

HYDAC

INTERNATIONAL

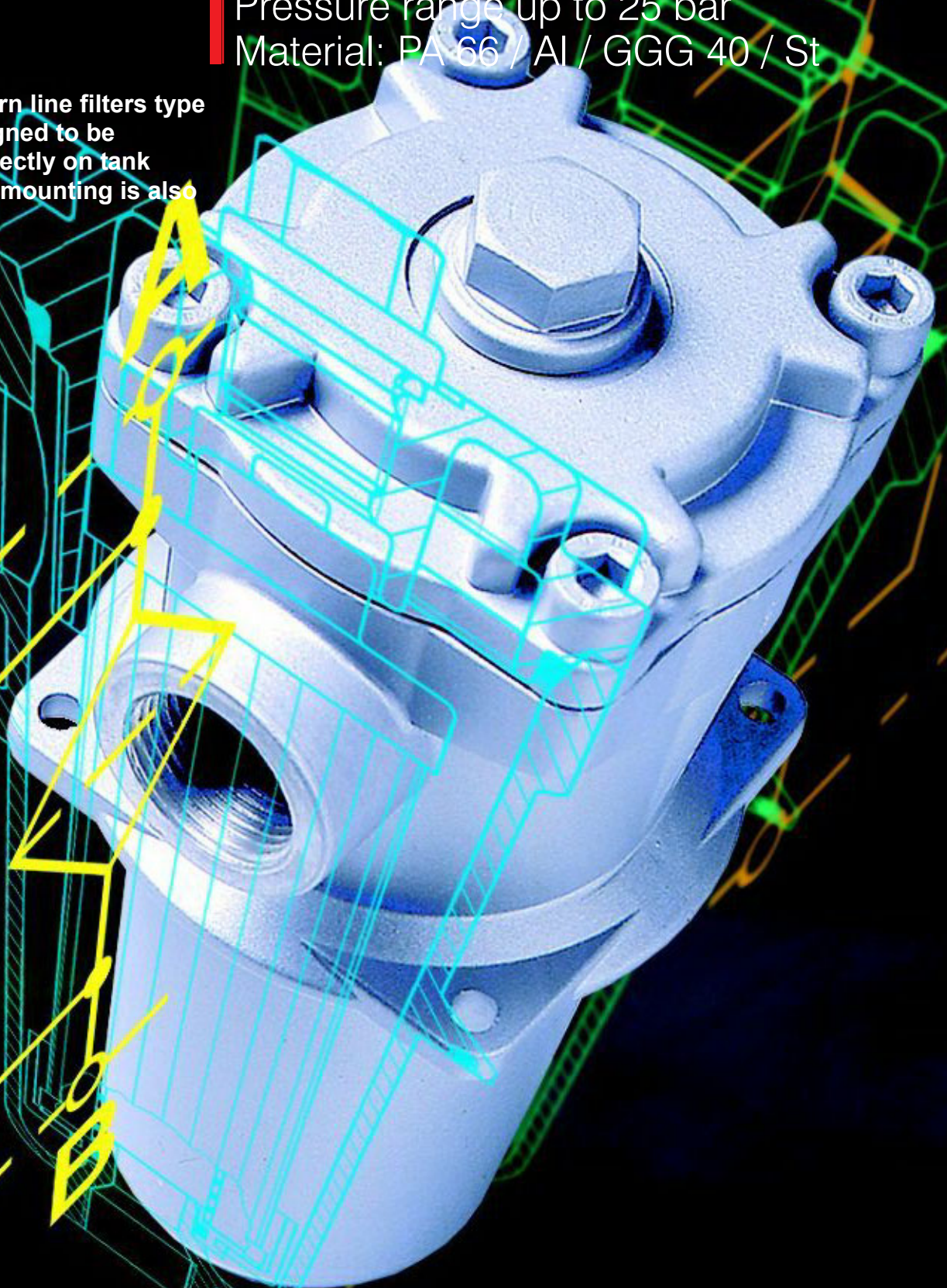
Return Line Filter RF

Flow rates up to 15,000 l/min

Pressure range up to 25 bar

Material: PA 66 / Al / GGG 40 / St

HYDAC return line filters type RF are designed to be mounted directly on tank tops. Inline mounting is also possible.



1. TECHNICAL SPECIFICATIONS

1.1. FILTER HOUSING

Construction

The return line filter consists of a one-piece housing with bolt-on cover plate.

A connection for a clogging indicator is standard.

The filter is designed to be used in hydraulic tanks to DIN 24339, cover plate Form C.

1.2. FILTER ELEMENTS

Original Hydac filter elements guarantee reliable function and protect hydraulic components and systems which are sensitive to contamination from wear and tear. Performance and quality tests according to international standards guarantee reliable operation of the filter.

HYDAC filters are validated and their quality is continuously monitored according to the following standards:

- DIN ISO 2941:
Verification of collapse / burst resistance
- DIN ISO 2942:
Verification of fabrication integrity and determination of first bubble point
- DIN ISO 2943:
Verification of material compatibility with fluids
- ISO 3724:
Verification of flow fatigue characteristics
- ISO 3968:
Evaluation of pressure drop versus flow characteristics
- ISO 4572/ISO16889:
Multi-pass method for evaluating filtration performance

In addition to guaranteeing retention and flow rate characteristics, the filter elements have excellent structural stability. The careful construction and mechanically stable support of the filter media guarantee above-average beta value stability and flow fatigue characteristics of the filter elements.

The filter elements are available with the following collapse/burst stability values:

| | |
|-----------------------------------|-----------|
| Betamicon®(BN3HC) | : 25 bar |
| Paper (P/HC) | : 10 bar |
| Wire mesh (W/HC) | : 30 bar |
| Stainless steel fibre (V) | : 210 bar |
| Betamicon®/ Aquamicron®(BN/AM) | : 10 bar |
| Aquamicron® (AM) | : 10 bar |

Note:

When changing from the old BN, P, W and V elements to BN3HC, P/HC, W/HC and V/HC elements, the contamination retainer must also be changed.

1.3. CLOGGING INDICATORS

Type of indicator

VR = return line indicator

Pressure setting

2 = 2 bar standard

Indicator type code

B. = visual

C. = electrical

D. = visual/electrical

Modification number

X = the latest version is always supplied

Supplementary details

-V = FPM seals, filter suitable for rapidly biodegradable oils and phosphate ester (HFD-R)

-LED= 2 light-emitting diodes up to 24 volt

-L... = light with corresponding voltage (24, 48, 110, 220 volt)

For further details on clogging indicators, please see:

Brochure no.: E 7.050../..

1.4. SEALS

Choice of Perbunan (NBR) or Viton (FPM) for HFD fluids

1.5. SPECIAL MODELS AND ACCESSORIES

- Filter housing for sizes 60, 160 and 330 in GGG 40 (SG iron)
- Filter housing surface electro-less nickel-plated (only possible on GGG 40)
- On sizes 2500 and over, supplied with cover plate lifting device
- Mating flanges available for filters from size 330 and above

1.6. SPARE PARTS

See Original Spare Parts List and Maintenance Instructions, **brochure no. E 7.103.E./..**

1.7. COMPATIBILITY WITH OPERATING FLUIDS

DIN ISO 2943:

- Hydraulic oils H to HLPD to DIN 51524
- Lubrication oils to DIN 51517, APJ, ACEA, DIN 51515, ISO 6743
- Compressor oils to DIN 51506
- Rapidly biodegradable operating fluids to VDMA 24568 HETG, HEES, HEPG
- Non-flam operating fluids HFC and HFD
- Operating fluids with high water content (>50 % water content) on request

For further details on filter elements:

Brochure no.: E 7.200../..

