

**NEW**

High Pressure filters

# FMM 150 series

Maximum working pressure up to 42 MPa (420 bar) - Flow rate up to 250 l/min



**PASSION TO PERFORM**



# FILTER SIZING

**THE CORRECT FILTER SIZING HAVE TO BE BASED ON THE TOTAL PRESSURE DROP DEPENDING BY THE APPLICATION. THE MAXIMUM TOTAL PRESSURE DROP ALLOWED BY A NEW AND CLEAN HIGH PRESSURE PRESSURE FILTER HAVE TO BE IN THE RANGE 0.8 ÷ 1.5 bar.**

The pressure drop calculation is performed by adding together the value of the housing with the value of the filter element. The pressure drop  $\Delta p_c$  of the housing is proportional to the fluid density ( $\text{kg}/\text{dm}^3$ ); all the graphs in the catalogue are referred to mineral oil with density of  $0.86 \text{ kg}/\text{dm}^3$ . The filter element pressure drop  $\Delta p_e$  is proportional to its viscosity ( $\text{mm}^2/\text{s}$ ), the corrective factor Y have to be used in case of an oil viscosity different than  $30 \text{ mm}^2/\text{s}$  (cSt).

### Sizing data for single filter element, head at top

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

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

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

Q = flow rate (l/min)

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

V2 = operating oil viscosity in  $\text{mm}^2/\text{s}$  (cSt)

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

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

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

### Verification formula

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

### Maximum total pressure drop ( $\Delta p_{\text{max}}$ ) allowed by a new and clean filter

Application	Range (bar)
Suction filters	0.08 ÷ 0.10
Return filters	0.4 ÷ 0.6
Low & Medium Pressure filters	0.4 ÷ 0.6 return lines
	0.3 ÷ 0.5 lubrication lines
	0.3 ÷ 0.4 off-line in power systems
	0.1 ÷ 0.3 off-line in test benches
High Pressure filters	0.8 ÷ 1.5
Stainless Steel filters	0.8 ÷ 1.5

### FMM150 calculation example

Application data:

High pressure filter

Pressure  $P_{\text{max}} = 300 \text{ bar}$

Flow rate  $Q = 120 \text{ l}/\text{min}$

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

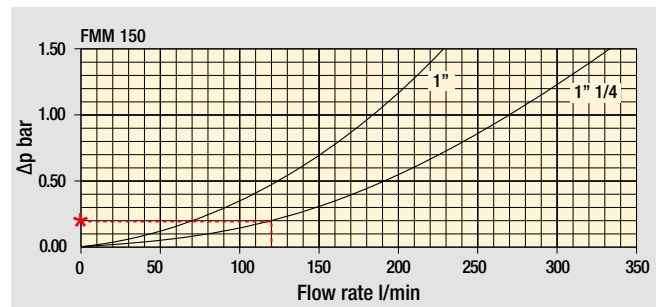
Oil density =  $0.86 \text{ kg}/\text{dm}^3$

Required filtration efficiency =  $25 \mu\text{m}$  with absolute filtration

With bypass valve and  $1 \frac{1}{4}$ " inlet connection

Calculation:

$\Delta p_c = 0.2 \text{ bar}$  (see graphic below)



Filter housings  $\Delta p$  pressure drop.

The curves are plotted using mineral oil with density of  $0.86 \text{ kg}/\text{dm}^3$  in compliance with ISO 3968.  $\Delta p$  varies proportionally with density.

$$\Delta p_e = (5.94 : 1000) \times 120 \times (46 : 30) = 1.09 \text{ bar}$$

### FMM150 corrective factor

Corrective factor Y to be used for the filter element pressure drop calculation.

The values depend to the filter size and length and to the filter media.

Reference oil viscosity  $30 \text{ mm}^2/\text{s}$

Filter element Type	Absolute filtration N - R Series					Nominal filtration N Series	
	A03	A06	A10	A16	A25	M25	
HP 150	1	17.53	15.91	7.48	6.96	5.94	1.07
	2	8.60	8.37	3.54	3.38	3.15	0.58
	3	6.53	5.90	2.93	2.79	2.12	0.49

$$\Delta p_{\text{Tot.}} = 0.2 + 1.09 = 1.29 \text{ bar}$$

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

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

Flow rates [l/min]

Filter series	Length	Filter element design - N Series					
		A03	A06	A10	A16	A25	M25
FMM 150	1	81	88	156	163	179	295
	2	142	145	227	230	236	312
	3	170	180	242	245	263	315

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

Connections of filter under test G  $1 \frac{1}{4}$ ".

