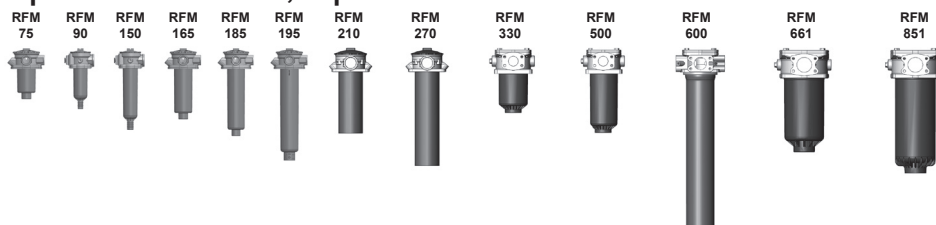




Return Line Filter RFM with 4-Hole Mounting

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

Contamination retention capacities in g

RFM	Betamicon® (BN4HC)			
	3 µm	5 µm	10 µm	20 µm
75	10.3	11.4	13.7	15.5
90	12.2	13.5	16.2	18.3
150	20.4	22.6	27.2	30.8
165	18.7	20.7	24.9	28.1
185	25.6	28.4	34.1	38.6
195	34.4	38.2	45.9	51.9
210	50.7	56.2	67.6	76.5
270	78.4	86.9	104.5	118.2
330	38.4	42.6	51.2	57.9
500	58.9	65.3	78.6	88.9
600	145.5	161.3	194.0	219.4
660	87.1	96.5	116.1	131.3
850	112.1	124.2	149.5	169.1
950	130.0	144.1	173.3	196.1
1300	181.0	200.7	241.4	273.1
2600	369.4	409.4	492.5	557.2

Filter elements are available with the following pressure stability values:

Betamicon® (BN4HC):	20 bar
ECOMicon® (ECON2):	10 bar
Stainl. steel 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 plate	Polyamide: RFM 75 to 270 Aluminium: RFM 330 to 851
Type of clogging indicator	VR Connection thread G 1/2 VMF Connection thread 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

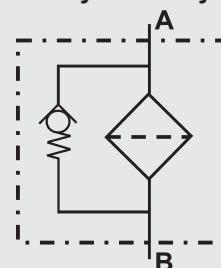
HYDRAULIC FLUIDS ISO 2943

- 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 BN/HC 500 B F F 10 D 1 . X /-L24

2.1. COMPLETE FILTER: TANK-TOP VERSION

Filter type

RFM

Filter material of element

BN/HC Betamicon® (BN4HC) ECO/N ECOmicron® (ECON2) - not RFM 210, 270
 P/HC Paper BN/AM Betamicon®/Aquamicron® - only RFM 330 bis 851
 W/HC Stainl. steel wire mesh AM Aquamicron® - only RFM 330 to 851
 MM Mobilemicron * RFM 600 only available with material BN4HC!

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 1¼							●	●					●		
F	G 1½							●	●		●	●		●		
K	SAE DN 40									●	●	●		●		
L	SAE DN 50													●		
M	SAE DN 65													●	●	

Filtration rating in µm

BN/HC, ECO/N: 3, 5, 10, 20 BN/AM: 3, 10 (only RFM 330 to 851) W/HC: 25, 50, 100, 200
 P/HC: 10, 20 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 - Installation 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. setting pressure of indicator and cracking pressure of bypass in bar (e.g.: A5-B6)
 BA filling connection G ½ (RFM 330 to 851)
 G with threaded port at outlet (RFM 330 and above)
 L... light with appropriate voltage (24, 48, 110, 220 Volt)] only for clogging indicators type "D"
 LED 2 light emitting diodes up to 24 Volt
 PSxx dipstick RFM 75, 165, 185, 195 on request
 PZxx dipstick RFM 90, 150 on request
 T with tank breather filter (only for RFM 75 to 270)
 V FPM seals
 Vxxx with extension tube (where xxx is the final dimension of the extension - no extension for RFM 90, 150!)
 W suitable for HFA and HFC emulsions
 xxxxx RFM 600 only (see point 2.4)

2.2 REPLACEMENT ELEMENT

0500 R 010 BN4HC /-V

Size

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

Type

R

Filtration rating in µm

BN4HC, ECON2: 003, 005, 010, 020 W/HC: 025, 050, 100, 200 AM: 040
 P/HC: 010 BN4AM: 003, 010 MM: 010, 015

Filter material

BN4HC, 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 _____
 L..., LED, V (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 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

