

Filter element

Element description

M - Wire Mesh	Δp 10 bar
P - Paper	Δp 10 bar
A - Microfibre	Δp 10 bar

Characteristics of filter elements with nominal filtration, M series

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

Characteristics of filter elements with nominal filtration, P series

For cellulose filter elements, filtration efficiency expressed in micron is to be construed as nominal $\beta_{x@} > 2$.

Characteristics of filter elements with absolute filtration, A series

For microfibre filter elements, filtration degree is defined by the test bench MULTIPASS ISO 16889.

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.

N.B. P series cellulose cartridges are compatible only with mineral oils in according to ISO 2943 - 4.

Multipass test in compliance new ISO 16889 Contaminant ISO MTD

Filtration	$\beta_{x@} \geq 1000$
Filter element	
A01*	<4
A03	5
A06	7
A10	10
A16	15
A25	20

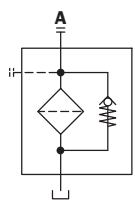
* On request

International standards for fluid contamination control

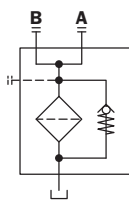
Components	Recommended filtrations									
	12/10/7	13/11/8	14/12/9	15/13/10	16/14/11	17/15/12	18/16/13	19/17/14	20/18/15	
Servo valves			●	●	●					
Proportional Valves				●	●	●				
Variable displacement pumps.					●	●	●			
Cartridge valves						●	●	●		
Piston pumps						●	●	●		
Vane pumps							●	●	●	
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	$\beta_{5@} \geq 1000$			$\beta_{7@} \geq 1000$			$\beta_{10@} \geq 1000$		$\beta_{20@} \geq 1000$	

Hydraulic symbols & Compatibility

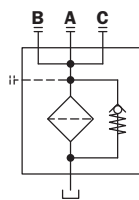
Style
1 connection



Style
2 connections



Style
3 connections

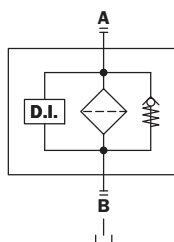


Compatibility (to ISO 2943)

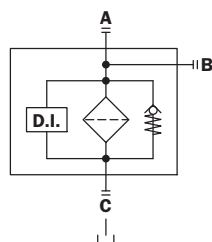
- * Housings compatible with: Mineral oils, synthetic fluids.
- * The filter elements are compatible with: Mineral oils, synthetic fluids.
- NBR seals series A, compatible with: Mineral oils, synthetic fluids, aqueous emulsions and water and glycol.
- FPM seals series V, compatible with: Mineral oils, synthetic fluids aqueous emulsions, water and glycol.

* Compatibility with aqueous emulsions, water and glycol see ordering code.

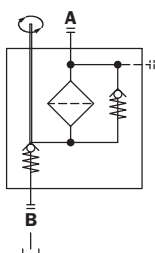
Style
2 connections + D.I.
FRI 255-850



Style
3 connections + D.I.
FRI 025-040-100-250-630



Style
RF2 250-350



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

Reference viscosity 30 mm²/s

Filter Element	Absolute Filtration					Nominal Filtration		Nominal Filtration
	H Series					N Series		N Series
Type	A 0 3	A 0 6	A 1 0	A 1 6	A 2 5	P 1 0	P 2 5	M25 - M60 - M90
MF 020 1	74,00	50,08	20,00	16,00	9,000	6,431	5,512	4,400
2	29,20	24,12	8,000	7,222	5,000	3,325	2,850	2,000
3	22,00	19,00	6,555	5,333	4,333	1,680	1,440	1,300
MF 030 1	74,00	50,80	20,00	16,00	9,000	6,431	5,512	3,400
MF 100 1	28,20	24,40	8,666	8,166	6,875	4,620	3,960	1,250
2	17,33	12,50	6,857	5,700	4,000	3,045	2,465	1,100
3	10,25	9,000	3,650	3,333	2,500	1,633	1,322	0,960
4	6,100	5,400	2,300	2,200	2,000	1,190	0,963	0,820
MF 180 1	3,666	3,050	1,640	1,560	1,236	1,177	1,064	0,255
2	1,685	1,371	0,676	0,542	0,509	0,431	0,390	0,120
MF 190 2	1,685	1,371	0,595	0,485	0,439	0,347	0,314	0,110
MF 400 1	3,200	2,750	1,394	1,326	1,055	0,956	0,865	0,215
2	2,000	1,867	0,875	0,850	0,550	0,494	0,447	0,130
3	1,900	1,600	0,625	0,512	0,489	0,389	0,352	0,110
MF 750 1	1,083	0,843	0,486	0,357	0,257	0,210	0,190	0,060
CU 025	78,00	48,00	28,00	24,00	9,330	9,333	8,510	1,250
CU 040	25,88	20,88	10,44	10,00	3,775	3,775	3,300	1,250
CU 100	15,20	14,53	5,142	4,952	2,000	2,000	0,171	1,100
CU 250	3,250	2,550	1,550	1,350	0,714	0,714	0,591	0,255
CU 630	1,960	1,680	0,846	0,720	0,420	0,420	0,360	0,090
CU 850	1,058	0,842	0,417	0,333	0,167	0,167	0,133	0,040

