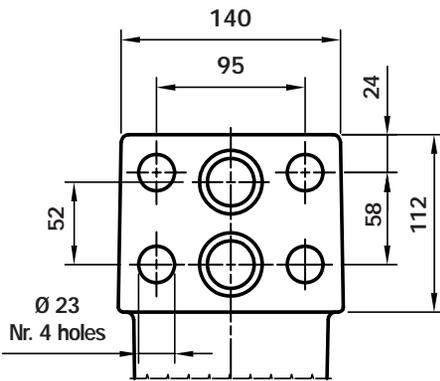
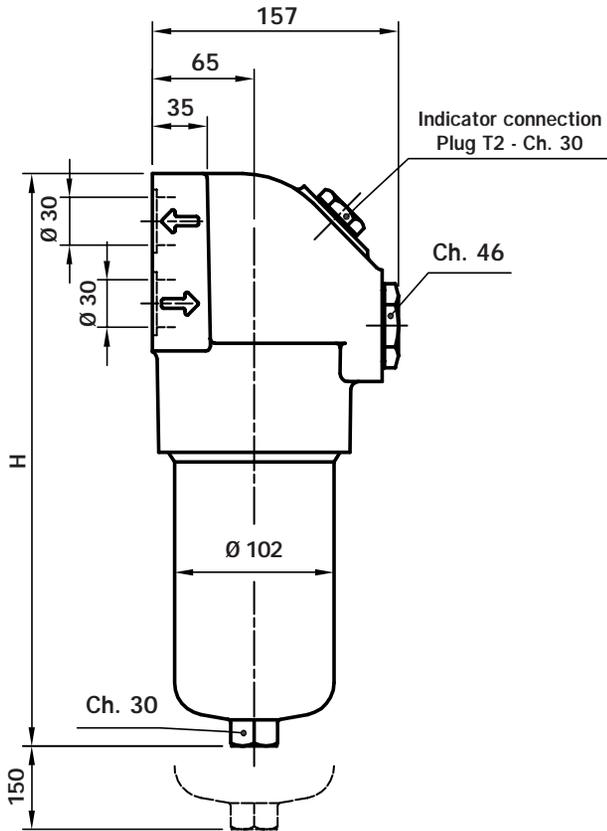
Recommended maximum flow rate

- Pressure drop of complete filter equal to Δp 1.5 bar.
- Oil kinematic viscosity 30 mm²/s (cSt).
- Density 0.86 kg/dm³.

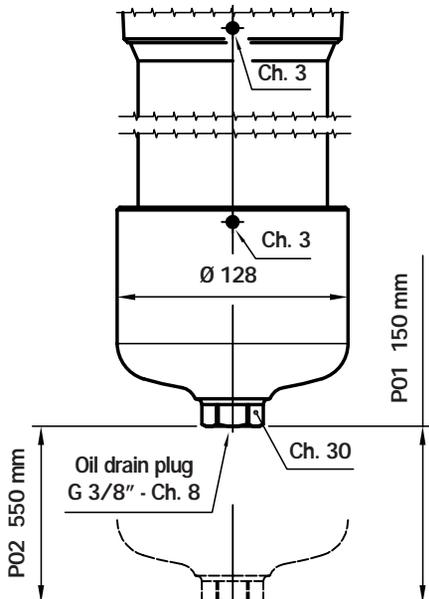
Filter element type	Flow rate I/min Series N	Flow rate I/min Series H	Filter Length
A03	67	48	1
A06	72	55	
A10	120	97	
A16	129	100	
A25	177	159	
M25	-	-	
A03	110	90	2
A06	116	110	
A10	152	137	
A16	154	140	
A25	224	182	
M25	-	-	
A03	152	126	3
A06	155	141	
A10	200	175	
A16	205	187	
A25	226	207	
M25	-	-	

Filter Length	H mm
1	266
2	379
3	454

FHB 320



Only for FHB 320 length 4



Recommended maximum flow rate

- Pressure drop of complete filter equal to Δp 1.5 bar.
- Oil kinematic viscosity 30 mm²/s (cSt).
- Density 0.86 kg/dm³.

Filter element type	Flow rate l/min Series N	Flow rate l/min Series H	Filter Length
A03	130	110	1
A06	143	117	
A10	238	192	
A16	285	200	
A25	340	300	
M25	440	-	
A03	259	200	2
A06	282	230	
A10	390	318	
A16	395	325	
A25	450	385	
M25	460	-	
A03	330	270	3
A06	368	312	
A10	440	380	
A16	450	382	
A25	460	395	
M25	480	-	
A03	367	310	4
A06	390	332	
A10	450	390	
A16	463	390	
A25	480	430	
M25	490	-	

Filter Length H mm

1 299

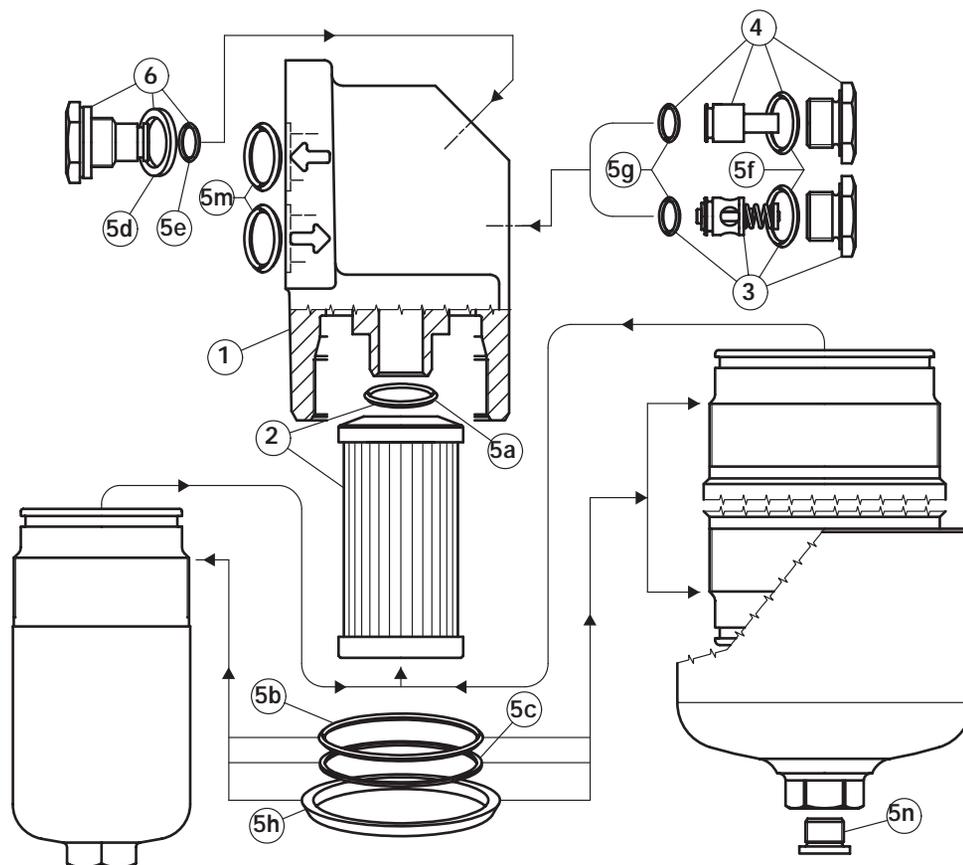
2 422

3 554

4 709

Style P01 standard maintenance from head.
Style P02 maintenance option from housing base.

Spare parts FHB



Pos.	Description	Qty.	FHB Series FILTER								
			050 1 - 2 - 3 - 4 - 5		065 1 - 2 - 3		135 1 - 2 - 3		320 1 - 2 - 3 - 4		
1	Complete filter	1	See order table								
2	Filter element	1	See order table								
3	Bypass assembly	1	02001312 (NBR) 02001385 (FPM)				02001381 (NBR) 02001382 (FPM)				
4	Non bypass assembly	1	02001314 (NBR) 02001386 (FPM)				02001383 (NBR) 02001384 (FPM)				
5	Seal kits	1	NBR 02050412	FPM 02050413	NBR 02050266	FPM 02050277	NBR 02050270	FPM 02050281	NBR 02050273	FPM 02050284	
5a	Filter element O-Ring	1	OR 3093 Ø 23,67 x 2,62		OR 4100 Ø 24,99 x 3,53		OR 3106 Ø 26,65 x 2,62		OR 144 Ø 39,69 x 3,53		
5b	O-Ring for housing	1	OR 3225 Ø 56,82 x 2,62		OR 159 Ø 55,56 x 3,53		OR 3256 Ø 64,77 x 2,62		2 pz.	OR 3350 Ø 88,57 x 2,62	
5c	Anti-extrusion ring	1	Parbak 139 Ø 56,03 x 2,18		Parbak 227 Ø 54,53 x 3		Parbak 144 Ø 63,96 x 2,18		2 pz.	Parbak 153 Ø 89,36 x 2,18	
5d	Gasket	1	01030058 (HNBR)	01030046 (FPM)	01030058 (HNBR)	01030046 (FPM)	01030058 (HNBR)	01030046 (FPM)	01030058 (HNBR)	01030046 (FPM)	
5e	O-Ring	1	OR 2050 Ø 12,42 x 1,78								
5f	Bp or Non Bp O-Ring	1	Bonded seal - G 1/2" - FPM							OR 3143 (NBR 90 Sh A) Ø 36,14 x 2,62	
5g	Bp or Non Bp O-Ring	1	OR 2050 - Ø 12,42 x 1,78 - FPM							OR 3106 Ø 26,65 x 2,62	
5h	Protective seal	1	01026521				01026509		01026510		
5m	Head seal	2	OR 3075 Ø 18,72 x 2,62				OR 3093 Ø 23,67 x 2,62		OR 4131 Ø 32,92 x 3,53		
5n	Oil drain plug	1								G 3/8" with bonded seal	
6	Indicator plug	1	T2H	T2V	T2H	T2V	T2H	T2V	T2H	T2V	
-	Indicators	1	See order table								

Ordering information FHB

Filter assembly FHB

Example: FHB

1	2	3	4	F1	5	6	7 _a
065	2	B	A	F1	A10	N	P01

Filter element HP

Example: HP

1	2	5	4	6	7 _b
065	2	A10	A	N	P01

1 - Size

050
065
135
320

2 - Filter length

1
2
3
4
5

(FHB 050-320 only)

(FHB 050 only)

3 - Valves

S	Without bypass side B - Standard
B	With bypass side B - Standard
D	Without bypass + check valve*
T	Without bypass + check valve*
E	Without bypass side C - Optional

*Reduced cross-section oilways

4 - Seals

A	NBR
V	FPM

5 - Filter elements

A03	Inorganic microfibre 3 μ
A06	Inorganic microfibre 6 μ
A10	Inorganic microfibre 10 μ
A16	Inorganic microfibre 16 μ
A25	Inorganic microfibre 25 μ
M25	Stainless steel mesh 25 μ (series N)

β_x (c) ≥ 1000
see page 10

6 - Filter elements collapse pressure

N	20 bar
H	210 bar (for HP 065, 135, 320)
S	210 bar (for HP 050)

7 - Options

a) Filter

P01	MP Filtri standard
P02	Maintenance from base of housing (FHB 320 4 only)
Pxx	Customer request

b) Filter element

P01	MP Filtri standard
Pxx	Customer request

DIFFERENTIAL INDICATORS (see page 15)

MP Filtri - The filter functions as described in this bulletin are valid exclusively for original MP Filtri filter elements and replacement parts. All rights reserved

The data in this publication is marketing information. MP Filtri reserves the right to make changes to the product described herein at any time it deems fit in relation to technical or commercial requirements. The colors of the products shown on the cover are for illustration purposes only.