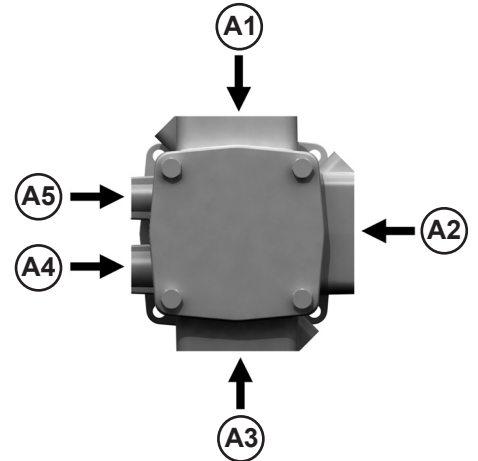
Port	A1	A2	A3	A4	A5
G 3/4					C
G 1				D	
G 1 1/4	E	E	E		
SAE DN 40	K	K	K		
plugged	0	0	0	0	0

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

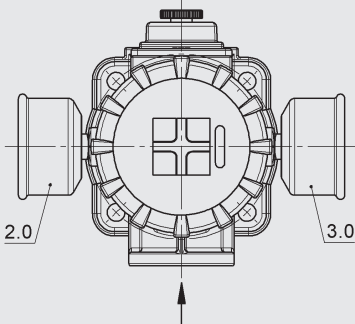
Example:

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

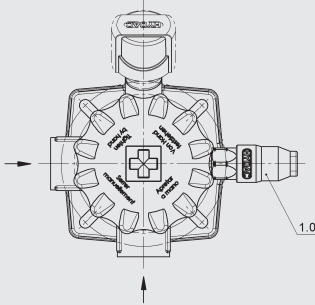


2.5 TYPE CODE: INSTALLATION POSITION OF THE CLOGGING INDICATOR

RFM 90, 150 .../-4L



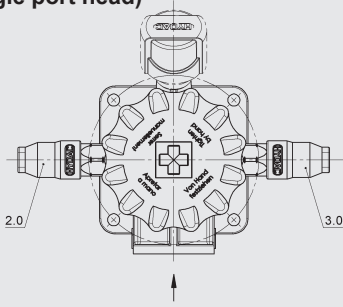
RFM 75, 165, 185, 195 .../-4L
 (Multiport head)



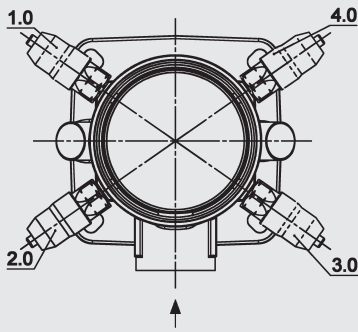
Type code	Mounting position of the clogging indicator	Type of indicator
2.X	Clogging indicator on left, 90° to the inlet	VMF...
3.X	Clogging indicator on right, VMF... 90° to the inlet	

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

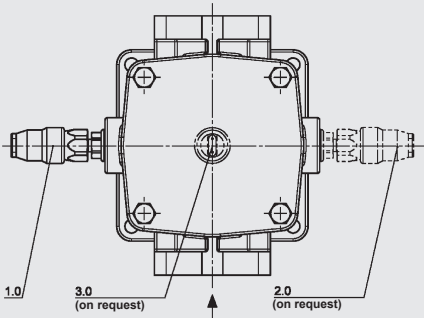
**On request:
RFM 75, 165, 185, 195 .../4L
(Single port head)**



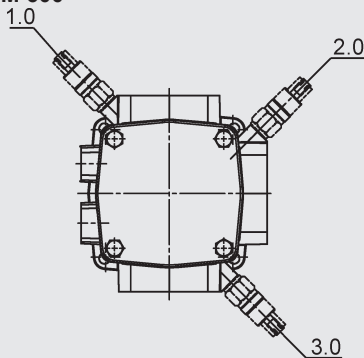
RFM 210, 270



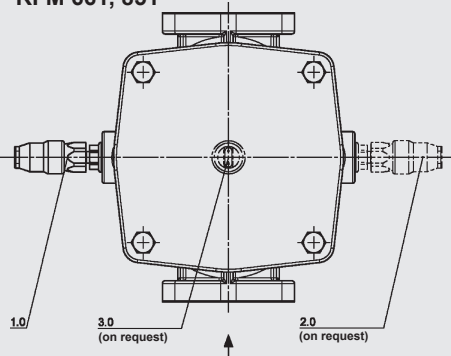
RFM 330, 500



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, 90° to the inlet	VMF...

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...

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.

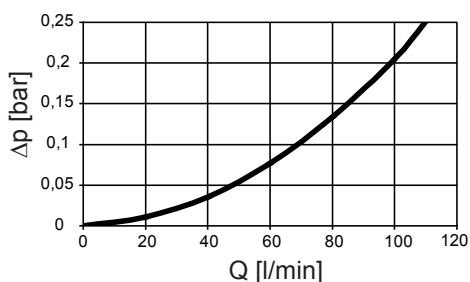
The well-known HYDAC element technology is of course available for these filter types

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/dm³ and a kinematic viscosity of 30mm²/s.

