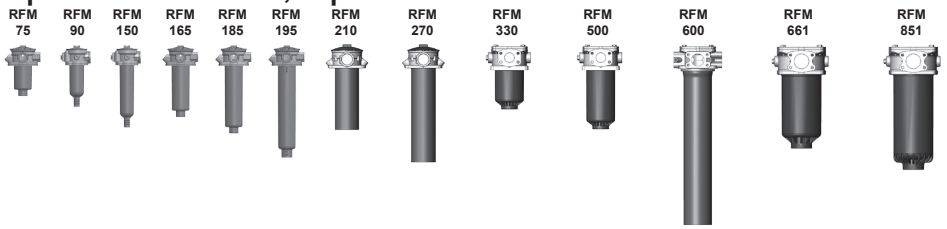
Return Line Filter RFM with 4-Hole Mounting

Tank-top mounted versions: up to 850 l/min, up to 10 bar



1. TECHNICAL SPECIFICATIONS

1.1 FILTER HOUSING

Construction

The filter housings are designed in accordance with international regulations. They consist of a filter head (with 4-hole flange), filter bowl and a screw-on cover plate.

Standard equipment:

- with bypass valve
- connection for a clogging indicator (Important: please state mounting position for indicator!)

1.2 FILTER ELEMENTS

HYDAC filter elements are validated and their quality is constantly monitored according to the following standards:

- ISO 2941, ISO 2942, ISO 2943, ISO 3724, ISO 3968, ISO 11170, ISO 16889

Filter elements are available with the following pressure stability values:

Optimicron® (ON):	20 bar
Ecomicron® (ECON2):	10 bar
Wire mesh (W/HC):	20 bar
Paper (P/HC):	10 bar
Betamicron® / Aquamicron® (BN4AM):	10 bar
Aquamicron® (AM):	10 bar
Mobilemicron® (MM):	10 bar

1.3 FILTER SPECIFICATIONS

Nominal pressure	10 bar	
Temperature range	-30 °C to +100 °C (short-term: -40 °C)	
Material of filter head	Aluminium:	all RFM
Material of filter bowl	Polyamide:	all RFM except 210, 270, 600
	Steel:	RFM 210, 270, 600
Material of cover	Polyamide:	RFM 75 to 270
	Aluminium:	RFM 330 to 851
Type of clogging indicator	VR	threaded connection G 1/2
	VMF	threaded connection G 1/8
	(return line indication)	
Pressure setting of the clogging indicator	2 bar (others on request)	
Bypass cracking pressure	3 bar (others on request)	

1.4 SEALS

NBR (=Perbunan)

1.5 INSTALLATION

Tank-top filter

1.6 SPECIAL MODELS AND ACCESSORIES

- Connections for filling the hydraulic system via return line element (RFM 330 and above)
- Extension tube (except RFM 90, 150) on request
- Tank breather filter built into head on RFM 75 to 270
- Dipstick for RFM 75, 165, 185, 195 (RFM 90 and 150 on request)
- 2-hole flange (see brochure "Return Line Filter RFM with 2-hole mounting")
- Multiport head on RFM 75, 165, 185, 195
- Single port version for RFM 75, 165, 185 and 195 on request

1.7 SPARE PARTS

See Original Spare Parts List

1.8 CERTIFICATES AND APPROVALS

On request

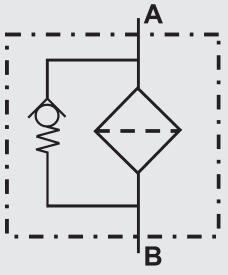
1.9 COMPATIBILITY WITH HYDRAULIC FLUIDS ISO 2943

- Hydraulic oils H to HLPD DIN 51524
- Lubrication oils DIN 51517, API, ACEA, DIN 51515, ISO 6743
- Compressor oils DIN 51506
- Biodegradable operating fluids VDMA 24568 HETG, HEES, HEPG
- Fire-resistant fluids HFA, HFB, HFC and HFD
- Operating fluids with high water content (>50% water content) on request

1.10 IMPORTANT INFORMATION

- Filter housings must be earthed.
- When using electrical clogging indicators, the electrical power supply to the system must be switched off before removing the clogging indicator connector.
- If an extension tube is to be fitted to the two-piece filter housing, the tube must be made of synthetic material or thin-wall aluminium.
- Extensions must be protected by fitting a bulkhead plate or other means of protection so that no forces can be transmitted to the filter housing or the extension.
- The filter can normally only be used for tank-mounting
- The filter must be fitted absolutely vertically, or after consultation with the manufacturer, only within the tolerances specified
- The filter must not be used as a suction filter
- Components (e.g. coolers) must not be installed after the filter

Symbol for hydraulic systems



E 7.106.1.2/11.16

2. MODEL CODE (also order example)

RFM ON 500 B F F 10 D 1 . X /-4L-L24

2.1. COMPLETE FILTER: TANK-TOP VERSION

Filter type
RFM

Filter material

ON	Optimicron®	ECO/N	Ecomicron® (ECON2) – not RFM 210, 270
P/HC	Paper	BN/AM	Betamicron®/Aquamicron® – only RFM 330 to 851
W/HC	Stainl. st. wire mesh	AM	Aquamicron® – only RFM 330 to 851
MM	Mobilemicron	*	RFM 600 only available with material ON!

