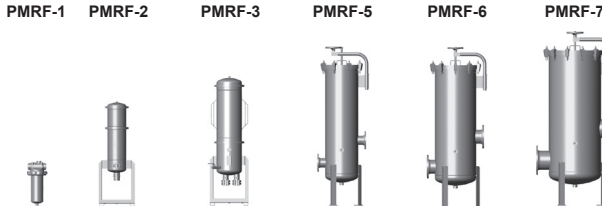


Process MultiRheo Filter PMRF



Specifications	
Nominal size:	G 1" – DN 200
Q _{max} :	1200 l/min
p _{max} :	40 bar
Filtration ratings:	1 – 90 µm

1. GENERAL

Product description

- Separation of solid particles from low viscosity fluids
- Suitable for applications with the highest cleanliness requirements
- Tried-and-tested candle filter technology for very fine filtration
- Also available as a switchable double filter

Filter element technology

- Filtration ratings: 1 to 90 µm
- Filtration materials:
 - Flexmicron Premium: durable, pleated filter elements (pleat technology) with low layer thickness made from melt-blown or high-quality glass fibres for graduated depth filtration – long services lives even for hard-to-filter fluids
 - Flexmicron Standard: Spun Spray depth filter elements (melt-blown) for graduated depth filtration – high cleanliness in a single pass, high filter thickness of filter medium → high storage volume for contamination
 - Flexmicron Economy: Spun Spray depth filter elements (melt-blown) suitable for applications with medium requirements for fluid and type purity – inexpensive solution

Product advantages

- Economic operation through high quality standards, defined filtration rates and high separation values
- Compact housing with high flow rates
- Service-friendly for filter element change
- Efficient system and component protection
- Environmentally safe disposal, as incinerable

Technical data – standard models

Size ¹⁾	Length [inches]	Mounting dimension	Materials	Pressure range	Temperature [°C] ²⁾	Weight (empty) [kg] ³⁾	Volume [l] ³⁾	No. of filter elements	Filter element type ⁴⁾ Filter material ⁵⁾	Filtration ratings [µm]
1	10 20 30 40	Pipe thread G1"	Stainless steel ¹⁾	PN 40	-10 to 90 ²⁾	8.8	4.3	1	FM-E FM-S FM-P	1 3 5 10 20 30 40 50 70 90
2		G 1" / Pipe thread 1.5" and 2"		PN 6 / PN 10		61	45	5	FM-E FM-S FM-P	
3		SAE 2" / G 1" Pipe thread 1.5" and 2" / DIN EN 50				51	65	11	FM-E FM-S FM-P	
4	40	DIN EN 50 / 80	Stainless steel ¹⁾ Carbon steel with or without internal corrosion protection	PN 10		120	120	17	FM-E FM-S FM-P	
5		DIN EN 80 / 100				200	180	22	FM-E FM-S FM-P	
6		DIN EN 100 / 150				280	250	36	FM-E FM-S FM-P	
7		DIN EN 150 / 200				452	415	52	FM-E FM-S FM-P	

¹⁾ Size 1 made of stainless steel 1.4571 / 1.4581
 Sizes 2 to 7 made of stainless steel 1.4301 or similar (group 304)
 Sizes 4 to 7 davit included

²⁾ Internally coated reservoir
 T_{S max} +60 °C – higher temperature on request

³⁾ Sizes 1 to 3 based on 40" length
 Sizes 4 to 7 based on filter E / NU

⁴⁾ Flexmicron Economy (FM-E): polypropylene
 Flexmicron Standard (FM-S): polypropylene or polyamide
 Flexmicron Premium (FM-P): polyester or glass fibre

⁵⁾ The maximum permissible differential pressure at the filter element is dependent on the particular application temperature – see table "Technical data, filter elements"

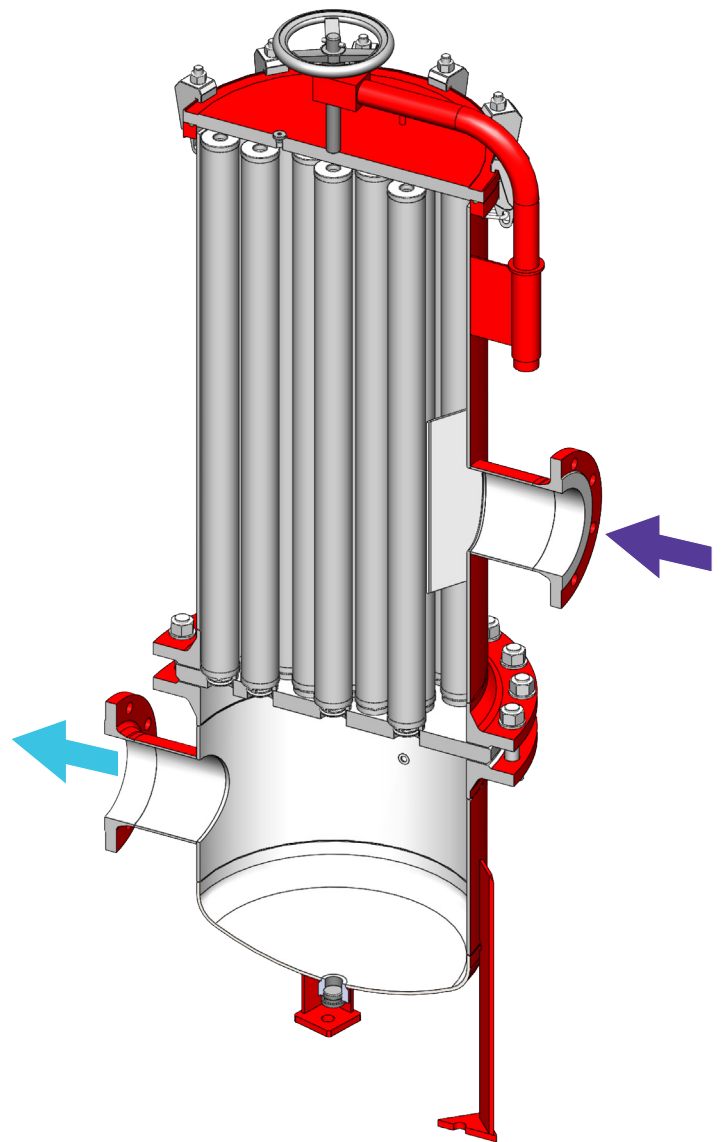
Technical data, filter elements

Filter material	Temperature / Δp _{max}		
	-10 to +30 °C	-10 to +60 °C	-10 to +100 °C
PES / GF	8 bar	6.5 bar	5 bar
PP	4 bar	2 bar	
PA	7 bar	5.5 bar	3.5 bar





