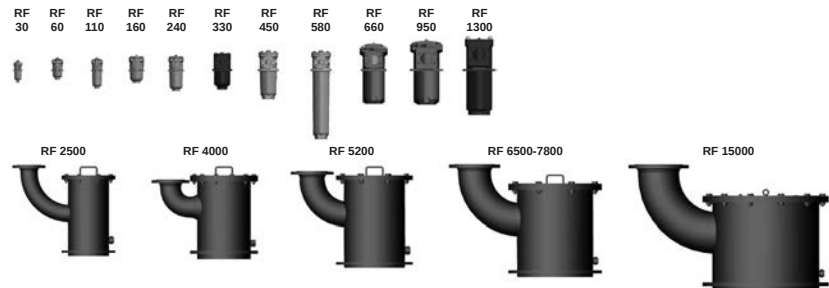


**HYDAC****INTERNATIONAL**

## Return Line Filter RF up to 15000 l/min, up to 25 bar



### 1. TECHNICAL SPECIFICATIONS

#### 1.1 FILTER HOUSING

##### Construction

The filter housings are designed in accordance with international regulations. They consist of a filter housing and a threaded cover plate. Standard equipment:

- bypass valve in the element. For RF 450/580 the bypass valve is built into the cover plate as standard.
- connection for a clogging 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

##### Number of filter elements

| RF    | Elements |
|-------|----------|
| 30    | 1x0030R  |
| 60    | 1x0060R  |
| 110   | 1x0110R  |
| 160   | 1x0160R  |
| 240   | 1x0240R  |
| 330   | 1x0330R  |
| 450   | 1x0450R  |
| 580   | 1x0580R  |
| 660   | 1x0660R  |
| 950   | 1x0950R  |
| 1300  | 1x1300R  |
| 2500  | 3x0850R  |
| 4000  | 5x0850R  |
| 5200  | 4x1300R  |
| 6500  | 5x1300R  |
| 7800  | 6x1300R  |
| 15000 | 10x1300R |

Filter elements are available with the following pressure stability values:

|                                 |         |
|---------------------------------|---------|
| Optimicron® (ON):               | 20 bar  |
| Paper (P/HC):                   | 10 bar  |
| Stainl. st. wire mesh (W/HC):   | 20 bar  |
| Stainless steel fibre (V):      | 210 bar |
| Betamicon®/Aquamicron® (BN4AM): | 10 bar  |
| Aquamicron® (AM):               | 10 bar  |

#### 1.3 FILTER SPECIFICATIONS

|                                            |                                                                                                                                                   |
|--------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| Nominal pressure                           | RF 30, 2500 to 15000: 10 bar<br>RF 450 and 580: 16 bar<br>RF 60 to 1300: 25 bar                                                                   |
| Temperature range                          | -10 °C to +100 °C                                                                                                                                 |
| Material of filter housing and cover plate | RF 30: PA 66<br>RF 60 to 580: Aluminium<br>RF 660 to 1300: EN-GJS-400-15<br>RF 2500 to 15000: Welded steel                                        |
| Type of clogging indicator                 | VR Connection thread G ½<br>(return line indicator up to 25 bar operating pressure)<br>VM Differential pressure indicator only for RF 450 and 580 |
| 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 INSTALLATION

Tank-top or inline filter.

RF 450 and 580 are also suitable for horizontal installation (with check valve).

#### 1.6 SPECIAL MODELS AND ACCESSORIES

On request

#### 1.7 SPARE PARTS

See Original Spare Parts List

#### 1.8 CERTIFICATES AND APPROVALS

On request

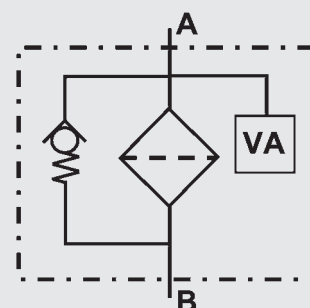
#### 1.9 COMPATIBILITY WITH HYDRAULIC FLUIDS ISO 2943

- 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.
- Filters must be flexibly mounted and not fixed rigidly to the floor or used as a pipe support.

##### Symbol for hydraulic systems



VA = clogging indicator

**Niehues**

Hydraulik · Automation

**2. MODEL CODE (also order example)**

RF ON 330 D L 10 D 1 X /-L24

**2.1 COMPLETE FILTER****Filter type**

RF

**Filter material**

ON Optimicron® (ON) P/HC Paper AM Aquamicon®  
 V Stainless steel fibre W/HC Stainl. st. wire mesh BN/AM Betamicon®/Aquamicon®

**Size of filter or element**

RF: 30, 60, 110, 160, 240, 330, 450, 580, 660, 950, 1300, 2500, 4000, 5200, 6500, 7800, 15000

**Operating pressure**

B = 10 bar (RF 30, 2500 to 15000)  
 C = 16 bar (RF 450, 580)  
 D = 25 bar (RF 60 to 1300)  
 V = 7 bar (for RF with clogging indicator up to max. 7 bar operating pressure)

