

HYDAC

INTERNATIONAL

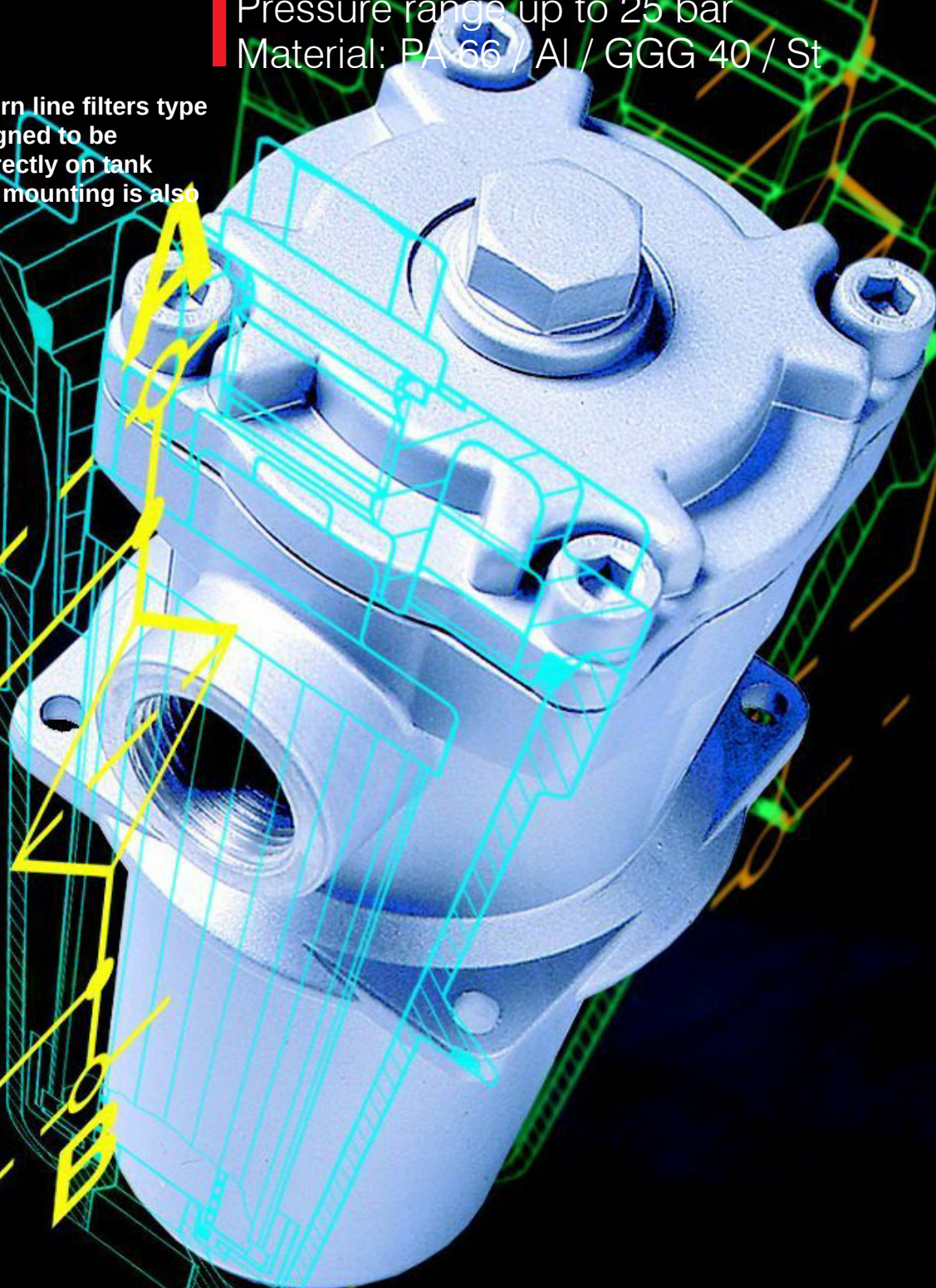
Return Line Filter RF

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.



E 7.116.2/12.04

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

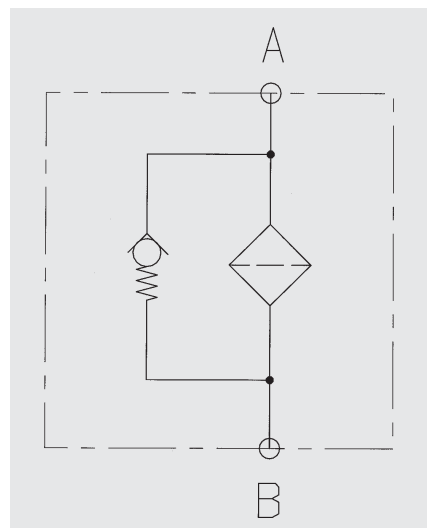
$\Delta p_a = 2 \text{ bar} - 0.2 \text{ bar}$
(compared to atmospheric pressure)
Other pressure settings on request

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.

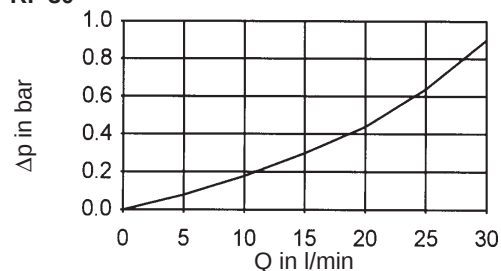
5.1. Δp -Q HOUSING GRAPHS TO ISO 3968

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.