2. FUNCTION AND SPECIAL FEATURES

FUNCTIONAL PRINCIPLE

- The medium to be filtered flows through the filter elements from outside to in
- Particles are deposited on the filter elements
- As contamination increases, the differential pressure between the filter's contaminated side and clean side rises
- Depending on the customer's particular system set-up, the filter elements can be changed when a particular differential pressure is reached (see also page 1, table "Technical data, filter elements").



3. CLOGGING INDICATORS

Type	Image	Description
Clogging indicator/differential pressure monitoring		
Visual PVD x B.x		<ul style="list-style-type: none"> • Visual display with green/red field • Automatic reset
Electrical PVD x C.x		<ul style="list-style-type: none"> • Electrical signal when trigger point is reached • Switch type: normally closed or normally open • Automatic reset
Visual-electrical PVD x D.x /-L...		<ul style="list-style-type: none"> • Lamp for visual display • Electrical signal (normally closed or normally open) • Automatic reset
Differential pressure gauge DS11		<ul style="list-style-type: none"> • 2 micro-switches (N/C or N/O) • Switch points of the micro-switches can be adjusted from outside • Measuring cell made from aluminium or stainless steel

4. FILTER CALCULATION*

CHECKLIST FOR FILTER CALCULATION

STEP 1: CALCULATION OF TOTAL PRESSURE LOSS FOR FILTER

The total pressure loss of the filters at a certain flow rate is the sum of the housing Δp and the filter element Δp . The pressure loss of the housing can be determined from the following pressure loss curves. The pressure drop of the filter elements is calculated using the R factors.

STEP 2: CORRECT DIMENSIONING

Following dimension data should be available:

- Nominal flow
- Type of medium
- Materials/resistance
- Viscosity
- Required filtration rating
- Solid particle concentration in the fluid
- Solid particle type
- Operating pressure
- Operating temperature
- Integration of the PMRF into the whole system

Maximum permitted flow rate for 1 mm²/s

Filter element length	Flexmicron Economy / Standard	Flexmicron Premium
10"	15 l/min	20 l/min
20"	30 l/min	40 l/min
30"	45 l/min	60 l/min
40"	60 l/min	80 l/min

NOTICE: The flow velocity of 4 m/s at the flange inlet should not be exceeded

STEP 3: CALCULATION OF PRESSURE LOSS FOR FILTER ELEMENTS

The pressure loss for filter elements in a clean state is calculated on the basis of the following formula:

$$\Delta p [\text{bar}] = \frac{R \times V \times Q}{n \times L \times 1000}$$

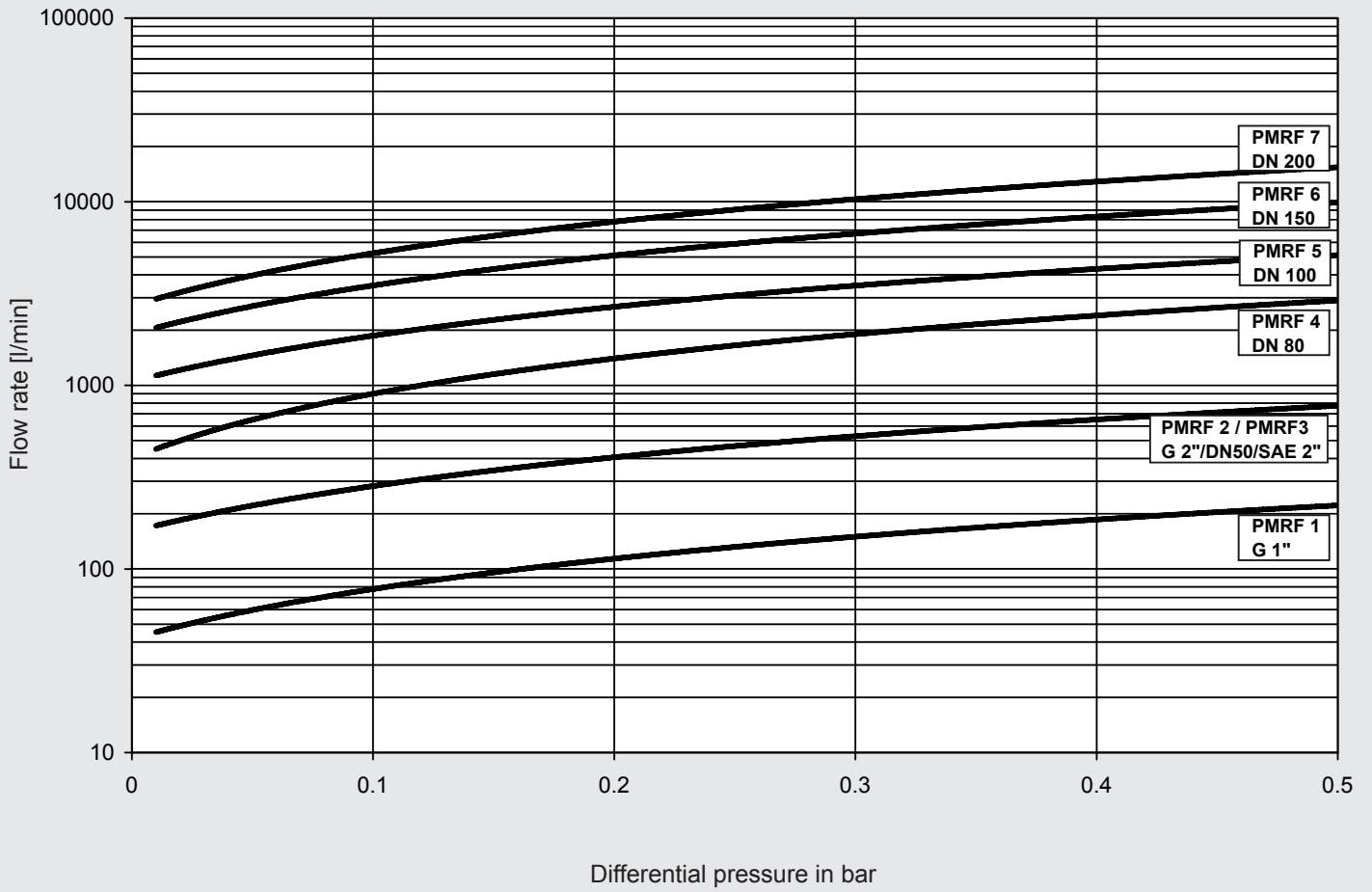
- R = R factor
 V = viscosity [mm²/s]
 Q = flow rate [l/min]
 n = no. of filter elements
 L = filter element length [inch]

