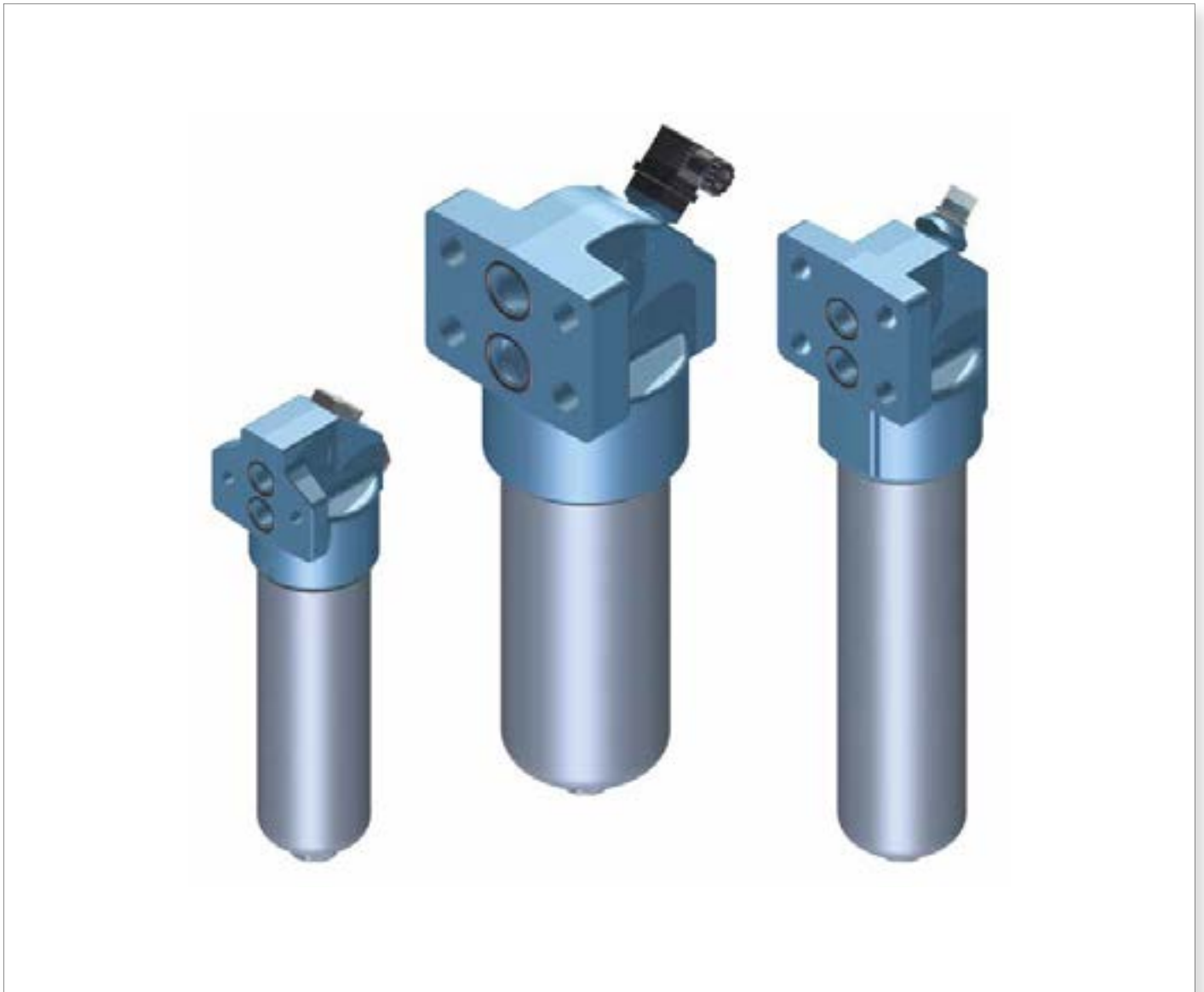


# FHB series

Maximum pressure up to 320 bar - Flow rate up to 485 l/min



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

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

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

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

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

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

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

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

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

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

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

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

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

Application data:

Top tank return filter

Filter with in-line connections

Pressure Pmax = 10 bar

Flow rate Q = 120 l/min

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

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

Required filtration efficiency = 25 µm with absolute filtration

With bypass valve and 1 1/4" inlet connection

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

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

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

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

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

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



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

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

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

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

## Return filters

Filter element	Absolute filtration H Series					Nominal filtration N Series			
	Type	A03	A06	A10	A16	A25	P10	P25	M25 M60 M90
MF 020	1	74.00	50.08	20.00	16.00	9.00	6.43	5.51	4.40
	2	29.20	24.12	8.00	7.22	5.00	3.33	2.85	2.00
	3	22.00	19.00	6.56	5.33	4.33	1.68	1.44	1.30
MF 030 MFX 030	1	74.00	50.08	20.00	16.00	9.00	6.43	5.51	3.40
MF 100 MFX 100	1	28.20	24.40	8.67	8.17	6.88	4.62	3.96	1.25
	2	17.33	12.50	6.86	5.70	4.00	3.05	2.47	1.10
	3	10.25	9.00	3.65	3.33	2.50	1.63	1.32	0.96
	4	6.10	5.40	2.30	2.20	2.00	1.19	0.96	0.82
MF 180 MFX 180	1	3.67	3.05	1.64	1.56	1.24	1.18	1.06	0.26
	2	1.69	1.37	0.68	0.54	0.51	0.43	0.39	0.12
MF 190 MFX 190	2	1.69	1.37	0.60	0.49	0.44	0.35	0.31	0.11
MF 400 MFX 400	1	3.20	2.75	1.39	1.33	1.06	0.96	0.87	0.22
	2	2.00	1.87	0.88	0.85	0.55	0.49	0.45	0.13
	3	1.90	1.60	0.63	0.51	0.49	0.39	0.35	0.11
MF 750 MFX 750	1	1.08	0.84	0.49	0.36	0.26	0.21	0.19	0.06
CU 025		78.00	48.00	28.00	24.00	9.33	9.33	8.51	1.25
CU 040		25.88	20.88	10.44	10.00	3.78	3.78	3.30	1.25
CU 100		15.20	14.53	5.14	4.95	2.00	2.00	0.17	1.10
CU 250		3.25	2.55	1.55	1.35	0.71	0.71	0.59	0.25
CU 630		1.96	1.68	0.85	0.72	0.42	0.42	0.36	0.09
CU 850		1.06	0.84	0.42	0.33	0.17	0.17	0.13	0.04
MR 100	1	19.00	17.00	6.90	6.30	4.60	2.94	2.52	1.60
	2	11.70	10.80	4.40	4.30	3.00	2.94	2.52	1.37
	3	7.80	6.87	3.70	3.10	2.70	2.14	1.84	1.34
	4	5.50	4.97	2.60	2.40	2.18	1.72	1.47	1.34
	5	4.20	3.84	2.36	2.15	1.90	1.60	1.37	1.34
MR 250	1	5.35	4.85	2.32	1.92	1.50	1.38	1.20	0.15
	2	4.00	3.28	1.44	1.10	1.07	0.96	0.83	0.13
	3	2.60	2.20	1.08	1.00	0.86	0.77	0.64	0.12
	4	1.84	1.56	0.68	0.56	0.44	0.37	0.23	0.11
MR 630	1	3.10	2.48	1.32	1.14	0.92	0.83	0.73	0.09
	2	2.06	1.92	0.82	0.76	0.38	0.33	0.27	0.08
	3	1.48	1.30	0.60	0.56	0.26	0.22	0.17	0.08
	4	1.30	1.20	0.48	0.40	0.25	0.21	0.16	0.08
	5	0.74	0.65	0.30	0.28	0.13	0.10	0.08	0.04
MR 850	1	0.60	0.43	0.34	0.25	0.13	0.12	0.09	0.03
	2	0.37	0.26	0.23	0.21	0.11	0.08	0.07	0.03
	3	0.27	0.18	0.17	0.17	0.05	0.04	0.04	0.02
	4	0.23	0.16	0.13	0.12	0.04	0.03	0.03	0.02

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

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

## Suction filters

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

## Return / Suction filters

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

## Low & Medium pressure filters

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

# FILTER SIZING Corrective factor

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

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

## High pressure filters

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

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

## Stainless steel high pressure filters

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

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

**Step 1** Select "FILTERS"



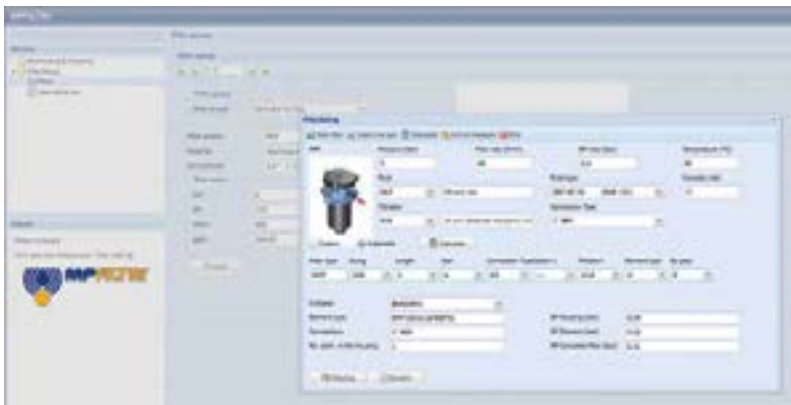
**Step 2** Choose filter group (Return Filter, Pressure Filter, etc.)



