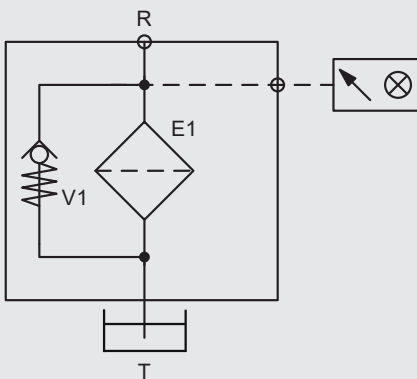




RFM Return line filter with 2-hole mounting

Symbol for hydraulic systems:



R: Tank connection
T: Tank
E1: Filter element
V1: Bypass valve

1. SIZES



2. TECHNICAL DATA

Filter specifications

Nominal pressure	10 bar
Maximum flow rate	220 l/min
Temperature range	-30 °C to + 100 °C (briefly -40 °C)
Material of filter head	Aluminium
Material of filter bowl	Polyamide
Material of end cap	Polyamide

Clogging indicator

Type	VMF – screw-in thread G 1/8
Pressure setting	2.0 bar

Bypass

Cracking pressure	3.0 bar
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Miscellaneous

Seal	NBR (= Perbunan)
Installation	As tank mounting filter
Special models and accessories	Air filter built into head
Certificates and approvals	On request

3. GENERAL DESCRIPTION

3.1 FILTER HOUSING

Construction

The filter housings are designed in accordance with international regulations. They consist of a filter head (with 2-hole flange) with filter bowl and screw-on end cap.

Standard model

- With bypass valve
- Port for clogging indicator, see section 4.4

3.2 FILTER ELEMENTS

The 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.

Pressure stability values

Designation	Model code	Collapse pressure
Optimicron®	ON	20 bar
Mobilemicron®	MM	10 bar

3.3 COMPATIBILITY WITH OPERATING FLUIDS (ISO 2943)

- Hydraulic oils HL to HVLP (DIN 51524)
- Lubrication oils (DIN 51517, API, ACEA, DIN 51515, ISO 6743)
- Compressor oils (DIN 51506)
- Biodegradable operating fluids HETG, HEES, HEPG (VDMA 24568) can only be used with FKM seals
- Fire-resistant fluids HFA, HFB, HFC and HFD (ISO 121922) as well as operating fluids with a high water content (>50% water content) on request

3.4 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 plastic 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 is only suitable for tank installation
- 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

4. MODEL CODE

4.1 FILTER ASSEMBLY

RFM ON 165 B C 10 D 1 . X /-L24

Filter type

RFM

Filter material

ON Optimicron®

MM Mobilemicron®

Size of filter or element

75, 90, 150, 165, 185, 195

Operating pressure

B 10 bar

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

Type and size of connection

Type	Connection	Filter size					
		75	90	150	165	185	195
B	G ½	●			●	●	●
C	G ¾	V	V	V	V	●	●
D	G 1	V			V	V	V

Filtration rating in µm

ON 5, **10, 20**

MM **10, 15**

Design of clogging indicator

- A** screw plug in indicator port
- C** electrical
- D** visual and electrical
- E** visual analogue display on scale
- F** electrical switch
- FD** electrical switch
- W** without port for clogging indicator

Type code

0 without port, no clogging indicator

1–3 see section 4.4 – note position of clogging indicator!

Modification number

X the latest version is always supplied

Supplementary details

- V FKM seal, **no details = NBR seal**
- A5 response pressure = 5 bar, **no details = 2 bar**
- B6 bypass cracking pressure = 6 bar, **no details = 3 bar**
- KB no bypass valve
- T with air filter
- SFREE Stat-Free
- L24** lamp with 24-volt voltage (CI design: D)
- L... lamp with corresponding voltage (48, 110, 220) (CI design: D)
- LED 2 LEDs, up to 24-volt voltage (CI design: D)
- 2M0 2 contacts, male (CI design: FD)

Note: Our **preferred models** are highlighted in colour.

