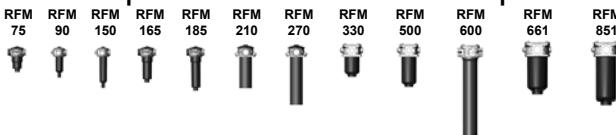




## Return Line Filter RFM

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



In-tank mounted versions: up to 2600 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, filter bowl and a screw-on cover plate.

Standard equipment:

- with bypass valve
- connection for a clogging indicator (Important: For RFM 75 to 851 please indicate 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	28.2
185	25.6	28.4	34.1	38.6
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
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
Material of filter bowl	Polyamide: all RFM except 210, 270 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 ½ VMF connection thread G 1/8
Pressure setting of clogging indicator	2 bar (others on request)
Bypass cracking pressure	3 bar (others on request)

### 1.4 SEALS

NBR (= Perbunan)

### 1.5 MOUNTING

As tank-top or in-tank filter

### 1.6 SPECIAL MODELS AND ACCESSORIES

- Connections for filling the hydraulic system via return line element (RFM 330 and above)
- Threaded connection in the outlet on request

- Breather filter built into the head on RFM 75 to 185

- Dipstick for RFM 75, 165, 185 (RFM 90 and 150 on request)

- Various in-tank versions

### 1.7 SPARE PARTS

See Original Spare Parts List

### 1.8 CERTIFICATES AND APPROVALS

On request

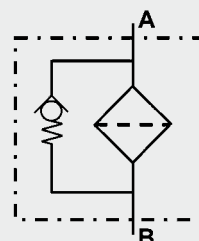
### 1.9 COMPATIBILITY WITH HYDRAULIC FLUIDS ISO 2943

- 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
- Non-flam operating fluids HFA, HFB, HFC and HFD
- Operating fluids with high water content (>50% water content) on request

### 1.10 IMPORTANT INFORMATION

- Filter housing 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 a pipe extension is to be fitted to the two-piece filter housing, the pipe must be made of synthetic material or thin-wall aluminium.
- Extensions must be protected by fitting a bulkhead 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 fitted 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 (for in-tank version, see point 2.5)

Filter type

RFM

Filter material of element\*

BN/HC Betamicon® (BN4HC) ECO/N ECOmicron® - not RFM 210, 270 and SET-Version 2600  
 P/HC Paper BN/AM Betamicon®/Aquamicron® - only RFM 330 to 851  
 W/HC Stainless steel wire mesh AM Aquamicron® - only RFM 330 to 851  
 MM Mobilemicron \* RFM 600 only available in BN4HC material!

Size of filter or element

RFM: 75, 90, 150, 165, 185, 210, 270, 330, 500, 600, 661, 851

Operating pressure

B = 10 bar

Additional inlet

Type	Port	Filter size				
		330	500	600	661	851
F	G 1 ½	●	●			
K	SAE DN 40	●	●			
M	SAE DN 65			●	●	
Z	To customer spec.			●		

Type and size of port (1 inlet)

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

For KIT, SET and S versions see point 2.6

X on request

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 (only RFM 330 to 851)  
 C electrical  
 D visual and electrical

for other clogging indicators see brochure no. E 7.050../..

Type code

0 no indicator 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

A.-B. setting pressure of indicator and cracking pressure of bypass in bar (e.g.: A5-B6)  
 BA filling connection (RFM 330 to 851)  
 L... light with appropriate voltage (24V, 48V, 110V, 220V) ] only for clogging indicators type D  
 LED 2 light emitting diodes up to 24 Volt  
 PSxx dipstick for RFM 75, 165, 185 on request  
 PZxx dipstick for RFM 90, 150 on request  
 T with tank breather filter (only for RFM 75 to 185)  
 V FPM seals  
 Vxxx with pipe extension (where xxx is the final dimension of the extension)  
 W suitable for HFA and HFC emulsions  
 xxxxxRFM 600 only (see point 2.4)

### 2.2 REPLACEMENT ELEMENT

0500 R 010 BN4HC /-V

Size

0075, 0090, 0150, 0165, 0185, 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 ] return line indicator up to  
 VMF connection thread G 1/8 ] 25 bar operating pressure