Size of filter or element
RFM: 75, 90, 150, 165, 185, 195, 210, 270, 330, 500, 600, 661, 851

Operating pressure
B = 10 bar
V = 7 bar (for RFM with clogging indicator up to max. 7 bar operating pressure)

Additional inlet

Type	Port	Filter size 75	165	185	195	330	500	600	661	851
D	G 1	●	●	●	●					
F	G 1 ½					●	●			
K	SAE DN 40					●	●			
M	SAE DN 65								●	●
Z	To customer specification							●		

not possible on RFM 90 and 150

Type and size of port (1 inlet)

Type	Port thread	Filter size 75	90	150	165	185	195	210	270	330	500	600	661	851
B	G ½	X	X	X	X	X	X							
C	G ¾	X	●	●	X	X	X							
D	G 1	●			●	●	●	●	●					
E	G 1¼							●	●			●		
F	G 1½							●	●	●	●	●		
K	SAE DN 40									●	●	●		
L	SAE DN 50											●		
M	SAE DN 65												●	●

X on request

Filtration rating in µm
ON: 1, 3, 5, 10, 15, 20 — ECO/N: 3, 5, 10, 20 — W/HC: 25, 50, 100, 200
P/HC: 10, 20 — BN/AM: 3, 10 (only RFM 330 to 851) — AM: 40 (only RFM 330 to 851)
MM: 10, 15

Type of clogging indicator
Y plastic blanking plug in indicator port
A steel blanking plug in indicator port
B/BM visual
C electrical
D visual and electrical
for other clogging indicators see brochure no. 7.050../..

Type code
0 without port, no clogging indicator
1–4 see point 2.5 – note position of clogging indicator!

Modification number
X the latest version is always supplied

Supplementary details
4L 4-hole flange for mounting (must be specified for RFM 75 to 185)
A..-B.. appropriate response pressure of clogging indicator and bypass cracking pressure in bar (e.g.: A5-B6)
BA filling port G ½ (RFM 330 to 851)
G with threaded connection in outlet (only RFM 330, 500, 661, 851)
KB without bypass valve
L... lamp with appropriate voltage (24, 48, 110, 220 volts)
only for clogging indicators type "D"
LED 2 light-emitting diodes up to 24 volts
PSxx dipstick for RFM 75, 165, 185, 195 on request
PZxx dipstick for RFM 90, 150 on request
T with air filter (only RFM 75 to 270)
V FKM seals
Vxxx with extension tube (where xxx is the final dimension of the extension – no extension possible for RFM 90, 150!)
W suitable for HFA and HFC emulsions
xxxxx only RFM 600 (see point 2.4)

2.2 REPLACEMENT ELEMENT

0500 R 010 ON /-V

Size
0075, 0090, 0150, 0165, 0185, 0195, 0210, 0270, 0330, 0500, 0600, 0660, 0850

Type
R

Filtration rating in µm
ON: 001, 003, 005, 010, 015, 020 — ECON2: 003, 005, 010, 020 — W/HC: 025, 050, 100, 200
P/HC: 010, 020 — BN4AM: 003, 010 — AM: 040
MM: 010, 015

Filter material
ON, ECON2, P/HC, W/HC, BN4AM, AM, MM

Supplementary details
V (for descriptions, see point 2.1)

2.3 REPLACEMENT CLOGGING INDICATOR

VR 2 D . X /-L24

Type

VR connection thread G 1/2
VMF connection thread G 1/8
] return line indicator

Pressure setting

2 standard 2 bar, others on request

Type of clogging indicator

see Point 2.1

Modification number

X the latest version is always supplied

Supplementary details

V only for VMF types B, BM, LE, LZ and C /-EX2G (all other clogging indicators have FKM seals as standard)

L..., LED (for descriptions, see point 2.1)

2.4 PORT CONFIGURATION RFM 600

Since there are numerous options for machining the ports on the head of the RKM 600, the code B**Z**x is selected here as standard.
In order to determine the position and size of the ports, a 5-letter code is added as supplementary detail. This is determined using the table below.
Unused ports are indicated by a "0".

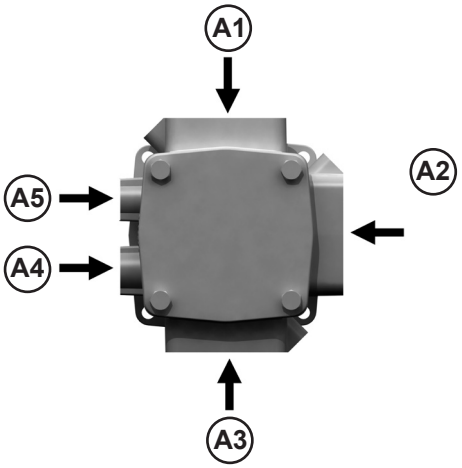
for RFM 600...B**ZK**

Port	A1	A2	A3	A4	A5
G ¾					C
G 1				D	
G 1¼	E	E	E		
SAE DN 40	K	K	K		
plugged	0	0	0	0	0

for RFM 600...B**ZL**

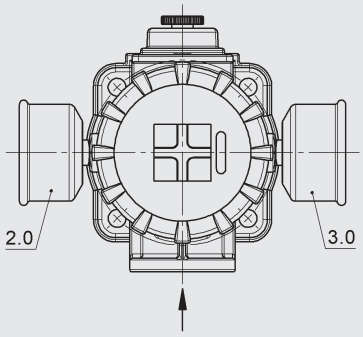
Port	A1	A2	A3	A4	A5
G ¾					(C)
G 1				D	
G 1½	F	(F)	F		
SAE DN 50	L	L	(L)		
plugged	(0)	0	0	(0)	0

