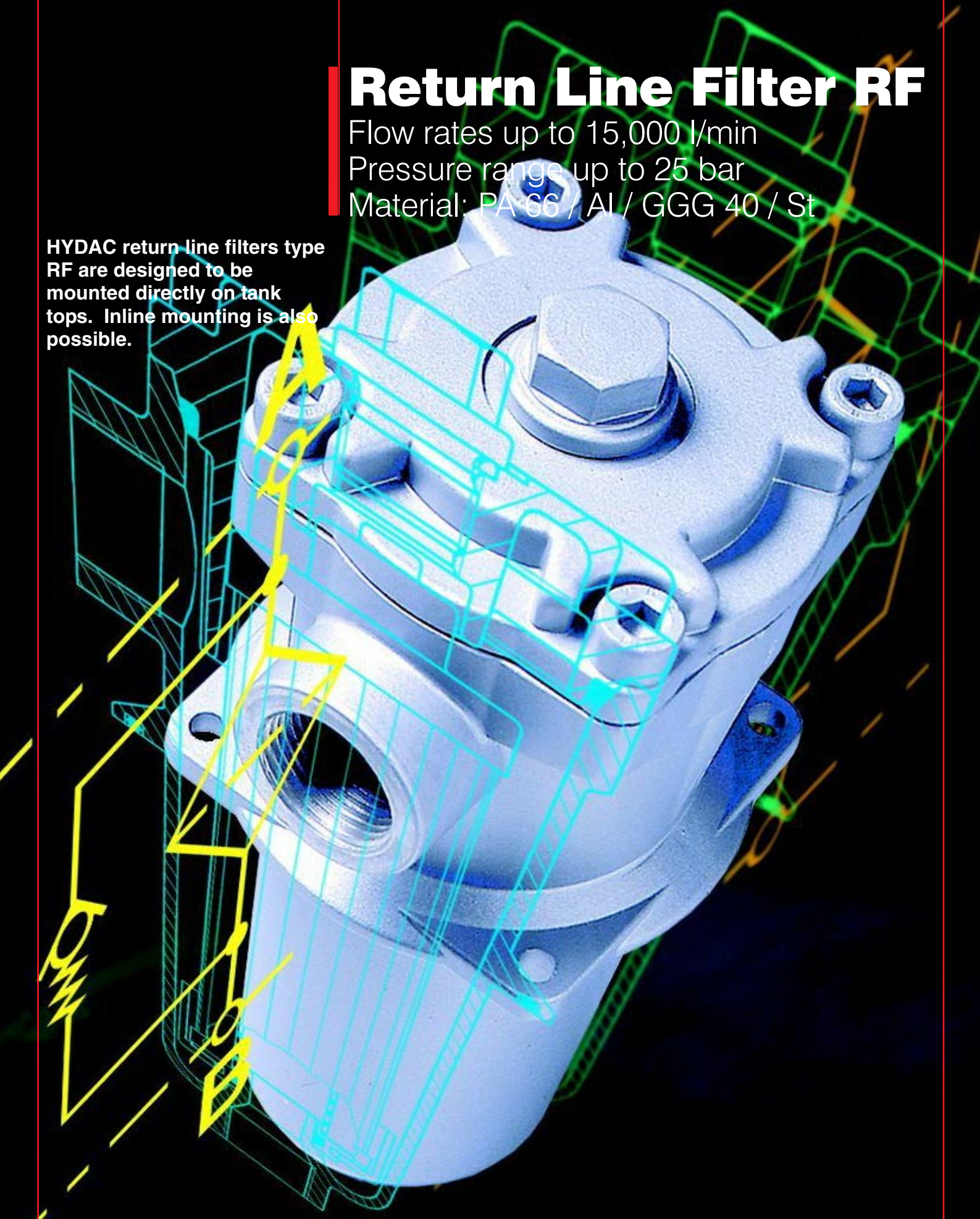
HYDAC INTERNATIONAL

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.

1.2. FILTER ELEMENTS

Hydac filter elements are tested according to the following ISO test standards:

- ISO 3724 Verification of flow fatigue characteristics
- ISO 4572 Contamination retention capacity
- ISO 4572 Multi-pass method for evaluating filtration performance
- ISO 3968 Evaluation of pressure drop versus flow characteristics
- ISO 2942 Bubble point test
- ISO 2941 Verification of collapse/ burst resistance

Reliable filter operation is only guaranteed with original HYDAC filter elements.

The filter elements are also suitable for use in dynamic applications due to their high differential pressure stability; max. permiss. Δp across the element:

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

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

For further details on filter elements, please see:
brochure no.: E 7.200../..

1.3. CLOGGING INDICATORS

Return line clogging indicators are used as standard. For inline mounted filters, a differential pressure indicator should be mounted externally.

Pressure setting of the return line clogging indicator

Δpa= 2 bar -0.2 bar

(compared to atmospheric pressure)

Other pressure settings on request

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 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./..

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

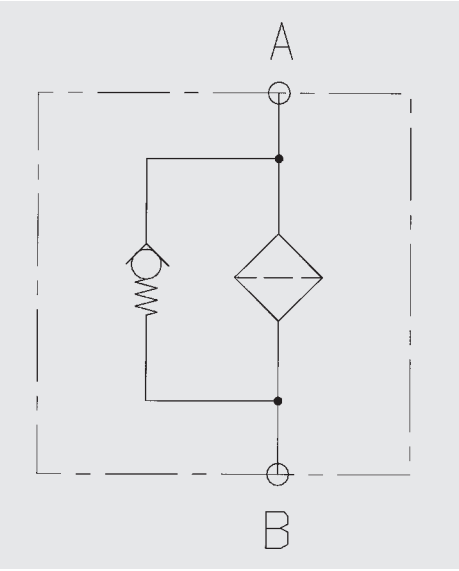
Cracking pressure of bypass valve

Δp_O= 3 bar +0.5 bar

Other cracking pressures on request

Fluid compatibility
Suitable for mineral oils, lubrication oils, non-flam fluids, synthetic and rapidly biodegradable oils. For use with water, please contact our technical sales department.

