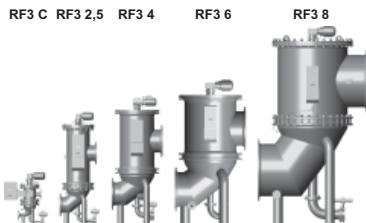


Backflushing Filter AutoFilt® RF3



1. TECHNICAL SPECIFICATIONS

1.1 GENERAL

The automatic back-flushing filter AutoFilt® RF3 is a self-cleaning system for extracting particles from low-viscosity fluids. Its robust construction and automatic back-flushing capability make a major contribution to operational reliability and **reduce operating and maintenance costs.**

The slotted tube or SuperMesh filter elements with **filtration rates from 25 to 3000 µm** ensure highly effective filtration of contaminating particles from the process medium.

Automatic cleaning starts as soon as the elements become contaminated. **The flow of filtrate is not interrupted during the back-flushing procedure.** A range of filters of different sizes allows **flow rates of up to 10000 m³ per hour.**

Numerous combinations of materials and equipment as well as **individually adjustable control parameters** allow optimum adaptation of the filter to any application.

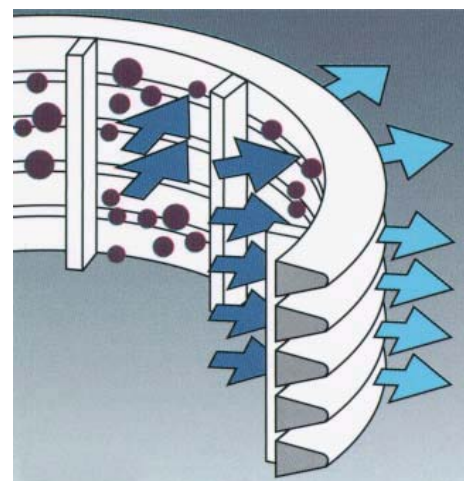
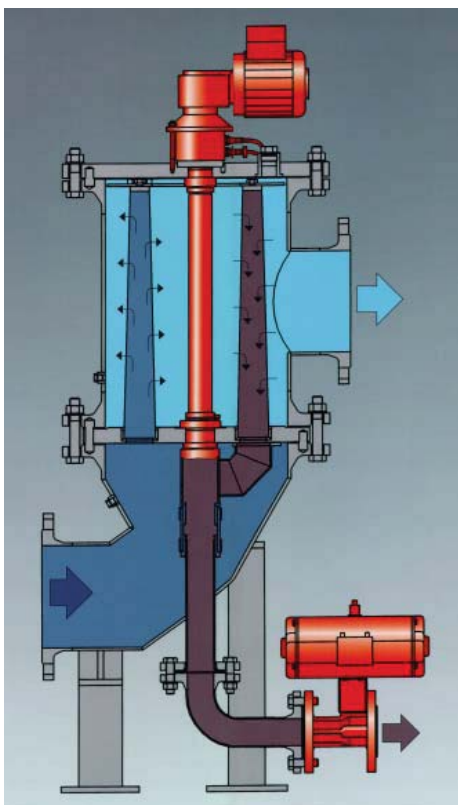
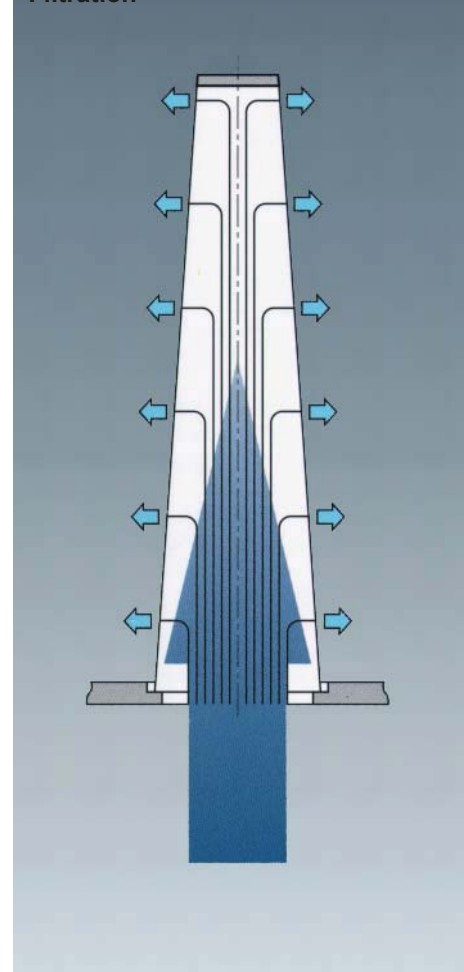
1.2 OPERATION OF THE AUTOFILT® RF3 Filtration

The fluid to be filtered flows through the slotted-tube filter elements of the back-flushing filter, passing from the inside to the outside.

Contamination particles then collect on the smooth inside of the filter elements.

As the level of the contamination increases, the differential pressure between the contaminated and clean sides of the filter increases. When the differential pressure reaches its pre-set value, back-flushing starts automatically.