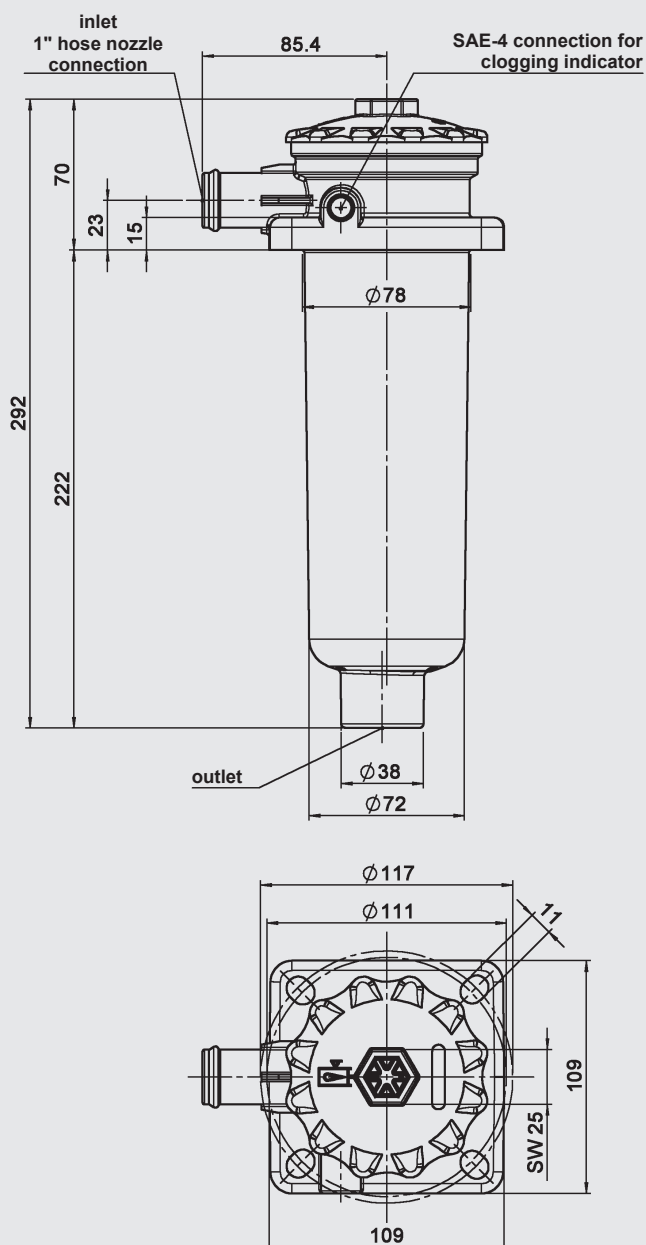
In this case, the differential pressure changes proportionally to the density.



Model Code

	RFMP	BN/HC	165	Y	HB	10	A	1	.X	/-4L-B6
Type	RFMP									
Filter material	BN/HC Betamicon ECO/N ECOmicron MM Mobilemicron									
Size	165									
Operating pressure	Y 7 bar									
Type of connection	HB Hose connection (hose barb)									
Filtration rating	BN/HC, 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:

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

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

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

(*see point 3.2)

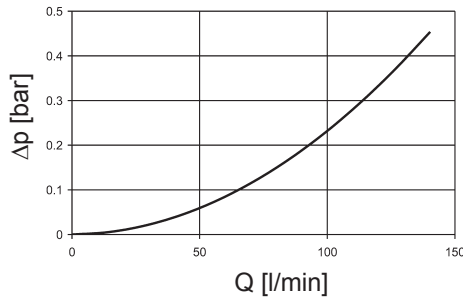
For ease of calculation, our Filter Sizing Program is available on request free of charge.

NEW: Sizing online at www.hydac.com

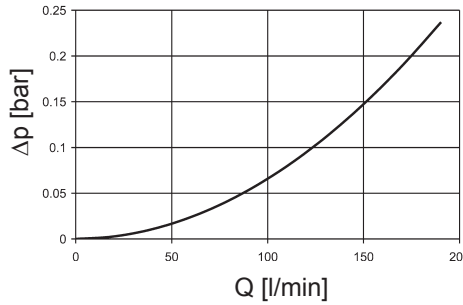
3.1 Δp -Q HOUSING CURVES BASED ON ISO 3968

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.