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	Betamicron® (BN3HC)
AM	Aquamicron®
BN/AM	Betamicron®/Aquamicron®
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 SAE DN 50 (2")	0330 R...	1	4.1 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 DIN DN 125	0850 R...	3	55.3 58.3
4000	DIN DN 125 DIN DN 150	0850 R...	5	97.3 101.3
5200	DIN DN 125 DIN DN 150	1300 R...	4	119.1 126.1
6500	DIN DN 150 DIN DN 200	1300 R...	5	175.1 186.1
7800	DIN DN 200 DIN DN 250	1300 R...	6	187.1 202.1
15000	DIN DN 250 DIN DN 300	1300 R...	10	329.1 382.1

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.

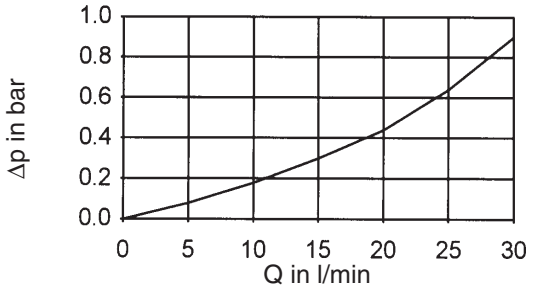
The pressure drop can either be determined with the aid of our FSP Filter Sizing Program, which is available free of charge, or by using the following graphs.

5.1. Δp-Q HOUSING GRAPHS TO ISO 3968

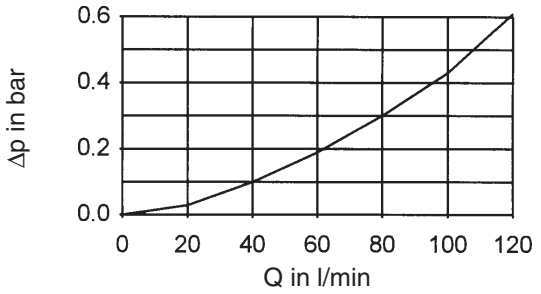
The housing graphs apply to mineral oil with a density of 0.86 kg/dm³ and a kinematic viscosity of 30 mm²/s for, in each case, the largest nominal width per size.

For turbulent flows, the differential pressure changes proportionally to the density.
For laminar flows it changes proportionally to the density and the viscosity.