Filtration



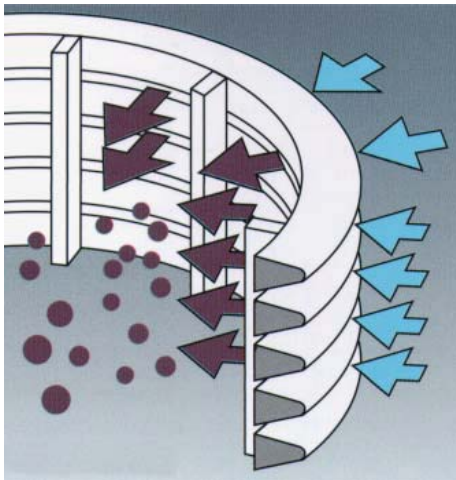
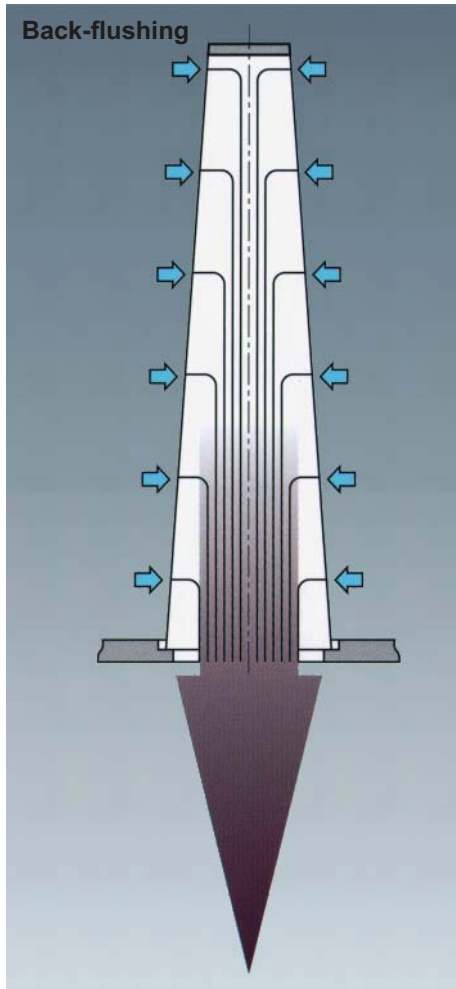
Triggering automatic back-flushing

Back-flushing is triggered automatically:

- When the triggering differential pressure is exceeded,
 - By means of an adjustable timer,
 - When the TEST key is pressed.
- As soon as back-flushing has been triggered, the filter starts to clean the filter elements.

Back-flushing of the filter elements – back-flushing cycle

- The geared motor turns the flushing arm under the filter elements to be cleaned.
- The back-flushing valve is opened.
- The pressure drop between filtrate side and back-flushing line flushes a small amount of the filtrate backwards into the filter elements to be cleaned. The contamination particles collected on the inside of the filter elements are loosened and flushed into the back-flushing line via the flushing arm.
- As soon as the "back-flushing time per element" has elapsed, the back-flushing valve is closed. In this way all the filter elements are flushed in succession. A back-flushing cycle is terminated when all the filter elements have been cleaned.



1.3 SPECIAL FEATURES OF THE AUTOFILT® RF3

Isokinetic filtering and back-flushing

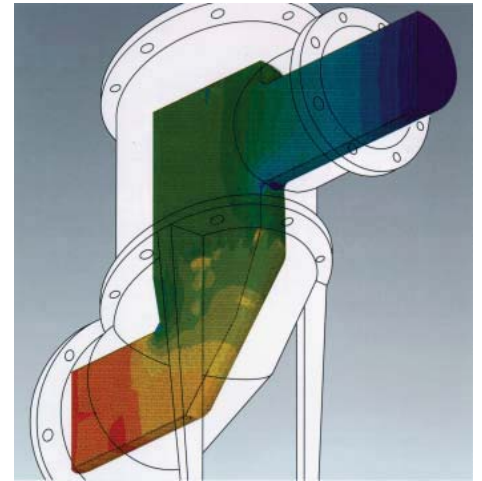
The special conical shape and configuration of the filter elements allows even flow, resulting in low pressure drop and complete cleaning of the elements. The advantage: fewer back-flushing cycles and lower loss of back-flushing fluid.

Pulse-aided back-flushing

In control modes EPT and PT the flushing arm remains under each filter element for only a few seconds. Rapid opening of the pneumatic back-flushing valve generates a pressure surge in the openings of the filter elements that provides an additional cleaning effect to the back-flushing process.

Low back-flushing quantities due to cyclic control

The back-flushing valve opens and closes during back-flushing of each filter element.