Overview R (resistance) factor	Filtration rating	Aqueous fluid			Oils	
	µm	PA	PP	PES β > 5000	PES β > 5000	GF β > 20000
Flexmicron Economy	1		37			
	3		29			
	5		20			
	10		11			
	20		8			
	30		6.8			
	40		5.4			
	50		4.2			
Flexmicron Standard	70		3.1			
	1	274	321			
	3	116	186			
	5	42	132			
	10	15	99			
	20	11	54			
	30	6	16			
	40	3.8	12			
	50	1.9	10			
	70	1.1	8			
Flexmicron Premium	90	0.6	6			
	1			32	10.4	5.4
	3			24	7.5	
	5			18	4.4	4.3
	10			17	1.8	3.2
	20			15	1.8	
	30			14	0.9	
40			14	0.9		

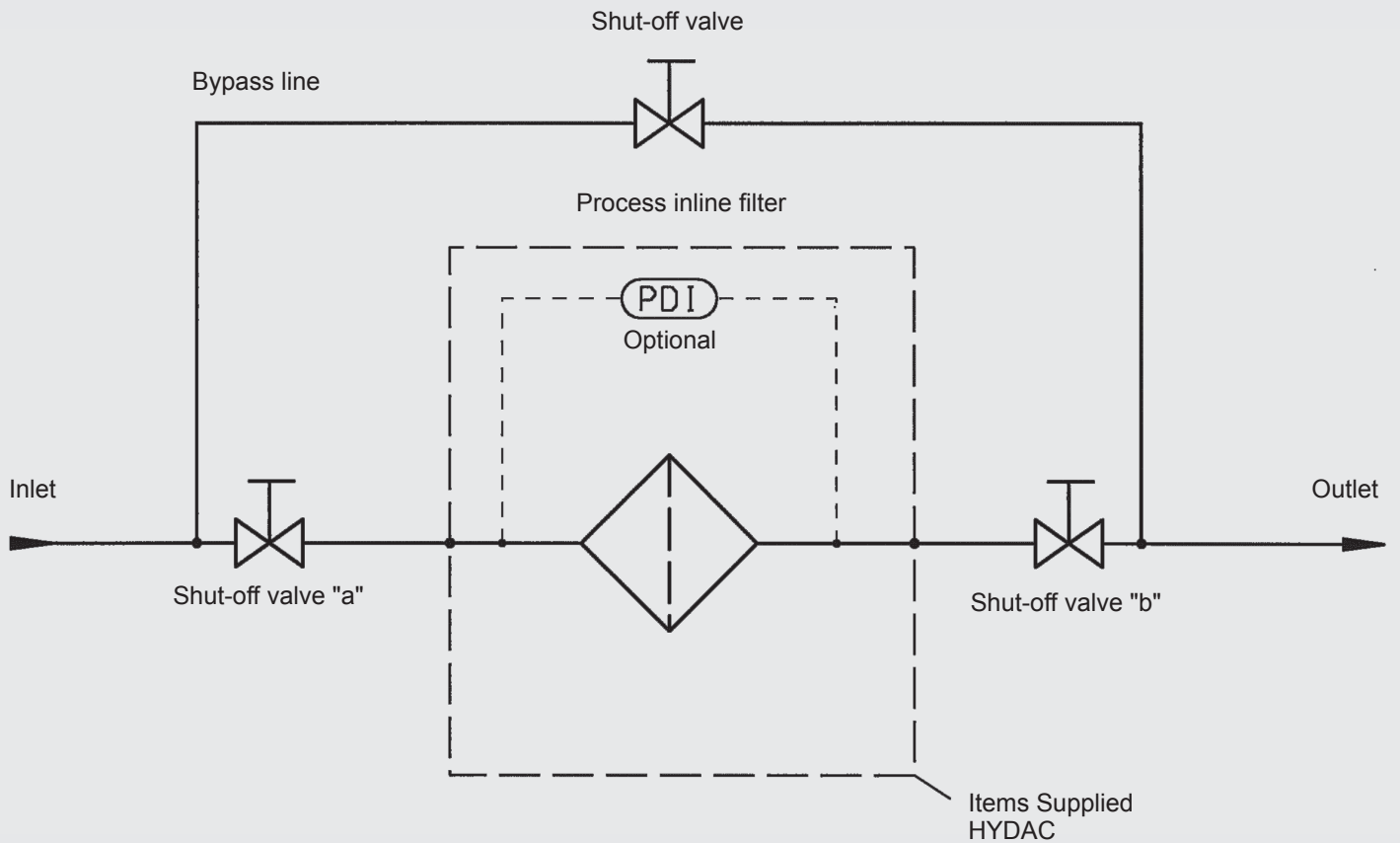
* Please contact our Head Office if you have any queries regarding filter calculation.

PRESSURE DROP CURVES

The pressure drop curves apply to water and other fluids up to a viscosity of 15 mm²/s.