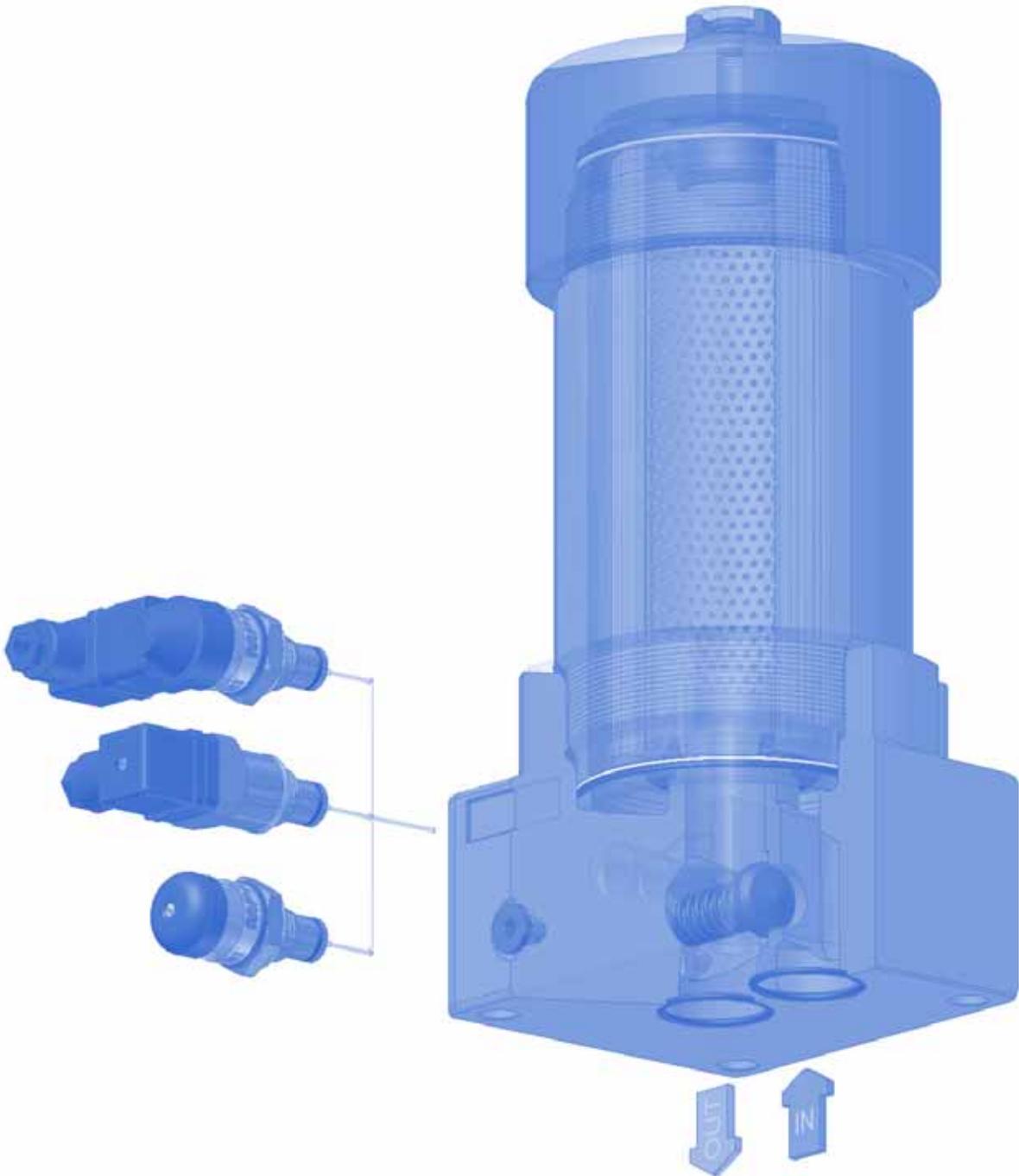
Copyright. All rights reserved.

FHF 320



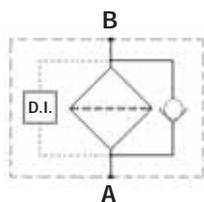
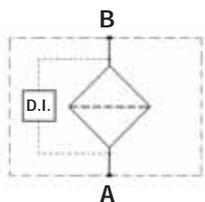
FHF **SERIES** 320

Working pressure
350 bar



Style S

Style B



Technical data

Filter body (Materials)

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

Pressure

- Maximum operating pressure: 350 bar (35 MPa)
- Test pressure: 525 bar (52.5 MPa)
- Burst pressure: 1260 bar (126 MPa)
- Pulsed pressure fatigue test 1,000,000 cycles with pressure from 0 to 350 bar (35 MPa)

Temperature

- From -25°C to +110°C

Bypass valve

- Opening pressure 6 bar \pm 10%
- Other opening pressures on request.

Elements type Δp

- Elements in microfibre series N: 20 bar
- Elements in microfibre series H: 210 bar
- Elements in stainless steel mesh series N: 20 bar
- Oil flow from exterior to interior.

Seals

- Standard Nitrile (NBR) series A
- Optional FPM series V

Weights without filter elements (kg)

Length	1	2	3
• FHF 320	19	35.5	44.5

Filter internal volumes (dm³)

Length	1	2	3
• FHF 320	3.44	5.61	7.75

Connections

In-line Inlet/Outlet
Manifold Inlet/Outlet

Compatibility

- Bodies compatible with:
Mineral oils to ISO 2943 - aqueous emulsions
synthetic fluids, water/glycol.
- Filter elements compatible with:
Mineral oils to ISO 2943 - aqueous emulsions
synthetic fluids, water/glycol.
- Nitrile (NBR) seals series A, compatible with:
Mineral oils to ISO 2943 - aqueous emulsions
synthetic fluids, water/glycol.
- V series FPM seals, compatible with:
Synthetic fluids type HS-HFDR-HFDS-HFDU
To ISO 2943

Filter Element Area

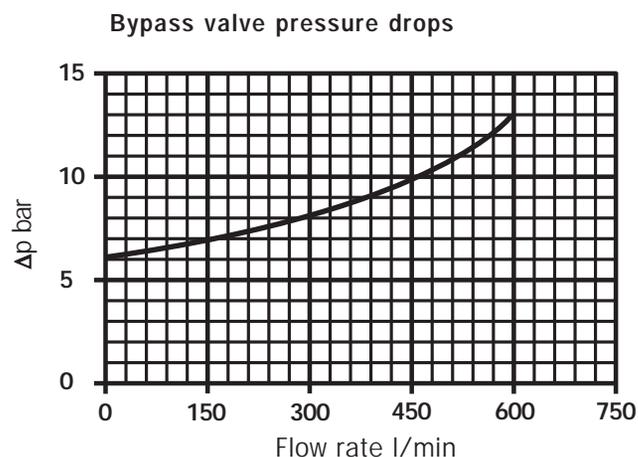
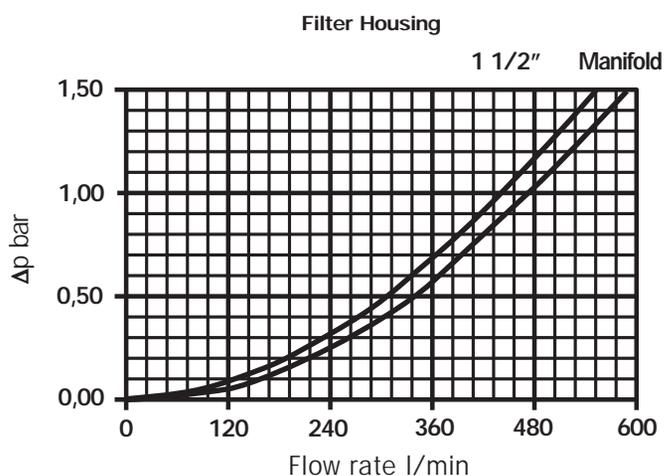
Filter element in stainless steel mesh
Length

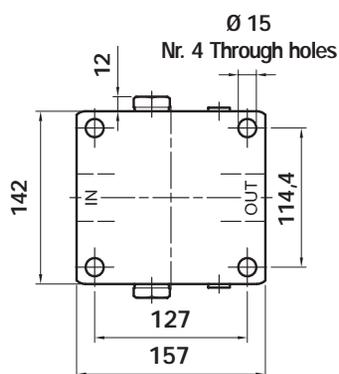
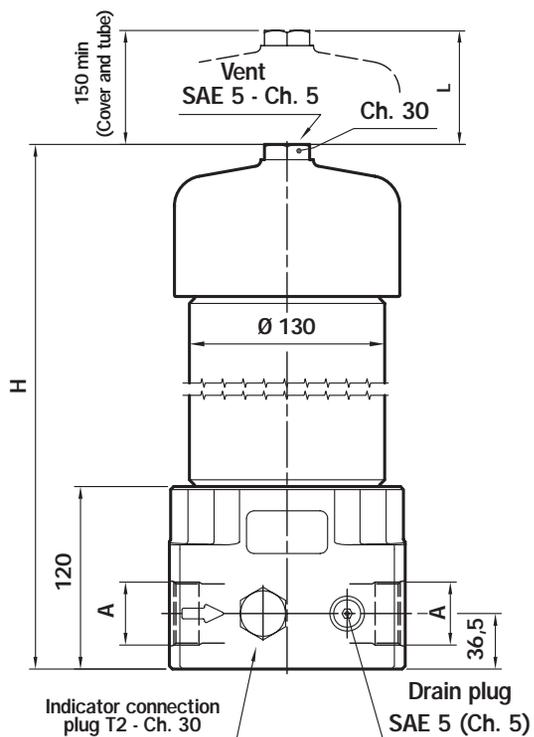
Type	1	2	3
HF320	4150	8050	12250
Values expressed in cm ²			

Pressure drops Δp Housing

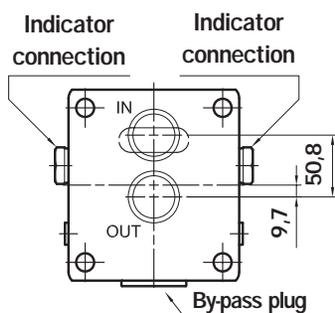
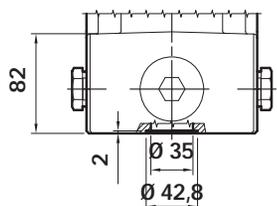
The curves are plotted using mineral oil with density of 0.86 kg/dm³ to ISO 3968.

Δp varies proportional with density.





Manifold version



Recommended maximum flow rate

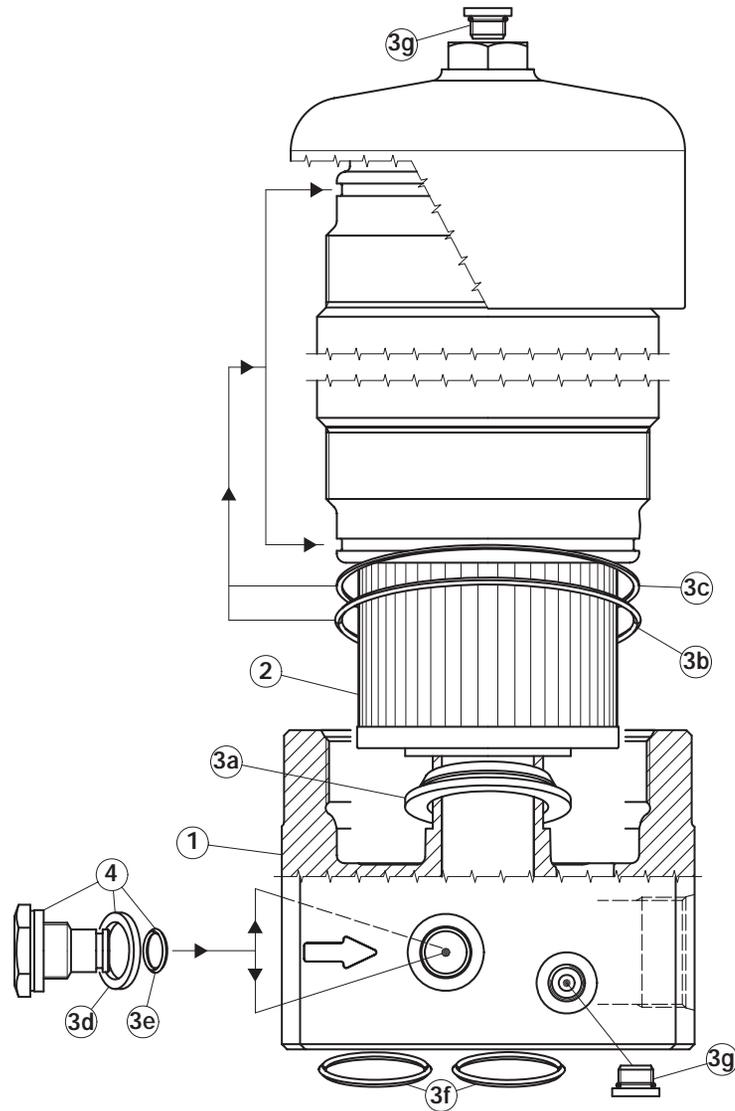
- Pressure drop of complete filter equal to Δp 1.5 bar.
- Oil kinematic viscosity 30 mm²/s (cSt).
- Density 0.86 kg/dm³.
- Connections of filter under test to Manifold.

Filter element type	Flow rate l/min Series N	Flow rate l/min Series H	Filter Length
A03	295	200	1
A06	335	205	
A10	348	280	
A16	400	300	
A25	465	340	
M25	-	-	
A03	380	310	2
A06	400	330	
A10	405	365	
A16	425	380	
A25	485	400	
M25	-	-	
A03	390	350	3
A06	420	355	
A10	425	400	
A16	445	405	
A25	500	420	
M25	-	-	

Filter Length	H mm	L mm
1	368	230
2	603	470
3	843	710

A Threaded Connections	A Flanged Connections
G 1 1/2"	MANIFOLD
1 1/2" NPT	1 1/2" SAE 6000 psi/M
SAE 24 (1 7/8"-12 UN)	
SAE 20 (1 5/8"-12 UN)	1 1/2" SAE 6000 psi/UNC

Spare parts FHF



Pos.	Description	Qty.	FHF Series FILTER 320 1 - 2 - 3	
1	Complete filter	1	See order table	
2	Filter element	1	See order table	
3	Seal kits	1	NBR 02050414	FPM 02050415
3a	O-Ring for filter element	2	01026566	01026585
3b	O-Ring for housing	2	OR 3425 Ø 107.62 x 2.62	
3c	Anti-extrusion ring	2	Parbak 156 Ø 108.41 x 2.18	
3d	Gasket	1	01030058 (HNBR)	01030046 (FPM)
3e	O-Ring	2	OR 2050 Ø 12.42 x 1.78	
3f	O-Ring for head (Manifold Connection)	2	OR 3150 Ø 37.77 x 2.62	
3g	Vent and drain plug	3	SAE 5	
4	Indicator plug	1	T2H	T2V
-	Indicator	1	See order table	

Ordering information FHF

Filter assembly FHF 320

Example: FHF

1	2	3	4	5	6	7	8
<input type="text"/>							
320	1	S	A	G1	A03	N	P01

Filter element HF 320

Example: HF

1	2	6	4	7	8
<input type="text"/>					
320	1	A03	A	N	P01

1 - Size

2 - Filter length

3 - Valves

Without bypass
 With bypass

4 - Seals

NBR
 FPM

5 - Connections

Type	320
<input type="text" value="G1"/>	G 1-1/2"
<input type="text" value="G2"/>	1-1/2" NPT
<input type="text" value="G3"/>	SAE 24
<input type="text" value="G4"/>	SAE 20
<input type="text" value="F1"/>	Manifold
<input type="text" value="F2"/>	1-1/2" SAE 6000 PSI/M
<input type="text" value="F3"/>	1-1/2" SAE 6000 PSI/UNC

6 - Filter elements

<input type="text" value="A03"/>	Inorganic microfibre 3 μ	} $\beta_x(c) \geq 1000$ see page 10
<input type="text" value="A06"/>	Inorganic microfibre 6 μ	
<input type="text" value="A10"/>	Inorganic microfibre 10 μ	
<input type="text" value="A16"/>	Inorganic microfibre 16 μ	
<input type="text" value="A25"/>	Inorganic microfibre 25 μ	
<input type="text" value="M25"/>	Stainless steel mesh 25 μ (style N only)	

7 - Filter elements collapse pressure

<input type="text" value="N"/>	20 bar
<input type="text" value="H"/>	210 bar

8 - Options

<input type="text" value="P01"/>	MP Filtri standard
<input type="text" value="Pxx"/>	Customer request

DIFFERENTIAL INDICATORS (see page 15)

MP Filtri - The filter functions as described in this bulletin are valid exclusively for original MP Filtri filter elements and replacement parts. All rights reserved

The data in this publication is marketing information. MP Filtri reserves the right to make changes to the product described herein at any time it deems fit in relation to technical or commercial requirements. The colors of the products shown on the cover are for illustration purposes only.
Copyright. All rights reserved.