2. GENERAL

Mounting

Tank-top filter or inline filter

Direction of flow

Inlet: side

Outlet: vertically down

Temperature range

-10 °C ... +100 °C

Other temperature ranges on request

Pressure setting of the return line indicator

$\Delta p_a = 2 \text{ bar} - 0.2 \text{ bar}$

(compared to atmospheric pressure)

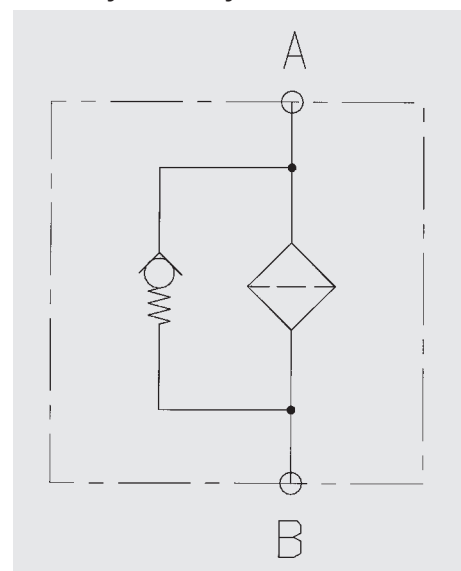
Other pressure settings on request

Cracking pressure of bypass valve

$\Delta p_o = 3 \text{ bar} + 0.5 \text{ bar}$

Other cracking pressures on request

Hydraulic symbol



3. MODEL CODE (also order example)

3.1. COMPLETE FILTER

RF BN/HC 330 D L 10 D 1 .X /-L24

Filter type

Filter material of element

BN/HC Betamicon® (BN3HC)
 AM Aquamicon®
 BN/AM Betamicon®/Aquamicon®
 P/HC paper
 W/HC stainless steel wire mesh
 V stainless steel fibre

Size / Housing material

PA 66: 30
 Al: 60, 110, 160, 240, 330
 SG iron (GGG40): 660, 950, 1300
 Welded steel: 2500, 4000, 5200, 6500, 7800, 15000

Operating pressure

B = 10 bar (Size 30, 2500 - 15000)
 D = 25 bar (Size 60 - 1300)

Type of connection / Connection size

| Code | Type of connection | Filter size | | | | | | | | | | | | | | |
|------|-------------------------------------|-------------|----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|-------|
| | | 30 | 60 | 110 | 160 | 240 | 330 | 660 | 950 | 1300 | 2500 | 4000 | 5200 | 6500 | 7800 | 15000 |
| B | G ½ | • | | | | | | | | | | | | | | |
| C | G ¾ | | • | • | | | | | | | | | | | | |
| E | G 1 ¼ | | | | • | • | | | | | | | | | | |
| G | G 2 | | | | | | • | | | | | | | | | |
| L | SAE DN 50 (2") | | | | | | • | | | | | | | | | |
| N | SAE DN 80 (3") | | | | | | | • | | | | | | | | |
| O | SAE DN 90 (3 1/2") | | | | | | | | • | | | | | | | |
| 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 | | | | | | | | | | | | | | | • |
| Z | According to customer specification | | | | | | | | | | | | | | | |

Filtration rating in µm

BN3HC, V: 3, 5, 10, 20
 BN/AM : 3, 10
 P/HC : 10, 20
 W/HC : 25, 50, 100, 200
 AM : 40

Type of clogging indicator

Y with plastic blanking plug in indicator port
 A with steel blanking plug in indicator port
 B with visual indicator
 C with electrical indicator
 D with combined visual/electrical indicator

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

Type code

1 standard connection
 2 size 2500 – 15000: outlet for each filter element location spigot with threaded connection for pipe extension
 3 size 2500 – 15000: common elbow outlet

Modification number

X the latest version is always supplied

Supplementary details

V FPM seals, filter suitable for rapidly biodegradable oils and phosphate ester (HFD-R)
 L... light with corresponding voltage (24V, 48V, 110V, 220V)
 LED 2 light-emitting diodes up to 24 volt
 KB without bypass valve
 B. special cracking pressure of the bypass valve (B1 = 1 bar, B6 = 6 bar)
 T with tank breather filter (only on size 30)
 DH cover plate lifting device (only for sizes 2500 to 15000)
 OR O-ring groove on the DIN inlet flange (only for sizes 2500 to 15000)
 GA mating weld connection flange

only on clogging indicators type D

3.2. REPLACEMENT ELEMENT

0330 R 010 BN3HC /-KB

Size

0030, 0060, 0110, 0160, 0240,
0330, 0660, 0850, 0950, 1300

Type

R

Filtration rating in μm

BN3HC, V: 3, 5, 10, 20

BN/AM : 3, 10

P/HC : 10, 20

W/HC : 25, 50, 100, 200

AM : 40

Filter material

BN3HC, V, BN/AM, P/HC, W/HC, AM

Supplementary details

V = FPM seals, filter suitable for rapidly biodegradable oils and phosphate ester (HFD-R)

W = NBR seals, filter suitable for oil-water emulsions (HFA, HFC) (only for V and W/HC elements)

KB = without bypass valve

B. = special bypass cracking pressure (B1 = 1 bar, B6 = 6 bar)

4. FILTER SPECIFICATIONS

| Filter type | Connection | Element size | Number of elements | Weight [kg] with element(s) |
|-------------|--------------------|--------------|--------------------|-----------------------------|
| 30 | G ½ | 0030 R... | 1 | 0.4 |
| 60 | G ¾ | 0060 R... | 1 | 0.9 |
| 110 | G ¾ | 0110 R... | 1 | 1.1 |
| 160 | G 1¼ | 0160 R... | 1 | 1.8 |
| 240 | G 1¼ | 0240 R... | 1 | 2.2 |
| 330 | G2 | 0330 R... | 1 | 4.1 |
| | SAE DN 50 (2") | | | 4.1 |
| 660 | SAE DN 80 (3") | 0660 R... | 1 | 20.0 |
| 950 | SAE DN 90 (3 1/2") | 0950 R... | 1 | 41.5 |
| 1300 | SAE DN 100 (4") | 1300 R... | 1 | 46.0 |
| 2500 | DIN DN 100 | 0850 R... | 3 | 55.3 |
| | DIN DN 125 | | | 58.3 |
| 4000 | DIN DN 125 | 0850 R... | 5 | 97.3 |
| | DIN DN 150 | | | 101.3 |
| 5200 | DIN DN 125 | 1300 R... | 4 | 119.1 |
| | DIN DN 150 | | | 126.1 |
| 6500 | DIN DN 150 | 1300 R... | 5 | 175.1 |
| | DIN DN 200 | | | 186.1 |
| 7800 | DIN DN 200 | 1300 R... | 6 | 187.1 |
| | DIN DN 250 | | | 202.1 |
| 15000 | DIN DN 250 | 1300 R... | 10 | 329.1 |
| | DIN DN 300 | | | 382.1 |

5. FILTER CALCULATION / SIZING

The total pressure drop of a filter at a certain flow rate is the sum of the housing Δp and the element Δp .

The pressure drop can either be determined with the aid of our FSP Filter Sizing Program, which can be ordered via our website www.hydac.com, or by using the following graphs.

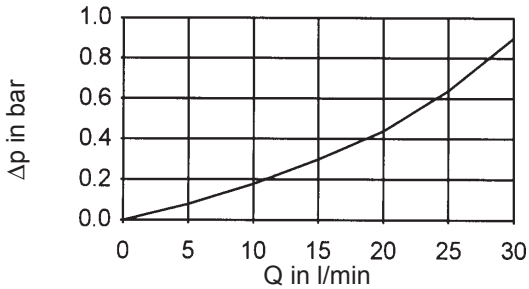
5.1. Δp -Q HOUSING GRAPHS TO ISO 3968

The housing graphs apply to mineral oil with a density of 0.86 kg/dm^3 and a kinematic viscosity of $30 \text{ mm}^2/\text{s}$ for, in each case, the largest nominal width per size.

