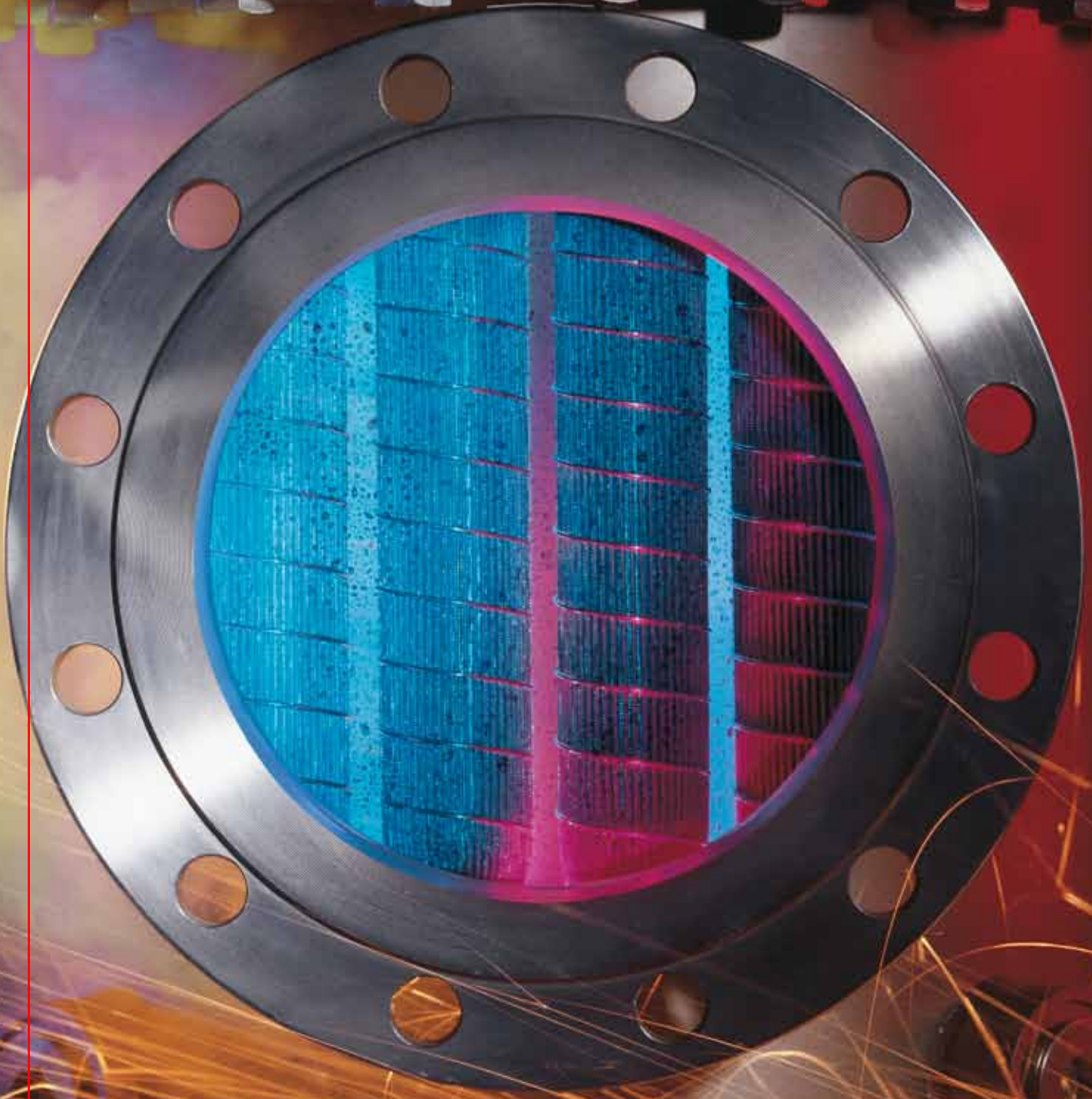


HYDAC

INTERNATIONAL

**Process Technology.
Product Catalogue.**



HYDAC Filters and Filter Elements for Process Technology

HYDAC has been a leading manufacturer of hydraulic components for well over 40 years. Part of the HYDAC group of companies, HYDAC Process Technology GmbH is your contact for filtration applications in the process technology, chemical and plastic processing industry.

Today HYDAC Process Technology GmbH is a market leader, providing sales and service worldwide.

Our declared aim is to implement the filtration requirements of our customers. The story of our success is founded on our experience in the widest variety of applications, the quality of our products and services and essentially in the benefits to customers of our products.

Filters for process technology are high performance, quality products which contribute through their high quality to ensuring the function and to a large degree to extending the service life of components, systems and machines: a longer service life, maximisation of the quality of the fluid being filtered and the possibility of re-using the filter element together with low maintenance costs will reduce your production costs and the environmental impact.

From our comprehensive filter range, you can choose between individual filter elements, filters in single or duplex form and complete filter systems with or without automatic backflushing.

Furthermore, we manufacture filter elements according to customer specifications. Our filter elements made of Chemicon® (metal fibre), wire mesh or in slotted tube design have already proven themselves in various applications in process technology.

The outstanding features of our high quality filter materials include high porosity combined with consistent retention rates and a high pressure and temperature stability up to an absolute filtration rating of 1.0 µm.



To make selecting the correct filter easier, you should weigh up the most important economic aspects such as ongoing costs for maintenance and operation against purchase costs and costs in the event of system breakdown. Other crucial factors for consideration should be pressure drop, contamination load, filter area and the cleanability of the filter material.

The products which you will find in this catalogue are the culmination of numerous field tests, research in HYDAC's own laboratory and decades of experience.

Our aim is also to become your partner in the field of filtration. Our expertise in filtration technology, high quality products and tireless dedication and service to the customer on site are reasons why we also wish to become your partner.

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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2. Industries and applications

HYDAC Process Technology GmbH filters can be used in many industries and applications.



Steel industry

Filtration of the process water to protect the nozzles and pumps during high pressure descaling and for water conditioning for the cooling of blast furnaces and rolling mills. Emulsion filtration in rolling mills.



Paper industry

Protection of nozzles of all types on paper machines. Treatment of fresh water (e.g. river water) for cooling and as process water. Sealing water filtration for vacuum pumps.



Power plants

Conditioning of used water for generator cooling and sealing water filtration to extend service life of the rotary seals on turbine shafts in hydroelectric power plants. Protection of heat exchangers in thermal power plants.



Automotive industry

Filtration of cooling lubricants and washing fluids to extend service intervals and so economise on costs of new purchase and disposal. In addition, conditioning of cooling and process water for different applications in the automotive industry.



Machine tools

Optimisation of cooling lubricant quality and therefore extension of lifetimes. In addition, protection of tools and therefore uniform quality of parts produced.



Mining

Filtration of water for sprinkling the shield and cutting machines. Cooling water treatment for mine ventilation. Protective filtration with backflushable block filters for the water hydraulics underground. Special filters for filtering HFA fluids.



Oil and gas industry

Filtration of injection water, cooling water, service water, flushing water (pipeline flushing) and MEG fluids in onshore and offshore systems. Filtration solutions for the subsea sector.



Marine

Pre-filtration for ballast water conditioning systems.



Water / waste water conditioning

Protective filter for membrane systems (e.g. for ultrafiltration membranes or reverse osmosis systems) for extension of lifetimes of the upstream candle filters or regeneration times of the membranes.

Conditioning of industrial water in sewage treatment plants.



District heating

Protection of heat exchangers to prevent blockages in the cooling channels.



Chemical industry

Cooling and process water filtration in many sectors of the chemical industry. Filtration of a wide variety of chemicals.



Other industry sectors

Polymer melt filtration using special elements manufactured according to customer requirements.

3. Product range

3.1 General

If you are considering using a filter from HYDAC Process Technology GmbH, you can choose from the following product portfolio:

Inline filters in single and duplex versions

Strainer filters in single and duplex versions

High pressure filters in stainless steel

Automatic backflushing filters from the series AutoFilt®

Filter systems with combinations of a wide variety of components (BTU, PTS)

Complete filtration skids

Filter element technology

Basically there are **8 main design principles** which should be taken into consideration:

- 1 Material resistance** to the medium – which materials are required? Do you need special sealing materials for the medium? etc. In this context, HYDAC can offer you a variety of materials and solutions.
- 2 Flow rate** – what are the minimum and maximum flow rates?
- 3 Pressure** – at what pressure does your system operate?
- 4 Pressure drop** – what pressure drop is permitted in your system?
- 5 Temperature** – at what temperature does your system operate?
- 6 Connection sizes** – what connection sizes are required?
- 7 Filtration rating** – what filter rating do you require? Remember the principle:
Not as fine as possible, but as fine as necessary.
- 8 Economic factors** – would you like manual or automatic operation?

For further product-specific calculation criteria, please see the relevant catalogue pages on the individual products.

At the end of the catalogue you will find our filter questionnaire which you can fill in for your personal filtration application and let us have all the necessary information. Together we will then work out a filtration solution which is tailored to your system.

HYDAC also has products which are suitable for use in potentially explosive locations. Please see our ATEX questionnaire at the end of the catalogue.

3.2 Filter materials / filtration ratings

The core of each filter is the filter element. This product is the result of many year's research and development work.

In order to provide solutions for the most varied filtration applications, a wide range of filter materials and element models is available.

Most filter materials can be cleaned, thus avoiding the considerable costs of re-purchase, storage and disposal.

The filtration performance of the filter materials is defined as follows:

3.2.1 Filtration performance

Retention rates for wire mesh and slotted tubes:

Nominal retention rates

The filtration ratings given in the model code for these qualities are based on a factory standard filter test. This test is carried out by introducing a large amount of dust (ISO MTD) at the beginning of the filter test and subsequently separating the contamination particles over 1 hour. The test filter must retain 90 - 95 % of all particles larger than the given filtration rating.


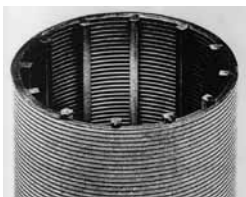
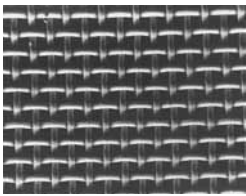
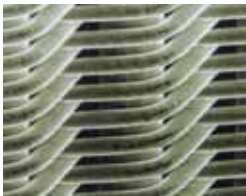
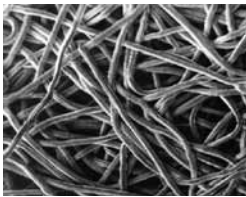

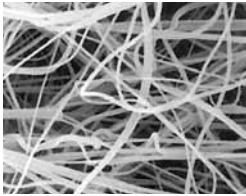
Retention rates for Betamicron® (glass fibre) and Chemicon® (metal fibre):

Absolute retention rate

The filtration ratings given in the brochure are determined by the multi-pass test carried out on the HYDAC test rig, based on ISO 4572 (multi-pass test for the determination and proof of the filtration performance, extended to finest filtration). In this test at least 99 % of all particles larger than the given filtration rating must be retained and this up to the max. permissible differential pressure across the filter element.

A filtration rate of 99 % corresponds to a β_x -value of 100, which denotes absolute filtration.

3.2.2 Summary of filter materials and filtration ratings

Filtration rating	Material	Description
3000 - 10000 μm nominal		Cleanable perforated sheet: Preferred application in strainer filters; Filtration direction from inside to outside; Allstainless steel.
50 - 3000 μm nominal		Cleanable slotted tube: Used in backflushing filters AutoFilt® RF3, RF4, RF5, RF7 and ATF in conical design and in many inline filters. The extremely robust construction allows maximum cleaning of the elements. Material: stainless steel
100 - 500 μm nominal		Cleanable square mesh: Stainless steel 1.4401 filter material which can be cleaned many times; can be used in all inline filters.
25, 40, 60 μm nominal		Cleanable dutch weave: Specially woven wire mesh with increased stability. For use in all inline filters and as specially sintered mesh combination (SuperMesh) in the AutoFilt® RF3, RF4 and RF7. Material: stainless steel
1 - 75 μm absolute		Cleanable metal fibre Chemicon®: Depth filter medium with 3-dimensional structure and very high contamination retention capacity with excellent retention characteristics. Material: stainless steel
3 - 20 μm absolute		Noncleanable glass fibre Betamicron®: Very high contamination retention capacity and retention characteristics with low purchase costs.
1 - 100 μm absolute		Noncleanable filter candles in polypropylene or polyester: Melt-blown or pleated FlexMicron candles with very high contamination retention capacities.

The selection of filter materials and filtration ratings is based on the system available and the components to be protected. In some cases coarse filtration is sufficient, but in others very fine filtration is required; complete cascade solutions are also possible.

3.2.3 Cleaning filter elements

In general the filter elements must be divided into cleanable and noncleanable filter materials.

The choice of filter materials should be made according to economic, ecological and system specific criteria. In the area of process filtration, a cleanable filter material is usually used.

The choice of cleaning methods depends essentially on the type of contamination and the filter material. To achieve a better cleaning effect, individual processes can also be combined together. In this context, ensure that the cleaning parameters and the chosen solvents do not attack the filter material.

Not all types of cleaning can be carried out by the customer themselves. By agreement with Head Office, specialist firms can be recommended who will carry out element cleaning for the customer. On request the customer will receive a cleaning log with bubble test point and weight records.

The cleaning can be carried out using different processes according to the **filter material and type of contamination:**

High pressure cleaning:

Suitable for cleaning coarse and loose particles manually and automatically with high pressure jets.

This must be carried out correctly, taking the spray pressure, water temperature and spray direction into account to avoid damage.

Ultrasound cleaning:

Cleaning filter elements in an ultrasound bath works by breaking down and flushing out the contamination particles which have become embedded in the element. The ultrasound bath is operated in the range from 20 to 40 kHz using water and a surfactant additive. Alternatively, specific solvents can also be used.

Scalding in solvents:

Scalding of the filter elements is a method whereby the elements are placed in a closed circuit, as in a rinsing machine. The system is operated with a solvent at high temperature.

In order to have the greatest possible transfer of matter at every point of the element, a special flow manipulation is required. After flushing, the solvent can be cooled and the element taken out.

Pyrolysis:

This is a cleaning method which is based on the degradation of organic material which has collected on the element. In so doing, the organic material is vaporised at high temperatures in a low oxygen environment. In order to prevent damage to the filter material, the temperature must be controlled accurately and evenly throughout the process. In addition, the proportion of oxygen must be precisely metered to prevent combustion.

Vacuum pyrolysis:

This method of cleaning filter elements is based on degrading synthetic materials in two stages.

The process takes place in a vacuum chamber. Here too, the material to be removed is heated by internal radiation heating whilst oxygen is excluded.

The first stage is melting i.e. changing to the fluid state. Any remaining synthetic residue is then removed by increasing the temperature to approx. 500 °C in a second stage, i.e. changing into a gaseous state.

When noncleanable filter elements are used, HYDAC Process Technology GmbH and the whole HYDAC group of companies sets great store by filter elements which can be incinerated for thermal recovery.

Note:

The information given here is intended only for reference and is to serve as a guideline when selecting filters, elements, materials and resistance.

If you have any further questions, please contact HYDAC Process Technology GmbH directly, or the HYDAC representatives in your country / region.



Backflushing Filter AutoFilt® RF3



RF3-C RF3-0 RF3-1 RF3-2 RF3-2.5 RF3-3 RF3-4 RF3-5 RF3-6 RF3-7 RF3-8



1. TECHNICAL SPECIFICATIONS

1.1 GENERAL

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

The slotted tube or SuperMesh elements in the filter 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 backflushing procedure.

A range of filters of different sizes **allow 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

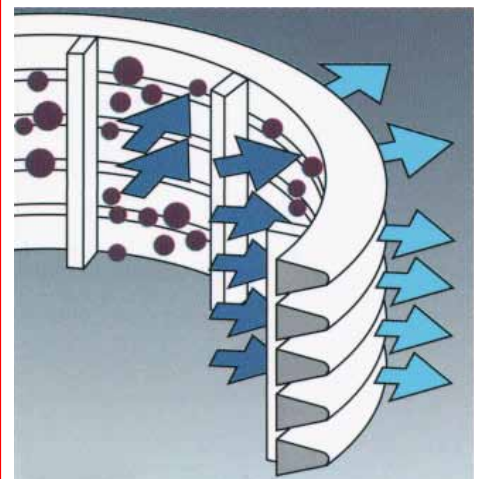
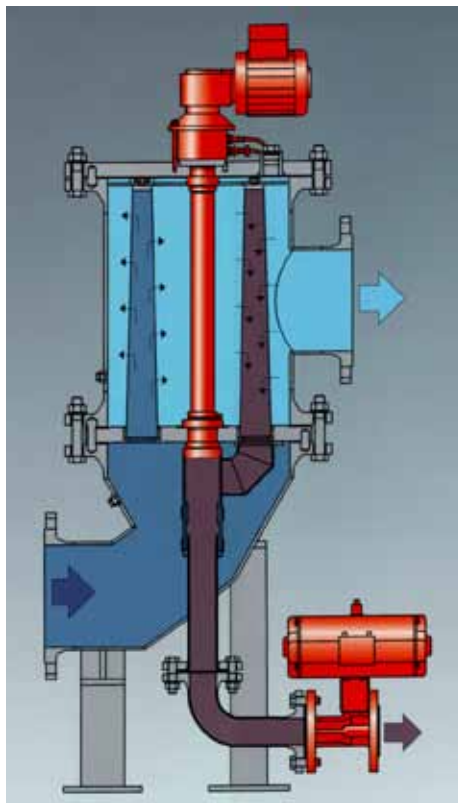
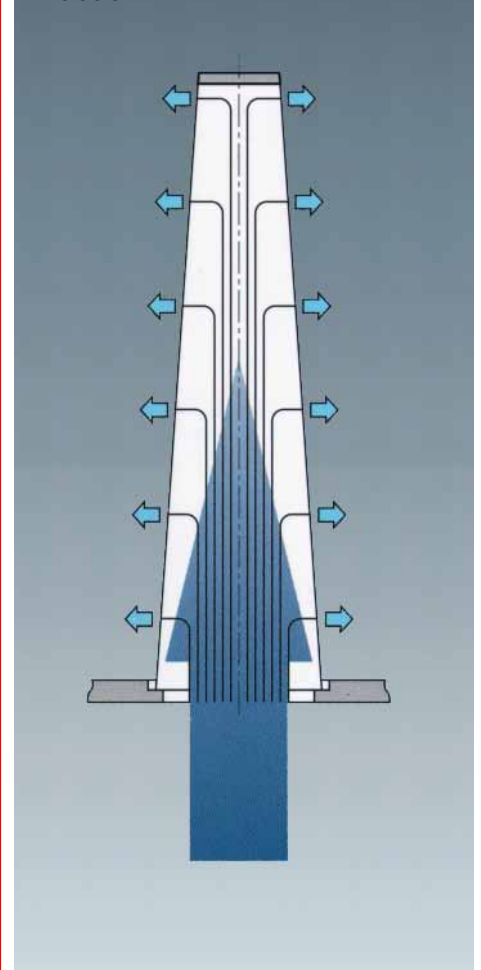
The fluid to be filtered flows through the slotted tube filter elements of the backflushing filter, passing from the inside to the outside.

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

As the level of contamination increases, the differential pressure between the contaminated and clean sides of the filter increases.

When the differential pressure reaches its preset value, backflushing starts automatically.

Filtration



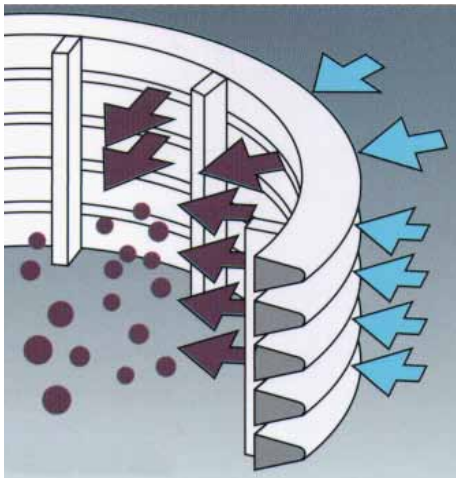
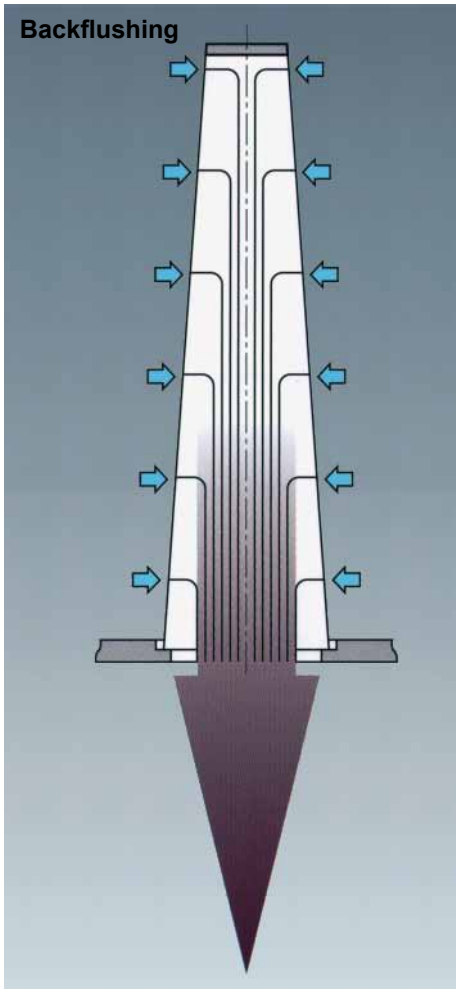
Triggering automatic backflushing

Backflushing is triggered automatically:

- When the triggering differential pressure is exceeded
 - By means of an adjustable timer (optional)
 - By pressing the TEST key
- As soon as backflushing has been triggered, the filter starts to clean the filter elements.

Backflushing of the filter elements - backflushing cycle

- The gear motor rotates the rinsing arm under the filter elements to be cleaned.
 - The backflushing valve is opened.
 - The pressure drop between the filtrate side and the backflushing line rinses a small partial flow of the filtrate in the opposite direction into the filter elements to be cleaned.
- The contamination particles deposited on the inside of the filter elements are detached and carried out via the rinsing arm into the backflushing line.
- After the "backflushing time per element" is complete, the backflushing valve is closed.
- In this way, all the filter elements are backflushed, one after the other. A backflushing cycle is complete once all filter elements have been cleaned.



1.3 SPECIAL FEATURES OF THE AUTOFILT® RF3

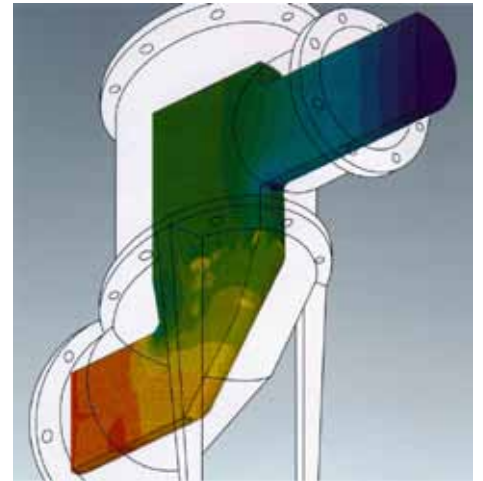
Isokinetic filtering and backflushing

The special conical shape and configuration of the filter elements allows even flow, resulting in low pressure drops and complete cleaning of the elements. The advantage: fewer backflushing cycles and reduced loss of backflushing fluid.

Pulseaided backflushing On the control types EPT and PT; the filter element to be backflushed remains in the flushing position for only a few seconds. Rapid opening of the pneumatic backflushing valve generates a pressure surge in the filter element openings, providing an additional cleaning effect to the backflushing process.

Low backflushing quantities due to cyclic control

The backflushing valve opens and closes during backflushing of each filter element.



The filter, which produces particularly good flow rates, is of a compact construction with high filtration performance and low pressure drops.

2. FILTER SPECIFICATIONS

2.1. STANDARD CONFIGURATIONS

2.1.1 Control parameters

- EPT: electro-pneumatic cyclic control
- EU: electrical circulation 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
- 3 x 440V / 60 Hz without neutral wire
- 3 x 525V / 50 Hz without neutral wire
- 3 x 575V / 60 Hz without neutral wire
- 3 x 690V / 50 Hz without neutral wire
- 1 x 230V / 50 Hz
- 1 x 230V / 60 Hz
- 1 x 115V / 60 Hz

2.1.3 Housing calculation / flange connections

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

2.1.4 Variable flange geometry

- Inlet/outlet and backflushing line, rotatable

2.1.5 Housing materials

- Carbon steel
- 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 paint
- 2K polyurethane coating
- rubber lined

2.1.10 Differential pressure gauge

- Aluminium
- Stainless steel
- Brass
- Chemical seal

2.1.11 Filtration ratings

- 25 µm, 40 µm and 60 µm SuperMesh
- 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 are 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 controls and 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
- Superduplex
- 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
- Superduplex
- Various qualities of stainless steel
- Elements with magnetic filtration technology
- Superflush element technology

2.2.7 External corrosion protection

- Multiplelayer coatings
- Special paints / coatings for offshore use
- Special paint/coatings according to customer specifications
- Colours to customer specification

2.2.8 Internal corrosion protection

- Glass flake lining
- Special paint/coatings according to customer specifications

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
- 3rd parties (TÜV, ABS, Lloyds, etc.)
- Welding procedure specifications (WPS) / Procedure Qualification Record (PQR)
- Inspection plan

And many others available on request

Further optional models on request.

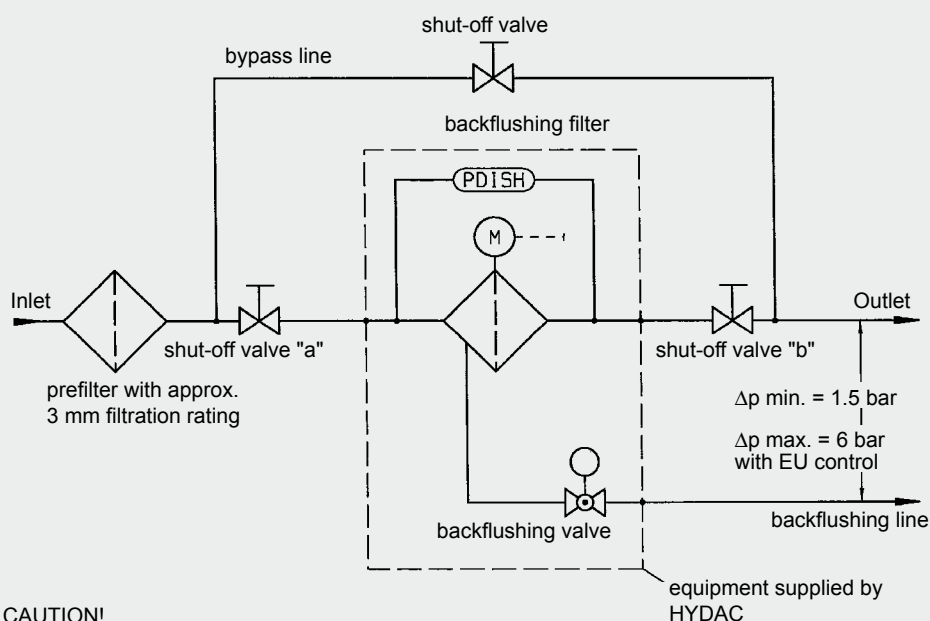
2.3 OVERVIEW OF TECHNICAL SPECIFICATIONS OF STANDARD MODELS

Frame Size	Pressure range [bar]	Connection ²⁾ Inlet/outlet	Connection backflushing line (PN 16)	Weight ³⁾ [kg]	Volume [l]	No. of elements	Filtration area [cm ²]	Backflush 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 AD2000, application of Pressure Equipment Directive 97/23/EC if required
- 3) Approx. empty weight based on standard pressure range
- 4) Per cycle, based on EPT/PT control mode with opening time of backflushing valve of 1.5 seconds and 1.5 bar differential pressure between outlet and backflushing line, with EU control the backflushing volume increases by a factor of 5.

2.4 CIRCUIT DIAGRAM



CAUTION!
For cleaning, there must be a minimum pressure difference between the outlet and the backflushing line of 1.5 bar.

3. MODEL CODE AUTOFILT® RF3

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

Type AutoFilter

Filter size

- 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 circulation control
- PT = pneumatic cyclic control
- PTZ = pneumatic cyclic control with timer function
- 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), 2K epoxy paint, internal
- NP = carbon steel, external primer (RAL 9006), 2K polyurethane paint, internal
- NG = carbon steel, external primer (RAL 9006), rubber lining
- E = stainless steel
- A = for ANSI flanges, add A
- J = for JIS flanges, add J

Material of backflushing valve

- N = butterfly: housing SG cast iron coated, washer stainless steel (only up to $p_{max} \leq 16$ bar!)
- B = butterfly: housing SG cast iron coated, washer bronze (only up to $p_{max} \leq 16$ bar!)
- S = ball valve: ball stainless steel, housing carbon steel to nominal width 50 mm from nominal width 50 mm SG cast iron coated (from $p_{max} > 16$ bar!)
- E = ball valve: ball stainless steel, housing stainless steel (from $p_{max} > 16$ bar!)