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



**Step 4** Push "PROCEED"



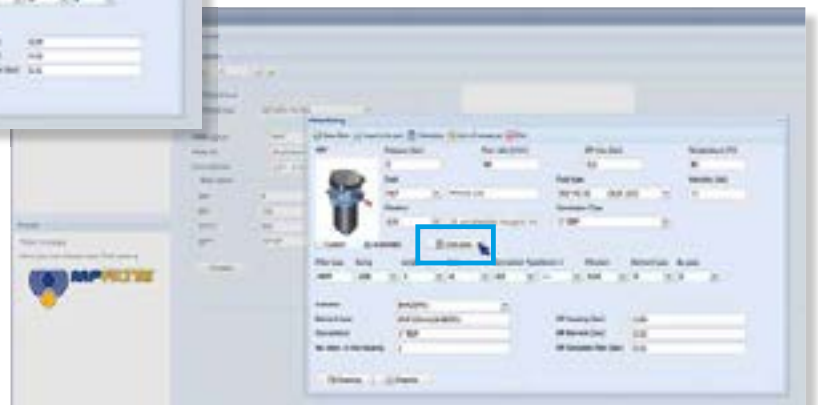
**Step 5**

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

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

**Step 6**

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



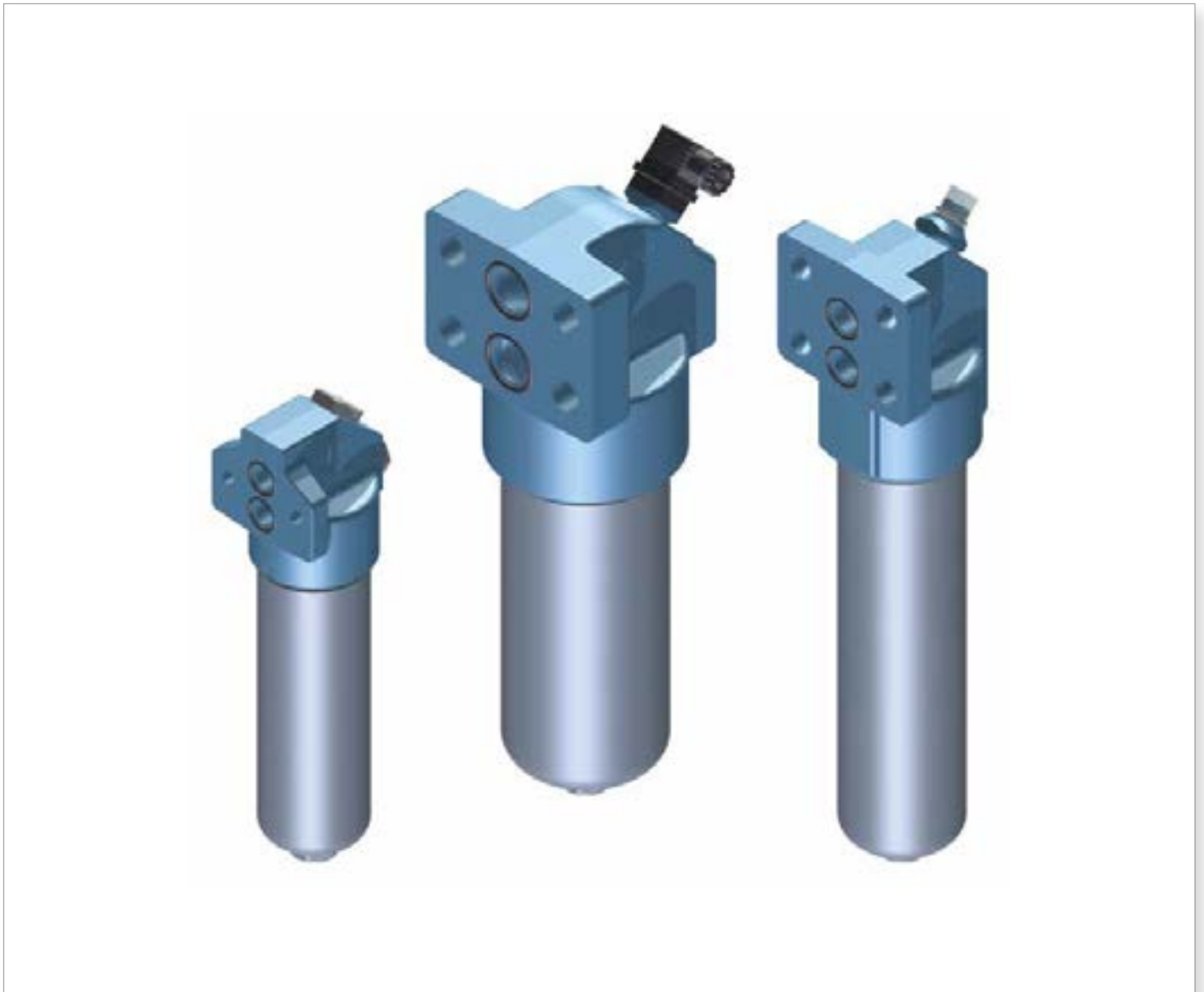
**Step 7**

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



# FHB series

Maximum pressure up to 320 bar - Flow rate up to 485 l/min



## Technical data

**High Pressure filters** Maximum pressure up to 320 bar - Flow rate up to 485 l/min

### Filter housing materials

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

### Pressure

- Working pressure: 32 MPa (320 bar)
- Test pressure: 48 MPa (480 bar)
- Burst pressure: 96 MPa (960 bar)
- Pulse pressure fatigue test: 1 000 000 cycles with pressure from 0 to 32 MPa (320 bar)

### Bypass valve

- Opening pressure 600 kPa (6 bar)
- Other opening pressures on request.

### $\Delta p$ element type

- Microfibre filter elements - series N: 20 bar
- Microfibre filter elements - series H: 210 bar (not available for FHB065 - FHB135 - FHB320)
- Microfibre filter elements - series S: 210 bar (only for FHB050)
- 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

Manifold mounting

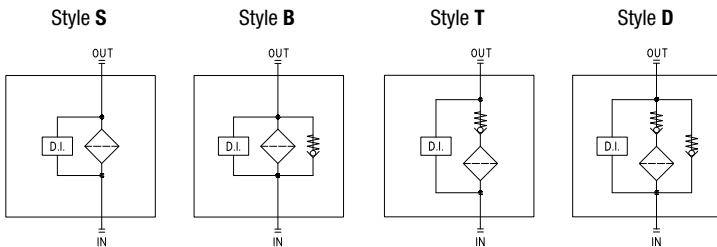
### Note

FHB filters are provided for vertical mounting

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

	Weights [kg]					Volumes [dm <sup>3</sup> ]						
	Lenght	1	2	3	4	5	Lenght	1	2	3	4	5
<b>FHB 050</b>		2.61	2.98	3.39	3.86	5.04		0.21	0.30	0.40	0.52	0.81
<b>FHB 065</b>		3.33	3.69	4.90	-	-		0.20	0.27	0.49	-	-
<b>FHB 135</b>		6.61	8.21	9.21	-	-		0.40	0.73	0.94	-	-
<b>FHB 320</b>		12.95	15.08	17.37	26.77	-		0.91	1.63	2.40	3.59	-