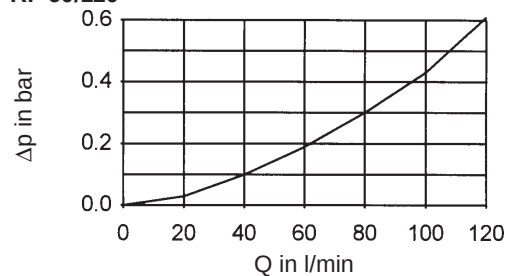
For turbulent flows, the differential pressure changes proportionally to the density.

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

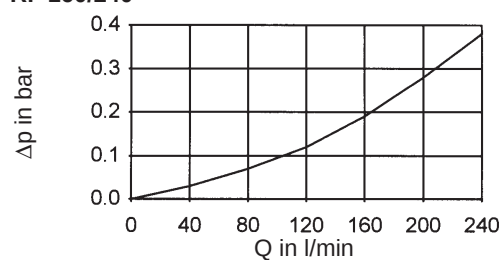
RF 30



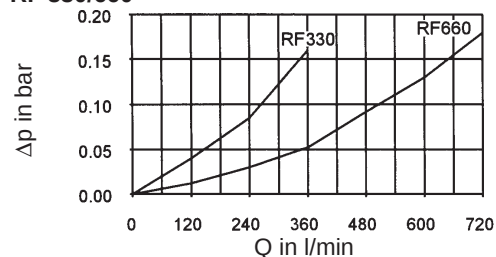
RF 60/110



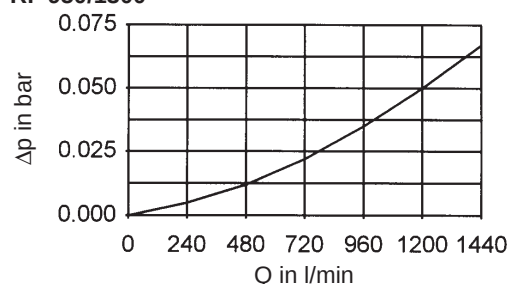
RF 160/240



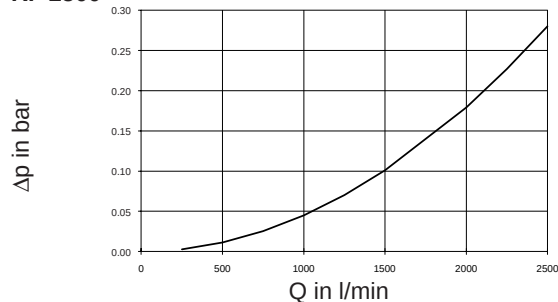
RF 330/660



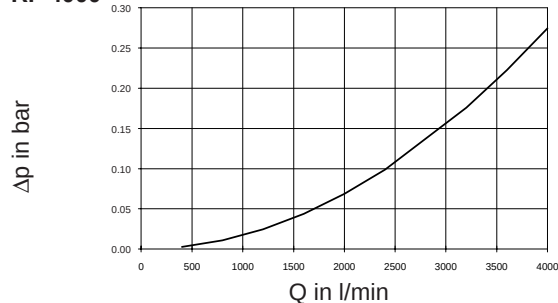