Differential pressure gauge

- 1 = pressure chamber aluminium (only to $p_{max} = 25$ bar!)
- 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 μ m)
- KD = conical SuperMesh (25, 40, 60 μ m)
- SKS = conical slotted tube Superflush
- SKD = conical SuperMesh Superflush

Size of element set

Identical to size of filter

Drawing number

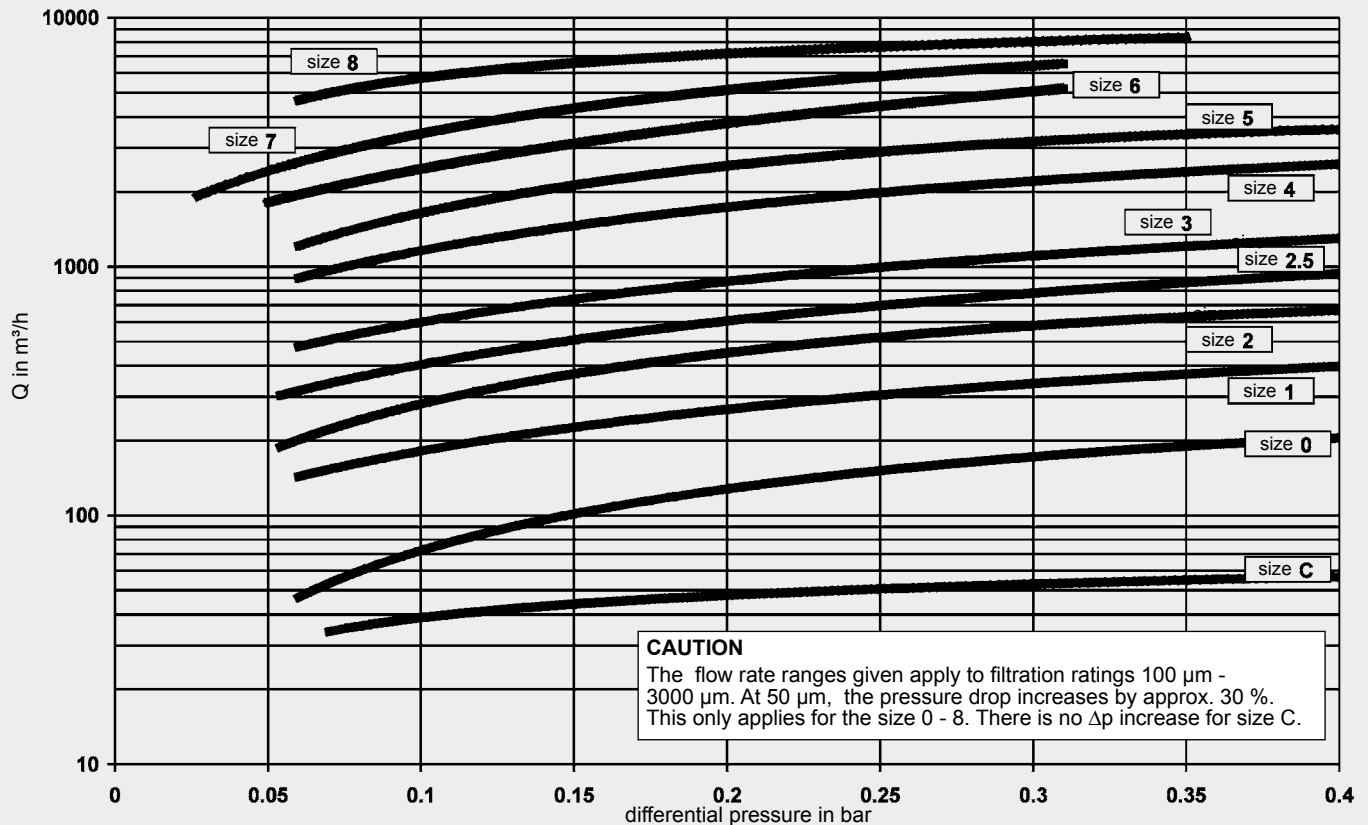
For special models (number is allocated after technical clarification at Head Office)

¹⁾ Stainless steel housing PN 16

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 backflushing line and the 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 pressure 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 into the whole system

The AutoFilt® RF3 is sized based on the pressure drop curve and, especially for emulsion applications, on the sizing table. Generally speaking, an initial Δp (clean filter condition) of 0.2 bar should not be exceeded.

The pressure drop curve is valid for filtration ratings of 100 – 3000 μm slotted tube and 25 μm , 40 μm and 60 μm SuperMesh.

Using 50 μm slotted tubes, the stated pressure drop increases for sizes C to 8 by approx. 30%. A further factor in the calculation is the flow velocity through the flange inlet. It should not exceed 4 m/s.

With reference to the sizing of AutoFilt® RF3, a separate consideration and sizing must be applied for water applications and emulsion applications due to different contamination loads (see 4.2 CALCULATION TABLES).

4.2. CALCULATION TABLES

The calculation tables form an important basis for selection of the AutoFilt® RF3. In particular the high contamination load in the emulsion applications requires that the filter should be calculated more generously. The following points must also be observed for emulsion applications:

- Validity of the tables for emulsions and oils up to a viscosity of 15 mm²/s.
- For applications in the field of cast iron processing, grinding, honing and for fluids with a viscosity over 15 mm²/s, you must contact the Head Office!
- The flow rate ranges given apply to filtration ratings $\geq 100 \mu\text{m}$.

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

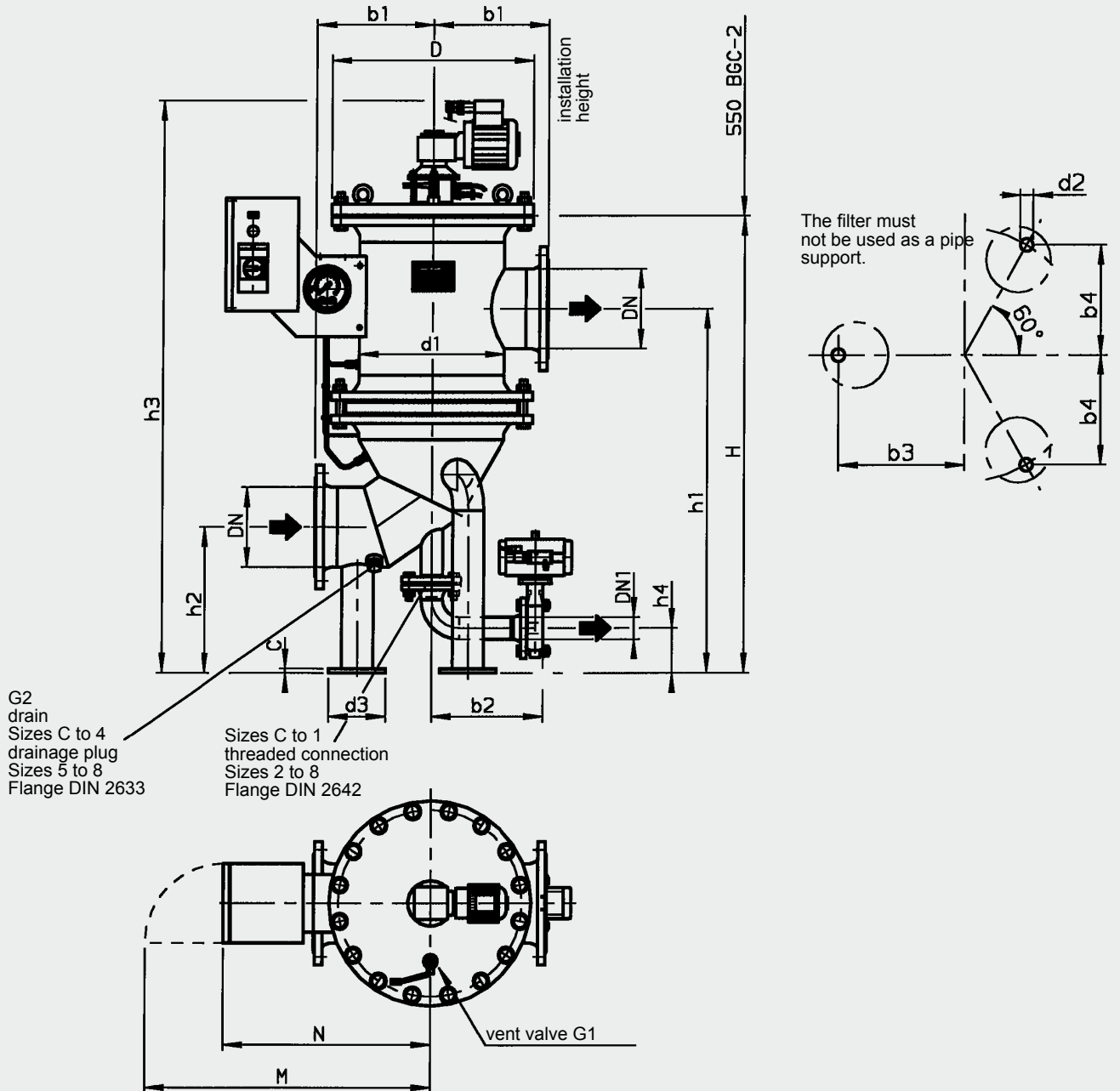
4.2.2 Emulsion applications (cooling lubricants, washing fluids)

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 acc. table 2.3.

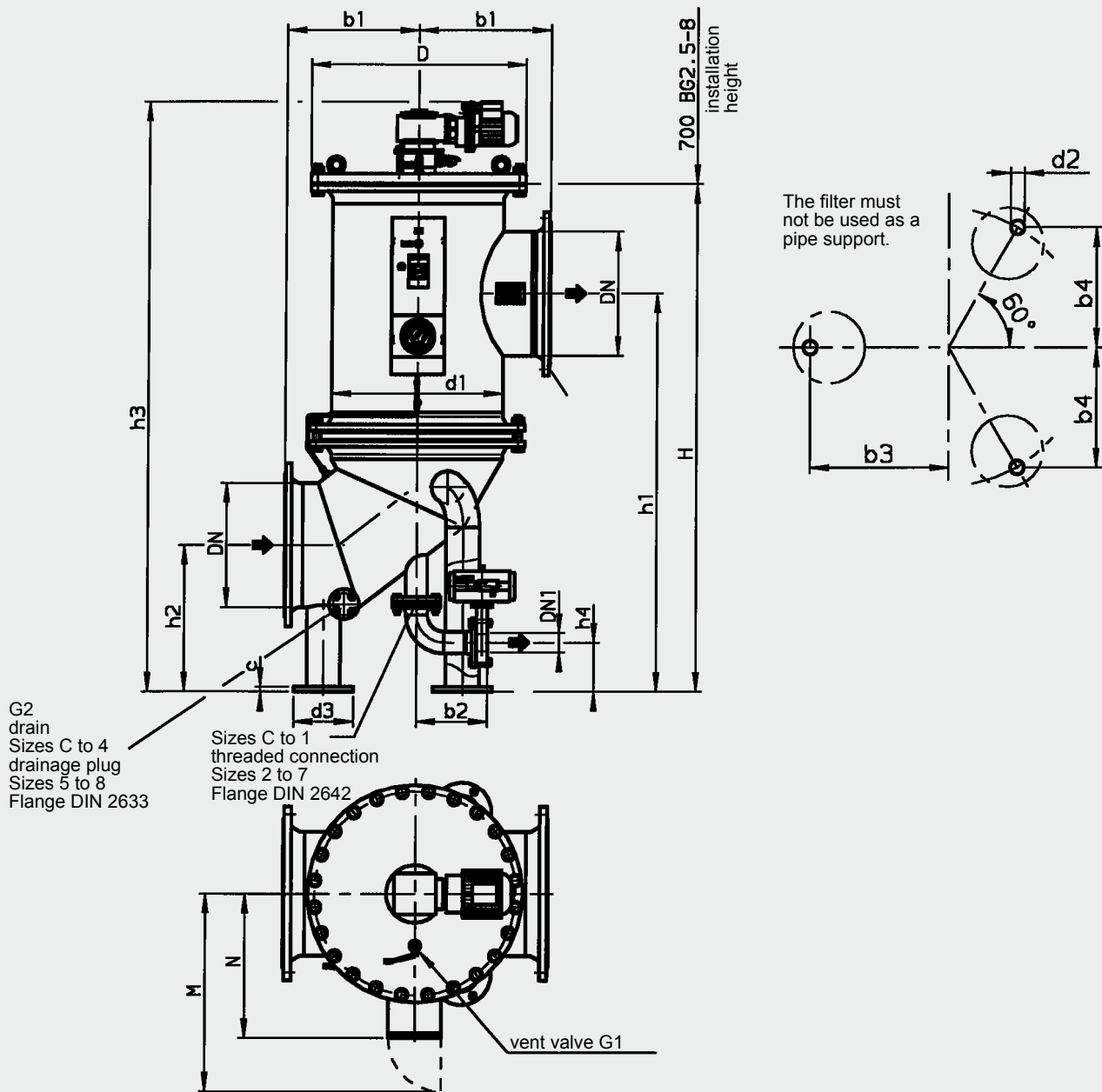
5.1 DIMENSIONS OF SIZES C TO 2



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 ± 10 mm tolerances.

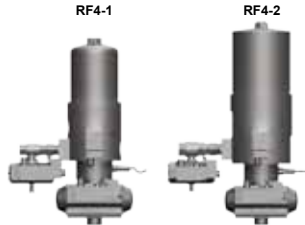
Size	DN	DN1	b1	b2	c	H	h1	h2	N	M	G1	G2	h3	h4	D	d1	d2	d3	b3	b4
RF3-2.5	250	50	325	312	12	1760	1300	400	440	660	G1/4	G3/4	2075	120	565	406	18	160	270	235
RF3-3	300	65	380	276	12	1888	1380	500	485	705	G1/4	G3/4	2185	155	670	508	18	160	322	278
RF3-4	400	80	450	296	20	2033	1525	600	540	760	G1/4	G3/4	2330	220	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.

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Backflushing Filter AutoFilt® RF4



1. TECHNICAL SPECIFICATIONS

1.1 GENERAL

The automatic backflushing AutoFilt® RF4 is a selfcleaning system for extracting particles from low viscosity fluids. Its robust construction and automatic backflushing capability make a major contribution to operational reliability and **reduce operating and maintenance costs.**

The slotted tube or SuperMesh elements in the filter with **filtration rates from 25 to 1000 µm** ensure highly effective filtration of contaminating particles from the process medium.

Automatic or manual cleaning starts as soon as the elements become contaminated.

The flow of filtrate is not interrupted during the backflushing procedure.

Two sizes allow **flow rates of 40 l/min to 220 l/min.**

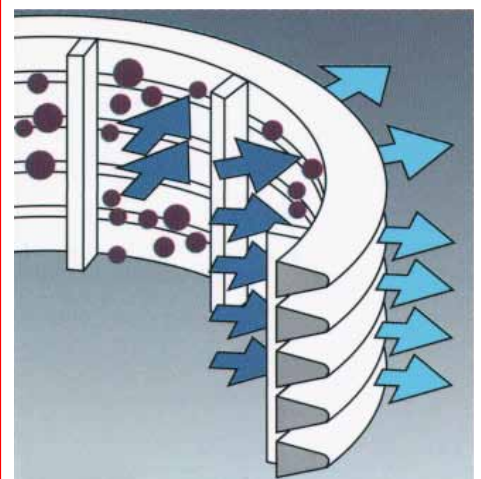
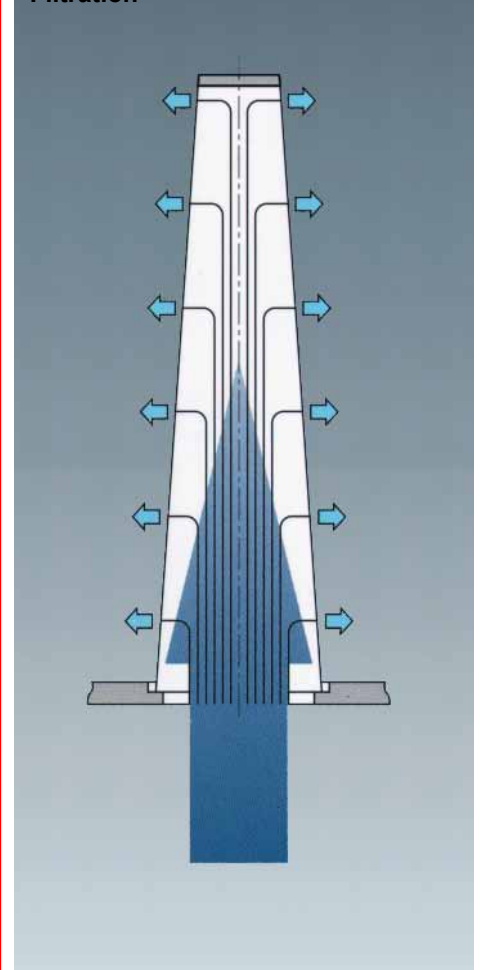
The AutoFilt® RF4 is available as a fully automatic or purely manual version.

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® RF4 Filtration

The fluid to be filtered flows through the slotted tube filter elements of the backflushing filter, passing from the inside to the outside. Contamination particles then collect on the smooth inside of the filter elements. As the level of contamination increases, the differential pressure between the contaminated and clean sides of the filter increases. When the differential pressure reaches its pre set value, backflushing starts automatically.

Filtration



Triggering automatic backflushing

Backflushing is triggered automatically when the triggering differential pressure is exceeded.

As soon as backflushing has been triggered, the filter starts to clean the filter elements.

Triggering backflushing on manual version

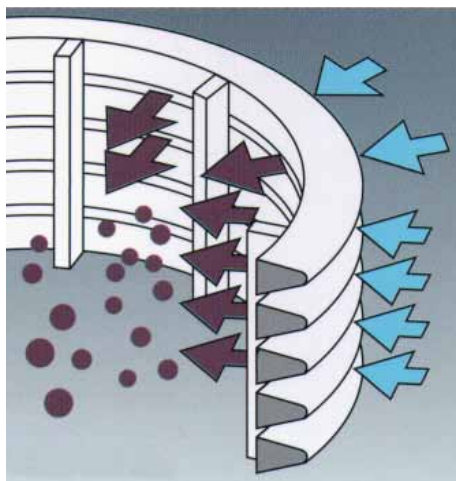
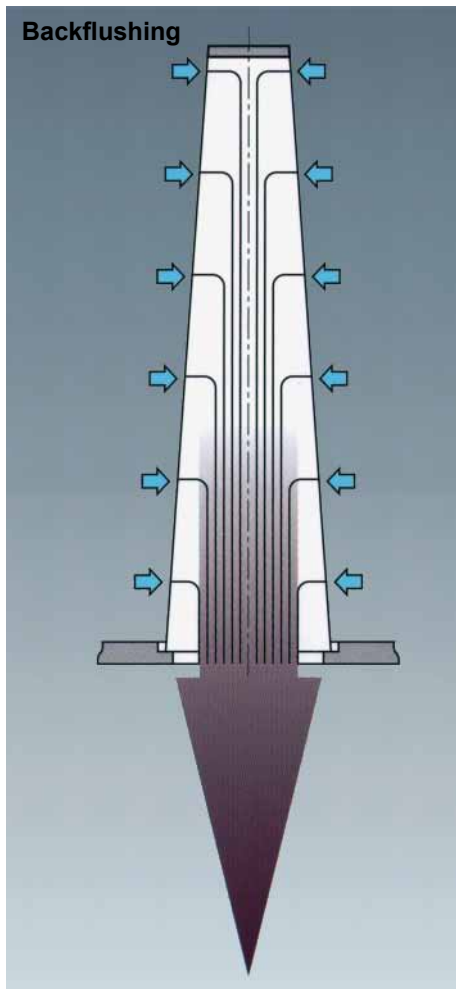
As soon as the visual clogging indicator responds, backflushing is started manually.

Backflushing of the filter elements - backflushing cycle

- The turning drive turns the element plate through an angle of 90°. This brings a clean filter element into filtration, and a contaminated filter element is positioned over the fixed flushing connection.
- The backflushing valve is opened.
- The pressure drop between the filtrate side and the backflushing line rinses a small partial flow of the filtrate in the opposite direction into the filter elements to be cleaned. The contamination particles deposited on the inside of the filter elements are detached and carried out via the rinsing arm into the backflushing line.
- After the "backflushing time per element", the backflushing valve is closed. In this way, all the filter elements are backflushed, one after the other.

A backflushing cycle is complete once all filter elements have been cleaned.

On the AutoFilt® RF4 with manual backflushing, the element plate including filter elements is turned and the backflushing valve is opened by hand.



1.3 SPECIAL FEATURES OF THE AUTOFILT® RF4

Isokinetic filtering and backflushing

The special conical shape and configuration of the filter elements allows even flow, resulting in low pressure drops and complete cleaning of the elements. The advantage: fewer backflushing cycles and reduced loss of backflushing fluid.

Pulse aided backflushing

The filter element to be backflushed remains in the flushing position for only a few seconds. Rapid opening of the backflushing valve generates a pressure surge in the filter element openings, providing an additional cleaning effect to the backflushing process.

Low backflushing quantities due to cyclic control

The backflushing valve opens and closes during backflushing of each filter element.

2. FILTER SPECIFICATIONS

2.1. STANDARD CONFIGURATIONS

2.1.1 Control parameters

- EPT: electro-pneumatic cyclic control
- ET: electrical cyclic control (electric only)
- M: manual

2.1.2 Connection voltages

- 230 V AC main voltage
 - 230 V AC or 24 V DC control voltage
- Only for ET control versions:**
- Control voltage 24 V DC, drive 3 x 400 V/N/PE, 50 Hz

2.1.3 Housing materials (combinations)

- Aluminium, anodised
- Stainless steel
- Carbon steel, nickel-plated

2.1.4 Material of internal parts

- Stainless steel

2.1.5 Material of elements

- Stainless steel

2.1.6 Backflushing valve

- Coaxial valve
- Stainless steel ball valve
- Ball valve, nickel-plated brass

2.1.7 Differential pressure monitoring

- Differential pressure switch with or without adjustment option

2.1.8 Filtration ratings

- 25 µm, 40 µm and 60 µm SuperMesh
- 30 µm to 1000 µm slotted tube

2.1.9 Electrical protection class

- IP54

2.1.10 Pressure ranges

- 6 bar (only stainless steel designs)
- 16 bar

2.2. OPTIONAL VERSIONS

There are a range of optional versions available for the AutoFilt® RF4. For technical details and prices, please contact our Technical Sales Department at Head Office.

2.2.1 Control /electrical components / voltage supply

- Special voltages
- Customised special solutions

2.2.2 Pressure ranges

- 25 bar

2.2.3 Filter elements

- Superflush element technology
- Elements with magnetic filtration technology

2.2.4 Documentation

- Manufacturer's test certificates
 - Material certificates
- 3.1 according to DIN EN 10204
And many others available on request
Further optional models on request.

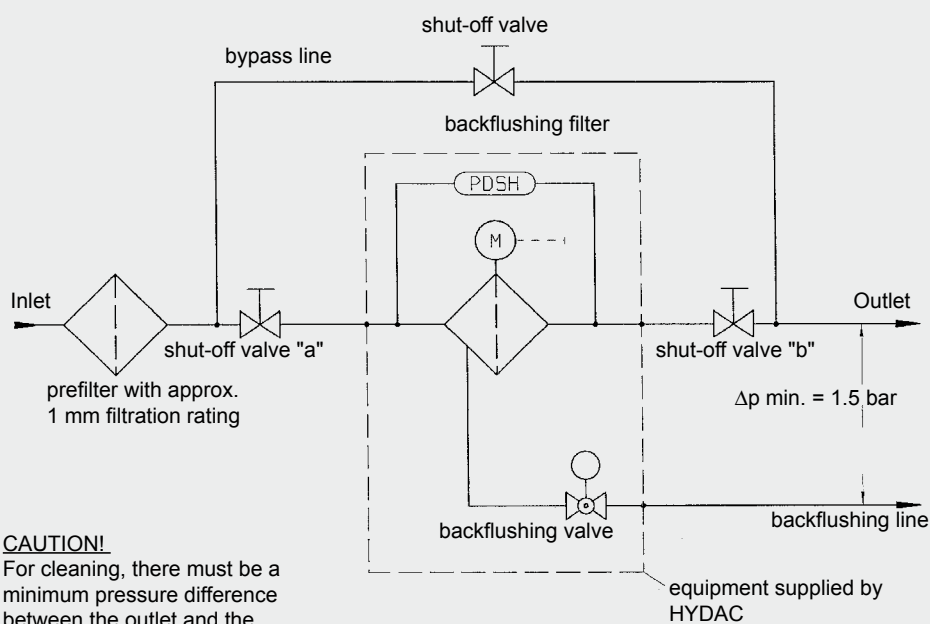
2.3 OVERVIEW OF TECHNICAL SPECIFICATIONS OF STANDARD MODELS

Frame Size	Pressure range [bar]	Connection Inlet/outlet	Backflushing line connection (PN16)	Weight ¹⁾ [kg]	Volume [l]	No. of elements	Filtration area [cm ²]	Backflush volume [l]
RF4-1	6	G 1"	G 1/2"	13	2.5	4 x KM	548	4
RF4-1	16	G 1"	G 1/2"	15	2.5	4 x KM	548	4
RF4-2	6	G 1 1/2"	G 3/4"	32	3.7	4 x KN	1420	13
RF4-2	16	G 1 1/2"	G 3/4"	63	3.7	4 x KN	1420	13

Max, permissible temperature for all AutoFilt® RF4: 90 °C

¹⁾ related to EPT version

2.4 CIRCUIT DIAGRAM



CAUTION!

For cleaning, there must be a minimum pressure difference between the outlet and the backflushing line of 1.5 bar. The required pressure difference may be higher depending on the application.

3. MODEL CODE AUTOFILT® RF4

RF4-2 - EPT 2 - NN - E - CO - 3 - 16 - X / SKNS100 - 1234567

Filter type

RF4-1 = AutoFilt® RF4, size 1
RF4-2 = AutoFilt® RF4, size 2

Control

M = manual
EPT = electro-pneumatic control (incl. pneumatic drive)
ET = electrical control

Type of voltage

0 = without control, without solenoid valve
1 = with control* and solenoid valve 230 V AC
2 = with control* and solenoid valve 24 V DC
3 = without control, with solenoid valve 230 V AC
4 = without control, with solenoid valve 24 V DC

only for ET control:

0C = without control*, drive 3 x 400 V/N/PE, 50 Hz
1C = with control*, drive 3 x 400 V/N/PE, 50 Hz

other voltages on request!

Materials

	Lower part of filter	Upper part of filter	Note
AA	Aluminium ALMG3	Aluminium ALMG3	Only RF4-1, 16 bar
NN	Carbon steel, nickel-plated	Carbon steel, nickel-plated	Only RF4-2, 16 bar
EE	Stainless steel	Stainless steel	RF4-1, RF4-2, 6 bar

Internal parts

E = Stainless steel

Backflushing valve

0 = without backflushing valve
CO = coaxial valve, brass
CON= coaxial valve, nickel-plated brass (only on request!)
COE= coaxial valve, stainless steel (only on request!)
KN = ball valve, nickel-plated brass(only on M or EPT control models)
KE = ball valve, stainless steel (only on M or EPT control models) (only on request!)

Differential pressure monitoring

0 = without differential pressure monitoring
1 = fixed value: 0,5 bar, Type DS 32, N/O contact
2 = adjustable: 0.1 - 1 bar, Type DS 31, (N/O) contact
3 = fixed value: 0.5 bar, Type DS 32, N/C valve
4 = Adjustable: 0.1 - 1 bar, Type DS 31, N/C valve
5 = visual clogging indicator (only for manual version)
7 = fixed value 0.5 bar, Type GW, N/C contact

Pressure range

06 = 6 bar (housing fastened with clamp), only for housings in stainless steel design
16 = 16 bar (filter upper section threaded)
25 = 25 bar, only for RF4-1 (only on request!)

Modification number

X = the latest version is always supplied

Elements / filtration rating

M = For magnet technology, add M
S = for Superflush, add S

For RF4-1:

KMS= slotted tube 30 µm to 1000 µm
KMD= SuperMesh 25 µm, 40 µm, 60 µm; other filtration ratings available on request

For RF4-2:

KNS= slotted tube 30 µm to 1000 µm
KND= SuperMesh 25 µm, 40 µm, 60 µm; other filtration ratings available on request

Drawing number

For special models

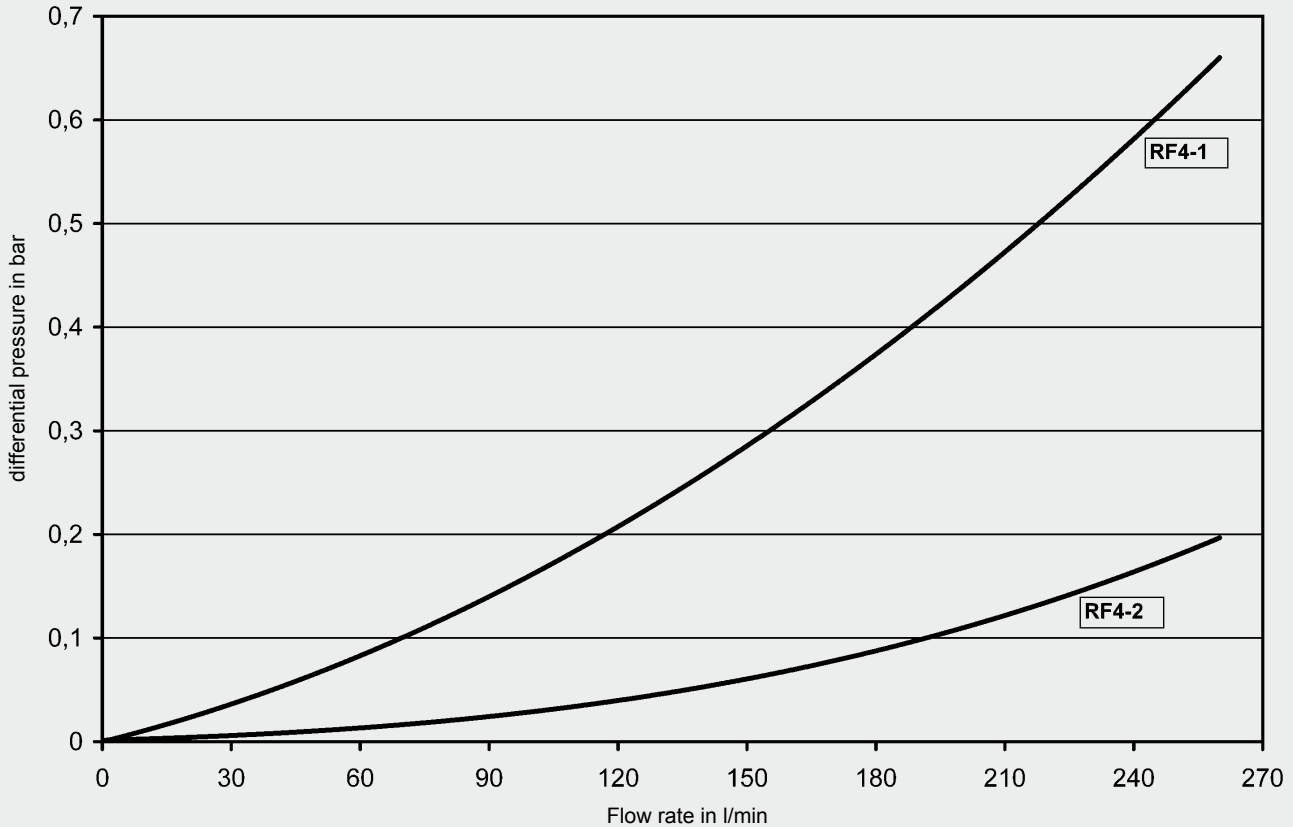
Preferred versions are marked in bold!