The reference fluid has a kinematic viscosity of  $30 \text{ mm}^2/\text{s}$  (cSt) and a density of  $0.86 \text{ kg}/\text{dm}^3$ .

For different pressure drop or fluid viscosity we recommend to use our selection software available on [www.mpfiltri.com](http://www.mpfiltri.com).

Please, contact our Sales Department for further additional information.

**Corrective factor Y**  
to be used for the filter element pressure drop calculation.

The values depend to the filter size and length and to the filter media.

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

**High pressure filters**

Filter element	Absolute filtration					Nominal filtration	
	N - R Series						N Series
Type	A03	A06	A10	A16	A25	M25	
HP 011	1	332.71	250.07	184.32	152.36	128.36	-
	2	220.28	165.56	74.08	59.13	37.05	-
	3	123.24	92.68	41.48	33.08	20.72	-
	4	77.76	58.52	28.37	22.67	16.17	-
HP 039	1	70.66	53.20	25.77	20.57	14.67	4.90
	2	36.57	32.28	18.00	13.38	8.00	2.90
	3	26.57	23.27	12.46	8.80	5.58	2.20
HP 050	1	31.75	30.30	13.16	12.3	7.29	1.60
	2	24.25	21.26	11.70	9.09	4.90	1.40
	3	17.37	16.25	8.90	7.18	3.63	1.25
	4	12.12	10.75	6.10	5.75	3.08	1.07
	5	7.00	6.56	3.60	3.10	2.25	0.80
HP 065	1	58.50	43.46	23.16	19.66	10.71	1.28
	2	42.60	25.64	16.22	13.88	7.32	1.11
	3	20.50	15.88	8.18	6.81	3.91	0.58
HP 135	1	20.33	18.80	9.71	8.66	4.78	2.78
	2	11.14	10.16	6.60	6.38	2.22	1.11
	3	6.48	6.33	3.38	3.16	2.14	1.01
HP 150	1	17.53	15.91	7.48	6.96	5.94	1.07
	2	8.60	8.37	3.54	3.38	3.15	0.58
	3	6.53	5.90	2.93	2.79	2.12	0.49
HP 320	1	10.88	9.73	5.02	3.73	2.54	1.04
	2	4.40	3.83	1.75	1.48	0.88	0.71
	3	2.75	2.11	1.05	0.87	0.77	0.61
	4	2.12	1.77	0.98	0.78	0.55	0.47
HP 500	1	4.44	3.67	2.30	2.10	1.65	0.15
	2	3.37	2.77	1.78	1.68	1.24	0.10
	3	2.22	1.98	1.11	1.09	0.75	0.08
	4	1.81	1.33	0.93	0.86	0.68	0.05
	5	1.33	1.15	0.77	0.68	0.48	0.04

Filter element	Absolute filtration					Nominal filtration	
	N Series						N Series
Type	A03	A06	A10	A16	A25	M25	
HF 320	1	3.65	2.95	2.80	1.80	0.90	0.38
	2	2.03	1.73	1.61	1.35	0.85	0.36
	3	1.84	1.42	1.32	1.22	0.80	0.35

