

STR & MPA - MPM series

Flow rate up to 875 l/min



FILTER SIZING

INDEX

	Page
CALCULATION	23
CORRECTIVE FACTOR	24

THE CORRECT FILTER SIZING HAVE TO BE BASED ON THE TOTAL PRESSURE DROP DEPENDING BY THE APPLICATION.

FOR EXAMPLE, THE MAXIMUM TOTAL PRESSURE DROP ALLOWED BY A NEW AND CLEAN RETURN FILTER 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 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)

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

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

Verification formula

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

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
	0.4 ÷ 0.6 return lines
	0.3 ÷ 0.5 lubrication lines
Low & Medium Pressure filters	0.3 ÷ 0.4 off-line in power systems
	0.1 ÷ 0.3 off-line in test benches
	0.4 ÷ 0.6 over-boost
High Pressure filters	0.8 ÷ 1.5
Stainless Steel filters	0.8 ÷ 1.5

Generic filter calculation example

Application data:

Tank top return filter

Pressure Pmax = 10 bar

Flow rate Q = 120 l/min

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

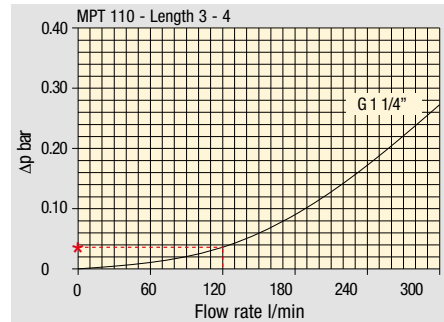
Oil density = $0.86 \text{ kg}/\text{dm}^3$

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

With bypass valve and G 1 1/4" inlet connection

Calculation:

$\Delta p_c = 0.03 \text{ bar}$ (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.

$\Delta p_e = (2.00 : 1000) \times 120 \times (46 : 30) = 0.37 \text{ bar}$

Filter element	Absolute filtration H Series					Nominal filtration N Series		
	A03	A06	A10	A16	A25	P10	P25	M25 M60 M90
Type								
Return filters								
MF 020	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
	3	22.00	19.00	6.56	5.33	4.33	1.68	1.44
MF 030	74.00	50.08	20.00	16.00	9.00	6.43	5.51	3.40
MFX 030	1	28.20	24.40	8.67	8.17	6.88	4.62	3.96
	2	17.33	12.50	6.86	5.70	4.00	3.05	2.47
	3	10.25	9.00	3.65	3.33	2.50	1.63	1.32
	4	6.10	5.40	2.30	2.20	2.00	1.19	0.96

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

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

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

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 length and to the filter media.
Reference oil viscosity 30 mm²/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
MLX 250	2	3.00	3.04	1.46	1.25	1.17	-	-	M25 0.20
MLX 660	2	1.29	1.26	0.52	0.44	0.38	-	-	M25 0.10
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

Return / Suction filters

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

Filter element	Absolute filtration N Series								
	Type	A03	A06	A10	A16	A25	P10	P25	M25 M60 M90
CU 110	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	4.16	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

Low & Medium pressure filters

Filter element	Absolute filtration N-W Series					Nominal filtration N Series			
	Type	A03	A06	A10	A16	A25	P10	P25	M25
CU 110	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
CU 210	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
DN	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
CU 400	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
	CU 900	1	0.86	0.63	0.32	0.30	0.21	-	-
CU 950	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
MR 630	7	0.88	0.78	0.36	0.34	0.16	0.12	0.96	0.47

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 N - R Series					Nominal filtration 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	2	70.66	53.20	25.77	20.57	14.67	4.90
	3	36.57	32.28	18.00	13.38	8.00	2.90
	4	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 N Series					Nominal filtration 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

Suction filters

Filter element	Nominal filtration N Series	
Type	P10	P25
SF 250	65	21

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	8.80	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

FILTER SIZING Selection Software

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"