RF 950/1300



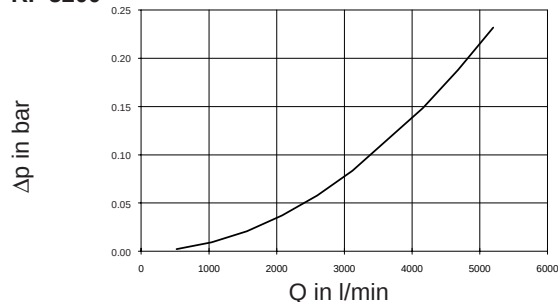
RF 2500



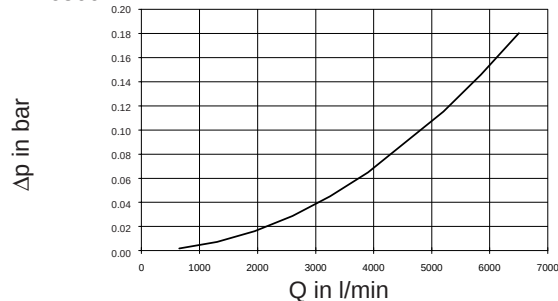
RF 4000



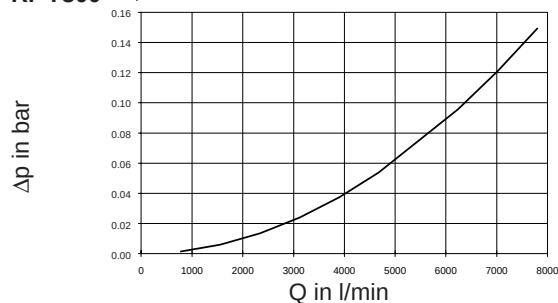
RF 5200



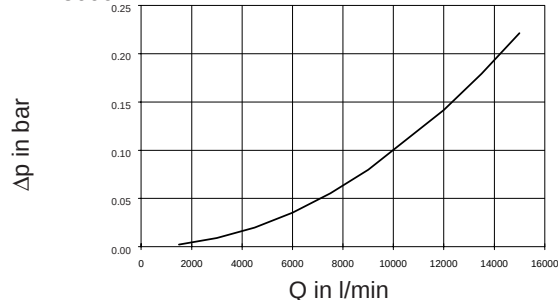
RF 6500



RF 7800

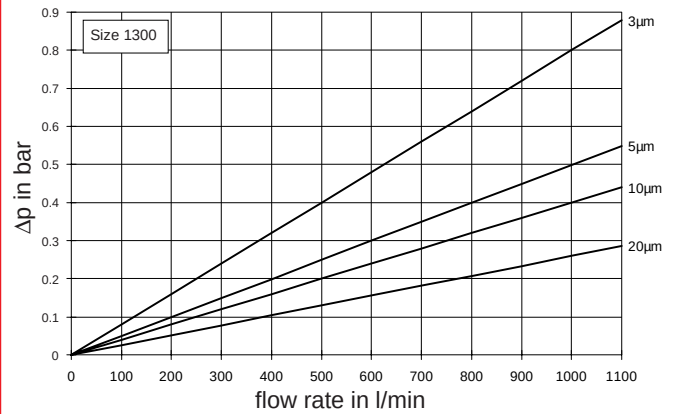
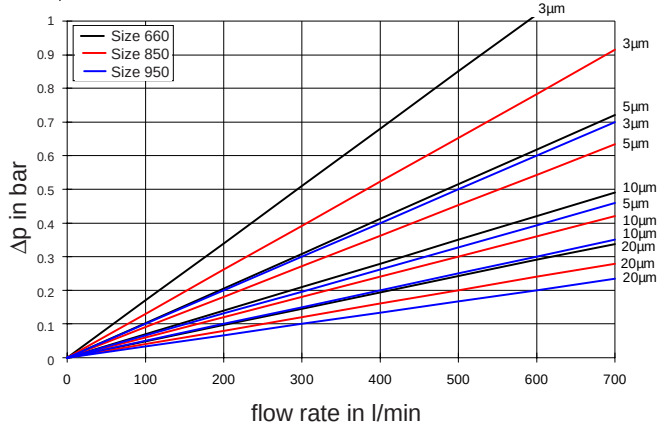
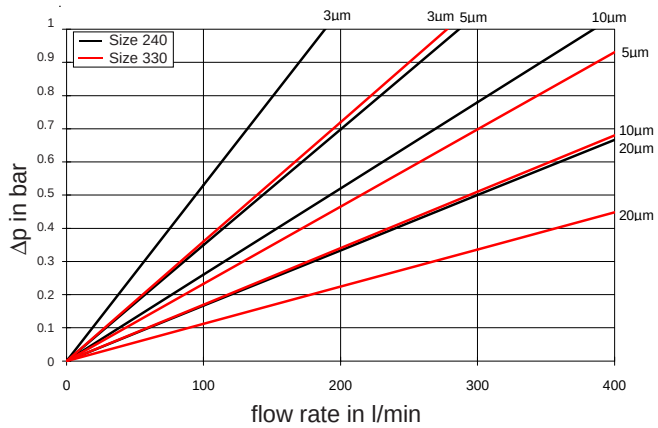
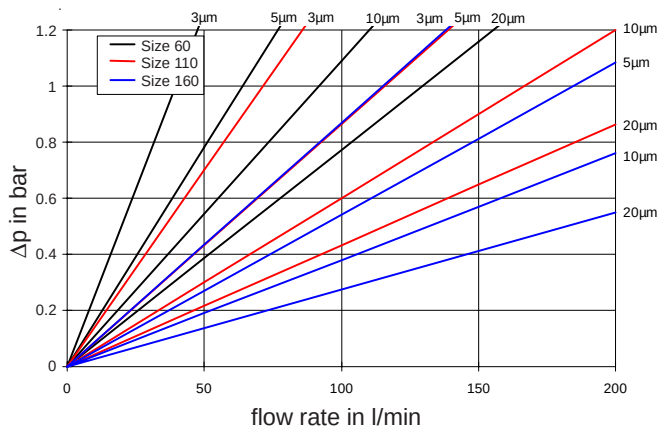
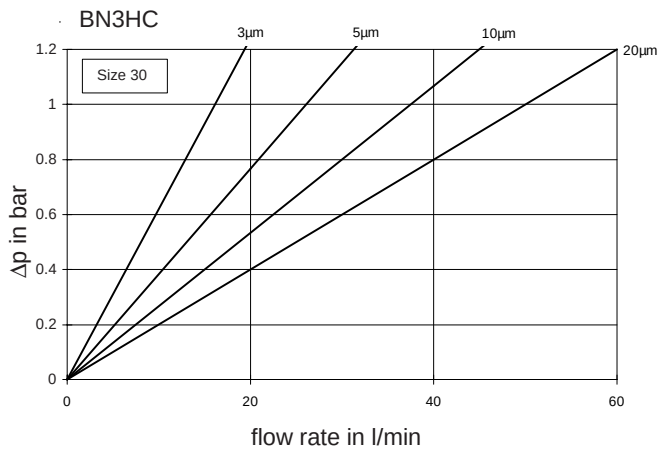


