

NEW

High Pressure filters

FMM 150 series

Maximum working pressure up to 42 MPa (420 bar) - Flow rate up to 300 l/min



PASSION TO PERFORM



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

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

Reference oil viscosity 30 mm²/s

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 |

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 Δp_c of the housing is proportional to the fluid density (kg/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 Δp_e is proportional to its viscosity (mm^2/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

Δp_c = Filter housing pressure drop [bar]

Δp_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 mm^2/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 (Δp_{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 | 0.4 ÷ 0.6 over-boost |
| | 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)

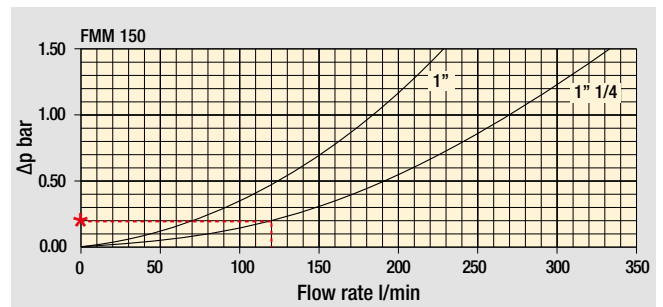
Oil density = $0.86 \text{ kg}/\text{dm}^3$

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

With bypass valve and 1 1/4" inlet connection

Calculation:

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



Filter housings Δp pressure drop.

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

Please, contact our Sales Department for further additional information.

FMM150 GENERAL INFORMATION

Technical data

High Pressure filters

In-line

Maximum working pressure up to 42 MPa (420 bar)

Flow rate up to 300 l/min

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

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

Available features:

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

Common applications:

- Agricultural machines
- Mobile machines

Filter housing materials

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

Pressure

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

Bypass valve

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

Δp element type

- 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

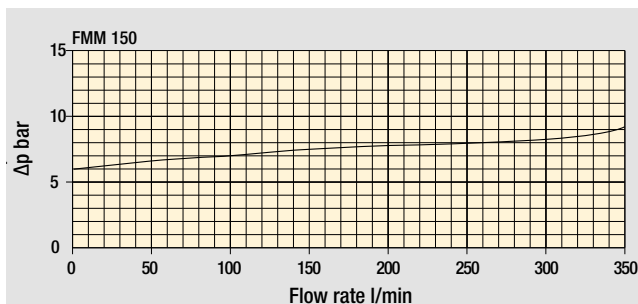
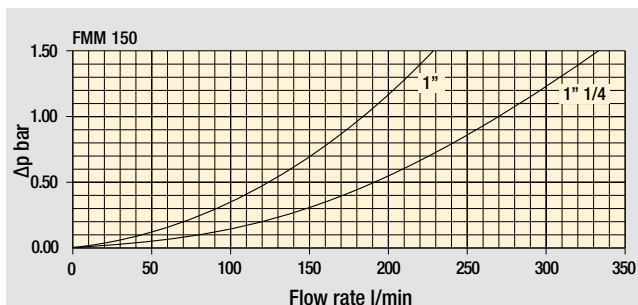
FMM150 filters are provided for vertical mounting



Weights [kg] and volumes [dm³]

| | Weights [kg] | | | | | Volumes [dm ³] | | | | | | |
|----------------|--------------|------|------|-------|---|----------------------------|--------|------|------|------|---|---|
| | Length | 1 | 2 | 3 | 4 | 5 | Length | 1 | 2 | 3 | 4 | 5 |
| FMM 150 | | 7.50 | 9.50 | 10.90 | - | - | | 0.60 | 1.00 | 1.25 | - | - |

Pressure drop

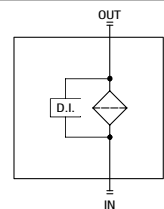


Filter housings
 Δp pressure drop

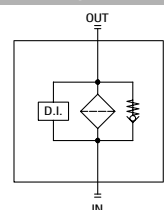
Bypass valve
pressure drop

Hydraulic symbols

Style S



Style B



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

| | |
|---------------------------------------|---------------------------------------|
| A03 Inorganic microfiber 3 µm | A16 Inorganic microfiber 16 µm |
| A06 Inorganic microfiber 6 µm | A25 Inorganic microfiber 25 µm |
| A10 Inorganic microfiber 10 µm | M25 Wire mesh 25 µm |

Element Δp
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)

| | |
|---------------------------------------|---------------------------------------|
| A03 Inorganic microfiber 3 µm | A16 Inorganic microfiber 16 µm |
| A06 Inorganic microfiber 6 µm | A25 Inorganic microfiber 25 µm |
| A10 Inorganic microfiber 10 µm | M25 Wire mesh 25 µm |

