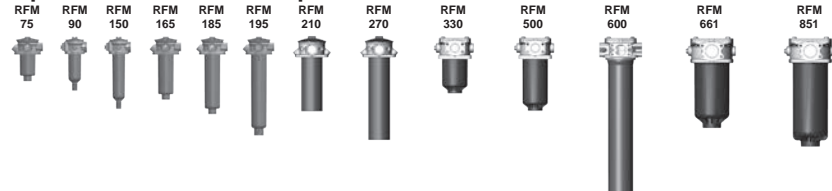


# HYDAC INTERNATIONAL



## 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:

Optimicon® (ON):	20 bar
Ecomicon® (ECON2):	10 bar
Wire mesh (W/HC):	20 bar
Paper (P/HC):	10 bar
Betamicon® / Aquamicon® (BN4AM):	10 bar
Aquamicon® (AM):	10 bar
Mobilemicon® (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

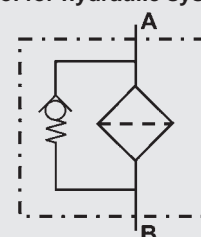
##### HYDRAULIC FLUIDS ISO 2943

- 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



## 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										not possible on RFM 90 and 150	
		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									•			

#### Type and size of port (1 inlet)

Type	Port thread	Filter size												X on request		
		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 1 ¼							•	•				•			
F	G 1 ½							•	•	•	•	•	•			
K	SAE DN 40									•	•	•	•			
L	SAE DN 50											•	•			
M	SAE DN 65												•	•		

#### 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)

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)

 only for clogging indicators  
 type "D"

### 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

#### 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)

VR 2 D . X /-L24

### 2.4 PORT CONFIGURATION RFM 600

Since there are numerous options for machining the ports on the head of the RKM 600, the code BZx 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...BZK

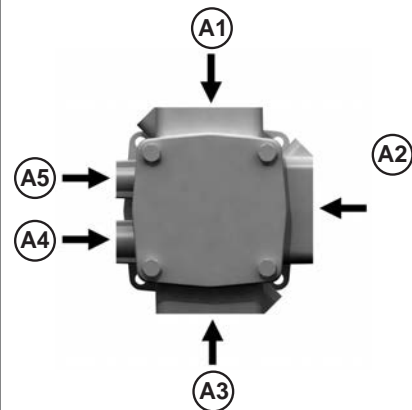
Port	A1	A2	A3	A4	A5
G 3/4					C
G 1				D	
G 1 1/4	E	E	E		
SAE DN 40	K	K	K		
plugged	0	0	0	0	0

for RFM 600...BZL

Port	A1	A2	A3	A4	A5
G 3/4					C
G 1				D	
G 1 1/2	F	F	F		
SAE DN 50	L	L	L		
plugged	0	0	0	0	0

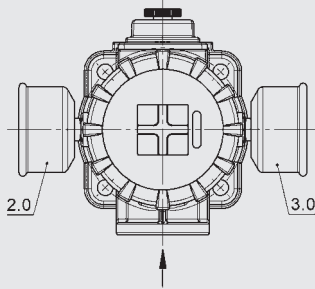
Example:

RFM BN/HC 600 BZL 10 A 1.0 /-0FLOC

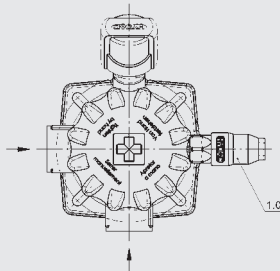


### 2.5 TYPE CODE: INSTALLATION POSITION OF THE CLOGGING INDICATOR

RFM 90, 150 .../-4L



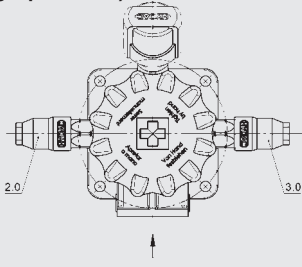
RFM 75, 165, 185, 195 .../-4L  
 (Multiport head)



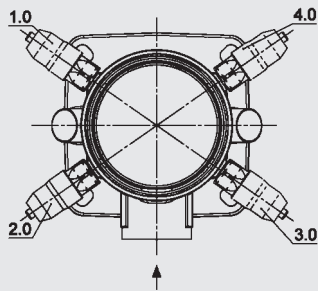
Type code	Mounting position of the clogging indicator	Type of indicator
2.X	Clogging indicator on left, 90° to the inlet	VMF...
3.X	Clogging indicator on right, VMF... 90° to the inlet	