## Hydraulic symbols



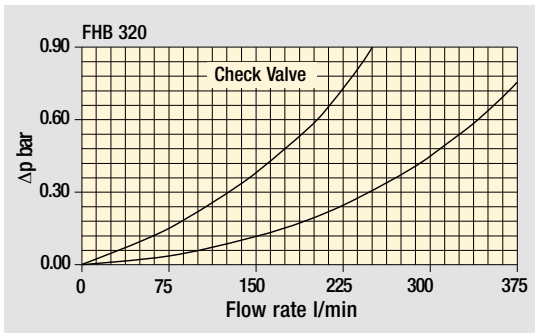
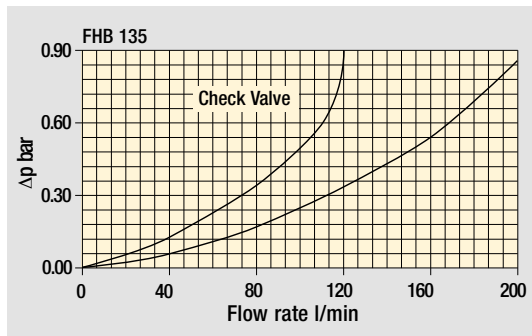
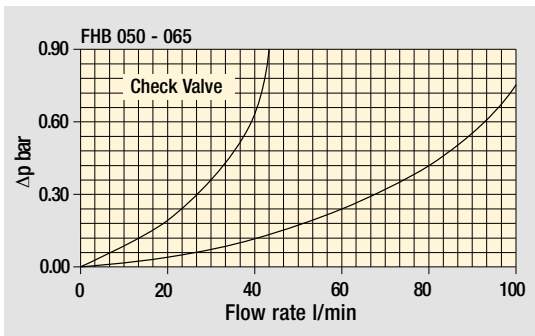


The curves are plotted using mineral oil with density of 0.86 kg/dm<sup>3</sup> in compliance with ISO 3968.

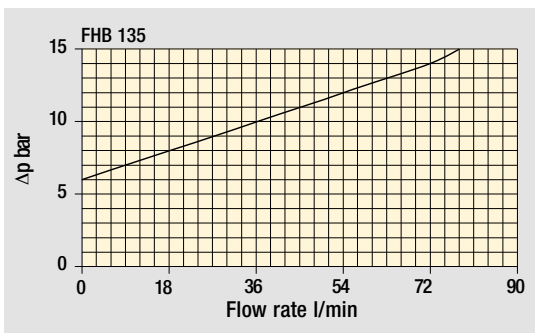
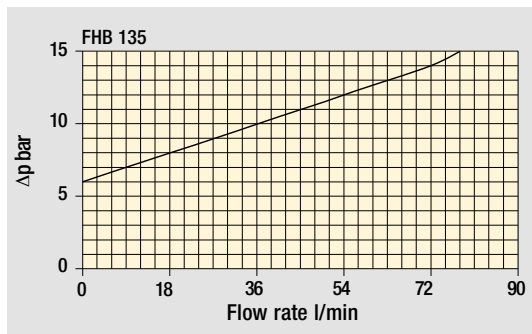
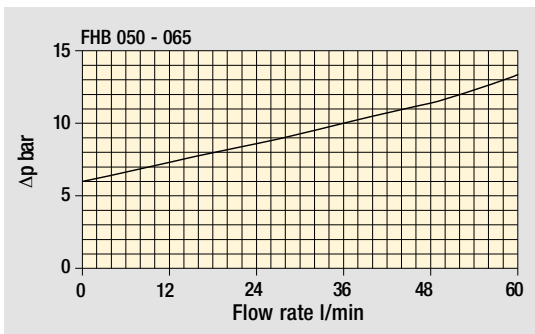
$\Delta p$  varies proportionally with density.

Pressure drop

Filter housings  $\Delta p$  pressure drop



Bypass valve pressure drop



## Designation & Ordering code

### COMPLETE FILTER

<b>Series and size</b> <b>FHB050</b>	Configuration example: <b>FHB050</b>   <b>2</b>   <b>T</b>   <b>A</b>   <b>F1</b>   <b>A06</b>   <b>S</b>   <b>P01</b>									
<b>Length</b> <b>1</b>   <b>2</b>   <b>3</b>   <b>4</b>   <b>5</b>										
<b>Valves</b> <b>S</b> Without bypass <b>B</b> With bypass 6 bar <b>T</b> With check valve, without bypass <b>D</b> With check valve, with bypass 6 bar										
<b>Seals</b> <b>A</b> NBR <b>V</b> FPM										
<b>Connections</b> <b>F1</b> Manifold										
<b>Filtration rating (filter media)</b>										
<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									
		<b>Valves</b>								
		<b>Element Δp</b>	<b>S</b>	<b>B</b>	<b>T</b>	<b>D</b>	<b>Execution</b>			
		<b>N</b> 20 bar		•		•	<b>P01</b> MP Filtri standard			
		<b>S</b> 210 bar	•		•		<b>Pxx</b> Customized			