**Pressure setting** \_\_\_\_\_  
 2 2 bar standard, 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 RFM 600, the code BZx is selected here as standard. In order to determine the position and size of the ports, a 5-digit code is added as a supplementary detail. This is determined using the table below. Unused ports are indicated by a "0".

for RFM 600...BZK

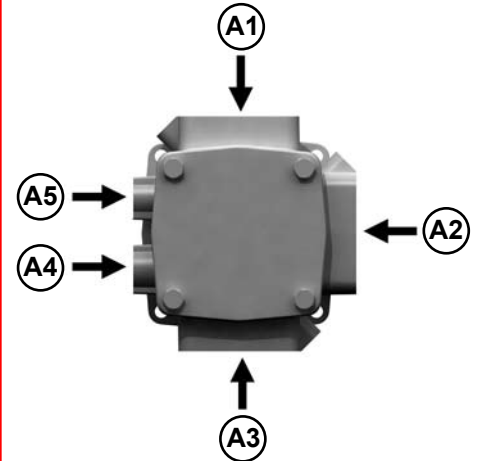
Port	A1	A2	A3	A4	A5
G 3/4					C
G 1				D	
G 1 1/4	E	E	E		
SAE DN 40	K	K	K		
plugged	0	0	0	0	0

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

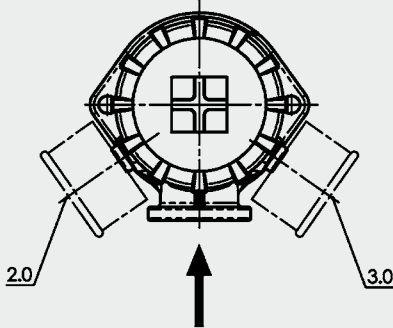
Example:

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

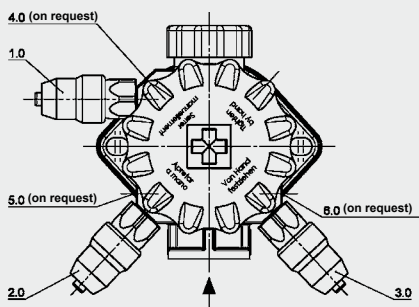


## 2.5 TYPE CODE: MOUNTING POSITION OF THE CLOGGING INDICATOR

RFM 90, 150



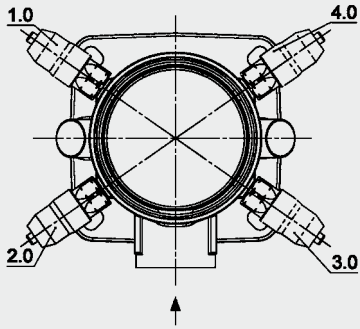
RFM 75, 165, 185



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

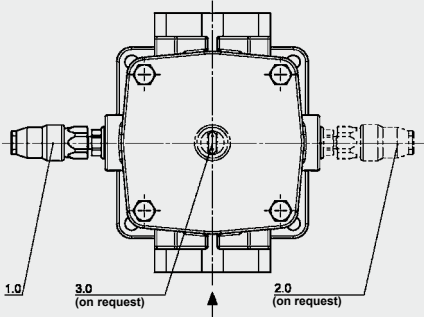
Type code	Mounting position of the clogging indicator	Type of indicator
1.X	Clogging indicator on left back, 90° to the inlet	VMF...
2.X	Clogging indicator on left front, 45° to the inlet	VMF...
3.X	Clogging indicator on right front, 45° to the inlet	VMF...

**RFM 210, 270**



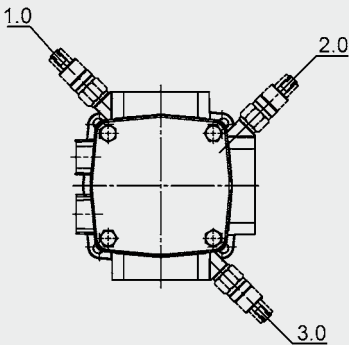
Type code	Mounting position of the clogging indicator	Type of clogging indicator
1.X	Clogging indicator on left back, 135° to the inlet	VMF...
2.X	Clogging indicator on left front, 45° to the inlet	VMF...
3.X	Clogging indicator on right front, 45° to the inlet	VMF...
4.X	Clogging indicator on right back,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