**Type and size of connection**

| Type | Port            | Filter size |    |     |     |     |     |     |     |     |     |      |      |      |      |      |      |       |
|------|-----------------|-------------|----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|-------|
|      |                 | 30          | 60 | 110 | 160 | 240 | 330 | 450 | 580 | 660 | 950 | 1300 | 2500 | 4000 | 5200 | 6500 | 7800 | 15000 |
| B    | G ½             | ●           |    |     |     |     |     |     |     |     |     |      |      |      |      |      |      |       |
| C    | G ¾             |             | ●  | ●   |     |     |     |     |     |     |     |      |      |      |      |      |      |       |
| E    | G 1¼            |             |    |     | ●   | ●   |     |     |     |     |     |      |      |      |      |      |      |       |
| G    | G 2             |             |    |     |     |     | ●   |     |     |     |     |      |      |      |      |      |      |       |
| L    | SAE DN 50 (2")  |             |    |     |     |     | ●   | ●   | ●   |     |     |      |      |      |      |      |      |       |
| M    | SAE DN 80 (3")  |             |    |     |     |     |     |     |     | ●   |     |      |      |      |      |      |      |       |
| N*   | G 3             |             |    |     |     |     |     |     |     | ●   |     |      |      |      |      |      |      |       |
| O    | SAE DN 90 (3½") |             |    |     |     |     |     |     |     |     | ●   |      |      |      |      |      |      |       |
| P    | SAE DN 100 (4") |             |    |     |     |     |     |     |     |     |     | ●    |      |      |      |      |      |       |
| R    | DIN DN 100      |             |    |     |     |     |     |     |     |     |     |      | ●    |      |      |      |      |       |
| U    | DIN DN 125      |             |    |     |     |     |     |     |     |     |     |      | ●    |      |      |      |      |       |
| V    | DIN DN 150      |             |    |     |     |     |     |     |     |     |     |      |      | ●    |      |      |      |       |
| W    | DIN DN 200      |             |    |     |     |     |     |     |     |     |     |      |      | ●    |      |      |      |       |
| X    | DIN DN 250      |             |    |     |     |     |     |     |     |     |     |      |      |      | ●    |      | ●    |       |
| Y    | DIN DN 300      |             |    |     |     |     |     |     |     |     |     |      |      |      |      |      | ●    | ●     |

\* This port G3 applies to filter outlet only (filter inlet = SAE DN 80)

**Filtration rating in µm**

ON: 1, 3, 5, 10, 15, 20 P/HC: 10, 20 BN/AM: 3, 10  
 V: 3, 5, 10, 20 W/HC: 25, 50, 100, 200 AM: 40

**Type of clogging indicator**

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

**Type code**

1 standard connection (only RF 30 to 1300)  
 2 RF 2500 to 15000: outlet for each filter element location spigot has threaded connection for pipe extension  
 3 RF 2500 to 15000: common elbow outlet

**Modification number**

X the latest version is always supplied

**Supplementary details**

B cracking pressure of bypass (e.g. B6 = 6 bar, for RF 450/580: B7 = 7 bar)  
 DE differential pressure measurement across element (RF 660, 950, 1300)  
 DH cover plate lifting device (only RF 2500 to 15000)  
 GA mating weld connection flange in steel  
 KB without bypass valve  
 L... light with appropriate voltage (24V, 48V, 110V, 220V)  
 LED 2 light emitting diodes up to 24 Volt  
 O O-ring groove on the DIN inlet flange (only RF 2500 to 15000)  
 T with tank breather filter (only RF 30)  
 V FPM seals

only for clogging indicators  
type D**2.2 REPLACEMENT ELEMENT**

0330 R 010 ON /-V

**Size**

0030, 0060, 0110, 0160, 0240, 0330, 0450, 0580, 0660, 0950, 1300

**Type**

R

**Filtration rating in µm**

ON: 001, 003, 005, 010, 015, 020 P/HC: 010, 020 BN4AM: 003, 010  
 V: 003, 005, 010, 020 W/HC: 025, 050, 100, 200 AM: 040

**Filter material**

ON, V, W/HC, P/HC, BN4AM, AM

**Supplementary details**

V (for descriptions, see point 2.1)

**2.3 REPLACEMENT CLOGGING INDICATOR**

VR 2 D X /-L24

**Type of indicator**

VR return line indicator up to 25 bar operating pressure (for RF 450/580: on request)  
 VM differential pressure indicator (only possible for RF 450/580)

**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)

E 7.116.7/11.16



### 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.

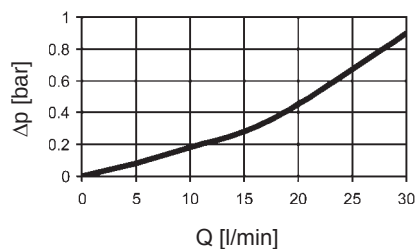
**NEW:** Sizing online at [www.hydac.com](http://www.hydac.com)

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

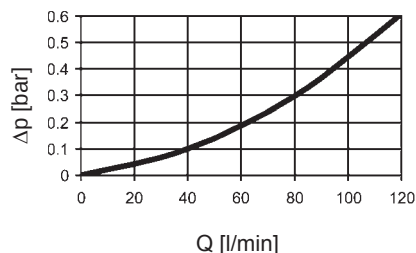
The housing curves apply to mineral oil with a density of 0.86 kg/dm<sup>3</sup> and a kinematic viscosity of 30 mm<sup>2</sup>/s.