Example:
RFM BN/HC 600 BZL 10 A 1.0 /-0FL0C



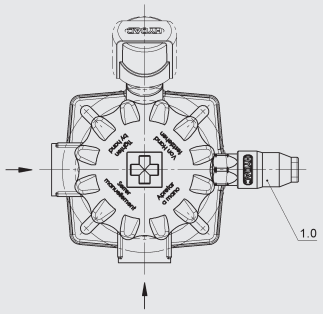
2.5 TYPE CODE: INSTALLATION POSITION OF THE CLOGGING INDICATOR

RFM 90, 150 .../-4L



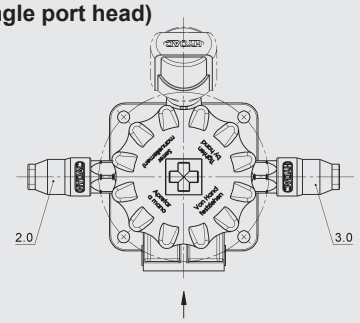
Type code	Mounting position of the clogging indicator	Type of indicator
2.X	Clogging indicator on left, 90° to the inlet	VMF...
3.X	Clogging indicator on right, 90° to the inlet	VMF...

RFM 75, 165, 185, 195 .../-4L (Multiport head)



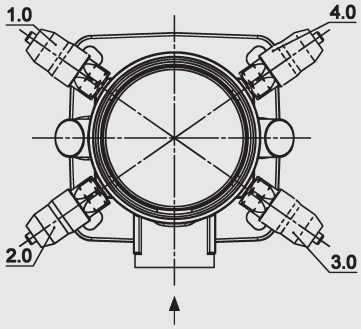
Type code	Mounting position of the clogging indicator	Type of indicator
1.X	see drawing	VMF...

On request:
RFM 75, 165, 185, 195 .../-4L
(Single port head)



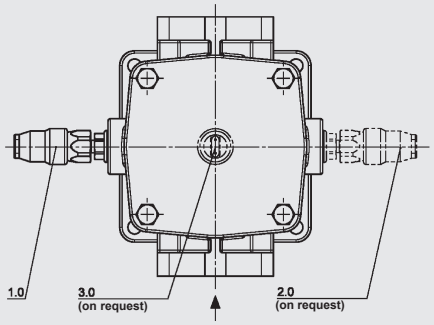
Type code	Mounting position of the clogging indicator	Type of indicator
2.X	Clogging indicator on left, 90° to the inlet	VMF...
3.X	Clogging indicator on right, 90° to the inlet	VMF...

RFM 210, 270



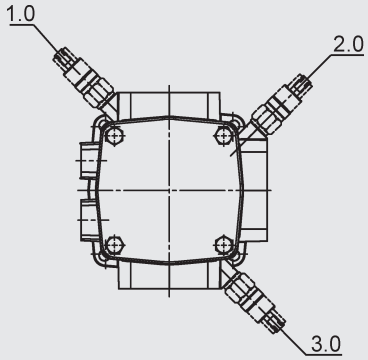
Type code	Mounting position of the clogging indicator	Type of indicator
1.X	Clogging indicator on left back, 135° to the inlet	VMF...
2.X	Clogging indicator on left front, 45° to the inlet	VMF...
3.X	Clogging indicator on right front, 45° to the inlet	VMF...
4.X	Clogging indicator on right back, 135° to the inlet	VMF...

RFM 330, 500



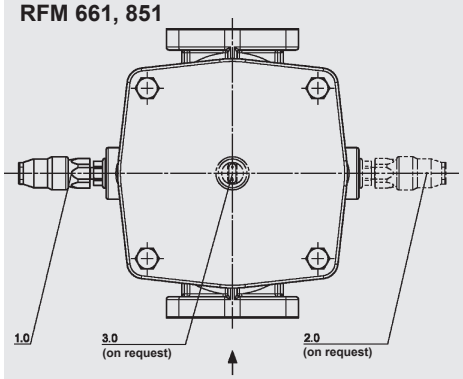
Type code	Mounting position of the clogging indicator	Type of indicator
1.X	Clogging indicator on left, 90° to the inlet	VR...

RFM 600



Type code	Mounting position of the clogging indicator	Type of indicator
1.X	see drawing	VMF...
2.X	see drawing	VMF...
3.X	see drawing	VMF...

RFM 661, 851



Type code	Mounting position of the clogging indicator	Type of indicator
1.X	Clogging indicator on left, 90° to the inlet	VR...

NOTE
Other type codes on request.

2.6 RETURN LINE FILTERS
RFM ALL-PLASTIC

The RFM All-Plastic filter provides a cost-effective alternative to the standard RFM product range.

This filter is an all-plastic version with a simple hose connection as the return line port.