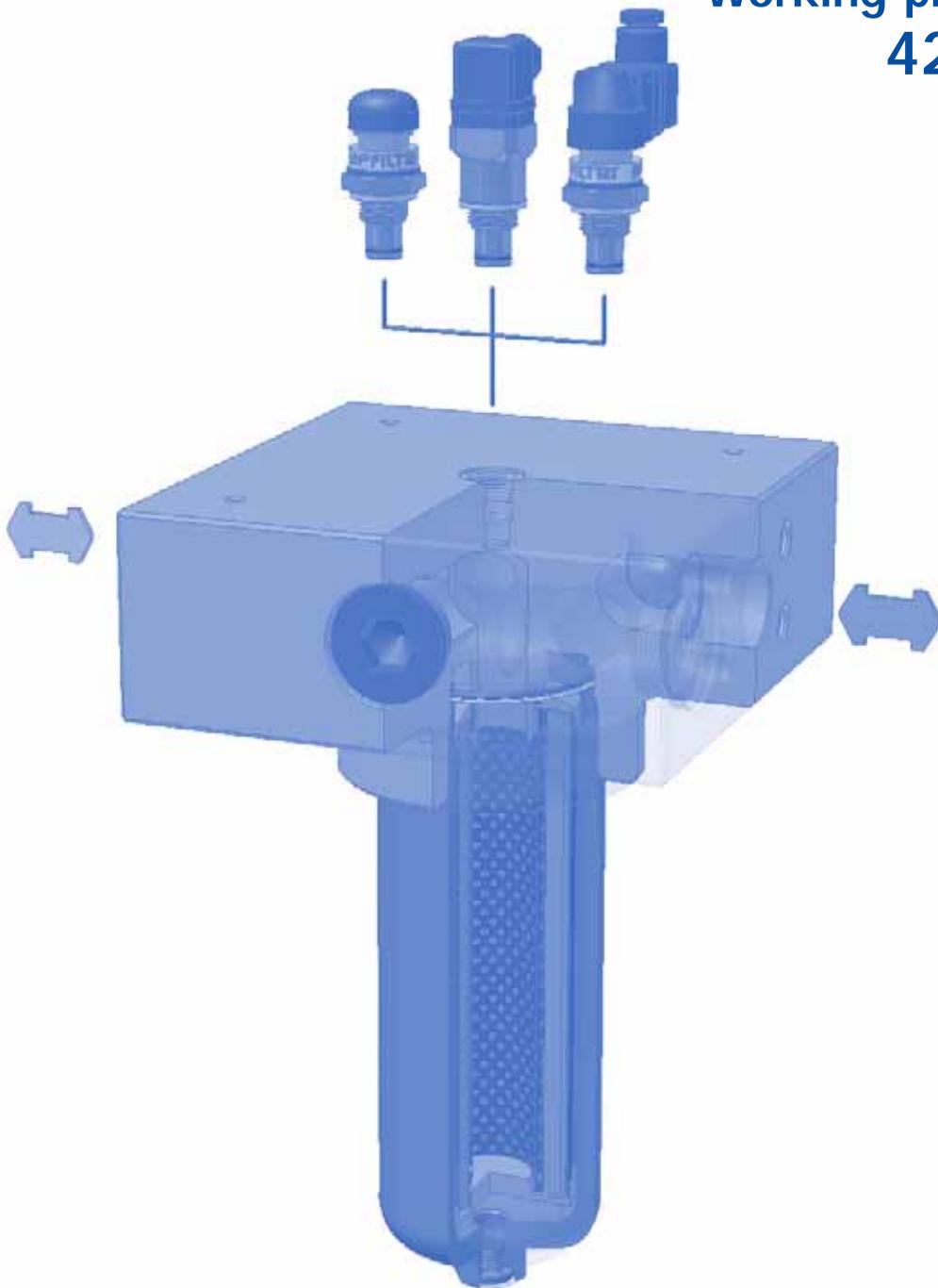
FHZ 320



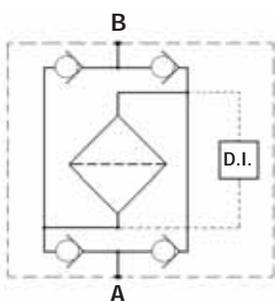
FHZ

SERIES 320

Working pressure
420 bar



Style Z



Technical data

Filter body (Materials)

- Head: Cast iron (chemical heat treatment)
- Housing: Steel (chemical heat treatment)
- Check valves: Steel

Pressure

- Maximum operating pressure: 420 bar (42 MPa)
- Test pressure: 630 bar (63 MPa)
- Burst pressure: 1250 bar (125 MPa)
- Pulsed pressure fatigue test 1,000,000 cycles with pressure from 0 to 420 bar (42 MPa)

Temperature

- From -25°C to +110°C

Elements type Δp

- Elements in microfibre series S: 210 bar
- Elements in stainless steel mesh series H: 210 bar
- Oil flow from exterior to interior.

Seals

- Standard Nitrile (NBR) series A
- Optional FPM series V

Weights without filter elements (kg)

Length	1	2	3	4
FHZ320	37.5	40	44.5	50

Filter internal volumes (dm³)

Length	1	2	3	4
FHZ320	2.54	3.25	4.03	4.95

Connections

In-line Inlet/Outlet
Panel Inlet/Outlet

Compatibility

- Bodies compatible with:
Mineral oils to ISO 2943 - aqueous emulsions
synthetic fluids, water/glycol.
- Filter elements compatible with:
Mineral oils to ISO 2943 - aqueous emulsions
synthetic fluids, water/glycol.
- Nitrile (NBR) seals series A, compatible with:
Mineral oils to ISO 2943 - aqueous emulsions
synthetic fluids, water/glycol.
- V series FPM seals, compatible with:
Synthetic fluids type HS-HFDR-HFDS-HFDU.
To ISO 2943

Filter Element Area

Filter element in stainless steel mesh
Length

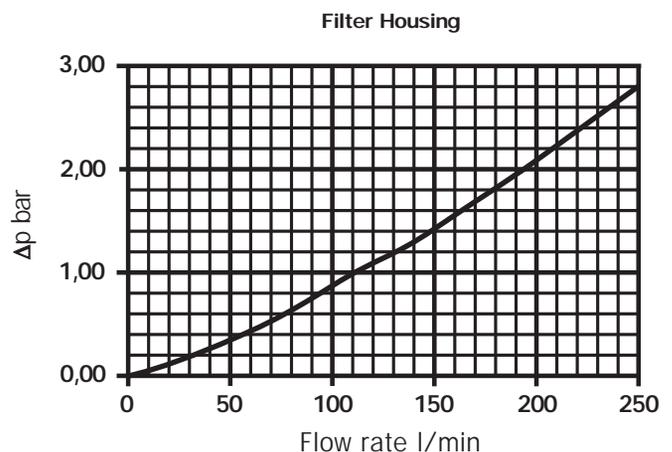
Type	1	2	3	4
HP320	1650	3645	5970	8280

Values expressed in cm²

Pressure drops Δp Housing

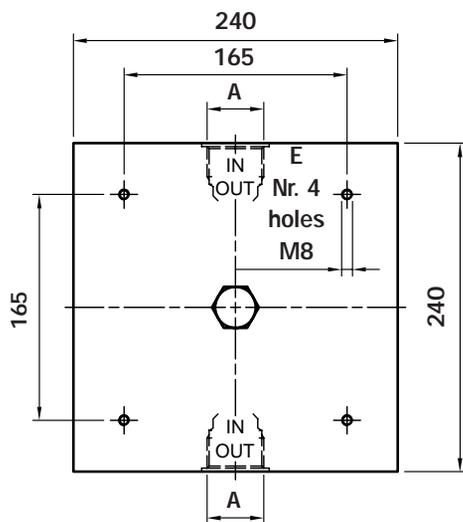
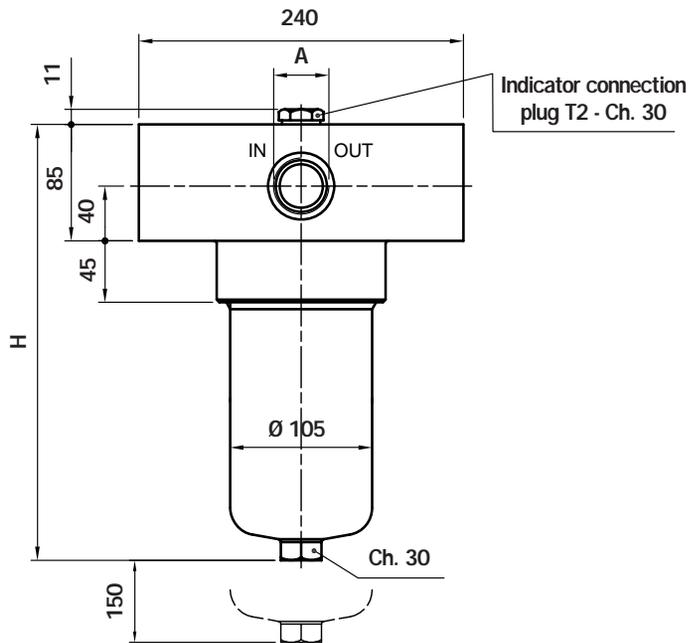
The curves are plotted using mineral oil with density of 0.86 kg/dm³ to ISO 3968.

Δp varies proportional with density.

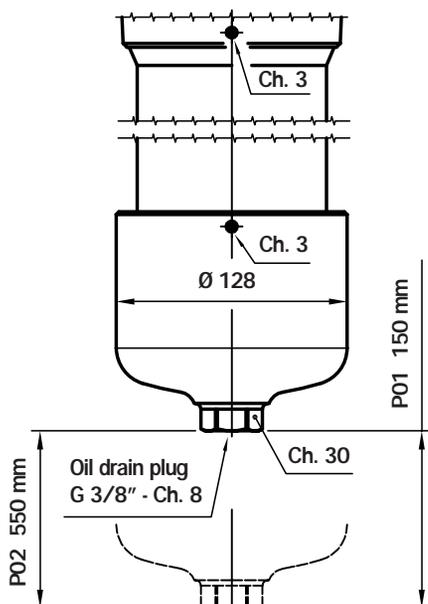


FHZ 320

Dimensions



Only for FHZ 320 length 4



Style P01 standard maintenance from head.
Style P02 maintenance option from housing base.

Recommended maximum flow rate

- Pressure drop of complete filter equal to Δp 2.5 bar.
- Oil kinematic viscosity 30 mm²/s (cSt).
- Density 0.86 kg/dm³.