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

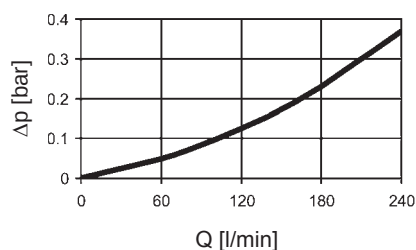
RF 30



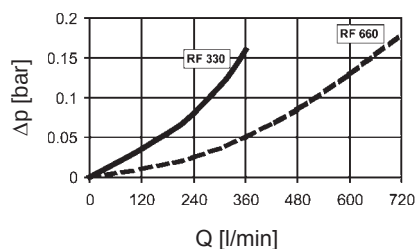
RF 60, 110



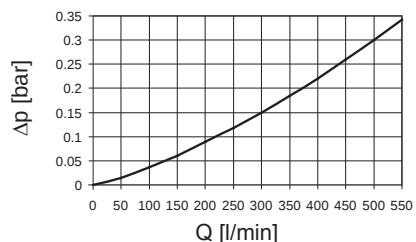
RF 160, 240



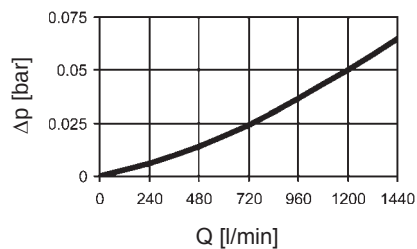
RF 330, 660



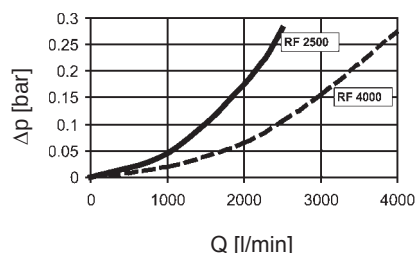
RF 450, 580



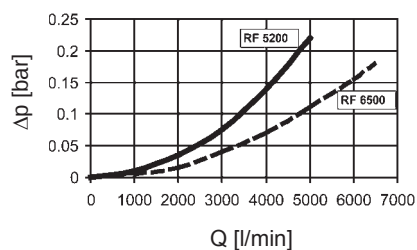
RF 950, 1300



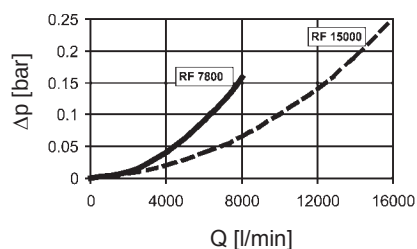
RF 2500, 4000



RF 5200, 6500



RF 7800, 15000



### 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.

| RF   | ON   |      |      |       |       |       |
|------|------|------|------|-------|-------|-------|
|      | 1 µm | 3 µm | 5 µm | 10 µm | 15 µm | 20 µm |
| 30   | 89.8 | 68.4 | 43.9 | 26.8  | 16.8  | 14.7  |
| 60   | 47.2 | 23.6 | 17.2 | 9.82  | 9.01  | 6.85  |
| 110  | 22.3 | 13.1 | 8.87 | 5.40  | 4.26  | 3.24  |
| 160  | 16.0 | 8.00 | 5.68 | 3.22  | 2.69  | 2.32  |
| 240  | 10.4 | 5.18 | 3.66 | 2.27  | 1.84  | 1.41  |
| 330  | 8.09 | 3.72 | 2.73 | 1.48  | 1.28  | 1.02  |
| 450  | 6.33 | 3.17 | 2.30 | 1.40  | 1.00  | 0.85  |
| 580  | 2.49 | 1.23 | 0.90 | 0.53  | 0.40  | 0.34  |
| 660  | 3.57 | 1.69 | 1.21 | 0.67  | 0.57  | 0.45  |
| 950  | 2.39 | 1.03 | 0.79 | 0.48  | 0.38  | 0.31  |
| 1300 | 1.72 | 0.72 | 0.59 | 0.35  | 0.32  | 0.22  |