CIRCUIT DIAGRAM



5. FILTER CONFIGURATION*

	Standard	Optional
Sealing materials	<ul style="list-style-type: none"> • NBR • FPM • EPDM 	
External corrosion protection	2-coat primer (not required for stainless steel housing)	
Internal corrosion protection	2-part epoxy coating (not applicable for stainless steel housing or type NU)	
Housing manufacture		ASME Code Design with or without ASME stamp
Flange connections		<ul style="list-style-type: none"> • ASME • JIS
Housing materials		<ul style="list-style-type: none"> • Various qualities of stainless steel • Various qualities of carbon steel
Differential pressure monitoring		
Documentation	Operating and maintenance instructions	<ul style="list-style-type: none"> • Manufacturer's inspection certificate to DIN 55350, part 18 "M" for construction and pressure inspection • Material certificates to EN 10204, 3.1 for pressure-bearing wetted parts • Third parties (TÜV, ABS, Lloyds, etc.) • Welding procedure specifications (WPS) / Procedure Qualification Record (PQR) • Inspection plan

* Other versions and customised special solutions following consultation with our Head Office.

6. MODEL CODE

MODEL CODE PMRF 1/2/3/4/5/6/7

PMRF - 4 - E / 17 - Q - 40 - 10 - F - 1 - 0

Type

PMRF = Process MultiRheo Filter

Size

- 1 = approx. 76 mm housing diameter
- 2 = approx. 223 mm housing diameter
- 3 = approx. 274 mm housing diameter
- 4 = approx. 355 mm housing diameter
- 5 = approx. 406 mm housing diameter
- 6 = approx. 508 mm housing diameter
- 7 = approx. 610 mm housing diameter

Housing material ¹⁾

	for size						
E = Stainless steel ²⁾	1	2	3	4	5	6	7
NU = carbon steel uncoated ²⁾				4	5	6	7
NM = carbon steel with internal 2-part epoxy coating*				4	5	6	7

* for quality, see technical specifications

Bold = standard

Filter element no.

	for size						
1 = 1 filter element	1						
5 = 5 filter elements		2					
11 = 11 filter elements			3				
17 = 17 filter elements				4			
22 = 22 filter elements					5		
36 = 36 filter elements						6	
52 = 52 filter elements							7

Filter element end cap form 1 and 2 as standard, other filter elements on request

Type of connection

	for size						
D = G 1"	1	2	3				
F = G 1 1/2"		2	3				
G = G 2"		2	3				
L = SAE 2"			3				
J = DIN DN 50 / 2"			3	4			
Q = DIN DN 80 / 3"				4	5		
R = DIN DN 100 / 4"					5	6	
V = DIN DN 150 / 6"						6	7
W = DIN DN 200 / 8"							7

Flange form placed after width

J = JIS

A = ASME

Only applicable for size 4, other sizes on request

Filter element length

	for size						
10 = 10"	1	2	3				
20 = 20"	1	2	3				
30 = 30"	1	2	3				
40 = 40"	1	2	3	4	5	6	7

Pressure range

	for size						
6 = 6 bar		2	3				
10 = 10 bar		2*	3*	4	5	6	7
16 = 16 bar				4	5	6	7
25 = 25 bar				4	5	6	7
40 = 40 bar	1						

Bold = standard

Sealing material

- N = NBR
- F = FPM
- E = EPDM

Clogging indicator

- 0 = none
- 1 = with visual CI (PVD 2 B.1)
- 2 = with visual-electrical CI (PVD 2 D.0/-L..)
- 3 = V01
- 4 = diff. press.gauge aluminium (measuring range 4 bar)
- 5 = diff. pressgauge stainless steel (measuring range 4 bar)
- 6 = with electrical CI (PVD 2 C.0)

See brochure no.: 7.719... Clogging Indicators for Process Filters

Modification number

- 0 = for all stainless steel housing and uncoated housing NU
- 1 = for all internally coated housing NM size 4 and above

¹⁾ Size 1 made of stainless steel 1.4571 / 1.4581
 Sizes 2 to 7 made of stainless steel 1.4301 or similar (group 304)
 Sizes 4 to 7 davit included

²⁾ On request

6. MODEL CODE

MODEL CODE FLEXMICRON E (ECONOMY) - FILTER ELEMENTS

N - 40 - FM-E - 005 - PP - 1 - F

Filter element length

10 = 10" 30 = 30"
20 = 20" 40 = 40"

Filter element type

FM-E= Flexmicron Economy

Filtration rating

001 = 1 µm 010 = 10 µm 040 = 40 µm 090 = 90 µm
003 = 3 µm 020 = 20 µm 050 = 50 µm
005 = 5 µm 030 = 30 µm 070 = 70 µm

Filter material

PP = polypropylene

End cap type

0 = cutting ring (DOE), no cap/seal (Ø 64 mm)
1* = plug-in adapter (1x 222 O-ring), flat end cap (Ø 64 mm)*
2* = plug-in adapter (2x 222 O-ring), flat end cap (Ø 64 mm)*
10 = gasket (DOE) (Ø 64 mm)
13 = plug-in adapter (2x 222 O-ring), locating spigot (Ø 64 mm)
14 = bayonet (2x 226 O-ring), locating spigot (Ø 64 mm)

Others on request

Sealing material

N = NBR
F = FPM
E = EPDM

Other filter element types on request

MODEL CODE FLEXMICRON S (STANDARD) - FILTER ELEMENTS

N - 40 - FM-S - 005 - PP - 1 - F

Filter element length

10 = 10" 30 = 30"
20 = 20" 40 = 40"

Filter element type

FM-S= Flexmicron Standard

Filtration rating

001 = 1 µm 010 = 10 µm 040 = 40 µm 090 = 90 µm
003 = 3 µm 020 = 20 µm 050 = 50 µm
005 = 5 µm 030 = 30 µm 070 = 70 µm

Filter material

PP = polypropylene
PA = polyamide

End cap type

0 = cutting ring (DOE), no cap/seal (Ø 64 mm)
1* = plug-in adapter (1x 222 O-ring), flat end cap (Ø 64 mm)*
2* = plug-in adapter (2x 222 O-ring), flat end cap (Ø 64 mm)*
10 = gasket (DOE) (Ø 64 mm)
13 = plug-in adapter (2x 222 O-ring), locating spigot (Ø 64 mm)
14 = bayonet (2x 226 O-ring), locating spigot (Ø 64 mm)