RF 15000

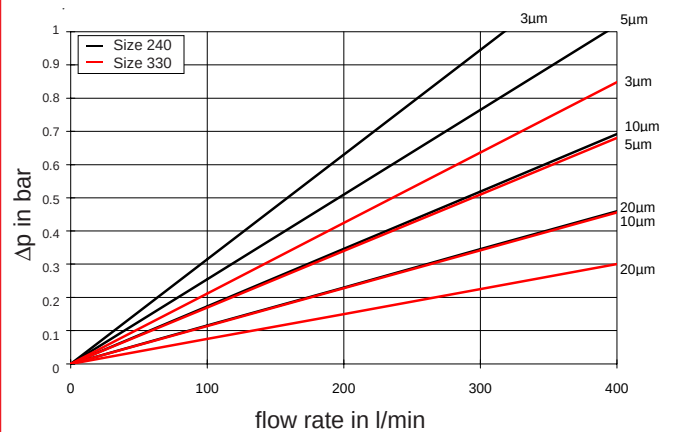
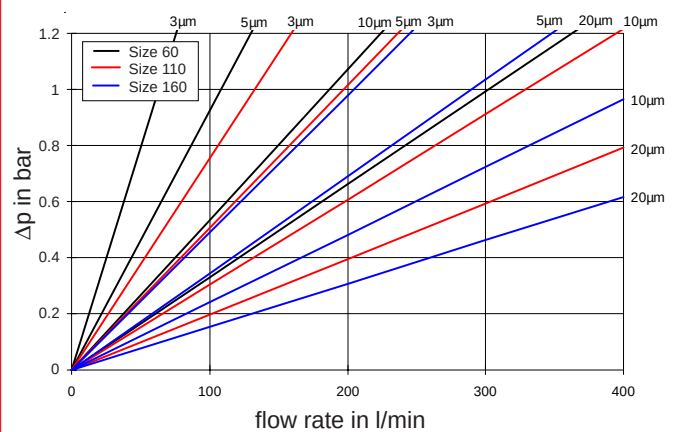
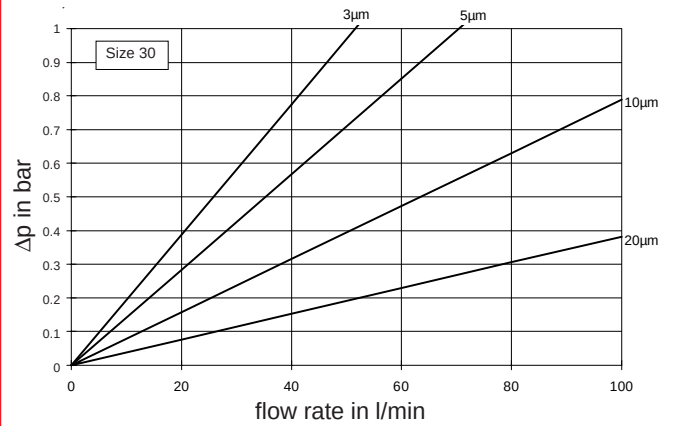