The filters are designed to ensure especially good flow conditions and enable **compact dimensions with high filtration performance and low pressure drop.**

2. FILTER SPECIFICATIONS

2.1 STANDARD CONFIGURATIONS

2.1.1 Control parameters

- EPT: electro-pneumatic cyclic control
- EU: electrical control (electric only)
- PT: pneumatic cyclic control (pneumatic only)
- PTZ: pneumatic cyclic control with timer function (pneumatic only)

2.1.2 Connection voltages

- 3 x 400V / 50 Hz with or without neutral wire
- 3 x 500V / 50 Hz without neutral wire
- 3 x 230V / 50 Hz with or without neutral wire
- 3 x 415V / 50 Hz without neutral wire
- 3 x 415V / 60 Hz with neutral wire
- 3 x 460V / 60 Hz without neutral wire
- Others on request

2.1.3 Reservoir mounting / flange connections

- AD 2000 / PED 97/23/EC (Pressure Equipment Directive)
- DIN flanges

2.1.4 Variable flange geometry

- Inlet / outlet and back-flushing line can be turned

2.1.5 Housing materials

- Carbon steel
- Grey cast iron (only for sizes CG and 0G)
- Stainless steel

2.1.6 Material of internal parts

- Stainless steel

2.1.7 Material of elements

- Stainless steel

2.1.8 External corrosion protection

- 2-coat primer (not required for stainless steel housing)

2.1.9 Internal corrosion protection

- 2K-epoxy coating
- Rubber coating

2.1.10 Differential pressure gauge

- Aluminium
- Stainless steel
- Brass
- Chemical seal

2.1.11 Filtration ratings

- 25 µm, 40 µm and 60 µm Super-Mesh
- 50 µm to 3000 µm slotted tube

2.1.12 Electrical protection class

- IP55

2.1.13 Pressure ranges

- 6 bar
- 10 bar
- 16 bar
- 25 bar
- 40 bar
- 64 bar (on request)
- 100 bar (on request)

2.2 OPTIONAL VERSIONS

There is a range of optional versions available for the AutoFilt® RF3. For technical details and prices, please contact our Technical Sales Department at Head Office.

2.2.1 Control / electrical components / voltage supply

- Manual version of the AutoFilt® RF3
- PLC control
- Filter without control for integration into customer's PLC
- Filter interlocking for parallel operation
- UL/CSA approved components
- Special IP protection classes
- Safe in tropical conditions
- Customised special solutions

2.2.2 Housing manufacture

- ASME Code design with or without U stamp

2.2.3 Flange connections

- ANSI
- JIS

2.2.4 Housing materials

- Duplex
- Super duplex
- Various qualities of stainless steel
- Various qualities of carbon steel

2.2.5 Cover plate lifting device

- Carbon steel
- Stainless steel
- Cover plate lifting device for retrofitting

2.2.6 Materials of internal parts and elements

- Duplex
- Super duplex
- Various qualities of stainless steel
- Elements with magnetic filtration technology
- Superflush element technology

2.2.7 Corrosion protection, external

- Multiple layer coatings
- Special paints / coatings for offshore
- Special paints / coatings according to customer specification
- Colours to customer specification

2.2.8 Corrosion protection, internal

- Glass flake lining
- Special coatings according to customer specification

2.2.9 Explosion protection

- ATEX according to Directive 94/9/EC

2.2.10 Documentation

- Manufacturer's test certificates
 - Material certificates 3.1 according to DIN EN 10204
 - GOST certificate of conformity
 - 3rd parties (TÜV, ABS, Lloyds, etc)
 - Welding procedure specifications (WPS) / Procedure Qualification Record (PQR)
 - Inspection plan
- And many others on request

Further optional models on request

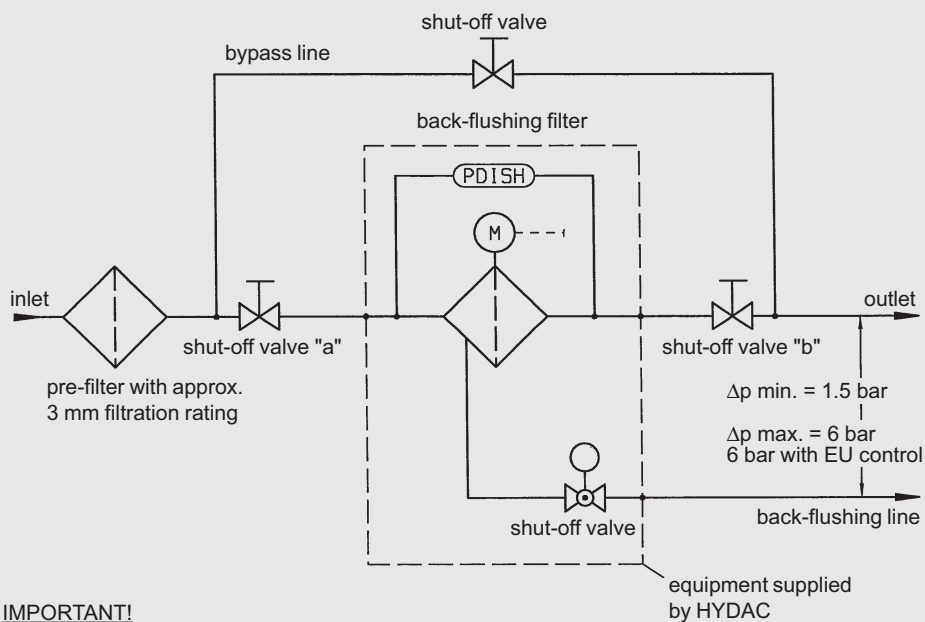
2.3 OVERVIEW OF TECHNICAL SPECIFICATIONS OF STANDARD MODELS