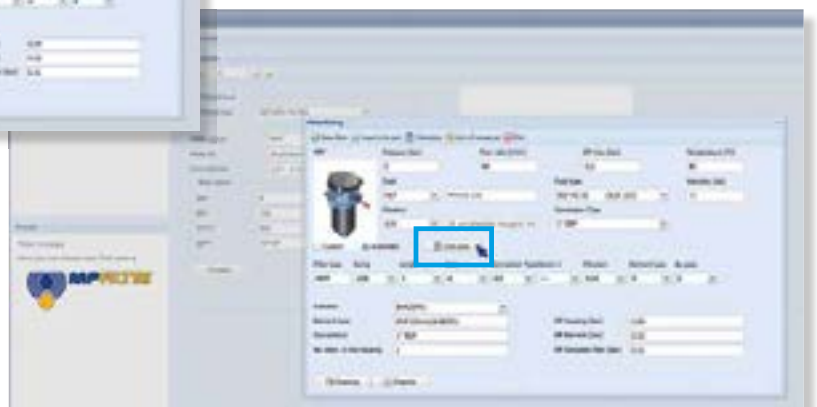
Step 5

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"

STR & MPA - MPM series

Flow rate up to 875 l/min



STR & MPA-MPM GENERAL INFORMATION

Description

Technical data

Suction filters

Flow rate up to 875 l/min

STR

STR is a range of suction strainers for protection of the downstream pump against the coarse contamination.

They are placed below the oil level directly connected to the suction line of the pump.

Available features:

- Female threaded connections up to 3", for a maximum flow rate of 875 l/min
- Bypass valve, to relieve excessive pressure drop across the filter media

Common application:

- Mobile machines (Construction and Agriculture machines)
- Industrial equipment

MPA - MPM

MPA and MPM are ranges of suction strainers for protection of the downstream pump against the coarse contamination.

They are placed below the minimum oil level, directly connected to the suction line of the pump.

The robust design allows the use of these filters in any heavy duty application.

Available features:

- Female threaded connections up to 3", for a maximum flow rate of 875 l/min
- Magnetic column (MPM), to hold the ferrous particles

Common application:

Industrial equipment

STR materials

- 1 - Connection: Polyamide, GF reinforced
- 2 - Core tube: Tinned Steel
- 3 - Wire mesh
- 4 - End cap: Polyamide, GF reinforced
- 5 - Bypass valve: Polyamide, GF reinforced - Steel

MPA - MPM materials

- 1 - Connection: Aluminium
- 2 - Magnetic column
- 3 - Tie rod: Galvanized Steel
- 4 - End cap: Galvanized Steel
- 5 - Core tube: Galvanized Steel
- 6 - Filter media: Wire mesh
- 7 - Bottom: Galvanized Steel
- 8 - Washer: Galvanized Steel
- 9 - Self-locking nut: Galvanized Steel - Nylon

Bypass valve

Opening pressure 30 kPa (0.3 bar)

Elements

Fluid flow through the filter element from OUT to IN.