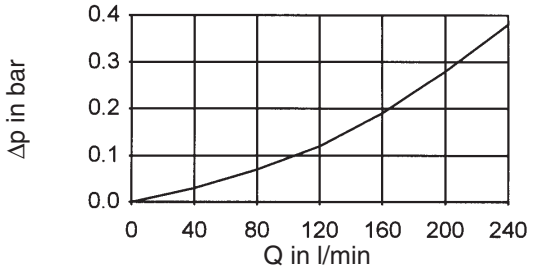
RF 30



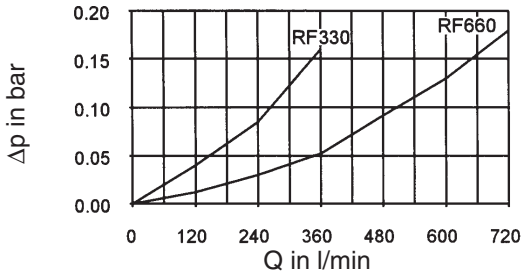
RF 60/110



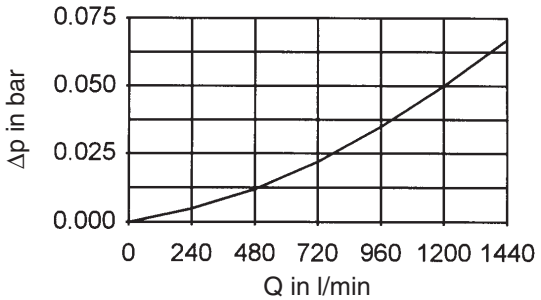
RF 160/240



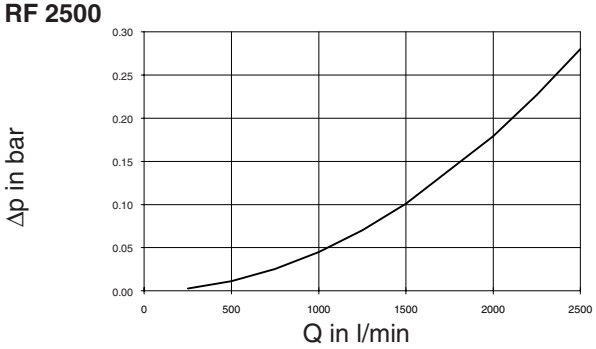
RF 330/660



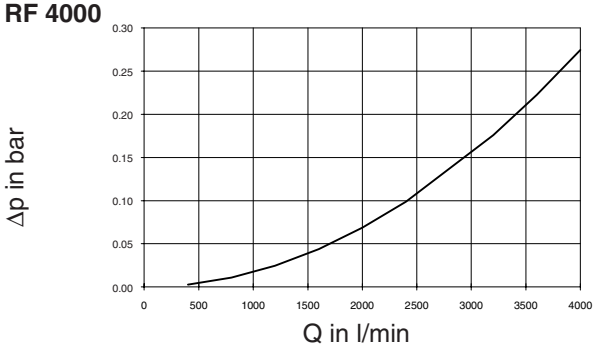
RF 950/1300



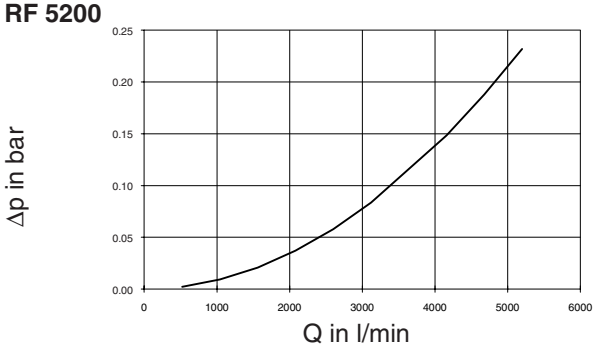
RF 2500



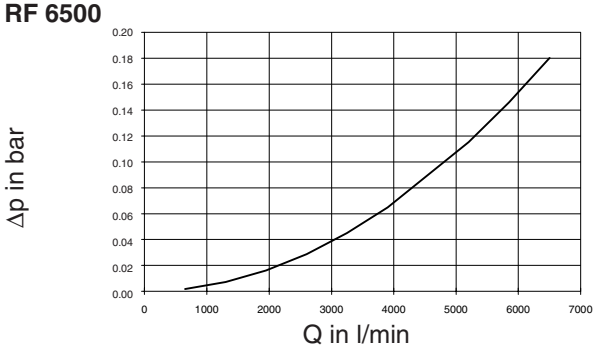
RF 4000



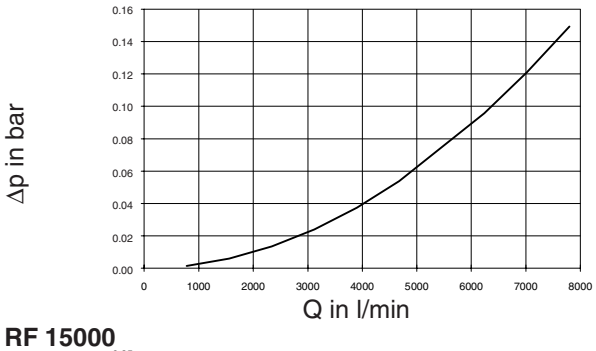
RF 5200



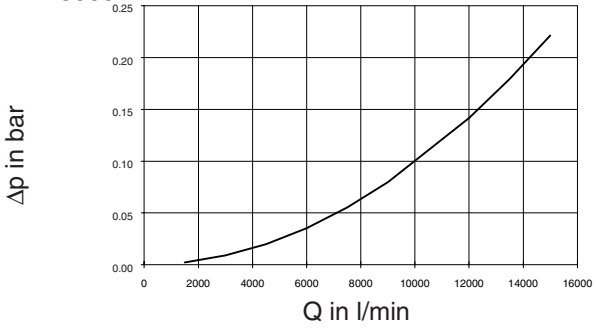
RF 6500



RF 7800



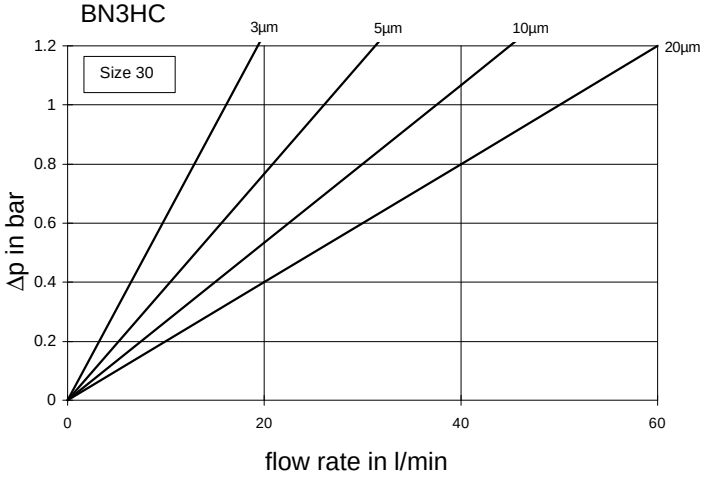
RF 15000

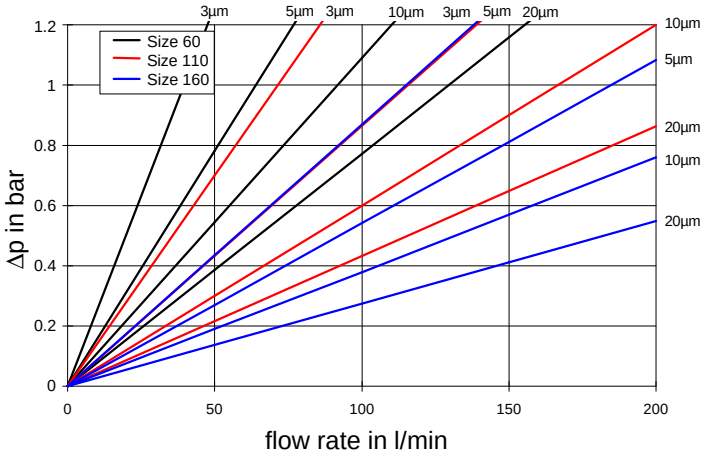


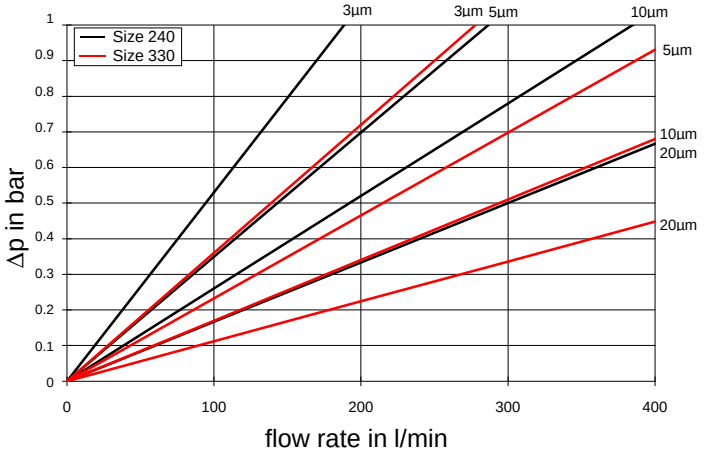
5.2. Δp-Q GRAPHS - FILTER ELEMENTS

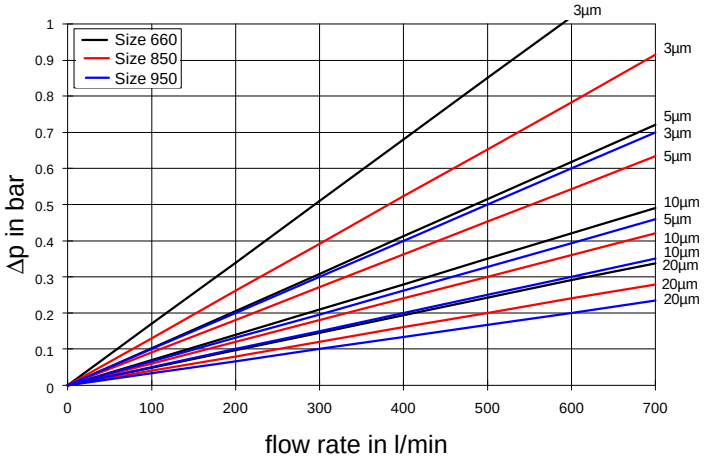
The element graphs apply to mineral oil with a kinematic viscosity of 30 mm²/s. The pressure drop changes proportionally to the change in viscosity (see Example 5.3.).

