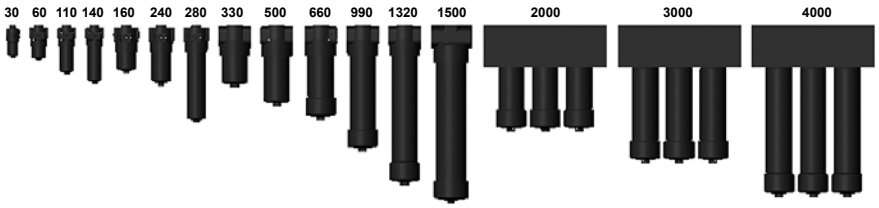
# Pressure Filter DF
# Pressure Filter for Reversible Oil Flow DFF
up to 2000 l/min, up to 420 bar




## 1. TECHNICAL SPECIFICATIONS

### 1.1 FILTER HOUSING

**Construction**

The filter housings are designed in accordance with international regulations. They consist of a filter head with a screw-in filter bowl. DFF filters are suitable for flow in both directions.

Standard equipment:

- connection for a clogging indicator in filter head
- drain screw with pressure relief (size DF 330 and above)
- 1 or 2-piece filter bowl available as an option for DF/DFF 280-660 and DF 2000
- 2-piece filter bowl for size DF/DFF 990 and above

### 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

**Contamination retention capacities in g**

| | | Betamicron® (BN4HC) | | | |
|---|---|---|---|---|---|
| DF/DFF | Elements | 3 µm | 5 µm | 10 µm | 20 µm |
| 30 | 1x0030 D | 4.6 | 5.1 | 5.4 | 5.6 |
| 60 | 1x0060 D | 6.5 | 7.3 | 7.8 | 8.0 |
| 110 | 1x0110 D | 13.8 | 15.5 | 16.4 | 16.9 |
| 140 | 1x0140 D | 18.1 | 20.3 | 21.5 | 22.2 |
| 160 | 1x0160 D | 19.8 | 22.2 | 23.5 | 24.3 |
| 240 | 1x0240 D | 32.3 | 36.3 | 38.4 | 39.6 |
| 280 | 1x0280 D | 70.6 | 79.3 | 83.9 | 86.6 |
| 330 | 1x0330 D | 47.2 | 53.1 | 56.1 | 57.9 |
| 500 | 1x0500 D | 76.9 | 86.5 | 91.5 | 94.4 |
| 660 | 1x0660 D | 102.2 | 114.9 | 121.5 | 125.4 |
| 990 | 1x0990 D | 154.5 | 173.7 | 183.7 | 189.5 |
| 1320 | 1x1320 D | 209.9 | 236.0 | 249.6 | 257.5 |
| 1500 | 1x1500 D | 159.5 | 170.0 | 191.3 | 212.7 |
| 2000 | 3x0660 D | 306.6 | 344.7 | 364.5 | 376.2 |
| 3000 | 3x0990 D | 463.5 | 521.1 | 551.1 | 568.5 |
| 4000 | 3x1320 D | 629.7 | 708.0 | 748.8 | 772.5 |

Filter elements are available with the following pressure stability values:

| | |
|---|---|
| Betamicron® (BN4HC): | 20 bar |
| Betamicron® (BH4HC): | 210 bar |
| Wire mesh (W): | 20 bar |
| Stainless steel fibre (V): | 210 bar |

### 1.3 FILTER SPECIFICATIONS

| | |
|---|---|
| Nominal pressure | 420 bar |
| Fatigue strength | at nominal pressure $2x10^6$ load cycles from 0 to nominal pressure (size 30 to 1320)<br>$3x10^5$ load cycles at 420 bar (size 1500)<br>$3x10^6$ load cycles at 280 bar (size 1500)<br>$10^6$ load cycles at 315 bar (size 2000-4000) |
| Temperature range | -30 °C to +100 °C<br>(-30 °C to -10 °C: $p_{max}$= 210 bar) |
| Material of filter head | EN-GJS 400-15 |
| Material of filter bowl | Steel |
| Type of clogging indicator | VD (differential pressure indication up to 420 bar operating pressure) |
| Pressure setting of clogging indicator | 5 bar (others on request) |
| Cracking pressure of bypass, only for DF filters (optional) | 6 bar (others on request) |