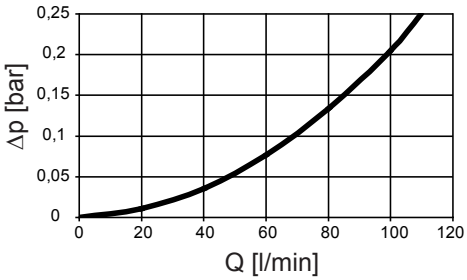
The well-known HYDAC element technology is of course available for these filter types

Nominal pressure: 7 bar
Flow rate up to 100 l/min
Temperature range: -30 °C to +100 °C

Δp-Q HOUSING CURVES
BASED ON ISO 3968

The housing curves apply to mineral oil with a density of 0.86 kg/dm³ and a kinematic viscosity of 30 mm²/s.

In this case, the differential pressure changes proportionally to the density.



Model Code

RFMP ON 165 Y HB 10 A 1 .X /-4L-B6

Type
RFMP

Filter material
ON Optimicron®
ECO/N Ecomicron®
MM Mobilemicron

Size
165

Operating pressure
Y 7 bar

Type of connection
HB Hose connection (hose barb)

Filtration rating
ON 1, 3, 5, 10, 15, 20 ECO/N 3, 5, 10, 20
MM 8, 10, 15

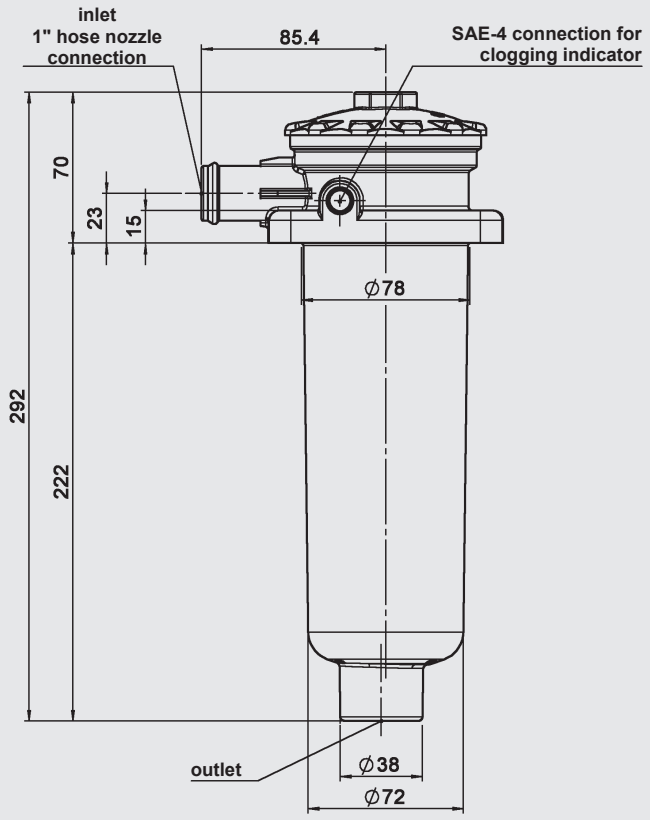
Type of clogging indicator (VA)
A steel blanking plug in indicator port

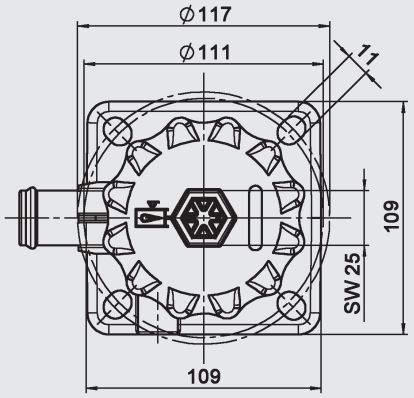
Type code
1

Modification number
X the latest version is always supplied

Supplementary details
4L 4-hole flange for mounting = **must be specified!**
B6 Bypass 6 bar

DIMENSIONS





3. FILTER CALCULATION / SIZING

The total pressure drop of a filter at a certain flow rate Q is the sum of the housing Δp and the element Δp and is calculated as follows:

$\Delta p_{total} = \Delta p_{housing} + \Delta p_{element}$

$\Delta p_{housing} =$ (see Point 3.1)

$$\Delta p_{element} = Q \cdot \frac{SK^*}{1000} \cdot \frac{viscosity}{30}$$

(*see point 3.2)

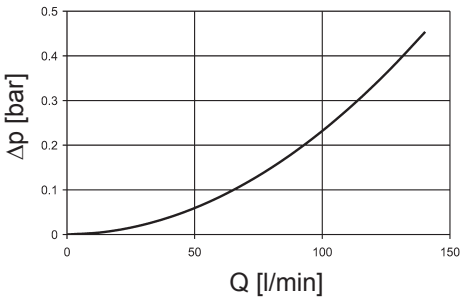
For ease of calculation, our Filter Sizing Program is available on request free of charge.

NEW: Sizing online at www.hydac.com

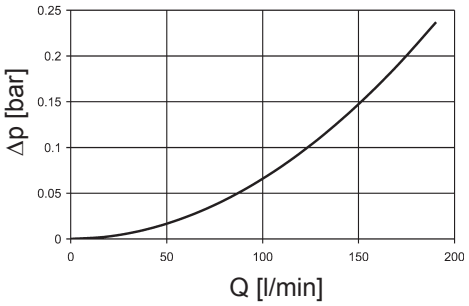
3.1 Δp-Q HOUSING CURVES BASED ON ISO 3968

The housing curves apply to mineral oil with a density of 0.86 kg/dm³ and a kinematic viscosity of 30 mm²/s.
In this case, the differential pressure changes proportionally to the density.