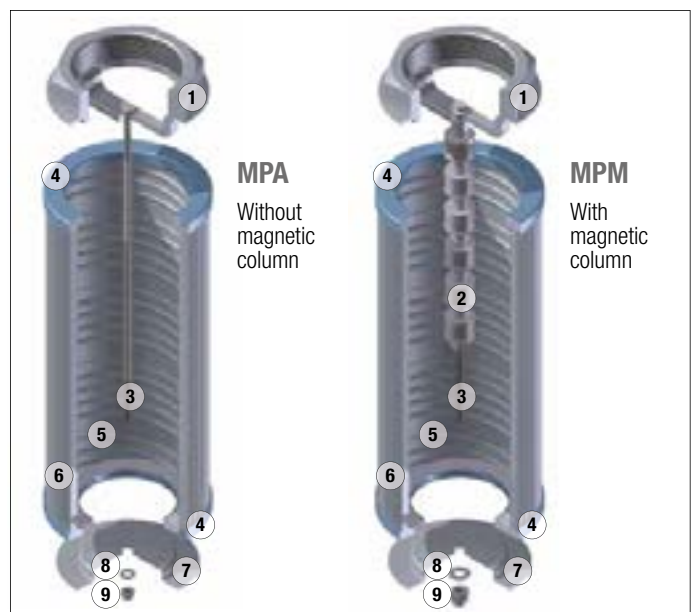


Temperature

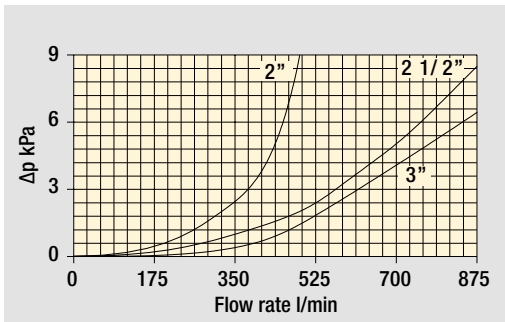
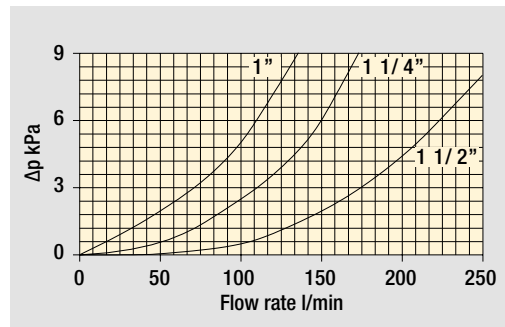
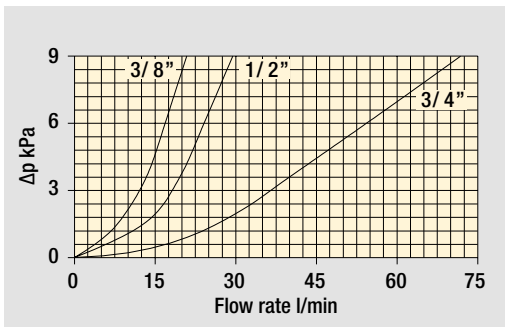
From -25 °C to +110 °C

Weights [kg]

Filter series	
STR	see page 35
MPA - MPM	see page 37



Filters pressure drop Δp
in function of connection type



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

Flow rates [l/min]

Filter series	Thread	l/min
STR-MPA-MPM	3/8"	19
	1/2"	28
	3/4"	67
	1"	126
	1 1/4"	167
	1 1/2"	258
	2"	480
	2 1/2"	854
	3"	995

Hydraulic symbols

Filter series	Style S	Style B
STR	•	•
MPA - MPM	•	

Maximum flow rate for a complete suction filter with a pressure drop $\Delta p = 0.08$ bar.

The reference fluid has a kinematic viscosity of 30 mm²/s (cSt) and a density of 0.86 kg/dm³.

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.

COMPLETE FILTER

Element series and size

STR045
STR050
STR065
STR070
STR086
STR100
STR140
STR150

Configuration example 1:

STR045	1	B	G1	M60	P01
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Configuration example 2:

STR100	4	S	G2	M250	P01
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Connection type

	STR045	STR050	STR065	STR070	STR086	STR100	STR140	STR150
1	3/8"	3/8"	1/2"	1/2"	1 1/2"	1 1/4"	1 1/2"	2"
2	1/2"	1/2"	3/4"	3/4"	2"	1 1/4"	2"	2 1/2"
3	-	-	3/4"	3/4"	1 1/2"	1 1/2"	2"	3"
4	-	-	1"	1"	2"	2"	2 1/2"	-
5	-	-	-	-	1 1/2"	1 1/2"	3"	-
6	-	-	-	1/2"	2"	-	3"	-

Valves

S	Without bypass
B	With bypass 0.3 bar

Thread type

G1	Thread GAS
G2	Thread NPT

Filtration rating (filter media)

M25	Wire mesh	25 µm
M60	Wire mesh	60 µm
M90	Wire mesh	90 µm
M250	Wire mesh	250 µm