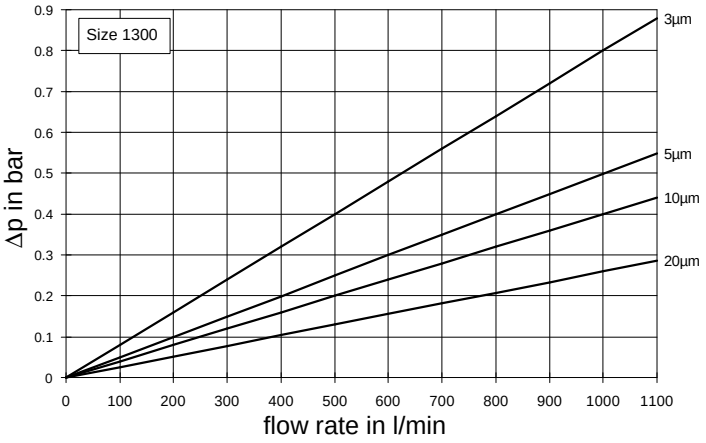
BN3HC



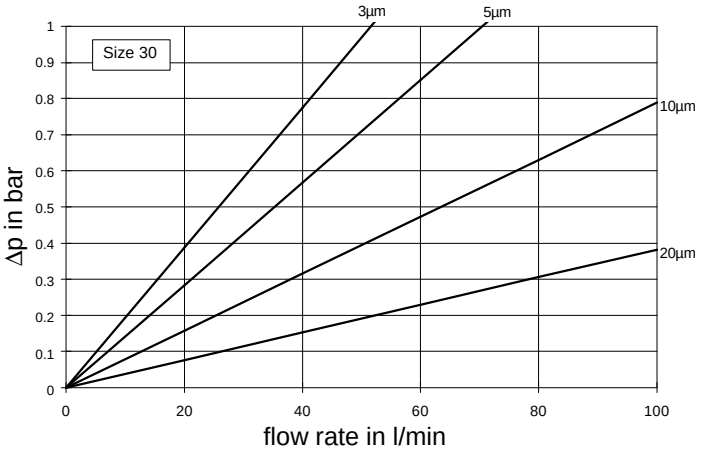


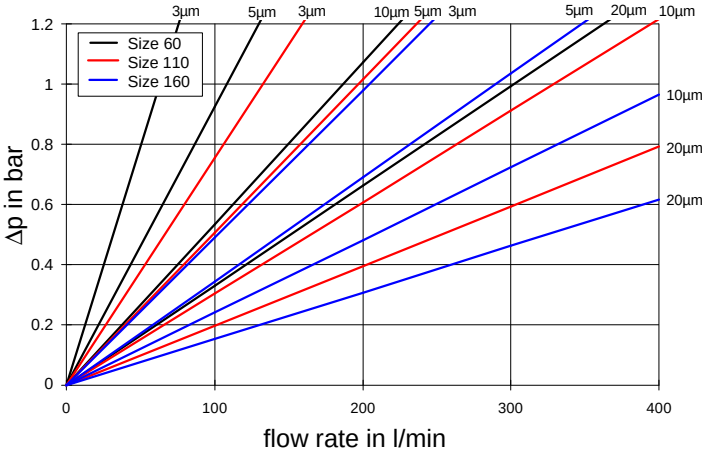


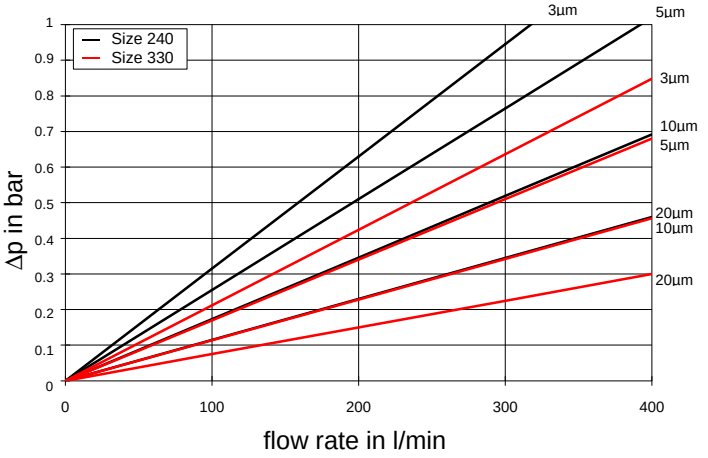


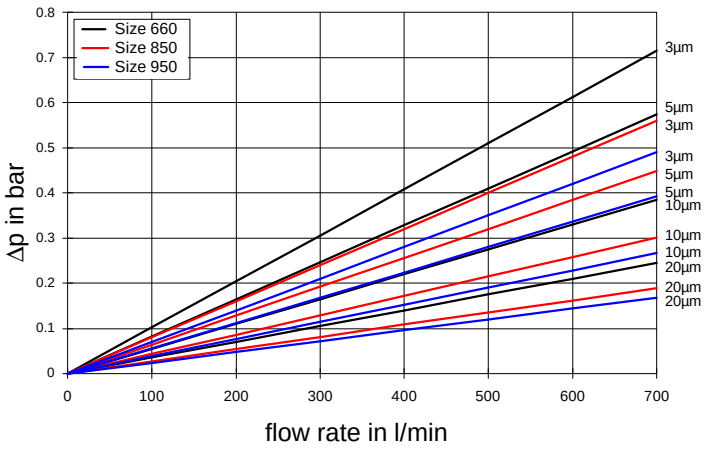


V Elements

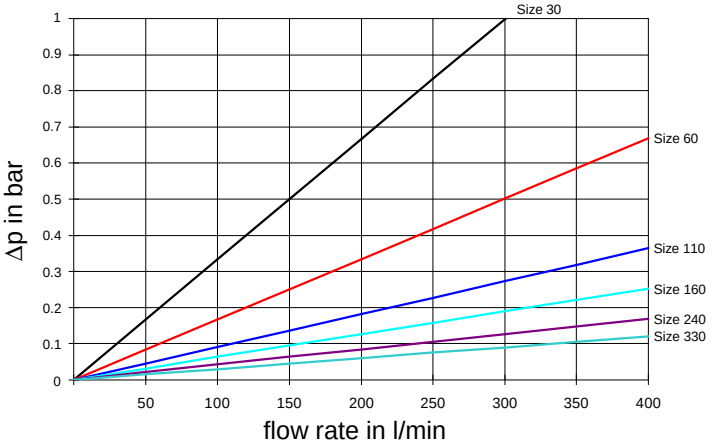