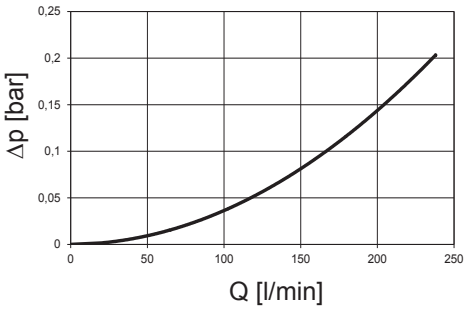
RFM 90, 150



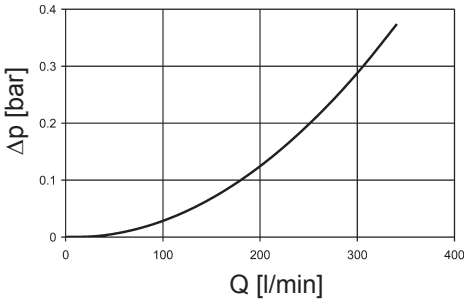
RFM 75, 165, 185



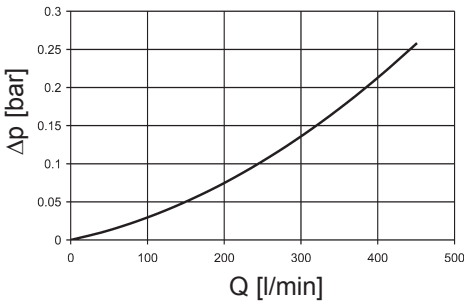
RFM 195



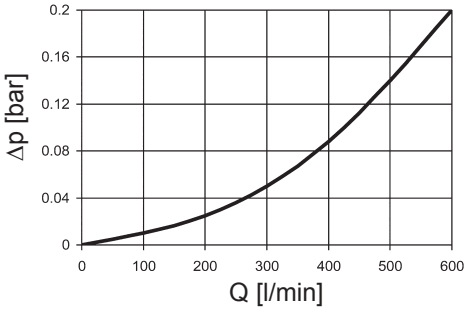
RFM 210, 270



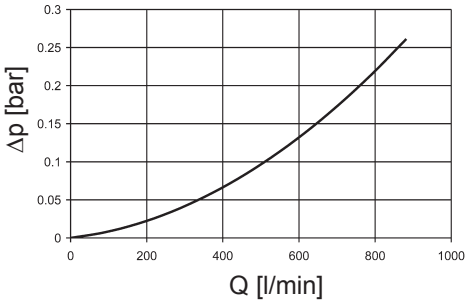
RFM 330, 500



RFM 600



RFM 661, 851



3.2 GRADIENT COEFFICIENTS (SK) FOR FILTER ELEMENTS

The gradient coefficients in mbar/(l/min) apply to mineral oils with a kinematic viscosity of 30 mm²/s. The pressure drop changes proportionally to the change in viscosity.

RFM	ON					
	1 µm	3 µm	5 µm	10 µm	15 µm	20 µm
75	25.6	19.4	13.4	7.31	4.80	4.40
90	22.5	13.1	9.49	6.07	4.30	3.21
150	13.4	7.80	5.65	3.61	2.55	1.91
165	14.1	9.44	7.37	4.02	2.25	2.42
185	10.4	7.44	5.74	2.93	1.65	1.41
195	7.66	5.48	4.22	2.16	1.22	1.04
210	5.66	3.28	2.55	1.53	1.00	0.88
270	3.66	2.12	1.65	0.99	0.65	0.57
330	8.09	3.72	2.73	1.48	1.28	1.02
500	5.27	2.60	1.90	1.09	0.84	0.69
600	2.35	1.23	1.10	0.61	0.42	0.34
660	3.57	1.69	1.21	0.67	0.57	0.45
850	2.77	1.31	1.00	0.58	0.44	0.36