**RFM 330, 500**



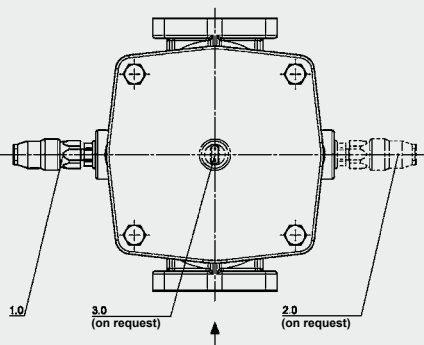
Type code	Mounting position of the clogging indicator	Type of clogging indicator
1.X	Clogging indicator on left, 90° to the inlet	VR...

**RFM 600**



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

**NOTE**  
Other type codes on request

## 2.6 MODEL CODE: IN-TANK MOUNTING FILTER

### KIT VERSION



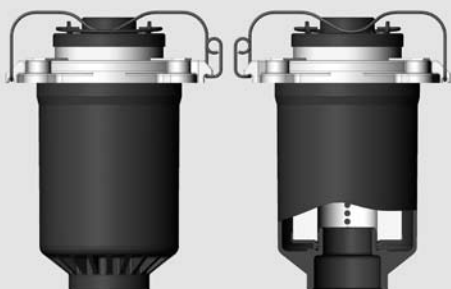
RFM BN/HC **165** **KIT** 10 W 1.0 /-V

**Size** \_\_\_\_\_  
75, 90, 150, 165, 185, 210, 270, 330, 500, 661, 851

**In-tank mounting version** \_\_\_\_\_  
KIT bowl only with element and seal

**Supplementary details** \_\_\_\_\_  
B. bypass cracking pressure (e.g. B6 = 6 bar)  
DFxxx spring extension (where xxx is the corresponding length) - on request  
G threaded connection in outlet (RFM 330 to 851)  
V FPM seal  
Vxxx pipe extension (where xxx is the final dimension of the extension)

### SET VERSION, screw-on Sizes 330 and 500



RFM BN/HC **330** **SET** 10 W 1.0 /-V

**Size** \_\_\_\_\_  
330, 500

**In-tank mounting version** \_\_\_\_\_  
SET bowl only with element and seal, plus adaptor ring

**Supplementary details** \_\_\_\_\_  
B. bypass cracking pressure (e.g. B6 = 6 bar)  
G threaded connection in outlet  
V FPM seal  
Vxxx pipe extension (where xxx is the final dimension of the extension)

### SET - VERSION, screw-on Sizes 950 to 2600



RFM ECO/N **950** **SET** 10 W 1.0 /-SO441

**Size** \_\_\_\_\_  
950, 1300 (ECO/N)  
2600 (BN/HC)

**In-tank mounting version** \_\_\_\_\_  
SET element only with integral contamination retainer, element location spigot and spring

**Supplementary details** \_\_\_\_\_  
SO441 this code must be added, also required for replacement element  
V FPM seal

### S VERSION, weld-in version



RFM BN/HC **165** **S** 10 W 1.0 /-V

**Size** \_\_\_\_\_  
75, 165, 185

**In-tank mounting version** \_\_\_\_\_  
S bowl only with element and seal, plus adaptor ring

**Supplementary details** \_\_\_\_\_  
B. bypass cracking pressure (e.g. B6 = 6 bar)  
V FPM seal  
Vxxx pipe extension (where xxx is the final dimension of the extension)

\* Other supplementary details on request (or point 2.1)

### 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 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)

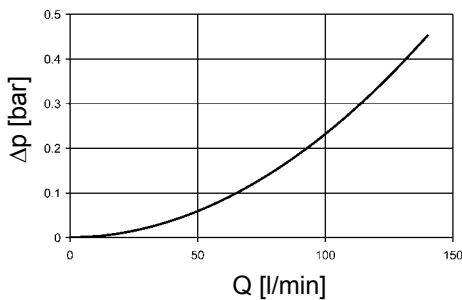
For ease of calculation, our Filter Sizing Program is available on request free of charge.