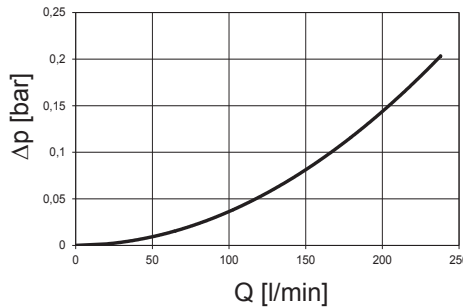
RFM 90, 150



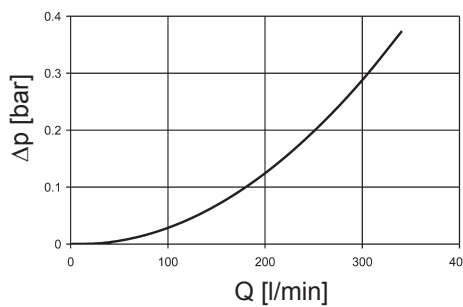
RFM 75, 165, 185



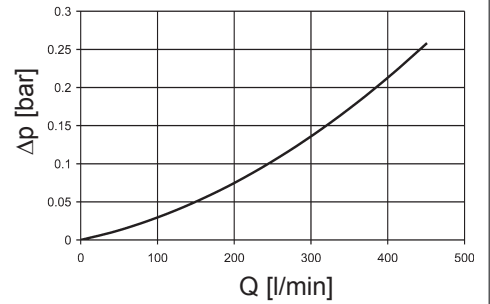
RFM 195



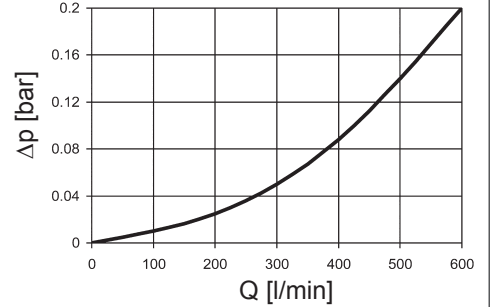
RFM 210, 270



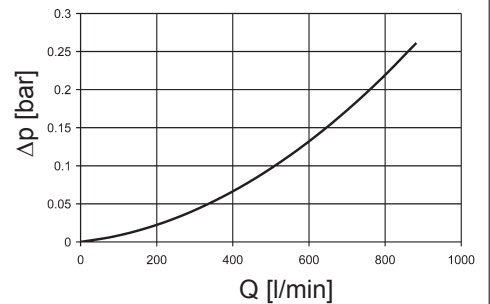
RFM 330, 500



RFM 600



RFM 661, 851

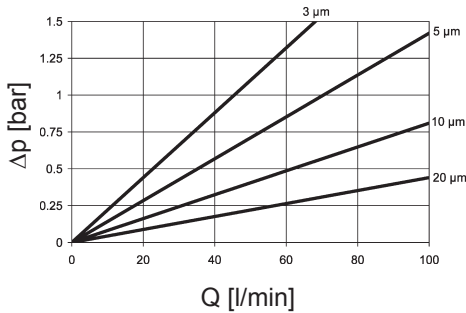


3.2 GRADIENT COEFFICIENTS (SK) FOR FILTER ELEMENTS

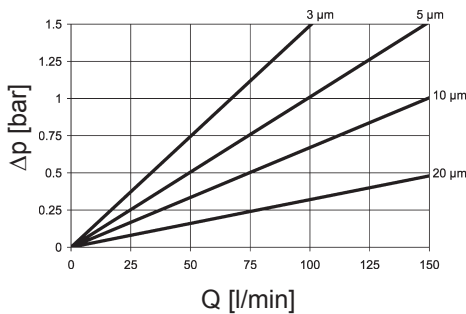
The gradient coefficients in mbar/(l/min) apply to mineral oils with a kinematic viscosity of 30 mm²/s. The pressure drop changes proportionally to the change in viscosity.