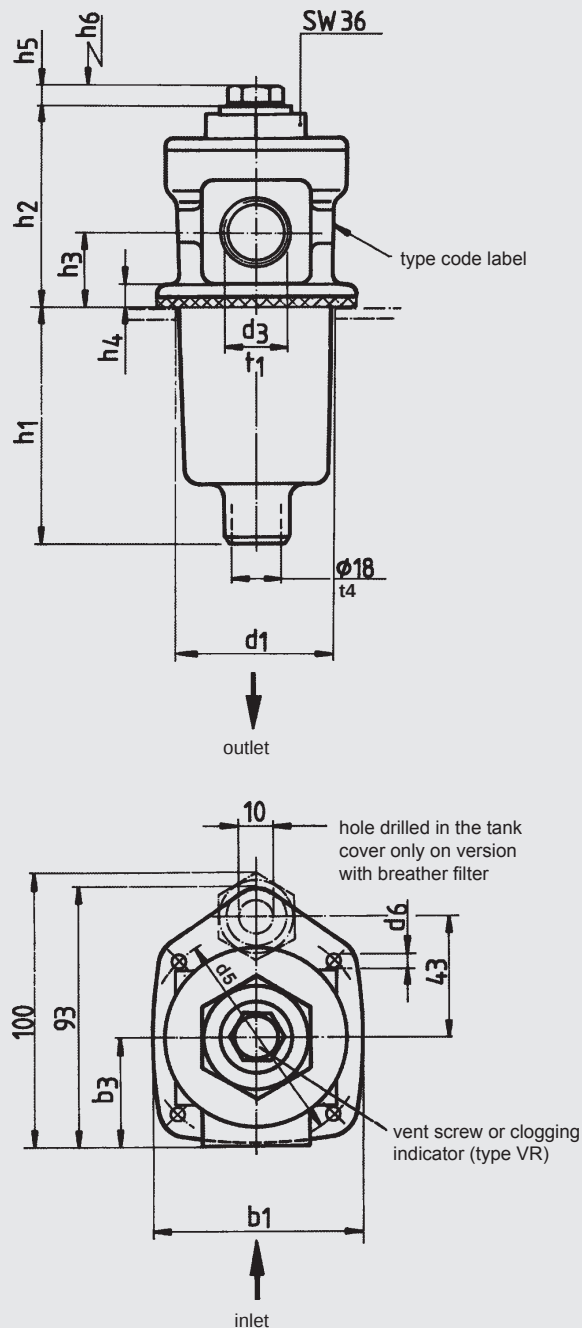
| RF   | V    |      |       |       | W/HC  |
|------|------|------|-------|-------|-------|
|      | 3 µm | 5 µm | 10 µm | 20 µm |       |
| 30   | 19.4 | 14.2 | 7.9   | 3.8   | –     |
| 60   | 15.9 | 9.3  | 5.4   | 3.3   | 0.611 |
| 110  | 7.6  | 5.1  | 3.0   | 2.0   | 0.30  |
| 160  | 4.9  | 3.5  | 2.4   | 1.5   | 0.193 |
| 240  | 3.2  | 2.6  | 1.7   | 1.2   | 0.123 |
| 330  | 2.1  | 1.7  | 1.1   | 0.8   | 0.195 |
| 450  | 1.7  | 1.3  | 0.9   | 0.6   | 0.165 |
| 580  | 0.7  | 0.5  | 0.3   | 0.3   | 0.065 |
| 660  | 1.0  | 0.8  | 0.6   | 0.4   | 0.067 |
| 950  | 0.7  | 0.6  | 0.4   | 0.2   | 0.048 |
| 1300 | 0.5  | 0.4  | 0.3   | 0.2   | 0.034 |