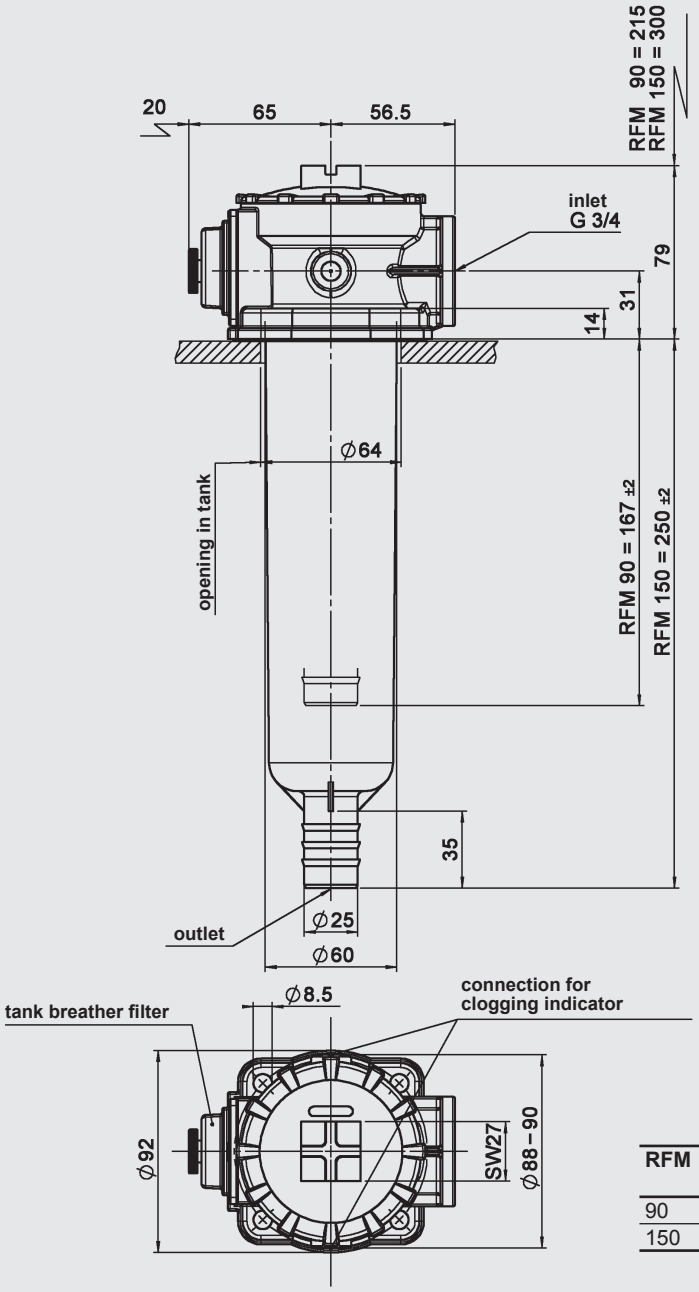
RFM	ECON2				W/HC
	3 µm	5 µm	10 µm	20 µm	–
75	22.0	14.2	8.1	4.4	0.362
90	14.9	10.1	6.7	3.2	0.312
150	8.9	6.0	4.0	1.9	0.185
165	11.2	7.8	4.5	2.4	0.199
185	8.9	6.1	3.3	1.8	0.907
195	6.6	4.5	2.4	1.3	0.668
210	–	–	–	–	0.068
270	–	–	–	–	0.044
330	4.2	2.7	1.7	1.2	0.195
500	3.0	1.9	1.3	0.8	0.128
600	–	–	–	–	–
660	1.9	1.2	0.8	0.5	0.067
850	1.5	1.0	0.7	0.4	0.052

4. DIMENSIONS

Tank requirements

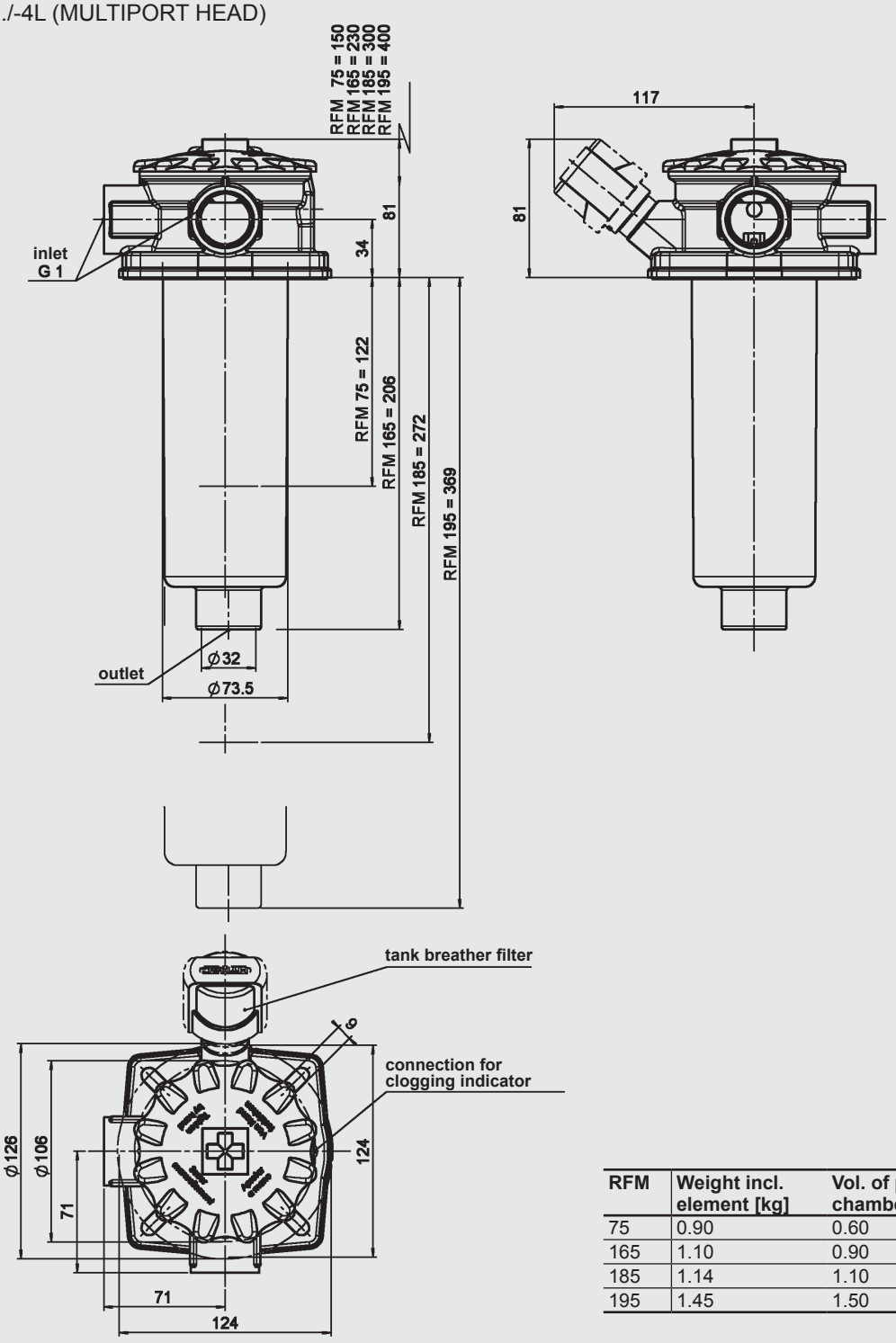
1. In the filter contact area, the tank flange should have a maximum flatness of 0.3 mm and Ra 3.2 µm maximum roughness.
2. In addition, the contact area should be free of damage and scratches.
3. The fixing holes of the tank flange must be blind, or stud bolts with threadlocker must be used to fix the filter. As an alternative, the tank flange can be continuously welded from the inside.
4. Both the tank sheet metal and/or the filter mounting flange must be sufficiently robust so that neither deform when the seal is compressed during tightening.
5. When using a dipstick through a mounting screw, threadlock the screw into the thread, using Loctite 243, for example, or a similar threadlocker.