RFM	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

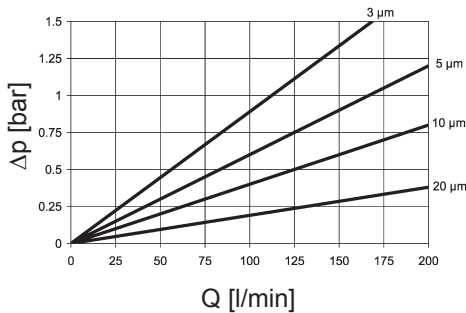
BN4HC: RFM 75



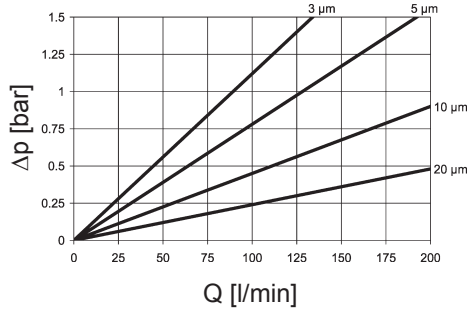
BN4HC: RFM 90



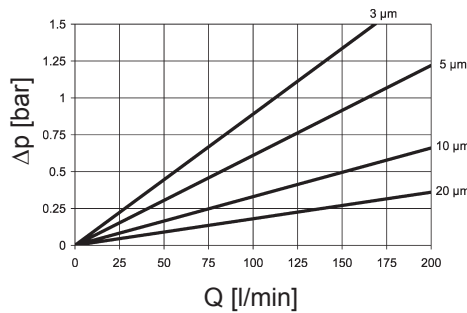
BN4HC: RFM 150



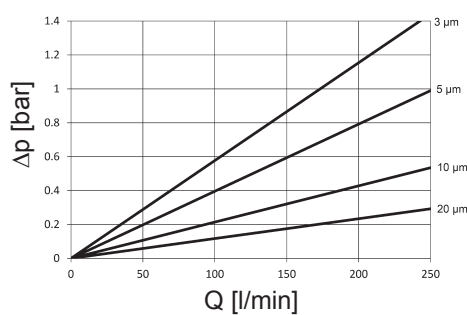
BN4HC: RFM 165



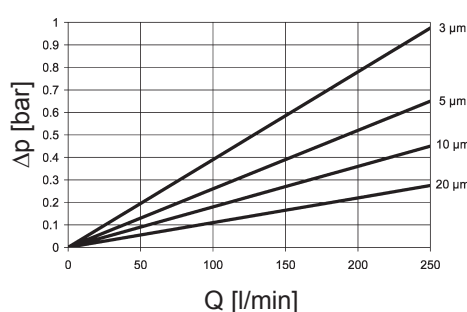
BN4HC: RFM 185



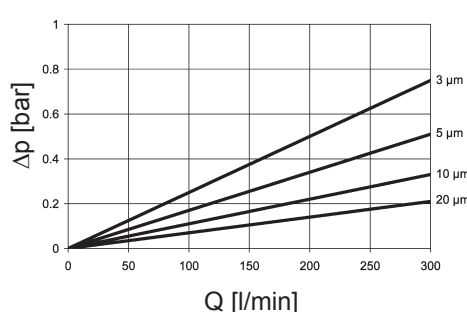