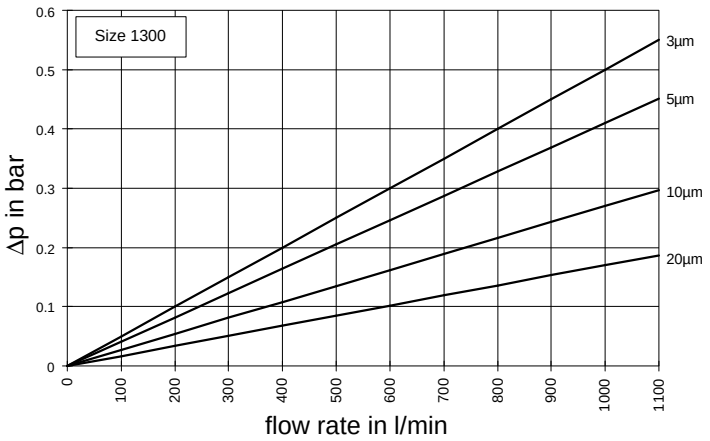


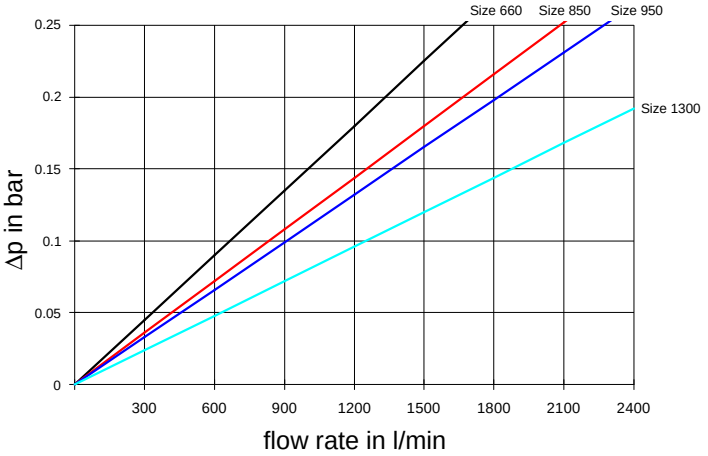




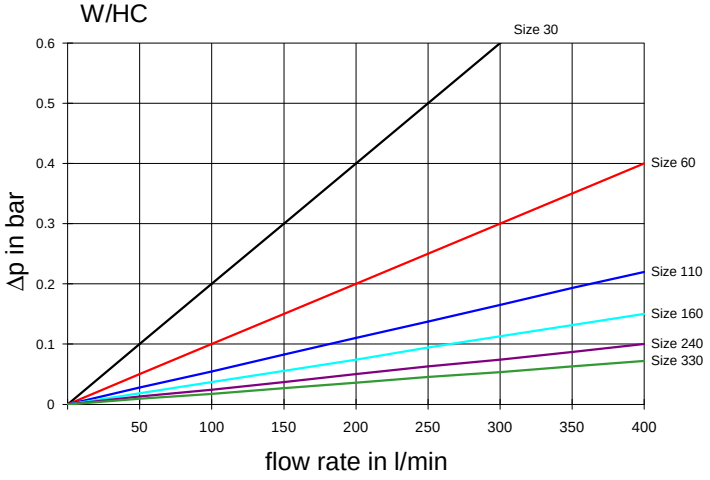
P/HC (10 µm)



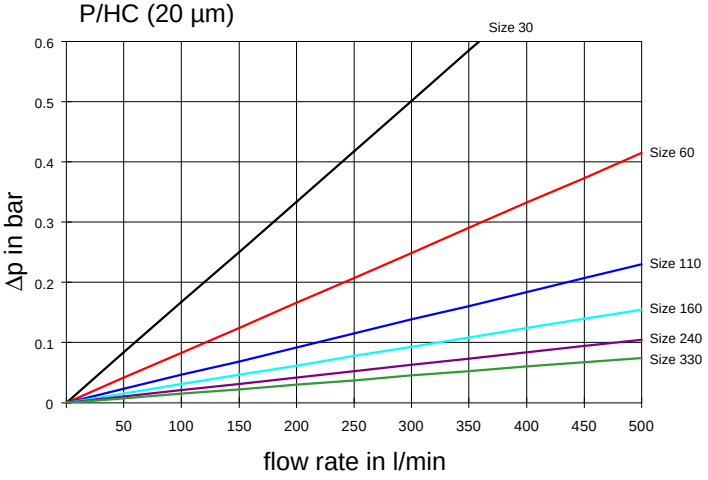


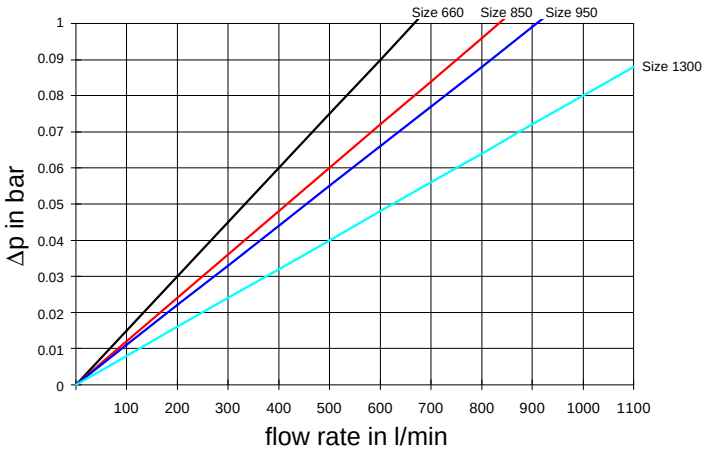


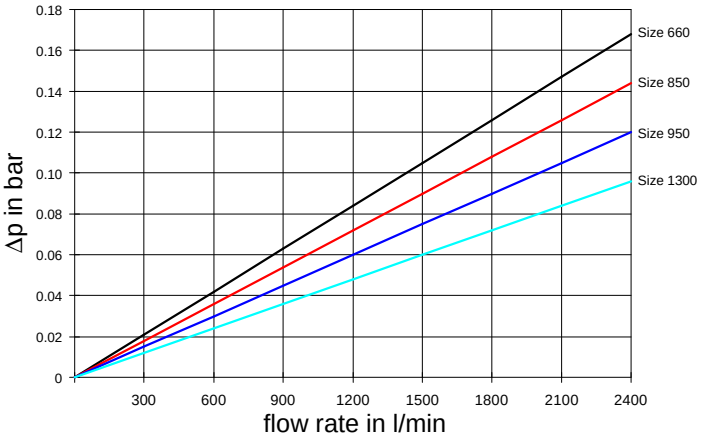
W/HC



P/HC (20 µm)