# FMM150 GENERAL INFORMATION

## Technical data

### High Pressure filters

#### In-line

**Maximum working pressure up to 42 MPa (420 bar)**

**Flow rate up to 250 l/min**

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

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

#### Available features:

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

#### Common applications:

- Agricultural machines
- Mobile machines

#### Filter housing materials

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

#### Pressure

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

#### Bypass valve

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

#### $\Delta p$ element type

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

#### Seals

- Standard NBR series A
- Optional FPM series V

#### Temperature

From -25 °C to +110 °C

#### Connections

In-line Inlet/Outlet

#### Note

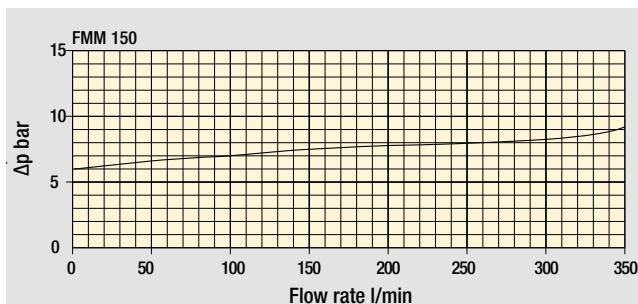
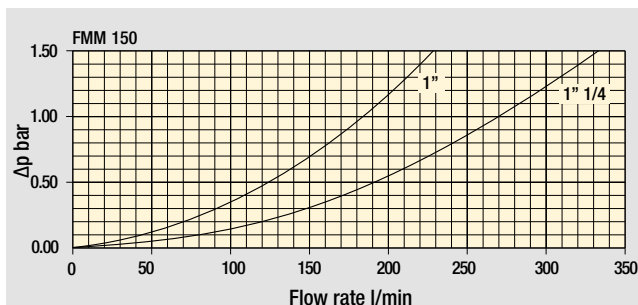
FMM150 filters are provided for vertical mounting



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

	Weights [kg]					Volumes [dm <sup>3</sup> ]						
	Length	1	2	3	4	5	Length	1	2	3	4	5
<b>FMM 150</b>		7.50	9.50	10.90	-	-		0.60	1.00	1.25	-	-

## Pressure drop

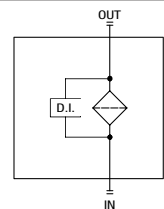


Filter housings  
 $\Delta p$  pressure drop

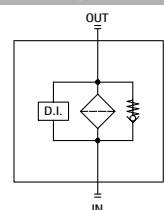
Bypass valve  
pressure drop

## Hydraulic symbols

### Style S



### Style B



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

# FMM150

## Designation & Ordering code

### COMPLETE FILTER

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

**Series and size**  
**FMM150**

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

**Valves**  
**S** Without bypass  
**B** With bypass 6 bar

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

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

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

**Filtration rating (filter media)**

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

**Element Δp**  
**N** 20 bar

**Execution**  
**P01** MP Filtri standard  
**Pxx** Customized

### FILTER ELEMENT

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

**Element series and size**  
**HP150**

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

**Filtration rating (filter media)**

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

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

**Element Δp**  
**N** 20 bar

**Execution**  
**P01** MP Filtri standard  
**Pxx** Customized

### ACCESSORIES

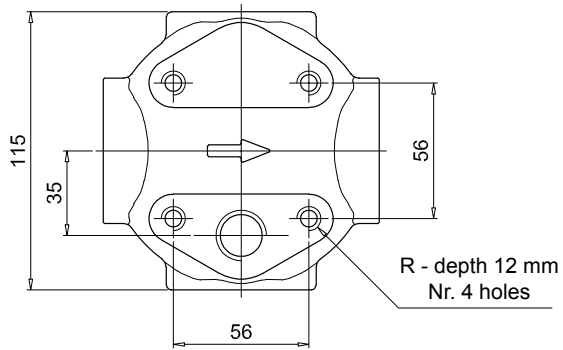
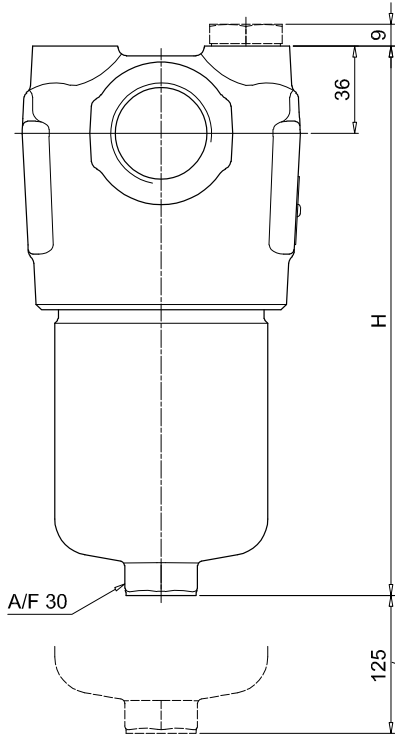
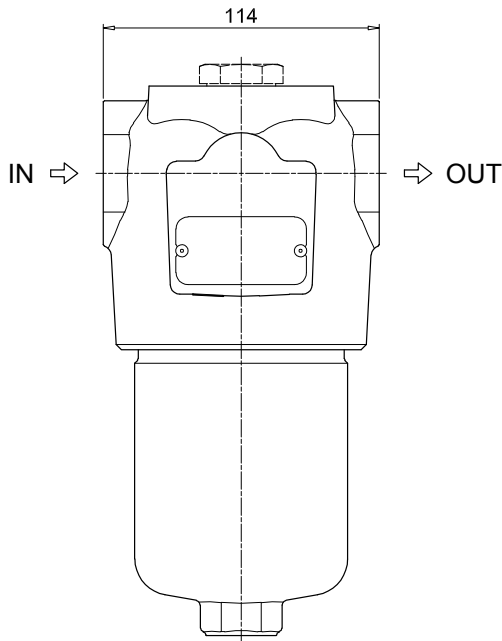
**Differential indicators**