BN4HC: RFM 195



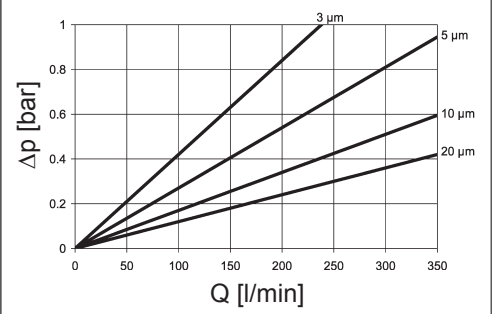
BN4HC: RFM 210



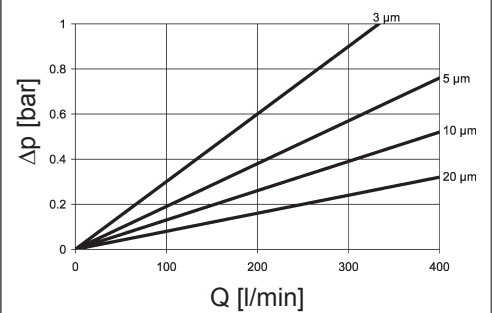
BN4HC: RFM 270



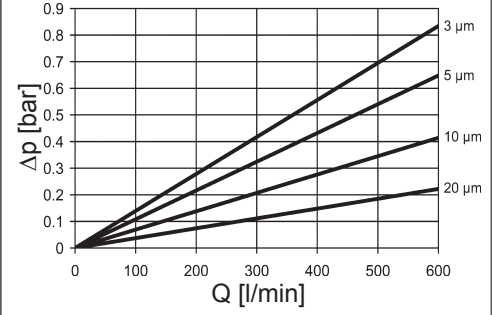
BN4HC: RFM 330



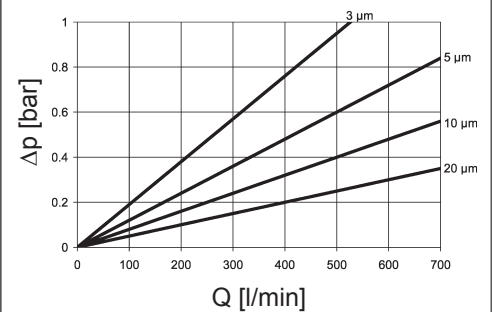
BN4HC: RFM 500



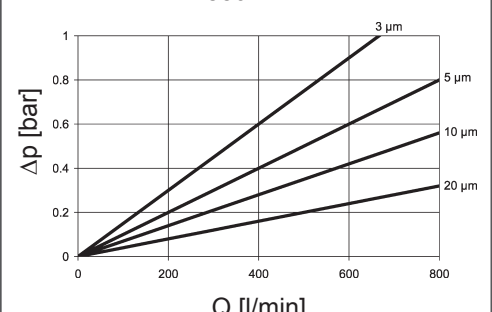
BN4HC: RFM 600



BN4HC: RFM 660



BN4HC: RFM 850

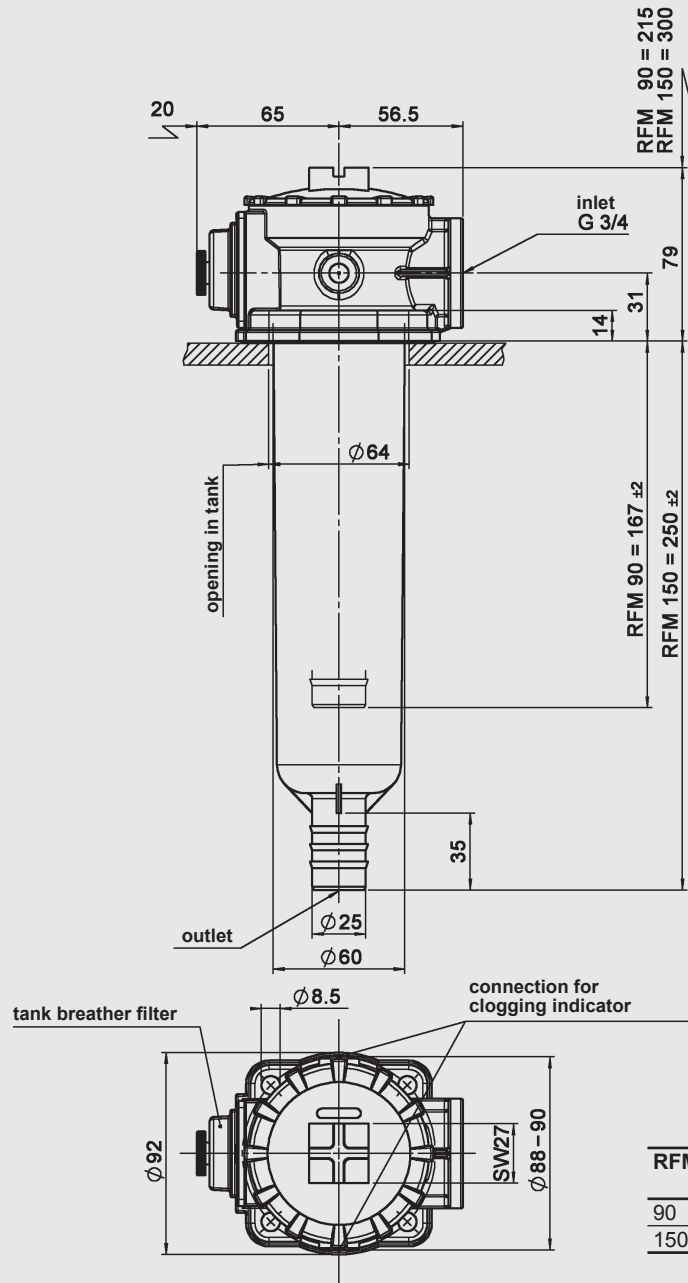


4. DIMENSIONS