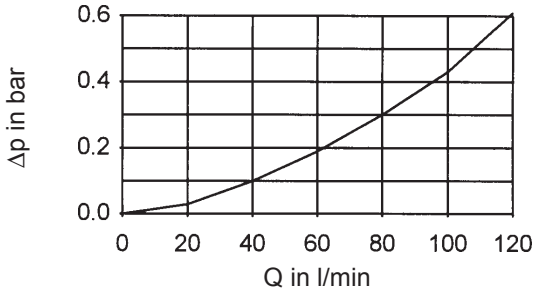
For turbulent flows, the differential pressure changes proportionally to the density.

For laminar flows it changes proportionally to the density and the viscosity.

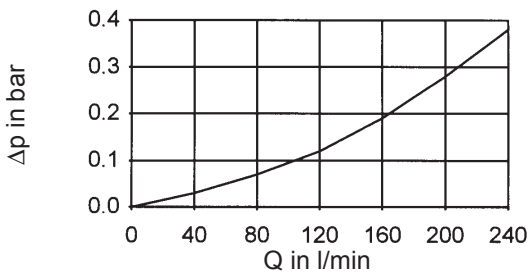
RF 30



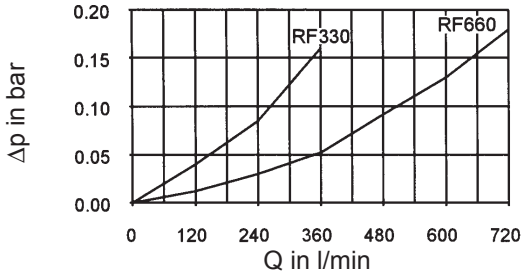
RF 60/110



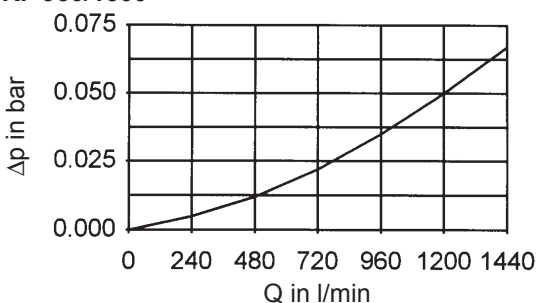
RF 160/240



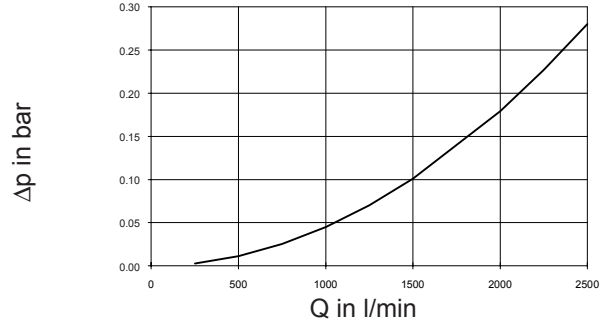
RF 330/660



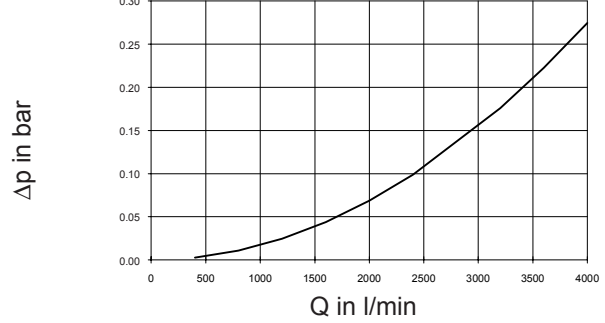
RF 950/1300



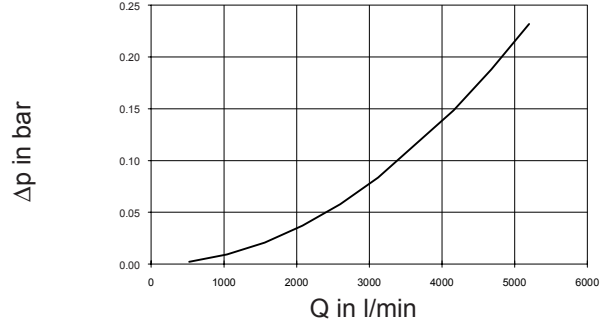