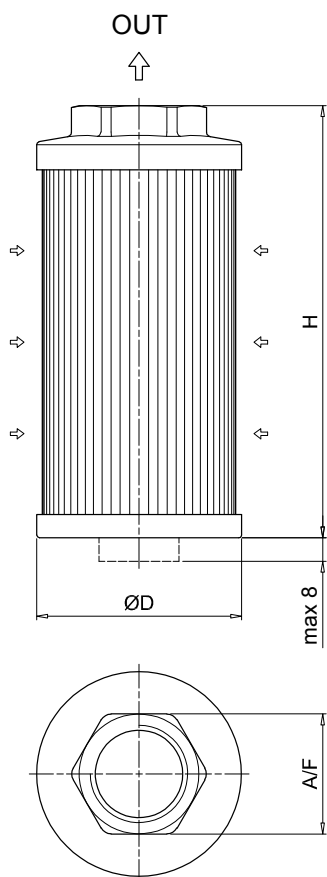
OTHER INFORMATION

Conditions of packaging

Filter size	Pcs. per box
045	12
050	12
065	6
070	6
086	6
100	6
140	1
150	1

Execution

P01	MP Filtri standard
Pxx	Customized



STR						
Filter size	Connection type	Thread	ØD [mm]	H [mm]	A / F [mm]	Weight [kg]
045	1	3/8"	46	105	30	0.15
	2	1/2"	46	105	30	0.19
050	1	3/8"	52	79	30	0.11
	2	1/2"	52	79	30	0.11
065	1	1/2"	65	110	41	0.19
	2	3/4"	65	110	41	0.22
	3	3/4"	65	144	41	0.24
070	4	1"	65	144	41	0.22
	1	1/2"	70	95	41	0.18
	2	3/4"	70	95	41	0.17
086	3	3/4"	70	141	41	0.23
	4	1"	70	141	41	0.22
	6	1/2"	70	141	41	0.24
	1	1 1/2"	86	143	69	0.33
100	2	2"	86	143	69	0.30
	3	1 1/2"	86	201	69	0.43
	4	2"	86	201	69	0.40
	5	1 1/2"	86	261	69	0.53
	6	2"	86	261	69	0.50
	1	1 1/4"	99	137	69	0.47
140	2	1 1/4"	99	227	69	0.58
	3	1 1/2"	99	227	69	0.55
	4	2"	99	227	69	0.51
	5	1 1/2"	99	137	69	0.43
	1	1 1/2"	130	160	69	0.70
150	2	2"	130	160	69	0.68
	3	2"	130	262	69	0.94
	4	2 1/2"	130	272	101	1.10
	5	3"	130	272	101	1.00
	6	3"	130	330	101	1.17
	1	2"	150	150	70	0.34
150	2	2 1/2"	150	212	90	0.37
	3	3"	150	272	100	0.40