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

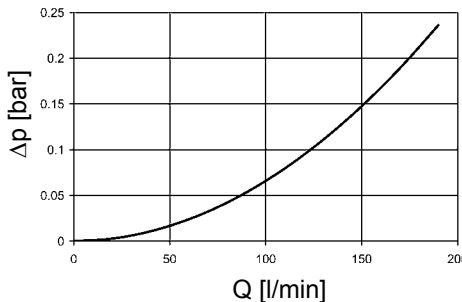
#### 3.1 $\Delta p$ -Q HOUSING GRAPHS BASED ON ISO 3968

The housing graphs 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.

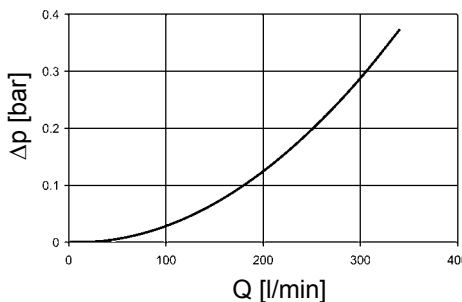
**RFM 90, 150**



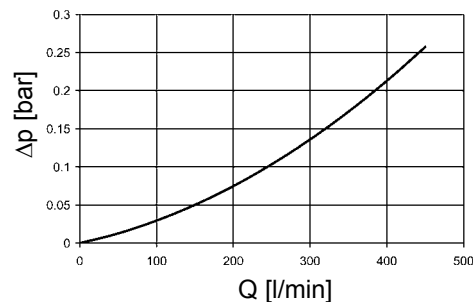
**RFM 75, 165, 185**



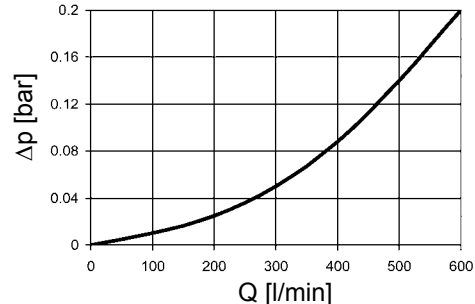
**RFM 210, 270**



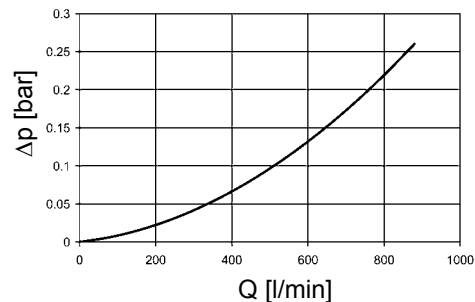
**RFM 330, 500**



**RFM 600**



**RFM 661, 851**

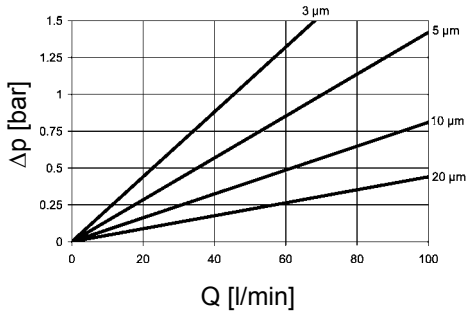


### 3.2 GRADIENT COEFFICIENTS (SK) FOR FILTER ELEMENTS

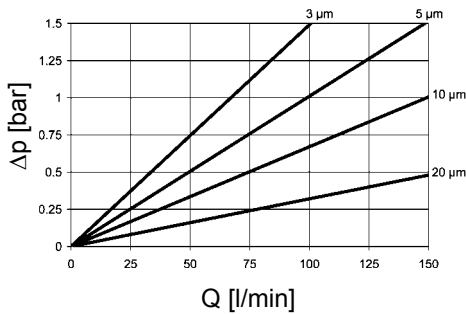
The gradient coefficients in mbar/(l/min) apply to mineral oils with a kinematic viscosity of 30 mm<sup>2</sup>/s. The pressure drop changes proportionally to the change in viscosity.