Filter element type	Flow rate l/min Series S	Filter Length
A03	115	1
A06	120	
A10	155	
A16	160	
A25	170	
T10	215	2
A03	160	
A06	170	
A10	192	
A16	195	
A25	208	3
T10	220	
A03	180	
A06	190	
A10	205	
A16	208	4
A25	215	
T10	220	
A03	190	
A06	195	
A10	210	4
A16	210	
A25	215	
T10	225	

A Flanged connection
E Depth 15 mm

G 1 1/4"	M12
G 1 1/4" NPT	1/2" UNC
SAE 20 (1 5/8" - 12 UN)	1/2" UNC

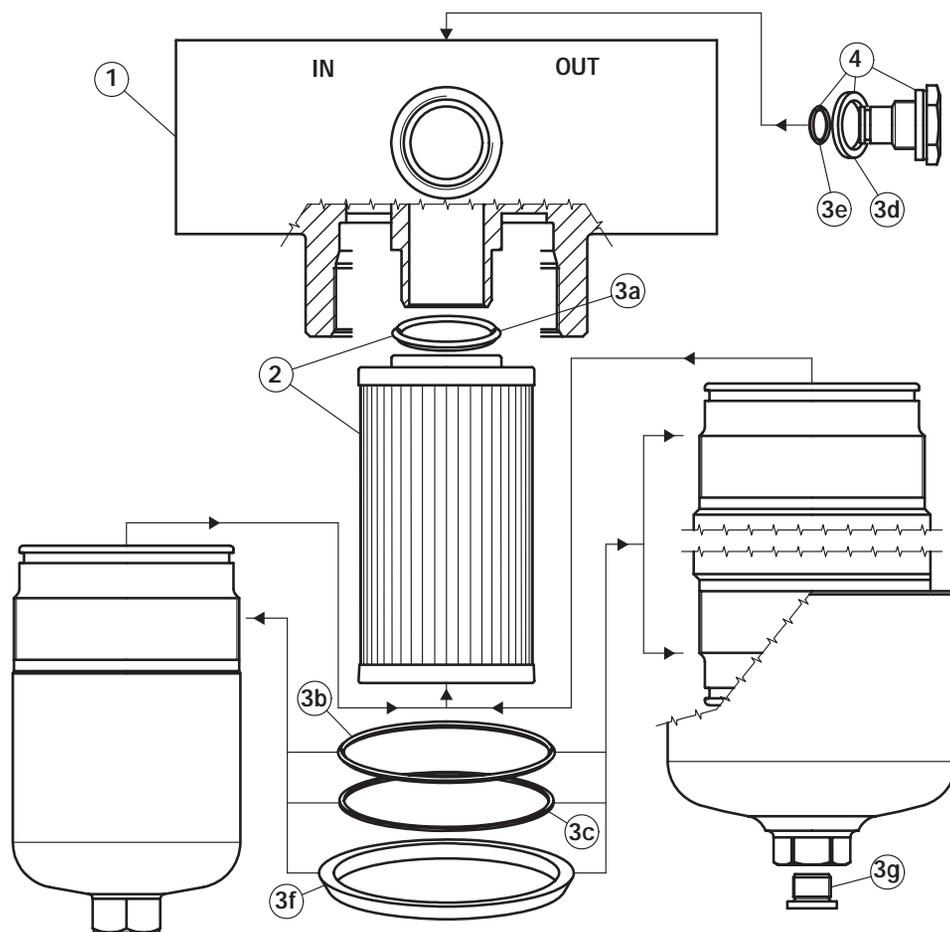
A Flanged connection
E Depth 15 mm

1 1/2" SAE 6000 psi/M	M12
1 1/2" SAE 6000 psi/UNC	1/2" UNC

Filter Length
H mm

1	253
2	376
3	508
4	663

Spare parts FHZ



Pos.	Description	Qty.	FHZ 320 Series FILTER 320 1 - 2 - 3 - 4	
1	Complete filter	1	See order table	
2	Filter element	1	See order table	
3	Seal kits	1	NBR 02050416	FPM 02050417
3a	O-Ring for filter element	1	OR 144 Ø 33.69 x 3.53	
3b	O-Ring for housing	2	OR 3350 Ø 88.57 x 2.62	
3c	Anti-extrusion ring	2	Parbak 153 Ø 89.36 x 2.18	
3d	Gasket	1	01030058 (HNBR)	01030046 (FPM)
3e	O-Ring	1	OR 2050 Ø 12.42 x 1.78	
3f	Protection seal	1	01026510	
3g	Oil drain plug	1	G 3/8" with seal	
4	Indicator plug	1	T2H	T2V
-	Indicator	1	See order table	

Ordering information FHZ

Filter assembly

FHZ320

Example: FHZ320

1	2	3	4	5	6a
<input type="checkbox"/>					
4	A	G1	A10	S	P01

Filter element

HP 320

Example: HP320

1	4	2	5	6b
<input type="checkbox"/>				
4	A10	A	S	Pxx

1 - Filter length

1
2
3
4

2 - Seals

A	NBR
V	FPM

3 - Connections

G1	G 1 1/4"
G2	1 1/4" NPT
G3	SAE 20 (1 5/8" 12 UN)
F1	1 1/2" SAE 6000 PSI - M
F2	1 1/2" SAE 6000 PSI - UNC

4 - Filter elements

A03	Inorganic microfibre 3 μ	} $\beta_x(c) \geq 1000$ See page 10
A06	Inorganic microfibre 6 μ	
A10	Inorganic microfibre 10 μ	
A16	Inorganic microfibre 16 μ	
A25	Inorganic microfibre 25 μ	
T10	Stainless steel mesh 25 μ (style H only)	

5 - Filter elements differential pressure

H	210 bar
S	210 bar

6 - Options

a) Filter

P01	MP Filtri standard
P02	MP maintenance from housing base (only for length 4)
Pxx	Customer request

b) Filter element

P01	MP Filtri standard
Pxx	Customer request

DIFFERENTIAL INDICATORS (see page 15)

MP Filtri - The filter functions as described in this bulletin are valid exclusively for original MP Filtri filter elements and replacement parts. All rights reserved

The data in this publication is marketing information. MP Filtri reserves the right to make changes to the product described herein at any time it deems fit in relation to technical or commercial requirements. The colors of the products shown on the cover are for illustration purposes only.

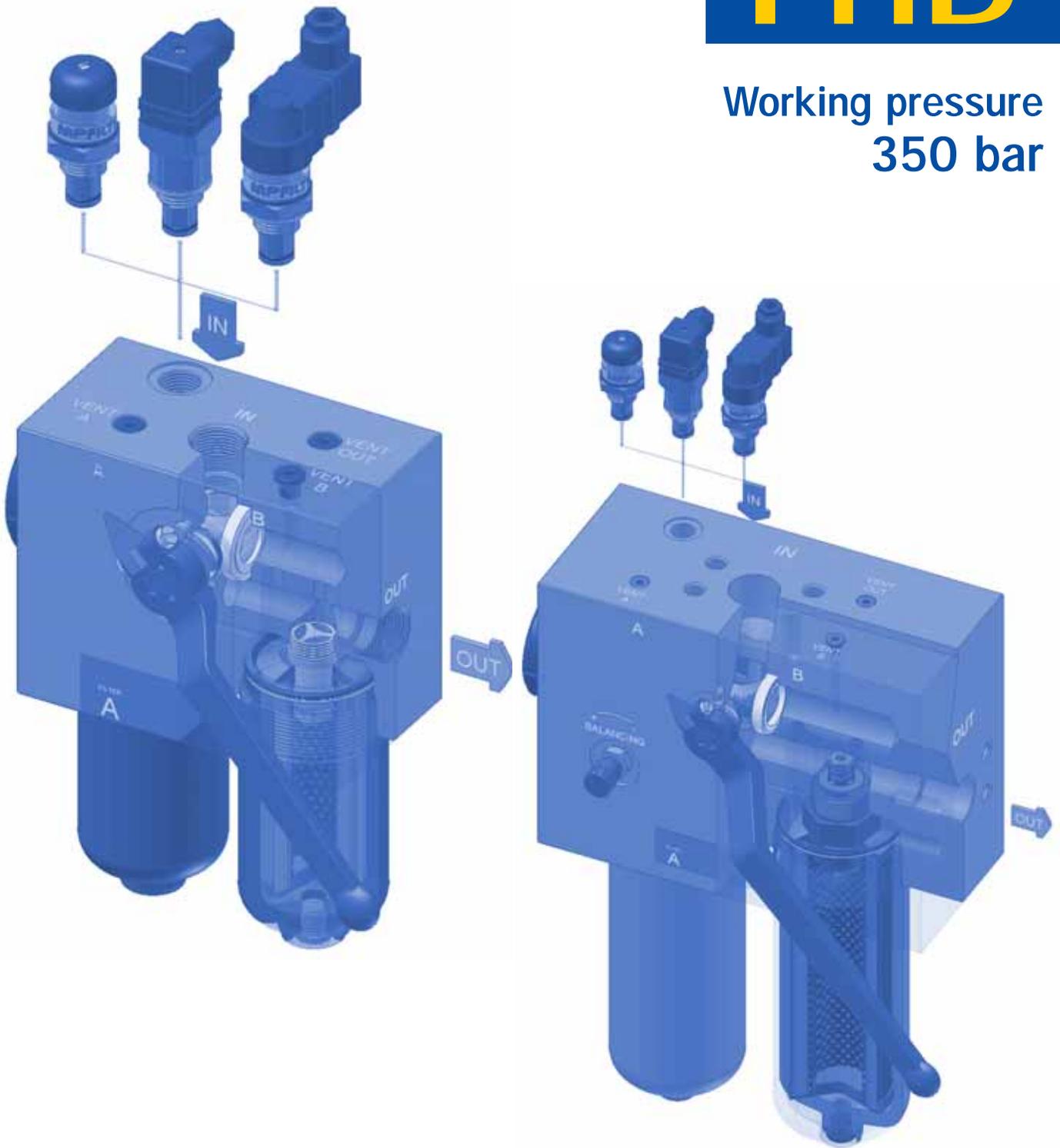
Copyright. All rights reserved.

FHD



SERIES FHD

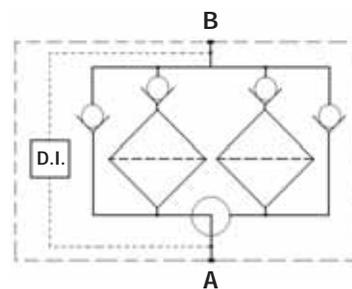
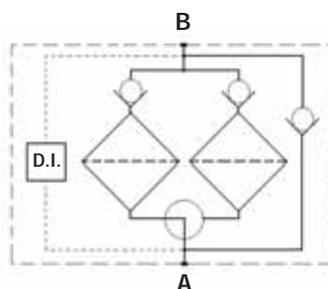
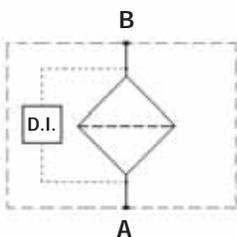
Working pressure
350 bar



Style S

Style B
Series FHD 051

Style B
Series FHD 325/332



Technical data

Filter body (Materials)

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

Pressure

- Maximum operating pressure: 350 bar (35 MPa)
- Test pressure: 525 bar (52.5 MPa)
- Burst pressure: 1250 bar (125 MPa)
- Pulsed pressure fatigue test 1,000,000 cycles with pressure from 0 to 350 bar (35 MPa)

Temperature

- From -25°C to +110°C

Bypass valve

- Opening pressure 6 bar \pm 10%
- Other opening pressures on request.

Elements type Δp

- Elements in microfibre series R: 20 bar
- Elements in microfibre series S-H: 210 bar
- Elements in stainless steel mesh series N: 20 bar
- Oil flow from exterior to interior.

Seals

- Standard Nitrile (NBR) series A
- Optional FPM series V

Weights without filter elements (kg)

	Length 0	1	2	3	4	5
• FHD 020	5.9	6.8				
• FHD 050			15	16.2	17.5	20
• FHD 325		50	55	59.5		
• FHD 332		65	80	89	101	

Filter internal volumes (dm³)

	Length 0	1	2	3	4	5
• FHD 020	0.31	0.51				
• FHD 050			1.05	1.25	1.46	1.82
• FHD 325		3.72	5.32	7.15		
• FHD 332		2.72	4.24	4.85	6.76	

Connections

In-line Inlet/Outlet 90°

Compatibility

- Bodies compatible with:
Mineral oils to ISO 2943 - aqueous emulsions
synthetic fluids, water/glycol.
- Filter elements compatible with:
Mineral oils to ISO 2943 - aqueous emulsions
synthetic fluids, water/glycol.
- Nitrile (NBR) seals series A, compatible with:
Mineral oils to ISO 2943 - aqueous emulsions
synthetic fluids, water/glycol.
- V series FPM seals, compatible with:
Synthetic fluids type HS-HFDR-HFDS-HFDU.
To ISO 2943

Filter Element Area

Filter element in stainless steel mesh

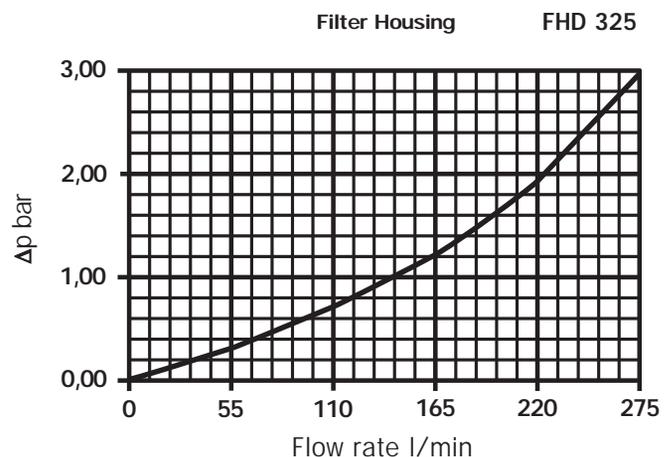
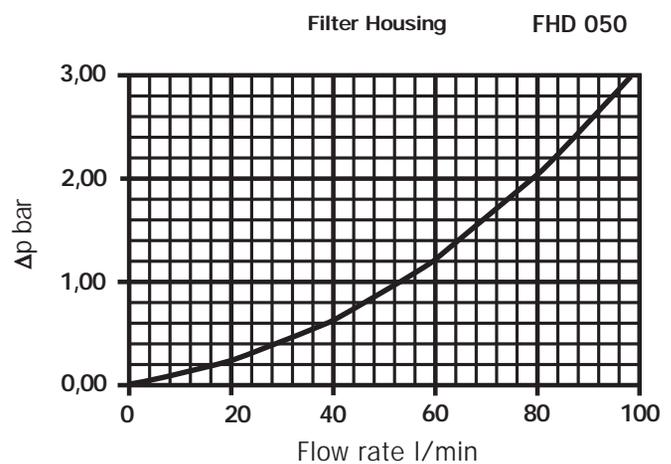
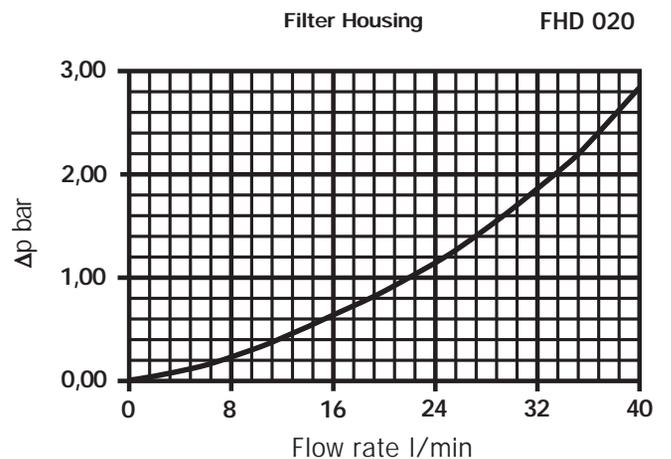
Type	Length					
	0	1	2	3	4	5
HP020		278				
HP050	-	450	700	1000	1300	2100
HP320	-	1650	3645	5970	8280	