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

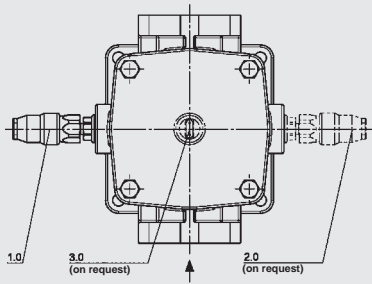
On request:  
**RFM 75, 165, 185, 195 .../4L**  
 (Single port head)



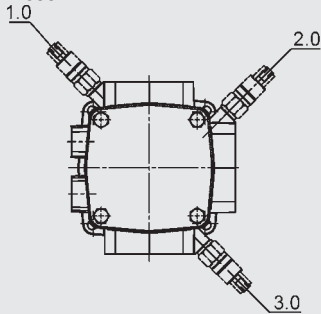
**RFM 210, 270**



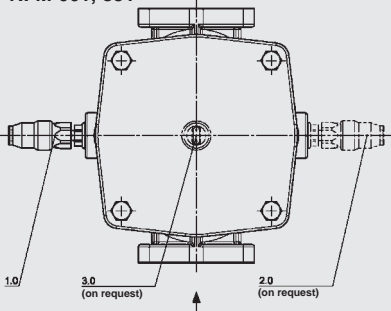
**RFM 330, 500**



**RFM 600**



**RFM 661, 851**



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, VMF... 90° to the inlet	

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

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

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...

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.

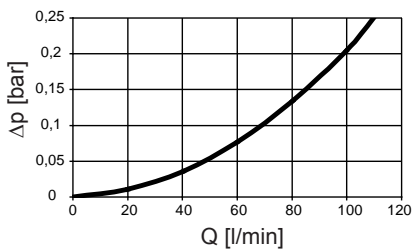
The well-known HYDAC element technology is of course available for these filter types

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/dm<sup>3</sup> and a kinematic viscosity of 30 mm<sup>2</sup>/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

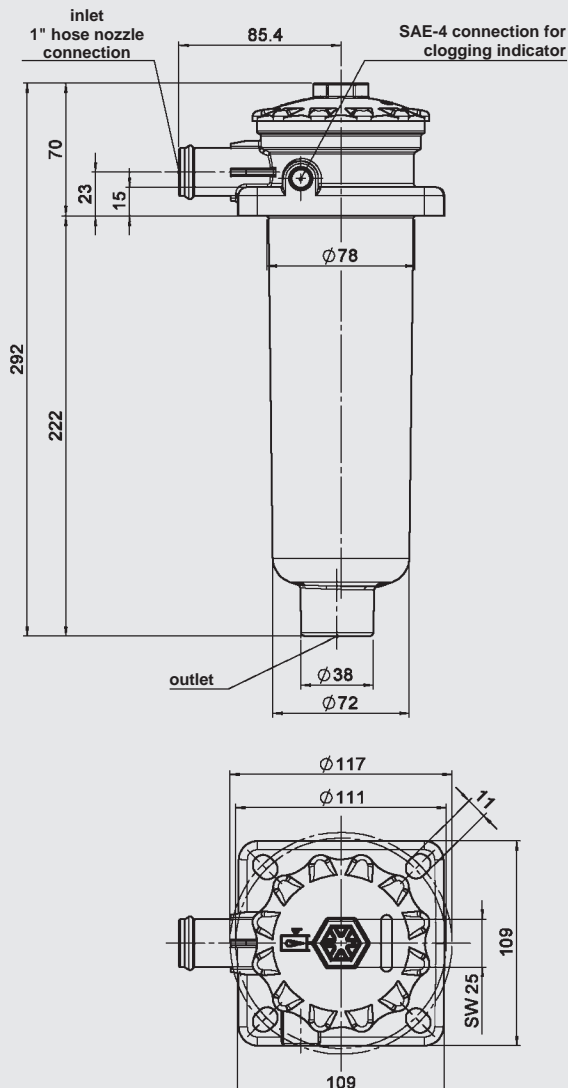
#### Modification number

X the latest version is always supplied

#### Supplementary details

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

### DIMENSIONS



E 7.106.1.2/11.16

### 3. FILTER CALCULATION / SIZING

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

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

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

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

(\*see point 3.2)

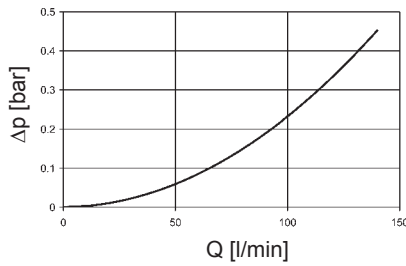
For ease of calculation, our Filter Sizing Program is available on request free of charge.