| Size | Pressure range [bar] | Connection ²⁾ Inlet / outlet | Connection Back-flush line (PN16) | Weight ³⁾ [kg] | Volume [l] | No. of elements | Filtration area [cm ²] | Back-flush volume ⁴⁾ [l] |
|------|----------------------|---|-----------------------------------|---------------------------|------------|--------------------|------------------------------------|-------------------------------------|
| C | 16 | DN 50 | DN 25 | 121 | 15 | 6 x KC | 2140 | 25 |
| CG | 16 | DN 50 | DN 25 | 121 | 15 | 6 x KC | 2140 | 25 |
| 0 | 10 ¹⁾ | DN 100 | DN 25 | 145 | 25 | 6 x K0 | 3810 | 25 |
| 0G | 16 | DN 100 | DN 25 | 145 | 25 | 6 x K0 | 3810 | 25 |
| 1 | 10 | DN 150 | DN 40 | 240 | 60 | 3 x K1 3 x K2 | 6190 | 35 |
| 2 | 10 | DN 200 | DN 50 | 365 | 105 | 4 x K1 4 x K2 | 8250 | 50 |
| 2.5 | 10 | DN 250 | DN 50 | 450 | 190 | 6 x K3 | 12500 | 65 |
| 3 | 10 | DN 300 | DN 65 | 570 | 280 | 9 x K3 | 18750 | 95 |
| 4 | 6 | DN 400 | DN 80 | 750 | 425 | 18 x K3 | 37500 | 210 |
| 5 | 6 | DN 500 | DN 80 | 1020 | 635 | 16 x K3 8 x K4 | 55760 | 310 |
| 6 | 6 | DN 600 | DN 100 | 1610 | 998 | 32 x K3 8 x K4 | 89100 | 485 |
| 7 | 6 | DN 700 | DN 100 | 1950 | 1355 | 24 x K3 20 x K4 | 106100 | 555 |
| 8 | 6 | DN 900 | DN 150 | 3550 | 2710 | 54 x K5 | 180700 | 720 |

Max. permissible temperature for all AutoFilt® RF3: 90 °C

- 1) Pressure range size 0 in stainless steel: 16 bar
- 2) According to DIN /EN - standard / reservoir manufacture to AD 2000, use of Pressure Equipment Directive 97/23/EC if required
- 3) Approx. empty weight based on standard pressure range
- 4) based on EPT/PT control mode with opening time of back-flushing valve of 1.5 seconds and 1.5 bar differential pressure between outlet and back-flushing line, with EU control the back-flushing volume increases by a factor of 5.

2.4 CIRCUIT DIAGRAM



IMPORTANT!
For cleaning there must be a minimum pressure difference between the outlet and back-flushing line of 1.5 bar.

3. MODEL CODE AUTOFILT® RF3

RF3 - 5 - EPT1 - NG - N - 1 - 3 - X / KS1000 - 5 - 12345678

Type AutoFilt _____

Size filter _____

- C = DN 50 PN16
- CG = DN 50 PN16 (SG cast iron)
- 0 = DN100 PN10¹⁾
- 0G = DN100 PN16 (SG cast iron)
- 1 = DN150 PN10
- 2 = DN200 PN10
- 2.5 = DN250 PN10
- 3 = DN300 PN10
- 4 = DN400 PN 6
- 5 = DN500 PN 6
- 6 = DN600 PN 6
- 7 = DN700 PN 6
- 8 = DN900 PN 6

Type of control / input supply voltage _____

- EPT = electro-pneumatic cyclic control
- EU = electrical control
- PT = pneumatic cyclic control
- PTZ = pneumatic cyclic control with timer
- 0 = without control, all users on terminal strip/block
- 1 = 3 x 400V / N / PE 50Hz
- 2 = 3 x 400V / x / PE 50Hz
- 3 = 3 x 500V / x / PE 50Hz
- 4 = 3 x 230V / N / PE 50Hz
- 5 = 3 x 230V / x / PE 50Hz
- 6 = 3 x 415V / x / PE 50Hz
- 7 = 3 x 415V / N / PE 60Hz
- 8 = 3 x 460V / x / PE 60Hz
- 9 = 3 x 440V / x / PE 60Hz
- A = 3 x 525V / x / PE 50Hz
- B = 3 x 575V / x / PE 60Hz
- C = 3 x 690V / x / PE 50Hz
- D = 1 x 230V / N / PE 50Hz
- E = 1 x 230V / N / PE 60Hz
- F = 1 x 115V / N / PE 60Hz

Housing material / corrosion protection _____

- N = carbon steel or SG cast iron, external primer (RAL 9006)
- NM = carbon steel or SG cast iron, external primer (RAL 9006), internal: 2K epoxy paint
- NG = carbon steel, external primer (RAL 9006), internal: 2 K epoxy paint, internal: rubber lined
- E = stainless steel
- A = for ANS flanges add A as well
- J = for JIS flanges add J as well