MPA-MPM

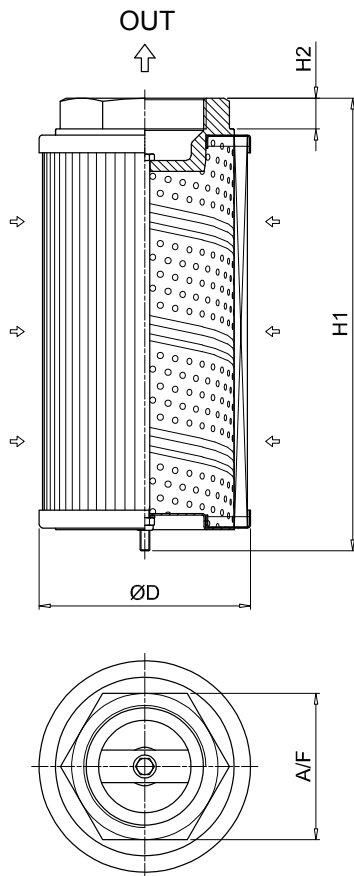
Designation & Ordering code

COMPLETE FILTER

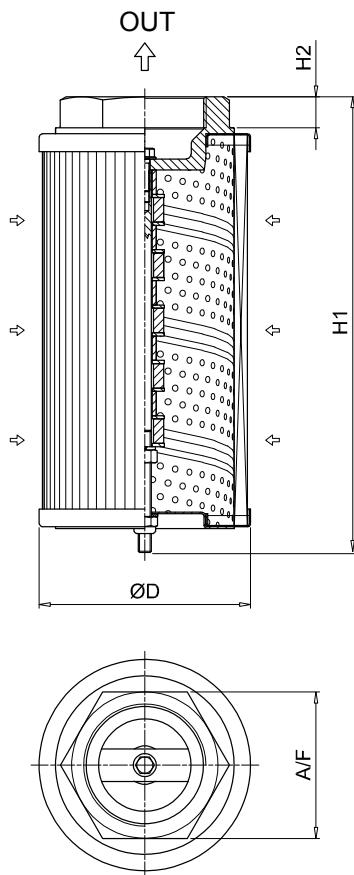
Element series		Configuration example 1:				
MPA	Without magnetic column	MPA	030	G1	M60	P01
MPM	With magnetic column	Configuration example 2:				
		MPM	430	G2	M250	P01
Connections						
012	3/8"					
015	1/2"					
025	1/2"					
030	3/4"					
045	3/4"					
050	1"					
075	1"					
095	1 1/4"					
120	1 1/4"					
150	1 1/2"					
180	1 1/2"					
220	2"					
280	2"					
300	2 1/2"					
380	2"					
430	3"					
Thread type						
G1	Thread GAS					
G2	Thread NPT					
Filtration rating (filter media)						
M25	Wire mesh 25 µm					
M60	Wire mesh 60 µm					
M90	Wire mesh 90 µm					
M250	Wire mesh 250 µm					
		Execution				
		P01	MP Filtri standard			
		Pxx	Customized			

OTHER INFORMATION

Conditions of packaging	
Size	Pcs. per box
012	12
015	6
025	6
030	6
045	6
050	6
075	6
095	6
120	6
150	6
180	1
220	1
280	1
300	1
380	1
430	1



MPA						
Filter size	Thread	ØD [mm]	H1 [mm]	H2 [mm]	A/F [mm]	Weight [kg]
012	3/8"	50	98	16	28	0.17
015	1/2"	50	98	16	28	0.17
025	1/2"	70	113	16	28	0.27
030	3/4"	70	115	18	42	0.36
045	3/4"	70	160	18	42	0.39
050	1"	70	160	18	42	0.35
075	1"	99	145	18	42	0.54
095	1 1/4"	99	148	20	60	0.63
120	1 1/4"	99	239	20	60	0.95
150	1 1/2"	99	239	20	60	0.91
180	1 1/2"	130	174	20	60	0.98
220	2"	130	162	13	80	1.00
280	2"	130	272	13	80	1.60
300	2 1/2"	130	281	20	90	1.67
380	2"	130	322	13	80	1.60
430	3"	130	335	22	106	1.93



MPM						
Filter size	Thread	ØD [mm]	H1 [mm]	H2 [mm]	A/F [mm]	Weight [kg]
012	3/8"	50	98	16	28	0.17
015	1/2"	50	98	16	28	0.17
025	1/2"	70	113	16	28	0.27
030	3/4"	70	115	18	42	0.36
045	3/4"	70	160	18	42	0.39
050	1"	70	160	18	42	0.35
075	1"	99	148	18	42	0.54
095	1 1/4"	99	154	20	60	0.63
120	1 1/4"	99	244	20	60	0.95
150	1 1/2"	99	244	20	60	0.91
180	1 1/2"	130	174	20	60	0.98
220	2"	130	163	13	80	1.00
280	2"	130	273	13	80	1.60
300	2 1/2"	130	282	20	90	1.67
380	2"	130	323	13	80	1.60
430	3"	130	336	22	106	1.93