## 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.
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.

RF 30

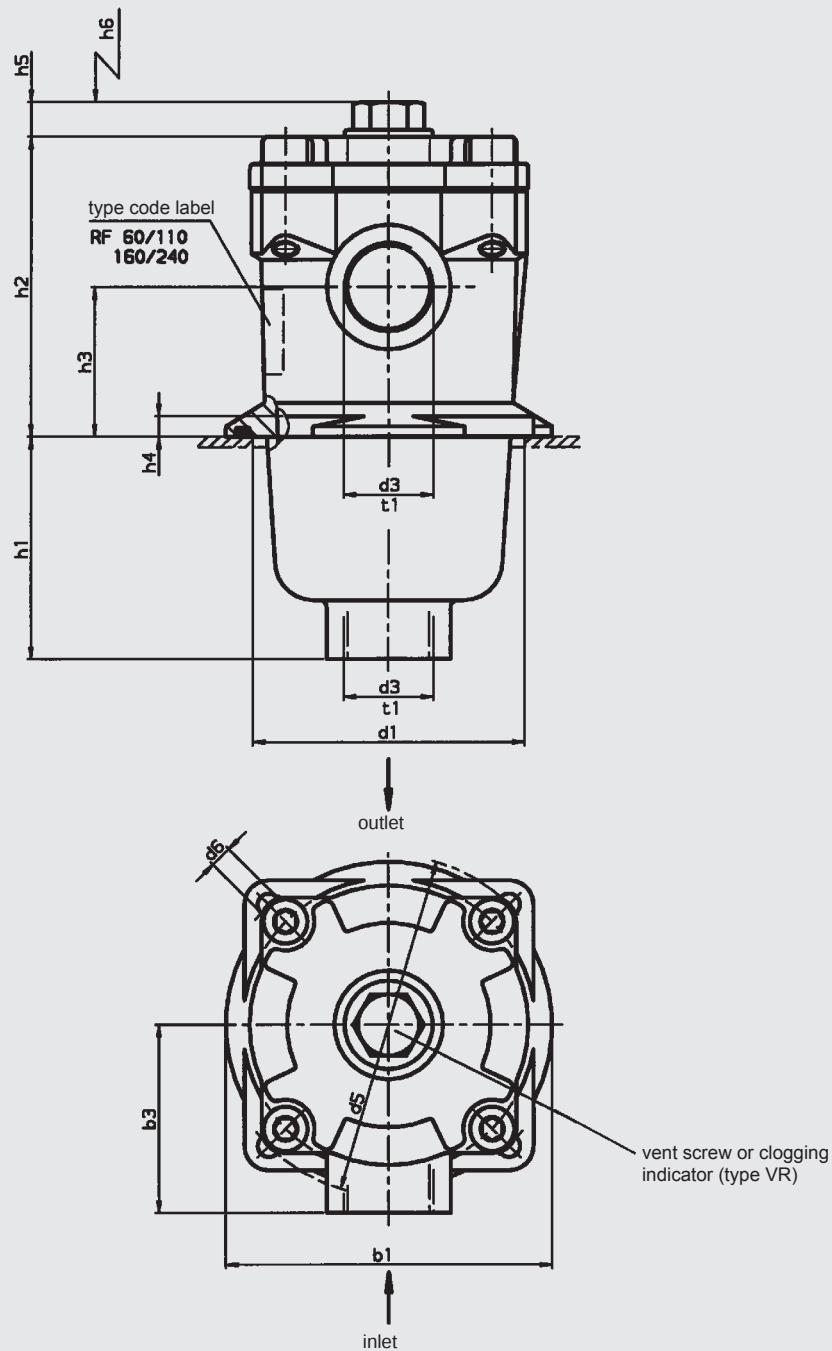


| RF | b1 | b3 | d1 | d3 <sup>1)</sup> | d5 | d6 <sup>2)</sup> | h1 | h2 | h3 | h4 | h5 | h6 | t1 | t4 | Weight including element [kg] | Volume of pressure chamber [l] |
|----|----|----|----|------------------|----|------------------|----|----|----|----|----|----|----|----|-------------------------------|--------------------------------|
| 30 | 71 | 38 | 60 | G ½              | 78 | M4               | 86 | 70 | 27 | 8  | 11 | 90 | 14 | 14 | 0.4                           | 0.18                           |