RFM	ECON2				W/HC
	3 μm	5 μm	10 μm	20 μm	
75	-	-	8.1	4.4	0.702
90	-	-	6.7	3.2	-
150	8.9	6.0	4.0	1.9	-
165	11.2	7.8	4.5	2.4	0.324
185	8.9	6.1	3.3	1.8	-
210	-	-	-	-	-
270	-	-	-	-	-
330	4.2	2.7	1.7	1.2	0.162
500	3.0	1.9	1.3	0.8	0.108
600	-	-	-	-	-
660	1.9	1.2	0.8	0.5	0.081
850	1.5	1.0	0.7	0.4	0.063
950	1.2	0.8	0.5	0.4	0.054
1300	0.8	0.6	0.4	0.3	0.045
2600	0.4	0.3	0.2	0.1	0.018

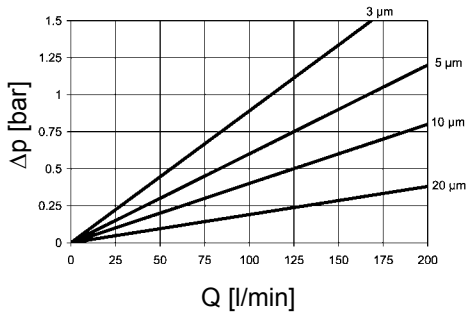
**BN4HC: RFM 75**



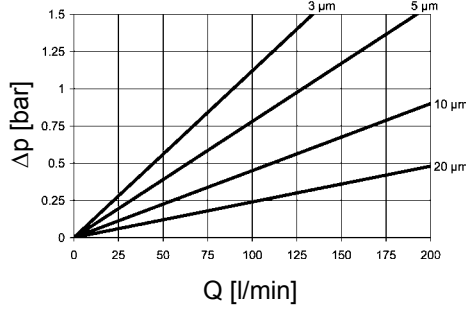
**BN4HC: RFM 90**



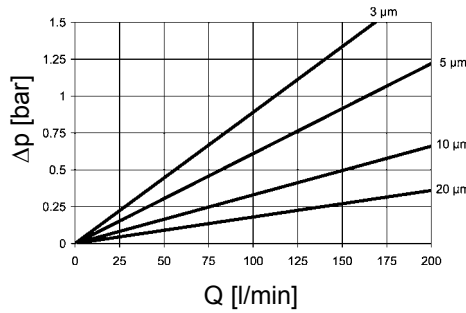