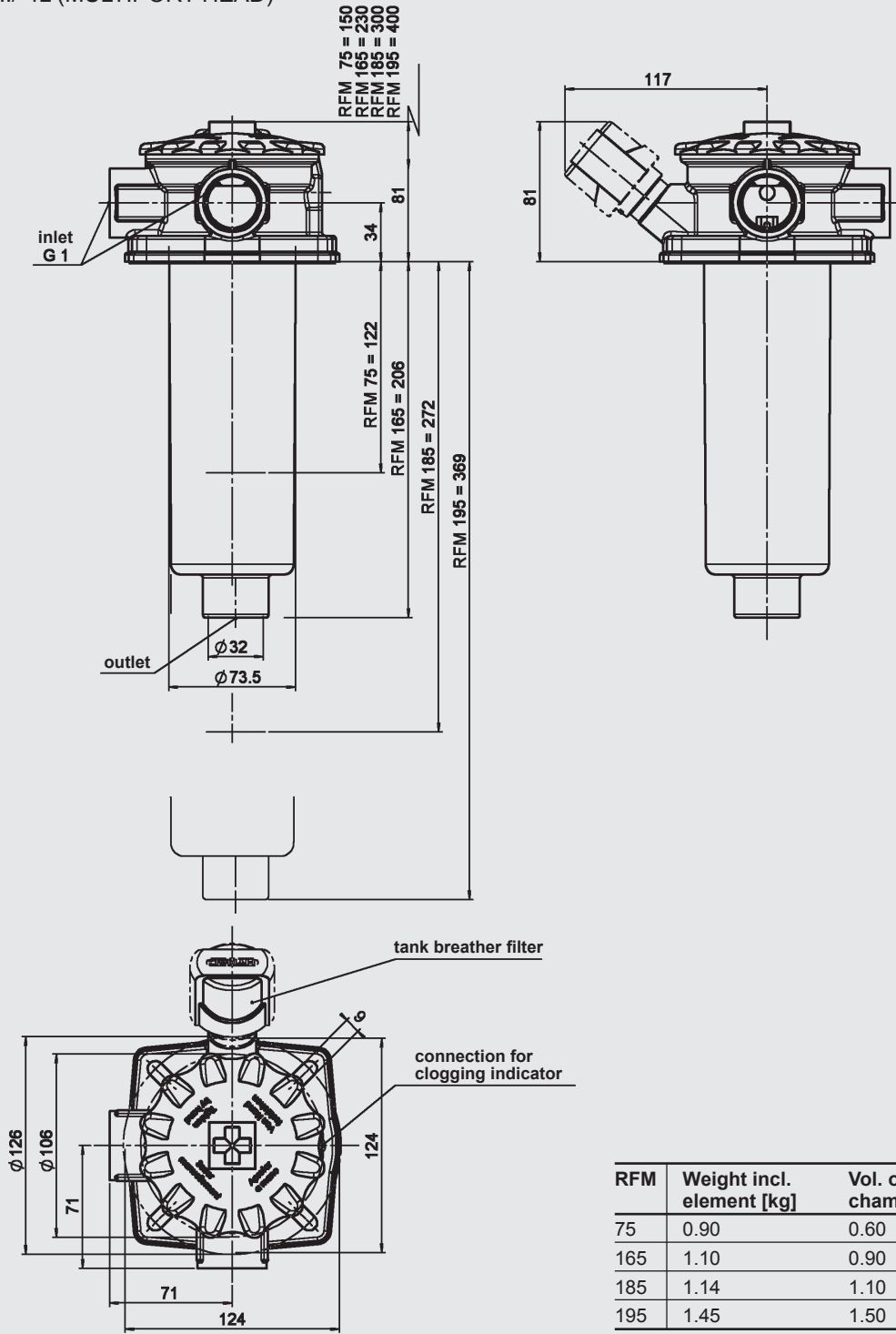
Tank requirements

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



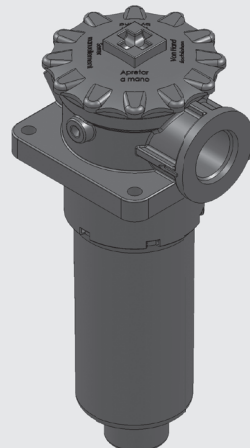
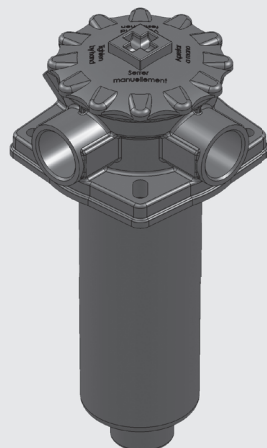
RFM 75, 165, 185, 195 .../-4L (MULTI-PORT HEAD)



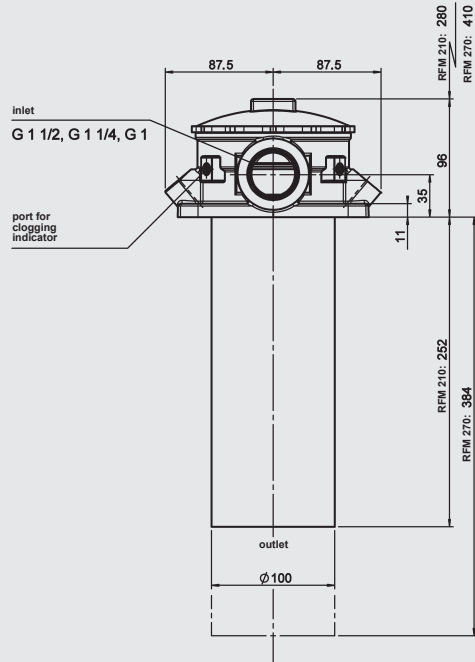
RFM	Weight incl. element [kg]	Vol. of pressure chamber [l]
75	0.90	0.60
165	1.10	0.90
185	1.14	1.10
195	1.45	1.50