* Supply voltage of control 110 - 230 V AC, 50 Hz / 110 – 120 V AC, 60 Hz

4. FILTER CALCULATION / SIZING

4.1 PRESSURE DROP CURVES

The pressure drop curves apply to water.



It is crucial when operating the AutoFilt® RF4 that there is a differential pressure between the backflushing line and the 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 pressure - must be below the boiling point of the medium
- Power supply and compressed air supply
- Pressure ratios after the AutoFilt® RF4 (is there any back pressure?)
- Integration of the AutoFilt® RF4 into the whole system

The AutoFilt® RF4 is sized based on the pressure drop curve and, especially for emulsion applications, on the sizing table. Generally speaking, an initial Δp (clean filter condition) of 0.2 bar should not be exceeded.

The pressure drop curve is valid for filtration ratings of 100 – 1000 μm slotted tube and 25 μm , 40 μm and 60 μm SuperMesh. A further factor in the calculation is the flow velocity through the filter inlet. It should not exceed 4 m/s.

With reference to the sizing of AutoFilt® RF4, a separate consideration and sizing must be applied for water applications and emulsion applications due to different contamination loads (see 4.2 Cooling Lubricant Calculation Tables).

4.2. CALCULATION TABLES

The calculation tables form an important basis for selection of the AutoFilt® RF4. In particular the high contamination load in the emulsion applications requires that the filter should be calculated more generously. The following points must also be observed for emulsion applications:

- Validity of the tables for emulsions and oils up to a viscosity of 15 mm^2/s .
- For applications in the field of cast iron processing, grinding, honing and for fluids with a viscosity over 15 mm^2/s , you must contact the Head Office!

4.2.1 Water applications

Fluid	Max. flow rate [l/min]	
	RF4-1	RF4-2
Water	120	220

The flow rate ranges indicated apply to filtration ratings $\geq 100 \mu\text{m}$.

4.2.2 Cooling lubricants

Fluid: Emulsion ¹⁾

Machined material	Type of machining	Max. flow rate [l/min]	
		RF4-1	RF4-2
Aluminium	Cutting	100	200
Cast iron ¹⁾	Cutting	70	160
Carbon steel	Cutting	80	180
Stainless steel	Cutting	80	180
Aluminium	Cutting	90	200
Cast iron	Grinding	50	140
Carbon steel	Grinding	60	150
Stainless steel	Grinding	60	150

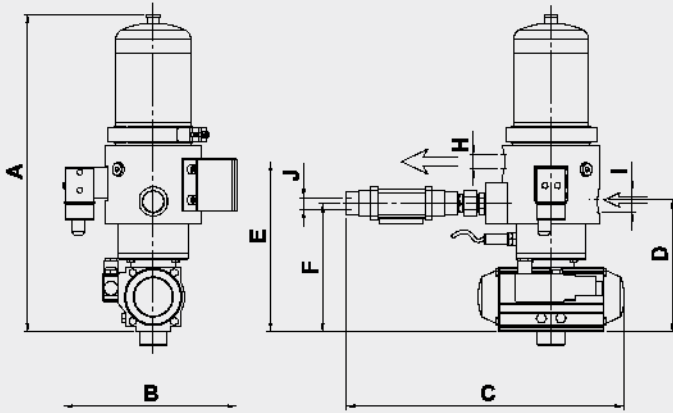
The flow rate ranges indicated apply to filtration ratings $\geq 100 \mu\text{m}$ and a maximum contamination capacity of 120 mg/l.

¹⁾ For other application contact our Technical Sales Department at Head office.

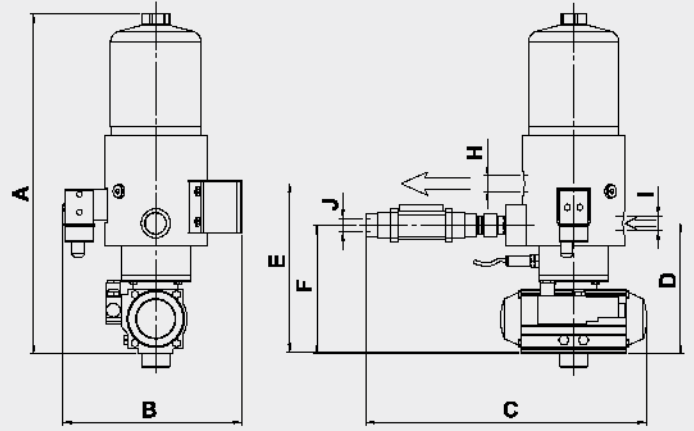
5. DIMENSIONS

5.1 DIMENSIONS OF RF4 WITH COAXIAL VALVE

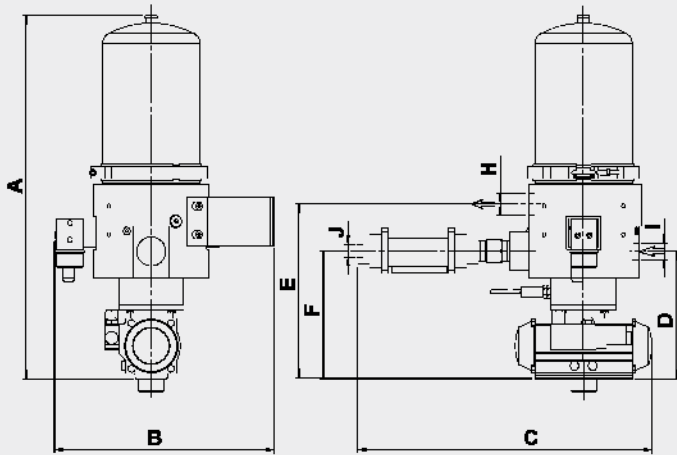
RF4-1 (6 bar, stainless steel with coaxial valve)



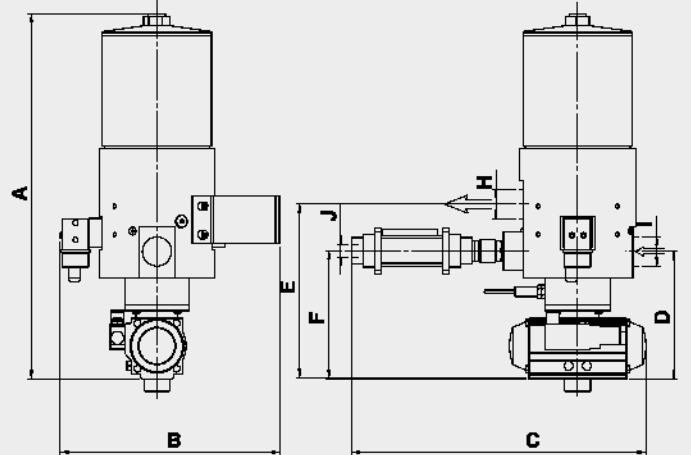
RF4-1 (16 bar with coaxial valve)



RF4-2 (6 bar, stainless steel with coaxial valve)



RF4-2 (16 bar with coaxial valve)

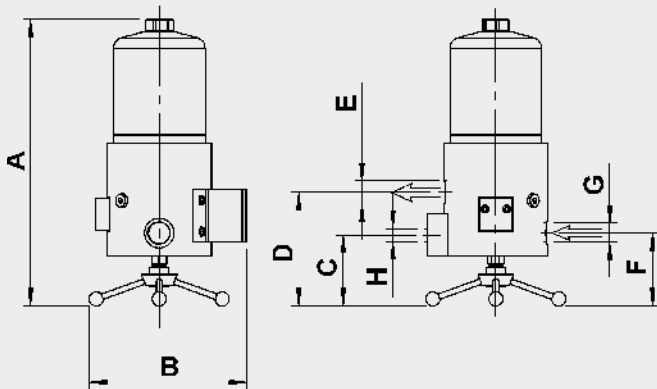


- The filter must not be used as a pipe support.
- The dimensions quoted have ± 5 mm tolerances.

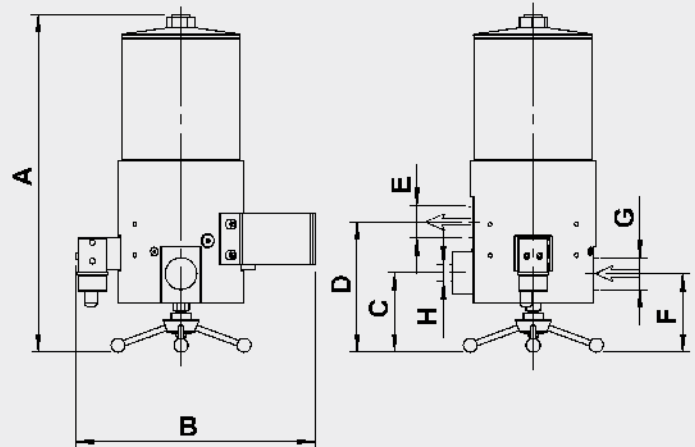
Type	A	B	C	D	E	F	H	I	J
RF4 - 1 (16 bar with coaxial valve)	490	258	405	190	245	185	1"	1"	1/2"
RF4 - 1 (6 bar stainless steel with coaxial valve)	457	250	405	190	245	185	1"	1"	1/2"
RF4 - 2 (16 bar with coaxial valve)	562	339	454	196	269	197	1 1/2"	1 1/2"	3/4"
RF4 - 2 (6 bar stainless steel with coaxial valve)	599	339	454	196	269	197	1 1/2"	1 1/2"	3/4"

5.2 DIMENSIONS OF SIZES 2

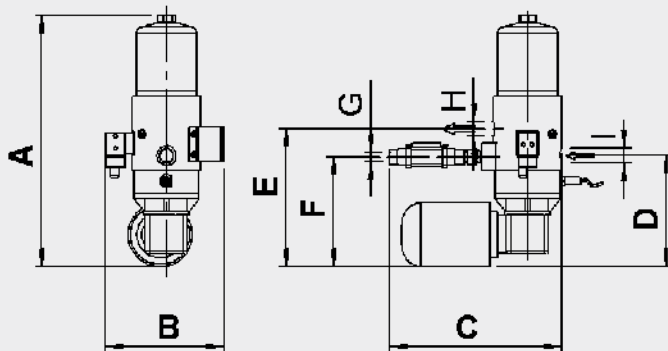
RF4-1-M-16 bar, manual design



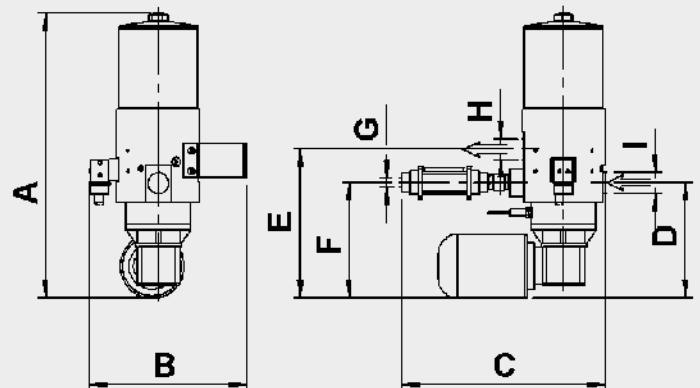
RF4-2-M-16 bar, manual design



RF4-1-ET-16 bar, electrical design



RF4-2-ET-16 bar, electrical design



- The filter must not be used as a pipe support.
- The dimensions quoted have ± 5 mm tolerances.

Type	A	B	C	D	E	F	G	H	I
RF4-1-M-16 bar	405	224	100	161	1"	103	1"	1/2"	
RF4-2-M-16 bar	478	339	113	184	1 1/2"	111	1 1/2"	3/4"	
RF4-1-ET-16 bar (with coaxial valve)	541	258	372	239	296	236	1/2"	1"	1"
RF4-2-ET-16 bar (with coaxial valve)	614	340	439	250	320	248	3/4"	1 1/2"	1 1/2"

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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Backflushing Filter AutoFilt® RF5



RF5 - 25

RF5 - 50

RF5 - 90



1. TECHNICAL SPECIFICATIONS

1.1 GENERAL

The AutoFilt® RF5 is a self cleaning system for extracting particles from low viscosity fluids. Its robust construction and automatic backflushing capability make a major contribution to operational reliability and **reduce operating and maintenance costs.**

The slotted tube elements in the filter with **filtration rates from 200 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 backflushing procedure.**

A range of filters of different sizes allow **flow rates of up to 4200 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® RF5

Filtration

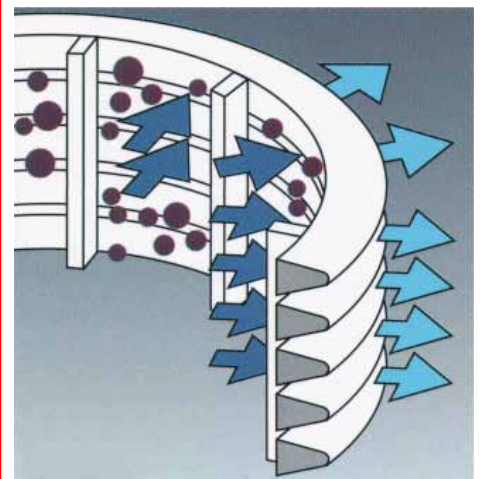
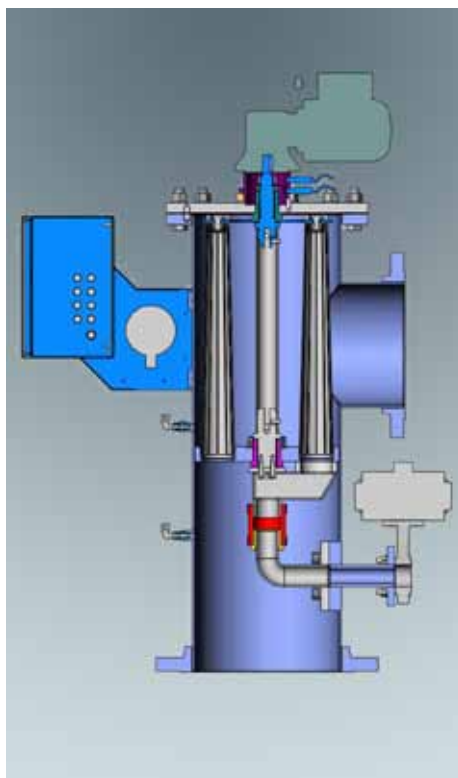
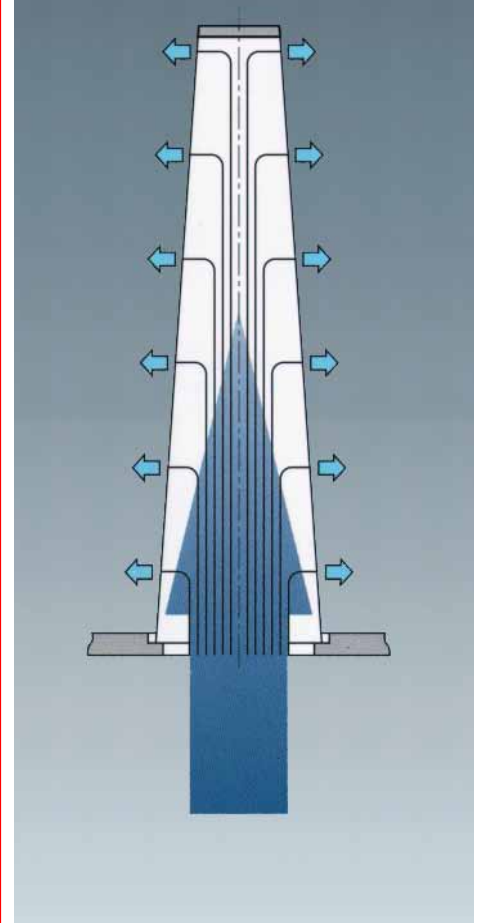
The fluid to be filtered flows through the slotted tube filter elements of the backflushing filter, passing from the inside to the outside.

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

As the level of contamination increases, the differential pressure between the contaminated and clean sides of the filter increases.

When the differential pressure reaches its pre set value, backflushing starts automatically.

Filtration



Triggering automatic backflushing

Backflushing is triggered automatically:

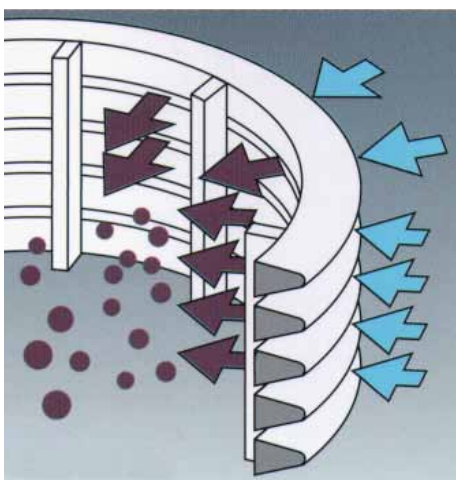
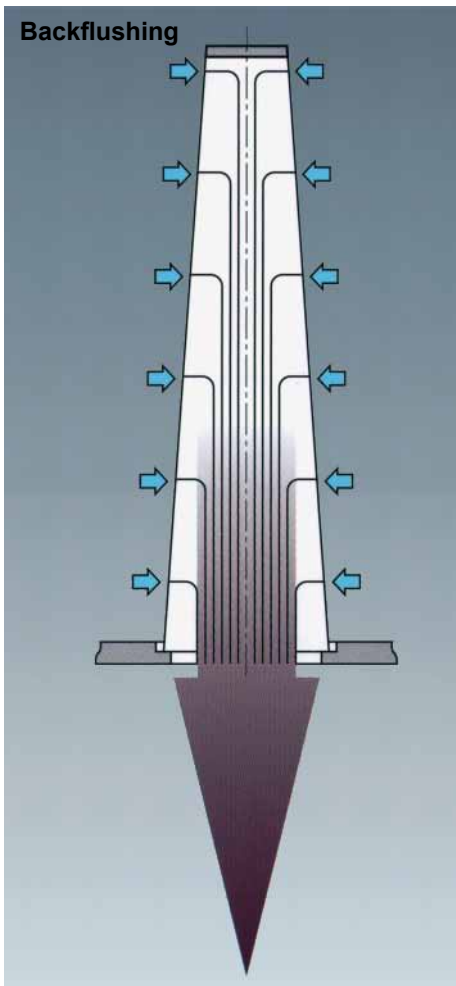
- When the triggering differential pressure is exceeded
- By means of an adjustable timer (optional)
- By pressing the TEST key

As soon as backflushing has been triggered, the filter starts to clean the filter elements.

Backflushing of the filter elements - backflushing cycle

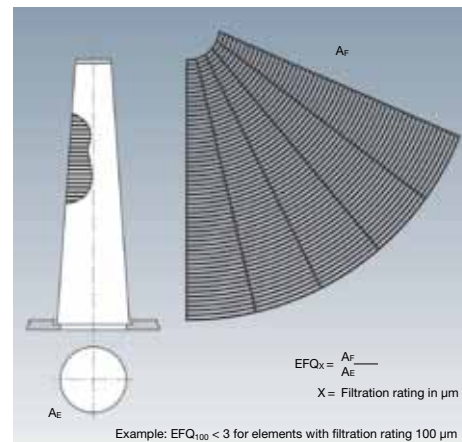
Type of control:

- EPZ: Electro-pneumatic cyclic control. The pneumatic backflushing valve opens, the gear motor rotates the rinsing arm continuously under and past the filter elements to be cleaned. The pressure drop between the filtrate side and the backflushing line rinses a minimal partial flow of the filtrate in the opposite direction, into the filter elements to be cleaned. The contamination particles deposited on the inside of the filter elements are detached and carried out via the rinsing arm into the backflushing line. Once the set backflushing time period has ended, the drive motor stops and the backflushing valve is closed.
- EZ: Electrical cyclic control. Like EPZ, but with an electrical backflushing valve.
- EPT: Electro-pneumatic cyclic control. The gear motor rotates the rinsing arm under the filter elements to be cleaned and stops. The backflushing valve is opened and this or the elements are cleaned due to the pressure drop between the filtrate side and the backflushing line. After the "backflushing time per element" has ended, the backflushing valve is closed. The gear motor then rotates the arm further to the next filter elements to be cleaned. The backflushing valve is opened again and the filter elements are backflushed. The complete backflushing cycle is ended once all filter elements have been cleaned.
- PT: Pneumatic cyclic control: Like EPT, but with purely pneumatic components.
- PTZ: Pneumatic cyclic control with timer function. Like PT, but a maximum filtration time can be set, independent of the differential pressure, between two backflushing cycles.



1.3 SPECIAL FEATURES OF THE AUTOFILT® RF5

- High flow rates with compact construction
- Pressure drop optimised
- Conical filter elements
- Filtration rating 200 – 3000 µm



Element opening quotient EFQ_x

The element opening quotient (EFQ_x) is decisive for an even and tailback free flow through the filter element during filtering and backflushing. The EFQ_x value is the ratio open filter surface of an element to opening cross-section on the element inlet.

2. FILTER SPECIFICATIONS

2.1. STANDARD CONFIGURATIONS

2.1.1 Control parameters

- EPZ: electro-pneumatic cyclic control
- EZ: electrical cyclic control
- EPT: electro-pneumatic cyclic control
- PT: pneumatic cyclic control
- PTZ: pneumatic cyclic control with timer function

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 without neutral wire
- 3 x 460V / 60 Hz without neutral wire
- Others available on request

2.1.3 Flange connections

- DIN / ANSI / JIS

2.1.4 Housing materials

- Carbon steel
- Stainless steel

2.1.5 Material of internal parts

- Stainless steel 1.4301

2.1.6 Material of elements

- Stainless steel 1.4435, 1.4404

2.1.7 External corrosion protection

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

2.1.8 Internal corrosion protection

- Epoxy coating
- Polyurethane coating

2.1.9 Differential pressure gauge

- Aluminium
- Stainless steel
- Brass

2.1.10 Filtration ratings

- 200 µm to 3000 µm slotted tube

2.1.11 Electrical protection class

- IP55

2.1.12 Pressure ranges

- 10 bar or 6 bar depending on size

2.1.13 Operating temperature

- Max. operating temperature 90 °C

2.2. OPTIONAL VERSIONS

There are a range of optional versions available for the AutoFilt® RF5. For technical details and prices, please contact our Technical Sales Department at Head Office.

2.2.1 Control /electrical components / voltage supply

- PLC control
- Filter without control for integration into customer's PLC
- Filter interlocking for parallel operation
- UL/CSA approved controls and components
- Special IP protection classes
- Safe in tropical conditions
- Customised special solutions

2.2.2 Housing manufacture

- ASME Code design
- U-stamp

2.2.3 Flange connections

- ANSI
- JIS

2.2.4 Housing materials

- Duplex
- Superduplex
- Various qualities of stainless steel
- Various qualities of carbon steel

2.2.5 Materials of internal parts and elements

- Duplex
- Superduplex
- Various qualities of stainless steel
- Superflush element technology

2.2.6 External corrosion protection

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

2.2.7 Internal corrosion protection

- Glass flake lining
- Special paint/coatings according to customer specifications

2.2.8 Explosion protection

- ATEX according to Directive 94/9/EC

2.2.9 Documentation

- Manufacturer's test certificates
- Material certificates 3.1
- GOST certificate
- 3rd parties (TÜV, ABS, Lloyds, etc.)
- WPS / PQR
- Inspection plan

And many others available on request

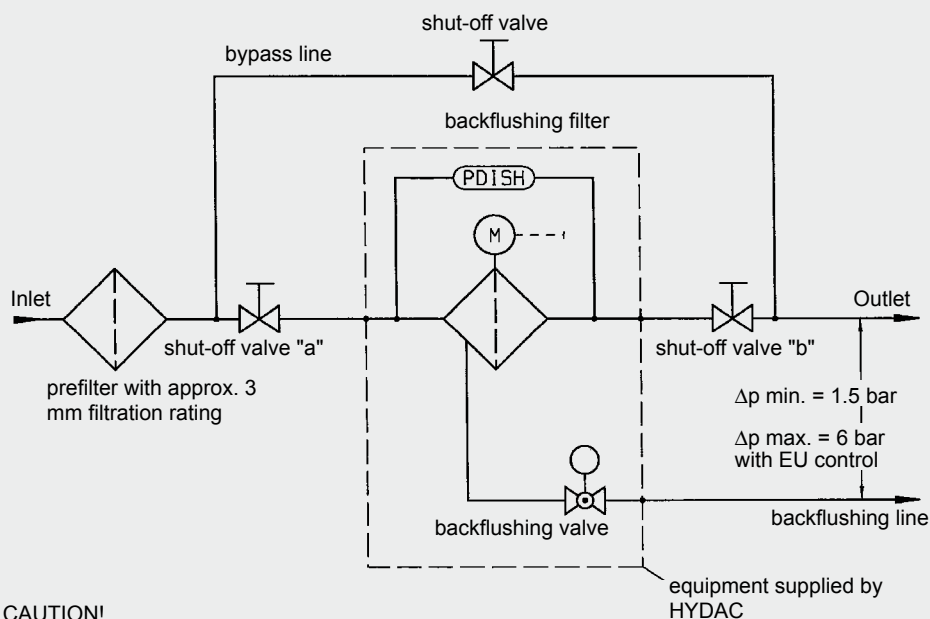
2.3 OVERVIEW OF TECHNICAL SPECIFICATIONS OF STANDARD MODELS

Filter Size	Pressure range [bar]	Connection ¹⁾ Inlet	Connection ¹⁾ Outlet	Connection back-flushing line 1	Weight ²⁾ [kg]	Volume [l]	No. of elements	Filtration area [cm ²]	Backflush volume ³⁾ [l]
25	10	DN 250	DN 200	DN 40	140	54	6 x E1	6120	35
30	10	DN 300	DN 250	DN 40	170	83	8 x E1	8160	47
40	6	DN 400	DN 300	DN 65	285	212	6 x E2	16920	63
50	6	DN 500	DN 400	DN 65	450	320	9 x E2	25380	95
60	6	DN 600	DN 500	DN 80	615	480	18 x E2	50760	233
70	6	DN 700	DN 600	DN 80	945	780	21 x E3	70980	271
90	6	DN 900	DN 800	DN 100	1515	1370	35 x E3	118300	606

Max. permissible temperature for all AutoFilt® RF5: 90 °C

- 1) According to DIN/EN standard / reservoir manufacture to AD2000, application of Pressure Equipment Directive 97/23/EC if required
- 2) Approx. empty weight based on standard pressure range
- 3) Based on EPT/PT control mode with opening time of backflushing valve of 1.5 seconds and 1.5 bar differential pressure between outlet and backflushing line, with EU control the backflushing volume increases by a factor of 5.

2.4 CIRCUIT DIAGRAM



CAUTION!
For cleaning, there must be a minimum pressure difference between the outlet and the backflushing line of 1.5 bar.