Others on request

Sealing material

N = NBR E = EPDM
F = FPM Z = no seal (only for end cap form 0)

Other filter element types on request

MODEL CODE FLEXMICRON P (PREMIUM) - FILTER ELEMENTS

N - 40 - FM-P - 005 - PES - 1 - F

Filter element length

10 = 10" 30 = 30"
20 = 20" 40 = 40"

Filter element type

FM-P= Flexmicron Premium

Filtration rating

001 = 1 µm 010 = 10 µm 040 = 40 µm 090 = 90 µm
003 = 3 µm 020 = 20 µm 050 = 50 µm
005 = 5 µm 030 = 30 µm 070 = 70 µm

Filter material

PES = polyester
GF = glass fibre

End cap type

1* = plug-in adapter (1x 222 O-ring), flat end cap (Ø 64 mm)*
2* = plug-in adapter (2x 222 O-ring), flat end cap (Ø 64 mm)*
3 = plug-in adapter (2x 222 O-ring), flat end cap (Ø 70 mm)
5 = plug-in adapter (2x 222 O-ring), locating spigot (Ø 70 mm)
7 = bayonet (2x 226 O-ring), locating spigot (Ø 70 mm)
10 = open (gasket DOE) (Ø 64 mm)
12 = Cuno adapter (suspended elements) (Ø 64 mm)

Others on request

Sealing material

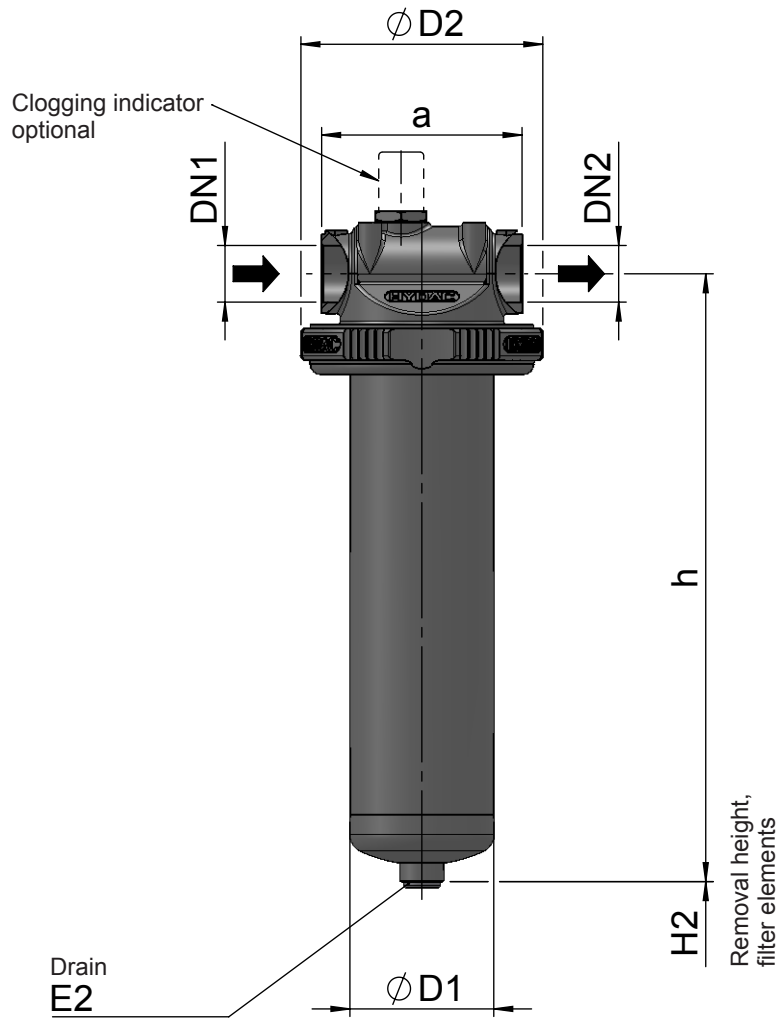
N = NBR
F = FPM
E = EPDM

Other filter element types

* Standard end cap form for PMRF filter housing. Other end cap form for PMRF filter housing on request.