4.2 REPLACEMENT ELEMENT

0165 R 010 ON /-V

Size

0075, 0090, 0150, 0165, 0185, 0195

Type

R

Filtration rating in μm

ON 005, 010, 020

MM 010, 015

Filter material

ON, MM

Supplementary details

V, B6,... for description, see section 4.1

4.3 REPLACEMENT CLOGGING INDICATOR

VMF 2 D . X /-L24

Type

VMF screw-in thread G $\frac{1}{8}$

Response pressure

2 standard 2 bar

Design

D see section 4.1

Modification number

X the latest version is always supplied

Supplementary details

V, L24,... For descriptions, see section 4.1

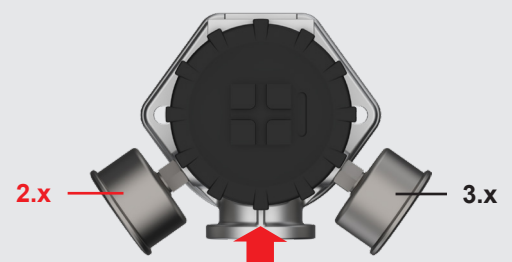
4.4 TYPE CODE: MOUNTING POSITION OF THE CLOGGING INDICATOR

Type code	Mounting position of clogging indicator	Indicator type
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2.x	Clogging indicator on front left, 45° to the inlet	VMF...
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3.x	Clogging indicator on front right, 45° to the inlet	VMF...
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RFM 90, 150



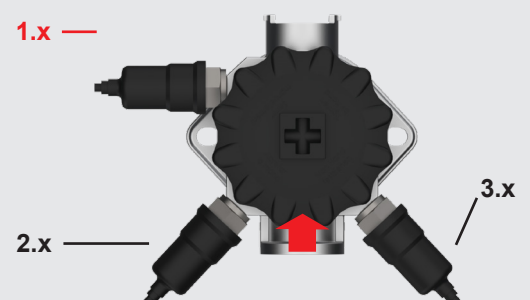
Type code	Mounting position of clogging indicator	Indicator type
-----------	---	----------------

1.x	Clogging indicator on back left, 90° to the inlet	VMF...
-----	---	--------

2.x	Clogging indicator on front left, 45° to the inlet	VMF...
-----	--	--------

3.x	Clogging indicator on front right, 45° to the inlet	VMF...
-----	---	--------

RFM 75, 165, 185, 195



5. FILTER CALCULATION

The total pressure drop of a filter at a particular flow rate **Q** and **viscosity** ν consists of the sum of the **housing pressure drop** $\Delta p_{\text{housing}}$ and the **element differential pressure** $\Delta p_{\text{element}}$ and can be calculated as follows:

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

$\Delta p_{\text{housing}}$ [bar] = see performance curves

$$\Delta p_{\text{element}} \text{ [bar]} = Q \text{ [l/min]} \cdot \frac{\text{SK [mbar / (l/min)]}}{1000} \cdot \frac{\nu \text{ [mm}^2\text{/s]}}{30}$$

SK = gradient coefficient (see section 5.2)

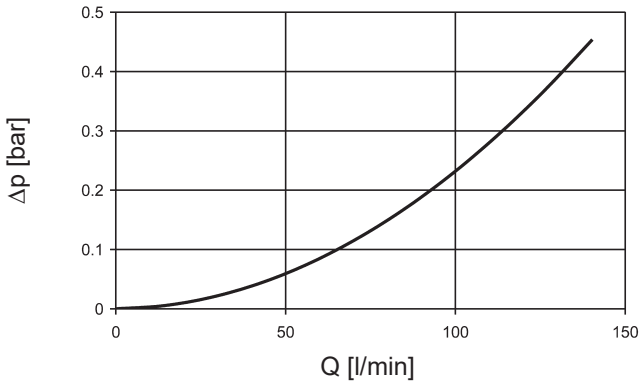
For ease of calculation, our Filter Sizing Program is available free of charge at:

www.hydac.com/en/online-tools

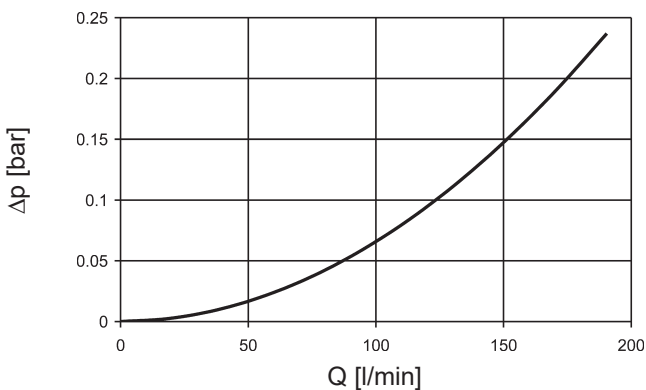
5.1 HOUSING CURVES

The housing curves are 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.

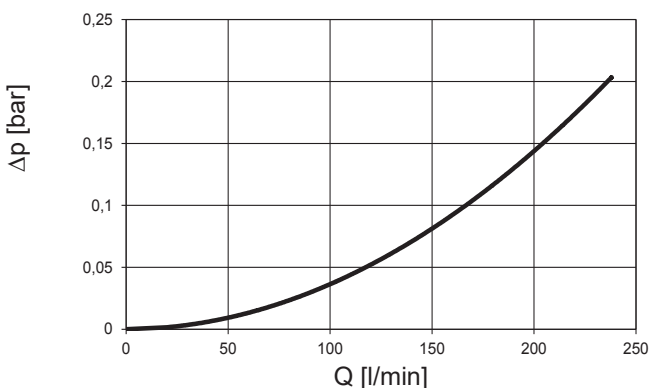
RFM 90, 150



RFM 75, 165, 185



RFM 195



5.2 GRADIENT COEFFICIENTS (SK)

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.

Size	ON			MM	
	5 μm	10 μm	20 μm	10 μm	15 μm
75	13.4	7.31	4.40	4.83	3.02
90	9.49	6.07	3.21	4.60	2.15
150	5.65	3.61	1.91	2.08	1.30
165	7.37	4.02	2.42	2.66	1.66
185	5.74	2.93	1.41	1.97	1.23
195	4.22	2.16	1.04	1.13	0.69

5.3 MAXIMUM FLOW RATE

The following maximum permitted flow rates (Q_{max}) are possible for the various sizes and connection sizes in l/min:

Size	Connector	Q_{max}
75	B	75
	C	90
	D	110
90	C	90
	D	110
150	C	105
	D	105
165	B	105
	C	125
	D	145
185	B	145
	C	165
	D	185
195	B	180
	C	200
	D	220

Information regarding dimensioning:

The hydraulic load on the filter element is primarily determined by the flow rate and the geometry of the particular filter element. Exceeding the maximum permitted flow rate (Q_{max}) and therefore the permitted hydraulic load can destroy the filter element.

Even the choice of operating medium can influence system performance and lead to problems during use such as electrostatic discharges.

Adherence to the maximum permitted flow rate should always be ensured throughout the system project planning process.