RF 2500



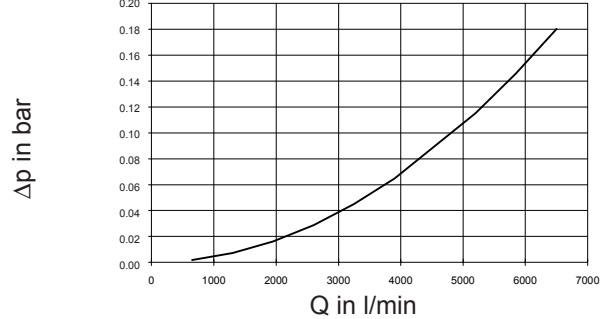
RF 4000



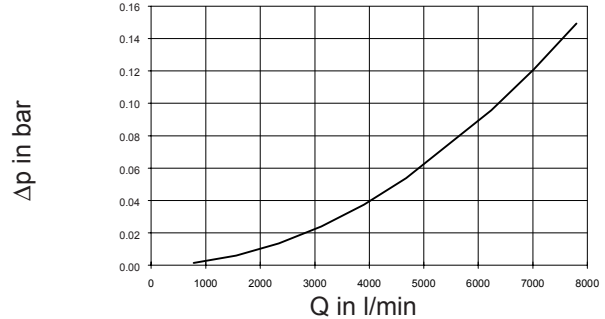
RF 5200



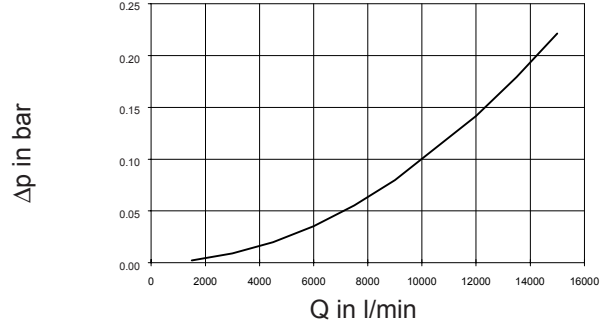
RF 6500



RF 7800

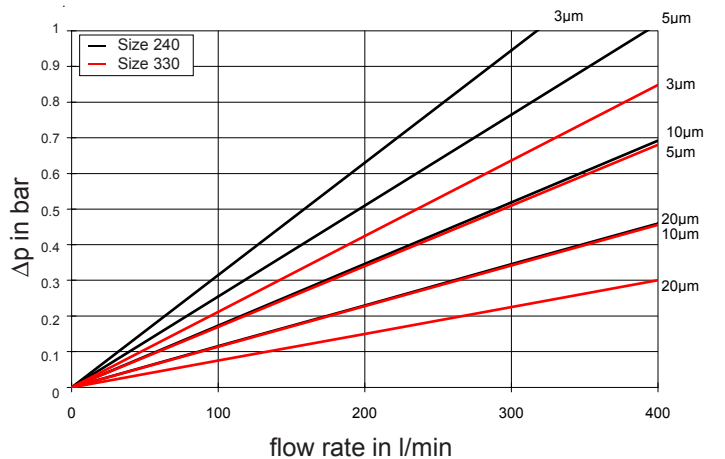
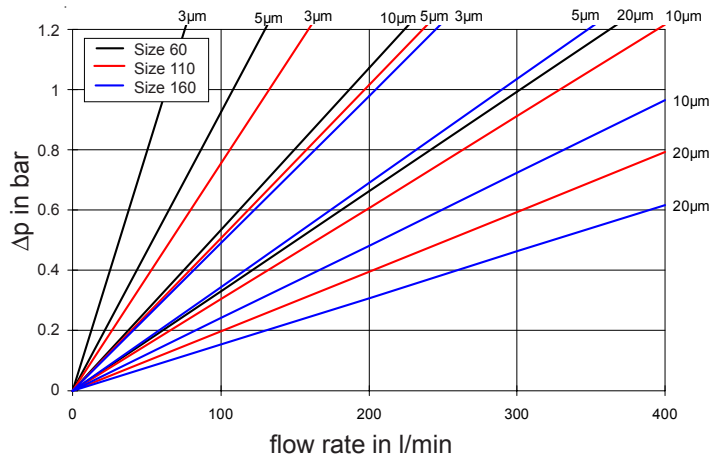
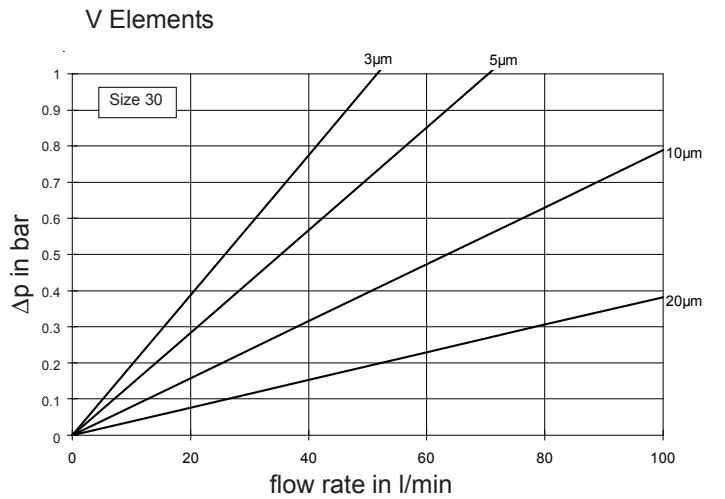
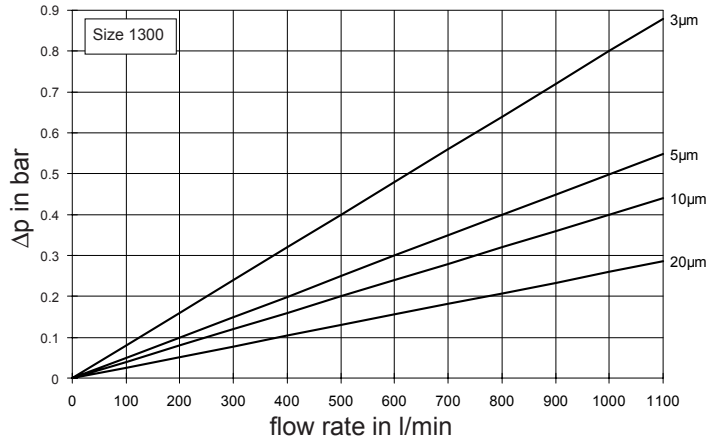
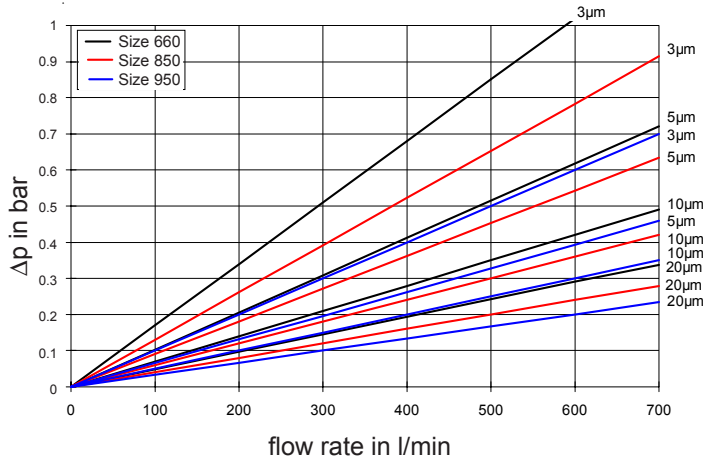
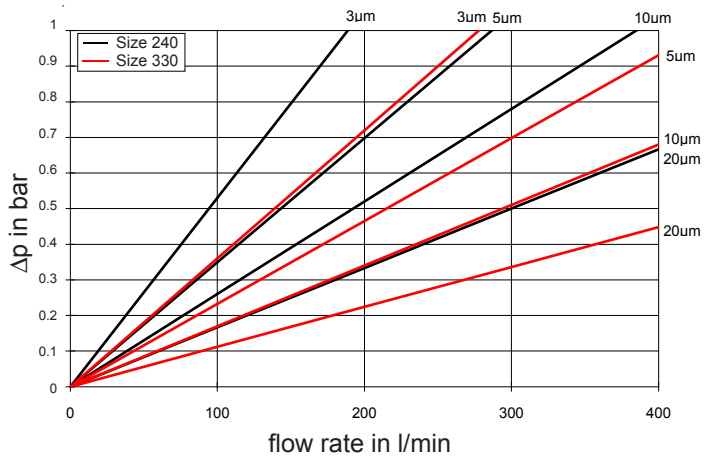
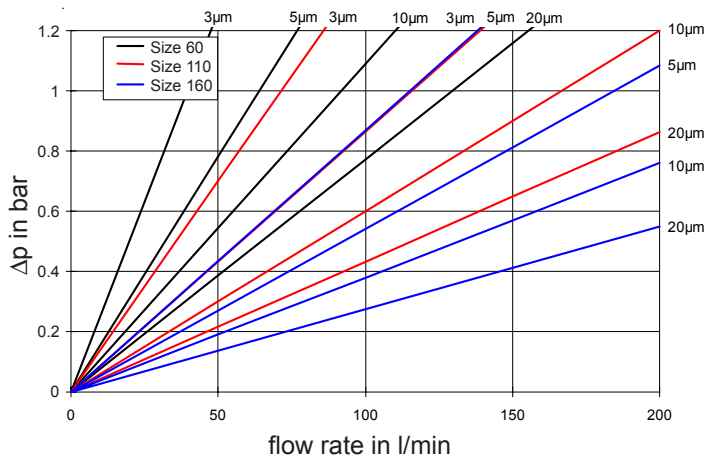
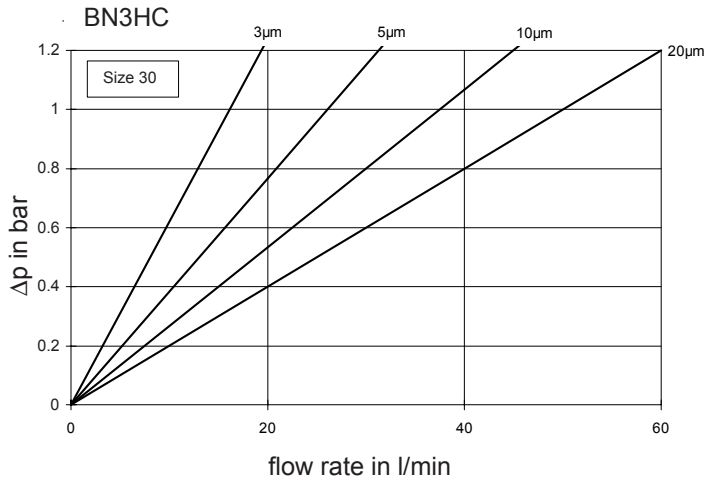