5.3. EXAMPLE

General

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

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

$\Delta p_{element}$ = 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

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

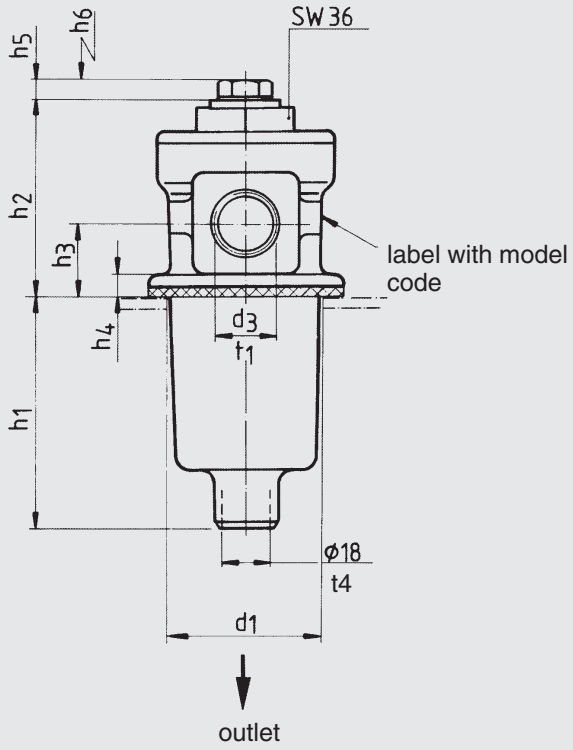
$\Delta p_{element}$ = $0.3 \times \frac{46}{30} = 0.46$ bar