| | | Betamicron® (BH4HC) | | | |
|---|---|---|---|---|---|
| DF/DFF | Elements | 3 µm | 5 µm | 10 µm | 20 µm |
| 30 | 1x0030 D | 3.0 | 2.9 | 3.2 | 3.7 |
| 60 | 1x0060 D | 4.6 | 4.5 | 5.0 | 5.7 |
| 110 | 1x0110 D | 10.1 | 9.9 | 10.9 | 12.4 |
| 140 | 1x0140 D | 13.3 | 13.0 | 14.3 | 16.3 |
| 160 | 1x0160 D | 12.9 | 12.6 | 13.9 | 15.9 |
| 240 | 1x0240 D | 21.6 | 21.1 | 23.2 | 26.5 |
| 280 | 1x0280 D | 48.1 | 47.1 | 51.8 | 59.1 |
| 330 | 1x0330 D | 34.6 | 33.9 | 37.2 | 42.5 |
| 500 | 1x0500 D | 57.5 | 56.3 | 61.8 | 70.5 |
| 660 | 1x0660 D | 76.8 | 75.2 | 82.6 | 94.3 |
| 990 | 1x0990 D | 111.8 | 109.4 | 120.2 | 137.2 |
| 1320 | 1x1320 D | 153.8 | 150.7 | 165.5 | 188.8 |
| 1500 | 1x1500 D | 126.4 | 137.8 | 160.9 | 195.3 |
| 2000 | 3x0660 D | 230.4 | 225.6 | 247.8 | 282.9 |
| 3000 | 3x0990 D | 335.4 | 328.2 | 360.6 | 411.6 |
| 4000 | 3x1320 D | 461.4 | 452.1 | 496.5 | 566.4 |

### 1.4 SEALS

NBR (= Perbunan)

### 1.5 MOUNTING

As inline filter with or without reversible oil flow

### 1.6 SPECIAL MODELS AND ACCESSORIES

- Seals in FPM, EPDM
- With bypass valve (only DF-Filter)
- Oil drain screw up to DF/DFF 280

### 1.7 SPARE PARTS

See Original Spare Parts List

### 1.8 CERTIFICATES AND APPROVALS

On request

### 1.9 COMPATIBILITY WITH HYDRAULIC FLUIDS ISO 2943

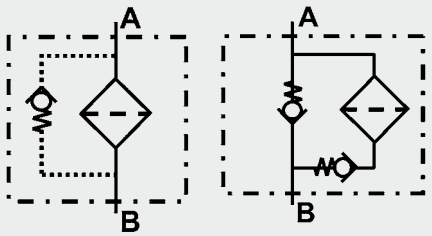
- Hydraulic oils H to HLPD DIN 51524
- Lubrication oils DIN 51517, API, ACEA, DIN 51515, ISO 6743
- Compressor oils DIN 51506
- Biodegradable operating fluids VDMA 24568 HETG, HEES, HEPG
- Non-flam operating fluids HFA, HFB, HFC and HFD
- Operating fluids with high water content (>50% water content)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

### 1.10 IMPORTANT INFORMATION

- Filter housing 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

**Symbol for hydraulic systems**

DF DFF



## 2. MODEL CODE (ALSO ORDER EXAMPLE)

**DF BN/HC 1500 T L L 10 D 1 . X /-L24**

### 2.1 COMPLETE FILTER

**Filter type**
DF or DFF

**Filter material of element**

| | | | |
|---|---|---|---|
| BN/HC | Betamicron® (BN4HC) | W | Wire mesh |
| BH/HC | Betamicron® (BH4HC) | V | Stainless steel fibre |

**Size of filter or element**
DF/DFF: 30*, 60, 110, 140, 160, 240, 280, 330, 500, 660, 990, 1320, 1500, 2000*, 3000*, 4000*

**Operating pressure**
T 420 bar

**Head design**
no details inline filter ports
L filter ports in L configuration (DF/DFF 1500 only)

**Type and size of port**

| Type | Port | Filter size | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 30* | 60 | 110 | 140 | 160 | 240 | 280 | 330 | 500 | 660 | 990 | 1320 | 1500 | 2000* | 3000* | 4000* |
| B | G ½ | ● | | | | | | | | | | | | | | | |
| C | G ¾ | | ● | ● | ● | | | | | | | | | | | | |
| E | G1 ¼ | | | | | ● | ● | ● | | | | | | | | | |
| F | G1 ½ | | | | | | | | ● | ● | ● | ● | ● | | | | |
| G | G2 | | | | | | | | | | | | | ● | | | |
| I | SAE DN 20 | | ● | ● | ● | | | | | | | | | | | | |
| J | SAE DN 32 | | | | | ● | ● | ● | | | | | | | | | |
| L | SAE DN 50 | | | | | | | | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| N | SAE DN 80 | | | | | | | | | | | | | | ● | ● | ● |

standard models

**Filtration rating in µm**
BN/HC, BH/HC, V: 3, 5, 10, 20 W: 25, 50, 100, 200

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

**Type code**
1 one-piece filter bowl (up to DF/DFF 660; DF 2000)
2 two-piece filter bowl (size DF/DFF 280 and above)

**Modification number**
X the latest version is always supplied

**Supplementary details**
B. bypass cracking pressure (e.g. B6 = 6 bar)*; no details = without bypass valve
L... light with appropriate voltage (24V, 48V, 110V, 220V) only for clogging indicators Type D
LED 2 light emitting diodes up to 24 Volt
P26 with 26" element (DF/DFF 1500 only)
P39 with 39" element (DF/DFF 1500 only)
SO184 pressure release/oil drain screw (sizes DF/DFF 330 and above)
V FPM seals
W suitable for HFA and HFC oil-water emulsions (only necessary when using a clogging indicator or V or W elements)
* only possible with DF filters