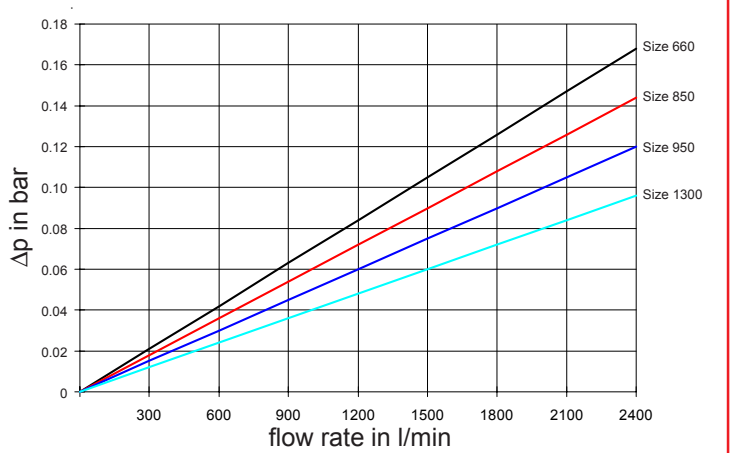
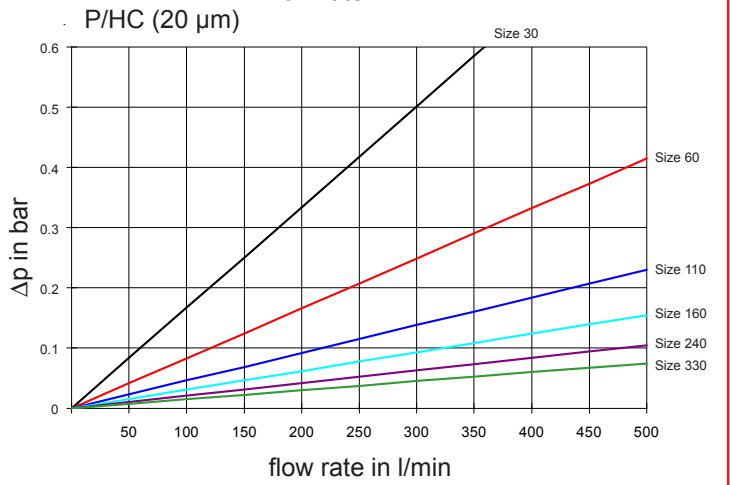
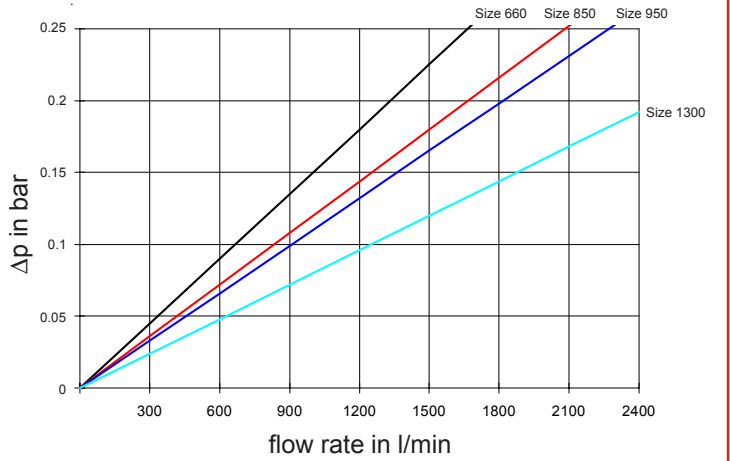
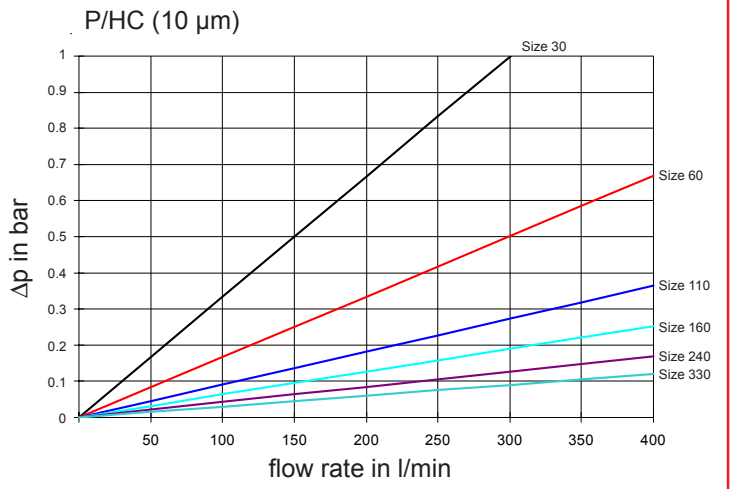
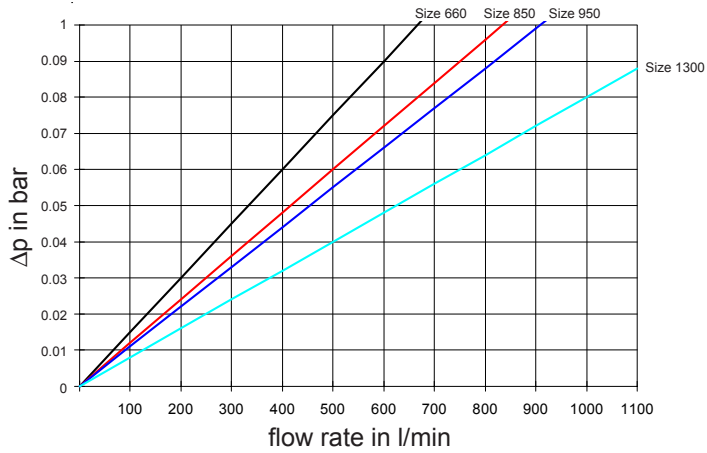
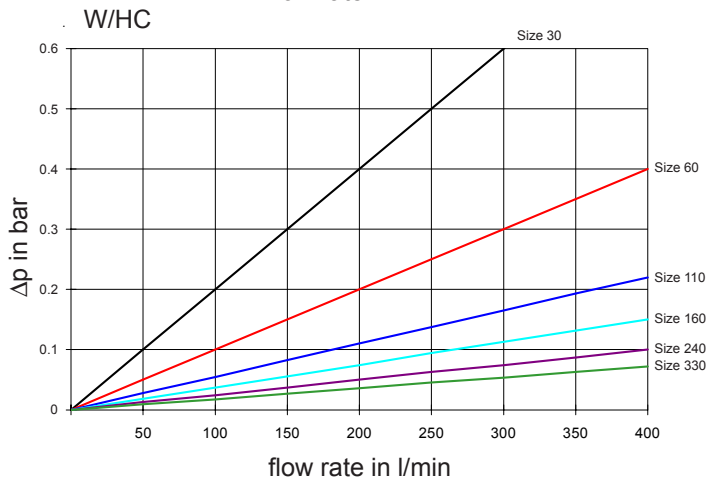
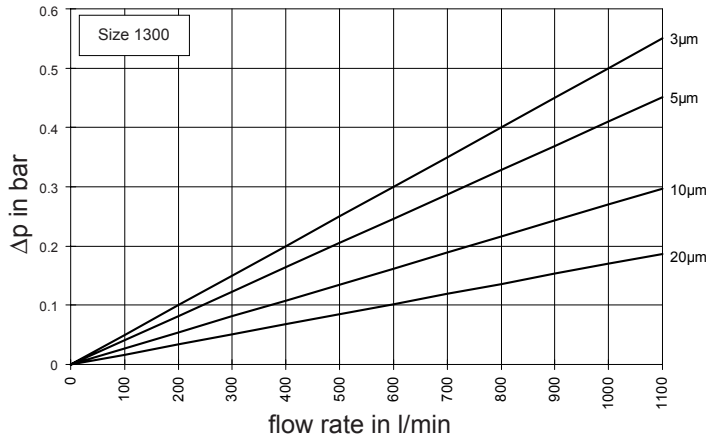
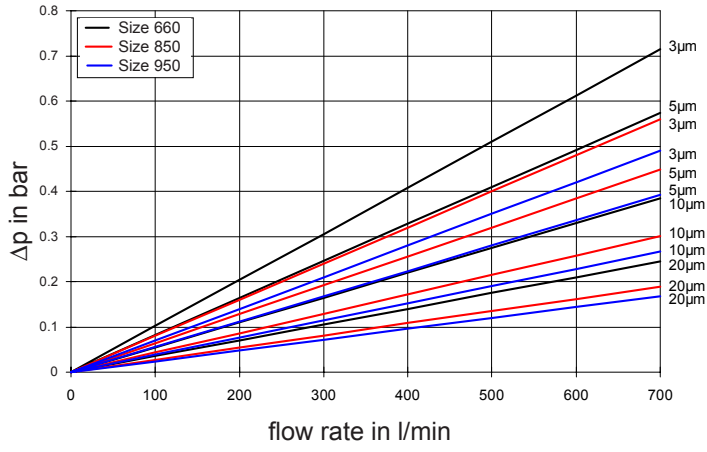
RF 15000