Values expressed in cm²

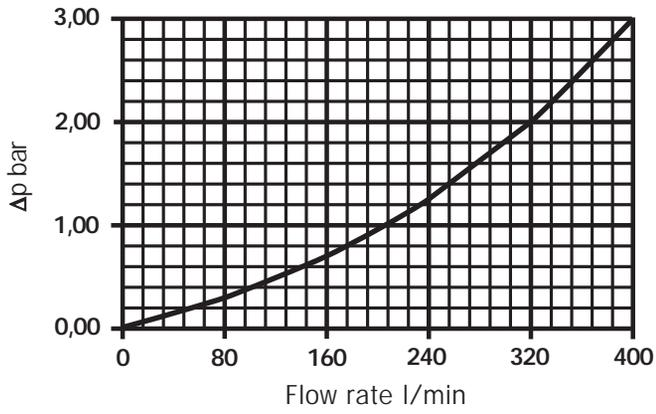
Pressure drops Δp Housing

The curves are plotted using mineral oil with density of 0.86 kg/dm³ to ISO 3968.

Δp varies proportional with density.



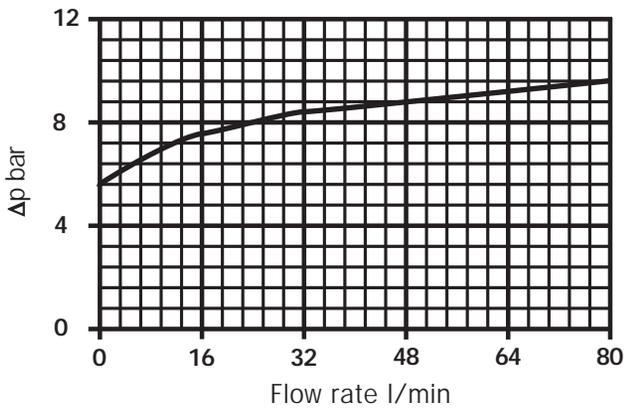
Filter Housing FHD 332



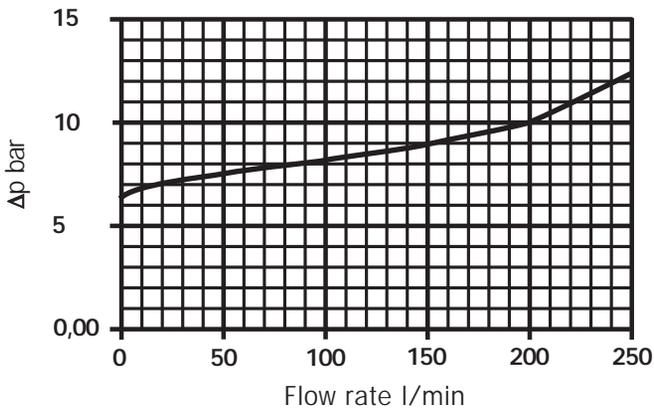
Valves

Bypass valve pressure drop

FHD 050



FHD 325 - 332



FHD

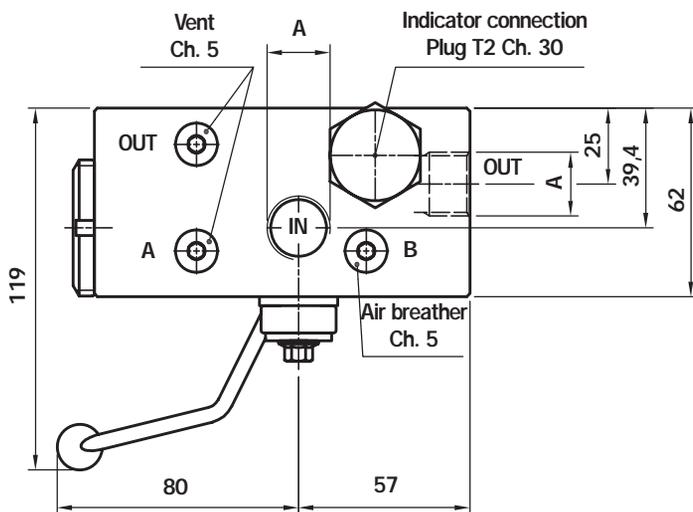
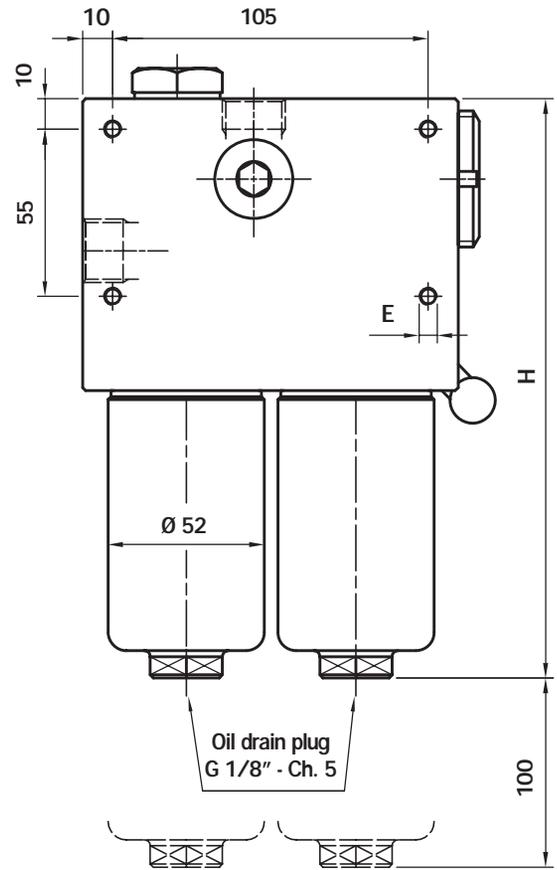
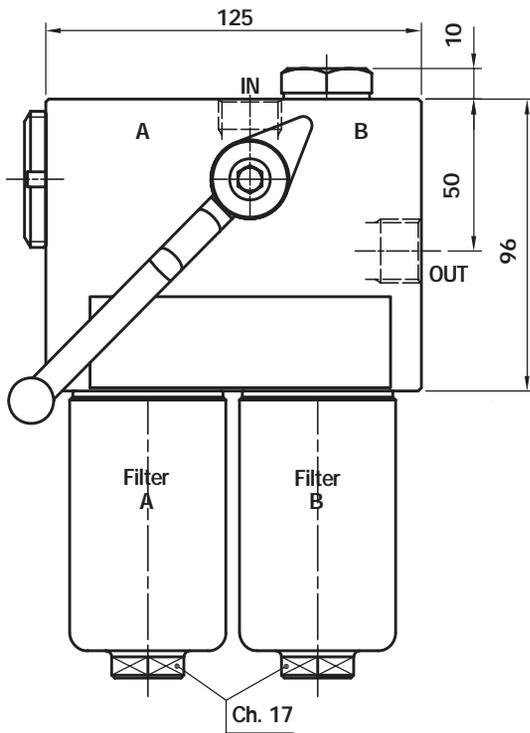
Recommended maximum flow rate

- Pressure drop of complete filter equal to Δp 2.5 bar.
- Oil kinematic viscosity 30 mm²/s (cSt).
- Density 0.86 kg/dm³.

Filter element type	020	050		325		332		Filter Length
	Flow rate l/min Series H	Flow rate l/min Series R	Flow rate l/min Series S	Flow rate l/min Series R	Flow rate l/min Series S	Flow rate l/min Series R	Flow rate l/min Series S	
A03	9							0
A06	10							
A10	14							
A16	15							
A25	17							
M25*	25							
A03	17	50	40	145	130			1
A06	20	59	48	150	135			
A10	28	68	60	195	175			
A16	30	70	60	208	180			
A25	33	76	67	220	212			
M25*	35	82	-	240	-			
A03		57	52	200	180	265	225	2
A06		60	55	208	190	275	245	
A10		70	58	225	215	315	290	
A16		75	72	235	218	320	295	
A25		80	78	245	230	330	315	
M25		86	-	245		340	-	
A03		64	60	220	205	295	268	3
A06		65	62	225	212	308	288	
A10		74	72	240	228	325	310	
A16		77	75	245	230	330	315	
A25		82	80	250	235	335	325	
M25		86	-	250	-	340	-	
A03		70	67			308	285	4
A06		72	70			315	295	
A10		78	76			330	315	
A16		79	77			335	315	
A25		82	82			340	305	
M25		86	-			345	-	
A03		77	73					5
A06		78	75					
A10		82	79					
A16		83	80					
A25		85	85					
M25		88	-					

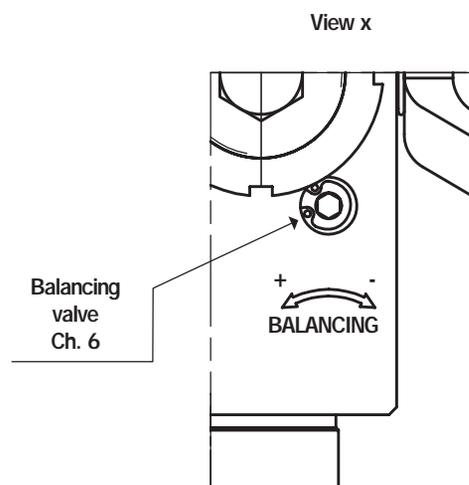
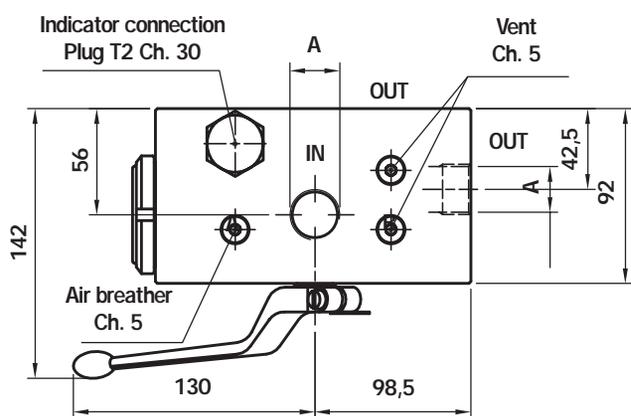
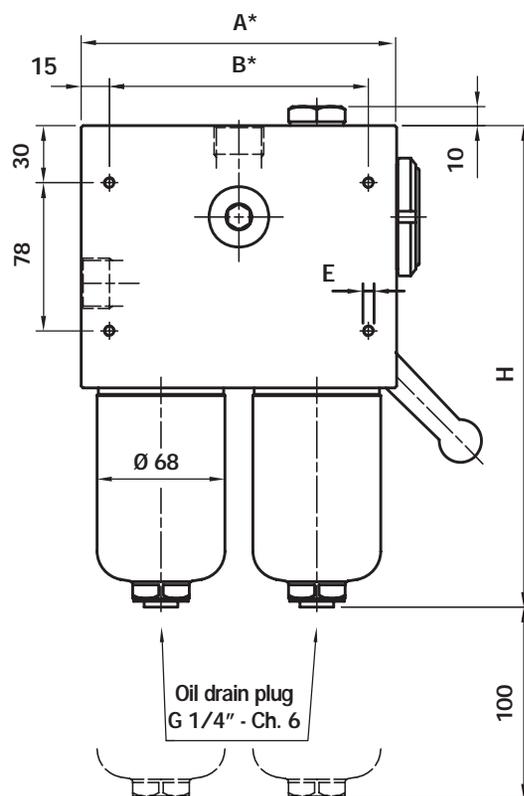
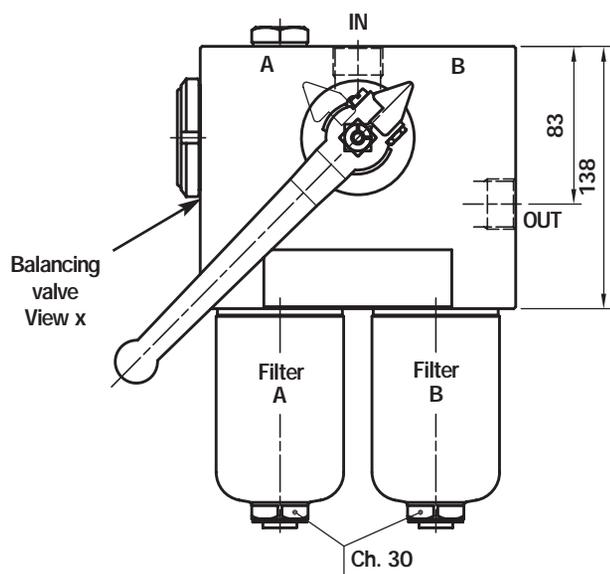
* SERIES N