Material of shut-off valve _____

- N = butterfly: housing SG cast iron coated, washer stainless steel
- S = ball valve: housing SG cast iron coated, ball stainless steel
- B = butterfly: housing SG cast iron coated, washer bronze

Differential pressure gauge _____

- 1 = pressure chamber aluminium
- 2 = pressure chamber stainless steel
- 3 = with chemical seal, stainless steel
- 4 = pressure chamber, brass

Flange position inlet and outlet _____

- 1 = filter outlet opposite filter inlet (standard)
- 2 = filter outlet offset by 90° clockwise to standard
- 3 = filter outlet offset by 180° clockwise to standard
- 4 = filter outlet offset by 270° clockwise to standard

Modification number _____

- X = the latest version is always supplied

Element set _____

- KS = conical slotted tubes (50 - 3000 µm)
- SKS = conical slotted tube Superflush
- KD = conical SuperMesh (25, 40, 60 µm)
- SKD = conical Supermesh Superflush

Size of element set _____

Identical to size of filter

Drawing number _____

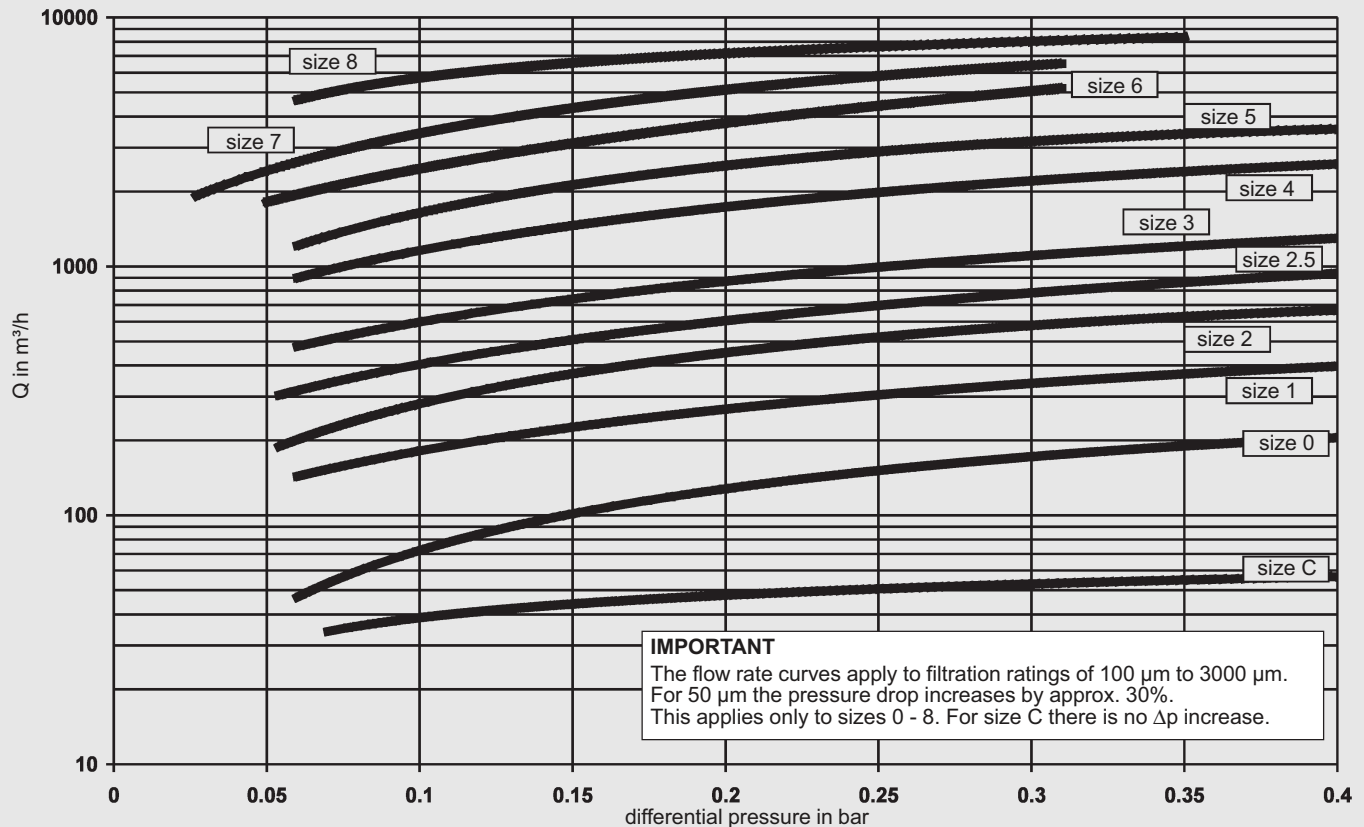
For special models
(number is allocated after technical clarification at Head Office)

¹⁾ stainless steel housing PN16

4. FILTER CALCULATION / SIZING

4.1 PRESSURE DROP CURVES

The pressure drop curves apply to water and other fluids up to a viscosity of 15 mm²/s.