**NEW:** Sizing online at [www.hydac.com](http://www.hydac.com)

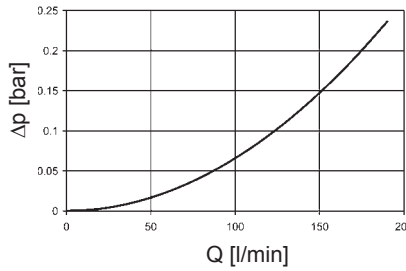
#### 3.1 $\Delta p$ -Q HOUSING CURVES BASED ON ISO 3968

The housing curves apply to mineral oil with a density of 0.86 kg/dm<sup>3</sup> and a kinematic viscosity of 30 mm<sup>2</sup>/s. In this case, the differential pressure changes proportionally to the density.

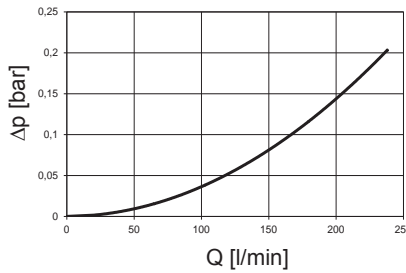
**RFM 90, 150**



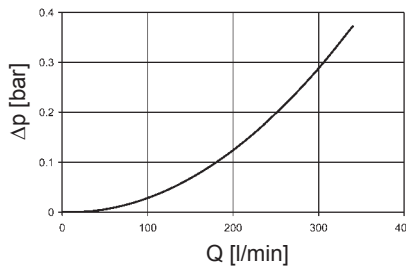
**RFM 75, 165, 185**



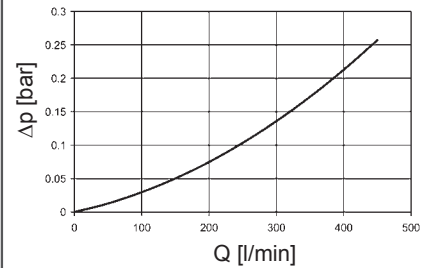
**RFM 195**



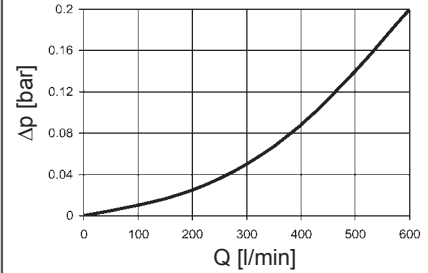
**RFM 210, 270**



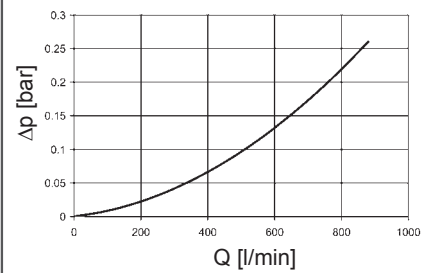
**RFM 330, 500**



**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 mm<sup>2</sup>/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