FHD 020



A Threaded Connections	E Depth 7 mm	Filter Length	H mm
G 1/2"	M6	0	144
1/2" NPT	1/4" UNC	1	194
SAE 8 (3/4"- 16 UNF)	1/4" UNC		

FHD 051

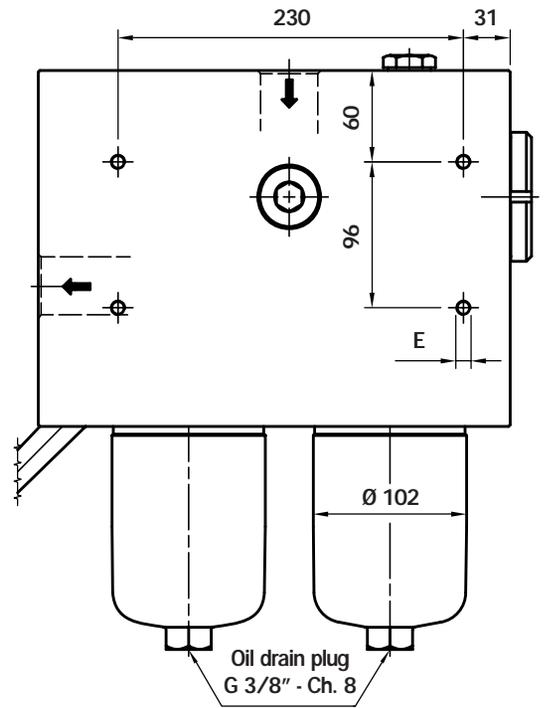
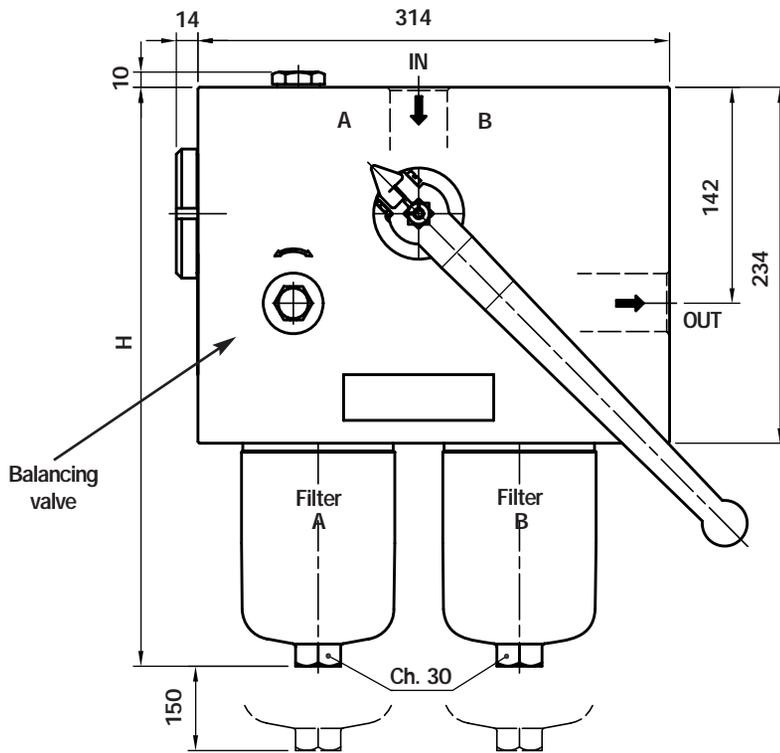


A Threaded Connections	E Depth 7 mm
G 1/2"	M6
G 3/4"	M6
1/2" NPT	1/4" UNC
3/4" NPT	1/4" UNC
SAE 8 (3/4" - 16 UNF)	1/4" UNC
SAE 12 (1 1/16" - 12 UN)	1/4" UNC

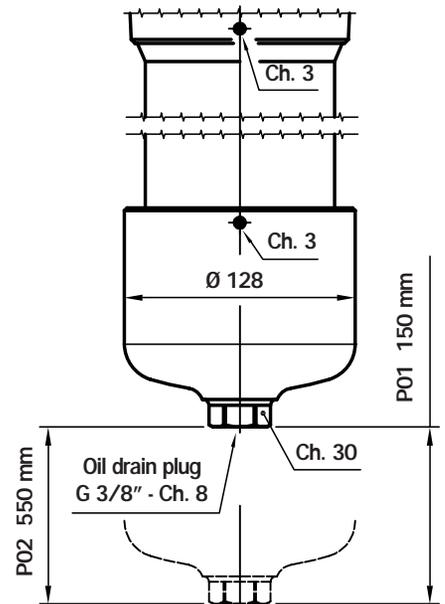
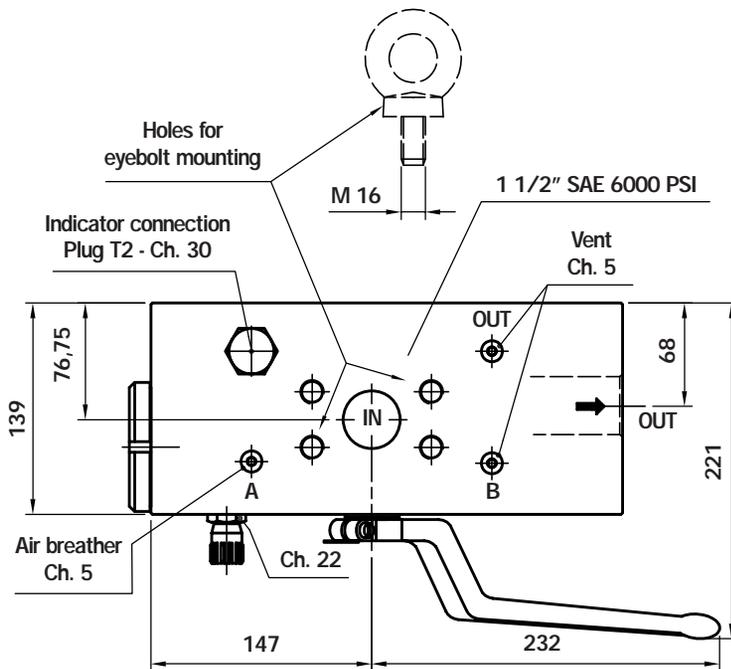
	A*	B*
With by-pass	182,5	152,5
Non by-pass	168	138

Filter Length	H mm
2	253
3	295
4	343
5	465

FHD 332



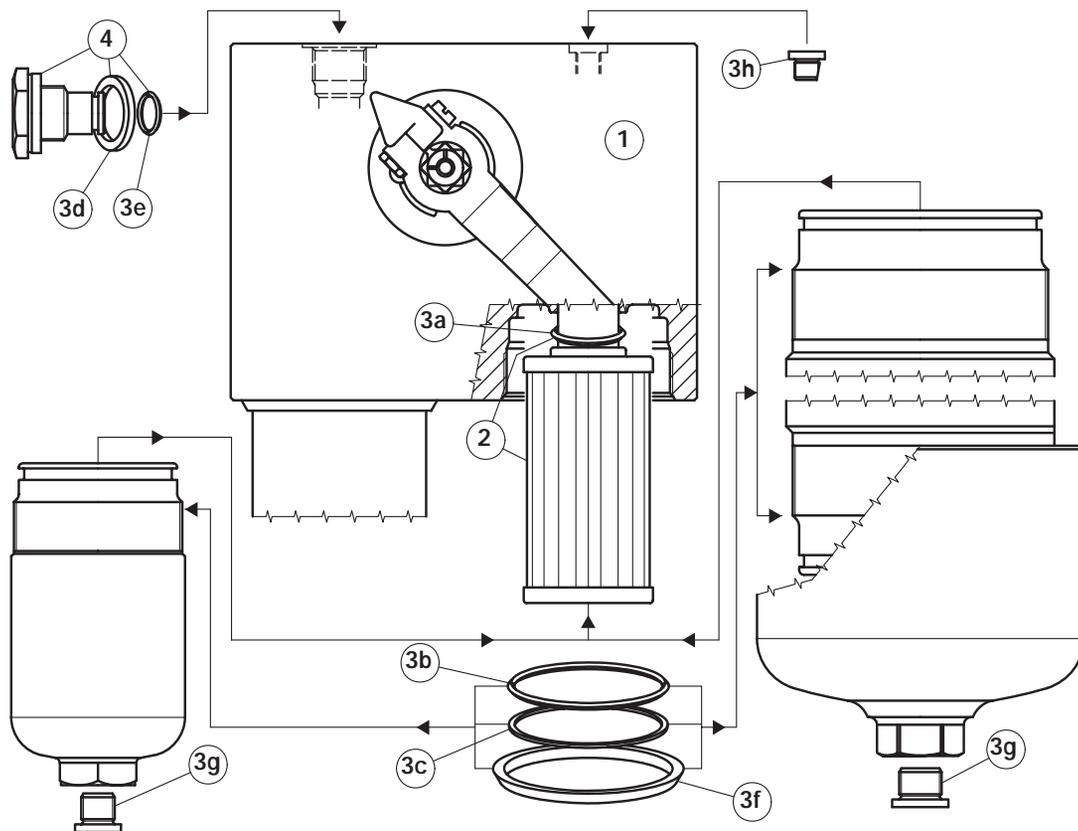
Only for FHD 332 length 4



Style P01 standard maintenance from head.
Style P02 maintenance option from housing base.

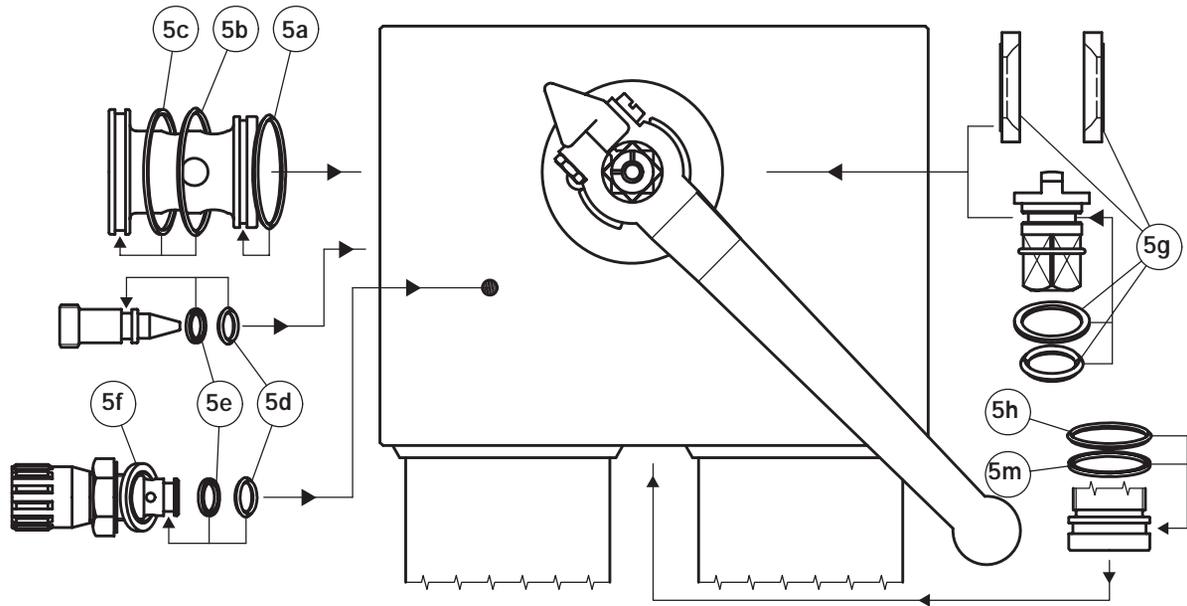
A Flanged connection	D	E Depth 11 mm	Filter Length	H mm
1 1/2" SAE 6000 PSI/M	M16	M10	2	480
1 1/2" SAE 6000 PSI/UNC	5/8" UNC	3/8" UNC	3	612
			4	767

Spare parts FHD



Pos.	Description	Qty.	FHD Series FILTER							
			020 0 - 1		051 2 - 3 - 4 - 5		325 1 - 2 - 3		332 2 - 3 - 4	
1	Complete filter	1	See order table							
2	Filter element	1	See order table							
3	Seal kits	1	NBR 02050418	FPM 02050419	NBR 02050420	FPM 02050421	NBR 02050377	FPM 02050378	NBR 02050377	FPM 02050378
3a	Filter element O-Ring	2	OR 121 Ø 15,88 x 2,62		OR 3093 Ø 23,67 x 2,62		OR 144 Ø 39,69 x 3,53			
3b	O-Ring for housing	2	OR 3162 Ø 40,95 x 2,62		OR 3225 Ø 56,82 x 2,62		4 pz.	OR 3350 Ø 88,57 x 2,62		
3c	Anti-extrusion ring	2	Parbak 130 Ø 41,73 x 2,18		Parbak 139 Ø 56,03 x 2,18		4 pz.	Parbak 153 Ø 89,36 x 2,18		
3d	Gasket	1	01030058 (HNBR)	01030046 (FPM)	01030058 (HNBR)	01030046 (FPM)	01030058 (HNBR)	01030046 (FPM)	01030058 (HNBR)	01030046 (FPM)
3e	O-Ring	1	OR 2050 Ø 12,42 x 1,78							
3f	Protective seal	2					01026510			
3g	Oil drain plug	2	G 1/8" with bonded seal		G 1/4" with bonded seal		G 3/8" with bonded seal			
3h	Air vent	3	01029094							
4	Indicator plug	1	T2H	T2V	T2H	T2V	T2H	T2V	T2H	T2V
-	Indicators	1	See order table							