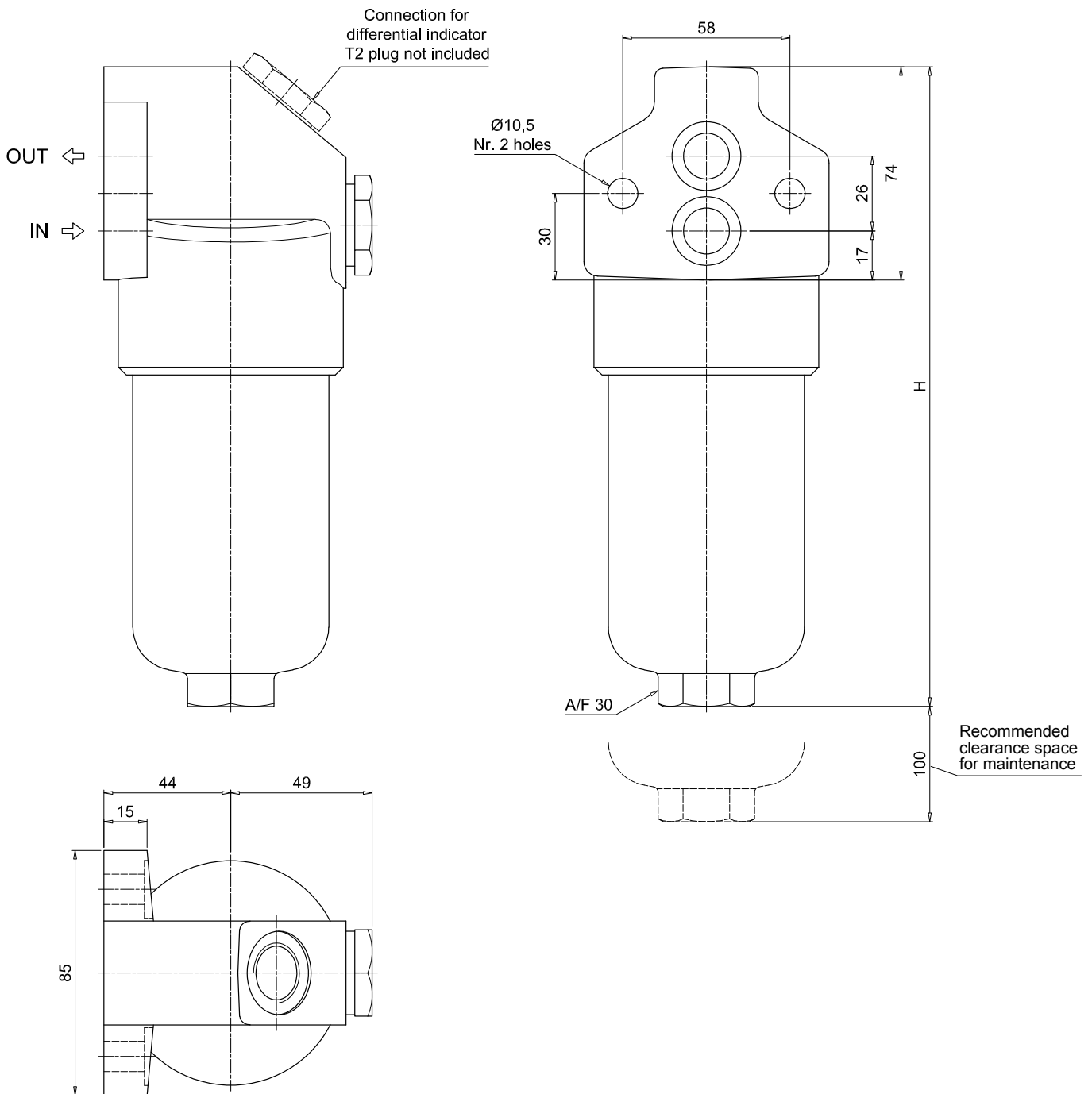
### FILTER ELEMENT

<b>Element series and size</b> <b>HP050</b>	Configuration example: <b>HP050</b>   <b>2</b>   <b>A06</b>   <b>A</b>   <b>S</b>   <b>P01</b>							
<b>Element length</b> <b>1</b>   <b>2</b>   <b>3</b>   <b>4</b>   <b>5</b>								
<b>Filtration rating (filter media)</b>								
<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							
		<b>Seals</b>		<b>Element Δp</b>		<b>Execution</b>		
		<b>A</b> NBR	<b>N</b> 20 bar	<b>P01</b> MP Filtri standard				
		<b>V</b> FPM	<b>S</b> 210 bar	<b>Pxx</b> Customized				

### ACCESSORIES

<b>Differential indicators</b>		page			page
<b>DEA</b> Electrical differential indicator		517	<b>DTA</b> Electronic differential indicator		520
<b>DEM</b> Electrical differential indicator		517-518	<b>DVA</b> Visual differential indicator		520
<b>DLA</b> Electrical / visual differential indicator		518-519	<b>DVM</b> Visual differential indicator		520
<b>DLE</b> Electrical / visual differential indicator		519			
<b>Additional features</b>		page			
<b>T2</b> Plug		521			

FHB050	
Filter length	H [mm]
1	185
2	222
3	264
4	312
5	434



# FHB FHB065 - FHB135 - FHB320

## Designation & Ordering code

### COMPLETE FILTER

Series and size Configuration example: **FHB320** | **4** | **S** | **A** | **F1** | **A06** | **H** | **P01**

**FHB065** | **FHB135** | **FHB320**

Length	FHB065	FHB135	FHB320
1	•	•	•
2	•	•	•
3	•	•	•
4			•

Valves	
<b>S</b>	Without bypass
<b>B</b>	With bypass 6 bar
<b>T</b>	With check valve, without bypass
<b>D</b>	With check valve, with bypass 6 bar

Seals	
<b>A</b>	NBR
<b>V</b>	FPM

Connections	
<b>F1</b>	Manifold

Filtration rating (filter media)			
<b>A03</b>	Inorganic microfiber	3 µm	
<b>A06</b>	Inorganic microfiber	6 µm	
<b>A10</b>	Inorganic microfiber	10 µm	
<b>A16</b>	Inorganic microfiber	16 µm	
<b>A25</b>	Inorganic microfiber	25 µm	
<b>M25</b>	Wire mesh	25 µm	