<sup>1)</sup> Threaded port to ISO 228 / <sup>2)</sup> Mounting hole for screw

E 7.116.7/11.16

RF 60-240



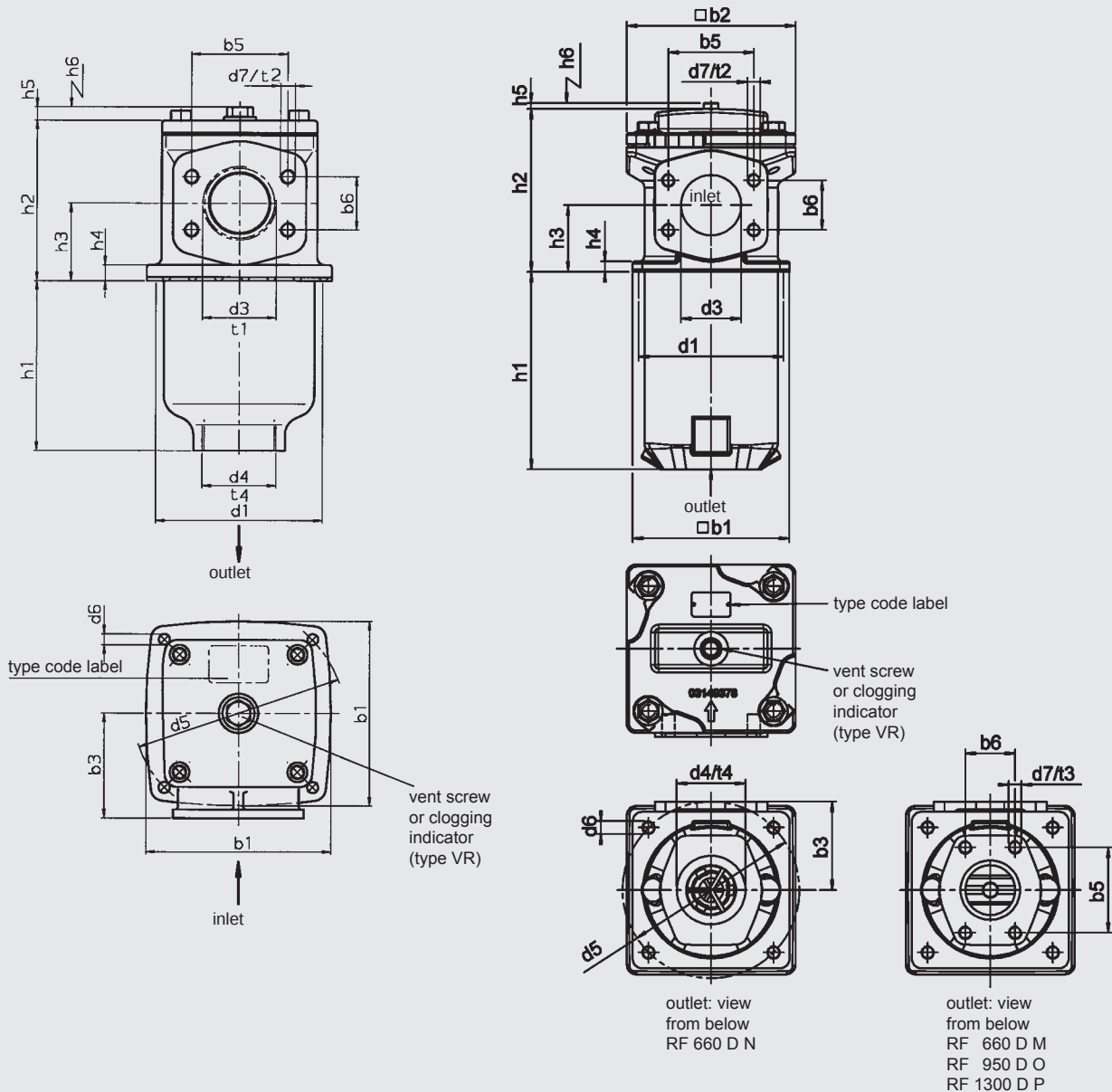
| RF  | b1  | b3 | d1  | d3 <sup>1)</sup> | d5  | d6 <sup>2)</sup> | h1  | h2  | h3 | h4 | h5 | h6  | t1 | t4 | Weight including element [kg] | Volume of pressure chamber [l] |
|-----|-----|----|-----|------------------|-----|------------------|-----|-----|----|----|----|-----|----|----|-------------------------------|--------------------------------|
| 60  | 96  | 55 | 80  | G 3/4            | 100 | M5               | 66  | 88  | 44 | 6  | 12 | 80  | 17 | -  | 0.9                           | 0.40                           |
| 110 | 96  | 55 | 80  | G 3/4            | 100 | M5               | 133 | 88  | 44 | 6  | 12 | 145 | 17 | -  | 1.1                           | 0.60                           |
| 160 | 126 | 72 | 106 | G 1 1/4          | 135 | M6               | 89  | 108 | 54 | 6  | 12 | 120 | 20 | -  | 1.8                           | 1.00                           |
| 240 | 126 | 72 | 106 | G 1 1/4          | 135 | M6               | 150 | 108 | 54 | 6  | 12 | 180 | 20 | -  | 2.2                           | 1.40                           |