### 2.2 REPLACEMENT ELEMENT

**1500 D 010 BN4HC /-V**

**Size**
0030, 0060, 0110, 0140, 0160, 0240, 0280, 0330, 0500, 0660, 0990, 1320, 1500

**Type**
D

**Filtration rating in µm**
BN4HC, BH4HC, V: 003, 005, 010, 020
W: 025, 050, 100, 200

**Filter material**
BN4HC, BH4HC, W, V

**Supplementary details**
P26, P39, V, W (for descriptions, see point 2.1)

### 2.3 REPLACEMENT CLOGGING INDICATOR

**VD 5 D . X /-L24**

**Type**
VD differential pressure indicator up to 420 bar operating pressure

**Pressure setting**
5 5 bar standard, 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, W (for descriptions, see point 2.1)

## 3. FILTER CALCULATION / SIZING

The total pressure drop of a filter at a certain flow rate Q is the sum of the housing Δp and element Δp and is calculated as follows:

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

$\Delta p_{housing}$ = (see point 3.1)

$\Delta p_{element} = Q \cdot \frac{SK^*}{1000} \cdot \frac{viscosity}{30}$

(*see point 3.2)

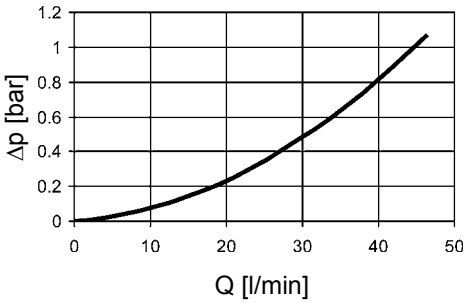
For ease of calculation, our Filter Sizing Program Filter-IT is available on request free of charge.

**NEW:** Sizing online at www.hydac.com

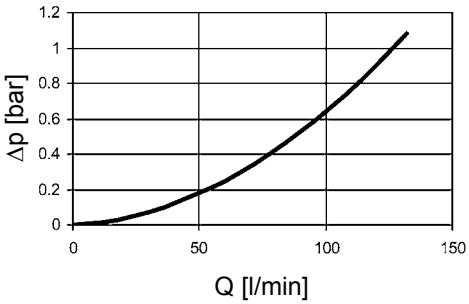
### 3.1 Δp-Q HOUSING GRAPHS BASED ON ISO 3968

The housing graphs apply to mineral oil with a density of 0.86 kg/dm³ and a kinematic viscosity of 30 mm²/s. In this case, the differential pressure changes proportionally to the density.