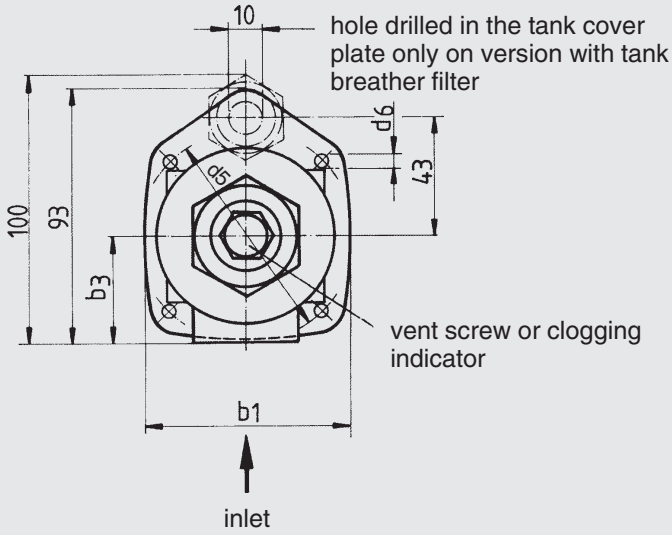
Δp_{total} = 0.59 bar

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

6. DIMENSIONS

6.1. RF 30

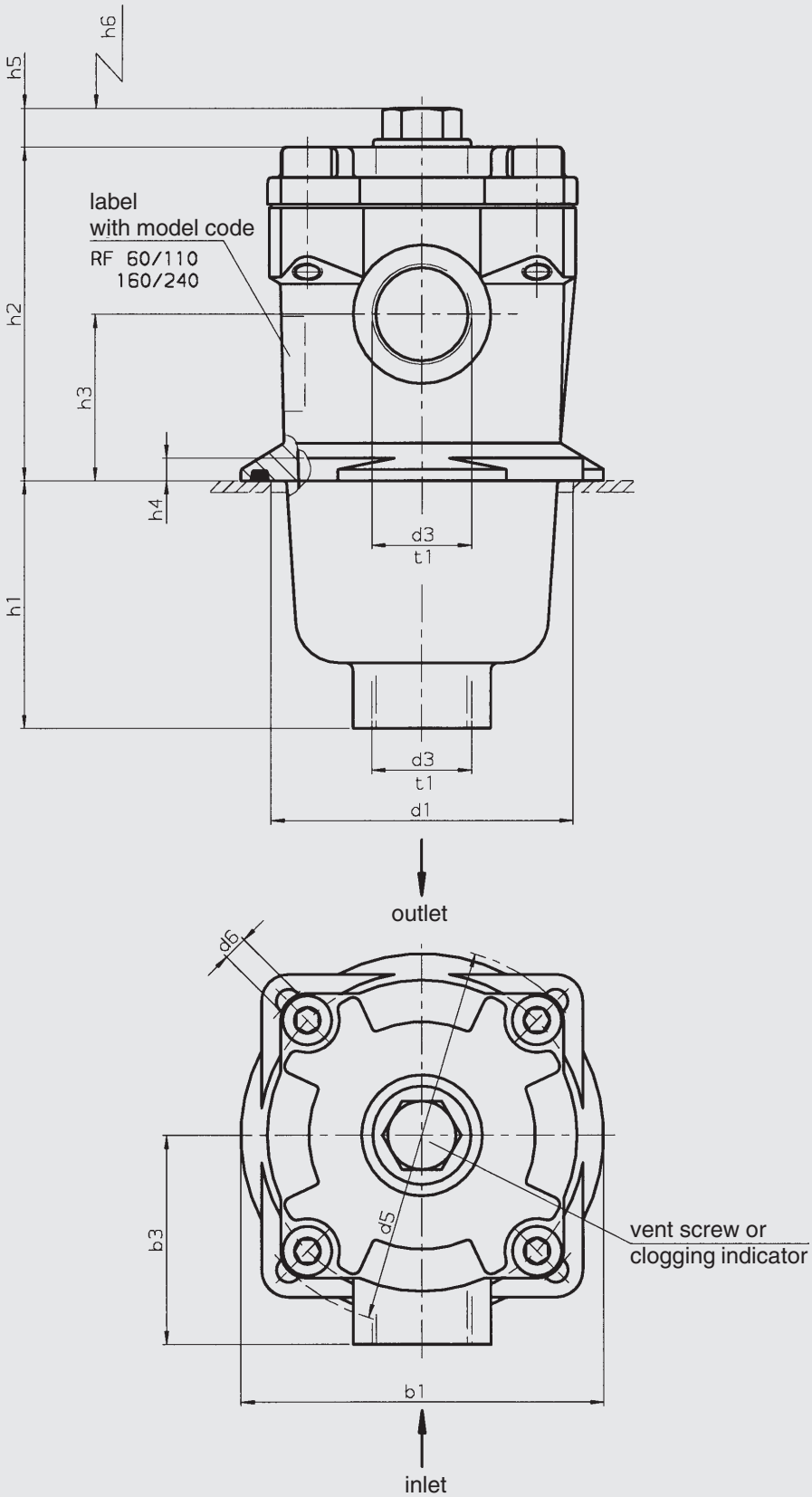




Type	b1	b3	d1	d3[1)]	d5	d6	d7	h1	h2	h3	h4	h5	h6	t1	t2	t4
Size 30	71	38	60	G ½	78	M4	–	86	70	27	8	11	90	14	–	14

[1)] threaded connection to ISO 228

6.2. RF 60-240

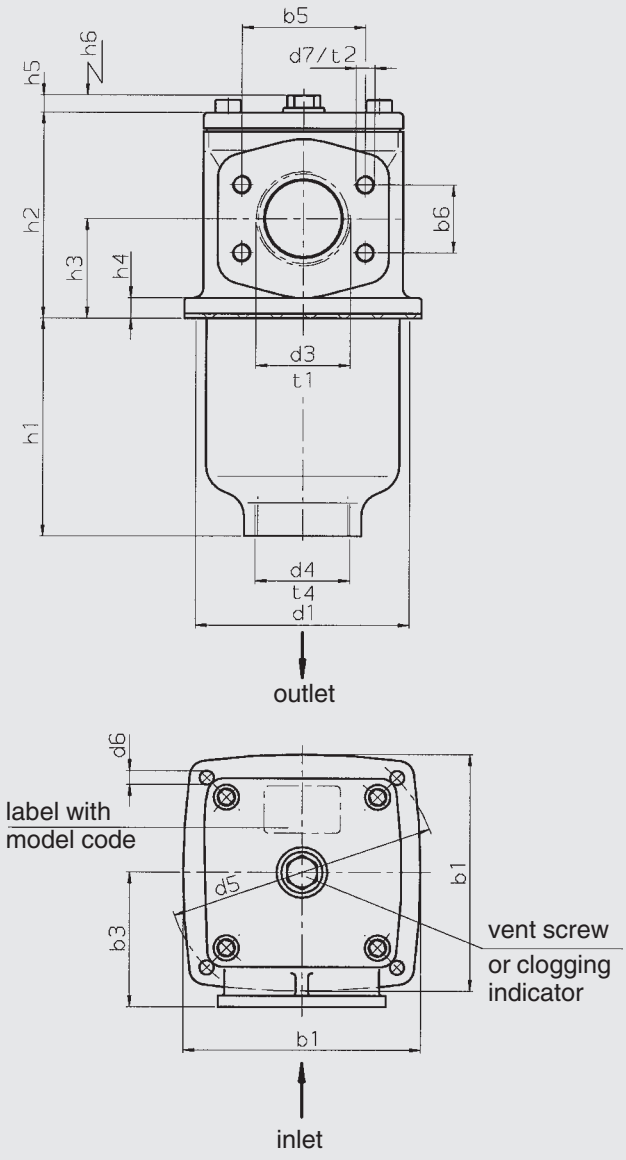


Type	b1	b3	d1	d3[2)]	d5	d6[1)]	h1	h2	h3	h4	h5	h6	t1
Size 60	96	55	80	G ¾	100	M5	66	88	44	6	12	80	17
Size 110	96	55	80	G ¾	100	M5	133	88	44	6	12	145	17
Size 160	126	72	106	G 1 ¼	135	M6	89	108	54	6	12	120	20
Size 240	126	72	106	G 1 ¼	135	M6	150	108	54	6	12	180	20

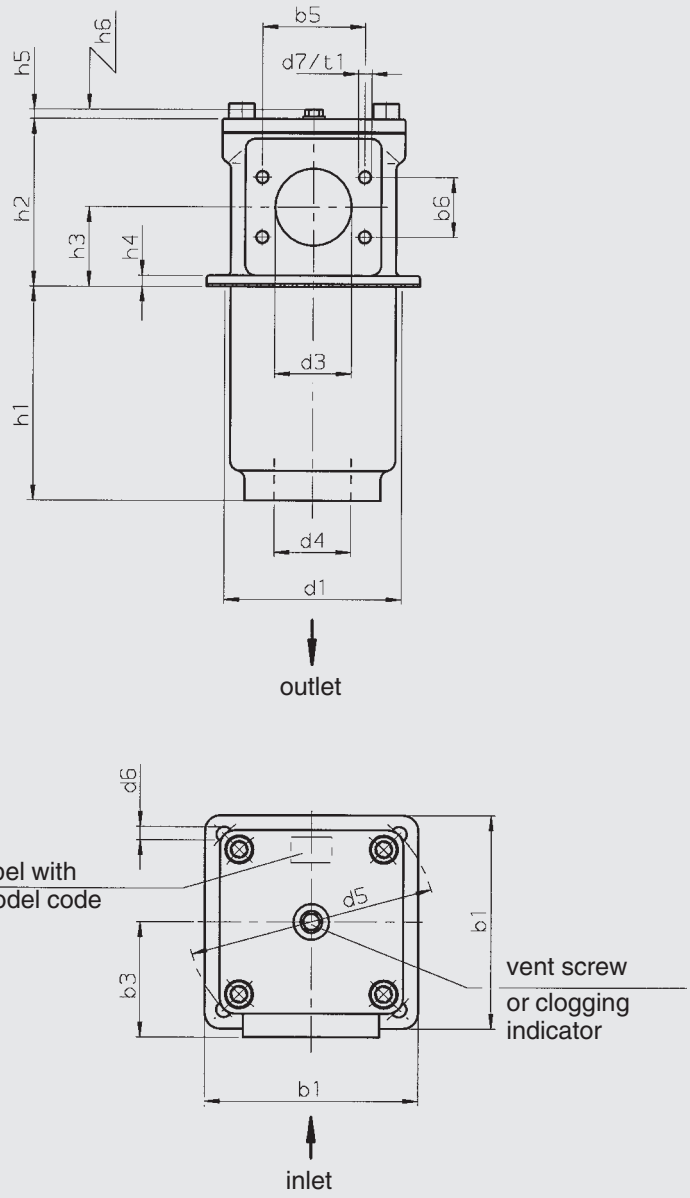
[1)] mounting hole for screw
[2)] threaded connection to ISO 228