RFM 90, 150 .../-4L



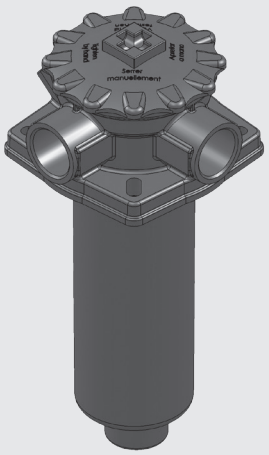
RFM	Weight incl. element [kg]	Vol. of pressure chamber [l]
90	0.54	0.60
150	0.75	0.80

RFM 75, 165, 185, 195 .../-4L (MULTIPORT HEAD)

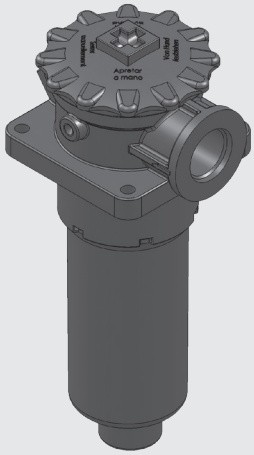


RFM	Weight incl. element [kg]	Vol. of pressure chamber [l]
75	0.90	0.60
165	1.10	0.90
185	1.14	1.10
195	1.45	1.50