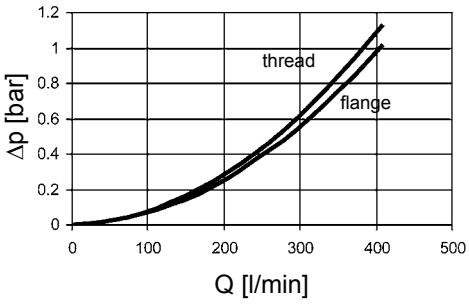
**DF 30**



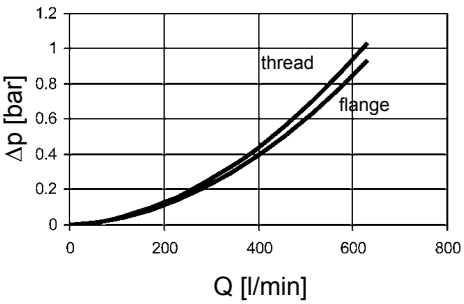

**DF 60, 110, 140**



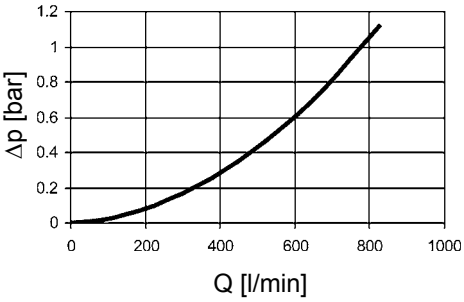

**DF 160, 240, 280**



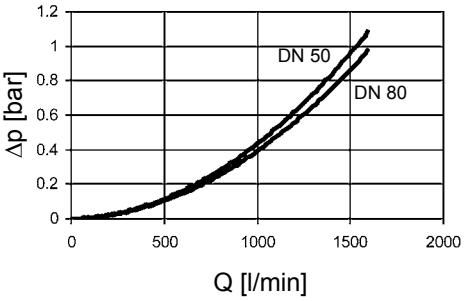

**DF 330, 500, 660, 990, 1320**



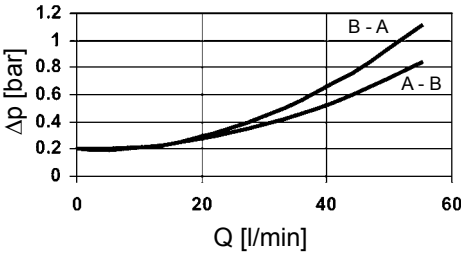

**DF 1500**



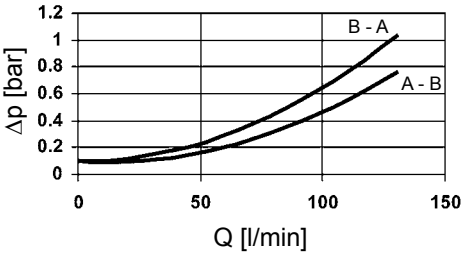

**DF 2000, 3000, 4000**



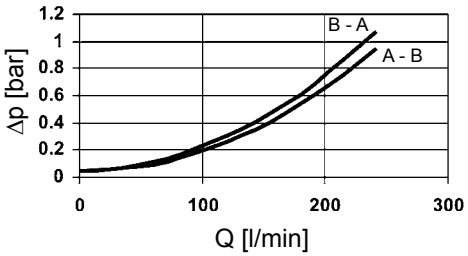

**DFF 60, 110, 140**



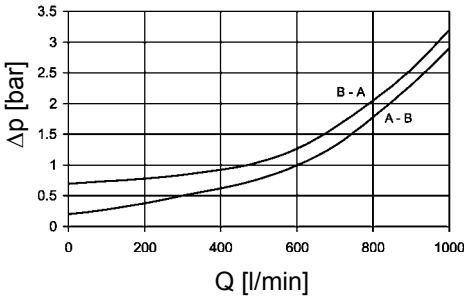

**DFF 160, 240, 280**




**DFF 330, 500, 660, 990, 1320**




**DFF 1500**

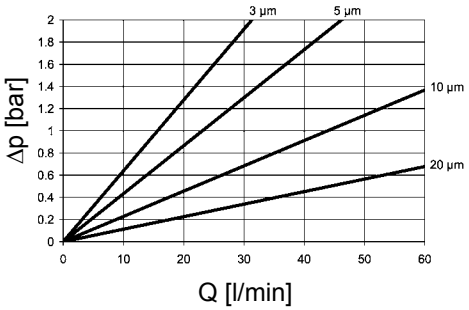


## 3.2 GRADIENT COEFFICIENTS (SK) FOR FILTER ELEMENTS

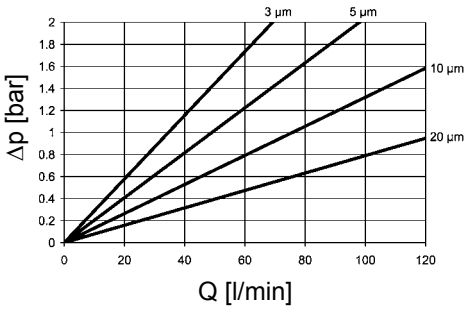
The gradient coefficients in mbar/(l/min) apply to mineral oils with a kinematic viscosity of 30 mm²/s. The pressure drop changes proportionally to the change in viscosity.

| DF/ | V | | | | W | BH4HC | | | |
|---|---|---|---|---|---|---|---|---|---|
| DFF | 3 µm | 5 µm | 10 µm | 20 µm | – | 3 µm | 5 µm | 10 µm | 20 µm |
| 30 | 18.4 | 13.5 | 7.5 | 3.6 | 3.030 | 91.2 | 50.7 | 36.3 | 19.0 |
| 60 | 16.0 | 9.3 | 5.4 | 3.3 | 0.757 | 58.6 | 32.6 | 18.1 | 12.2 |
| 110 | 8.2 | 5.6 | 3.3 | 2.2 | 0.413 | 25.4 | 14.9 | 8.9 | 5.6 |
| 140 | 5.8 | 4.8 | 3.1 | 2.3 | 0.324 | 19.9 | 11.3 | 8.1 | 4.3 |
| 160 | 4.6 | 3.2 | 2.3 | 1.4 | 0.284 | 16.8 | 10.4 | 5.9 | 4.4 |
| 240 | 3.1 | 2.5 | 1.7 | 1.1 | 0.189 | 10.6 | 6.8 | 3.9 | 2.9 |
| 280 | 2.3 | 1.7 | 1.2 | 0.8 | 0.162 | 5.7 | 3.4 | 1.8 | 1.6 |
| 330 | 2.2 | 1.8 | 1.2 | 0.8 | 0.138 | 7.7 | 4.5 | 2.8 | 2.0 |
| 500 | 1.5 | 1.2 | 0.8 | 0.5 | 0.091 | 4.2 | 2.6 | 1.5 | 1.2 |
| 660 | 1.1 | 0.9 | 0.6 | 0.4 | 0.069 | 3.3 | 1.9 | 1.0 | 0.9 |
| 990 | 0.8 | 0.6 | 0.4 | 0.3 | 0.046 | 2.2 | 1.3 | 0.8 | 0.6 |
| 1320 | 0.6 | 0.5 | 0.3 | 0.2 | 0.035 | 1.6 | 1.0 | 0.6 | 0.4 |
| 1500 | - | - | - | - | - | 1.4 | 0.8 | 0.6 | 0.5 |