Element $\Delta p$	Valves			
	S	B	T	D
<b>N</b> 20 bar		•		•
<b>H</b> 210 bar	•		•	

Execution				
	1	2	3	4
<b>P01</b> MP Filtri standard	•	•	•	•
<b>P02</b> Maintenance from the bottom of the housing				•
<b>Pxx</b> Customized				

### FILTER ELEMENT

Element series and size Configuration example: **HP320** | **4** | **A06** | **A** | **H** | **P01**

**HP065** | **HP135** | **HP320**

Element length	HP065	HP135	HP320
1	•	•	•
2	•	•	•
3	•	•	•
4			•

Filtration rating (filter media)			
<b>A03</b>	Inorganic microfiber	3 µm	
<b>A06</b>	Inorganic microfiber	6 µm	
<b>A10</b>	Inorganic microfiber	10 µm	
<b>A16</b>	Inorganic microfiber	16 µm	
<b>A25</b>	Inorganic microfiber	25 µm	
<b>M25</b>	Wire mesh	25 µm	

Seals	
<b>A</b>	NBR
<b>V</b>	FPM

Element $\Delta p$	
<b>N</b>	20 bar
<b>H</b>	210 bar

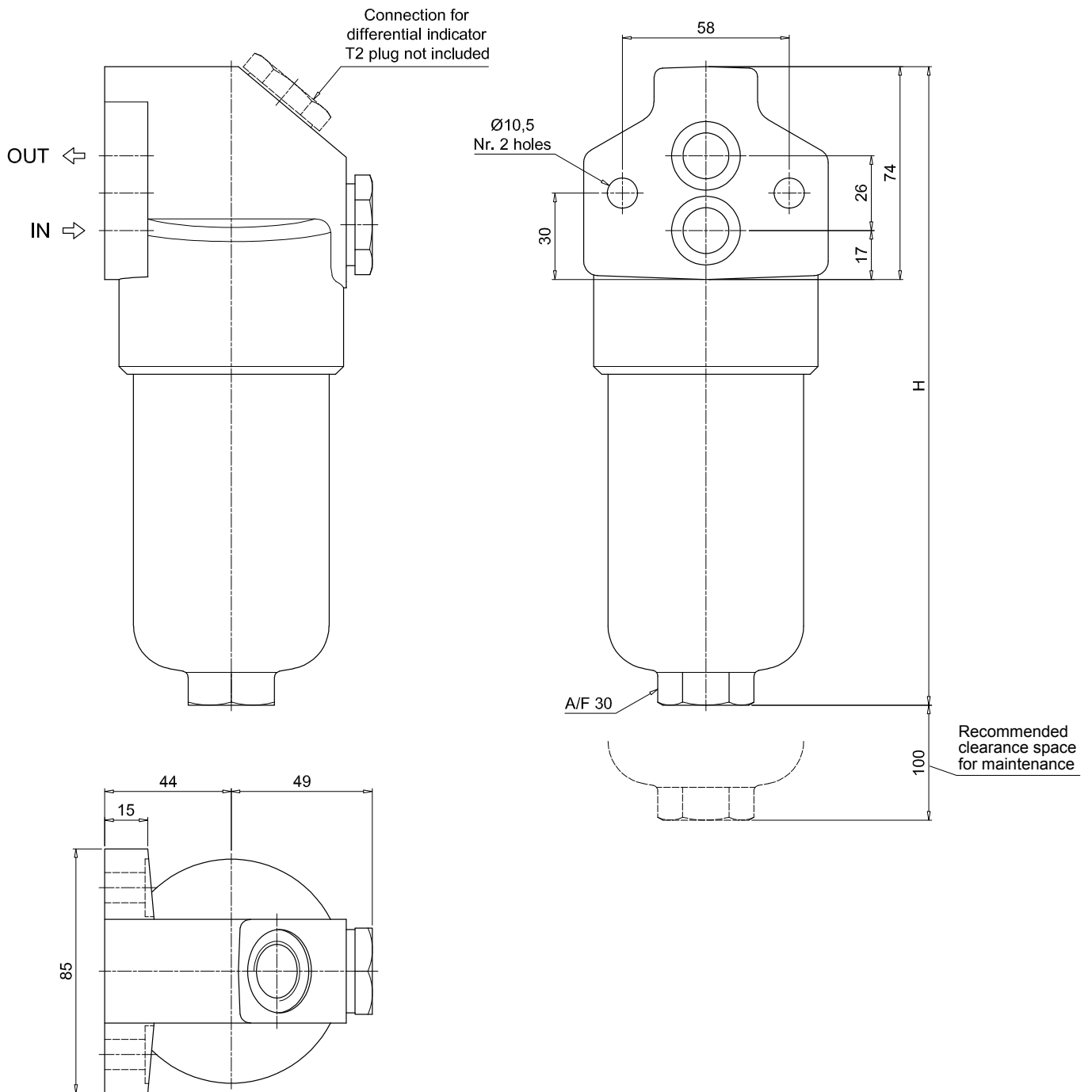
Execution	
<b>P01</b>	MP Filtri standard
<b>Pxx</b>	Customized

### ACCESSORIES

Differential indicators	page		page
<b>DEA</b> Electrical differential indicator	517	<b>DTA</b> Electronic differential indicator	520
<b>DEM</b> Electrical differential indicator	517-518	<b>DVA</b> Visual differential indicator	520
<b>DLA</b> Electrical / visual differential indicator	518-519	<b>DVM</b> Visual differential indicator	520
<b>DLE</b> Electrical / visual differential indicator	519		