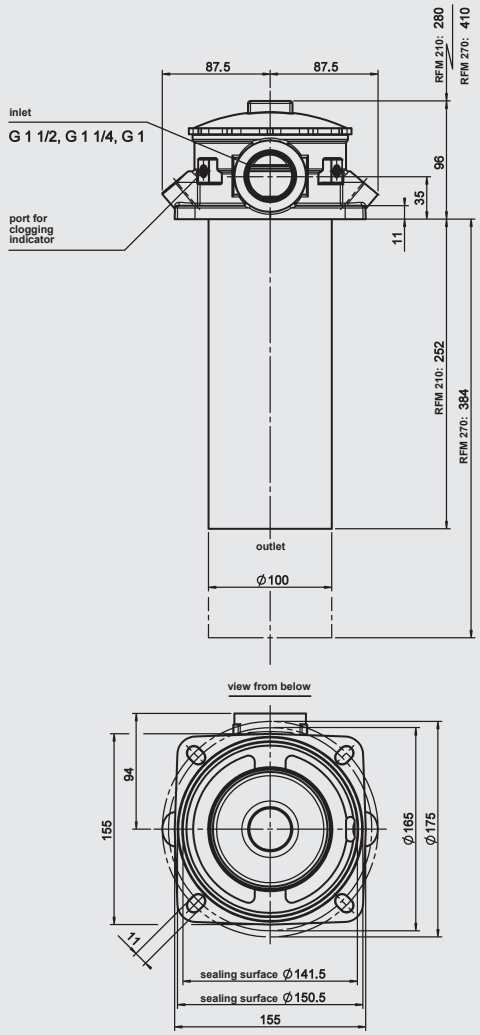
MULTIPORT HEAD



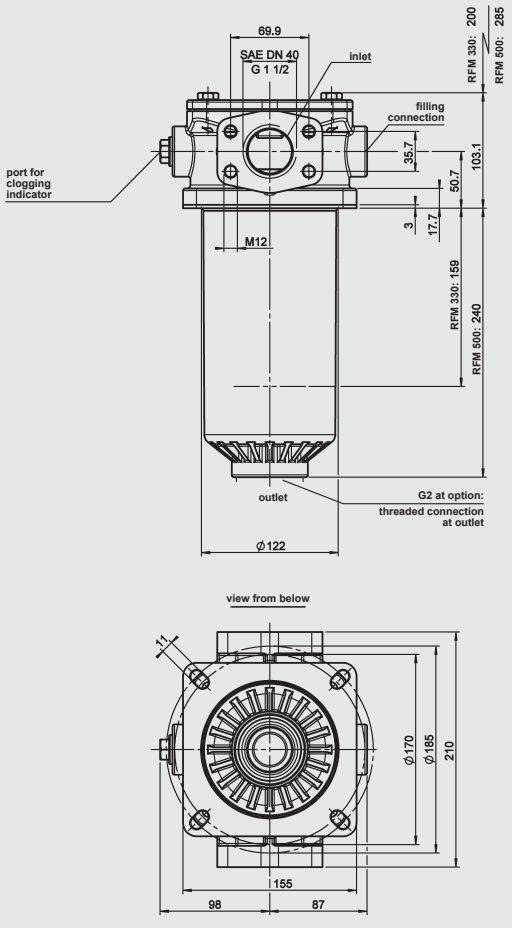
ON REQUEST:
SINGLE PORT HEAD



RFM 210, 270

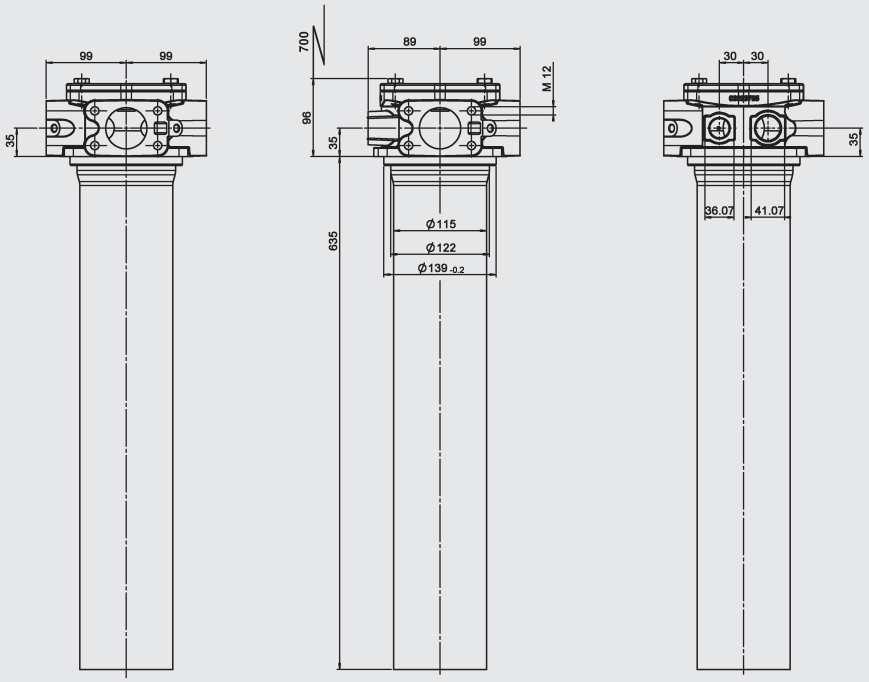


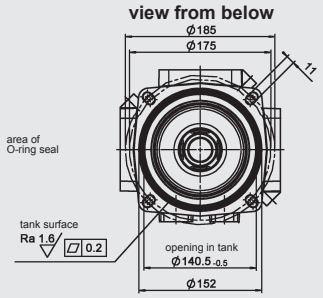
RFM 330, 500



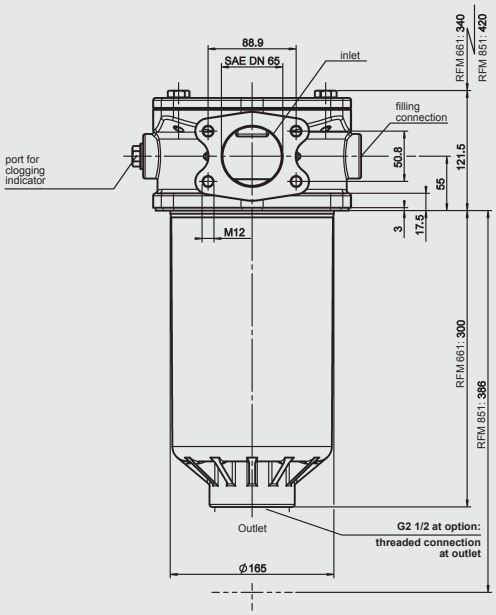
RFM	Weight incl. element [kg]	Vol. of pressure chamber [l]
210	3.10	2.20
270	4.30	3.60
330	3.90	2.00
500	4.50	3.00

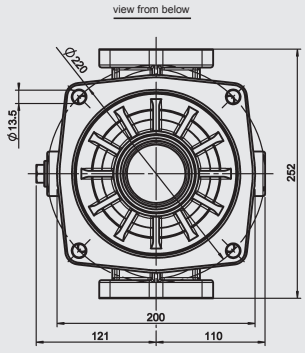
RFM 600





RFM 661, 851





RFM	Weight incl. element [kg]	Vol. of pressure chamber [l]
600	7.30	7.70
661	9.00	7.20
851	10.50	8.50

NOTES

NOTE

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

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