Filter Element	Absolute Filtration					Nominal Filtration		Nominal Filtration
	A 0 3	A 0 6	A 1 0	A 1 6	A 2 5	P 1 0	P 2 5	M25 - M60 - M90
MR 100 1	19,00	17,00	6,900	6,300	4,600	2,940	2,520	1,600
2	11,70	10,80	4,400	4,300	3,000	2,940	2,520	1,371
3	7,800	6,870	3,700	3,100	2,700	2,142	1,836	1,343
4	5,500	4,970	2,600	2,400	2,180	1,715	1,470	1,343
5	4,200	3,840	2,360	2,150	1,900	1,600	1,374	1,343
MR 250 1	5,350	4,850	2,322	1,920	1,500	1,380	1,200	0,154
2	4,000	3,280	1,440	1,100	1,070	0,960	0,830	0,134
3	2,600	2,200	1,080	1,000	0,861	0,768	0,640	0,124
4	1,840	1,560	0,680	0,560	0,440	0,370	0,285	0,1055
MR 630 1	3,100	2,475	1,320	1,140	0,916	0,830	0,730	0,088
2	2,060	1,920	0,820	0,760	0,380	0,333	0,269	0,080
3	1,480	1,300	0,600	0,560	0,260	0,221	0,170	0,078
4	1,300	1,200	0,480	0,400	0,245	0,210	0,160	0,074
5	0,740	0,650	0,300	0,280	0,130	0,101	0,080	0,039
MR 850 1	0,600	0,427	0,342	0,250	0,134	0,118	0,090	0,030
2	0,368	0,261	0,225	0,212	0,109	0,084	0,065	0,025
3	0,269	0,182	0,169	0,166	0,052	0,043	0,037	0,023
4	0,228	0,155	0,126	0,119	0,041	0,033	0,025	0,015

Filter Sizing

Correct sizing of the filter must be based on a variable pressure drop depending on the application:

- return filter Δp from 0,4 to 0,6 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 referred to mineral oil with density of $0,86 \text{ kg/dm}^3$. The filter element pressure drop value is proportional to viscosity mm^2/s , the Y values in the catalogue are referred to viscosity of $30 \text{ mm}^2/\text{s}$.

Sizing data for single cartridge, head at top

Δp Tot.

Δp_c Filter housing

Δp_e Filter element

Y Multiplication factor (see below)

Q l/min = flow rate

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

V2 = operating viscosity in mm^2/s (cSt)

Δp Tot. = $\Delta p_c + \Delta p_e$

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

Calculation examples with HLP Mineral oil Variation in viscosity

Data:

Filter with in-line connections

Pressure = 10 bar

Flow rate = 120 l/min

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

Density = 0.86 kg/dm^3

Filtration = $25 \mu\text{m}$ absolute

With bypass valve

Filter type - MPT110.4 (see housings pressure drop graphs)

Practical example

Q = 120 l/min

V₂ = $46 \text{ mm}^2/\text{s}$ (cSt)

P_{max} = 10 bar

Filtration = $25 \mu\text{m}$ absolute

Δp Tot. max = **0,5 bar** (max. recommended value)

Filter element series H, Δp max 10 bar

$\Delta p_c = 0,03 \text{ bar}$ (* see diagram)