7. DIMENSIONS

PMRF-1

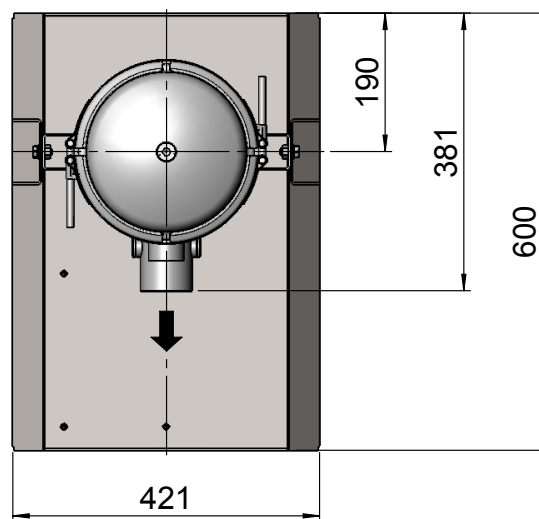
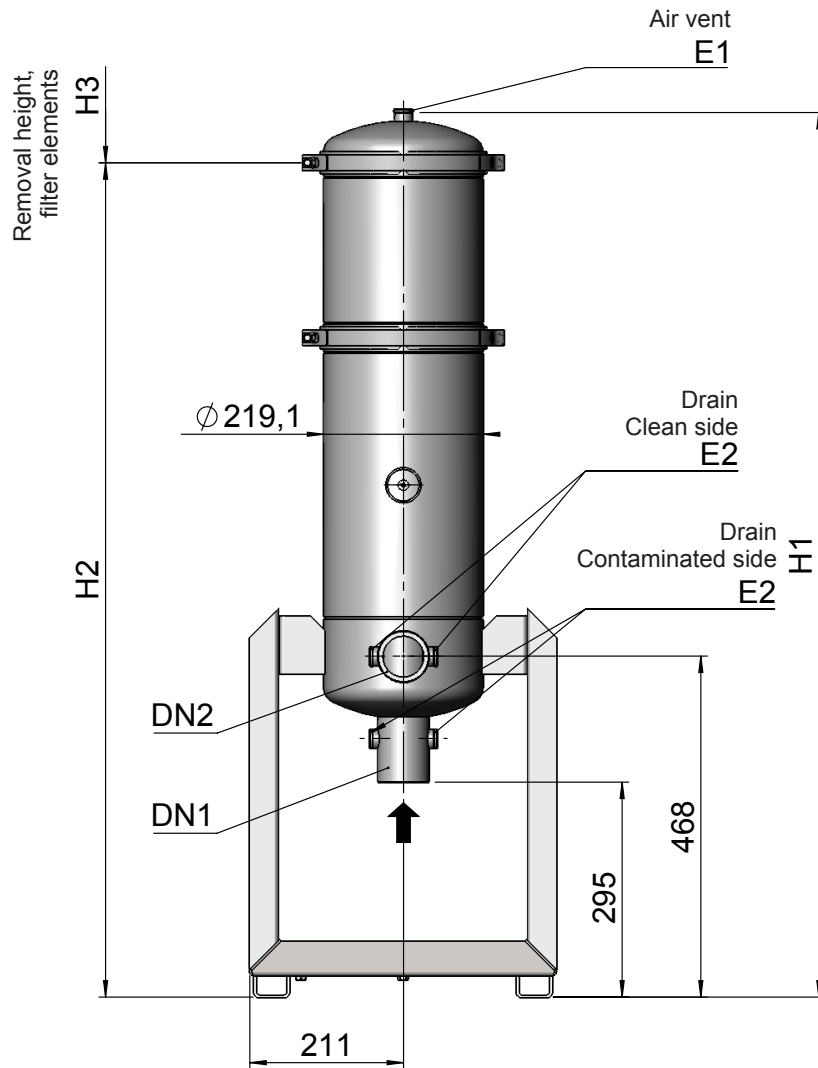


The dimensions indicated have ± 5 mm tolerances.
Subject to technical modifications.

Length	h	D1	a	DN1	DN2	D2	H2	E2	Volume [L]
10"	332.5	76.1	106	G1	G1	128	35	G1/4	1.1
20"	586.5	76.1	106	G1	G1	128	35	G1/4	2.1
30"	816	76.1	106	G1	G1	128	35	G1/4	3
40"	1094.5	76.1	106	G1	G1	128	35	G1/4	4

7. DIMENSIONS

PMRF-2

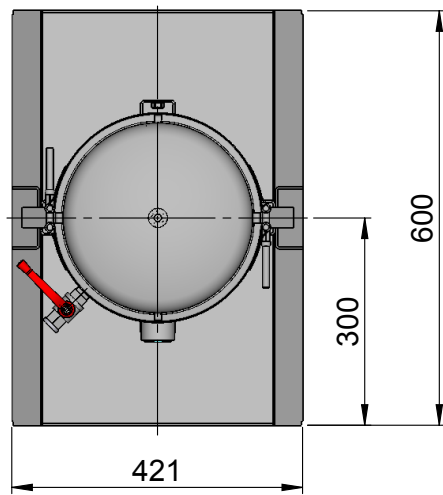
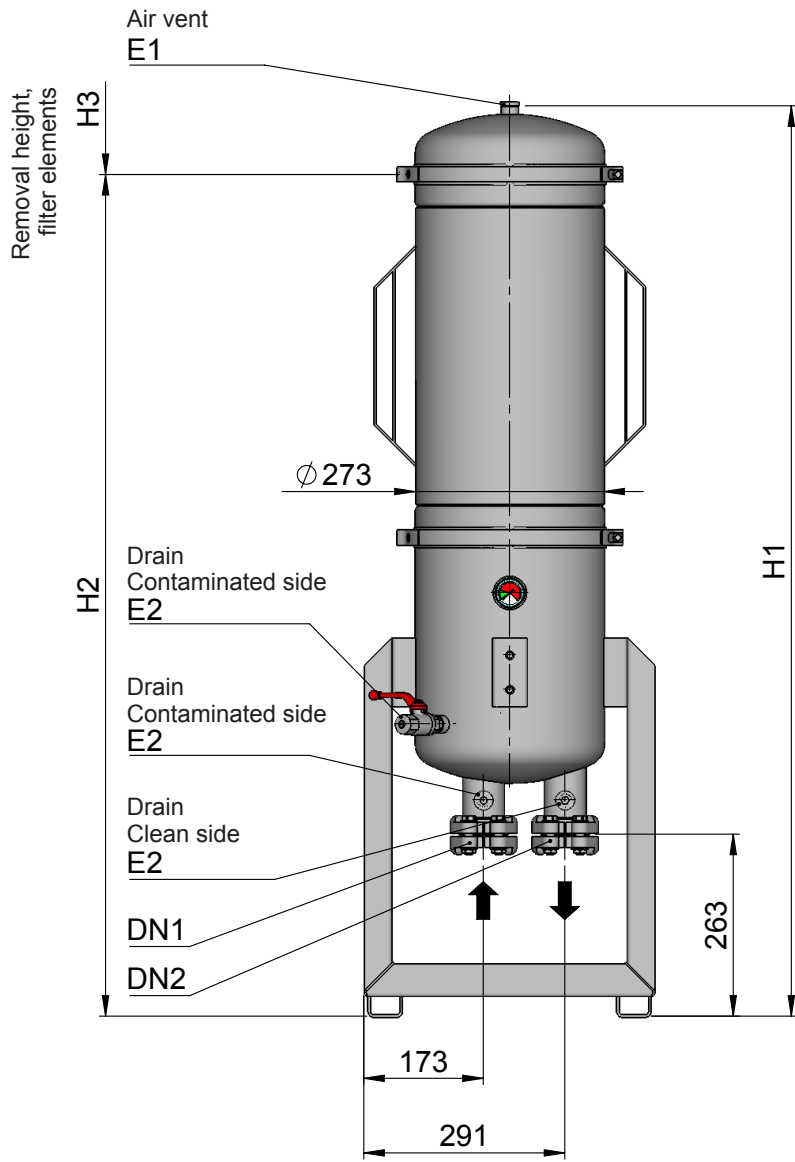


The dimensions indicated have ± 10 mm tolerances.
Subject to technical modifications.