3. MODEL CODE AUTOFILT® RF5

RF5 - 25 - EPT - N - N - 2 - 1 - 1 / ES200 - 25 - 12345678

Type AutoFilt®

Size / filter inlet - filter outlet

25	= DN250 - DN200	PN10
30	= DN300 - DN250	PN10
40	= DN400 - DN300	PN6
50	= DN500 - DN400	PN6
60	= DN600 - DN500	PN6
70	= DN700 - DN600	PN6
90	= DN900 - DN800	PN6

Type of control / Input supply voltage

EPZ	= electro-pneumatic cyclic control
EZ	= electrical control
EPT	= electro-pneumatic cyclic control
PT	= pneumatic cyclic control
PTZ	= pneumatic cyclic control with timer function
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

N	= carbon steel, external primer (RAL 9006)
NM	= carbon steel, external primer (RAL 9006), 2K epoxy paint, internal
NP	= carbon steel, external primer (RAL 9006), 2K polyurethane paint, internal
E	= stainless steel
A	= for ANSI flanges, add A
J	= for JIS flanges, add J

Material of backflushing valve

N	= butterfly: housing SG cast iron coated, washer stainless steel
B	= butterfly: housing SG cast iron coated, washer bronze

Differential pressure gauge

1	= pressure chamber aluminium
2	= pressure chamber stainless steel
4	= pressure chamber brass

Control cabinet fixtures

1	= Control cabinet offset by 90° clockwise to filter outlet
2	= Control cabinet offset by 180° clockwise to filter outlet (opposite)
3	= Control cabinet offset by 270° clockwise to filter outlet

Modification number

X	= the latest version is always supplied
---	---

Element set

ESx	= conical slotted tubes (200 µm - 3000 µm)
SESx	= conical slotted tubes, Superflush-coated

Size of element set

Identical to size of filter

Drawing number

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

MODEL CODE ELEMENT SET AUTOFILT® RF5

S ES 200 - 25 - V - R

Superflush coating

optional, appears only if selected

Filter element

ES = conical slotted tube

Filtration rating

ES = 200 - 3000 µm

Size of element set (according to size of filter)

25, 30, 40, 50, 60, 70, 90

Seal material

V = Viton

N = NBR

E = EPDM

T = FEP coated Viton seal

End cap

R = welded on with O-ring seal

MODEL CODE SINGLE ELEMENT AUTOFILT® RF5

S E 25 S 200 R - V

Superflush coating

optional, appears only if selected

Filter element

E = conical element

Element size

25, 30, 40, 50, 60, 70, 90

Filter material

S = slotted tube

Filtration rating

200 - 3000 µm

End cap

R = welded on with O-ring seal

Seal material

V = Viton

N = NBR

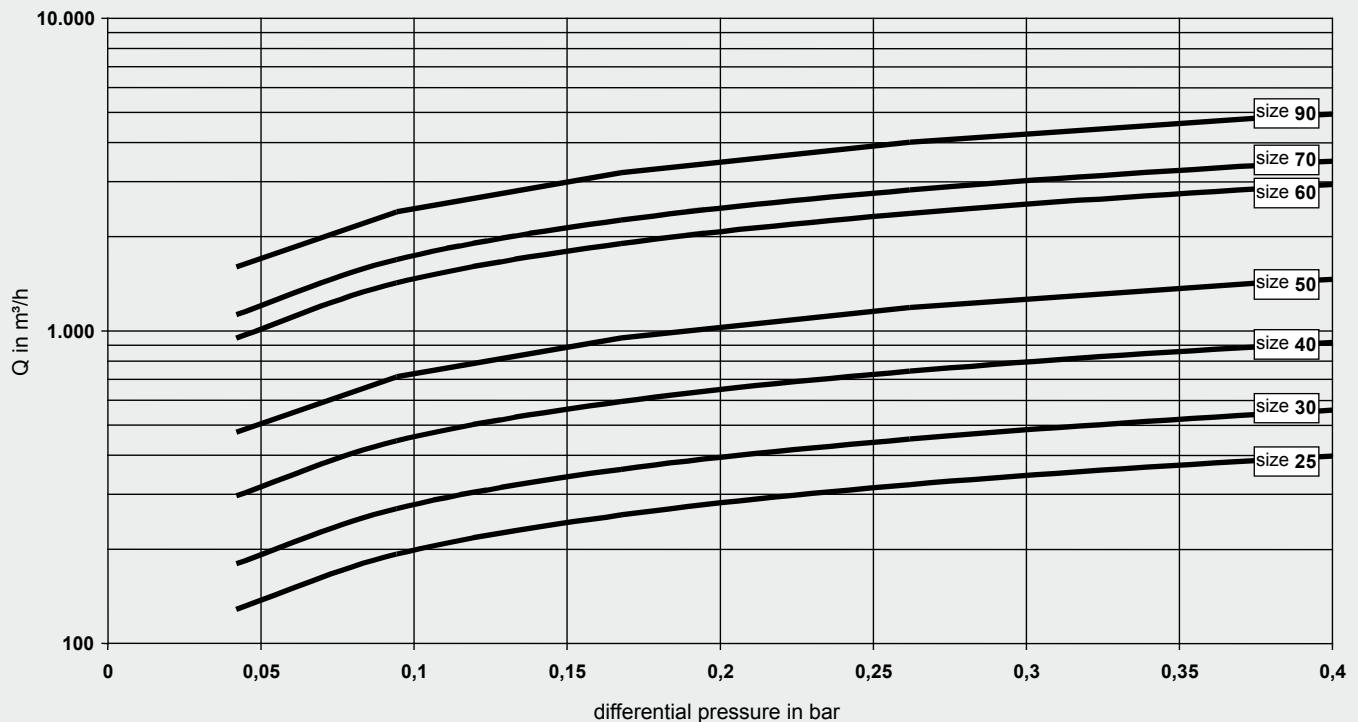
E = EPDM

T = FEP coated Viton seal

4. FILTER CALCULATION / SIZING

4.1 PRESSURE DROP CURVES

The pressure drop curves apply to water.



It is crucial when operating the AutoFilt® RF5 that there is a differential pressure between the backflushing line and the 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:

(see also Filter questionnaire)

- Flow rate
- Type of medium
- Materials
- Viscosity
- Required filtration rating
- Particulate loading in the fluid
- Type of contamination
- Operating pressure
- Operating temperature
- Power supply and compressed air supply
- Pressure ratios after the AutoFilt® RF5 (is there any back pressure?)
- Integration of the AutoFilt® RF5 into the whole system

The AutoFilt® RF5 is sized based on the pressure drop curve and the calculation table. Generally speaking, an initial Δp (clean filter condition) of 0.2 bar should not be exceeded. The pressure drop curve is valid for filtration ratings of 200 – 3000 μm slotted tube. A further factor in the calculation is the flow velocity through the filter outlet. It should not exceed 3 m/s.

4.2. CALCULATION TABLES

4.2.1 Water applications

The calculation tables form an important basis for selection of the AutoFilt® RF5.

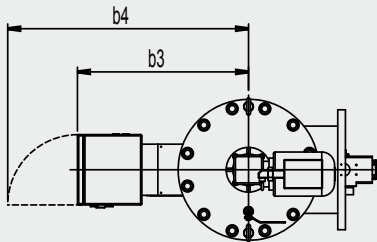
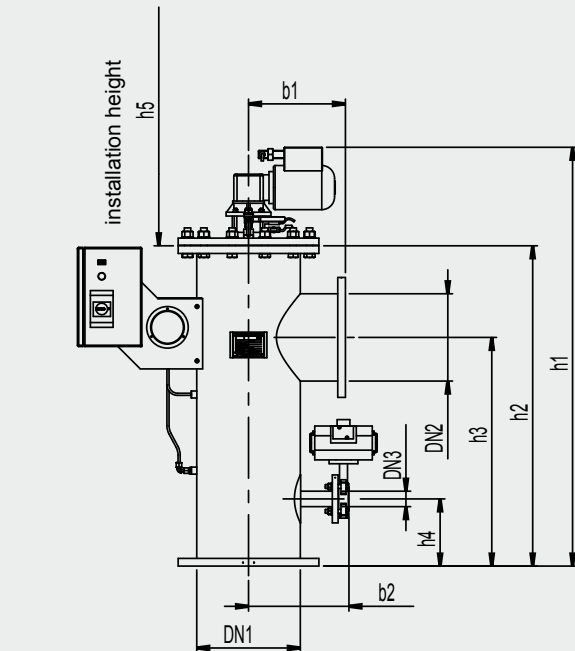
Filter Size	Flow rate range
25	170 - 320 m³/h
30	290 - 450 m³/h
40	400 - 750 m³/h
50	650 - 1200 m³/h
60	1000 - 1900 m³/h
70	1500 - 2800 m³/h
90	2600 - 4200 m³/h

- The flow rate ranges given apply to filtration ratings $\geq 200 \mu\text{m}$.

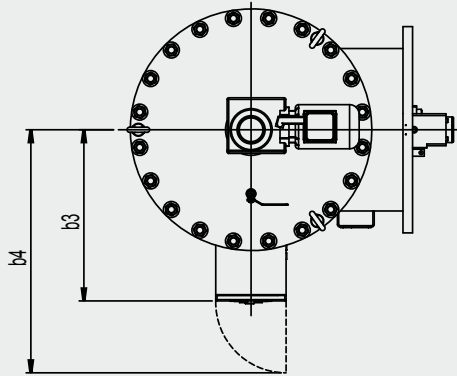
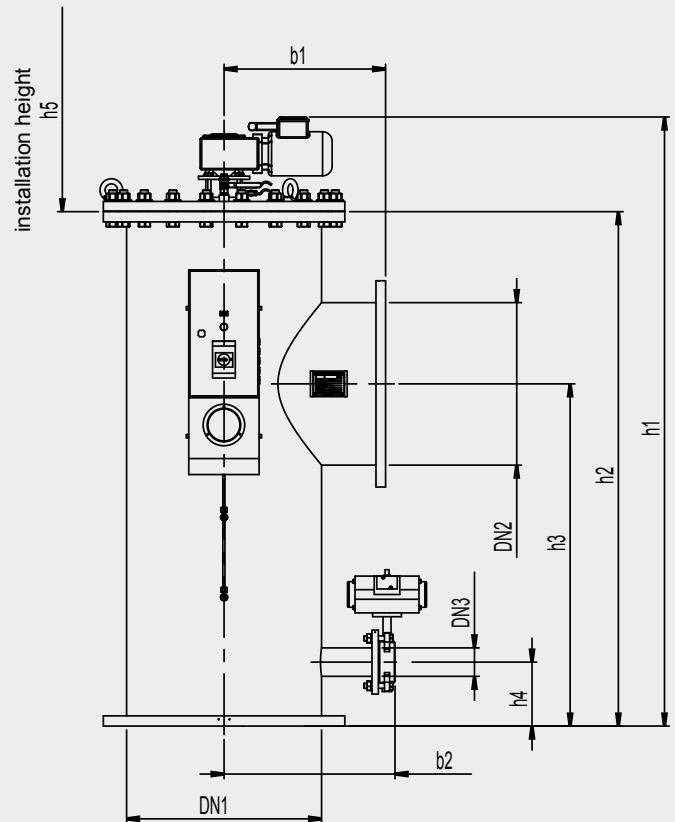
5. DIMENSIONS

The dimensions indicated relate to the standard pressure ranges.

SIZES 25-40



SIZES 50-90



Filter Size	DN1	DN2	DN3	h1	h2	h3	h4	h5	b1	b2	b3	b4
25	250	200	40	1212.5	912.5	625	180	550	300	275	508	728
30	300	250	40	1313.5	1001.5	715	210	550	300	314	533	753
40	400	300	65	1890.5	1575.5	1030	180	1050	370	380	575	795
50	500	400	65	1888.5	1585.5	1050	190	1050	435	440	485	705
60	600	500	80	1905.5	1608.5	1070	200	1050	505	534	540	760
70	700	600	80	2238.5	1903.5	1235	200	1350	570	580	593	813
90	900	800	100	2328.5	1993.5	1325	225	1350	690	690	698	918

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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Backflushing Filter AutoFilt® RF7

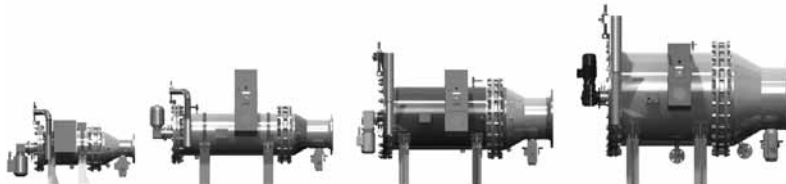


RF7 - 1

RF7 - 2.5

RF7 - 4

RF7 - 6



1. TECHNICAL SPECIFICATIONS

1.1 GENERAL

The AutoFilt® RF7 is a self cleaning system for extracting particles from low viscosity fluids. Its robust construction and automatic backflushing capability make a major contribution to operational reliability and **reduce operating and maintenance costs**. The slotted tube or SuperMesh elements in the filter 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 backflushing procedure.** A range of filters of different sizes allow **flow rates of up to 7500 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.

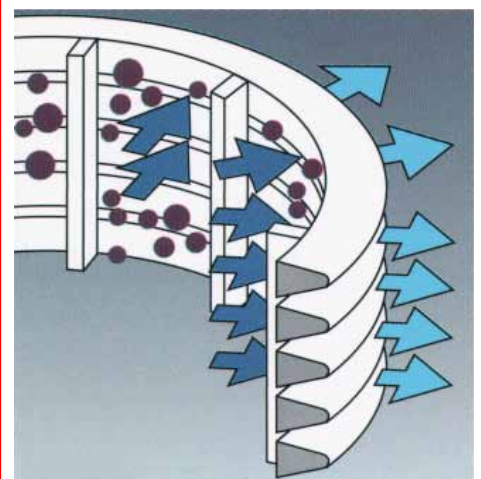
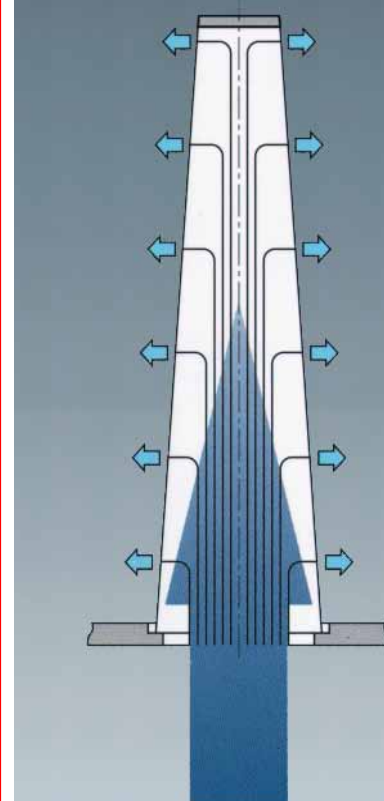
The new horizontal backflushing filter AutoFilt® RF7 supplements the Hydac backflushing filter family by a further, particularly user-friendly, compact series which is especially applicable for systems where there is little space.

The series pivoting lid device allows easy access to the inside of the filter without requiring a lot of force or time. A special holding device allows the filter elements to be removed if necessary without hoisting equipment being required. They can easily be reinstalled without damaging the filter elements or the housing wall.

1.2 OPERATION OF THE AUTOFILT® RF7 Filtration

The fluid to be filtered flows through the slotted tube filter elements of the backflushing filter, passing from the inside to the outside. Contamination particles then collect on the smooth inside of the filter elements. As the level of contamination increases, the differential pressure between the contaminated and clean sides of the filter increases. When the differential pressure reaches its pre set value, backflushing starts automatically.

Filtration



Triggering automatic backflushing

Automatic backflushing is triggered:

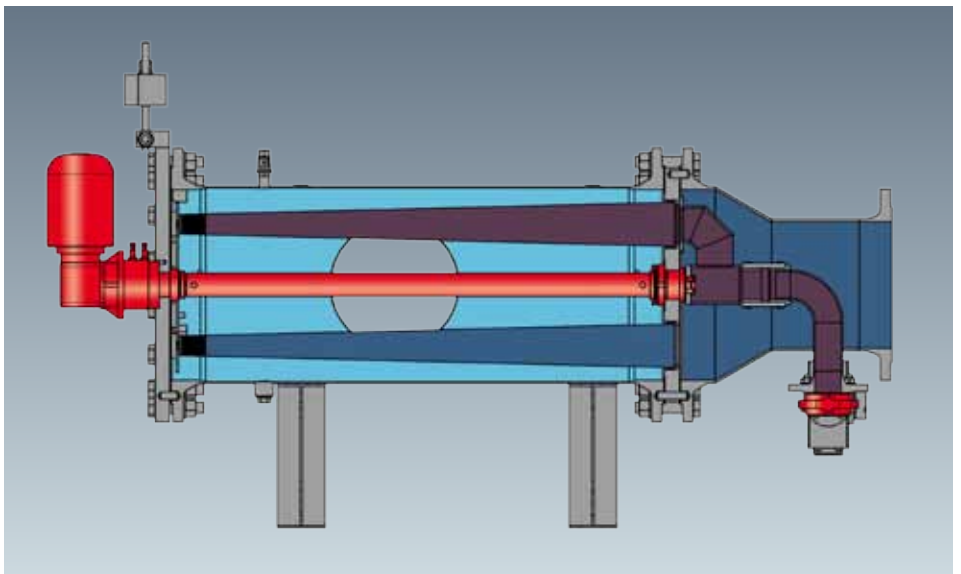
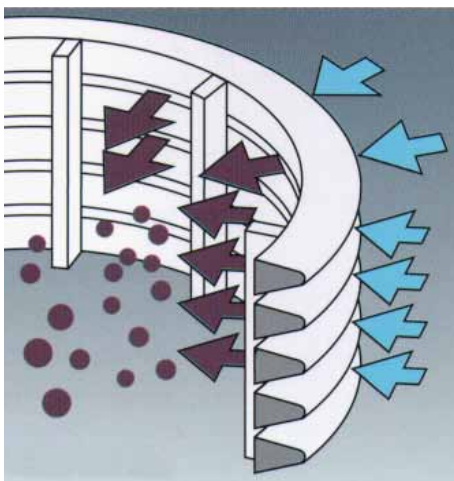
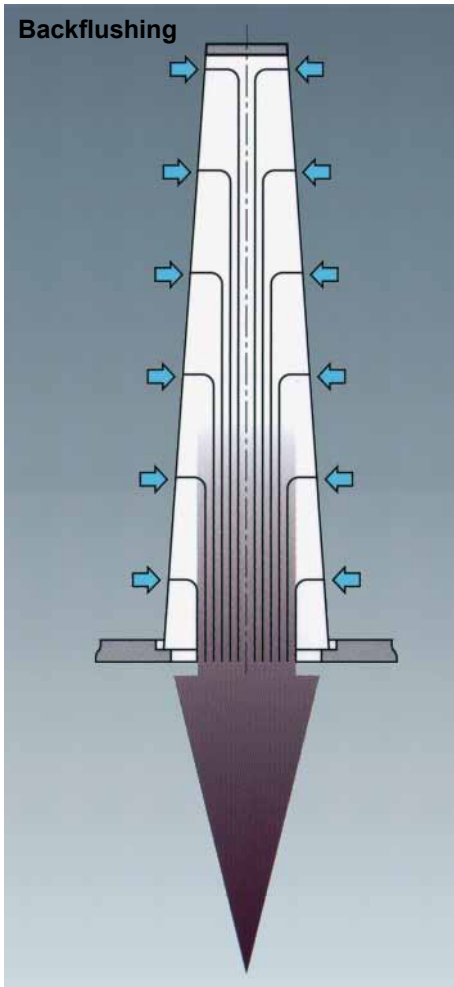
- When the triggering differential pressure is exceeded
- By means of an adjustable timer (optional)
- By pressing the TEST key

As soon as backflushing has been triggered, the filter starts to clean the filter elements.

Backflushing of the filter elements - backflushing cycle

The backflushing function depends on the selected control type:

- EPT: Electro-pneumatic cyclic control
The gear motor rotates the rinsing arm under the filter elements to be cleaned and stops. The backflushing valve is opened and this or the elements are cleaned due to the pressure drop between the filtrate side and the backflushing line. After the "backflushing time per element" has ended, the backflushing valve is closed. The gear motor then rotates the arm further to the next filter elements to be cleaned. The backflushing valve is opened again and the filter elements are backflushed. A complete backflushing cycle is complete once all filter elements have been cleaned.
- PT: Pneumatic cyclic control:
Like EPT, but with purely pneumatic components.
- PTZ: Pneumatic cyclic control with timer function
Like PT, but a maximum filtration time can be set, independent of the differential pressure, between two backflushing cycles.
- EU: Electrical circulation control
The electrical backflushing valve opens. The gear motor rotates the rinsing arm continually past and under the filter elements to be cleaned. The pressure drop between the filtrate side and the backflushing line rinses a small partial flow of the filtrate in the opposite direction into the filter elements to be cleaned. The contamination particles deposited on the inside of the filter elements are detached and carried out via the backflushing arm into the backflushing line. Once the rinsing arm has reached its position, the gear motor stops and the electrical backflushing valve closes automatically.
- EPU: Electro-pneumatic circulation control as EU but with pneumatic actuator on backflushing valve.



1.3 SPECIAL FEATURES OF THE AUTOFILT® RF7

Isokinetic filtration and backflushing

The patented conical shape and configuration of the filter elements allows even flow, resulting in low pressure drops and complete cleaning of the elements across the entire installed filter area. The advantage: fewer backflushing cycles and reduced loss of backflushing fluid.

Pulse aided backflushing

On the cyclic control types EPT and PT, the rinsing arm remains under each filter element for only a few seconds. Rapid opening of the pneumatic backflushing valve generates a pressure surge in the filter element openings, providing an additional cleaning effect to the backflushing process.

Small backflushing quantities due to cyclic control

The backflushing valve opens and closes during backflushing of each filter element.

2. FILTER SPECIFICATIONS

2.1. STANDARD CONFIGURATIONS

2.1.1 Control parameters

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

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 available on request

2.1.3 Flange connections

- DIN / ANSI / JIS

2.1.4 Housing materials

- Carbon steel
- Stainless steel

2.1.5 Material of internal parts

- Stainless steel 1.4301

2.1.6 Material of elements

- Stainless steel 1.4435, 1.4404

2.1.7 External corrosion protection

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

2.1.8 Internal corrosion protection

- Epoxy coating
- Polyurethane coating
- Rubber lined

2.1.9 Differential pressure gauge

- Aluminium
- Stainless steel
- Brass
- Chemical seal

2.1.10 Filtration ratings

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

2.1.11 Electrical protection class

- IP55

2.1.12 Pressure ranges

- 10 bar or 6 bar depending on size

2.1.13 Operating temperature

- Max. operating temperature 90 °C

2.2. OPTIONAL VERSIONS

There are a range of optional versions available for the AutoFilt® RF7. For technical details and prices, please contact our Technical Sales Department at Head Office.

2.2.1 Control /electrical components / voltage supply

- PLC control
- Filter without control for integration into customer's PLC
- Filter interlocking for parallel operation
- UL/CSA approved controls and components
- Special IP protection classes
- Safe in tropical conditions
- Customised special solutions

2.2.2 Housing manufacture

- ASME Code Design
- U-Stamp

2.2.3 Flange connections

- ANSI
- JIS

2.2.4 Housing materials

- Duplex
- Superduplex
- Various qualities of stainless steel
- Various qualities of carbon steel

2.2.5 Materials of internal parts and elements

- Duplex
- Superduplex
- Various qualities of stainless steel
- Superflush element coating

2.2.6 External corrosion protection

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

2.2.7 Internal corrosion protection

- Glass flake lining
- Special paint/coatings according to customer specifications

2.2.8 Explosion protection

- ATEX according to Directive 94/9/EC

2.2.9 Documentation

- Manufacturer's test certificates
- Material certificates 3.1
- GOST certificate
- 3rd parties (TÜV, ABS, Lloyds, etc.)
- WPS / PQR
- Inspection plan

And many others available on request

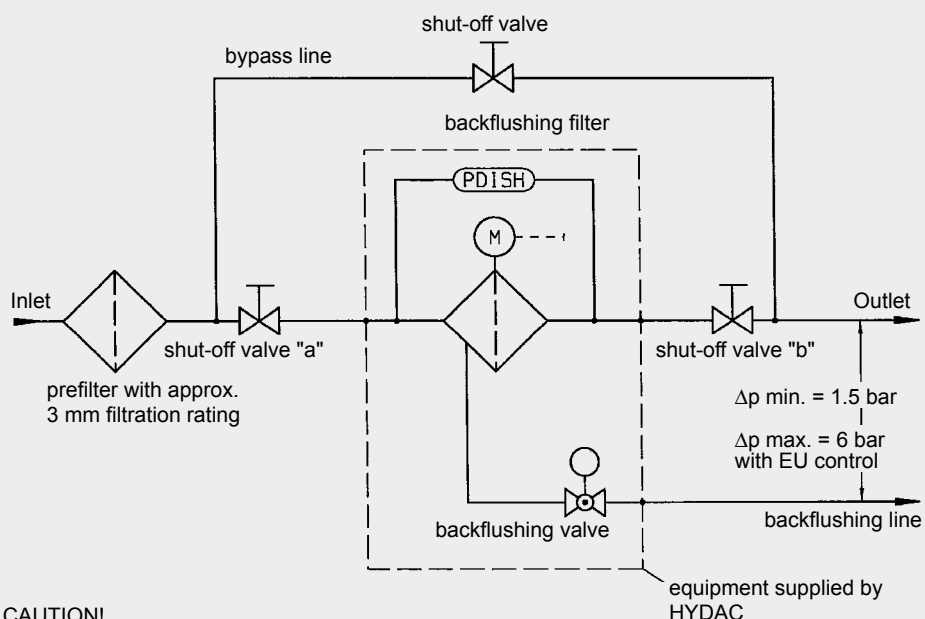
2.3 OVERVIEW OF TECHNICAL SPECIFICATIONS OF STANDARD MODELS

Filter Size	Pressure range [bar]	Connection ¹⁾ Inlet	Connection ¹⁾ Outlet	Connection back-flushing line	Weight ²⁾ [kg]	Volume [l]	No. of elements	Filtration area [cm ²]	Backflush volume ³⁾ [l]
C	16	DN 50	DN 50	DN 25	130	15	6 x KC	2140	25
0	10	DN 100	DN 100	DN 25	155	25	6 x K0	3810	25
1	10	DN 150	DN 150	DN 40	250	60	3 x K1 3 x K2	6190	35
2	10	DN 200	DN 200	DN 50	375	105	4 x K1 4 x K2	8250	50
2.5	10	DN 250	DN 250	DN 50	645	190	6 x K3	12500	65
3	10	DN 300	DN 300	DN 65	585	280	9 x K3	18750	95
4	6	DN 400	DN 400	DN 80	775	425	18 x K3	37500	210
5	6	DN 500	DN 500	DN 80	1040	635	16 x K3 8 x K4	55760	310
6	6	DN 600	DN 600	DN 100	1650	998	32 x K3 8 x K4	89100	485
7	6	DN 700	DN 700	DN 100	2000	1355	24 x K3 20 x K4	106100	555
8	6	DN 900	DN 900	DN 150	3610	2710	54 x K5	180700	720

Max. permissible temperature for all AutoFilt® RF7: 90 °C

- ¹⁾ According to DIN/EN standard / reservoir manufacture to AD2000, application of Pressure Equipment Directive 97/23/EC if required
- ²⁾ Approx. empty weight based on standard pressure range
- ³⁾ Based on EPT/PT control mode with opening time of backflushing valve of 1.5 seconds and 1.5 bar differential pressure between outlet and backflushing line, with EU / EPU control the backflushing volume increases by a factor of 5.

2.4 CIRCUIT DIAGRAM



CAUTION!
For cleaning, there must be a minimum pressure difference between the outlet and the backflushing line of 1.5 bar.

3. MODEL CODE AUTOFILT® RF7

RF7 - 3B - EPT1 - NP - N - 1 - 1A - x / SKS 100 - 3 - 12345678

Type AutoFilt®

Size / filter inlet - filter outlet

- C = DN 50 PN16
- 0 = DN100 PN10
- 1 = DN150 PN10
- 2 = DN200 PN10
- 2.5 = DN250 PN10
- 3 = DN300 PN10
- 4 = DN400 PN6
- 5 = DN500 PN6
- 6 = DN600 PN6
- 7 = DN700 PN6
- 8 = DN900 PN6
- A = PN6 (follows size)
- B = PN10 (follows size)
- C = PN16 (follows size)
- D = PN25 (follows size)

Type of control / Input supply voltage

- EU = electrical time-controlled circulation control
- EPT = electro-pneumatic cyclic control
- PT = pneumatic cyclic control
- EPU = electro-pneumatic circulation control
- PTZ = pneumatic cyclic control with timer function
- 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

- N = carbon steel, external primer (RAL 9006)
- NM = carbon steel, external primer (RAL 9006), 2K epoxy paint, internal
- NP = carbon steel, external primer (RAL 9006), 2K polyurethane paint, internal
- E = stainless steel
- A = for ANSI flanges, add A
- J = for JIS flanges, add J

Material of backflushing valve

- N = butterfly: housing SG cast iron coated, washer 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 setting/ backflushing line setting (each in the direction of the filter inlet)

- 1 = outlet to right
- 2 = outlet up
- 3 = outlet to left
- A = backflushing line to left
- B = backflushing line downwards
- C = backflushing line to right

Modification number

- X = the latest version is always supplied

Element set

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

Size of element set

Identical to size of filter

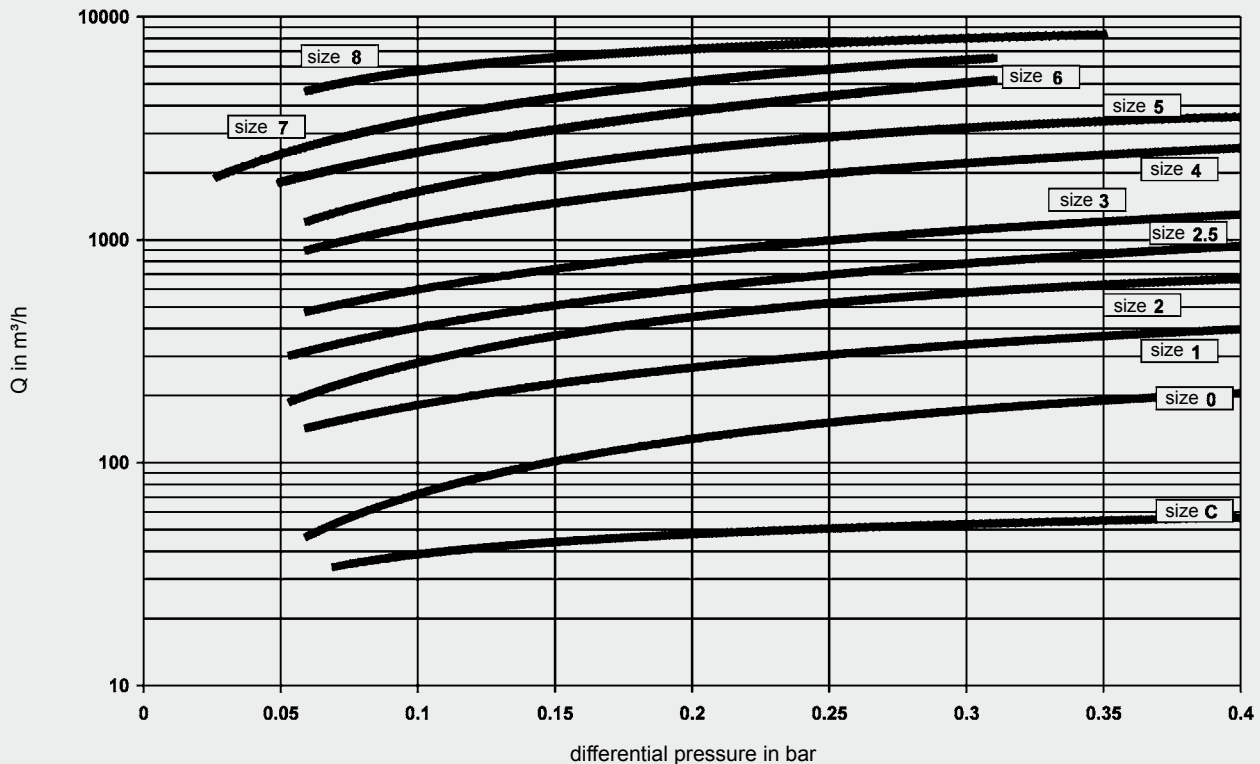
Drawing number

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

4. FILTER CALCULATION / SIZING

4.1 PRESSURE DROP CURVES

The pressure drop curves apply to water.