**BN4HC: RFM 150**



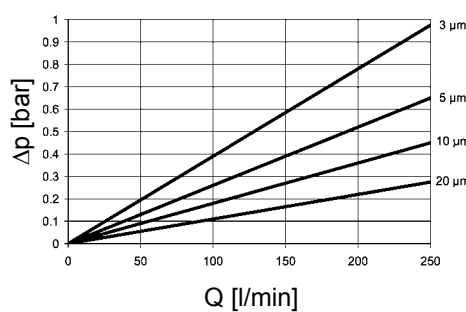
**BN4HC: RFM 165**



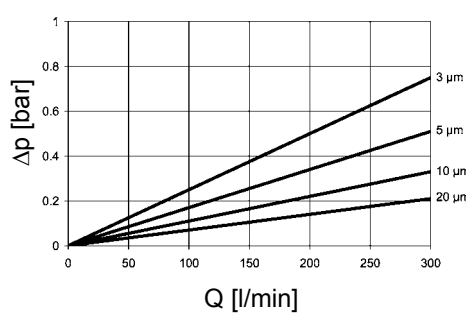
**BN4HC: RFM 185**



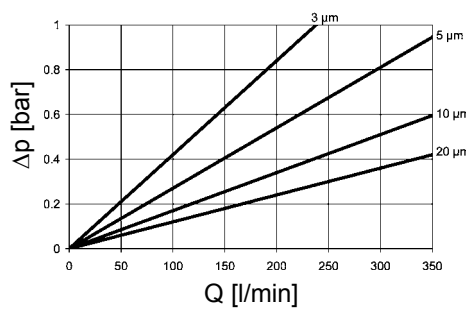
**BN4HC: RFM 210**



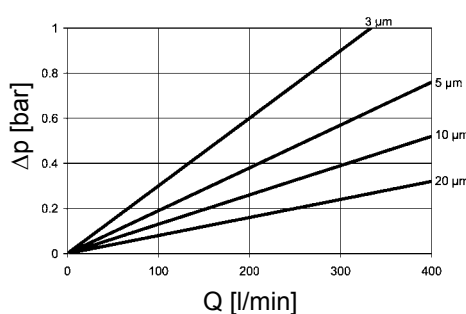
**BN4HC: RFM 270**



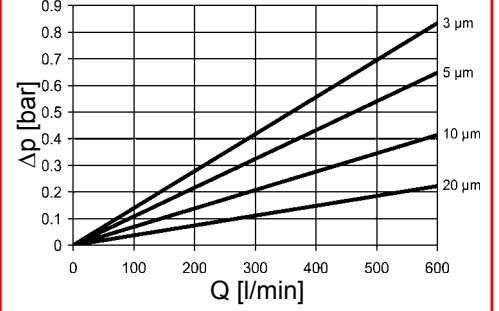
**BN4HC: RFM 330**



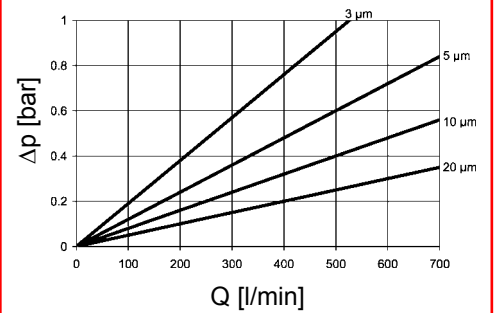
**BN4HC: RFM 500**



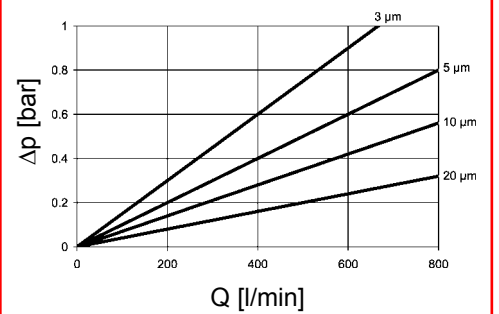
**BN4HC: RFM 600**



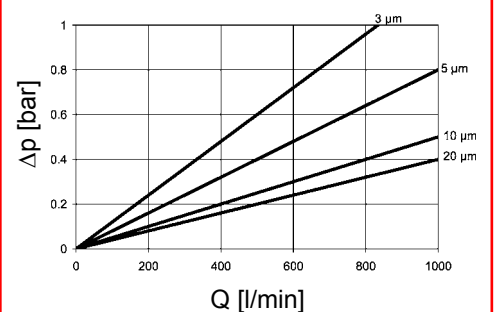
**BN4HC: RFM 660**



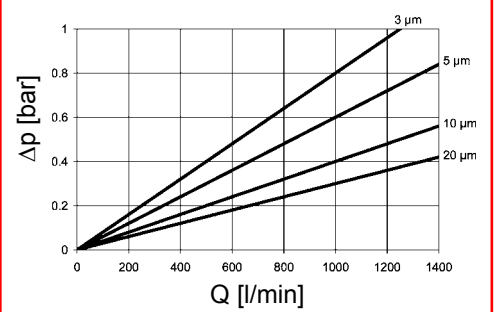