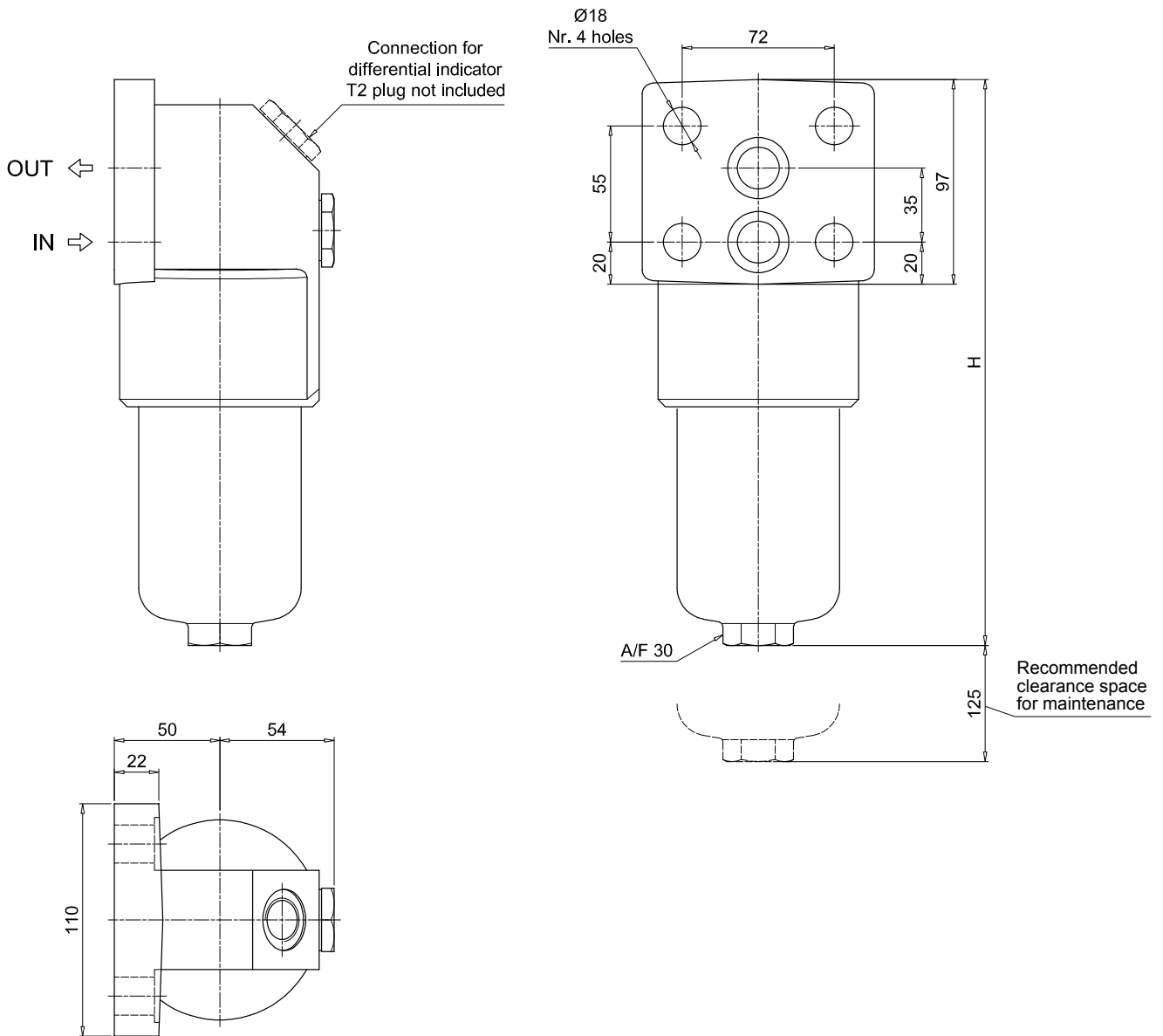
Additional features	page
<b>T2</b> Plug	521