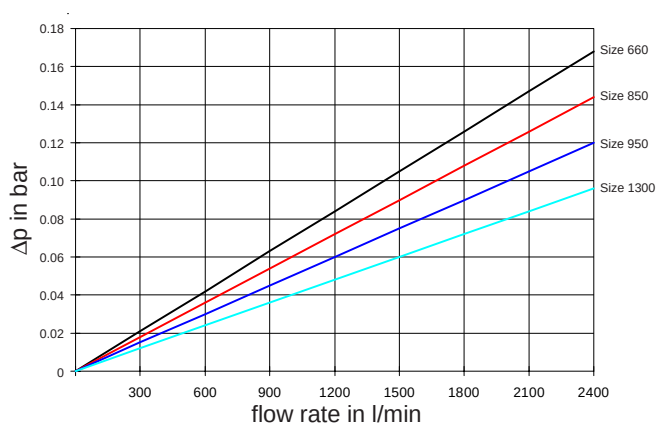
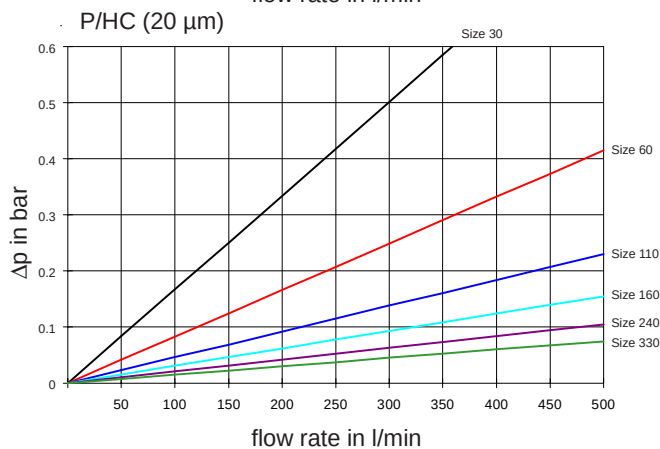
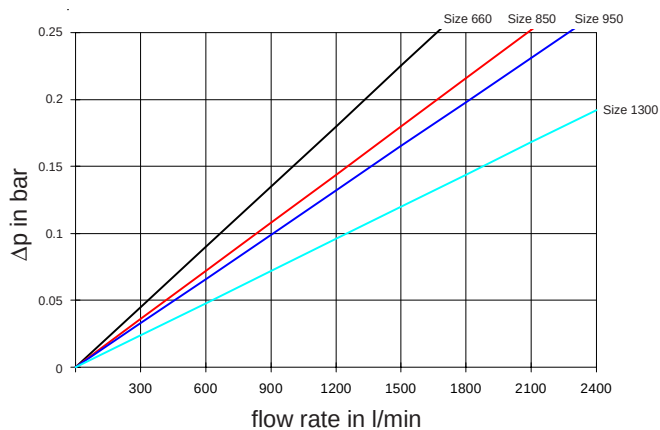
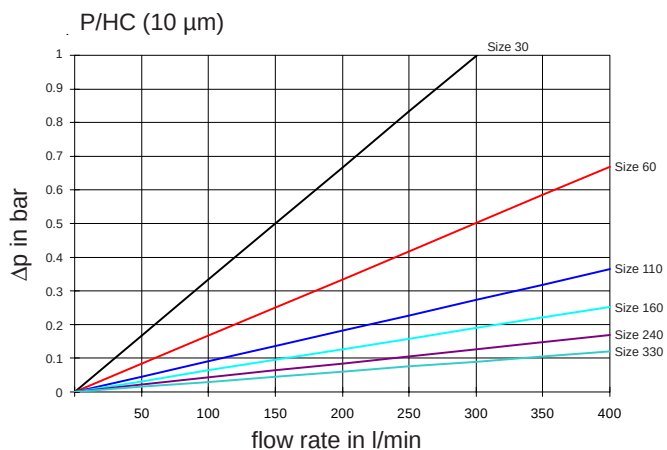
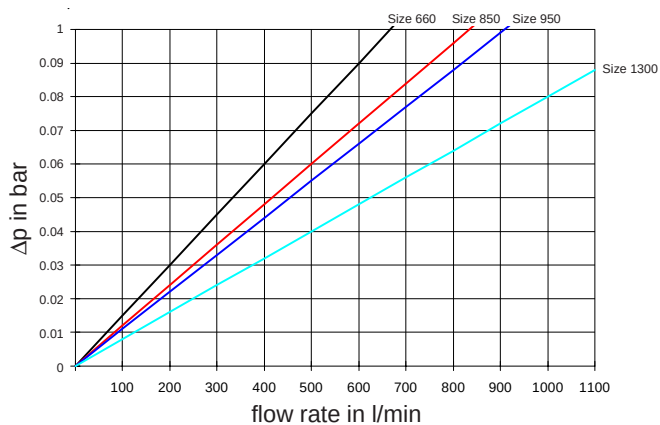
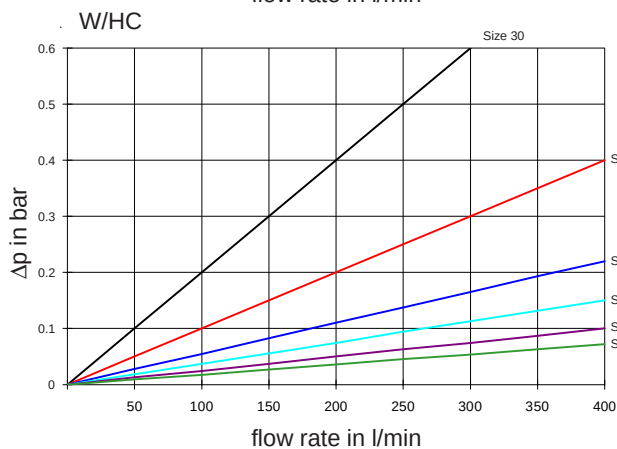
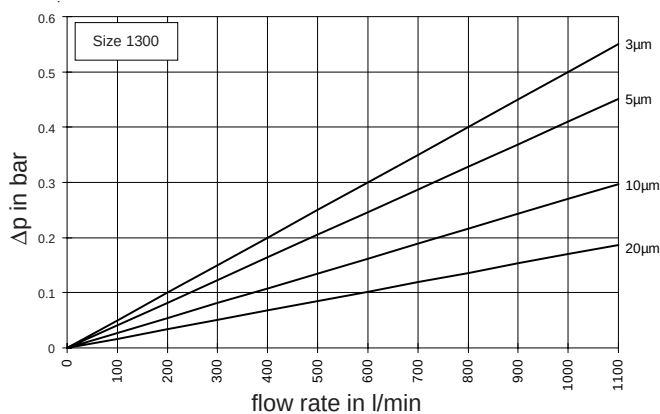
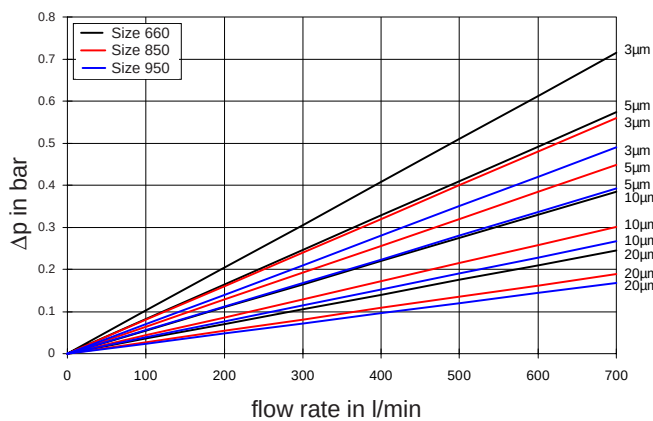
5.2. Δp -Q GRAPHS - FILTER ELEMENTS

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.).