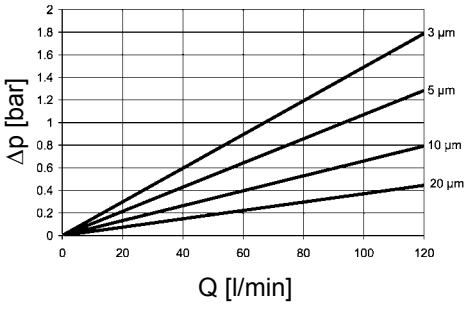
### BN4HC: 30



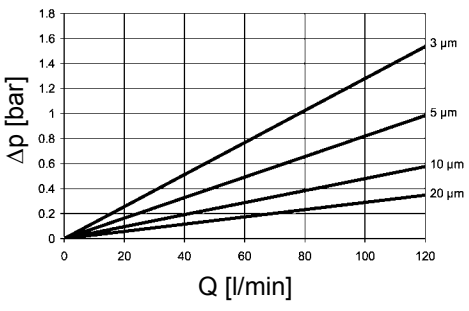

### BN4HC: 60



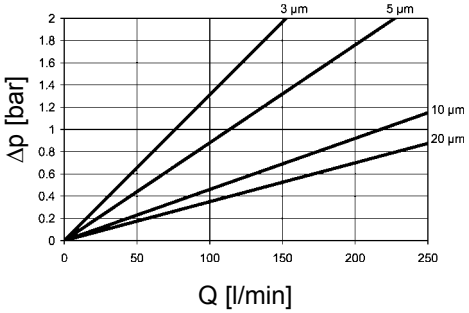

### BN4HC: 110



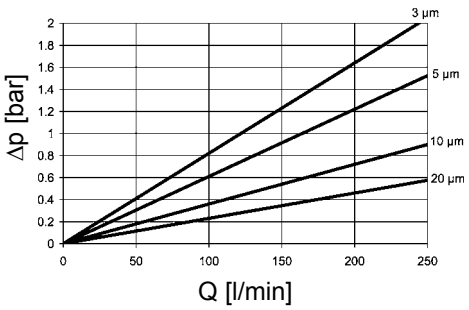

### BN4HC: 140



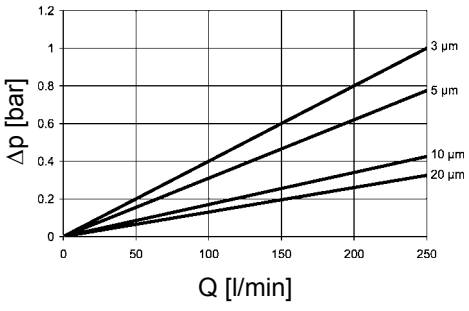

### BN4HC: 160



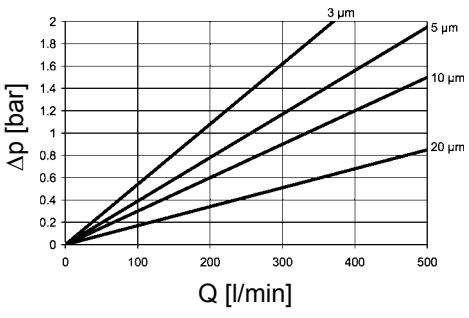

### BN4HC: 240



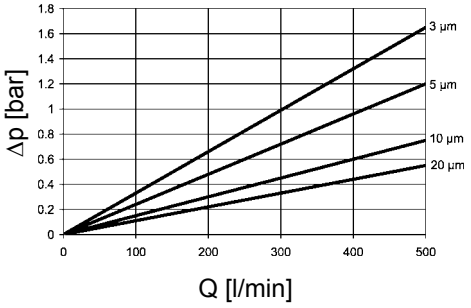