<b>DEA</b> Electrical differential indicator	<b>DLE</b> Electrical / visual differential indicator
<b>DEH</b> Hazardous area electronic differential indicator	<b>DTA</b> Electronic differential indicator
<b>DEM</b> Electrical differential indicator	<b>DVA</b> Visual differential indicator
<b>DLA</b> Electrical / visual differential indicator	<b>DVM</b> Visual differential indicator

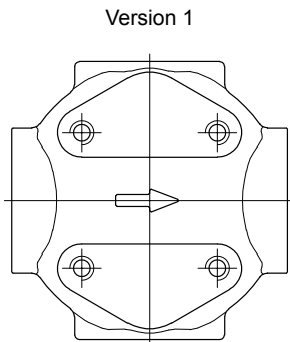
**Additional features**  
**T2** Plug

# FMM150

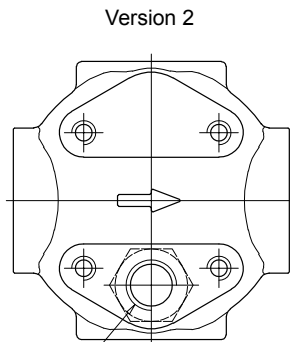
## Dimensions



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

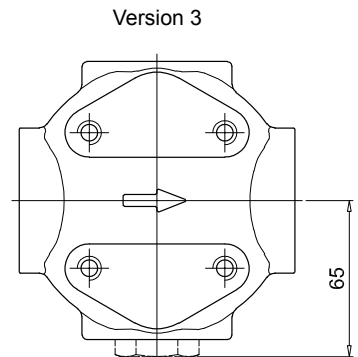


Version 1



Version 2

Connection for differential indicator  
T2 plug not included

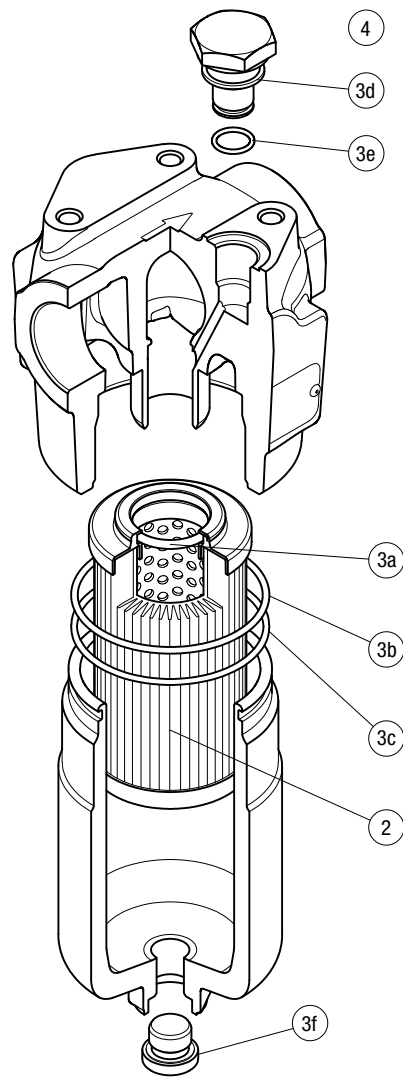


Version 3

Connection for differential indicator  
T2 plug not included

# FMM150 SPARE PARTS

Order number for spare parts



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

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