It is crucial when operating the AutoFilt® RF3 that there is a differential pressure between the back-flushing line and filter outlet of at least 1.5 bar. This minimum pressure differential ensures the operation of the filter.

In order to be able to size the filter correctly, the following design data should be available:

- Flow rate
- Type of medium
- Materials / resistance
- Viscosity
- Required filtration rating
- Particulate loading in the fluid
- Type of contamination
- Operating pressure
- Operating temperature – must be below the boiling point of the medium
- Power supply and compressed air supply
- Pressure ratios after the AutoFilt® RF3 (is there any back pressure?)
- Integration of the AutoFilt® RF3 in the whole system

The pressure drop curves and the tables, including the one for special emulsion applications, can be used to calculate the AutoFilt® RF3. Generally speaking, an initial Δp (clean condition of the filter) of 0.2 bar should not be exceeded. The pressure drop curve applies to filtration ratings of 100 - 3000 µm slotted tube and 25 µm, 40 µm and 60 µm SuperMesh.

When using 50 µm slotted tubes the pressure drop indicated for sizes 0 to 8 increases by approx. 30%.

A further factor in the calculation is the flow velocity through the flange inlet. It should not exceed 4 m/s.

When sizing the AutoFilt® RF3, the calculation of water applications and emulsion applications must be treated separately because of the different contamination load (see point 4.2. Calculation tables).

4.2 CALCULATION TABLES

The calculation tables form an important basis for deciding the choice of AutoFilt® RF3.

In particular the higher contamination load in emulsion applications demands more generous sizing of the filter.

The following points must also be taken into account for emulsion applications:

- Table applies to emulsions and oils with a viscosity of up to 15 mm²/s
- For applications in the areas of cast iron machining, grinding and honing and for fluids with a viscosity above 15 mm²/s, Head Office must definitely be consulted.
- The flow rate ranges given apply to filtration ratings ≥ 100 µm.

4.2.1 Water applications

| Size | Typical flow rate range |
|--------|-------------------------------|
| C / CG | 5 - 28 m ³ /h |
| 0 / OG | 25 - 113 m ³ /h |
| 1 | 90 - 254 m ³ /h |
| 2 | 200 - 450 m ³ /h |
| 2.5 | 400 - 600 m ³ /h |
| 3 | 550 - 860 m ³ /h |
| 4 | 810 - 1700 m ³ /h |
| 5 | 1500 - 2450 m ³ /h |
| 6 | 2000 - 3600 m ³ /h |
| 7 | 3000 - 5000 m ³ /h |
| 8 | 4500 - 7500 m ³ /h |

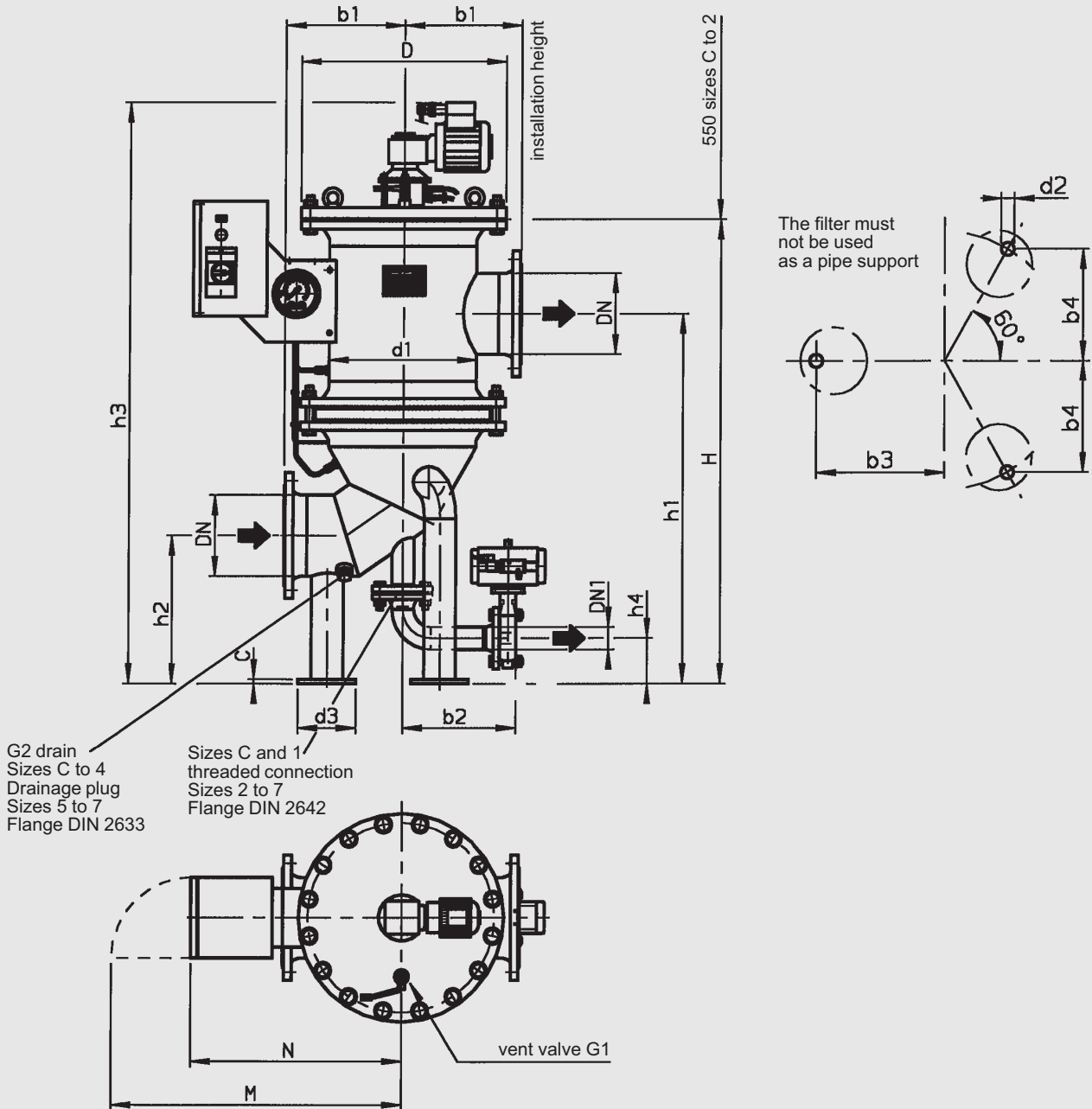
4.2.2 Emulsion applications (cooling lubricants, washing fluids)