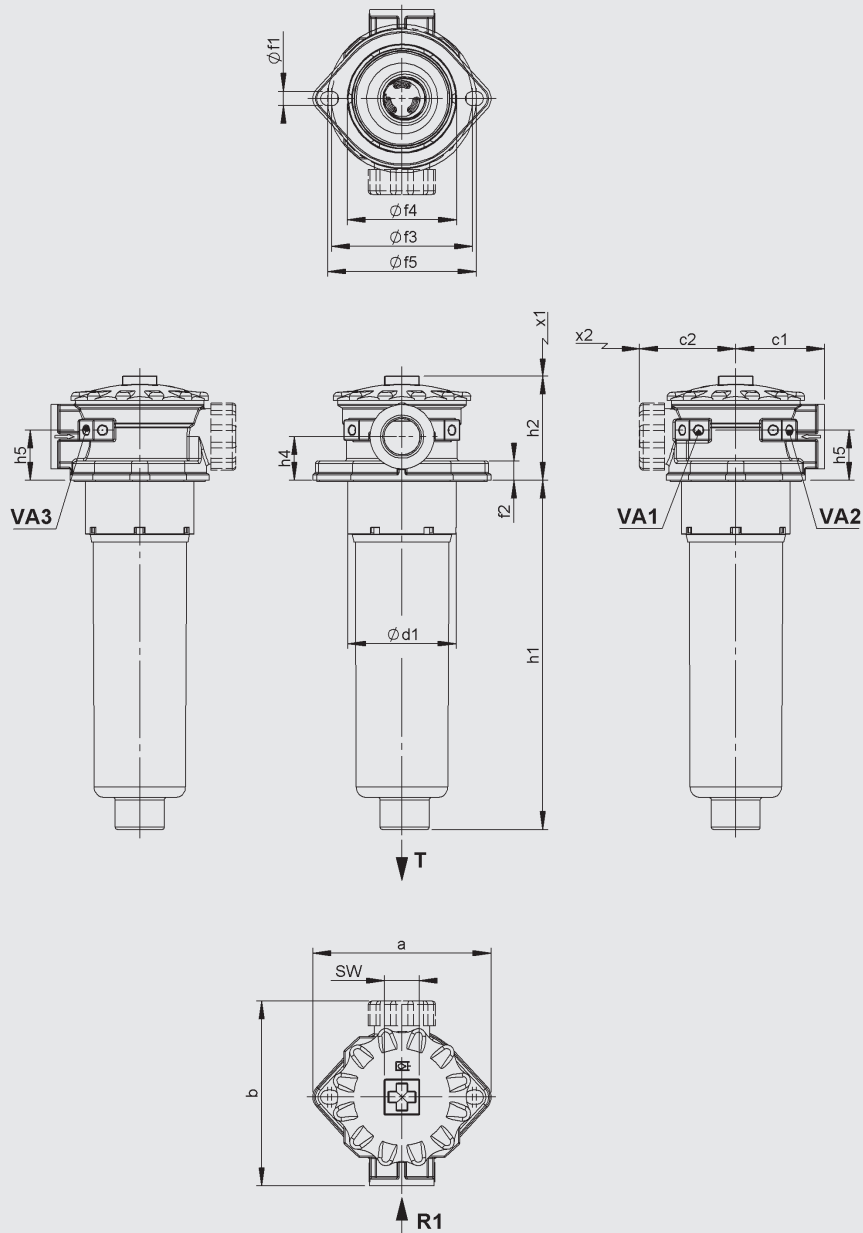
If you have any questions regarding dimensioning or project planning, please contact the technical sales department at HYDAC Filbertechnik.

6. DIMENSIONS

Tank requirements...

1. In the filter mounting interface, the tank flange should have a maximum flatness of 0.3 mm and Ra 3.2 µm maximum roughness.
2. In addition, the mounting interface should be free from 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 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 75, 165, 185, 195