**BN4HC: RFM 850**



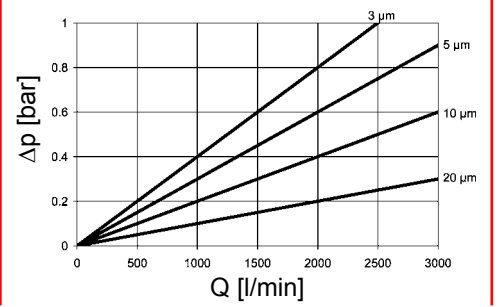
**BN4HC: RFM 950**



**BN4HC: RFM 1300**

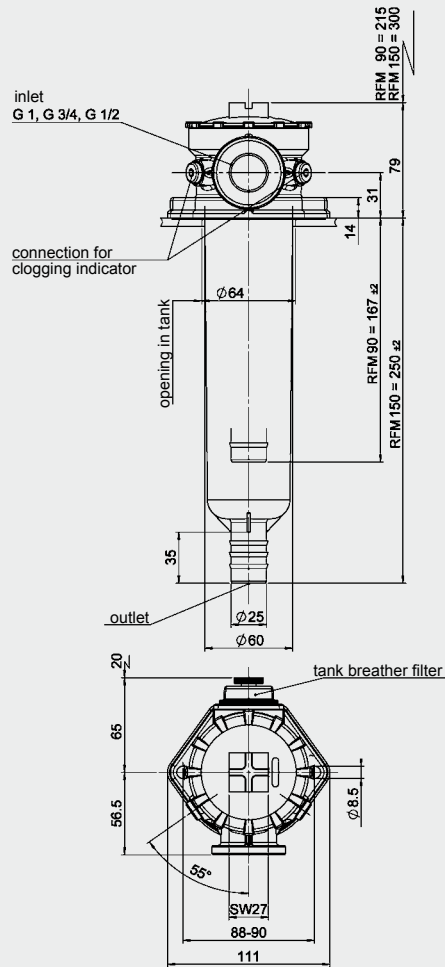


**BN4HC: RFM 2600**

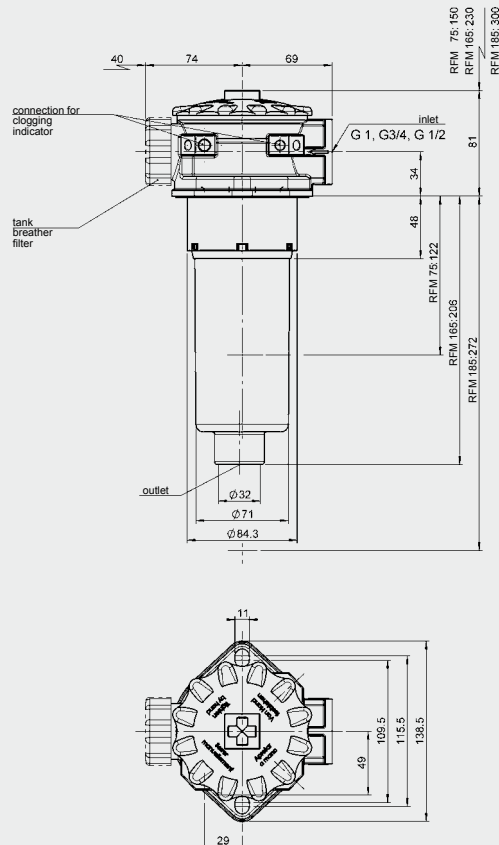


## 4. DIMENSIONS

RFM 90, 150



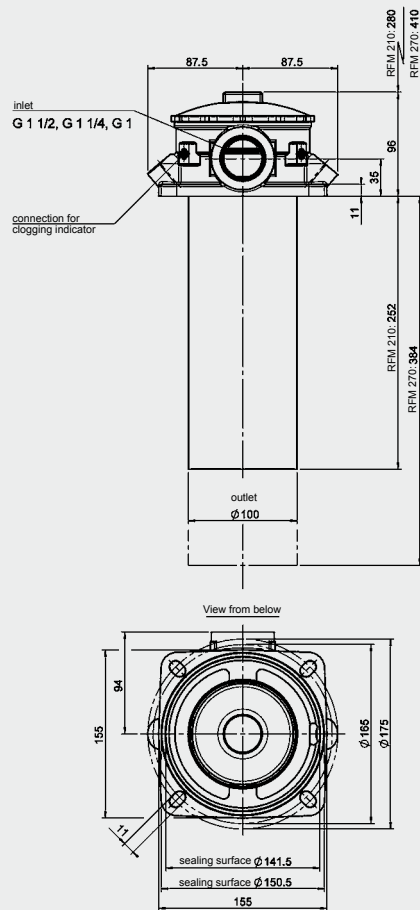
RFM 75, 165, 185



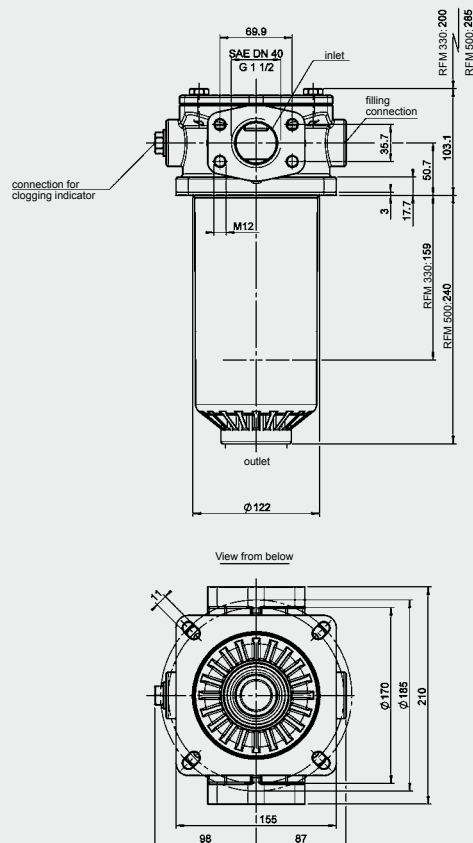
RFM	Weight incl. element [kg]	Vol. of pressure chamber [l]
75	0.90	0.60
90	0.54	0.60
150	0.75	0.80
165	1.10	0.90
185	1.14	1.10



## RFM 210, 270

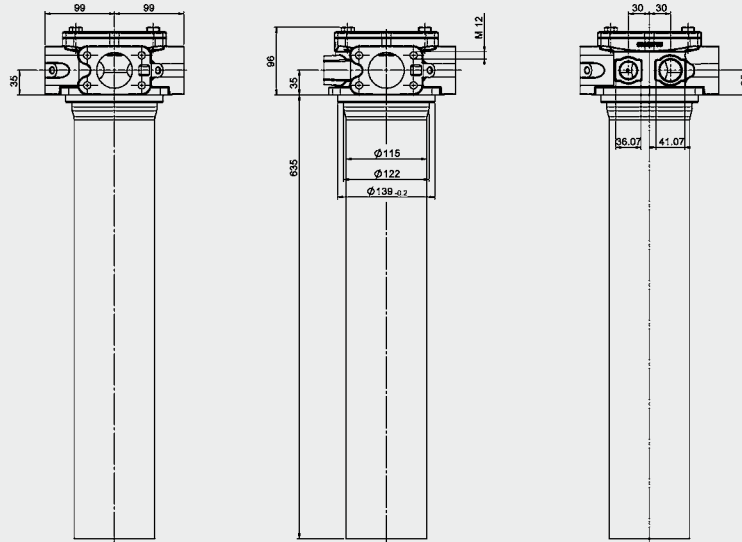