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

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

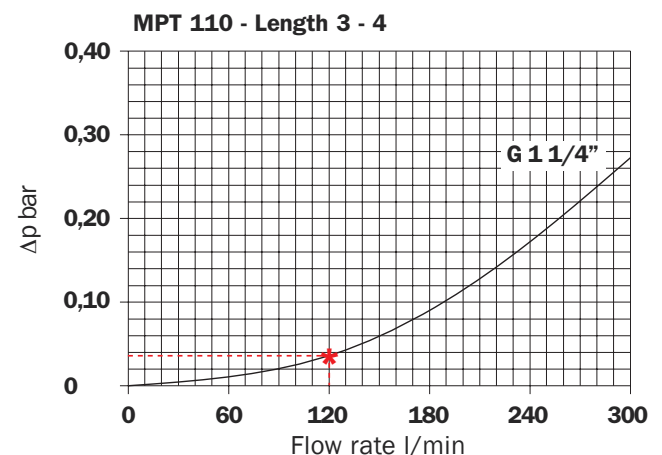
Sized filter type:

MPT 110 4 C A G3 2 A25 E P01

Filter housings Δp pressure drop

The curves are plotted utilising mineral oil with density of $0,86 \text{ kg/dm}^3$ to ISO 3968.

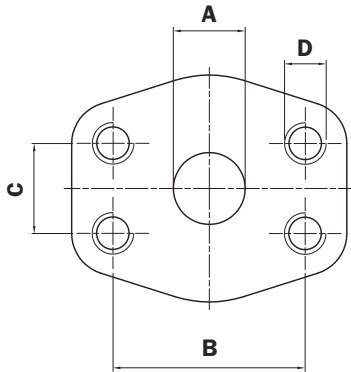
Δp varies proportionally with density.



Sizes - Connections DN - SAE

Connection to 3000 psi SAE flange

FLANGE SAE 3000 PSI

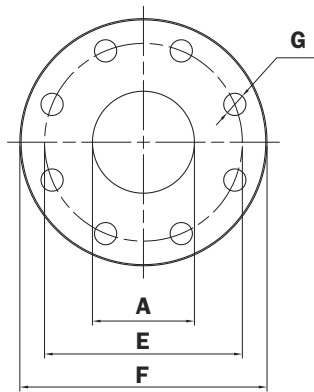


Dimension	1" SAE 3000 PSI	1" SAE 3000 PSI	1 1/4" SAE 3000 PSI	1 1/4" SAE 3000 PSI	1 1/2" SAE 3000 PSI	1 1/2" SAE 3000 PSI	2" SAE 3000 PSI	2" SAE 3000 PSI
	M	UNC	M	UNC	M	UNC	M	UNC
A	25	25	32	32	38	38	51	51
B	52,4	52,4	58,7	58,7	70	70	77,8	77,8
C	26,2	26,2	30,2	30,2	35,7	35,7	42,9	42,9
D	M10	3/8" UNC	M10	7/16" UNC	M12	1/2" UNC	M12	1/2" UNC

Connection to 3000 psi SAE flange

FLANGE DN 100 PN 10/16

Dimension	2 1/2" SAE 3000 PSI	2 1/2" SAE 3000 PSI	3" SAE 3000 PSI	3" SAE 3000 PSI	3 1/2" SAE 3000 PSI	3 1/2" SAE 3000 PSI	4" SAE 3000 PSI	4" SAE 3000 PSI
	M	UNC	M	UNC	M	UNC	M	UNC
A	63	63	73	73	89	89	99	99
B	88,9	88,9	106,4	106,4	120,7	120,7	130,2	130,2
C	50,8	50,8	62	62	70	70	77,8	77,8
D	M12	1/2" UNC	M16	5/8" UNC	M16	5/8" UNC	M16	5/8" UNC



Connection Flange IN-OUT	DN 100 PN 16
A	99
E	180
F	220
G	18

SAE flange connections available on Return filters

Filter Type	Connections							
	SAE 3000 psi							
	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	3 1/2"	4"
MPF 184			X					
MPF 194			X					
MPF 450				X				
MPF 451				X				
MPF 750				X				
MPH 250		X	X					
MPH 630				X	X			
MPH 660						X		X
MPH 850						X		X
FRI 100	X							
FRI 250			X					
FRI 255			X					
FRI 630					X			
FRI 850							X	
RF2 250			X					