It is crucial when operating the AutoFilt® RF7 that there is a pressure differential between the backflushing line and the 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:

(see also Filter questionnaire)

- Flow rate
- Type of medium
- Materials
- Viscosity
- Required filtration rating
- Particulate loading in the fluid
- Type of contamination
- Operating pressure
- Operating temperature
- Power supply and compressed air supply
- Pressure ratios after the AutoFilt® RF7 (is there any back pressure?)
- Integration of the AutoFilt® RF7 into the whole system

The AutoFilt® RF7 is sized based on the pressure drop curve and the calculation table. Generally speaking, an initial Δp (clean filter condition) of 0.2 bar should not be exceeded. The pressure drop curve is valid for filtration ratings of 100 – 3000 μm slotted tube and 25 μm , 40 μm and 60 μm SuperMesh. Using 50 μm

slotted tubes, the stated pressure drop increases for sizes C to 8 by approx. 30 %. A further factor in the calculation is the flow velocity through the filter inlet. It should not exceed 4 m/s.

With reference to the sizing of the AutoFilt® RF7, a separate consideration and sizing must be applied for water applications and emulsion applications due to different contamination loads (see 4.2 Calculation Tables).

4.2. CALCULATION TABLES

The calculation tables form an important basis when deciding on the AutoFilt® RF7.

In particular the higher contamination load in emulsion applications demands more generous sizing of the filter. The following points must also be observed for emulsion applications:

- Validity of the tables for emulsions and oils up to a viscosity of 15 mm^2/s .
- For applications in the field of cast iron processing, grinding, honing and for fluids with a viscosity over 15 mm^2/s , you must contact the Head Office!

- The flow rate ranges given apply to filtration ratings $\geq 100 \mu\text{m}$.

4.2.1 Water applications

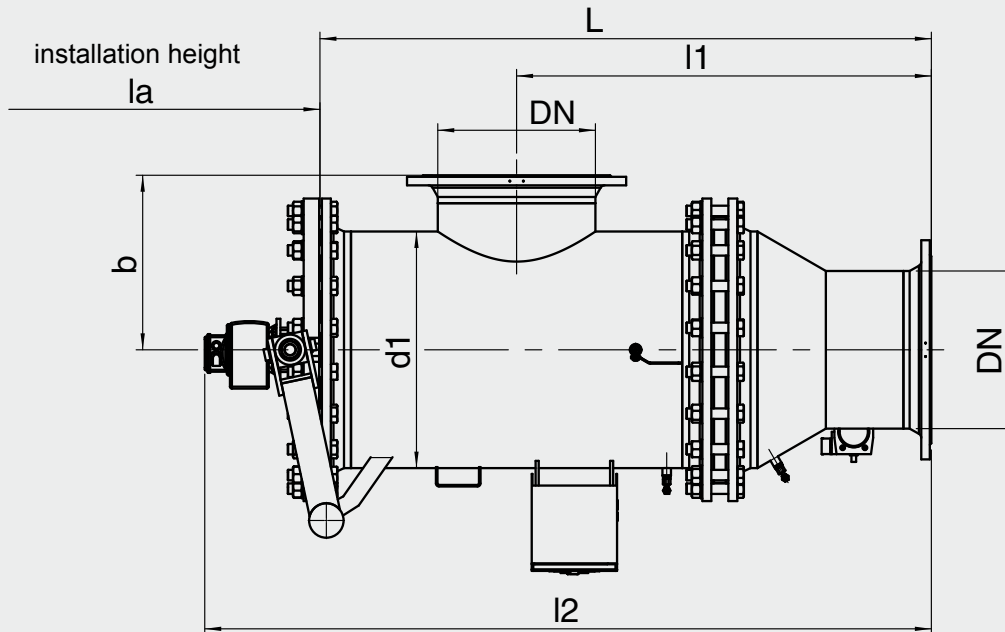
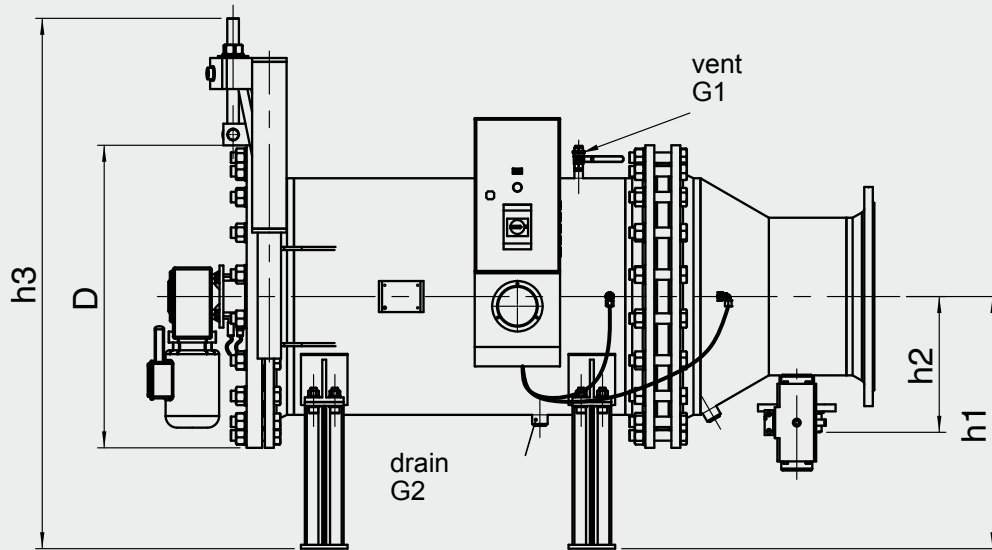
Filter Size	Flow rate range
C	5 - 28 m^3/h
0	25 - 113 m^3/h
1	90 - 254 m^3/h
2	200 - 450 m^3/h
2.5	400 - 600 m^3/h
3	550 - 860 m^3/h
4	810 - 1700 m^3/h
5	1500 - 2450 m^3/h
6	2000 - 3600 m^3/h
7	3000 - 5000 m^3/h
8	4500 - 7500 m^3/h

4.2.2 Emulsion applications (cooling lubricants, washing fluids)

Filter Size	Flow rate range
C	5 - 15 m^3/h
0	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.



Filter Size	DN	DN1	l1	b	h1	h2	h3	D	d1	L	l2	G1	G2	la
C	50	25	504	200	360	120	650	340	220	635	892	G1/4	G1/2	550
0	100	25	596	200	385	150	685	340	220	850	1165	G1/4	G1/2	550
1	150	40	647	270	450	189	805	445	324	900	1215	G1/4	G3/4	550
2	200	50	764	325	500	220	1000	565	406	1020	1335	G1/4	G3/4	700
2.5	250	50	1024	325	500	260	1000	565	406	1480	1770	G1/4	G3/4	700
3	300	65	1042	380	590	280	1200	670	508	1550	1848	G1/4	G3/4	700
4	400	80	1069	450	650	350	1400	780	610	1576	1873	G1/4	G3/4	700
5	500	80	1139	550	750	370	1575	895	711	1585	1920	G1/4	DN40	700
6	600	100	1159	625	840	475	1750	1115	914	1690	2046	G1/4	DN40	700
7	700	100	1200	750	890	510	1900	1230	1016	1475	1830	G1/4	DN40	700
8	900	150	1474	950	1100	620	2250	1405	1220	2114	2460	G1/4	DN40	700

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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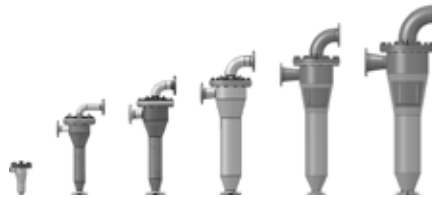




TwistFlow Strainer AutoFilt® ATF

Flow rate: up to 400 m³/h, up to 16 bar
Filtration rating: 200 to 3000 µm

ATF-1 ATF-2 ATF-2.5 ATF-3 ATF-3.5 ATF-4



1. TECHNICAL SPECIFICATIONS

1.1 GENERAL

The HYDAC AutoFilt® TwistFlow Strainer ATF is used to filter solid particles from water and other fluids similar to water.

With filtration ratings of between 200 and 3000 µm, the AutoFilt® TwistFlow Strainer ATF is particularly suitable for separating suspended solid particles up to several g per litre from preferably low viscosity fluids.

1.2 APPLICATIONS

The AutoFilt® ATF can be used to separate solids and fluids in low viscosity fluids and if, for example, used for

- Pre-separation before the AutoFilt® RF3 / RF4
- Prefiltration in order to relieve the load on sand filters
- Prefiltration before membrane systems
- Filtration of surface water
- Filtration of sea water
- Filtration of process water
- Filtration of wastewater

1.3 CONSTRUCTION AND FUNCTION

This filter is a hybrid system consisting of a centrifuge separator and an inline filter. The fluid to be cleaned enters the housing tangentially – similar to a centrifuge separator – and accelerates down as a result of the tapered housing cross-section. The resulting spiral flow with its centrifugal force carries the coarsest contamination first – its density is obviously higher than that of the fluid – to the inner wall of the housing.



1.4 FUNCTION

When pressed against the filter wall, the particles sediment at a higher density in the lower part of the filter, where they are finally carried out. The remaining particles, which only marginally differ in density from the fluid, are separated by a conical filter element which is located in the middle of the filter.

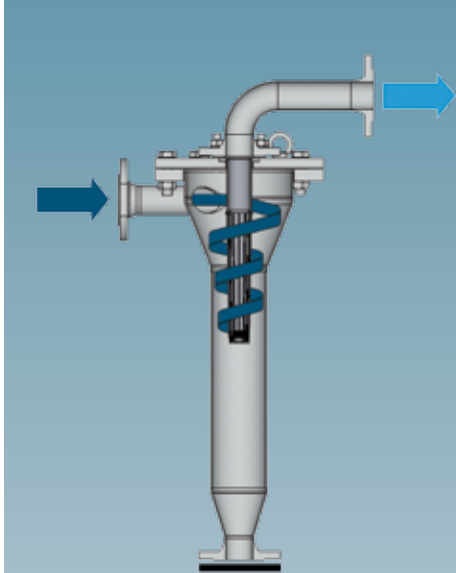
This conical filter element specially developed for the filter ensures optimum flow characteristics, and on the one hand makes possible continual self-cleaning of the filter during operation, and on the other makes the pressure drop of the whole filter much lower compared with a centrifugal separator of a similar size. Both the sedimented particles and those separated by the filter element finally collect in the lower part of the housing and are discharged periodically from the system by opening the contamination flap.

During this cleaning procedure (depending on the installation situation of the strainer) part of the untreated water flow is used for a few seconds to clean the elements and to rinse the filter.

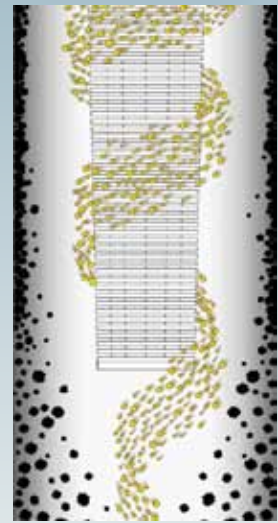
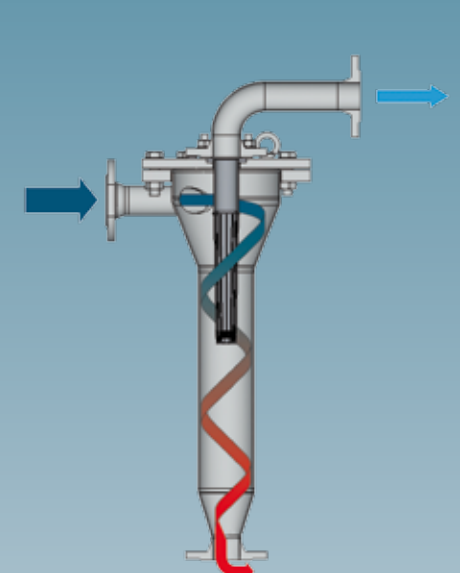
Because only a partial flow is used for rinsing, the filtration operation is continuous. In addition, the unit is of course excellent for bypass flow applications which are able to do without a partial flow for short periods. Depending on the application and the amount of solid particles, the contamination interval can be adapted individually to the preparation process via a timer function.

In order to filter high flow rates, the TwistFlow Strainer AutoFilt® ATF can also be supplied as a skid solution.

Filtration phase



Cleaning phase



1.5 SPECIAL FEATURES OF THE TWISTFLOW STRAINER

The ATF is particularly suited to high levels of contamination and large fluctuations in the solid particle content of the untreated water.

Due to the use of conical slotted tube and sintered wire meshes with filtration ratings of between 200 and 3000 µm, a precise selectivity and therefore a constant filtrate quality is ensured – independent of fluctuations in operating pressure or flow rate.

Due to the special flow conditions resulting from the element geometry and their arrangement, the pressure drop on the overall unit is relatively low at < 1.0 bar.

The pre-filtration of solid particles of a higher density means that the filter surface area can take a correspondingly higher load and the filter size can therefore be comparatively small.

The filter elements are cleaned solely by flushing with untreated fluid.

The ATF saves on space in comparison to conventional separating units such as lamellar separators or sand filters.

Several TwistFlow Strainers can be integrated in almost any quantity into systems and as a result can be flexibly adapted to the required flow rates.

The filter unit ATF is maintenance-friendly, as it is equipped with a flange cover. On sizes 2 to 4, it is also possible to replace the filter element without having to open the filter.

2. FILTER SPECIFICATIONS

2.1 SUMMARY OF TECHNICAL SPECIFICATIONS OF THE FILTER HOUSING (STANDARD CONFIGURATION)

Size	Pressure range [bar]		Connection Inlet/outlet	Connection cleaning line	Filter area [cm ²]	Temperature [°C]	Weight [kg]	Volume [l]
	PN10	PN16						
1		●	G 1"	G 1"	150	0 to 90	15	1.8
2	●	●	DN 50	DN 50	360		60	13.5
2.5	●	●	DN 80	DN 80	966		135	28
3	●	●	DN 100	DN 100	1720		200	55
3.5	●	●	DN 150	DN 100	3500		263	130
4	●	●	DN 200	DN 150	3900		418	230

2.2. FURTHER SPECIFICATIONS OF THE FILTER HOUSING (STANDARD CONFIGURATION)

2.2.1 Material of seal

- asbestos-free gasket (C4400)

2.2.2 Control parameters

0: without valve, without control

M: manual

EP: electro-pneumatic drain valve without timer function

EPZ: electro-pneumatic drain valve with timer function

E: electrical drain valve without timer function

EZ: electrical drain valve with timer function

2.2.3 Flange connections

- DIN flanges
- ANSI flanges
- JIS flanges
- NPT thread optional (only ATF-1)

2.2.4 Housing materials

- Stainless steel (AISI 304 / 1.4301)
- Carbon steel

2.2.5 Materials for elements

- Stainless steel

2.2.6 External corrosion protection

- 2 coats of primer RAL 9006 (not required for stainless steel housings)

2.2.7 Internal corrosion protection

- 2K polyurethane coating, internal

2.2.8 Filtration ratings

- Conical slotted tube with or without Superflush 200 to 3000 µmm

2.2.9 Pressure ranges

- 10 bar
- 16 bar

2.2.10 Operating temperatures

- 0 to 90 °C

2.2.11 Documentation

- Operating and maintenance instructions

2.3. OPTIONAL VERSIONS

2.3.1 Housing manufacture

- ASME Code Design with or without U-Stamp

2.3.2 Housing materials

- Duplex, Superduplex
- Different stainless steel and carbon steel qualities

2.3.3 Documentation

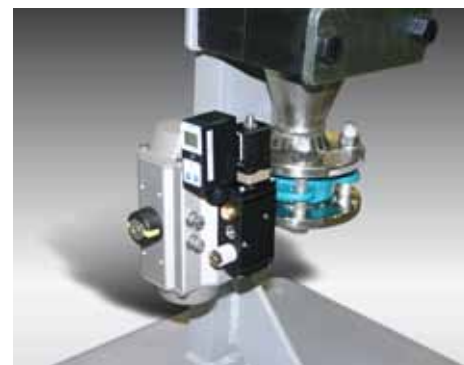
- Manufacturer's test certificates
- Material certificates 3.1 according to DIN EN 10204
- And many others available on request

2.3.4 Accessories

- Frame for ATF-2, ATF-2.5 and ATF-3
- Mounting clips for ATF-2, ATF-2.5 and ATF-3
- Differential pressure gauge for customer use



Solenoid valve on ATF-1



Flap on ATF-2, 2.5



Flap on ATF-3, 3.5, 4

3. MODEL CODE TwistFlow Strainer

ATF - 2 - EPZ1 - E - NN - 10 - 0 - X / UKS2 200 - 12345678

TwistFlow Strainer

Size/ connections

- 1 = inlet/outlet G 1"
- 2 = inlet/outlet DN 50
- 2.5 = inlet/outlet DN 80
- 3 = inlet/outlet DN 100
- 3.5 = inlet/outlet DN 150
- 4 = inlet/outlet DN 200

Control

- 0 = without valve, without control
- M = manually-operated drain valve
- EP = electro-pneumatically-operated drain valve, without timer function
- EPZ = electro-pneumatically-operated drain valve, with timer function
- E = electrically-operated drain valve, without timer function
- EZ = electrically-operated drain valve, without timer function

Type of voltage (EP, EPZ, E and EZ)

- 1 = control voltage 230 V AC, 50-60 HZ
- 2 = control voltage 110 V AC, 50-60 HZ
- 3 = control voltage 24 V AC, 50-60 HZ
- 4 = control voltage 24 V DC

Housing materials

- N = carbon steel or SG cast iron (RAL 9006)
- E = stainless steel
- A = For ANSI flanges, add A
- J = For JIS flanges, add J
- T = NPT threaded connection (only for size 1) also add T
- P = internal coating with 2-K polyurethane paint (also add P)

Drain valve

- 0 = without drain valve
- NN = flap GGG 40 coated, cuff NBR, washer, stainless steel
- NE = flap GGG 40 coated, cuff EPDM, washer, stainless steel
- NV = flap GGG 40 coated, cuff Viton, washer, stainless steel
- BN = flap GGG 40 coated, cuff NBR, washer, bronze
- BE = flap GGG 40 coated, cuff EPDM, washer, bronze
- BV = flap GGG 40 coated, cuff Viton, washer, bronze
- E = ball valve, stainless steel (only size 1)
- M = ball valve, brass (only size 1)

Pressure ranges

- 10 = PN 10
- 16 = PN 16

Equipment

- 0 = without accessories
- 1 = with base frame (only ATF-2, ATF-2.5 and ATF-3)
- 2 = mounting clips set (only ATF-2, ATF-2.5 and ATF-3)
- 3 = differential pressure gauge pressure chamber aluminium (only for customer use)
- 4 = differential pressure gauge stainless steel (only for customer use)
- 5 = differential pressure gauge pressure chamber brass (only for customer use)

Modification number

Element set

- UKS1 = conical slotted tube for size 1
- UKS2 = conical slotted tube for size 2
- UKS2.5 = conical slotted tube for size 2.5
- UKS3 = conical slotted tube for size 3
- UKS3.5 = conical slotted tube for size 3.5
- UKS4 = conical slotted tube for size 4
- SUKS1 = conical slotted tube Superflush for size 1
- SUKS2 = conical slotted tube Superflush for size 2
- SUKS2.5 = conical slotted tube Superflush for size 2.5
- SUKS3 = conical slotted tube Superflush for size 3
- SUKS3.5 = conical slotted tube Superflush for size 3.5
- SUKS4 = conical slotted tube Superflush for size 4

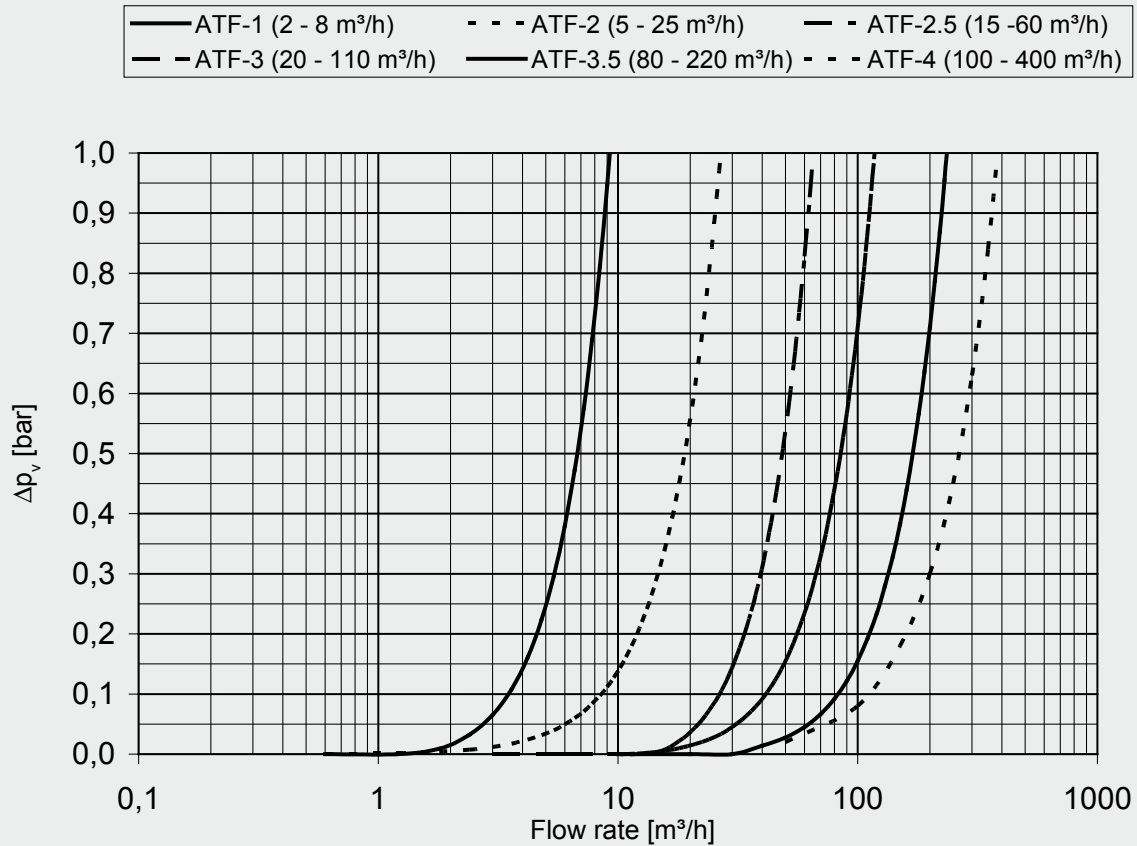
Filtration ratings

- 200 = 200 µm (not for size 4)
- 300 = 300 µm (not for size 4)
- 500 = 500 µm
- 1000 = 1000 µm
- 2000 = 2000 µm
- 3000 = 3000 µm

Drawing number

4. FILTER CALCULATION / SIZING

4.1 PRESSURE DROP CURVES



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
- Solid particle type and density/ densities
- Operating Pressure
- Operating temperature

The AutoFilt® TwistFlow Strainer ATF is sized based on the pressure drop curve.

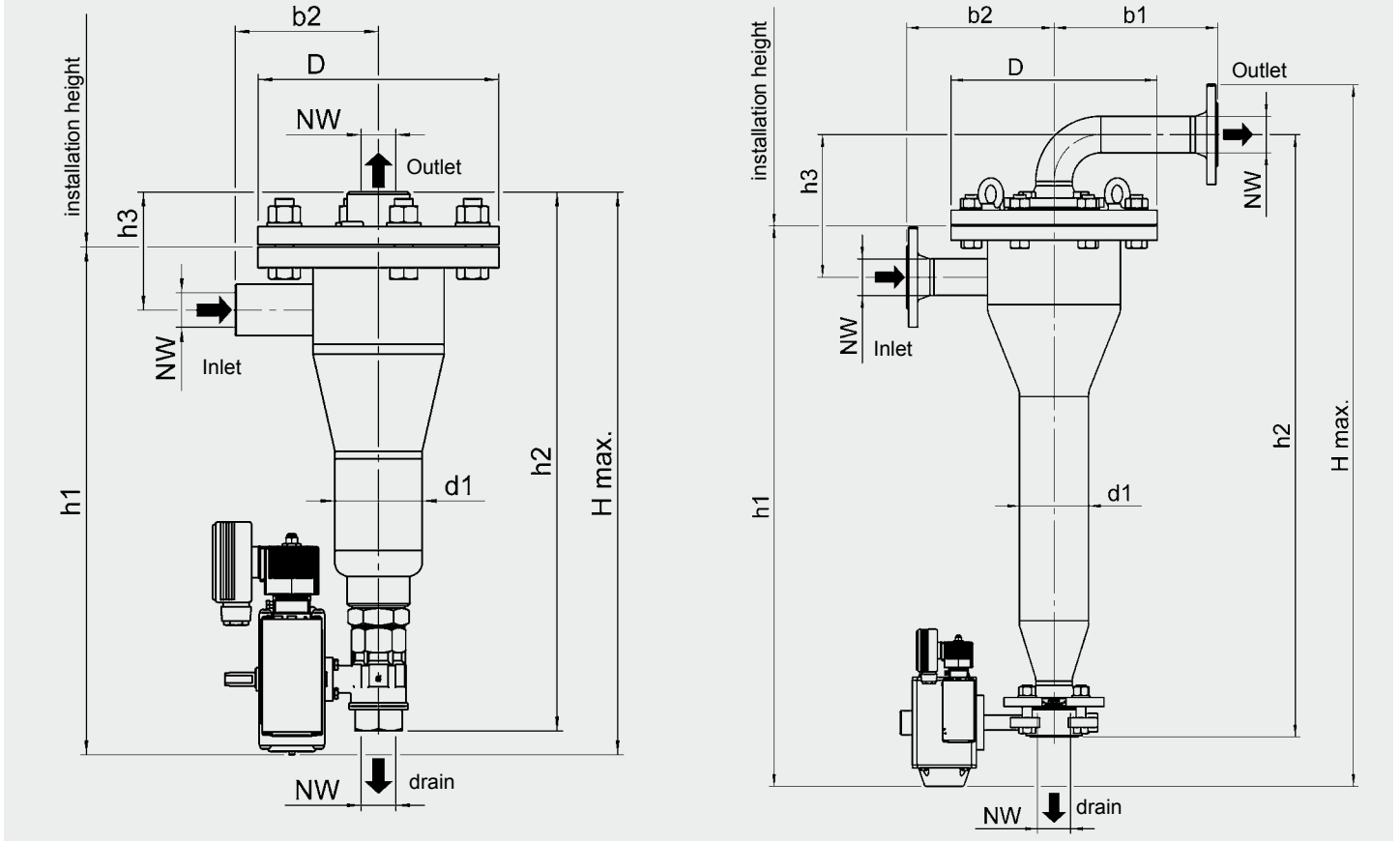
A further factor in the calculation is the flow velocity through the flange inlet. It should not exceed 4 m/s.

In order to filter high flow rates, the TwistFlow Strainer AutoFilt® ATF can also be supplied as a skid solution.