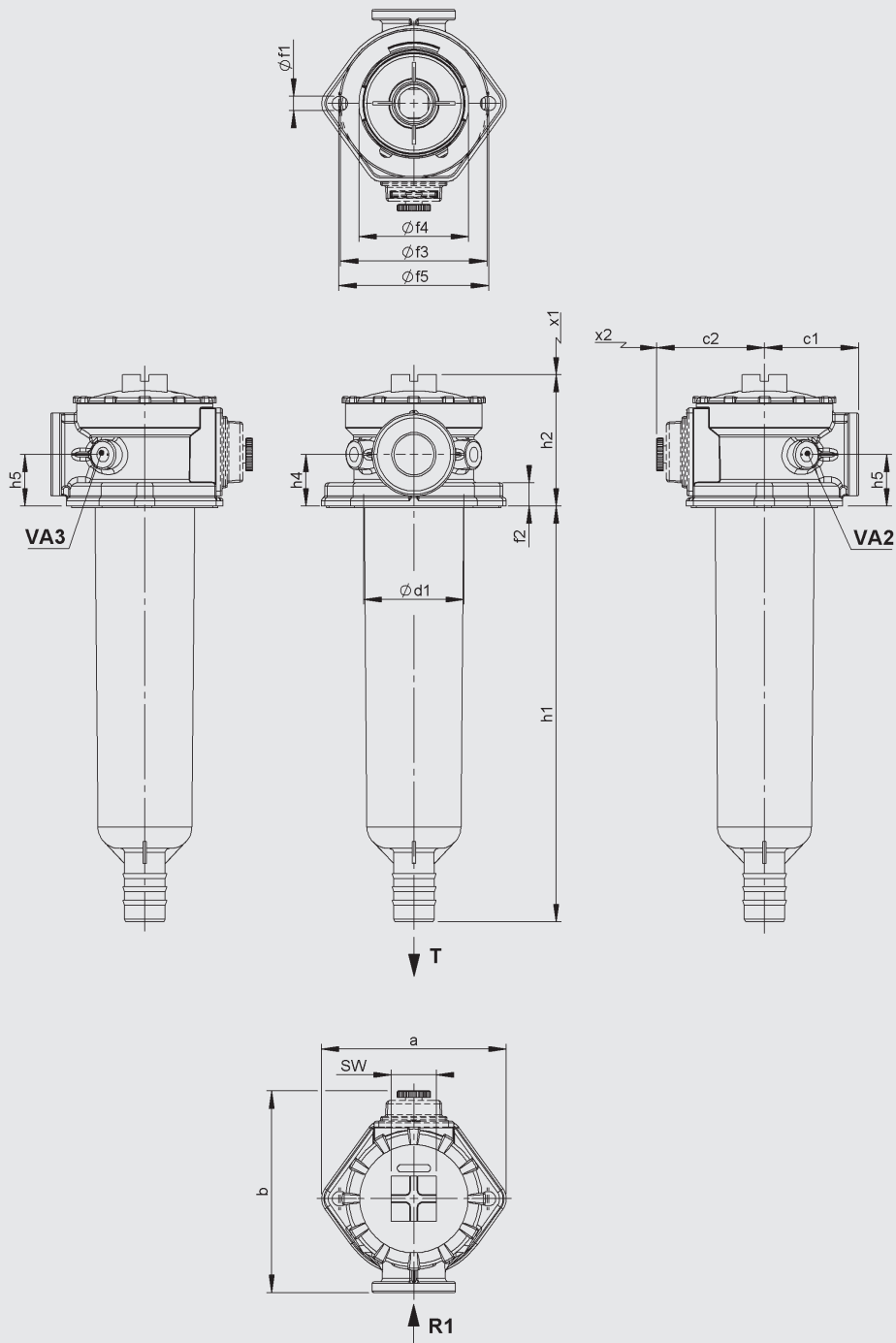
VA = connection for clogging indicator

T = tank

R = tank connection

Size	a	b	c1	c2	Ød1	Øf1	f2	Øf3	Øf4	Øf5	h1	h2	h4	h5	x1	x2	SW	Weight incl. element	Volume of pressure chamber	
																		[kg]	[l]	
75											max. 128				165			0.90	0.70	
165	138.5	144	69	75	84.3	11	15	109.5	85	115.5	81	34	39	40	27			max. 212	1.10	1.00
max. 278																		1.14	1.20	
max. 369																		1.30	1.60	

RFM 90, 150



VA = connection for clogging indicator
 T = tank
 R = tank connection

Size	a	b	c1	c2	$\phi d1$	$\phi f1$	f2	$\phi f3$	$\phi f4$	$\phi f5$	h1	h2	h4	h5	x1	x2	SW	Weight incl. element	Volume of pressure chamber
																		[kg]	[l]
90	111	121.5	56.5	65	60	8.5	14	88	66	90	167	79	31	31	215	20	27	0.54	0.60
150											250							300	0.75