V Elements





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 mm²/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 mm²/s
(ISO VG 46 at 40 °C)
Q = 50 l/min

⇒ $\Delta p_{\text{housing}}$ = 0.13 bar (at Q)

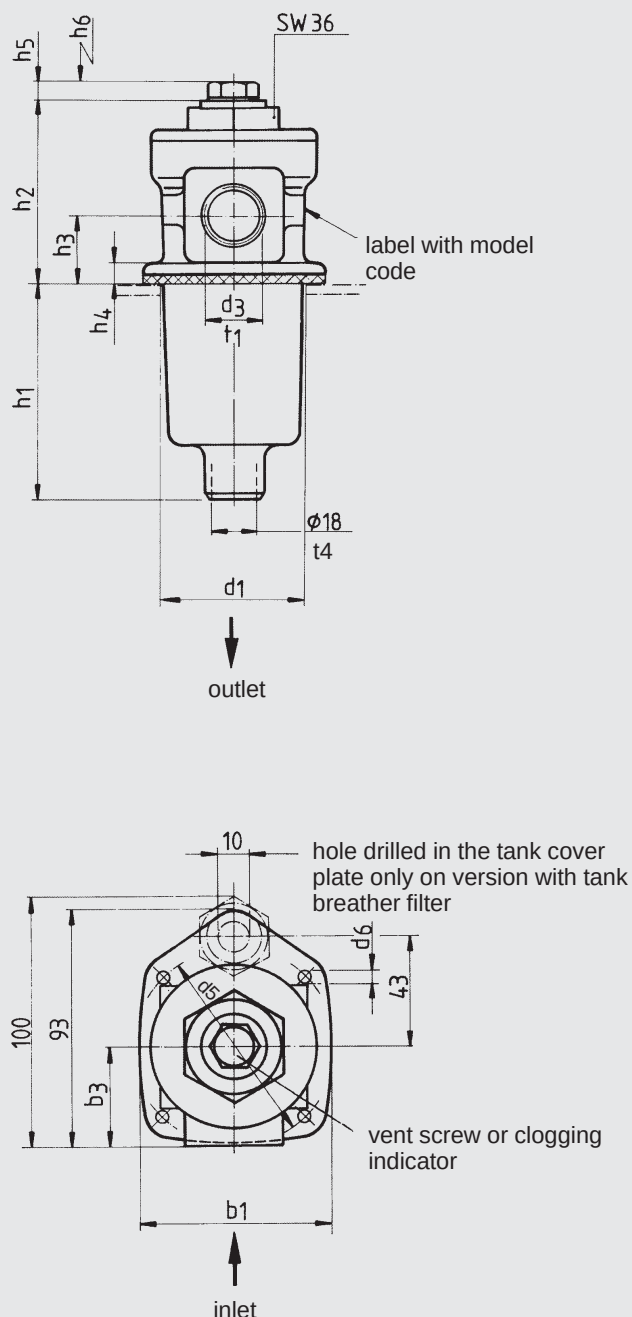
$\Delta p_{\text{element}}$ = 0.46 bar

Δp_{total} = 0.59 bar

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

6. DIMENSIONS

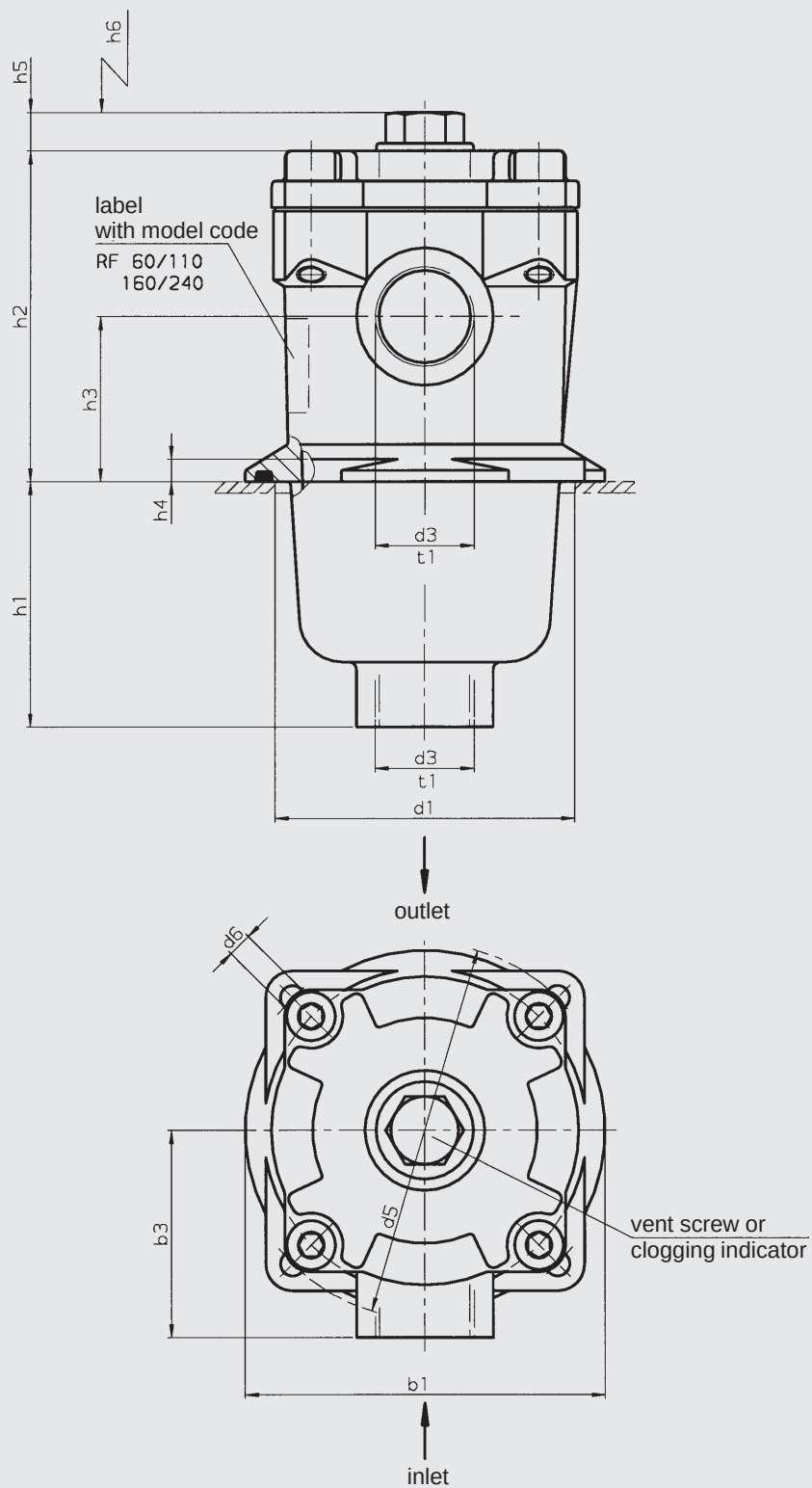
6.1. RF 30