5.2. Δp -Q GRAPHS - FILTER ELEMENTS

The element graphs apply to mineral oil with a kinematic viscosity of 30 mm²/s. The pressure drop changes proportionally to the change in viscosity (see Example 5.3.).





5.3. EXAMPLE

General

$$\Delta p_{\text{total}} = \Delta p_{\text{housing}} + \Delta p_{\text{element}} \cdot \frac{\text{viscosity (mm}^2/\text{s)}}{30 \text{ mm}^2/\text{s}}$$

$\Delta p_{\text{housing}}$ = to be determined from point 5.1.

$\Delta p_{\text{element}}$ = element pressure drop at flow rate Q/n and viscosity $30 \text{ mm}^2/\text{s}$ according to point 5.2.

n = number of elements according to table at Point 4, Filter specifications

Example

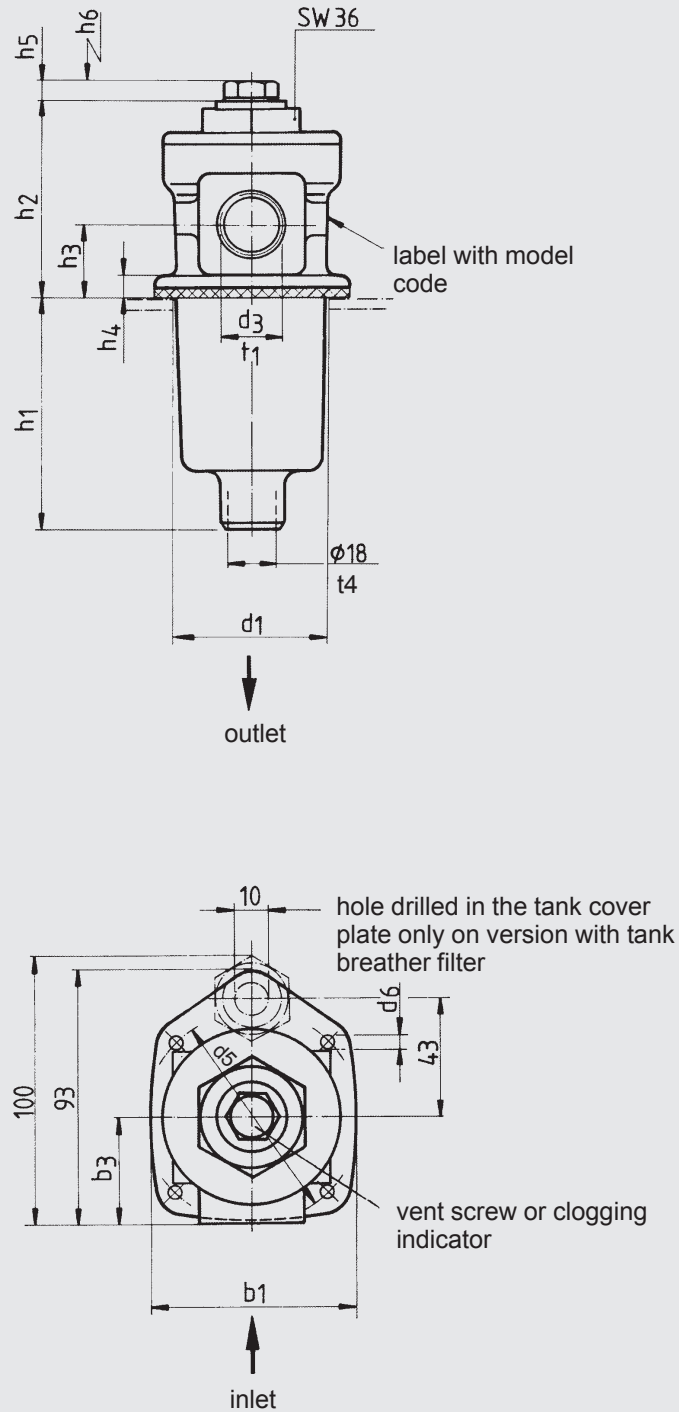
System data: RF110 with BN3HC element (10 μm)
viscosity = 46 mm^2/s
(ISO VG 46 at 40 °C)
 $Q = 50 \text{ l/min}$

$$\Rightarrow \begin{aligned} \Delta p_{\text{housing}} &= 0.13 \text{ bar (at } Q) \\ \Delta p_{\text{element}} &= 0.46 \text{ bar} \\ \Delta p_{\text{total}} &= \underline{0.59 \text{ bar}} \end{aligned}$$

For ease of calculation, our FSP Filter Sizing Program can be ordered from our website www.hydac.com.