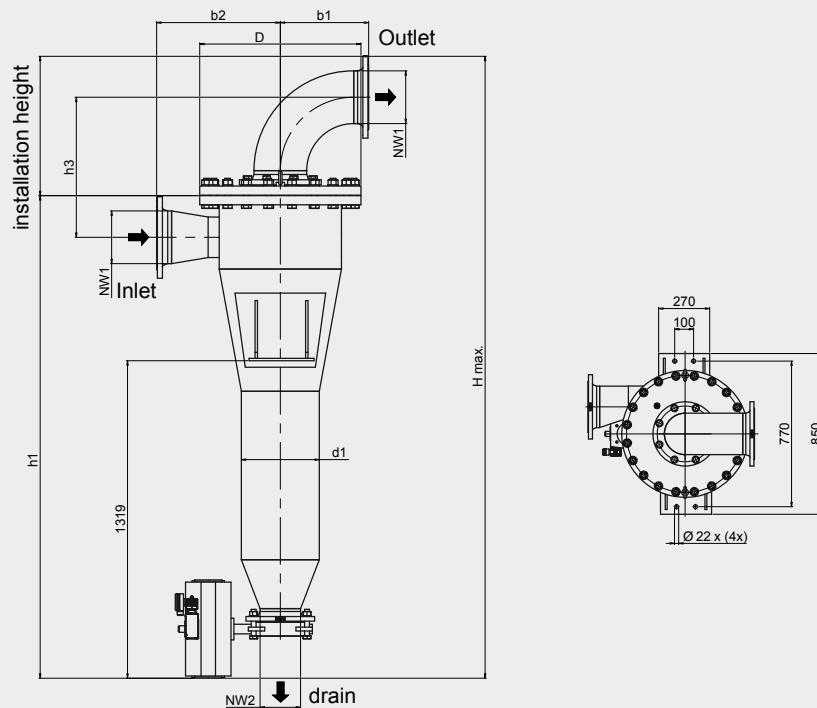
5. DIMENSIONS

5.1 ATF-1, ATF-2, ATF-2.5 AND ATF-3



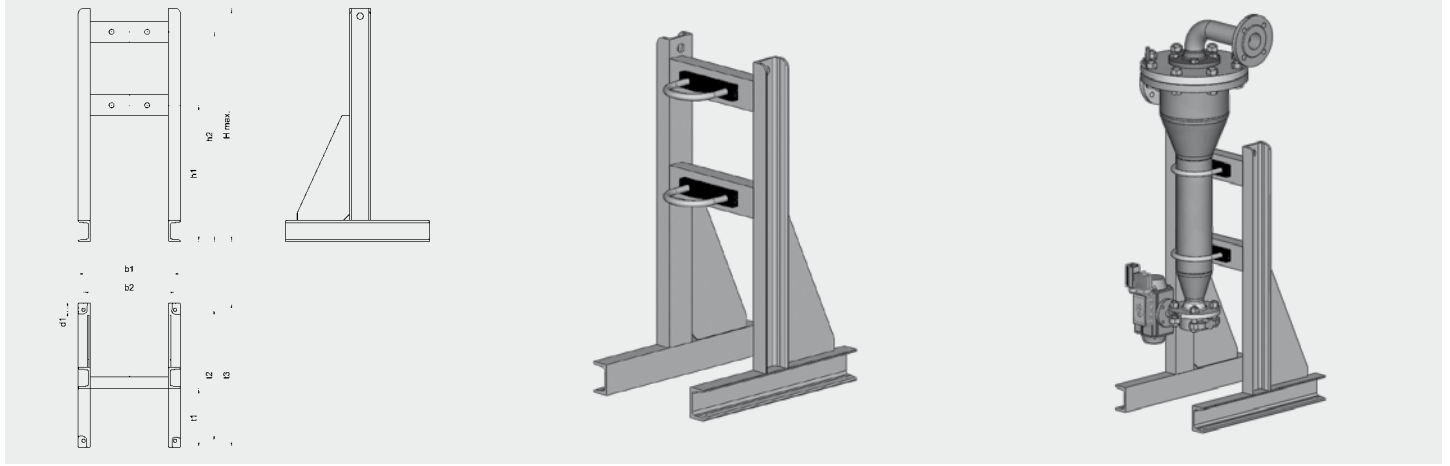
Filter Size	NW	H max.	h1	h2	h3	b1	b2	D	d1	installation height
TwistFlow Strainer-1	1"	490	445	470	103	–	125	210	76.1	350
TwistFlow Strainer-2	50	1160	925	995	235	270	243	340	114.3	500
TwistFlow Strainer-2.5	80	1435	1140	1235	315	220	280	395	139.7	650
TwistFlow Strainer-3	100	1750	1400	1500	350	260	322	445	219.1	1000

5.2 ATF-3.5 AND ATF-4



Filter Size	NW1	NW2	H max.	h1	h2	h3	b1	b2	D	d1	installation height
TwistFlow Strainer-3.5	150	100	2260	1785	1980	478	284	435	565	273	1300
TwistFlow Strainer-4	200	150	2585	2005	2240	582	367	514	670	323.9	1170

5.3 FRAME FOR ATF-2, ATF-2.5 AND ATF-3 (ATF-3.5 and ATF-4 with support brackets)



Filter Size	H max.	h1	h2	b1	b2	t1	t2	t3	d1
TwistFlow Strainer-2	890	520	800	390	350	225	500	550	13
TwistFlow Strainer-2.5	1180	700	1050	430	380	320	790	850	17
TwistFlow Strainer-3	1420	810	1290	510	460	345	840	900	17

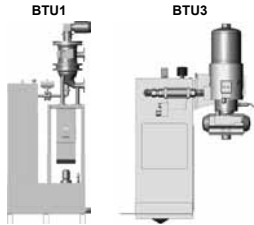
NOTE

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Subject to technical modifications.

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Backflush Treatment Unit BTU



1. TECHNICAL SPECIFICATIONS

1.1 GENERAL

The BTU unit with integral backflushing filter is a turnkey automatic filtration unit for water-miscible cooling lubricants, oils or washing water which continuously filters solid particles, such as very fine magnetic and non-magnetic metal particles, corundum, sand particles etc. It provides long-term filtration producing reduced-particle filtrate.

The quality of the filtrate is dependent on the separation limit of the filter used.

A BTU unit generally consists of:

- Backflushing filter for the main filtration
- Process twist sieve (PTS) to treat the backflushed volume
- Buffer tank with components (only BTU1)
- Control

The process twist sieve (PTS) is a component which is fitted downstream from the backflushing filter to filter the backflushed volume. In this way, with the help of the twist sieve, a further filtration process is carried out via the backflushing line.

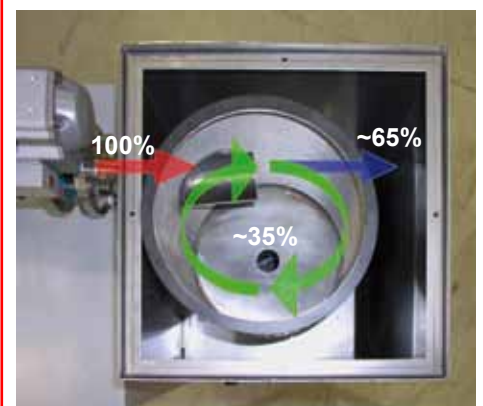
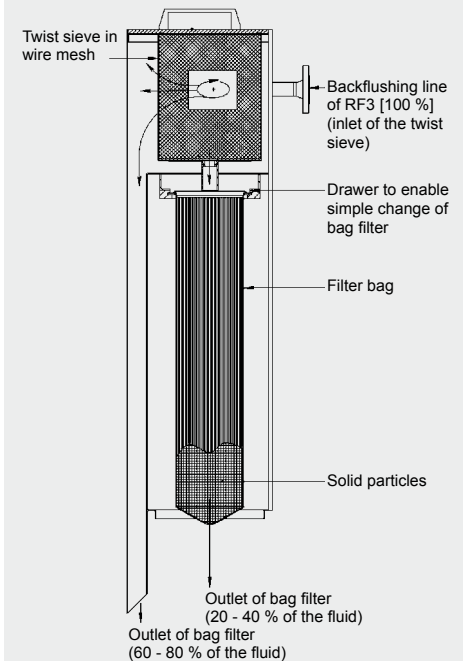
The solid particles from the backflushing volume are collected in a bag filter which is suspended under the twist sieve. When this is full, it is easy to dispose of by pulling open the drawer.

The fluid filtered by the twist sieve or the bag flows back to the buffer tank (BTU1). As soon as the fluid level in the buffer tank reaches the upper switch point of the level gauge (optional, the tank pump (optional) empties the tank.

Due to the short-term pressure shock when backflushing the automatic filter and due to the tangential inlet flow, the fluid is filtered by the wire mesh inside the twist sieve. Approx. 70 % of the backflushing volume passes through the twist sieve and is therefore already filtered when it flows into the buffer tank below the filter via the channel on one side of the twist sieve.

The remaining 30 % of fluid which is heavily contaminated with particles is forced by the centrifugal force and gravity through an opening in the floor of the twist sieve down into a bag filter. The fluid is filtered through the bag from the inside to the outside. Particles are retained and the cleaned emulsion flows into the buffer tank. The pressure shock ensures that the wire mesh (TopMesh) is flushed at every backflushing process, i.e. the twist sieve is self-cleaning and practically maintenance-free.

Function principle PTS



2. SYSTEM SPECIFICATIONS

2.1. STANDARD CONFIGURATIONS

2.1.1 Tank configuration

- BTU1: add-on unit (incl. buffer tank, tank volume 150 l)
- BTU3: tank-top unit (for retrofitting to existing tank)

2.1.2 Filtration rating of twist sieve

- 25 µm to 150 µm SuperMesh

2.1.3 Backflushing filter

- Series AutoFilt® RF3, sizes C, 0 and 1
- Size 2 on request
- Series AutoFilt® RF4, sizes 1 and 2

2.1.4 Bag filter

- PE: Polyester
- PP: Polypropylene
- N: Nylon
- Filtration rating: 25 µm to 150 µm

2.1.5 Material of twist sieve housing and buffer tank

- Stainless steel
- Carbon steel
(for the backflushing filter, the available materials are as listed in the relevant brochure for the standard pressure ranges)

2.1.6 Control versions

- Without control for integration into customer's own control system
- Level monitoring for buffer tank and/or bag filter
- Complete control (power unit control (Siemens CPU), monitoring of the backflushing filter, return pump level monitoring)

2.1.7 Return pump (BTU1 only)

- Buffer tank with or without return pump

2.1.8 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

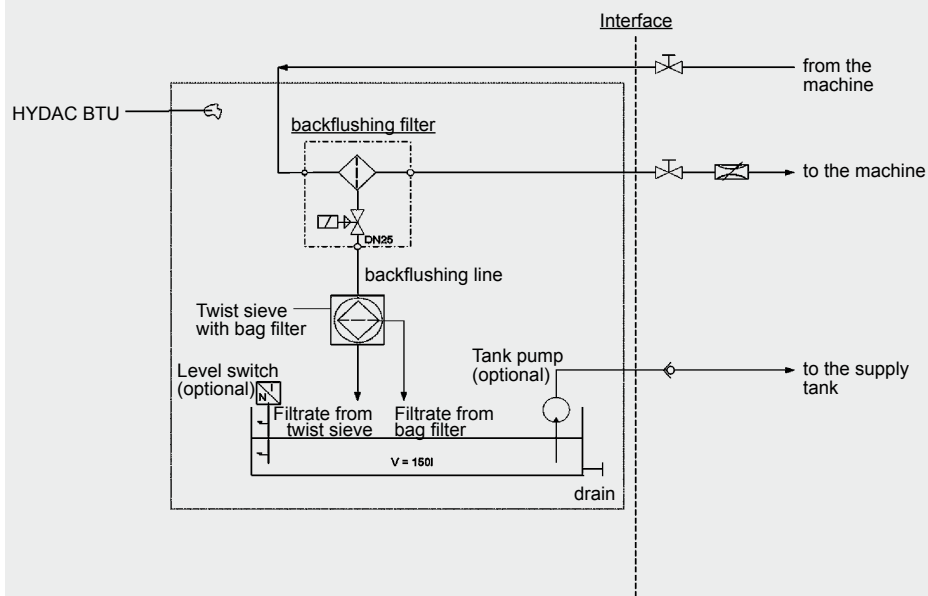
2.1.9 Filtration ratings for the RF

- 25 µm, 40 µm, 60 µm SuperMesh
- 50 µm to 150 µm slotted tube

2.1.10 Electrical protection class

- IP54

2.2 CIRCUIT DIAGRAM



2.3 OPTIONAL VERSIONS

There are a range of optional versions available for the Backflush Treatment Unit. For technical details and prices, please contact our Technical Sales Department at Head Office.

Customised special solutions can also be made available, for example, for retrofitting to existing backflushing filters.

2.4 CALCULATING THE FILTRATION SYSTEM / SIZING

When calculating the main filtration in the filtration unit, the relevant data sheets for the series AutoFilt® RF3 and AutoFilt® RF4 must be consulted.

The type of backflush fluid treatment is selected according to the backflushing filter used:

- Size PTS180 for RF4-1 / RF4-2
- Size PTS250 for RF3-C / RF3-0
- Size PTS450 for RF3-1

3. MODEL CODE

BTU1 - 80 - AS1EEE2L - P 50 - EE - S - T - X - 1234567

3.1 BACKFLUSH TREATMENT UNIT BTU

Type _____
BTU1 = add-on unit
BTU3 = tank-top unit

Filtration rating of twist sieve _____
25 = D25
40 = D40
60 = D60
80 = D80
100 = D100
150 = D150

Backflushing filter type _____
As per separate model code

Bag filter material _____
PE = polyester
PP = polypropylene
N = nylon

Filtration rating of bag filter _____
25 = 25 µm
50 = 50 µm
100 = 100 µm
150 = 150 µm

Material of twist sieve housing and buffer tank _____
EE = housing and buffer tank: stainless steel
EN = housing: stainless steel; buffer tank; carbon steel
NN = housing and buffer tank: carbon steel
NE = housing: carbon steel; buffer tank; stainless steel
EEE = housing, buffer tank, filter frame: stainless steel

Control functions _____
0 = unit without control function
N1 = level monitoring of buffer tank
N2 = level monitoring of bag filter
N3 = level monitoring of buffer tank and bag filter
S = control complete

Pump _____
0 = without pump
T = return pump in buffer tank
(only possible with BTU1)

Modification number _____
X = the latest version is always supplied

Drawing number _____
For special models only

3.2 AUTOFILT® FOR BTU

A E 1 E E E 2 L

Size AutoFilt®

- A = RF3-C
- B = RF3-CG
- D = RF3-0
- E = RF3-0G
- F = RF3-1
- G = RF4-1
- H = RF4-2

Type of control

- 0 = without
- E = EPT

Type of voltage

For RF3:

- 0 = without control
- 1 = 3x 400 V/N/PE, 50 Hz
- 2 = 3x 400 V/X/PE, 50 Hz
- 3 = 3x 500 V/X/PE, 50 Hz
- 4 = 3x 230 V/N/PE, 50 Hz
- 5 = 3x 230 V/X/PE, 50 Hz
- 6 = 3x 415 V/X/PE, 50 Hz
- 7 = 3x 415 V/N/PE, 50 Hz
- 8 = 3x 460 V/N/PE, 50 Hz

For RF4:

- M = with control*; with solenoid valve 230 V AC
- N = with control*; with solenoid valve 24 V DC
- O = without control*; with solenoid valve 230 V AC
- P = without control; with solenoid valve 24 V DC

* Supply voltage of the control 230 V AC, 50 Hz

Materials of housing

For RF3 only:

- 0 = carbon steel, external primer ("N")
- 1 = carbon steel, external primer, internal coating ("NM")
- 3 = stainless steel ("E")

For RF4-1 only:

- AA = Configuration (AAE): aluminium, aluminium, stainless steel
- EE = Configuration (EEE): stainless steel, stainless steel, stainless steel

For RF4-2 only:

- NN = Configuration (NNE): carbon steel, carbon steel, stainless steel
- EE = Configuration (EEE): stainless steel, stainless steel, stainless steel

Note: The backflushing filter is supplied in the standard pressure range!

Materials of backflushing valve

For RF3 only:

- N = carbon steel
- E = stainless steel

For RF4 only:

- 1 = coaxial valve
- 2 = ball valve

Differential pressure gauge

For RF3 only:

- 1 = pressure chamber aluminium
- 2 = pressure chamber stainless steel
- 3 = with chemical seal / stainless steel

For RF4 only:

- F = fixed value: 0.5 bar
- A = adjustable: 0.1 - 1.0 bar
- G = GW indicator, N/C

Flange options (RF3 only)

- 1 = filter outlet opposite filter inlet (standard) (not for RF3-C)
- 2 = filter outlet offset by 90° clockwise to standard
- 3 = filter outlet offset by 180° clockwise to standard

Filter elements

with:	RF3	RF4-1	RF4-2
B =	KD25	KMD25	KND25
C =	KD40	KMD40	KND40
D =	KD60	KMD60	KND60
E =	KD80	KMD80	KND80
L =	KS50	KMS50	KNS50
M =	KS100	KMS100	KNS100
N =	KS150	KMS150	KNS150

3.3 PROCESS TWIST SIEVE PTS

PTS - 40 - 250 - E - L - 2 - P 50 - X - 12345678

Type _____
PTS = Process twist sieve

Filtration rating PTS in µm _____
25 = D25
40 = D40
60 = D60
80 = D80
100 = D100
150 = D150

Diameter _____
180 = Ø 180 mm (only for RF4, without)
180/1 = Ø 180 mm (only for RF4-1, with bracket)
180/2 = Ø 180 mm (only for RF4-2, with bracket)
250 = Ø 250 mm (only for RF3-C and RF3-0)
450 = Ø 450 mm (only for RF3-1)

Housing material _____
N = carbon steel, primed
E = stainless steel

Housing length _____
K = short (standard for PTS-180)
L = long (standard for PTS-250/-450)

Level switch _____
0 = without
1 = with level switch stainless steel (only for diameters 250 mm, 450 mm)

Bag filter material _____
PE = polyester
PP = polypropylene
N = nylon

Bag filtration rating _____
25 = 25 µm
50 = 50 µm
100 = 100 µm
150 = 150 µm

Modification number _____
X = the latest version is always supplied

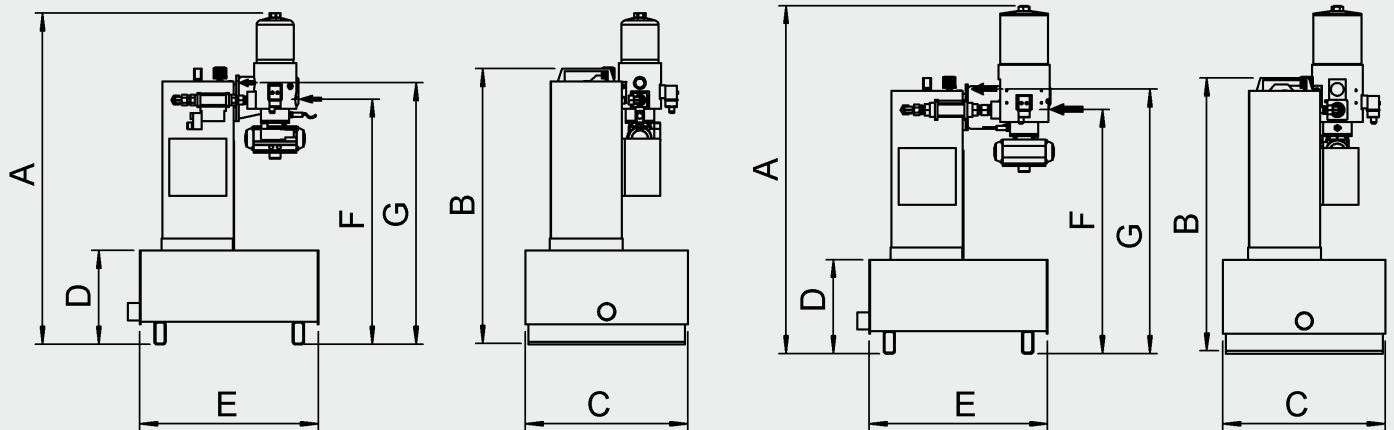
Drawing number _____
For special models only

4. DIMENSIONS

4.1 DIMENSIONS OF BTU1 WITH RF4-1 OR RF4-2

BTU1 with RF4-1

BTU1 with RF4-2

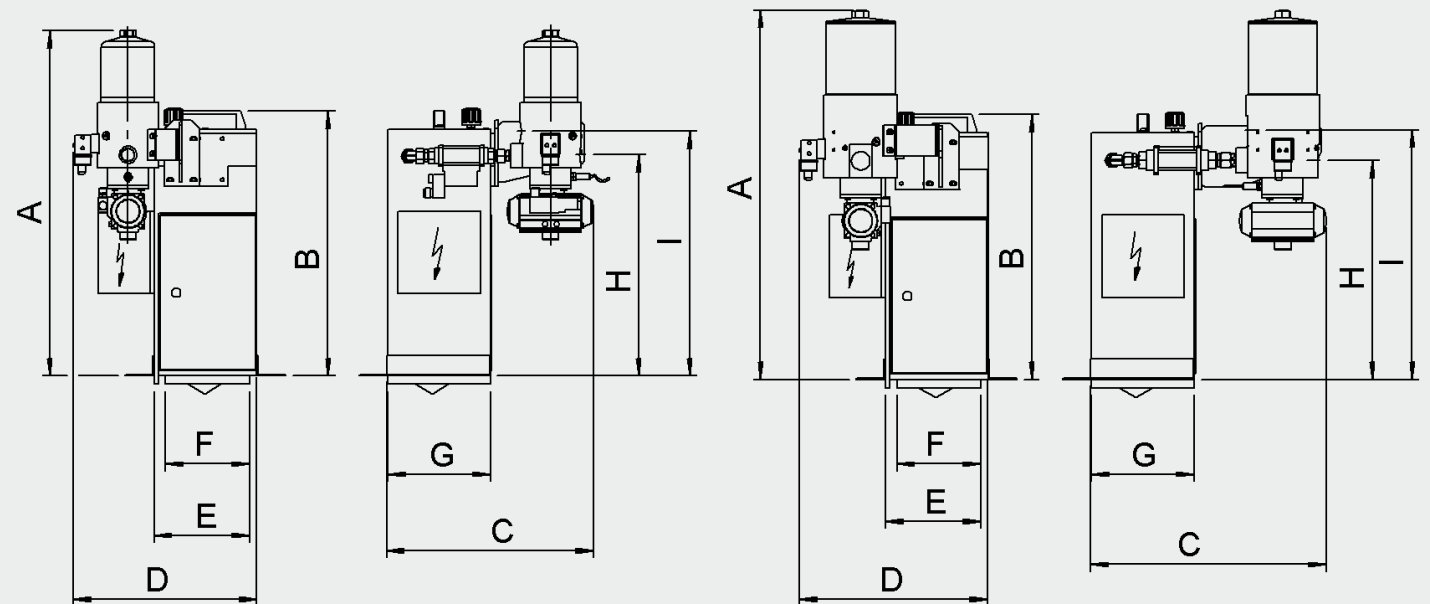


Type	A	B	C	D	E	F	G
BTU1 with RF4-1, 16 bar	1162	972	570	330	626	860	917
BTU1 with RF4-2, 16 bar	1223	972	570	330	626	860	929

4.2 DIMENSIONS OF BTU3 WITH RF4-1 OR RF4-2

BTU3 with RF4-1

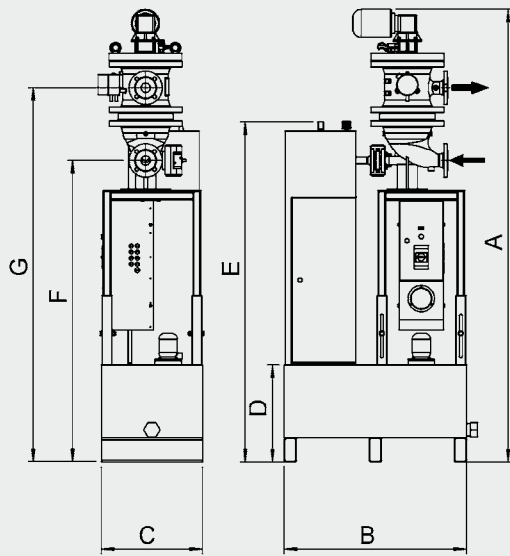
BTU3 with RF4-2



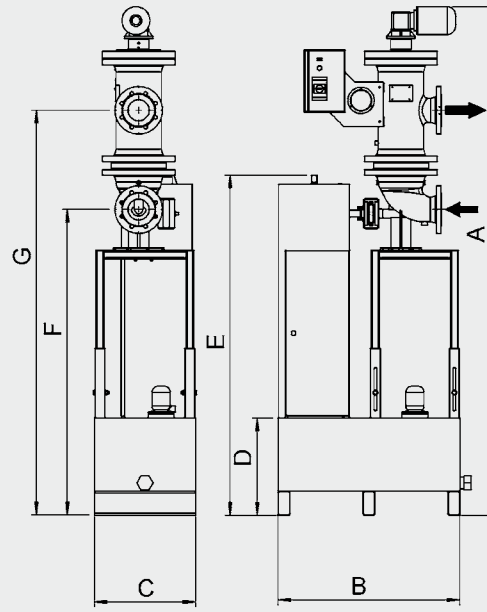
Type	A	B	C	D	E	F	G	H	I
BTU3 with RF4-1, 16 bar	840	645	505	447	232	204	250	538	596
BTU3 with RF4-2, 16 bar	898	645	537	457	232	204	250	533	607

4.3 DIMENSIONS OF BTU1

BTU1 with RF3-CG



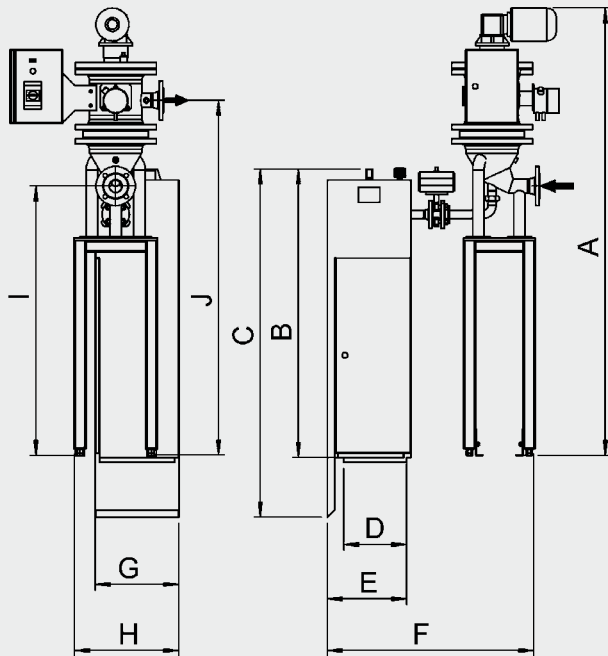
BTU1 with RF3-0G



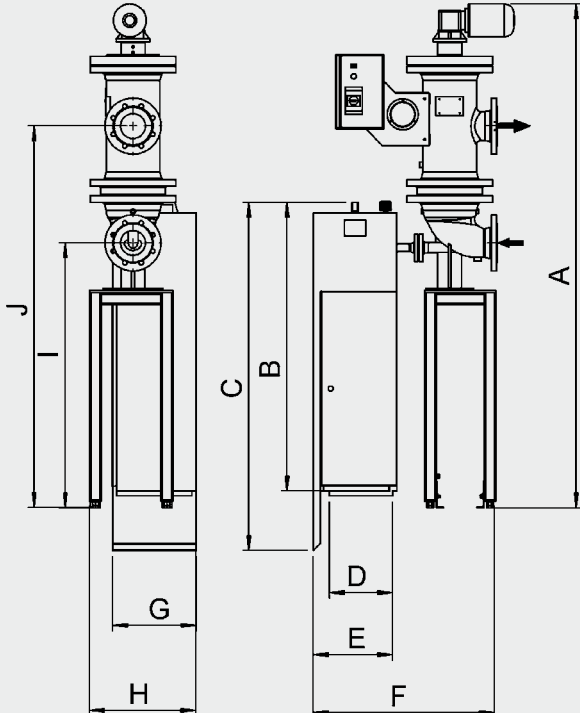
Type	A	B	C	D	E	F	G
BTU1 with RF3-CG	2234	900	500	480	1680	1487	1846
BTU1 with RF3-0G	2512	900	500	480	1680	1507	1997

4.4 DIMENSIONS OF BTU3

BTU3 with RF3-CG



BTU3 with RF3-0G



Type	A	B	C	D	E	F	G	H	I	J
BTU3 with RF3-CG	1877	1210	1460	264	332	867	350	437	1130	1488
BTU3 with RF3-0G	2113	1210	1460	264	332	760	350	446	1110	1600

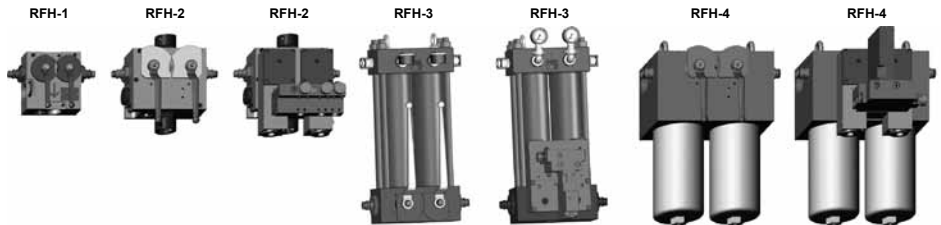
NOTE

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 For applications or operating conditions not described, please contact the relevant technical department.
 Subject to technical modifications.