## RFM 330, 500

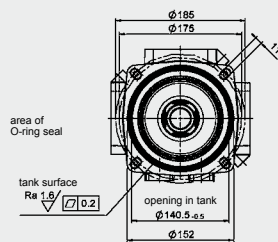


RFM	Weight incl. element [kg]	Vol. of pressure chamber [l]
210	3.10	2.20
270	4.30	3.60
330	3.90	2.00
500	4.50	3.00

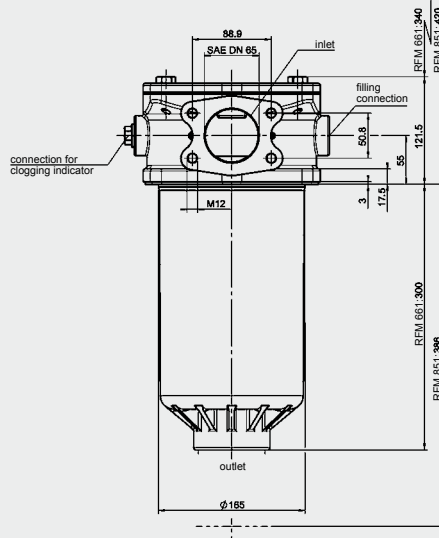
## RFM 600



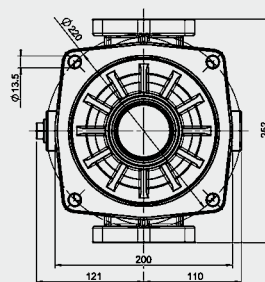
View from below



## RFM 661, 851



View from below



**Dimensions for in-tank mounting filters (KIT, SET, S versions) on request!**

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

### 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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