6.3. RF 330-1300

Size 330, 660



Size 950, 1300



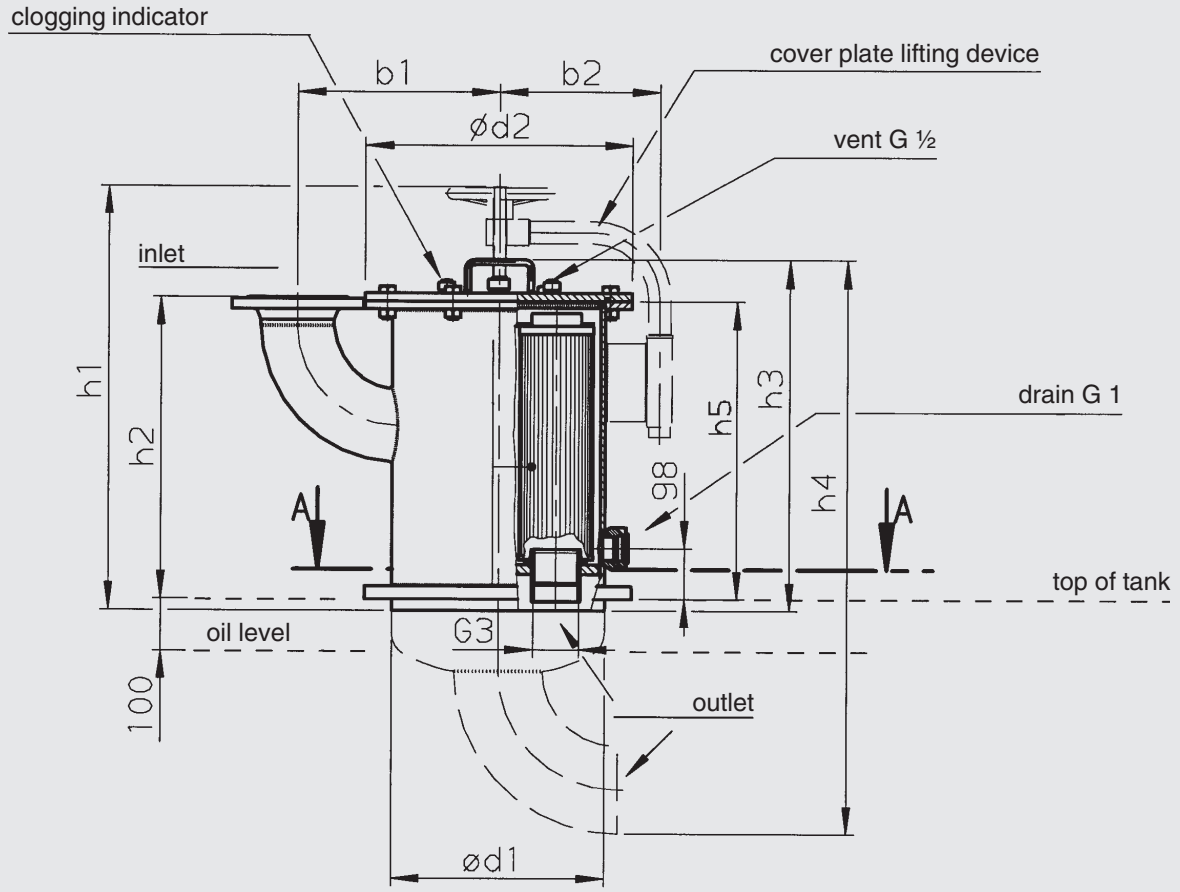
Type	b1	b3	b5	b6	d1	d3	d4	d5	d6[1)]	d7
Size 330	150	85	– 77.8	– 42.9	135	G2 SAE DN 50 (2")	G2	170	M8	– M12
Size 660	196	110	106.4	61.9	180	SAE DN 80 (3")	G3	220	M12	M16
Size 950	255	135	120.7	69.5	208	SAE DN 90 (3½")	SAE DN 90 (3½")	290	M16	M16
Size 1300	255	145	130.2	77.8	208	SAE DN 100 (4")	SAE DN 100 (4")	290	M16	M16

Type	h1	h2	h3	h4	h5	h6	t1	t2	t4
Size 330	138	131	63	13	12	180	27	– 23	27
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	–

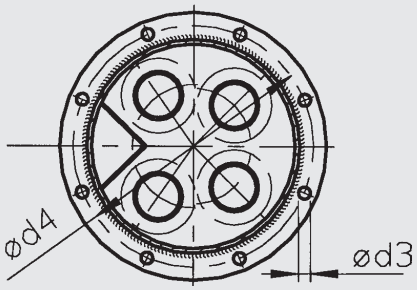
Filter connection for SAE flanges to SAE-J 518c / 3000 psi

[1)] Mounting hole for screw

6.4. RF 2500 - 15000



A–A



Type	Flanged connection	h1	h2	h3	h4	h5	b1	b2	d1	d2	d3	d4	No. of coverplate screws
2500	DIN DN 100 DIN DN 125	732	580 505	590	992 925	496	395 317	240	273	360	18	320	8
4000	DIN DN 125 DIN DN 150	738	523 540	596	940 995	496	358 390	282	356	450	18	410	8
5200	DIN DN 125 DIN DN 150	812	576 620	670	1030 1085	571	390 420	308	406	510	23	460	8
6500	DIN DN 150 DIN DN 200	817	620 720	675	1110 1210	571	462 535	358	508	620	26	572	8
7800	DIN DN 200 DIN DN 250	817	720 800	675	1210 1315	571	535 605	358	508	620	26	572	8
15000	DIN DN 250 DIN DN 300	817	800 866	667	1360 1460	571	709 777	460	711	840	26	780	12

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.