Length	H1	H2	H3	DN1	DN2	E1	E2	Volume [L]
10"	975	905	350	G2	G2	G1/2	G1/2	17
20"	1215	1145	610	G2	G2	G1/2	G1/2	26
30"	1433	1363	850	G2	G2	G1/2	G1/2	35
40"	1682	1612	1115	G2	G2	G1/2	G1/2	45

7. DIMENSIONS

PMRF-3



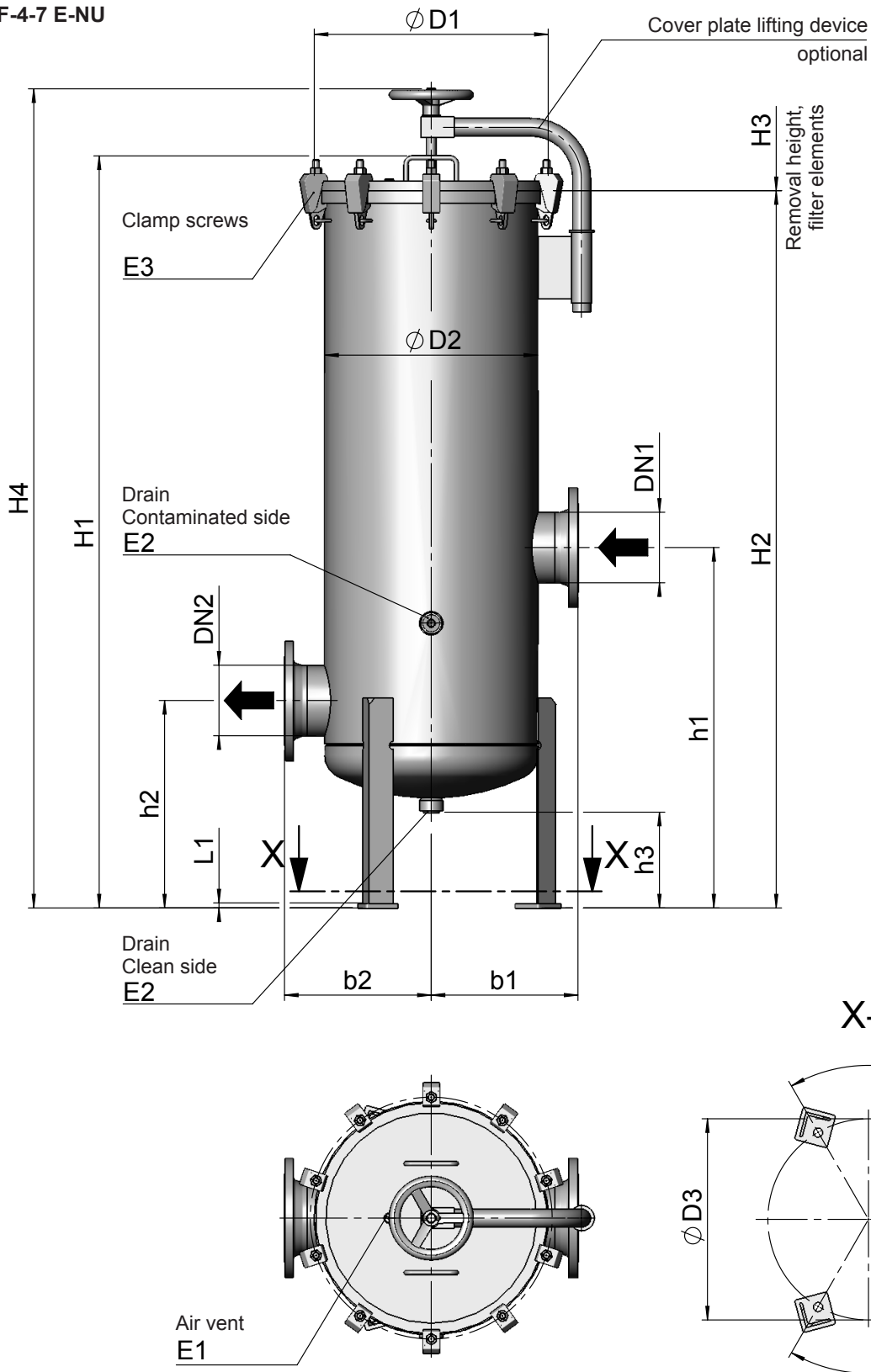
The dimensions indicated have ± 10 mm tolerances.
Subject to technical modifications.

Length	H1	H2	H2	DN1	DN2	E1	E2	Volume [l]
10"	798	698	281	SAE 2" 3000psi	SAE 2" 3000psi	G1/2	G1/2	20
20"	1066	966	537	SAE 2" 3000psi	SAE 2" 3000psi	G1/2	G1/2	40
30"	1323	1223	765	SAE 2" 3000psi	SAE 2" 3000psi	G1/2	G1/2	50
40"	1578	1478	1043	SAE 2" 3000psi	SAE 2" 3000psi	G1/2	G1/2	65