MULTI-PORT HEAD

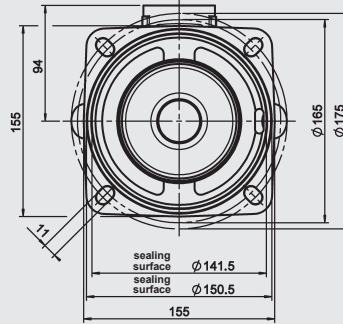
ON REQUEST:
SINGLE PORT HEAD



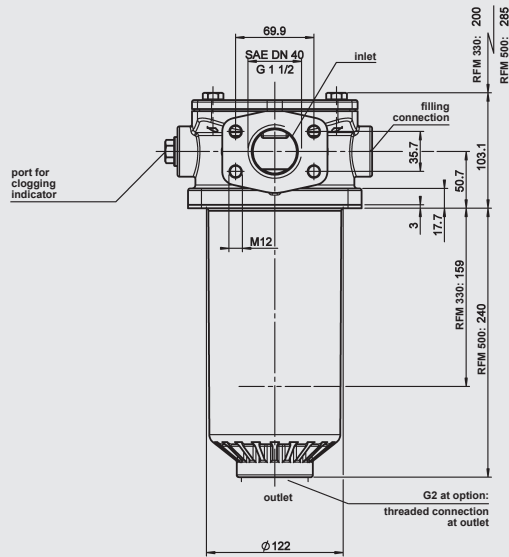
RFM 210, 270



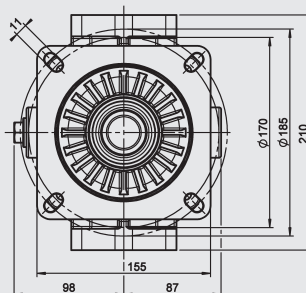
view from below



RFM 330, 500

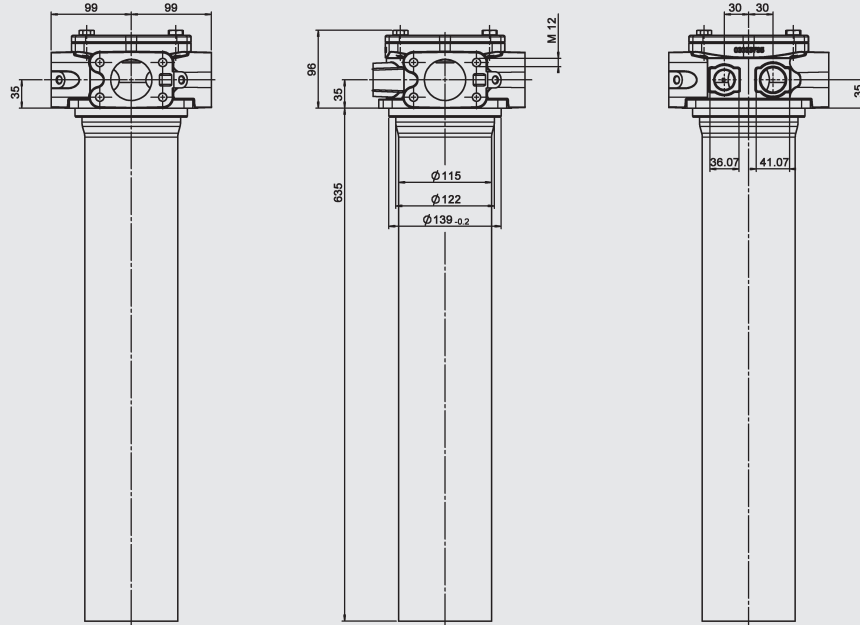


view from below

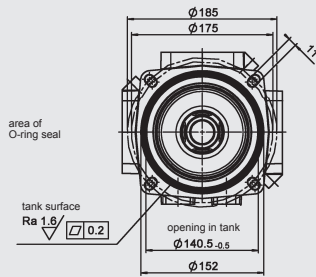


RFM	Weight incl. element [kg]	Vol. of pressure chamber [l]
210	3.10	2.20
270	4.30	3.60
330	3.90	2.00
500	4.50	3.00

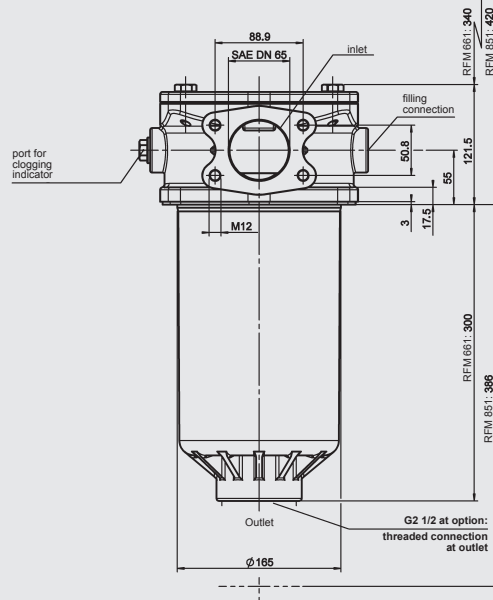
RFM 600



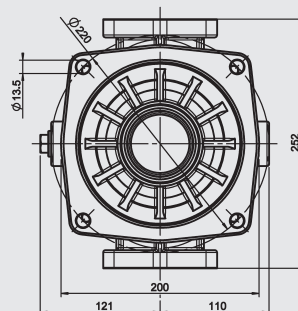
view from below



RFM 661, 851



view from below



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