6. DIMENSIONS

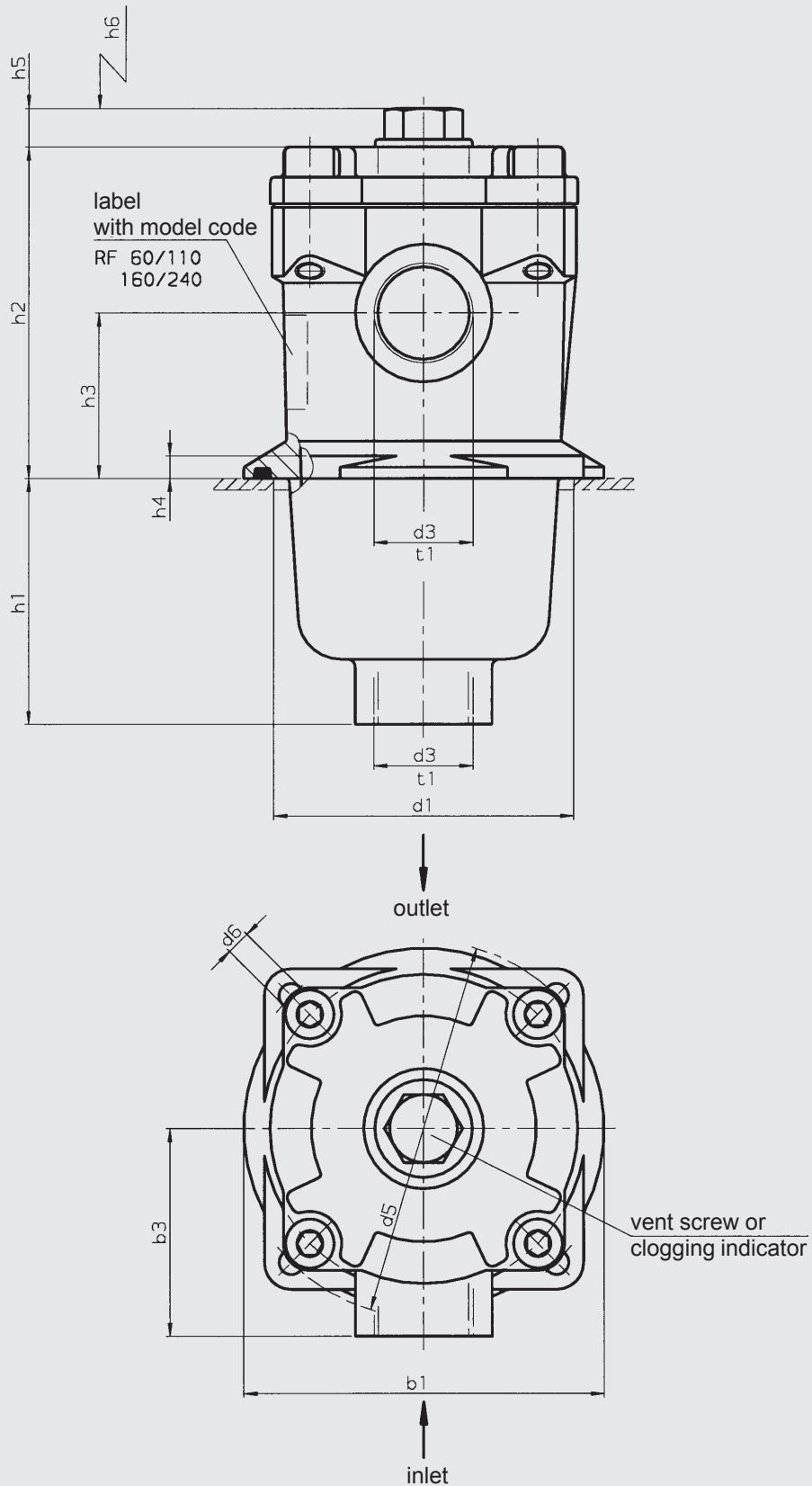
6.1. RF 30



| Type | b1 | b3 | d1 | d3 ¹⁾ | d5 | d6 | d7 | h1 | h2 | h3 | h4 | h5 | h6 | t1 | t2 | t4 |
|---------|----|----|----|------------------|----|----|----|----|----|----|----|----|----|----|----|----|
| Size 30 | 71 | 38 | 60 | G 1/2 | 78 | M4 | - | 86 | 70 | 27 | 8 | 11 | 90 | 14 | - | 14 |

¹⁾ threaded connection to ISO 228

6.2. RF 60-240



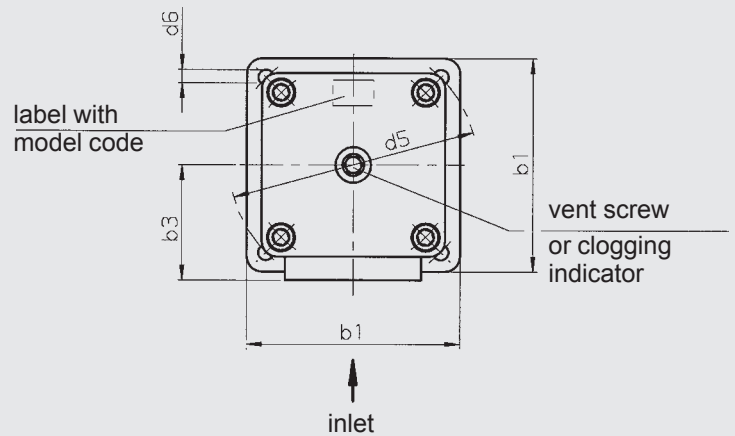
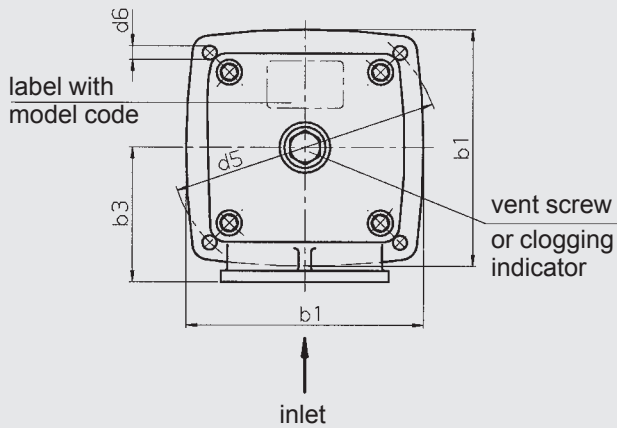
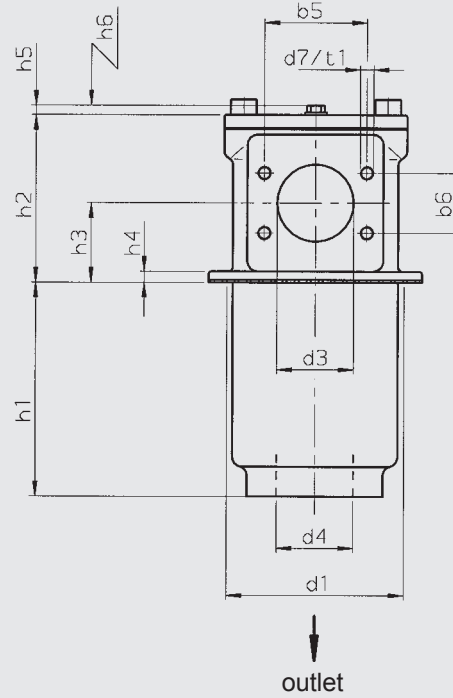
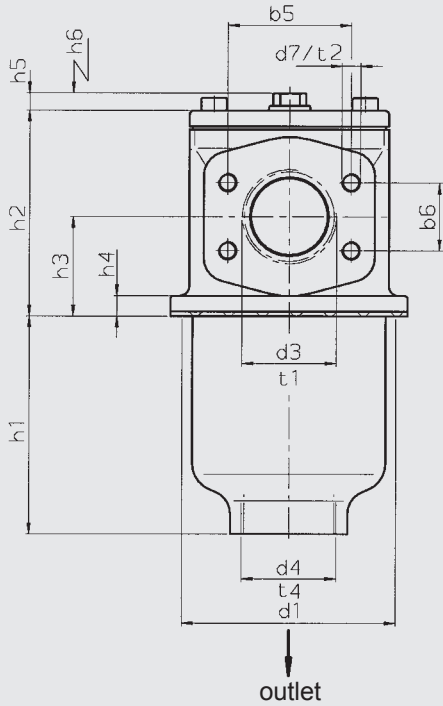
| Type | b1 | b3 | d1 | d3 ²⁾ | d5 | d6 ¹⁾ | h1 | h2 | h3 | h4 | h5 | h6 | t1 |
|----------|-----|----|-----|------------------|-----|------------------|-----|-----|----|----|----|-----|----|
| Size 60 | 96 | 55 | 80 | G 3/4 | 100 | M5 | 63 | 88 | 44 | 6 | 12 | 80 | 17 |
| Size 110 | 96 | 55 | 80 | G 3/4 | 100 | M5 | 130 | 88 | 44 | 6 | 12 | 145 | 17 |
| Size 160 | 126 | 72 | 106 | G 1 1/4 | 135 | M6 | 89 | 108 | 54 | 6 | 12 | 120 | 20 |
| Size 240 | 126 | 72 | 106 | G 1 1/4 | 135 | M6 | 150 | 108 | 54 | 6 | 12 | 180 | 20 |