Spare parts FHD



Pos.	Description	Qty.	FHD Series FILTER							
			020 0 - 1		051 2 - 3 - 4 - 5		325 1 - 2 - 3		332 2 - 3 - 4	
			NBR	FPM	NBR	FPM	NBR	FPM	NBR	FPM
5	Seal kits	1	02050422	02050423	02050424	02050425	02050426	02050427	02050428	02050429
5a	O-Ring for spacer	1	OR 2081 Ø 20,35 x 1,78		OR 2131 Ø 33,05 x 1,78		OR 2155 Ø 39,45 x 1,78		OR 2200 Ø 50,52 x 1,78	
5b	O-Ring for spacer	1	OR 2093 Ø 23,52 x 1,78		OR 2150 Ø 37,82 x 1,78		OR 3162 Ø 40,95 x 2,62		OR 3200 Ø 50,47 x 2,62	
5c	Anti-extrusion ring for spacer	1	Parbak 021 Ø 24,26 x 1,14		Parbak 029 Ø 38,56 x 1,14		Parbak 130 Ø 41,73 x 2,18		Parbak 136 Ø 51,26 x 2,18	
5d	O-Ring for balancing valve	1	-		OR 2031 Ø 7,65 x 1,78		OR 2037 Ø 9,25 x 1,78			
5e	Anti-extrusion ring balancing valve	1	-		01045083		01045090			
5f	Bonded seal for balancing valve	1	-		-		Bonded Seal Ø 15,83 - FPM			
5g	Seal kit for spacer	1	02050376 (DN10)		02050360 (DN20)		02050361 (DN25)		02050362 (DN32)	
5h	O-Ring Bp	1	-		OR 2093 Ø 23,52 x 1,78		-		-	
5m	Anti-extrusion ring Bp	1	-		Parbak 021 Ø 24,26 x 1,14		-		-	

Ordering information FHD

Filter assembly	1	2	3	4	5	6	7	8a
FHD020/051	<input type="checkbox"/>							
Example: FHD 051	051	4	S	A	G1	A10	S	P01
Filter element	1	2	6	4	7	8b		
HP 050	<input type="checkbox"/>							
Example: HP050	050	4	A10	A	S	P01		

1 - Size

Filter	Filter element
<input type="checkbox"/> 020	<input type="checkbox"/> 020
<input type="checkbox"/> 051	<input type="checkbox"/> 050

2 - Filter length

	FHD 020	FHD 051
<input type="checkbox"/> 0	X	-
<input type="checkbox"/> 1	X	-
<input type="checkbox"/> 2	-	X
<input type="checkbox"/> 3	-	X
<input type="checkbox"/> 4	-	X
<input type="checkbox"/> 5	-	X

3 - Bypass valve

<input type="checkbox"/> S	Without bypass
<input type="checkbox"/> B	With bypass (only for FHD 051)

4 - Seals

<input type="checkbox"/> A	NBR
<input type="checkbox"/> V	FPM

5 - Connections

	FHD 020	FHD 051
<input type="checkbox"/> G1	G 1/2"	G 3/4"
<input type="checkbox"/> G2	-	3/4" NPT
<input type="checkbox"/> G3	1/2" NPT	G 1/2"
<input type="checkbox"/> G4	SAE 8	1/2" NPT
<input type="checkbox"/> G5	-	SAE 8
<input type="checkbox"/> G6	-	SAE 12
<input type="checkbox"/> F1	-	-
<input type="checkbox"/> F2	-	-

6 - Filter element

<input type="checkbox"/> A03	Inorganic microfibre 3 µ	} βx (c) ≥ 1000 see page 10
<input type="checkbox"/> A06	Inorganic microfibre 6 µ	
<input type="checkbox"/> A10	Inorganic microfibre 10 µ	
<input type="checkbox"/> A16	Inorganic microfibre 16 µ	
<input type="checkbox"/> A25	Inorganic microfibre 25 µ	
<input type="checkbox"/> M25	Stainless steel mesh 25 µ (style N only)	

7 - Filter elements differential pressure

<input type="checkbox"/> R	20 bar only FHD 051	<input type="checkbox"/> N	20 bar (only for element M25)
<input type="checkbox"/> S	210 bar only FHD 051		
<input type="checkbox"/> H	210 bar only FHD 020		

8 - Options

a) Filter

<input type="checkbox"/> P01	MP Filtri standard
<input type="checkbox"/> P02	MP with replacement of the filter element from the cap (only for length 4)
<input type="checkbox"/> Pxx	Customer request

b) Filter element

<input type="checkbox"/> P01	MP Filtri standard
<input type="checkbox"/> Pxx	Customer request

DIFFERENTIAL INDICATORS (see page 15)

MP Filtri - The filter functions as described in this bulletin are valid exclusively for original MP Filtri filter elements and replacement parts. All rights reserved

The data in this publication is marketing information. MP Filtri reserves the right to make changes to the product described herein at any time it deems fit in relation to technical or commercial requirements. The colors of the products shown on the cover are for illustration purposes only.
Copyright. All rights reserved.

Ordering information FHD

Filter assembly	1	2	3	4	5	6	7	8a
FHD 325/332	<input type="checkbox"/>							
Example: FHD 332	332	4	S	A	G1	A10	S	P01
Filter element	2	6	4	7	8b			
HP 320	<input type="checkbox"/>							
Example: HP320	4	A10	A	S	P01			

1 - Size

325
332

2 - Filter length

	FHD 325	FHD 332
1	X	-
2	X	X
3	X	X
4	-	X

3 - Bypass valve

S	Without bypass
B	With bypass

4 - Seals

A	NBR
V	FPM

5 - Connections

	FHD 325	FHD 332
G1	G 1 1/4"	-
G2	-	-
G3	1 1/4" NPT	-
G4	SAE 20	-
G5	-	-
G6	-	-
F1	-	1 1/2" SAE 6000 PSI/M
F2	-	1 1/2" SAE 6000 PSI/UNC

6 - Filter element

A03	Inorganic microfibre 3 µ	} Bx (c) ≥ 1000 see page 10
A06	Inorganic microfibre 6 µ	
A10	Inorganic microfibre 10 µ	
A16	Inorganic microfibre 16 µ	
A25	Inorganic microfibre 25 µ	
M25	Stainless steel mesh 25 µ (style N only)	

7 - Filter elements differential pressure

R	20 bar	N	20 bar (only for element M25)
S	210 bar		

8 - Options

a) Filter

P01	MP Filtri standard
P02	MP with replacement of the filter element from the cap (only for length 4)
Pxx	Customer request

b) Filter element

P01	MP Filtri standard
Pxx	Customer request

DIFFERENTIAL INDICATORS (see page 15)

MP Filtri - The filter functions as described in this bulletin are valid exclusively for original MP Filtri filter elements and replacement parts. All rights reserved

The data in this publication is marketing information. MP Filtri reserves the right to make changes to the product described herein at any time it deems fit in relation to technical or commercial requirements. The colors of the products shown on the cover are for illustration purposes only.

Copyright. All rights reserved.

Operating and Maintenance



Pressurized filters are utilized to remove contaminant from hydraulic systems. Long working life of the hydraulic components and correct use of the hydraulic systems can be assured only when maintenance is performed correctly and at regular intervals.

Pressurized filters can be equipped with bypass valves, reverse flow valves, and check valves.

If the filters are not equipped with a bypass valve, only high strength filter cartridges should be used (Δp 210 bar) to avoid the risk of collapse due to the presence of contaminants retained during the filtration process.

- “H” series cartridges when by-pass valves are not installed.
- “S” series cartridges when reverse flow valves and duplex filters are installed.

When bypass valves are present and during flushing operations, we recommend the use of cartridges with low mechanical strength (Δp 20 bar).

- “N” series cartridges when reverse flow valves are not installed.
- “R” series cartridges when reverse flow valves and duplex filters are installed.

In order to prevent the filter elements from collapsing due to excessive hydraulic pressure it is essential to use differential indicators that serve to inform the user of the need to change the cartridge.

Effective contamination control can be assured only by the correct use of clogging indicators.

CHANGING THE FILTER ELEMENT FILTERS WITH IN-LINE AND MANIFOLD TYPE CONNECTIONS

- 1 Depressurize system and filter.
- 2 Unscrew (the oil drain plug, first if present) the housing using the appropriate tools and extract the filter element (see fig. 2).
- 3 Collect the spent oil and cartridge in a suitable container and dispose of them in compliance with statutory legislation.

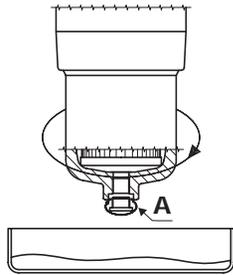


Fig. 1

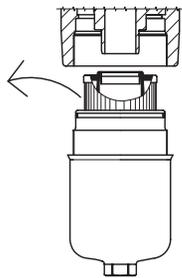


Fig. 2

!!! WARNING !!!

- 4 To avoid damaging the components check and clean the following parts is necessary:
 - the thread of the housing and the seals and the thread of the head.
 Check the condition of the seals - when chasing the seals lubricate the new seals with operating fluid prior to installation (see fig. 3).

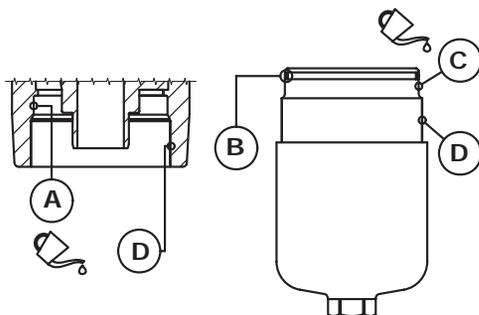


Fig. 3

- 5 Lubricate the filter element seal with the operating fluid before installing the new filter element (see fig. 4).

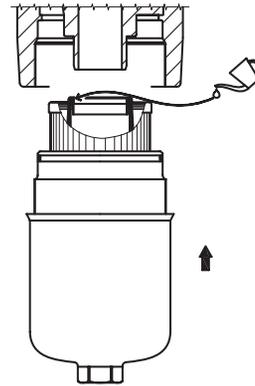


Fig. 4

- 6 Screw the housing onto the head using the correct tool. **WARNING:** Screw the housing fully home onto the head "DO NOT APPLY EXCESSIVE TIGHTENING TORQUE".

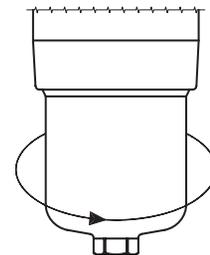


Fig. 5

- 7 Start the machine and check for the absence of leaks. Repeat the operation when the machine has reached its operating temperature.

**CHANGING THE FILTER
ELEMENT ON FMP - FHP - FHM - FHB
FILTERS
WITH HOUSING LENGTH 4 AND 5**

- 1 Depressurize the system.
- 2 Unscrew the oil drain plug and collect the fluid in a suitable container. When the filter has fully drained check the condition of the seals and if OK re-assemble the plug, tightening it fully down (see fig. 1). Unscrew the cover (version P01) or housing (version P02) using the specific tools, and then extract the filter element (see fig. 2).
- 3 Collect the spent oil and cartridge in a suitable container and dispose of them in compliance with statutory legislation.

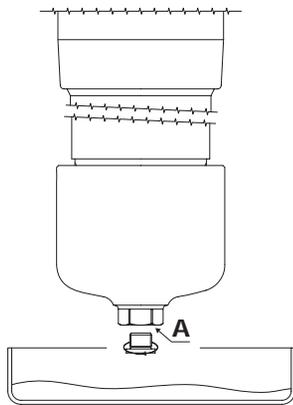


Fig. 1

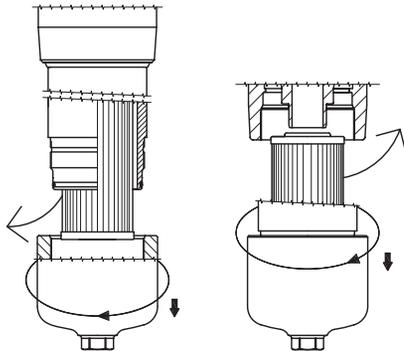


Fig. 2

!!! WARNING !!!

- 4 To avoid damaging the components, check the cover threads (version P01) or the housing threads (version P02) and the seals thoroughly; check also the housing (version P01) or head threads (version P02). Check the condition of the seals - when changing the seals lubricate the new seals with operating fluid prior to installation (see fig. 3).

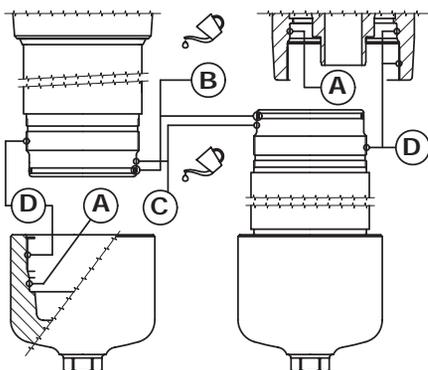


Fig. 3

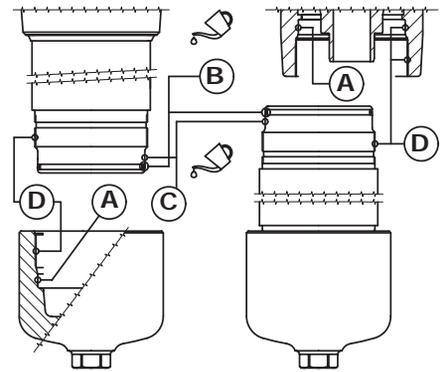


Fig. 3

- 5 Lubricate the filter element seal with the operating fluid prior to installation (see fig. 4).