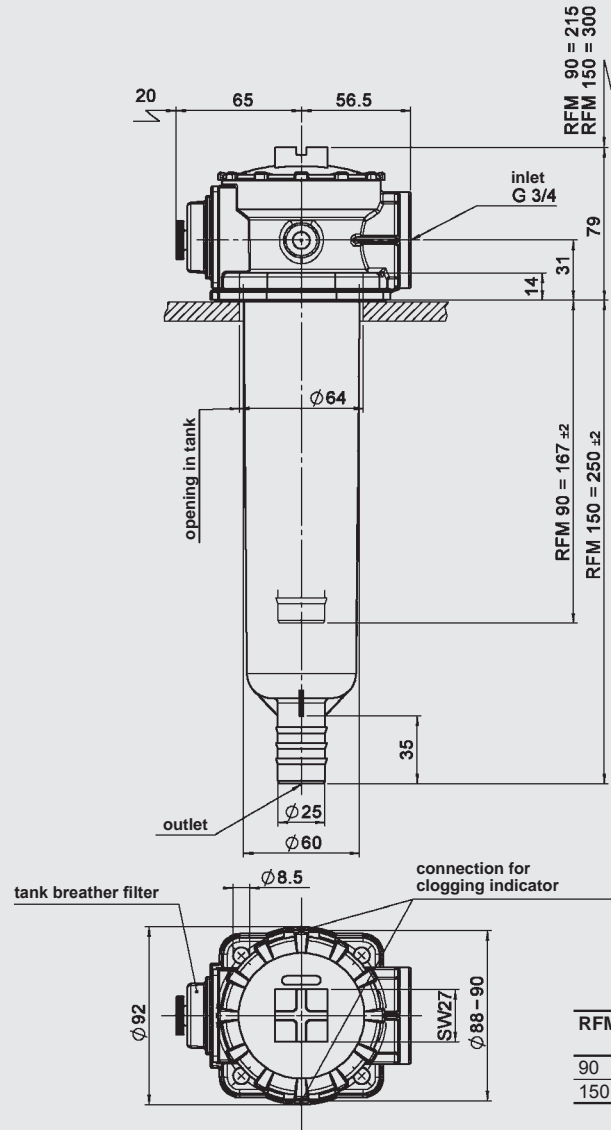
RFM	ECON2				W/HC
	3 µm	5 µm	10 µm	20 µm	
75	22.0	14.2	8.1	4.4	0.362
90	14.9	10.1	6.7	3.2	0.312
150	8.9	6.0	4.0	1.9	0.185
165	11.2	7.8	4.5	2.4	0.199
185	8.9	6.1	3.3	1.8	0.907
195	6.6	4.5	2.4	1.3	0.668
210	–	–	–	–	0.068
270	–	–	–	–	0.044
330	4.2	2.7	1.7	1.2	0.195
500	3.0	1.9	1.3	0.8	0.128
600	–	–	–	–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

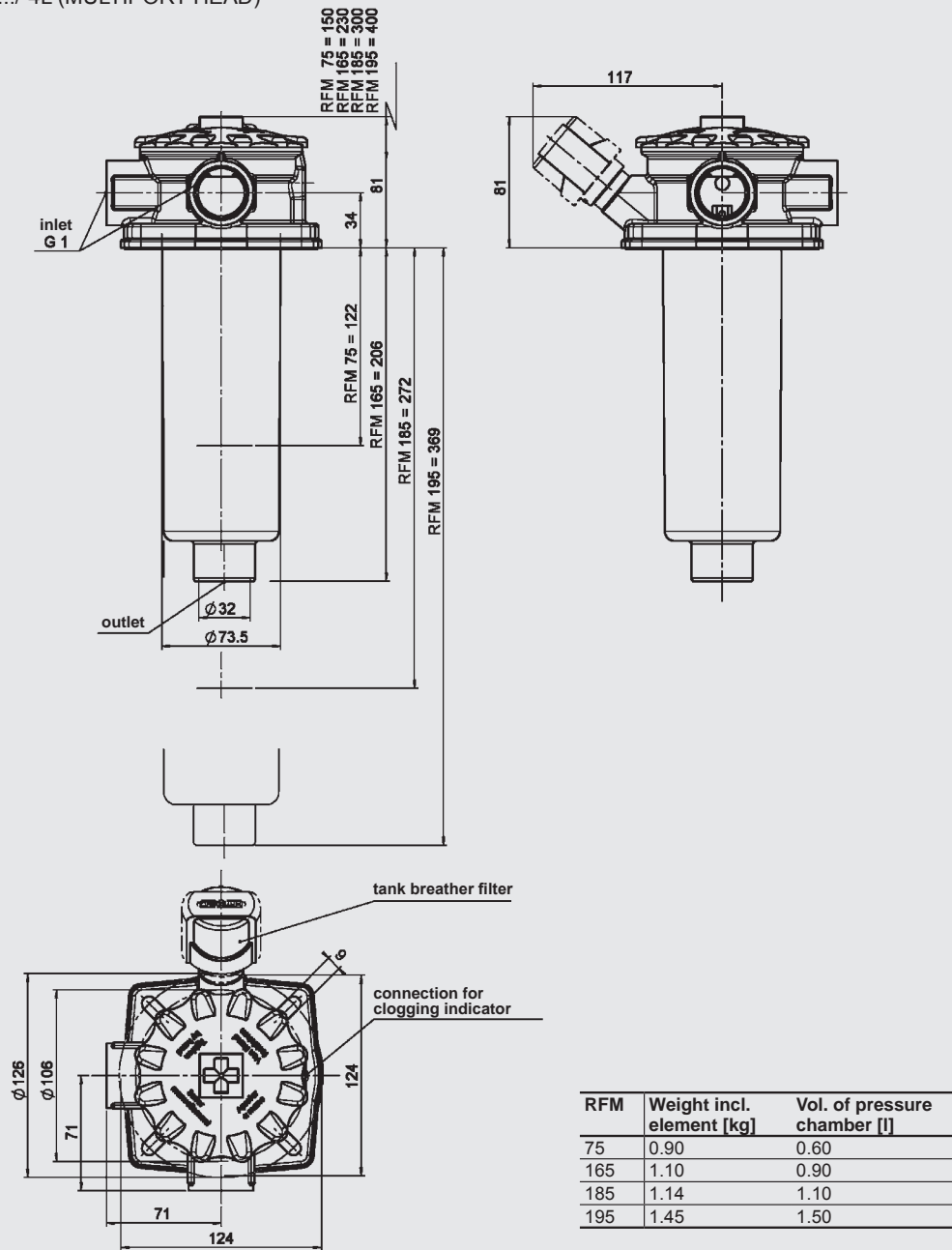
1. In the filter contact area, the tank flange should have a maximum flatness of 0.3 mm and Ra 3.2 µm maximum roughness.
2. In addition, the contact area should be free of damage and scratches.
3. The fixing holes of the tank flange must be blind, or stud bolts with threadlocker must be used to fix the 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