### BN4HC: 280



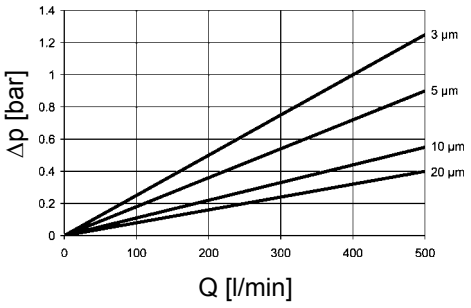

### BN4HC: 330



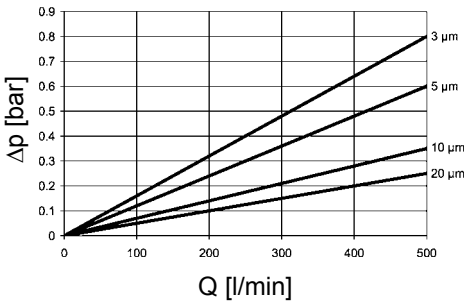

### BN4HC: 500



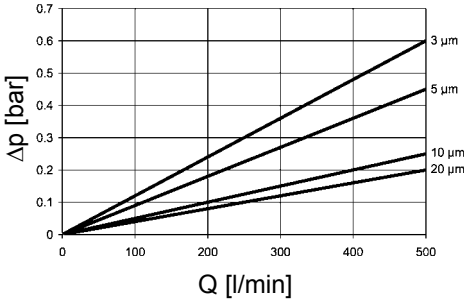

### BN4HC: 660



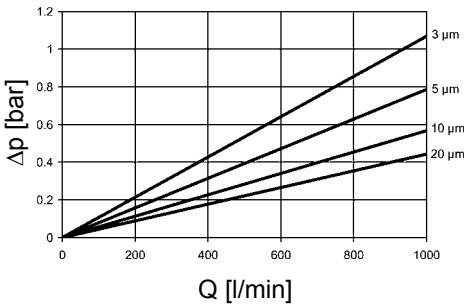

### BN4HC: 990




### BN4HC: 1320

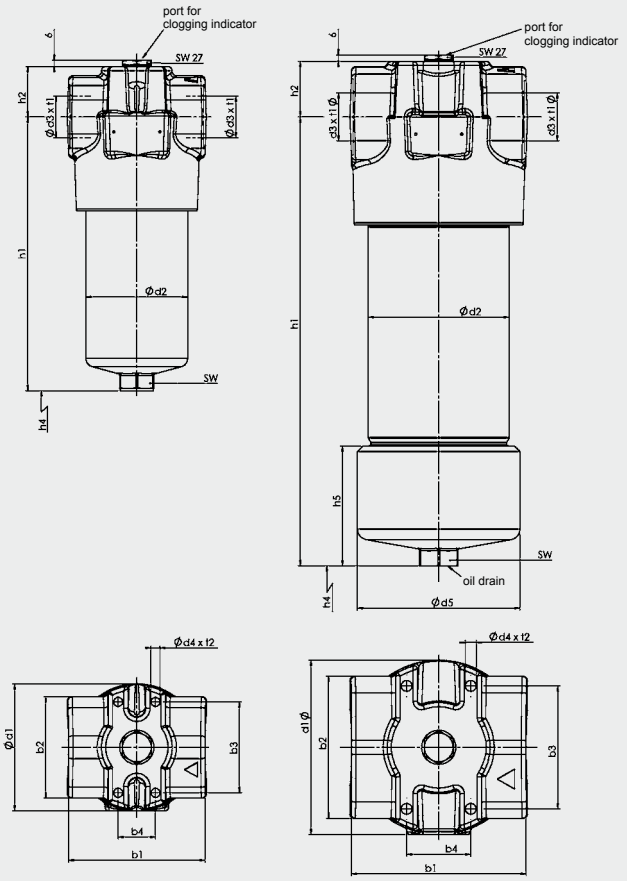



### BN4HC: 1500



# 4. DIMENSIONS

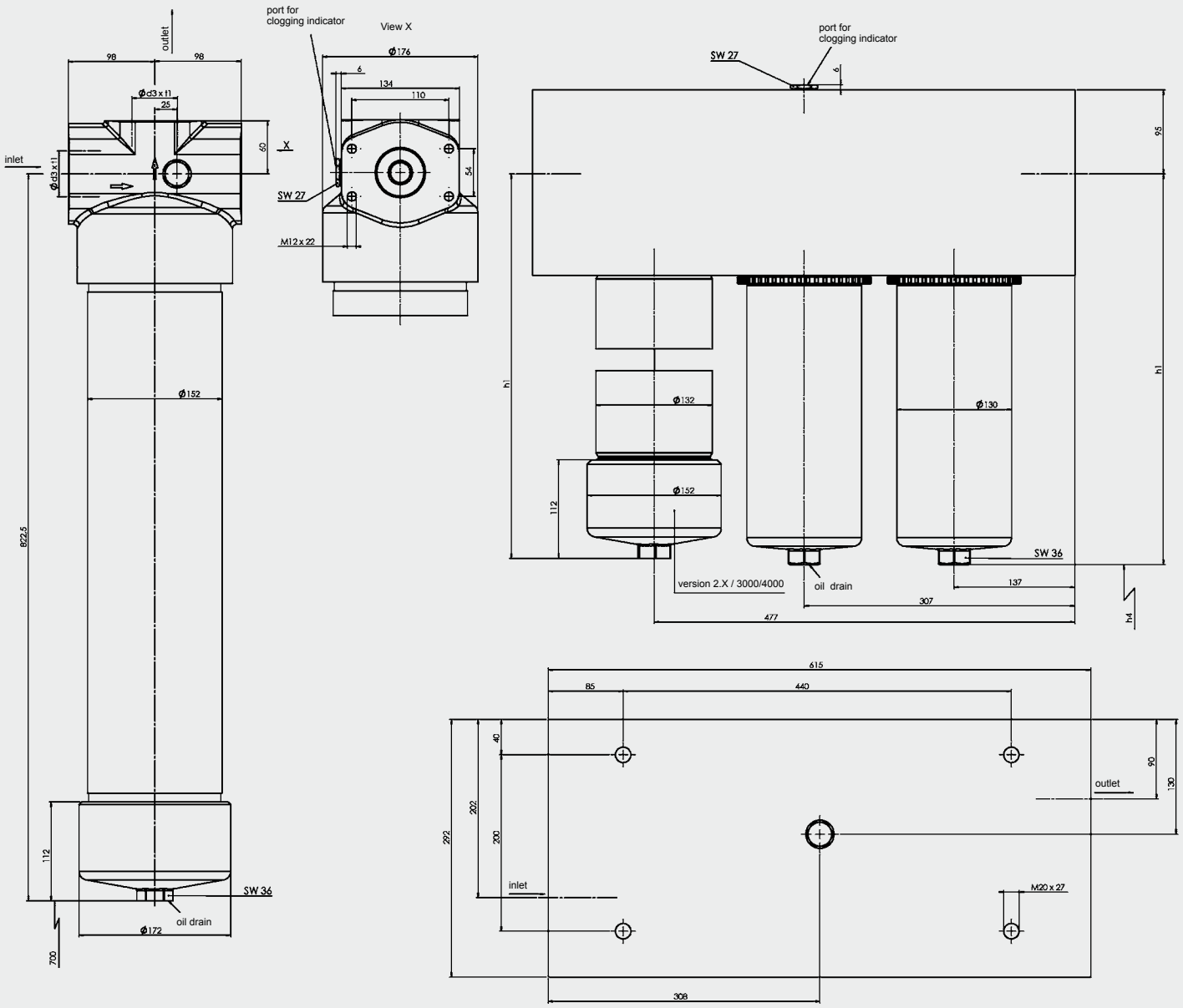
## DF 30, DF/DFF 60 to 1500 (inline filter ports)