FHB065	
Filter length	H [mm]
<b>1</b>	194
<b>2</b>	225
<b>3</b>	327



## FHB135

Filter length	H [mm]
<b>1</b>	268
<b>2</b>	381
<b>3</b>	456

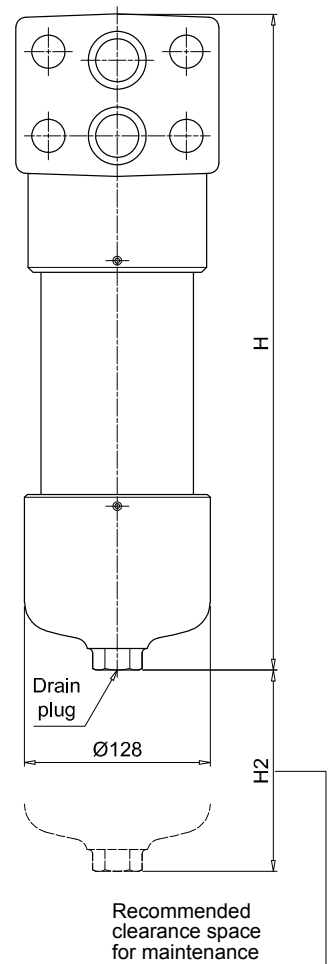
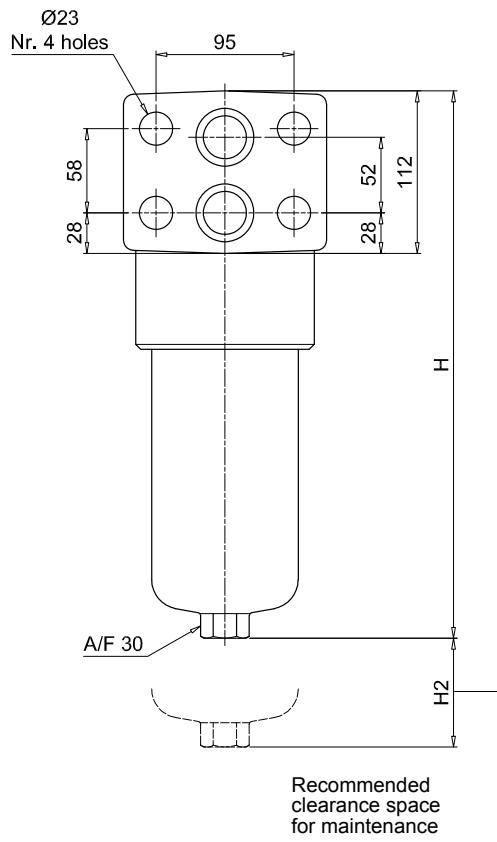
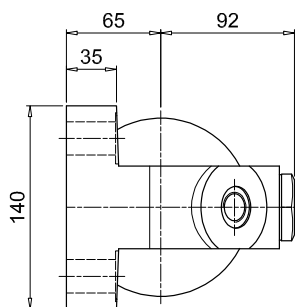
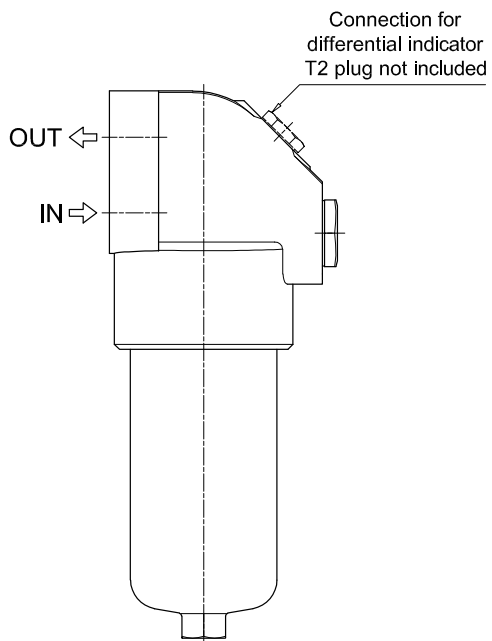


## FHB320

Filter length	H [mm]	H2 [mm]	
		P01	P02
<b>1</b>	301	150	-
<b>2</b>	424	150	-
<b>3</b>	556	150	-
<b>4</b>	709	150	550

### Length 1 - 2 - 3

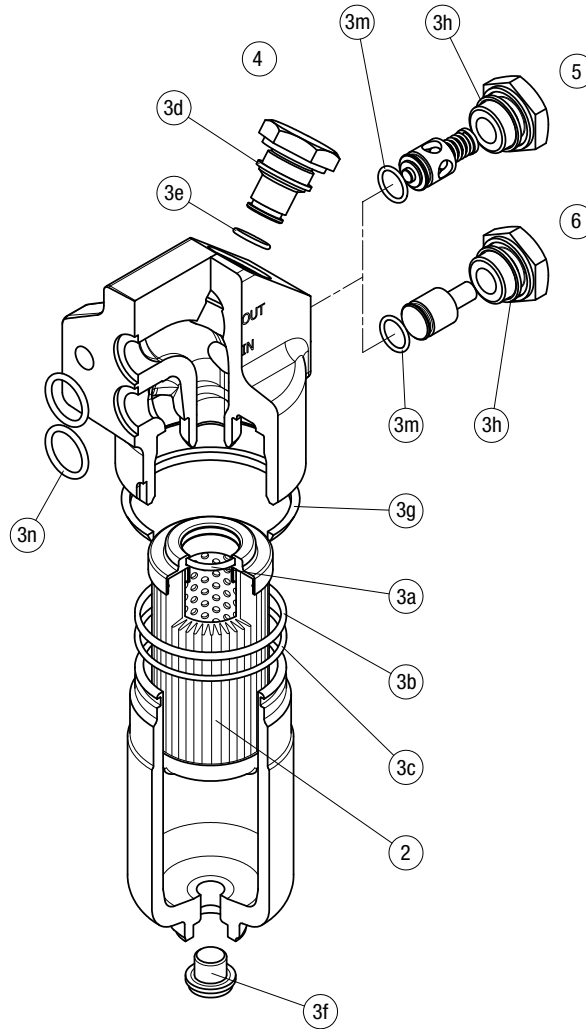
### Length 4



# FHB SPARE PARTS

Order number for spare parts

FHB 050 - 065 - 135 - 320



Item:	Q.ty: 1 pc.	Q.ty: 1 pc.		Q.ty: 1 pc.		Q.ty: 1 pc.		Q.ty: 1 pc.	
Filter series	Filter element	Seal Kit code number		Indicator connection plug		Bypass assembly		Non-bypass assembly	
		NBR	FPM	NBR	FPM	NBR	FPM	NBR	FPM
<b>FHB 050</b>	See order table	02050412	02050413			02001312	02001385	02001314	02001386
<b>FHB 065</b>		02050266	02050277			02001312	02001385	02001314	02001386
<b>FHB 135</b>		02050270	02050281	T2H	T2V	02001312	02001385	02001314	02001386
<b>FHB 320</b>		02050273	02050284			02001381	02001382	02001383	02001384