<sup>1)</sup> Threaded port to ISO 228 / <sup>2)</sup> Mounting hole for screw

E 7.116.7/11.16

RF 330

RF 660 - 1300

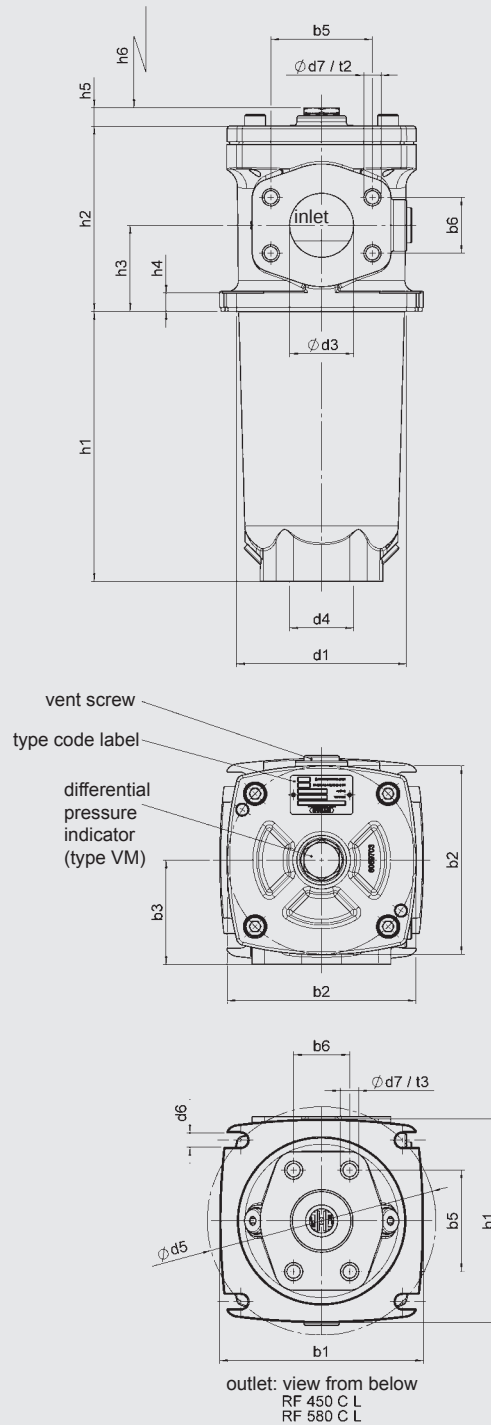


| RF   | b1  | b2  | b3  | b5    | b6   | d1  | d3                   | d4                   | d5  | d6 <sup>1)</sup> | d7  | h1    | h2  | h3  | h4 | h5 | h6  | t1 | t2 | t3 | t4 | Weight<br>including<br>element<br>[kg] | Volume<br>of pressure<br>chamber<br>[l] |
|------|-----|-----|-----|-------|------|-----|----------------------|----------------------|-----|------------------|-----|-------|-----|-----|----|----|-----|----|----|----|----|----------------------------------------|-----------------------------------------|
| 330  | 150 | 126 | 85  | 77.8  | 42.9 | 135 | G2<br>SAE DN 50 (2") | G2                   | 170 | M8               | M12 | 139   | 130 | 63  | 13 | 12 | 180 | 27 | 23 | -  | 27 | 4.1                                    | 2.0                                     |
| 660  | 195 | 210 | 110 | 106.4 | 61.9 | 180 | SAE DN 80 (3")       | G3<br>SAE DN 80 (3") | 220 | M12              | M16 | 246   | 203 | 83  | 13 | 8  | 320 | -  | 28 | 18 | 28 | 31.0                                   | 6.8                                     |
| 950  | 250 | 244 | 135 | 120.7 | 69.9 | 208 | SAE DN 90 (3½")      | SAE DN 90 (3½")      | 290 | M16              | M16 | 252.5 | 225 | 93  | 13 | 8  | 385 | -  | 20 | 20 | -  | 44.5                                   | 10.3                                    |
| 1300 | 250 | 244 | 145 | 130.2 | 77.8 | 208 | SAE DN 100 (4")      | SAE DN 100 (4")      | 290 | M16              | M16 | 330.5 | 269 | 121 | 13 | 8  | 485 | -  | 20 | 20 | -  | 52.5                                   | 13.5                                    |

 Filter connection for SAE flanges to SAE-J 518c / 3000 PSI / <sup>1)</sup> Mounting hole for screw