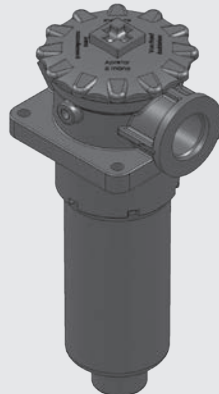
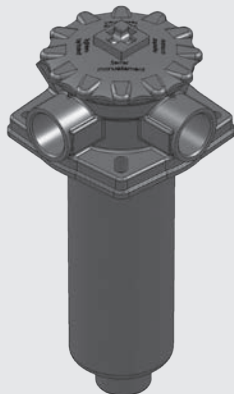


RFM 75, 165, 185, 195 .../-4L (MULTI-PORT HEAD)

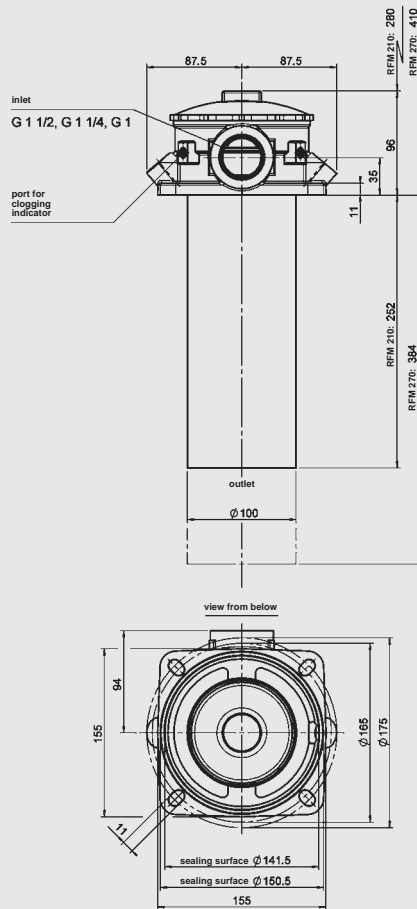


MULTI-PORT HEAD

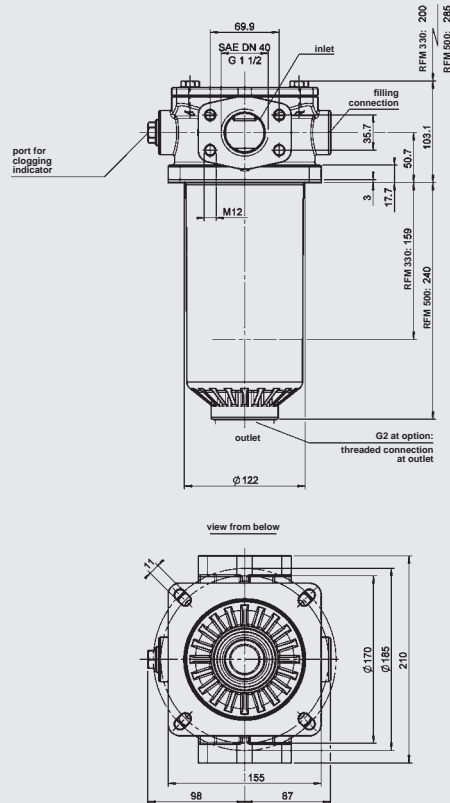
ON REQUEST:  
SINGLE PORT HEAD



RFM 210, 270