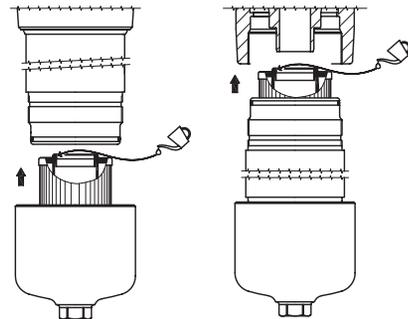


Fig. 4

- 6 Screw the cover onto the housing (version P01), or the housing onto the head (version P02) using the correct tool. **WARNING:** Screw the cover / housing fully home on the housing "DO NOT APPLY EXCESSIVE TIGHTENING TORQUE" .

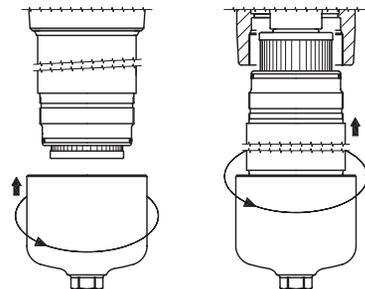


Fig. 5

- 7 Start the machine and check for the absence of leaks. Repeat the operation when the machine has reached its operating temperature.

CHANGING THE FILTER ELEMENT ON FHF FILTERS

- 1 Depressurize the system and clean the filter.
- 2 Unscrew the air vent plug (pos. A) and open the oil drain connection (pos. B), collect the fluid in a suitable container (see fig. 1).
When the operation is finished check the condition of the seals and if OK re-assemble plug (pos. A) and drain plug tightening both fully down. Unscrew the cover using the specific tools and extract the filter element (see fig. 2).
- 3 Collect the spent oil and cartridge in a suitable container and dispose of them in compliance with statutory legislation.

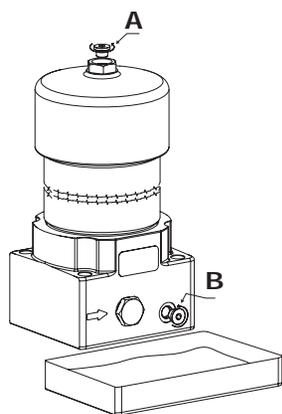


Fig. 1

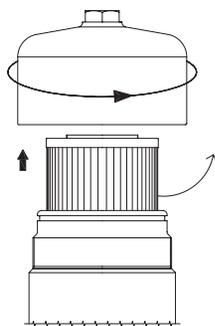


Fig. 2

!!! WARNING!!!

- 4 To avoid damaging the components check the cover threads and the seals thoroughly; check also the housing-thread.
Check the condition of the seals - when changing the seals lubricate the new seals with operating fluid prior to installation (see fig. 3).

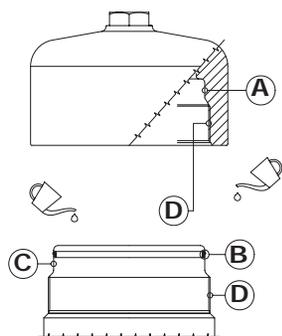


Fig. 3

- 5 Lubricate the filter element seal with the operating fluid prior to installation (see fig. 4).

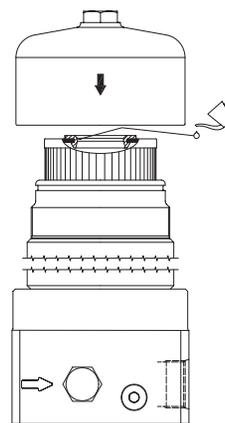


Fig. 4

- 6 Screw the cover onto the housing using the correct tool. **WARNING:** Screw the cover fully home into the housing "DO NOT APPLY EXCESSIVE TIGHTENING TORQUE".

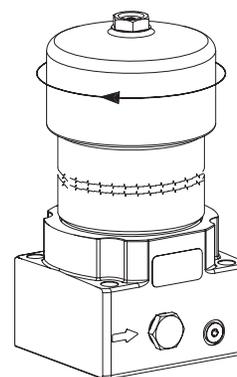


Fig. 5

- 7 Start the machine and bleed the air by unscrewing (max. one turn) the plug (pos. A).
When the operation is terminated screw the plug fully down and check for the absence of leaks.
Repeat the operation when the machine has reached its operating temperature.

**CHANGING THE FILTER
ELEMENT ON FILTERS
FHD 020 - 051 - 325 - 332**

1 Before turning the valve from housing B to housing A, open the * balancing valve (pos. C) by turning it counterclockwise.

Bleed the air through the plug (pos. A1), the screw must be turned through a maximum of one revolution.

After bleeding the air re-tighten the vent plug and close the balancing valve (pos. C) by turning it clockwise.

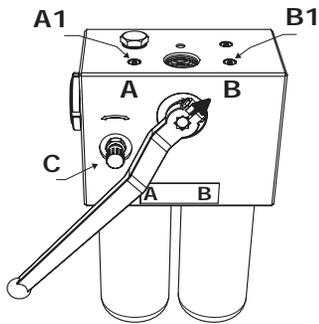


Fig. 1

2 Turn handle to divert the oil flow from housing B to housing A (see fig. 2). Unscrew the air vent plug (pos. B1) and open the oil drain connection (pos. B2) collecting the fluid in a suitable container.

When the operation is finished check the condition of the seals and if OK re-assemble on the plug (pos. B2) tightening it fully down and re-tighten the the air vent connection (pos. B1).

Unscrew housing (B) using the appropriate tools and extract the filter element (see fig. 3).

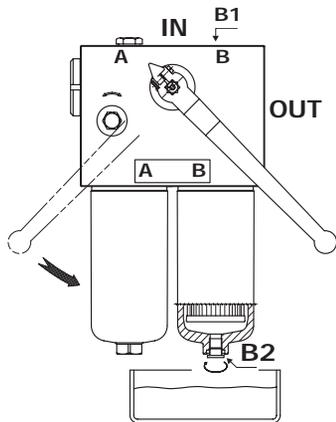


Fig. 2

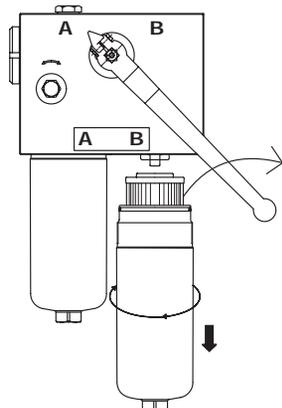


Fig. 3

3 Collect the spent oil and cartridge in a suitable container and dispose of them in compliance with statutory legislation.

!!! WARNING !!!

4 To avoid damaging the components check the thread of the housing and the seals thoroughly; check also the thread of the head.

Check the condition of the seals - when changing the seals lubricate the new seals with operating fluid prior to installation (see fig. 4).

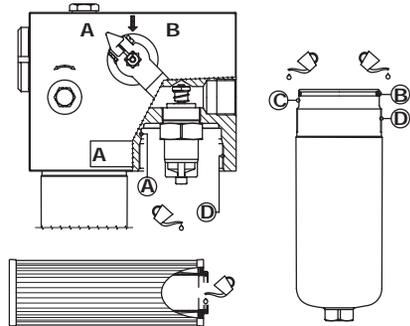


Fig. 4

5 Lubricate the filter element seal with the operating fluid prior to installation.

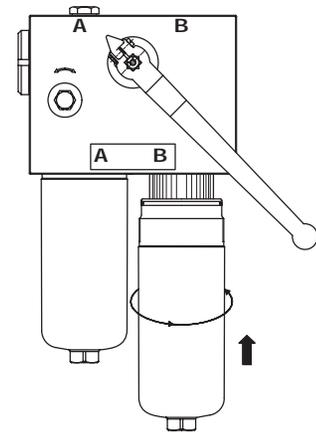


Fig. 5

6 Screw the housing onto the head using the correct tool. **WARNING:** Screw the housing fully home

on the housing "DO NOT APPLY EXCESSIVE TIGHTENING TORQUE " Open the balancing valve* (pos. C) by turning it counterclockwise.

Bleed the air through the plug (pos. B1), the screw must be turned through a maximum of one revolution.

After bleeding the air re-tighten the vent plug and close the balancing valve* (pos. C) by turning it clockwise. Check for the absence of leaks.

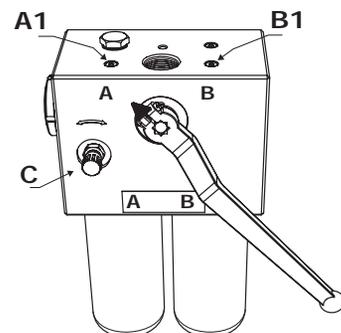


Fig. 6

* The balancing valve is not present in version FHD 020.

**CHANGING THE FILTER
ELEMENT ON FILTER FHD 332
HOUSING LENGTH 4**

- 1 Before turning the valve from housing B to housing A, open the balancing valve (pos. C) by turning it counterclockwise. Bleed the air through the plug (pos. A1), the screw must be turned through a maximum of one revolution. After bleeding the air re-tighten the vent plug and close the balancing valve (pos. C) by turning it clockwise (see fig 1).

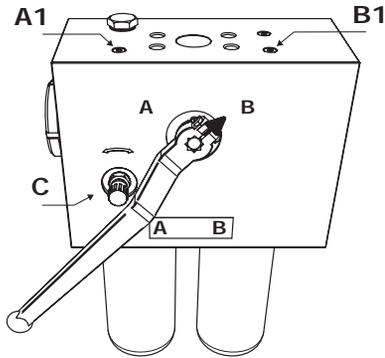


Fig. 1

- 2 Turn handle to divert the oil flow from housing B to housing A. Unscrew the air vent plug (pos. B1) and open the oil drain connection (pos. B2) collecting the fluid in a suitable container. When the operation is finished check the condition of the seals and if OK re-assemble on the plug (pos. B2) tightening it fully down and close the the air vent connection (pos. B1). Unscrew the cover (version P01) or housing (version P02) using the specific tools, and then extract the filter element (see fig 2).

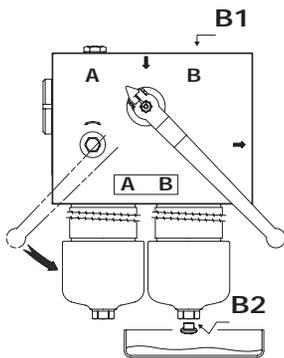


Fig. 2

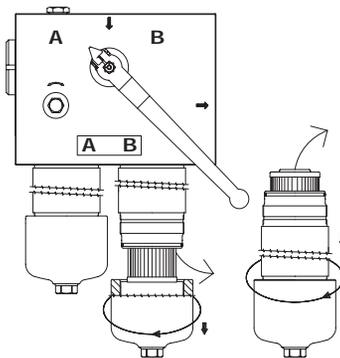


Fig. 3

- 3 Collect the spent oil and cartridge in a suitable container and dispose of them in compliance with statutory legislation.

!!! WARNING !!!

- 4 To avoid damaging the components check the cover threads (version P01) or the housing threads (version P02) and the seals thoroughly; check also the housing threads (version P01) or the head threads (version P02). Check the condition of the seals - when changing the seals lubricate the new seals with operating fluid prior to installation (see fig. 4).

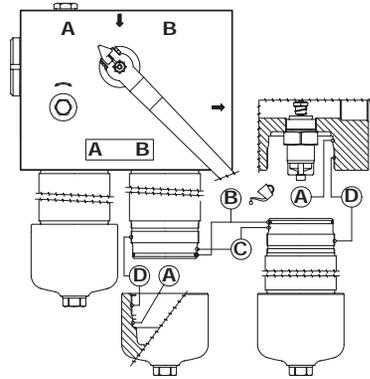


Fig. 4

- 5 Lubricate the filter element seal with the operating fluid prior to installation (see fig 5).

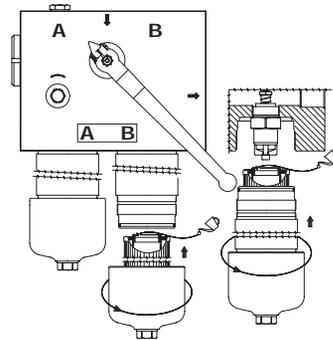


Fig. 5

- 6 Screw the cover onto the housing (version P01), or the housing onto the head (version P02) using the correct tool. **WARNING:** Screw down the cover / housing fully home into the housing "DO NOT APPLY EXCESSIVE TIGHTENING TORQUE ". Open the balancing valve* (pos. C) by turning it counterclockwise. Bleed the air by means of plug (pos. B1), the screw must be turned through a maximum of one revolution. After bleeding the air refit the vent plug and close the balancing valve* (pos. C) by turning it clockwise. Check for the absence of leaks.

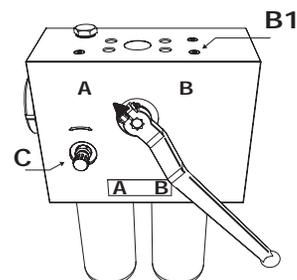


Fig. 6

* The balancing valve is not present in version FHD 020.