EN 7.714.2/09.17

7. DIMENSIONS

PMRF-4-7 E-NU

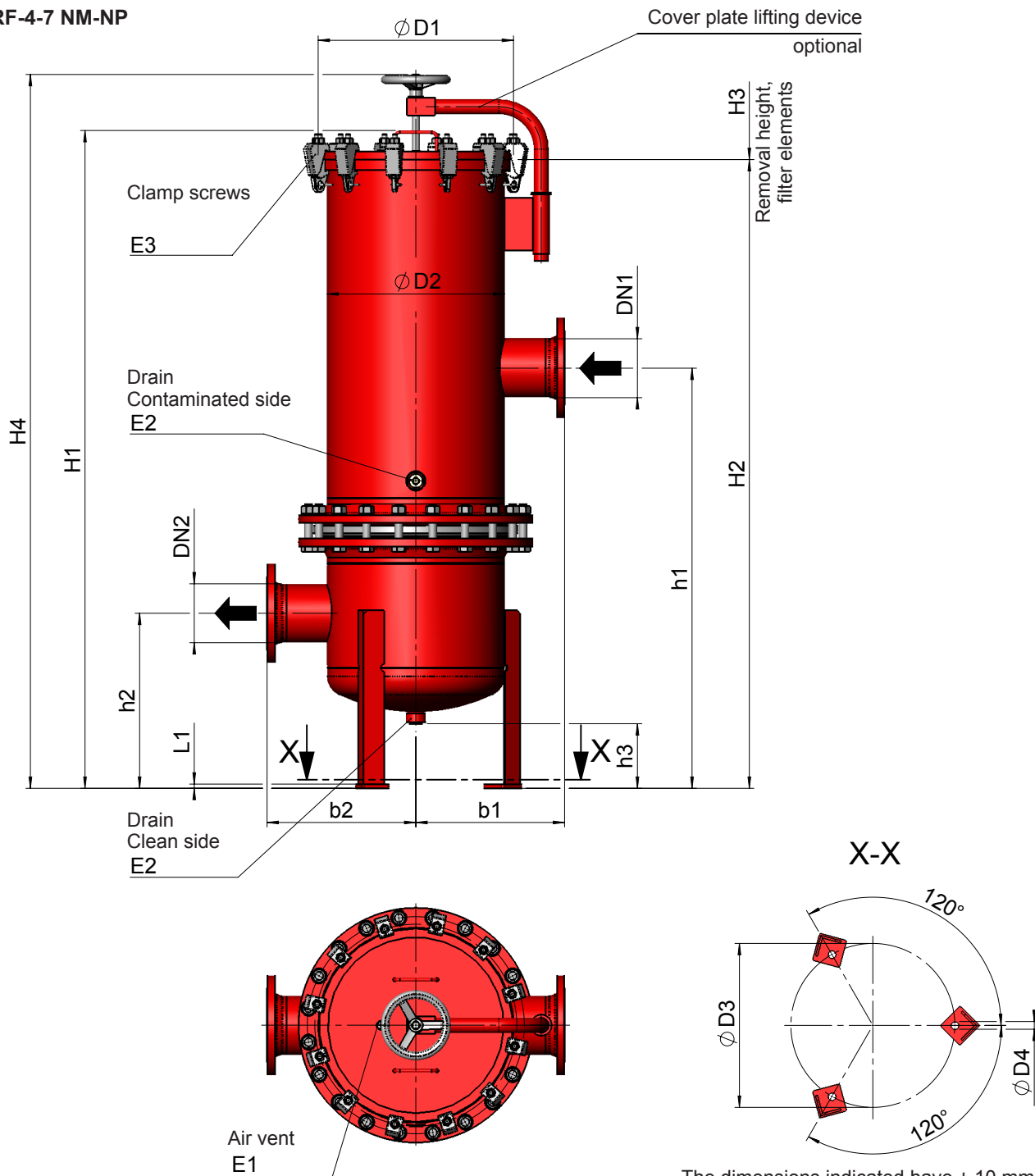


The dimensions indicated have ± 10 mm tolerances. Subject to technical modifications.

Size	DN1	DN2	b1	b2	h1	h2	h3	H1	H2	H3	H4	L1	D1	D2	D3	D4	E1	E2	E3
PMRF-4	50	50	275	275	310	540	105	1535	1455	1080	1677	12	405	355.6	325	22	G1/4	G1	6xM16
PMRF-4	80	80	275	275	310	540	105	1535	1455	1080	1677	12	405	355.3	325	22	G1/4	G1	6xM16
PMRF-5	80	80	300	300	525	800	249	1784	1702	1080	1944	12	456	406.4	377	22	G1/4	G1	8xM16
PMRF-5	100	100	300	300	525	800	249	1784	1702	1080	1944	12	456	406.4	377	22	G1/4	G1	8xM16
PMRF-6	100	100	350	350	495	860	228	1795	1712	1080	1960	12	558	508	480	22	G1/4	G1	10xM16
PMRF-6	150	150	350	350	495	860	228	1795	1712	1080	1960	12	558	508	480	22	G1/4	G1	10xM16
PMRF-7	150	150	450	450	890	525	207	1843	1753	1080	2006	12	660	610	583	22	G1/2	G1	12xM16
PMRF-7	200	200	450	450	890	525	207	1843	1753	1080	2006	12	660	610	583	22	G1/2	G1	12xM16

7. DIMENSIONS

PMRF-4-7 NM-NP



The dimensions indicated have ± 10 mm tolerances.
Subject to technical modifications.

Size	DN1	DN2	b1	b2	h1	h2	h3	H1	H2	H3	H4	L1	D1	D2	D3	D4	E1	E2	E3
PMRF-4	50	50	275	275	775	375	173	1671	1601	1080	1823	12	405	355.6	325	22	G1/4	G1	6xM16
PMRF-4	80	80	275	275	775	375	173	1671	1601	1080	1823	12	405	366.6	325	22	G1/4	G1	6xM16
PMRF-5	80	80	350	350	900	400	160	1726	1644	1080	1886	12	456	406.4	377	22	G1/4	G1	8xM16
PMRF-5	100	100	350	350	900	400	160	1726	1644	1080	1886	12	456	406.4	377	22	G1/4	G1	8xM16
PMRF-6	100	100	425	425	1200	500	184	1879	1796	1080	2039	12	558	508	468	22	G1/4	G1	10xM16
PMRF-6	150	150	425	425	1200	500	184	1879	1796	1080	2039	12	558	508	468	22	G1/4	G1	10xM16
PMRF-7	150	150	450	450	1300	565	209	1991	1901	1080	2161	12	660	610	583	22	G1/2	G1	12xM16
PMRF-7	200	200	450	450	1300	565	209	1991	1901	1080	2161	12	660	610	583	22	G1/2	G1	12xM16

NOTE

The information in this brochure relates to the operating conditions and applications described.
For applications and/or operating conditions not described, please contact the relevant technical department.
Subject to technical modifications.

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