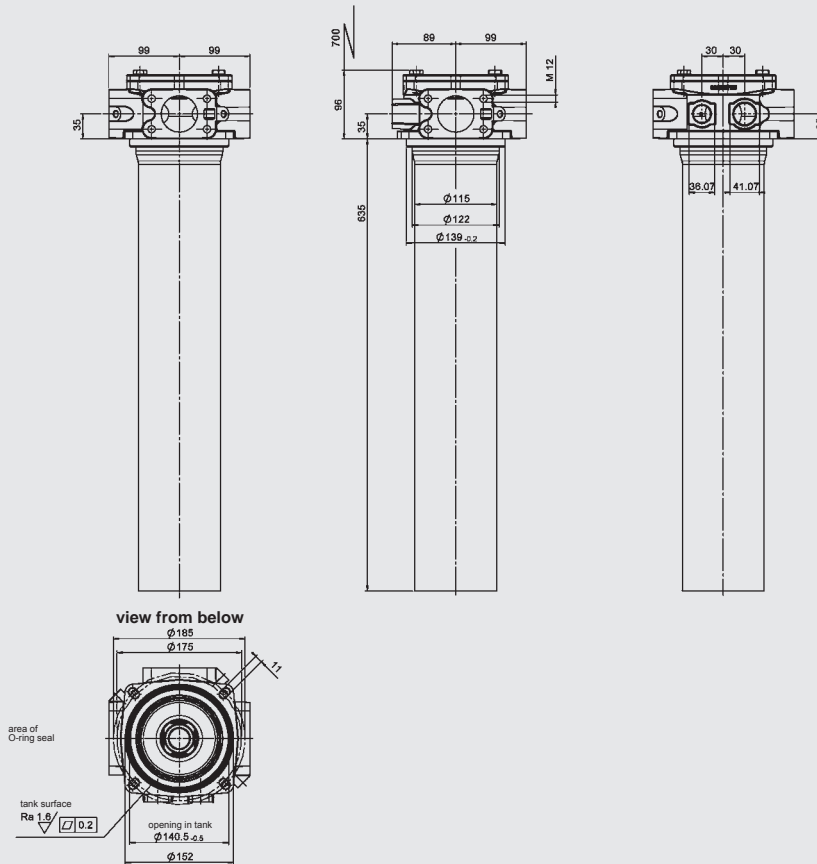
RFM 330, 500



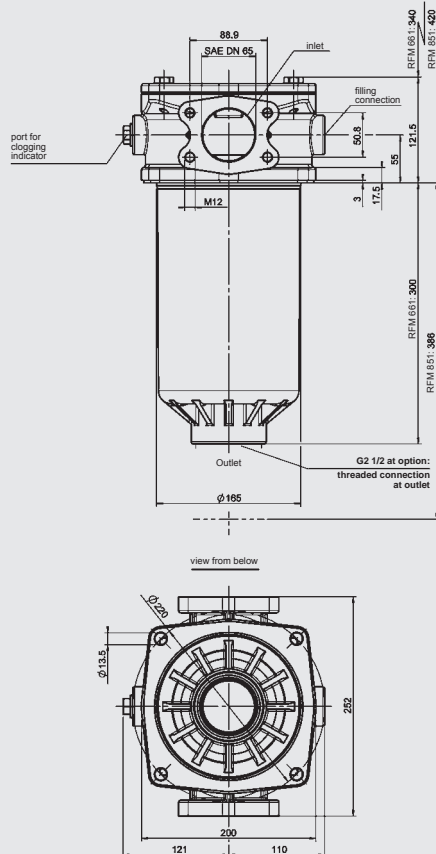
RFM	Weight incl. element [kg]	Vol. of pressure chamber [l]
210	3.10	2.20
270	4.30	3.60
330	3.90	2.00
500	4.50	3.00



## 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

E 7.106.1.2/11.16