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Backflushing High Pressure Filter AutoFilt® RFH



1. TECHNICAL SPECIFICATIONS

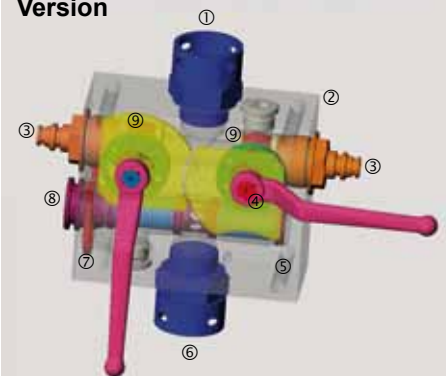
1.1 GENERAL

The backflushing high pressure filter AutoFilt® RFH is an easy-to-operate backflushing filter for water-based fluids at operating pressures of up to 350 bar. The main area of application is to protect shield hydraulics in mining. However, other applications are possible, such as rotary valve hydraulics of pumped storage hydrostations, paint filtration or the protection of high pressure nozzles. Three sizes are available and volumes of up to 800 l/min can be achieved. The backflushing is carried out manually using switch levers. To some extent the filters can also be controlled remotely electrohydraulically or purely hydraulically. As the working fluid, the customer's own operating fluid or an external hydraulic fluid is used. Robust filter materials in stainless steel are available, such as slotted tube or multi-layered wire mesh.

1.2 CONSTRUCTION AND FUNCTION

The sizes RFH-1 and RFH-2 consist of stainless steel housing blocks which can be mounted to the supporting structure by means of the bore holes in the corners of the housing. On the RFH-4, just the filter head is designed as a housing block; in this version the elements are in two screw-in cylinder bowls. The inlet and outlet connections are opposite each other (inline model). The backflushing ports are on the side. Ensure that connection of the backflushing lines to these ports is secure because of the high pressures. A slotted tube or a wire mesh element, which is divided into two filter chambers, is fitted into the filters RFH-1 and RFH-2 respectively. In the RFH-3 and RFH-4, two divided elements are fitted. Each filter chamber or each element is backflushed manually by switching a ball valve.

Construction of RFH-1 / 2 Manual Version

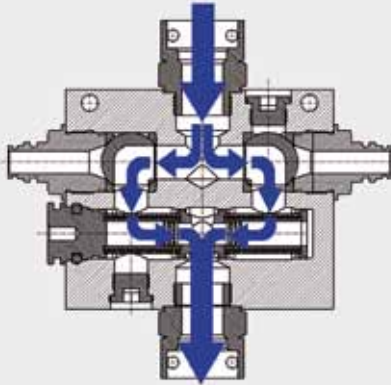


- 1 Inlet
- 2 Housing block
- 3 Backflushing connections
- 4 Switch locking mechanism
- 5 Mounting borehole
- 6 Outlet
- 7 Retaining clip for element
- 8 Element
- 9 Change-over ball valve

Filtration:

The fluid to be filtered flows through both chambers of the filter element from the outside to the inside. The filtrate flows through a T-piece between the two element halves to the outside. Both switch levers indicate the direction of filtration.

Filtration

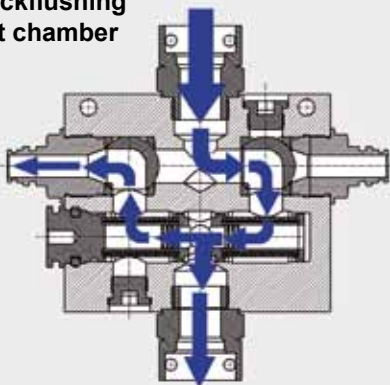


Backflushing:

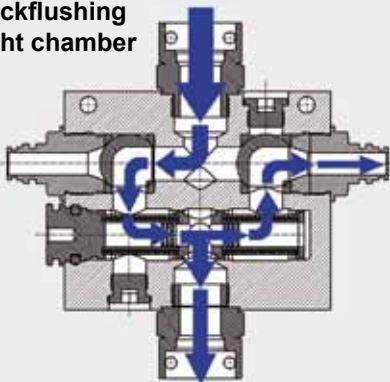
Both filter chambers are backflushed one after the other using their own filtrate when the relevant lever is switched. When backflushing, the flow is reversed into the relevant element segment and removes the contamination from the surface. During the backflushing process, filtration continues via the other half of the element. The flushing time should be 1 to 2 seconds per element half.

In order to prevent both filter chambers being flushed at the same time, the change-over lever is fitted with a rotating lock mechanism. This prevents any interruption to the flow of filtered fluid as a result of incorrect operation.

Backflushing left chamber



Backflushing right chamber



2. FILTER SPECIFICATIONS

2.1 STANDARD CONFIGURATIONS

2.1.1 Control parameters

- Manual backflushing with two manual levers for all sizes
- Automatic backflushing - hydraulic actuation (only sizes 2 & 4) via external operating fluid, pilot operation of the actuators via hydraulic fluid
- The operating fluid requires an operating pressure of between 150 and 350 bar.
- Automatic backflushing - electrohydraulic actuation (only sizes 2 & 4) via external fluid ($p > 100$ bar), pilot operation of the actuators via weather-proof solenoid valves (12V DC); for operating pressures > 100 bar filter's own filtrate can be used as the operating medium.

2.1.2 Connection voltages

- 12 V DC - only on electrohydraulic version

2.1.3 Housing materials (combinations)

- Stainless steel
- Brass
- Carbon steel, nickel-plated (bowls RFH-4)

2.1.4 Material of elements (combinations)

- Filter material stainless steel
- End caps and support tubes stainless steel or brass

2.1.5 Seal materials

- Sealing cups for ball change-over valves in Victrex Peek
- NBR
- Others on request

2.1.6 Differential pressure monitoring (only RFH-3, RFH-4)

- Two individual pressure gauges
- Separately piped PVD indicator with adaptor block

2.1.7 Filter materials and filtrating ratings

- Wire mesh: 25 μm , 40 μm , 60 μm
- Slotted tube: 50 μm , 100 μm , 200 μm , 500 μm

2.1.8 Pressure range of filter housing

- 350 bar for sizes 1, 2 and 4 in stainless steel version
- 200 bar for size 4 in brass version
- 160 bar for size 3

2.1.9 Minimum flushing pressure

- The pressure difference between the filter outlet and the backflushing line outlet must not underrun 10 bar.

2.1.10 Permissible differential pressure on the element

- Δp max. 350 bar for wire mesh elements
- Δp max. 100 bar for slotted tube elements

2.1.11 Documentation

- Operating and maintenance instructions
- ATEX according to Directive 94/9/EC (M2 c)

2.2. OPTIONAL VERSIONS

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

2.2.1 Connections

- Threaded connections instead of SteckO (staple lock type)
- DN 32 or G 1 1/4" for RFH-2

2.2.2 Seal materials

- FPM (Viton)
- Others on request

2.2.3 Documentation

- Manufacturer's test certificates
- Material certificates 3.1 according to DIN EN 10204
- and many others on request

2.2.4 Other

- Protective guard for pressure gauge
- Further optional models on request.

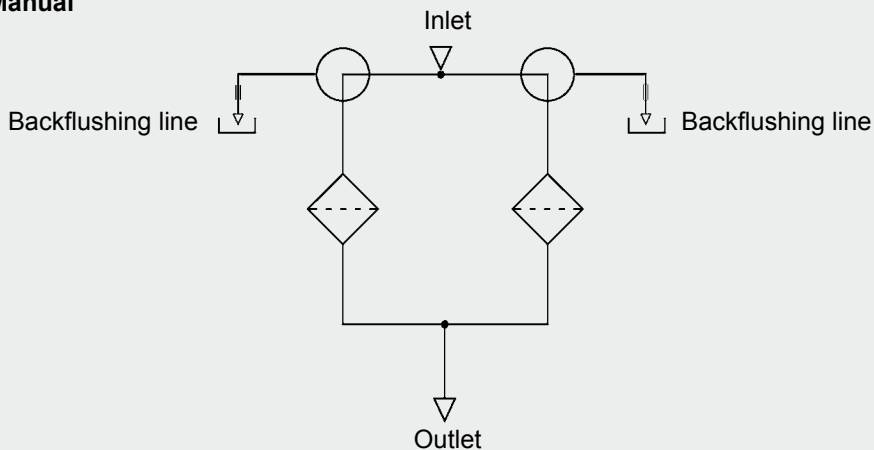
2.3 OVERVIEW OF TECHNICAL SPECIFICATIONS OF STANDARD MODELS

	RFH-1	RFH-2	RFH-3	RFH-4
Operating Pressure	350 bar	350 bar	160 bar	350 bar
Control pressure (only for automatic version)	Not available	150 - 350 bar	150 - 350 bar	150 - 350 bar
Max. Δp on element ¹⁾	350 bar	350 bar	160 bar	350 bar
Max. operating temperature	90 °C	90 °C	60 °C	90 °C
Main dimensions (WxLxH) (manual version)	≈ 230 x 155 x 110	≈ 230 x 265 x 170	≈ 332 x 570 x 215	≈ 345 x 475 x 265
Weight (with actuator)	8.5 kg	20.5 kg (38 kg)	88 kg (105 kg)	95 kg (112 kg)
Volume of pressure chamber	0.25 l	0.42 l	3.9 l	4.2 l
Control options	Manual	Manual, hydraulic, electrohydraulic	Manual, hydraulic, electrohydraulic	Manual, hydraulic, electrohydraulic
Inlet/Outlet	SteckO DN 25	SteckO DN 25	G 2	G 2 / SteckO DN 50
Backflushing line	SteckO DN 12	SteckO DN 12	SteckO DN 25	SteckO DN 19
Control pressure connection	Not available	SteckO DN 10	SteckO DN 10	SteckO DN 10
Filter area	50 cm ²	80 cm ²	928 cm ²	1094 cm ²
Nominal flow rate	400 l/min	600 l/min	600 l/min	800 l/min
Material housing	Stainless steel, brass	Stainless steel, brass	Stainless steel, brass	Brass: up to 200 bar, Stainless steel: up to 350 bar bowl nickel-plated steel

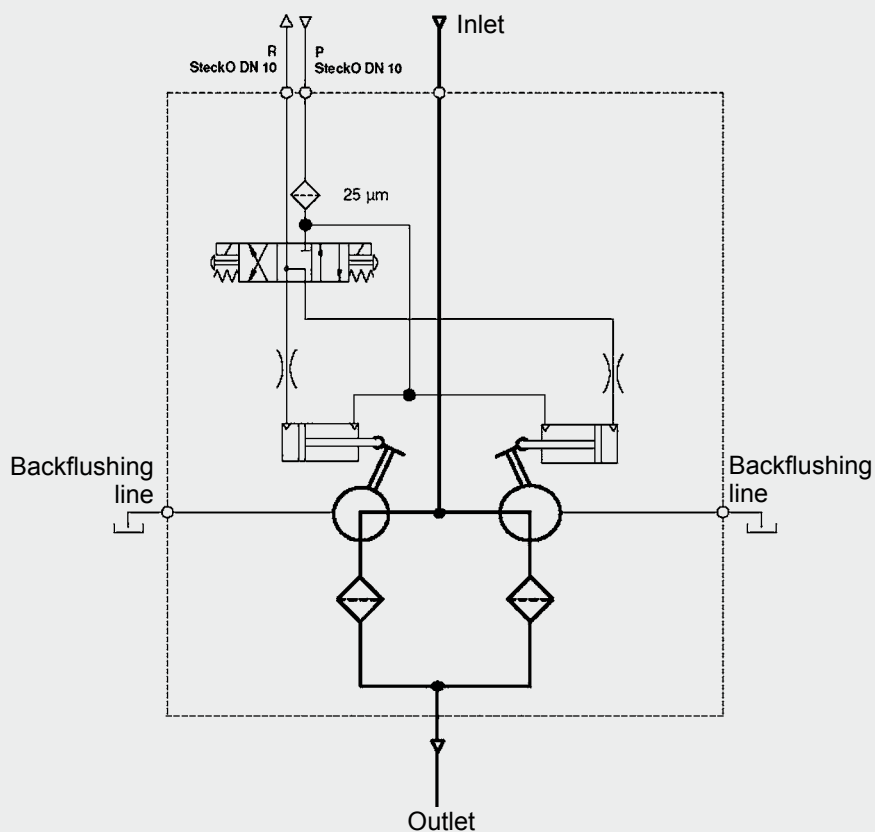
¹⁾ applies to wire mesh elements, Δp for slotted tube elements 100 bar

2.4 SECTIONAL FUNCTIONAL DRAWING

Manual



Electro-hydraulic



3. MODEL CODE

RFH - 1 - S - 25 - E - 0 - N - 1 - 1 - X / RH - 1 - 40 - D - N - 1234567

Type _____
RFH = Backflushing filter, high pressure

Size _____
1 = 50 cm² / 400 ltr
2 = 80 cm² / 600 ltr
3 = 930 cm² / 600 ltr
4 = 1100 cm² / 800 ltr

Connection size _____
S = SteckO
G = thread (inch)
Others on request

Connection size _____
e.g. 25 mm

Material _____
Important: pressure range is dependent on material
M = brass
E = stainless steel
M/E = combined brass/stainless steel

Special equipment _____
0 = without
1 = with 2 pressure gauges (0-600 bar)*
2 = with 2 pressure gauges (0-600 bar) and protective guard*

Seal material _____
N = NBR (Standard)
V = Viton

Type of control _____
1 = Manual
2 = actuator, hydraulic, (only for RFH-2, RFH-3 and RFH-4)
3 = actuator, electrohydraulic, (only for RFH-2, RFH-3 and RFH-4)

Supplementary details _____
0 = without
1 = ATEX certificate EX.M2C (mining)

Modification number _____
X = the latest version is always supplied

Element type _____
RH = backflushing high pressure element

Element size _____
Identical to filter size

Filtration rating _____
Slotted tube: 50; 100; 200; 500 µm
wire mesh: 25; 40; 60 µm

Material of filter element _____
D = wire mesh
S = slotted tube

Seal material on element _____
0 = without*
N = NBR (standard)
V = Viton

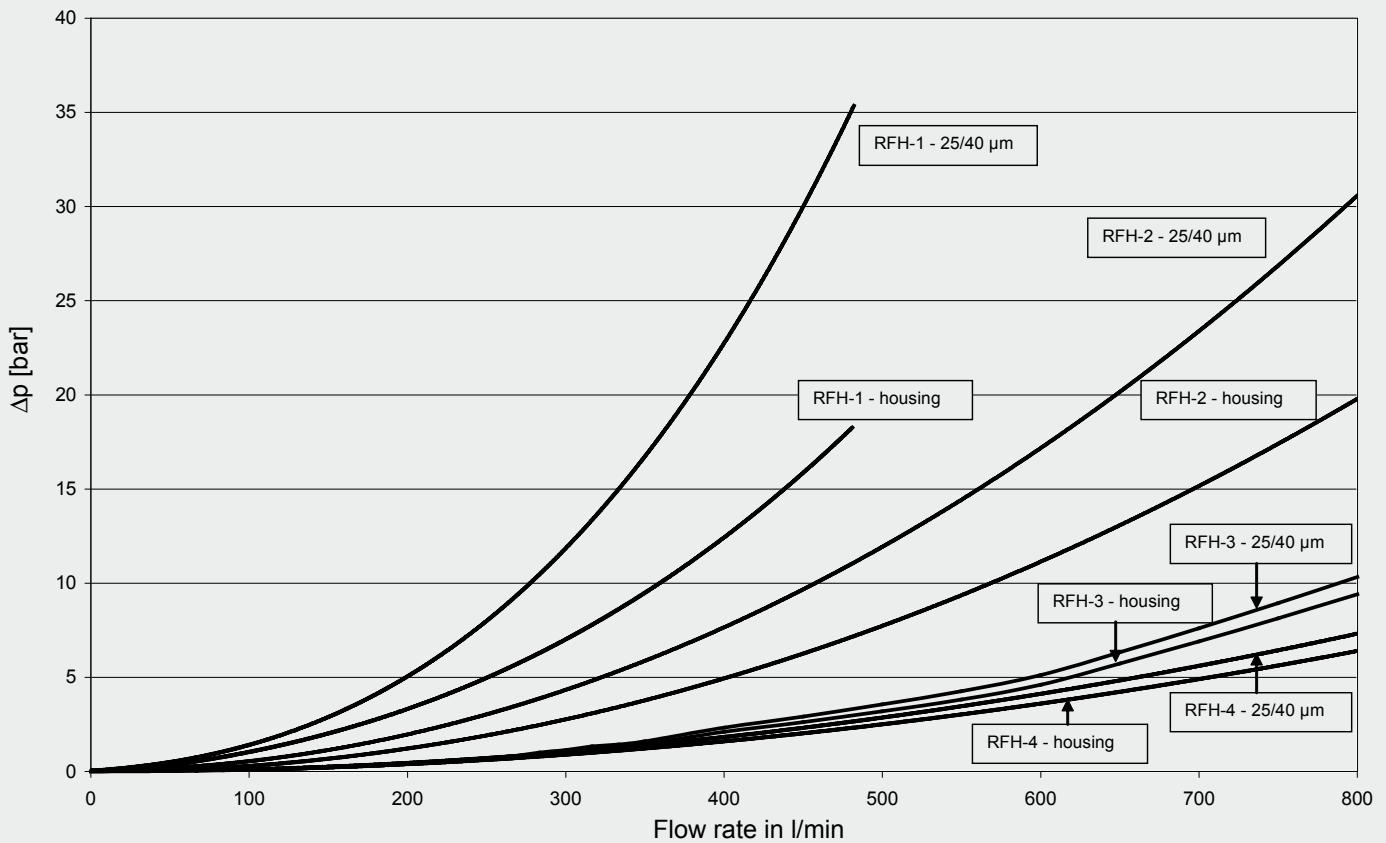
Drawing number _____
For special models

* only RFH4

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.



- For slotted tube filter inserts of 100 μm and 200 μm, the pressure drop curves apply, similar to the 25 μm and 40 μm wire meshes.
- When using 50 μm slotted tube filter inserts, 30% more pressure drop must be added to the valid curves.
- Please take into account the lower permissible differential pressure of the elements when using slotted tube elements (see 2.1.9 Permissible differential pressure across the element).

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
- Integration of the RFH into the whole system

Filter sizes 1 and 2 are designed as a back-up filter for low levels of solid particle contamination. Due to the greater filter area, the RFH-3 and RFH-4 is also suitable for higher particle concentrations. As with all backflushing filters, fibres and sticky substances cause problems when backflushing with this filter, too.

Use the flow rate curves for water and emulsion applications to calculate the filter. The initial pressure drop for clean elements can be selected between 0.1 bar and 5 bar depending on the operating pressure and level of contamination.

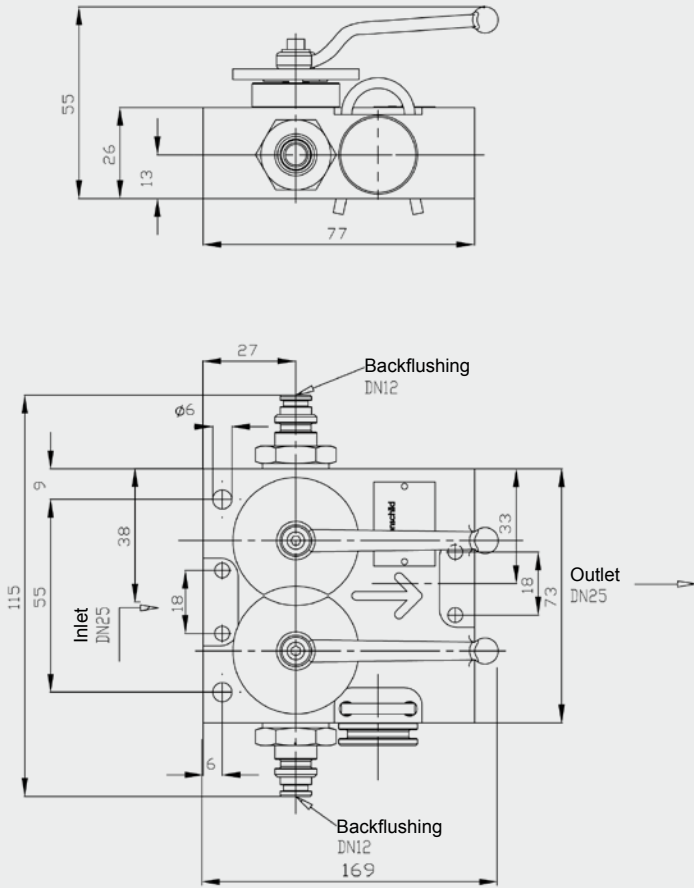
The shield hydraulics in coal mining represent a special case.

For this application, initial differential pressures of up to 25 bar are usual. The maximum flow rates for this application are:

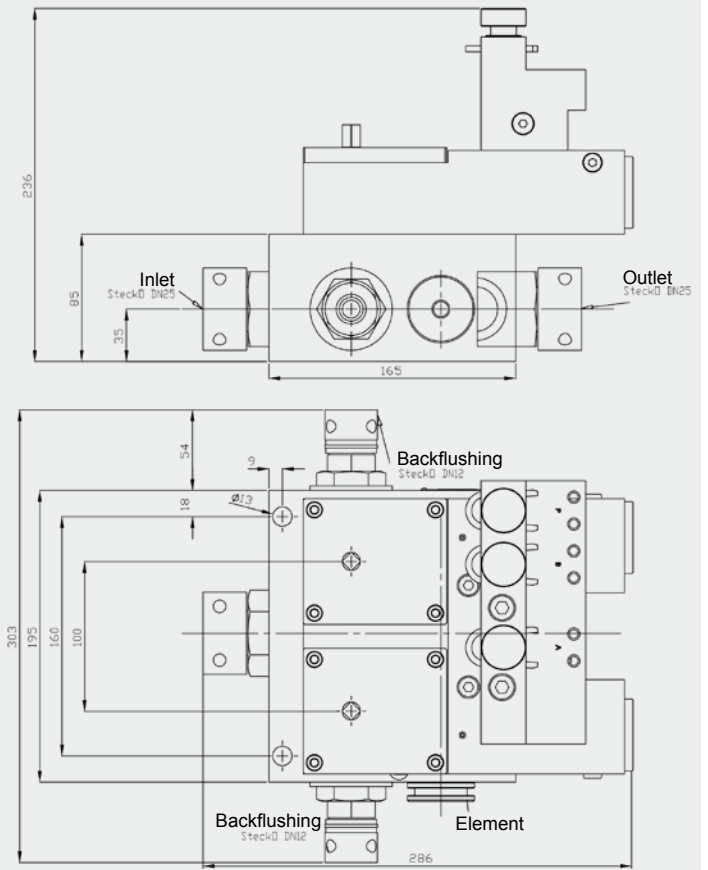
- RFH-1 max = 400 l/min
initial Δp approx. 23 bar
- RFH-2 max = 600 l/min
initial Δp approx. 17 bar
- RFH-3 max = 600 l/min
initial Δp approx. 8 bar
- RFH-4 max = 800 l/min
initial Δp approx. 8 bar