| Size | Typical flow rate range |
|--------|-------------------------------|
| C / CG | 5 - 15 m ³ /h |
| 0 / OG | 10 - 60 m ³ /h |
| 1 | 40 - 100 m ³ /h |
| 2 | 90 - 200 m ³ /h |
| 2.5 | 100 - 350 m ³ /h |
| 3 | 150 - 450 m ³ /h |
| 4 | 200 - 650 m ³ /h |
| 5 | 350 - 950 m ³ /h |
| 6 | 700 - 1500 m ³ /h |
| 7 | 1000 - 1700 m ³ /h |
| 8 | 1300 - 3000 m ³ /h |

5. DIMENSIONS

The dimensions indicated relate to the standard pressure ranges according to Table 2.3.

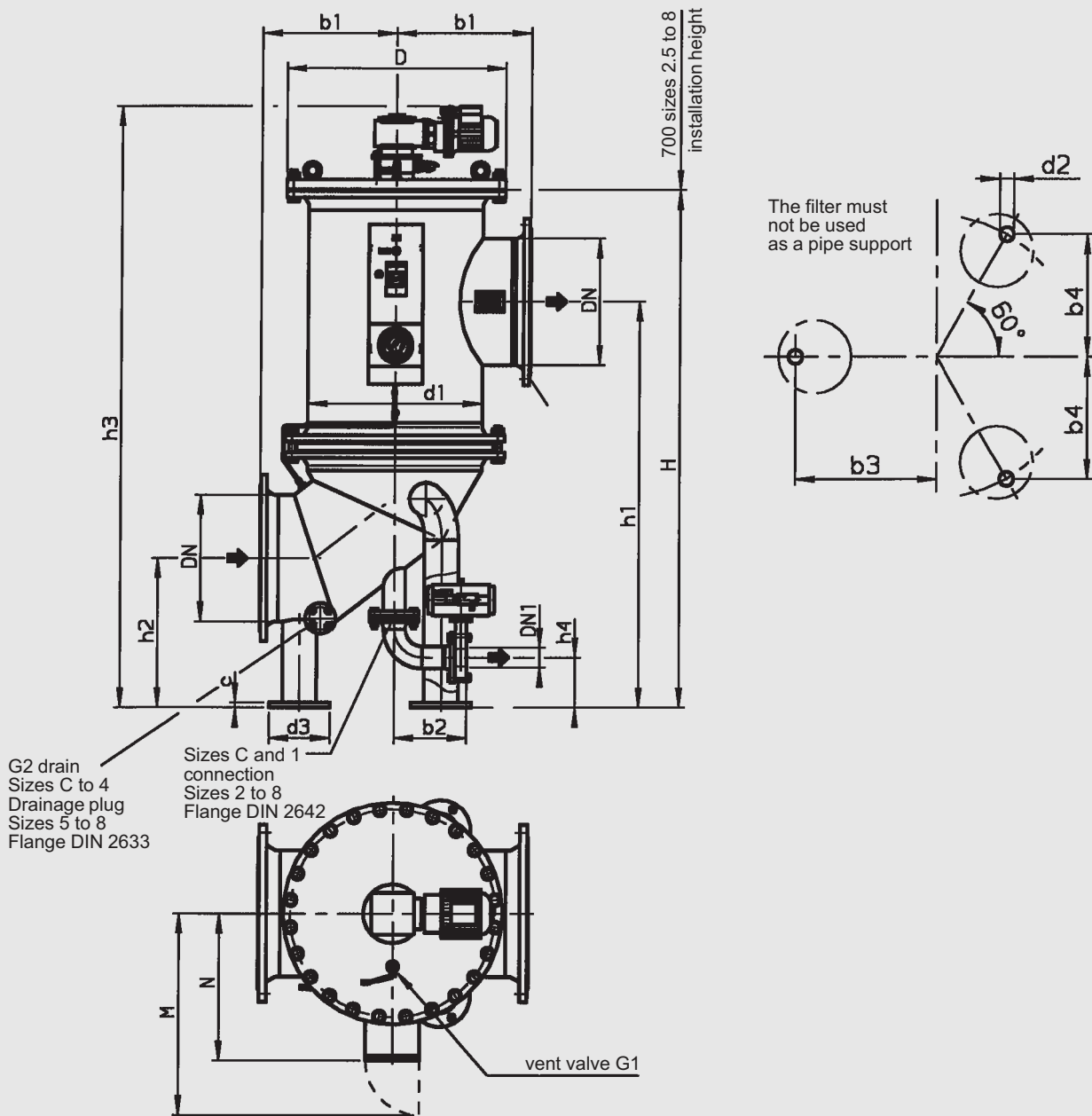
5.1 DIMENSIONS OF SIZES C TO 2



The dimensions indicated have ± 5 mm tolerances

| Size | DN | DN1 | b1 | b2 | c | H | h1 | h2 | M | N | G1 | G2 | h3 | h4 | D | d1 | d2 | d3 | b3 | b4 |
|-------|-----|-----|-----|-----|----|-------|------|-----|-----|-----|------|------|-------|-----|-----|-----|----|-----|-----|-----|
| RF3-C | 50 | 25 | 200 | 250 | 8 | 711.5 | 579 | 220 | 665 | 443 | G1/4 | G1/2 | 966.5 | 100 | 340 | 220 | 12 | 100 | 155 | 135 |
| RF3-0 | 100 | 25 | 200 | 241 | 8 | 993 | 740 | 250 | 691 | 471 | G1/4 | G1/2 | 1305 | 100 | 340 | 220 | 12 | 100 | 155 | 135 |
| RF3-1 | 150 | 40 | 270 | 263 | 10 | 1113 | 860 | 300 | 753 | 533 | G1/4 | G3/4 | 1425 | 115 | 445 | 324 | 15 | 120 | 210 | 186 |
| RF3-2 | 200 | 50 | 325 | 313 | 12 | 1255 | 1000 | 400 | 795 | 575 | G1/4 | G3/4 | 1565 | 120 | 565 | 406 | 18 | 160 | 270 | 235 |

5.2 DIMENSIONS OF SIZES 2.5 TO 8



The dimensions indicated have ± 5 mm tolerances