Seals
A NBR
V FPM

Element Δp
N 20 bar

Execution
P01 MP Filtri standard
Pxx Customized

ACCESSORIES

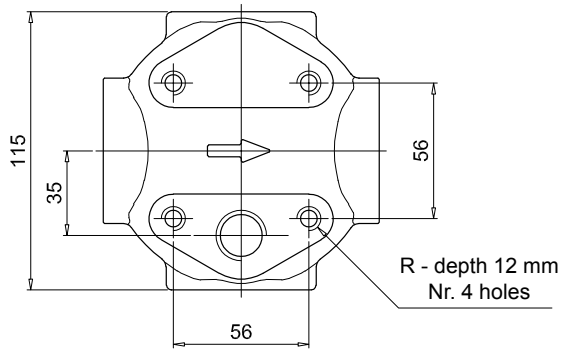
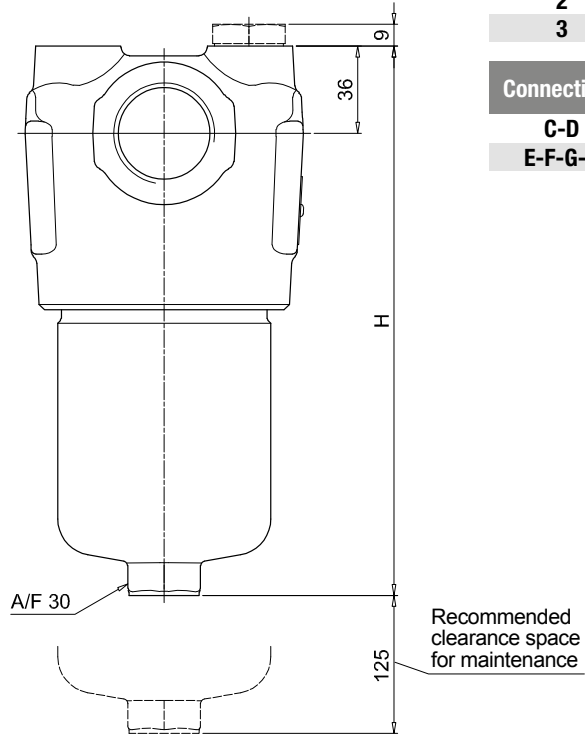
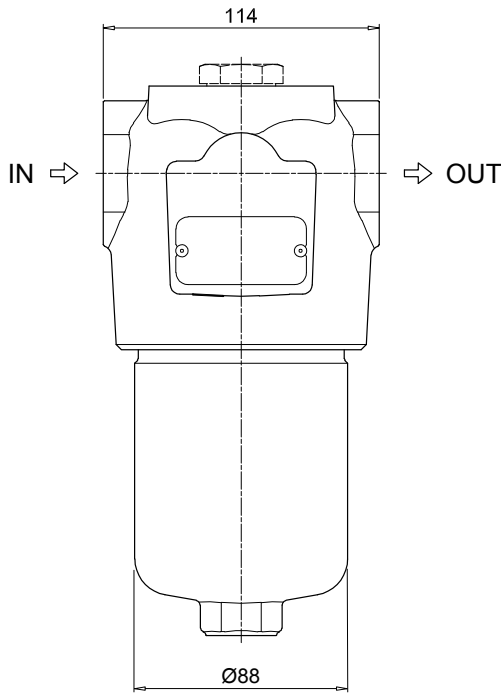
Differential indicators

| | |
|---|---|
| DEA Electrical differential indicator | DLE Electrical / visual differential indicator |
| DEH Hazardous area electronic differential indicator | DTA Electronic differential indicator |
| DEM Electrical differential indicator | DVA Visual differential indicator |
| DLA Electrical / visual differential indicator | DVM Visual differential indicator |

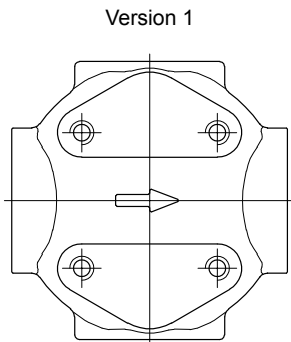
Additional features
T2 Plug

FMM150

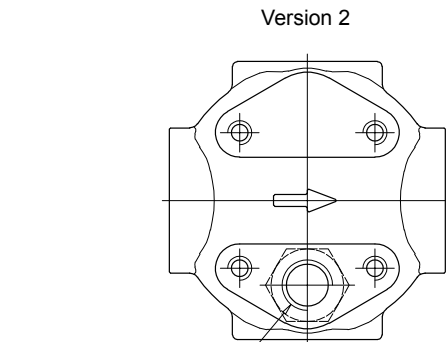
Dimensions



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

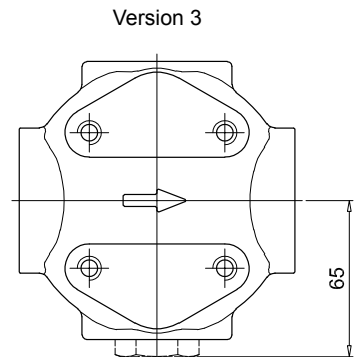


Version 1



Version 2

Connection for differential indicator
T2 plug not included

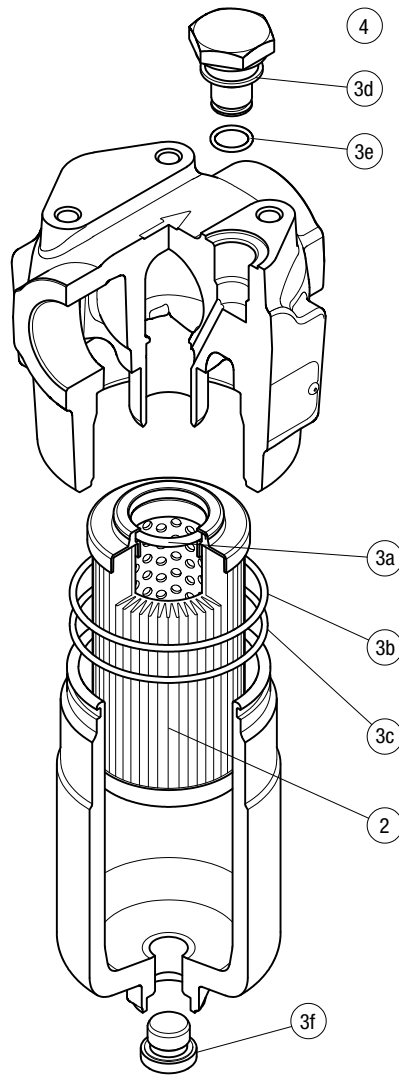


Version 3

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 | |
| | | NBR | FPM | NBR | FPM |
| FMM 150 | See order table | 02050731 | 02050732 | T2H | T2V |

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