| Type | b1 | b2 | b3 | b4 | d1 | d2 | d3 | d4 | d5 | h1 | h2 | h4 | h5 | SW | t1 | t2 | Weight including element [kg] | Vol. of pressure chamber [l] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30 ... B ... 1.X | 68 | 38 | 45 | 30 | 69 | 52 | G ½ | M5 | - | 131.5 | 38 | 75 | - | 24 | 14 | 6 | 2.3 | 0.13 |
| 60 ... C ... 1.X | 90 | 71 | 56 | 32 | 86 | 68 | G ¾ | M6 | - | 140 | 40 | 85 | - | 27 | 17 | 9 | 4.5 | 0.20 |
| 60 ... I ... 1.X | 89 | 71 | 56 | 32 | 86 | 68 | SAE DN 20 | M6 | - | 140 | 40 | 85 | - | 27 | - | 9 | 4.5 | 0.20 |
| 110 ... C ... 1.X | 90 | 71 | 56 | 32 | 86 | 68 | G ¾ | M6 | - | 209.5 | 40 | 85 | - | 27 | 17 | 9 | 5.4 | 0.33 |
| 110 ... I ... 1.X | 89 | 71 | 56 | 32 | 86 | 68 | SAE DN 20 | M6 | - | 209.5 | 40 | 85 | - | 27 | - | 9 | 5.4 | 0.33 |
| 140 ... C ... 1.X | 89 | 71 | 56 | 32 | 86 | 68 | G ¾ | M6 | - | 250.5 | 40 | 85 | - | 27 | 17 | 9 | 6.0 | 0.40 |
| 140 ... I ... 1.X | 89 | 71 | 56 | 32 | 86 | 68 | SAE DN 20 | M6 | - | 250.5 | 40 | 85 | - | 27 | - | 9 | 6.0 | 0.40 |
| 160 ... E ... 1.X | 125 | 95 | 85 | 35 | 119 | 95 | G1¼ | M10 | - | 196.5 | 47 | 105 | - | 32 | 21 | 14 | 10.3 | 0.60 |
| 160 ... J ... 1.X | 125 | 95 | 85 | 35 | 119 | 95 | SAE DN 32 | M10 | - | 196.5 | 47 | 105 | - | 32 | - | 14 | 10.3 | 0.60 |
| 240 ... E ... 1.X | 125 | 95 | 85 | 35 | 119 | 95 | G1¼ | M10 | - | 256 | 47 | 105 | - | 32 | 21 | 14 | 11.8 | 0.80 |
| 240 ... J ... 1.X | 125 | 95 | 85 | 35 | 119 | 95 | SAE DN 32 | M10 | - | 256 | 47 | 105 | - | 32 | - | 14 | 11.8 | 0.80 |
| 280 ... E ... 1.X | 125 | 95 | 85 | 35 | 119 | 95 | G1¼ | M10 | - | 438 | 47 | 105 | - | 32 | 21 | 14 | 16.3 | 1.60 |
| 280 ... J ... 1.X | 125 | 95 | 85 | 35 | 119 | 95 | SAE DN 32 | M10 | - | 438 | 47 | 105 | - | 32 | - | 14 | 16.3 | 1.60 |
| 330 ... F ... 1.X | 160 | 133 | 115 | 60 | 163 | 130 | G1½ | M12 | - | 257.5 | 52 | 115 | - | 36 | 23 | 17 | 24.5 | 1.50 |
| 330 ... L ... 1.X | 160 | 133 | 115 | 60 | 163 | 130 | SAE DN 50 | M12 | - | 257.5 | 52 | 115 | - | 36 | - | 17 | 24.5 | 1.50 |
| 500 ... F ... 1.X | 160 | 133 | 115 | 60 | 163 | 130 | G1½ | M12 | - | 350.5 | 52 | 115 | - | 36 | 23 | 17 | 28.6 | 2.30 |
| 500 ... L ... 1.X | 160 | 133 | 115 | 60 | 163 | 130 | SAE DN 50 | M12 | - | 350.5 | 52 | 115 | - | 36 | - | 17 | 28.6 | 2.30 |
| 660 ... F ... 1.X | 160 | 133 | 115 | 60 | 163 | 130 | G1½ | M12 | - | 428 | 52 | 115 | - | 36 | 23 | 17 | 31.6 | 3.00 |
| 660 ... L ... 1.X | 160 | 133 | 115 | 60 | 163 | 130 | SAE DN 50 | M12 | - | 428 | 52 | 115 | - | 36 | - | 17 | 31.6 | 3.00 |