| Size | DN | DN1 | b1 | b2 | c | H | h1 | h2 | N | M | G1 | G2 | h3 | h4 | D | d1 | d2 | d3 | b3 | b4 |
|---------|-----|-----|-----|-----|----|------|------|------|-----|------|------|------|------|-----|------|------|----|-----|-----|-----|
| RF3-2.5 | 250 | 50 | 325 | 312 | 12 | 1760 | 1300 | 400 | 440 | 660 | G1/4 | G3/4 | 2075 | 120 | 565 | 406 | 18 | 160 | 270 | 235 |
| RF3-3 | 300 | 65 | 380 | 276 | 12 | 1888 | 1380 | 500 | 485 | 705 | G1/4 | G3/4 | 2185 | 155 | 670 | 508 | 18 | 160 | 322 | 278 |
| RF3-4 | 400 | 80 | 450 | 296 | 20 | 2033 | 1525 | 600 | 540 | 760 | G1/4 | G3/4 | 2330 | 220 | 780 | 610 | 22 | 200 | 375 | 357 |
| RF3-5 | 500 | 80 | 550 | 296 | 20 | 2080 | 1635 | 600 | 593 | 813 | G1/4 | DN40 | 2415 | 200 | 895 | 711 | 27 | 250 | 485 | 420 |
| RF3-6 | 600 | 100 | 625 | 312 | 20 | 2280 | 1745 | 675 | 698 | 918 | G1/4 | DN40 | 2615 | 200 | 1115 | 914 | 30 | 300 | 565 | 515 |
| RF3-7 | 700 | 100 | 750 | 312 | 20 | 2315 | 1805 | 700 | 750 | 970 | G1/4 | DN40 | 2650 | 200 | 1230 | 1016 | 30 | 300 | 653 | 565 |
| RF3-8 | 900 | 150 | 950 | 560 | 20 | 3183 | 2543 | 1000 | 850 | 1070 | G1/4 | DN40 | 3506 | 229 | 1405 | 1220 | 30 | 300 | 716 | 620 |

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.

HYDAC Process Technology GmbH
 Am Wrangelflöz 1
 D-66538 Neunkirchen
 Tel.: 0 68 21 / 86 90 - 0
 Fax: 0 68 21 / 86 90 - 200
 Internet: www.hydac.com
 E-Mail: prozess-technik@hydac.com