Type	b1	b3	d1	d3 ¹⁾	d5	d6	d7	h1	h2	h3	h4	h5	h6	t1	t2	t4
Size 30	71	38	60	G ½	78	M4	–	86	70	27	8	11	90	14	–	14

¹⁾ threaded connection to ISO 228

6.2. RF 60-240



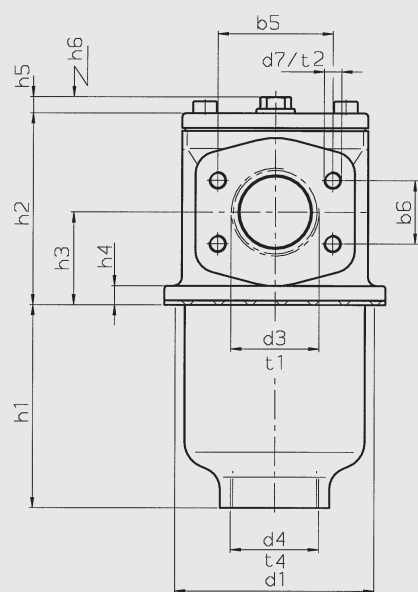
Type	b1	b3	d1	d3 ²⁾	d5	d6 ¹⁾	h1	h2	h3	h4	h5	h6	t1
Size 60	96	55	80	G 3/4	100	M5	63	88	44	6	12	80	17
Size 110	96	55	80	G 3/4	100	M5	130	88	44	6	12	145	17
Size 160	126	72	106	G 1 1/4	135	M6	89	108	54	6	12	120	20
Size 240	126	72	106	G 1 1/4	135	M6	150	108	54	6	12	180	20