| 330 ... F ... 2.X | 160 | 133 | 115 | 60 | 163 | 132 | G1½ | M12 | 152 | 254 | 52 | 180 | 112 | 36 | 23 | 17 | 27.4 | 1.50 |
| 330 ... L ... 2.X | 160 | 133 | 115 | 60 | 163 | 132 | SAE DN 50 | M12 | 152 | 254 | 52 | 180 | 112 | 36 | - | 17 | 27.4 | 1.50 |
| 500 ... F ... 2.X | 160 | 133 | 115 | 60 | 163 | 132 | G1½ | M12 | 152 | 343 | 52 | 270 | 112 | 36 | 23 | 17 | 31.5 | 2.30 |
| 500 ... L ... 2.X | 160 | 133 | 115 | 60 | 163 | 132 | SAE DN 50 | M12 | 152 | 343 | 52 | 270 | 112 | 36 | - | 17 | 31.5 | 2.30 |
| 660 ... F ... 2.X | 160 | 133 | 115 | 60 | 163 | 132 | G1½ | M12 | 152 | 420 | 52 | 350 | 112 | 36 | 23 | 17 | 34.4 | 3.00 |
| 660 ... L ... 2.X | 160 | 133 | 115 | 60 | 163 | 132 | SAE DN 50 | M12 | 152 | 420 | 52 | 350 | 112 | 36 | - | 17 | 34.4 | 3.00 |
| 990 ... F ... 2.X | 160 | 133 | 115 | 60 | 163 | 132 | G1½ | M12 | 152 | 576 | 52 | 500 | 112 | 36 | 23 | 17 | 43.4 | 4.20 |
| 990 ... L ... 2.X | 160 | 133 | 115 | 60 | 163 | 132 | SAE DN 50 | M12 | 152 | 576 | 52 | 500 | 112 | 36 | - | 17 | 43.4 | 4.20 |
| 1320 .. F ... 2.X | 160 | 133 | 115 | 60 | 163 | 132 | G1½ | M12 | 152 | 742 | 52 | 670 | 112 | 36 | 23 | 17 | 51.1 | 5.60 |
| 1320 .. L ... 2.X | 160 | 133 | 115 | 60 | 163 | 132 | SAE DN 50 | M12 | 152 | 742 | 52 | 670 | 112 | 36 | - | 17 | 51.1 | 5.60 |
| 1500 .. G ... 2.X | 196 | 134 | 110 | 54 | 176 | 152 | G2 | M12 | 172 | 822.5 | 60 | 700 | 112 | 36 | 30 | 22 | 69.3 | 8.20 |
| 1500 .. L ... 2.X | 196 | 134 | 110 | 54 | 176 | 152 | SAE DN 50 | M12 | 172 | 822.5 | 60 | 700 | 112 | 36 | - | 22 | 69.3 | 8.20 |

B, C, E, F, G = threaded connection
I, J, L = flange connection to DIN ISO 6162, 6000 psi with metric thread

**DF/DFF 1500 (filter ports in L configuration)** **DF 2000, 3000, 4000**




| Type | d3 | h1 | h4 | t1 | Weight incl. element [kg] | Vol. of pressure chamber[l] |
|---|---|---|---|---|---|---|
| 1500 .. LG .. 2.X | G2 | - | 700 | 30 | 69.3 | 8.20 |
| 1500 .. LL .. 2.X | SAE DN 50 | - | 700 | - | 69.3 | 8.20 |
| 2000 .. N ... 1.X | SAE DN 80 | 447 | 95 | - | 265 | 14.00 |
| 2000 .. N ... 2.X | SAE DN 80 | 440 | 350 | - | 274 | 14.00 |
| 3000 .. N ... 2.X | SAE DN 80 | 596 | 500 | - | 302 | 17.60 |
| 4000 .. N ... 2.X | SAE DN 80 | 762 | 670 | - | 326 | 21.80 |

G = threaded connection

L, N = flange connection to DIN ISO 6162, 6000 psi with metric thread

## 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.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