E 7.116.7/11.16

RF 450 / 580

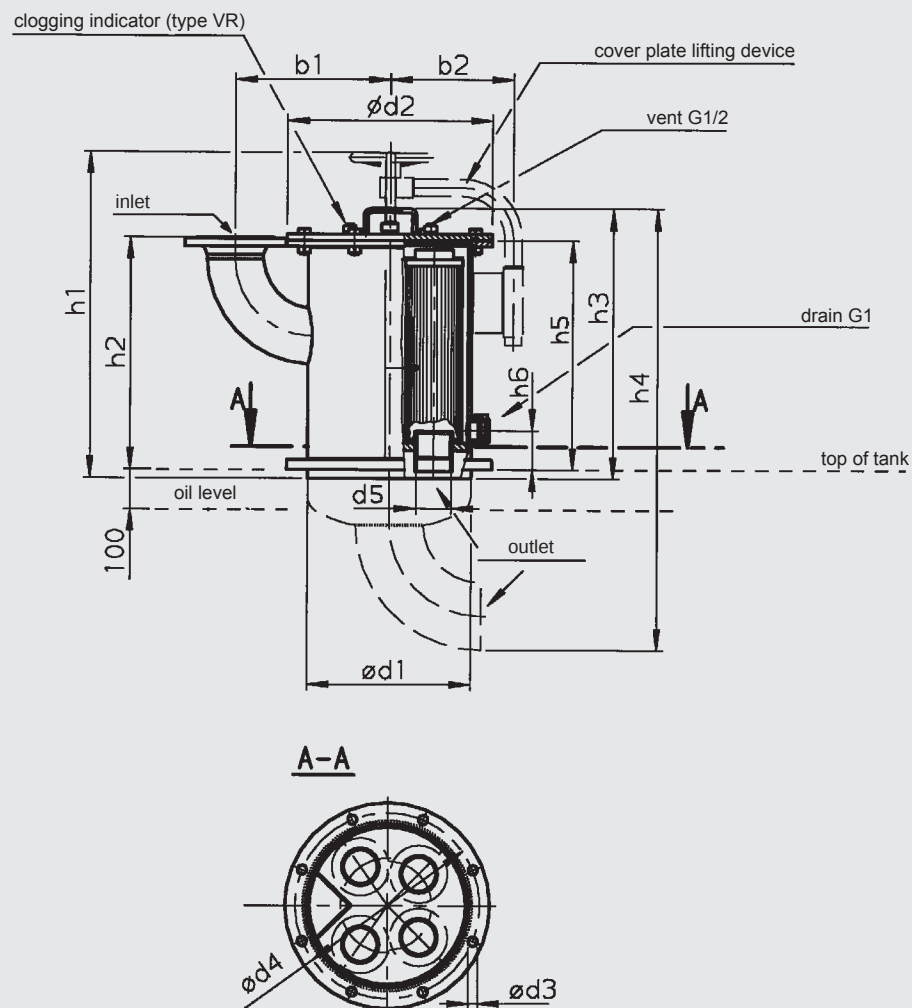


| RF  | b1  | b2    | b3 | b5   | b6   | d1  | d3             | d4             | d5  | d6 <sup>1)</sup> | d7  | h1  | h2  | h3 | h4 | h5 | h6  | t1 | t2 | t3 | t4 | Weight<br>incl.<br>element<br>[kg] | Volume<br>of<br>pressure<br>chamber<br>[l] |
|-----|-----|-------|----|------|------|-----|----------------|----------------|-----|------------------|-----|-----|-----|----|----|----|-----|----|----|----|----|------------------------------------|--------------------------------------------|
| 450 | 156 | 144.5 | 80 | 77.8 | 42.9 | 130 | SAE DN 50 (2") | SAE DN 50 (2") | 175 | M10              | M12 | 207 | 142 | 66 | 14 | 14 | 345 | -  | 22 | 22 | -  | 6.6                                | 2.7                                        |
| 580 | 156 | 144.5 | 80 | 77.8 | 42.9 | 130 | SAE DN 50 (2") | SAE DN 50 (2") | 175 | M10              | M12 | 507 | 142 | 66 | 14 | 14 | 645 | -  | 22 | 22 | -  | 9.4                                | 4.7                                        |

 Filter connection for SAE flanges to SAE-J 518c / 3000 PSI / <sup>1)</sup> Mounting hole for screw

E 7.116.7/11.16

RF 2500 - 15000



dimension h4 on request!

| RF    | Flange connection | h1  | h2  | h3  | h5  | h6 | b1  | b2  | d1  | d2  | d3 | d4  | d5 | No. of cover plate screws | Weight including element [kg] | Volume of pressure chamber [l] |
|-------|-------------------|-----|-----|-----|-----|----|-----|-----|-----|-----|----|-----|----|---------------------------|-------------------------------|--------------------------------|
| 2500  | DIN DN 100        | 732 | 578 | 590 | 496 | 84 | 395 | 240 | 273 | 360 | 18 | 320 | G2 | 8                         | 55.3                          | 26.0                           |
|       | DIN DN 125        |     | 505 |     |     |    | 317 |     |     |     |    |     |    |                           | 58.3                          | 29.0                           |
| 4000  | DIN DN 125        | 738 | 501 | 596 | 496 | 84 | 355 | 282 | 356 | 450 | 18 | 410 | G2 | 12                        | 97.3                          | 44.0                           |
|       | DIN DN 150        |     | 540 |     |     |    | 388 |     |     |     |    |     |    |                           | 101.3                         | 48.0                           |
| 5200  | DIN DN 125        | 812 | 576 | 670 | 571 | 84 | 382 | 308 | 406 | 510 | 23 | 460 | G3 | 8                         | 119.1                         | 64.0                           |
|       | DIN DN 150        |     | 615 |     |     |    | 416 |     |     |     |    |     |    |                           | 126.1                         | 68.0                           |
| 6500  | DIN DN 150        | 817 | 615 | 680 | 571 | 84 | 470 | 358 | 508 | 620 | 26 | 572 | G3 | 8                         | 175.1                         | 98.0                           |
|       | DIN DN 200        |     | 720 |     |     |    | 535 |     |     |     |    |     |    |                           | 186.1                         | 108.0                          |
| 7800  | DIN DN 200        | 817 | 720 | 680 | 571 | 84 | 535 | 358 | 508 | 620 | 26 | 572 | G3 | 8                         | 187.1                         | 108.0                          |
|       | DIN DN 250        |     | 800 |     |     |    | 605 |     |     |     |    |     |    |                           | 202.1                         | 126.0                          |
| 15000 | DIN DN 250        | 817 | 800 | 709 | 571 | 84 | 712 | 460 | 711 | 840 | 26 | 780 | G3 | 12                        | 329.1                         | 224.0                          |
|       | DIN DN 300        |     | 866 |     |     |    | 777 |     |     |     |    |     |    |                           | 382.1                         | 247.0                          |



## NOTES

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