¹⁾ mounting hole for screw

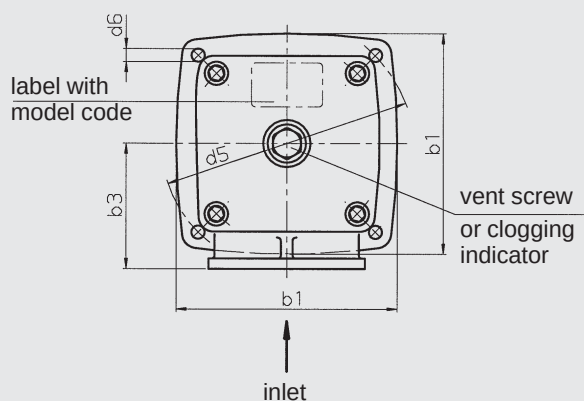
²⁾ threaded connection to ISO 228

6.3. RF 330-1300

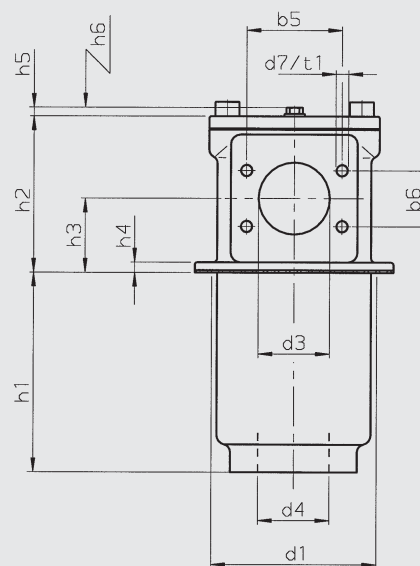
Size 330, 660



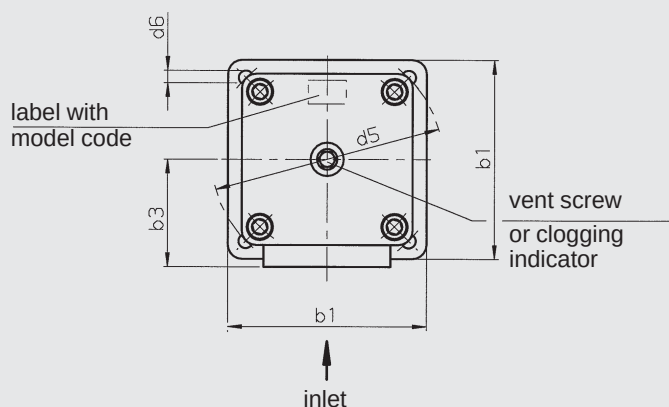
outlet



Size 950, 1300



outlet



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")	G3	220	M12	M16
Size 950	255	135	120.7	69.5	208	SAE DN 90 (3½")	SAE DN 90 (3½")	290	M16	M16
Size 1300	255	145	130.2	77.8	208	SAE DN 100 (4")	SAE DN 100 (4")	290	M16	M16

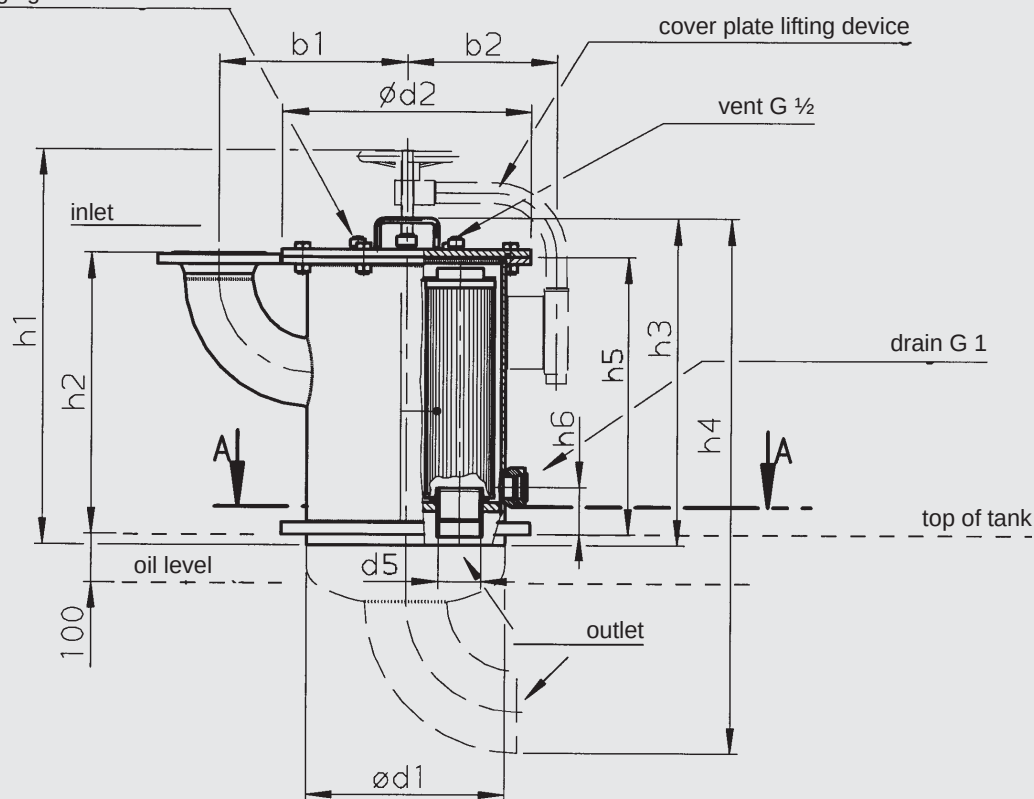
Type	h1	h2	h3	h4	h5	h6	t1	t2	t4
Size 330	138	131	63	13	12	180	27	—	27
								23	
Size 660	243	167	84	13	12	320	—	28	32
Size 950	251	198	93	13	12	350	—	22	—
Size 1300	332	241	121	13	12	460	—	22	—

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

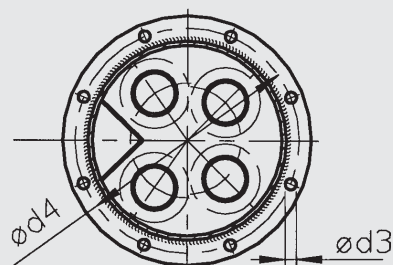
¹⁾ Mounting hole for screw

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.