¹⁾ mounting hole for screw

²⁾ threaded connection to ISO 228

Size 330, 660

Size 950, 1300



| Type | b1 | b3 | b5 | b6 | d1 | d3 | d4 | d5 | d6 ¹⁾ | d7 |
|-----------|-----|-----|-------|------|-----|-----------------|----|-----|------------------|-----|
| Size 330 | 150 | 85 | – | – | 135 | G2 | G2 | 170 | M8 | – |
| | | | 77.8 | 42.9 | | SAE DN 50 (2") | | | | M12 |
| Size 660 | 196 | 110 | 106.4 | 61.9 | 180 | SAE DN 80 (3") | | 220 | M12 | M16 |
| Size 950 | 255 | 135 | 120.7 | 69.5 | 208 | SAE DN 90 (3½") | | 290 | M16 | M16 |
| Size 1300 | 255 | 145 | 130.2 | 77.8 | 208 | SAE DN 100 (4") | | 290 | M16 | M16 |

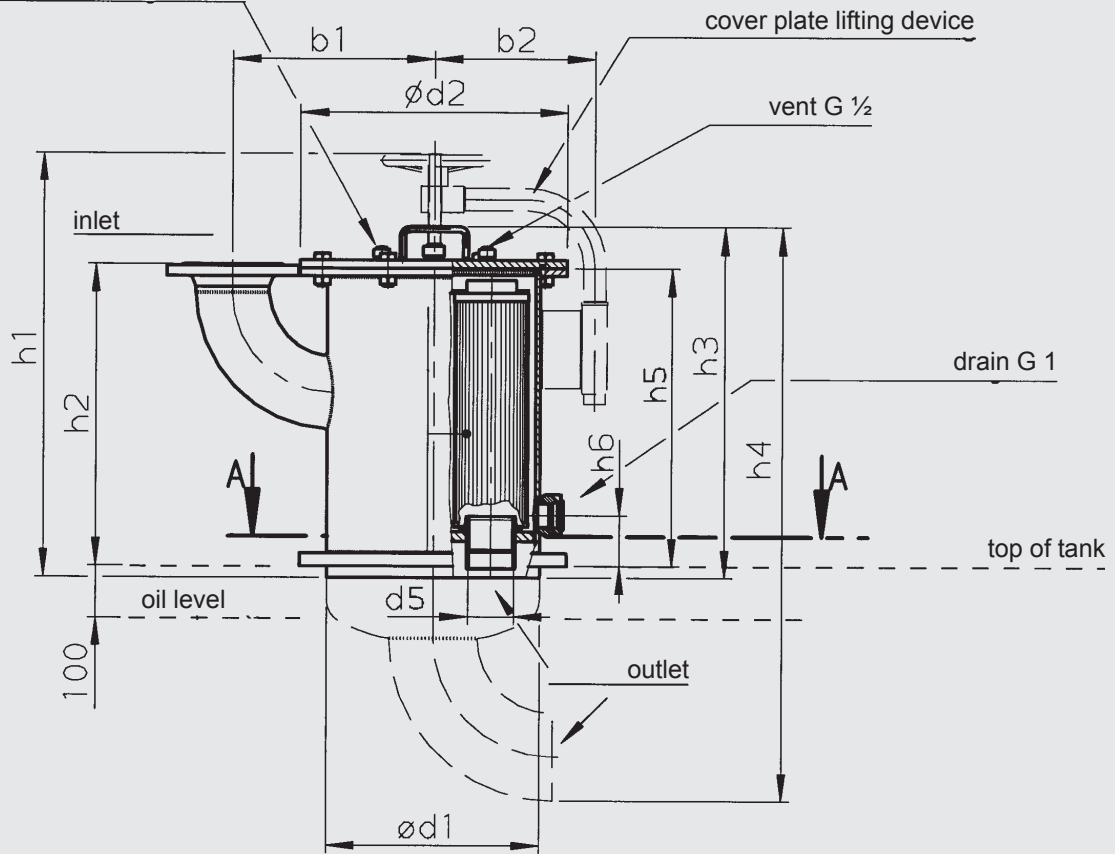
| Type | h1 | h2 | h3 | h4 | h5 | h6 | t1 | t2 | t4 |
|-----------|-----|-----|-----|----|----|-----|----|----|----|
| Size 330 | 138 | 131 | 63 | 13 | 12 | 180 | 27 | – | 27 |
| | | | | | | | | 23 | |
| Size 660 | 243 | 167 | 84 | 13 | 12 | 320 | – | 28 | 32 |
| Size 950 | 251 | 198 | 93 | 13 | 12 | 350 | – | 22 | – |
| Size 1300 | 332 | 241 | 121 | 13 | 12 | 460 | – | 22 | – |

Filter connection for SAE flanges to SAE-J 518c / 3000 psi

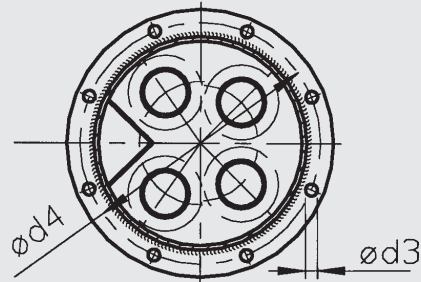
¹⁾ Mounting hole for screw

6.4. RF 2500 - 15000

clogging indicator



A-A



| Type | Flanged connection | h1 | h2 | h3 | h4 | h5 | h6 | b1 | b2 | d1 | d2 | d3 | d4 | d5 | No. of cover plate screws |
|-------|--------------------|-----|-----|-----|------|-----|----|-----|-----|-----|-----|----|-----|----|---------------------------|
| 2500 | DIN DN 100 | 732 | 578 | 590 | 992 | 496 | 88 | 395 | 240 | 273 | 360 | 18 | 320 | G2 | 8 |
| | DIN DN 125 | | 505 | | 925 | | | 310 | | | | | | | |
| 4000 | DIN DN 125 | 738 | 501 | 596 | 940 | 496 | 88 | 355 | 282 | 356 | 450 | 18 | 410 | G2 | 12 |
| | DIN DN 150 | | 540 | | 995 | | | 388 | | | | | | | |
| 5200 | DIN DN 125 | 812 | 576 | 670 | 1030 | 571 | 98 | 382 | 308 | 406 | 510 | 23 | 460 | G3 | 8 |
| | DIN DN 150 | | 615 | | 1085 | | | 416 | | | | | | | |
| 6500 | DIN DN 150 | 817 | 615 | 680 | 1110 | 571 | 98 | 470 | 358 | 508 | 620 | 26 | 572 | G3 | 8 |
| | DIN DN 200 | | 720 | | 1210 | | | 535 | | | | | | | |
| 7800 | DIN DN 200 | 817 | 720 | 680 | 1210 | 571 | 98 | 535 | 358 | 508 | 620 | 26 | 572 | G3 | 8 |
| | DIN DN 250 | | 800 | | 1315 | | | 605 | | | | | | | |
| 15000 | DIN DN 250 | 817 | 800 | 709 | 1360 | 571 | 98 | 712 | 460 | 711 | 840 | 26 | 780 | G3 | 8 |
| | DIN DN 300 | | 866 | | 1460 | | | 777 | | | | | | | |

7. 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.