5. DIMENSIONS

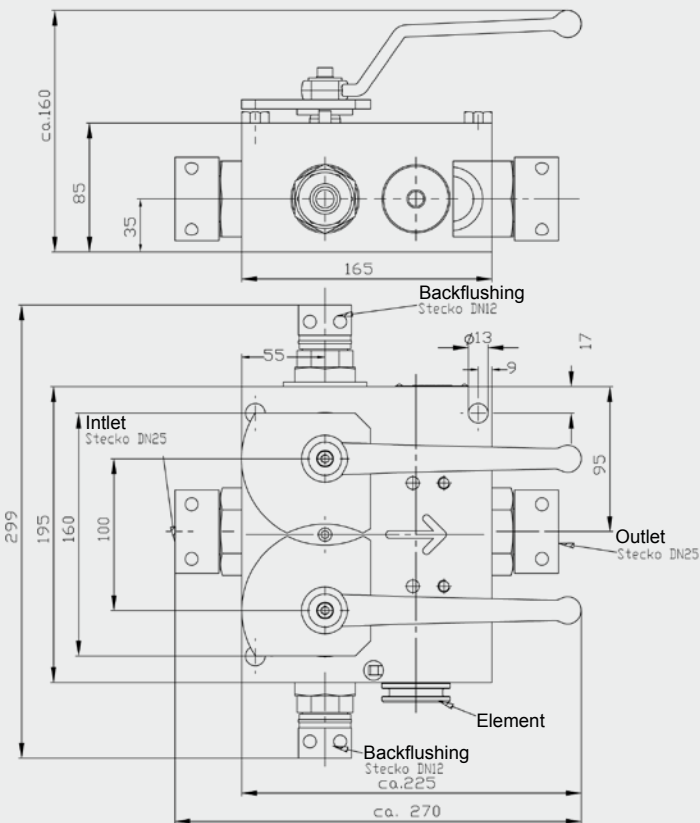
5.1 DIMENSIONS RFH-1 MANUAL



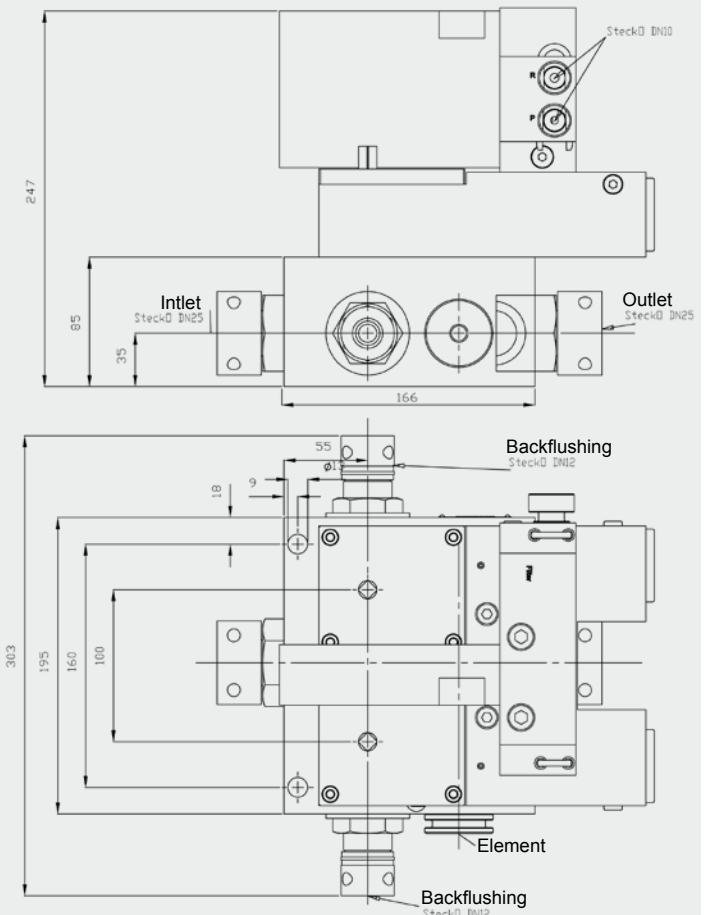
5.3 DIMENSIONS RFH-2 HYDRAULIC



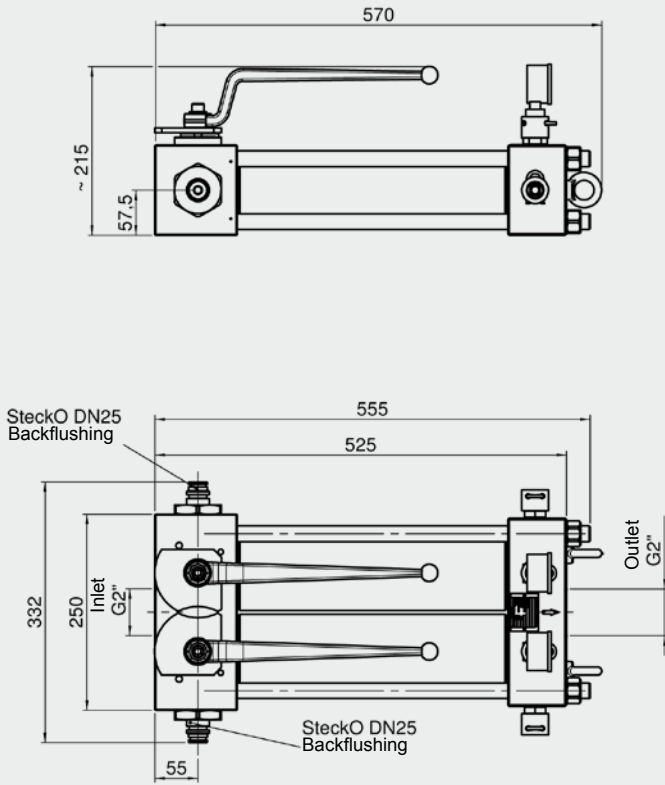
5.2 DIMENSIONS RFH-2 MANUAL



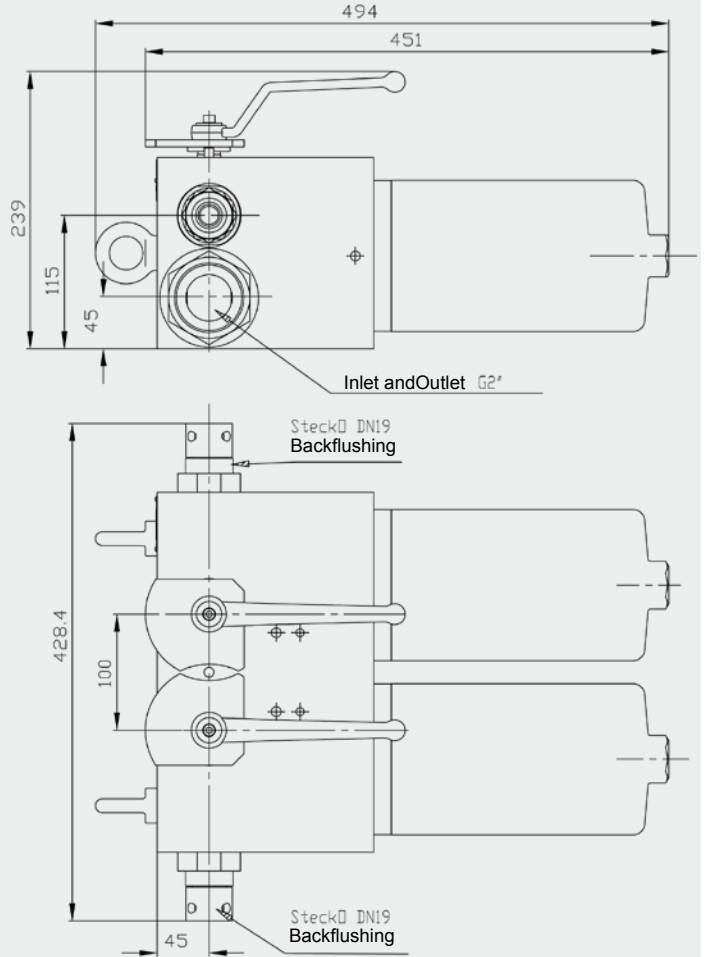
5.4 DIMENSIONS RFH-2 ELECTROHYDRAULIC



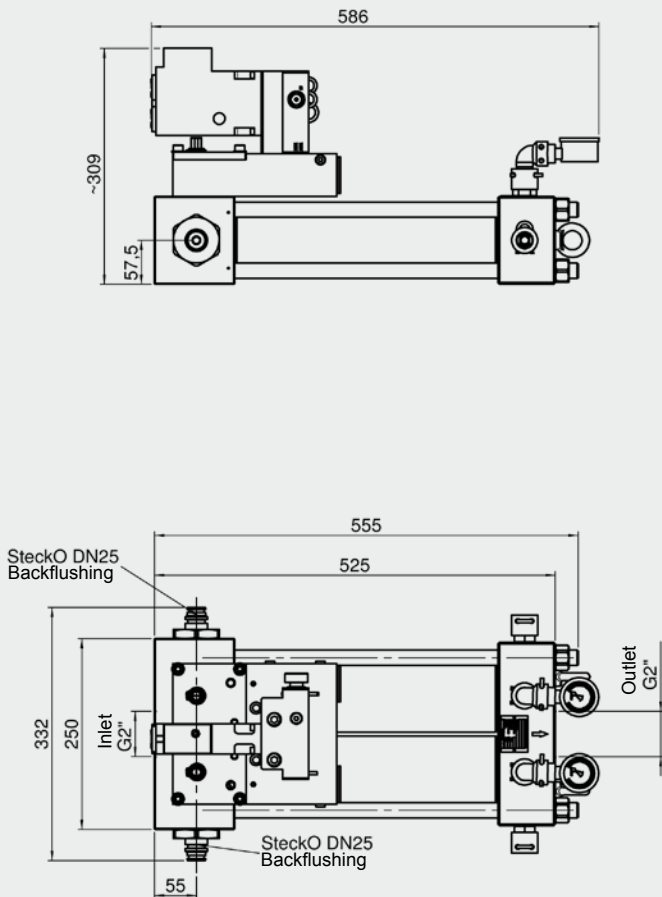
5.5 DIMENSIONS RFH-3 MANUAL



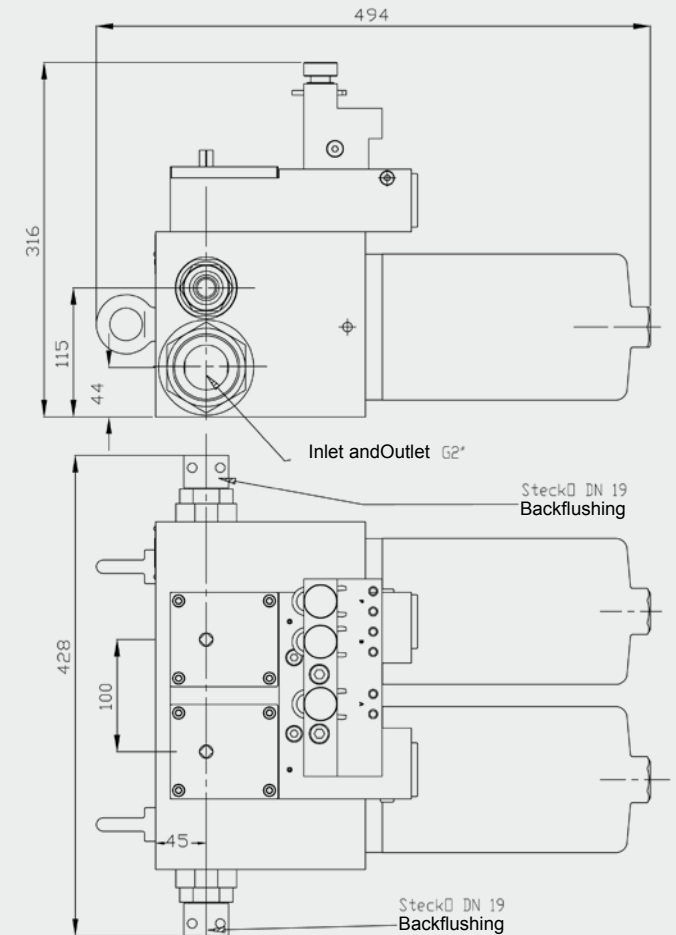
5.7 DIMENSIONS RFH-4 MANUAL



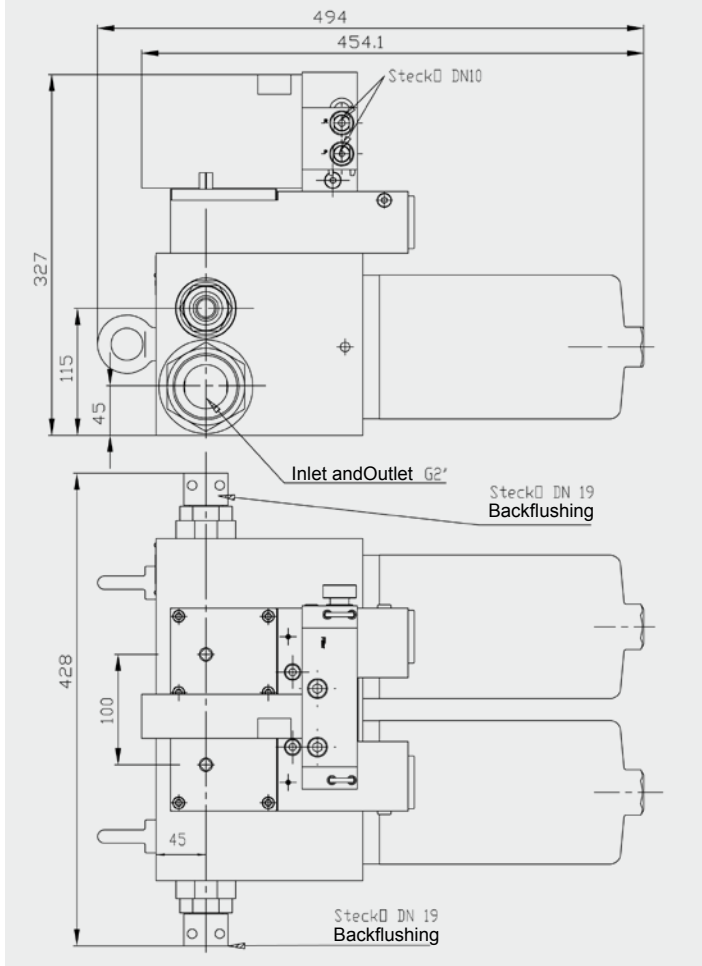
5.6 DIMENSIONS RFH-3 ELECTROHYDRAULIC



5.8 DIMENSIONS RFH-4 HYDRAULIC



5.9 DIMENSIONS RFH-4 ELECTROHYDRAULIC



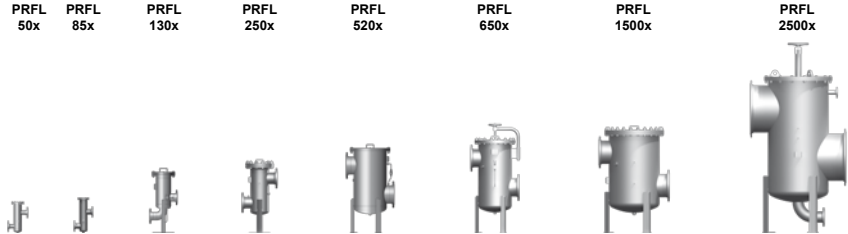
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Process Inline Filter PRFL



1. TECHNICAL SPECIFICATIONS

1.1 GENERAL

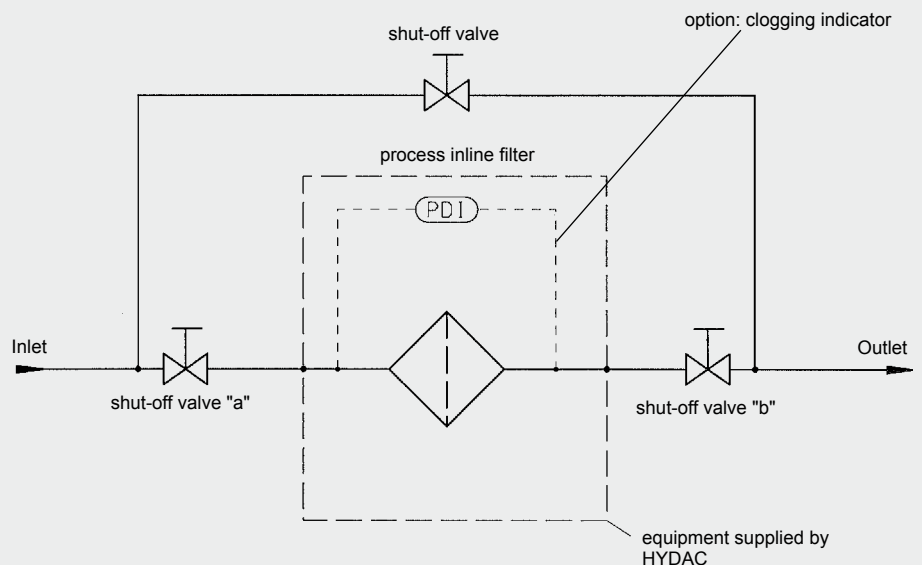
In-line filters, type PRFL are designed for process engineering and chemical plants. They are suitable for filtering solid contamination from water based fluids. The choice of eight standard sizes means that a suitable filter can be found for the particular application. According to the required cleanliness level, various filter materials with different filtration ratings can be used. By using clogging indicators which monitor the differential pressure, the condition of the filter can be determined at any time. Some filter materials can be cleaned and reused, therefore reducing operating costs. Filter housings are available in carbon steel with an internal epoxy coating and in stainless steel.

1.2 SUMMARY OF AVAILABLE SIZES AND CONNECTIONS

Connection size	Series							
	50x	85x	130x	250x	520x	650x	1500x	2500x
DN 50	●		●					
DN 80		●	●					
DN 100			●	●				
DN 150				●	●			
DN 200				●	●	●		
DN 250					●	●	●	
DN 300						●	●	
DN 400							●	
DN 500							●	●
DN 600								●
DN 700								●

The selection of the connection size depends on the level of contamination of the fluid and the associated filter area.

1.3 CIRCUIT DIAGRAM



2. FILTER SPECIFICATIONS

2.1 SUMMARY OF TECHNICAL SPECIFICATIONS OF THE FILTER HOUSING (STANDARD CONFIGURATION)

Series	Type	Connection size			Materials						Pressure range*				Temp. [°C]	Weight [kg]	Volume [l]
		SAE	Pipe thread G	DIN DN	Stainless steel	Carbon steel					PN 16	PN 25	PN40	PN64			
						Cast stainless steel	Welded without int. corrosion protection	Welded with int. corrosion protection	Cast without int. corrosion protection	Cast with internal corrosion protection							
50x	503	2"	2"	50	●	●						●				19	3.9
	504									●							
	505										●						
85x	853	-	-	80	●	●						●	●		38	9.5	
	854									●							
	855										●						
130x	1303	-	-	50 / 80 / 100 / 150	●							●			55	20	
	1304									●							
	1305										●						
250x	2503	-	-	100 / 150 / 200	●							●			85	46	
	2504									●							
	2505										●						
520x	5203	-	-	150 / 200 / 250	●							●			300	118	
	5204									●							
	5205										●						
650x	6503	-	-	200 / 250 / 300	●							●			360	213	
	6504									●							
	6505										●						
1500x	15003	-	-	250 / 300 / 400 / 500	●							●			460	433	
	15004									●							
	15005										●						
2500x	25003	-	-	500 / 600 / 700	●							●			990	1330	
	25004									●							
	25005										●						

* Other pressure ranges for welded versions on request.

2.2 FURTHER SPECIFICATIONS OF THE FILTER HOUSING (STANDARD CONFIGURATION)

2.2.1 Seal materials

FPM (Viton), asbestos free gasket

2.2.2 Corrosion protection, external

2 layer primer (not required for stainless steel filters)

2.2.3 Corrosion protection, internal

2K-epoxy primer (not required for stainless steel filters)

2.2.4 Documentation

Operating and maintenance instructions

2.3 SUMMARY OF TECHNICAL SPECIFICATIONS OF FILTER ELEMENTS

Series	No. of filter elements	Filter element type	Overall filter area [cm ²]		Filter materials and filtration ratings [µm]				Permiss. diff. pressure across element [bar]
			Slotted tube	Pleated materials	Betamicon® (glass fibre)	Chemicon® (metal fibre)	Wire mesh	Slotted tube	
50x	1	L-503-...	667	5665	3, 5, 10, 20	not available	25, 40, 60, 100, 150, 200, 250, 500	50, 100, 150, 200, 250, 300, 400, 500, 1000, 2000, 3000	10 bar except for slotted tube Size 853 Size 1303 Size 2603 6 bar
85x	1	L-853-...	1300	11171					
130x	1	L-1303-...	1890	16825					
250x	3	L-853-...	3900	33513					
520x	4	L-1303-...	7560	67300					
650x	5	L-1303-...	9450	84125					
1500x	10	L-1303-...	18900	168250					
2500x	17	L-2603-...	64426	572050					

2.4 OPTIONAL VERSIONS

There is a range of optional versions available for the process inline filter PRFL. For technical details and prices, please contact our Technical Sales Department at Head Office.

2.4.1 Housing manufacture

- AD Rules / PED 97/23/EC
- ASME Code Design (with or without U-Stamp)

2.4.2 Flange connections

- ANSI
- JIS

2.4.3 Housing materials

- Various qualities of stainless steel*
 - Various qualities of carbon steel*
- *(not for cast versions)

2.4.4 Materials of internal parts and elements

- Various qualities of stainless steel
- Various qualities of carbon steel*
- Various qualities of Duplex/ Superduplex

2.4.5 Cover lifting devices

- Stainless steel version
- Carbon steel version

2.4.6 Seal materials

- Various seal materials on request, depending on the resistance to the fluid.

2.4.7 Corrosion protection and external finishes

- RAL colours acc. customer requirements (for carbon steel qualities)
- Various multi layer coatings

2.4.8 Differential pressure monitoring

- Visual
- Electrical
- Visual electrical
- Differential pressure gauge with 2 microswitches

2.4.9 Documentation

- Manufacturer's test certificates
- Material certificates (3.1 according to DIN EN 10204)
- 3rd parties (TÜV, ABS, Lloyds, etc.)
- Welding procedure specifications (WPS) / Procedure Qualification Record (PQR)
- Inspection plan
- and many other documents available on request

Further optional models on request.

3. MODEL CODE

PRFL - BN - 1303 - AF3 - 10 - 0 - 1 - X

3.1 INLINE FILTER PRFL / PRFLD

Type

PRFL = Inline filter

PRFLD = Inline filter duplex (change-over)

Material of filter element

BN = Betamicron®

D = wire mesh (cleanable)

S = slotted tube (cleanable) end cap: polyamide, bonded

SW = slotted tube (cleanable) end cap: stainless steel, welded

M = Chemicon® (only size 50x)

Size

50x = DN 50

85x = DN 80

130x = DN 50 / 80 / 100 / 150

250x = DN 100 / 150 / 200

520x = DN 150 / 200 / 250

650x = DN 200 / 250 / 300

1500x = DN 250 / 300 / 400 / 500

2500x = DN 500 / 600 / 700 (only for single filter PRFL)

End code x

x = 3 stainless steel housing

x = 4 housing carbon steel + epoxy internal coating

x = 5 housing carbon steel without coating

Type of connection (see table)

F = flange to followed by nominal width e.g. F100

AF = flange to ANSI followed by nominal width in inches

G = threaded connection followed by nominal width in inches (only for size PRFLD 504/505)

S = SAE connection followed by nominal width in inches (only for size 3")

SC = SAE connection with mating flange and welding end

Filtration rating in µm

3, 5, 10, 20 (absolute) (Betamicron®)

1, 3, 5, 10, 20 (absolute) (Chemicon®)

25, 40, 60, 100, 150, 200, 250, 500 (wire mesh)

50, 100, 200, 300, 500, 1000, 2000, 3000 (slotted tube)

Equipment

0 = without additional equipment

1 = cover plate lifting device

2 = vent and drain ball valve

Type of clogging indicator

0 = without clogging indicator

1 = visual indicator PVD 2 B.1

2 = visual-electrical indicator PVD 2 D.0

3 = visual-electrical-analogue indicator V01

4 = visual-analogue indicator in aluminium with 2 adjustable contacts (0...4 bar)

5 = visual-analogue indicator in stainless steel with 2 adjustable contacts (0...4 bar)

6 = electrical differential pressure switch PVD 2 C.0

(only conditionally possible with cast iron, contact Head Office!)

Modification number

Supplementary details

Drawing number for special equipment

3.2 INLINE FILTER ELEMENT

L - 1303 - D - 100 - V

Element construction

Inline filter element

Size

113, 503, 853, 1303, 2603

Material of filter element

D = wire mesh

S = slotted tube, end cap: polyamide, bonded

SW = slotted tube, end cap: stainless steel, welded

BN3HC = Betamicron® glass fibre

M = Chemicon® metal fibre (only size L-503)

Filtration rating in µm

Betamicron® 3, 5, 10, 20 (absolute)

Chemicon® 1, 3, 5, 10, 20 (absolute)

wire mesh 25, 40, 60, 100, 150, 200, 250, 500

slotted tube 50, 100, 200, 300, 500, 1000, 2000, 3000

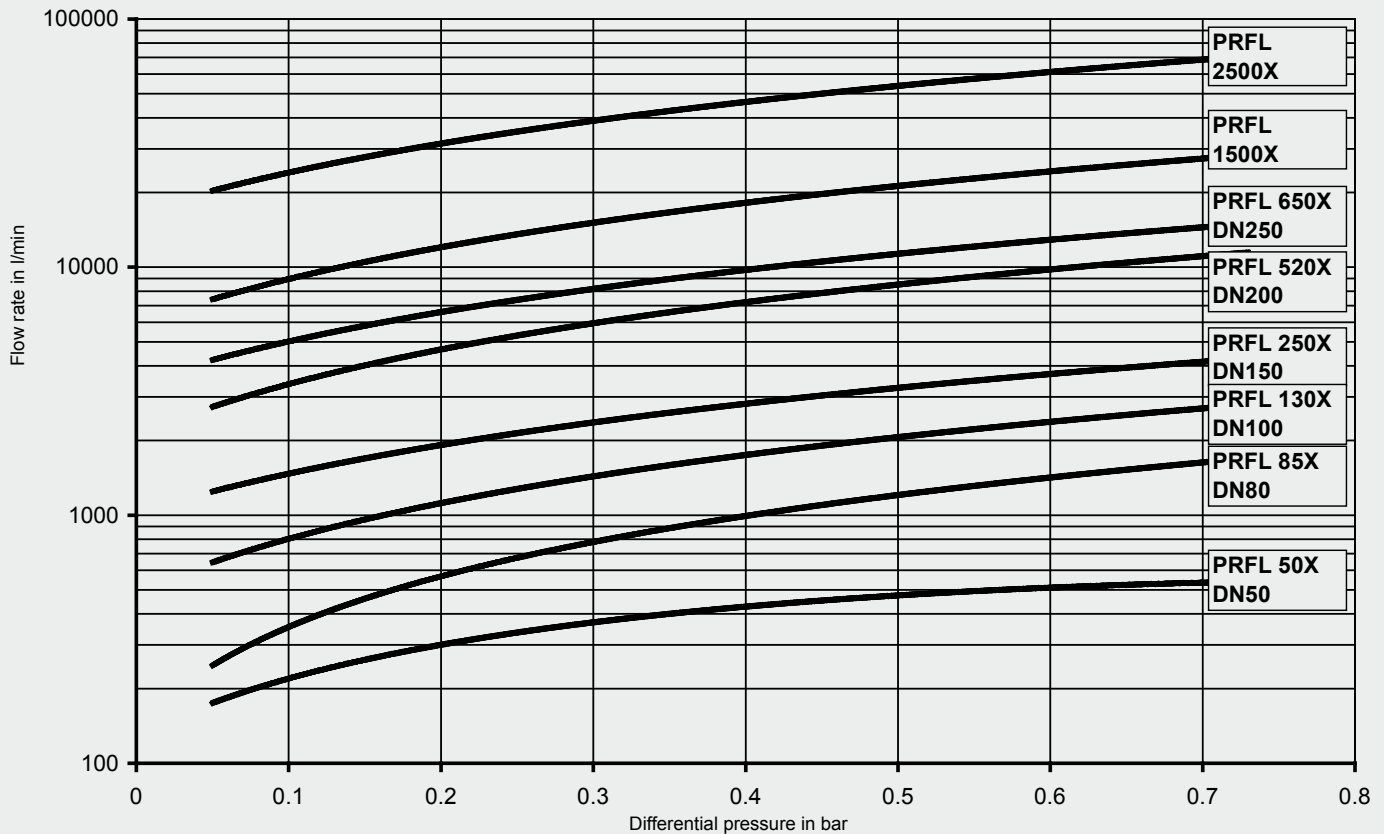
Seal material

V = Viton

4. FILTER CALCULATION / SIZING

4.1 PRESSURE DROP CURVES HOUSING

The curves apply to water at 20 °C or fluids to 15 mm²/s!



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

Use the pressure drop curves to calculate the Process Inline Filter PRFL. Generally speaking, an initial - Δp (clean filter condition) of > 0.2 bar should not be exceeded.

The pressure drop curves are valid for filtration ratings of 100 – 3000 μm slotted tube. The stated housing pressure drop increases by approx. 30 % for filtration ratings of 50 μm .

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

4.2 FILTRATION PERFORMANCE

- Retention rates for wire mesh and slotted tube:

Nominal retention rates

The filtration rating given in the model code is based on a HYDAC factory standard filter test.

This test is carried out by introducing a large amount of dust (ISO MTD) at the beginning of the filter test and subsequently separating the contamination particles over 1 hour. The test filter must retain 90 - 95 % of all particles larger than the given filtration rating.

- Retention rates for Betamicron® (glass fibre), Chemicron® (metal fibre):

Absolute retention rate

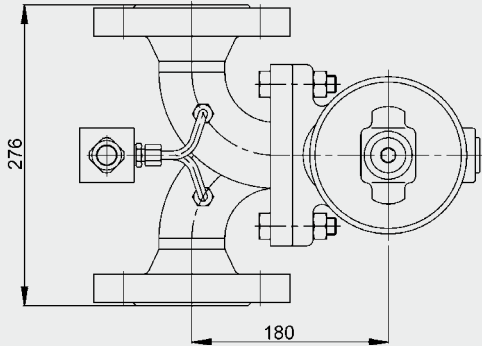
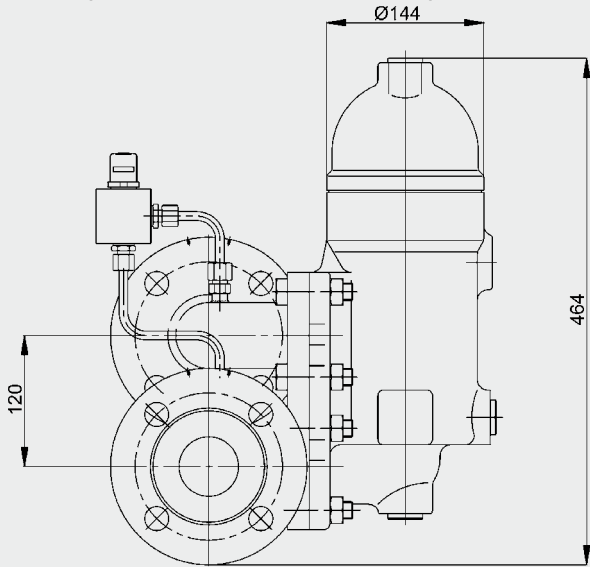
The filtration rates given in the brochure are determined by the multi-pass test carried out on the HYDAC test rig, based on ISO 4572 (multi-pass test for the determination and proof of the filtration performance, extended to finest filtration).

In this test at least 99 % of all particles larger than the given rating must be retained, and this up to the max. permissible differential pressure across the filter element. A filtration rate of 99 % corresponds to a β_x -value of 100, which denotes absolute filtration.

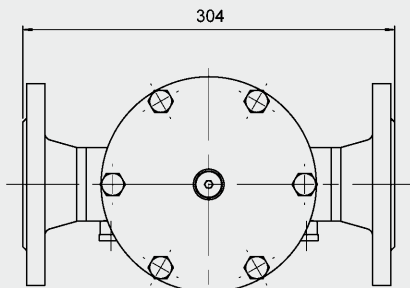
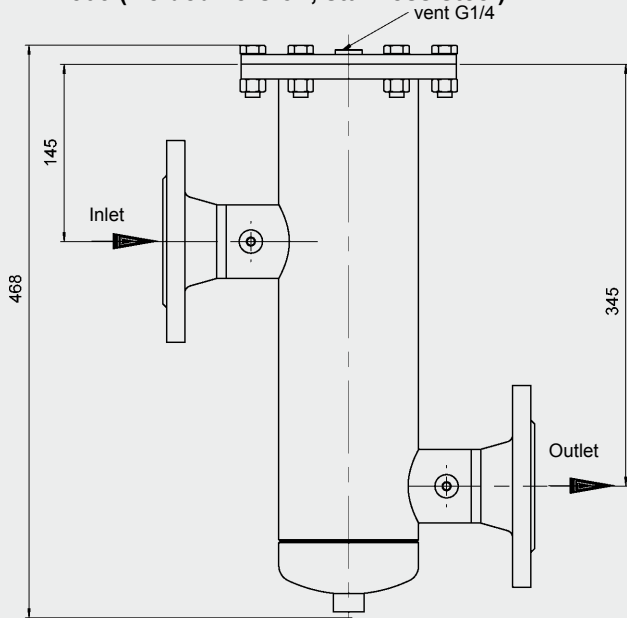
5. DIMENSIONS

5.1 FILTER HOUSING

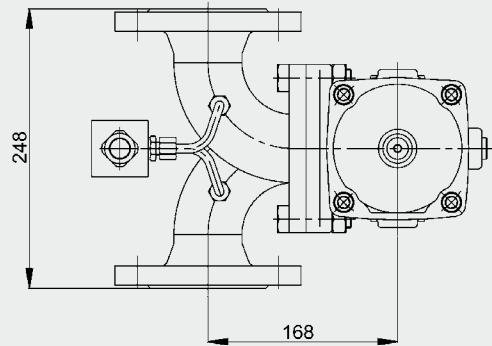
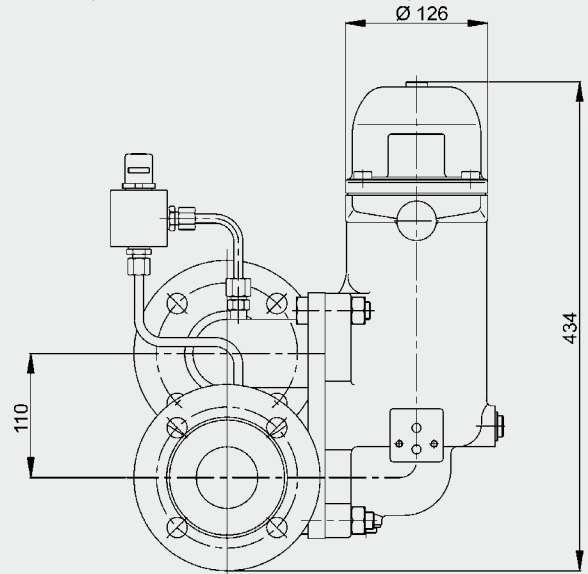
PRFL 503 (cast version, stainless steel)



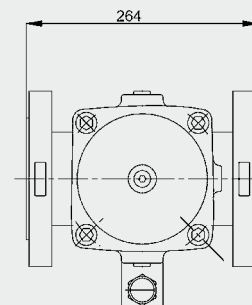
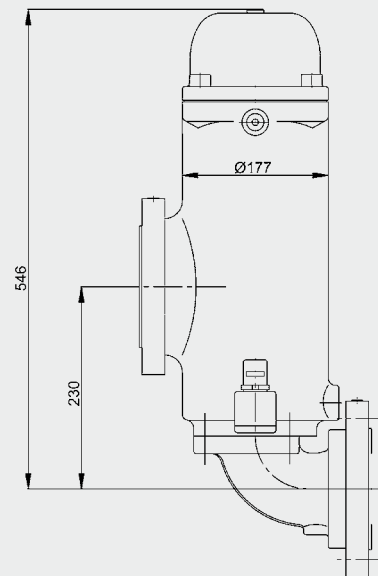
PRFL 503 (welded version, stainless steel)



PRFL 504 (cast version, carbon steel)

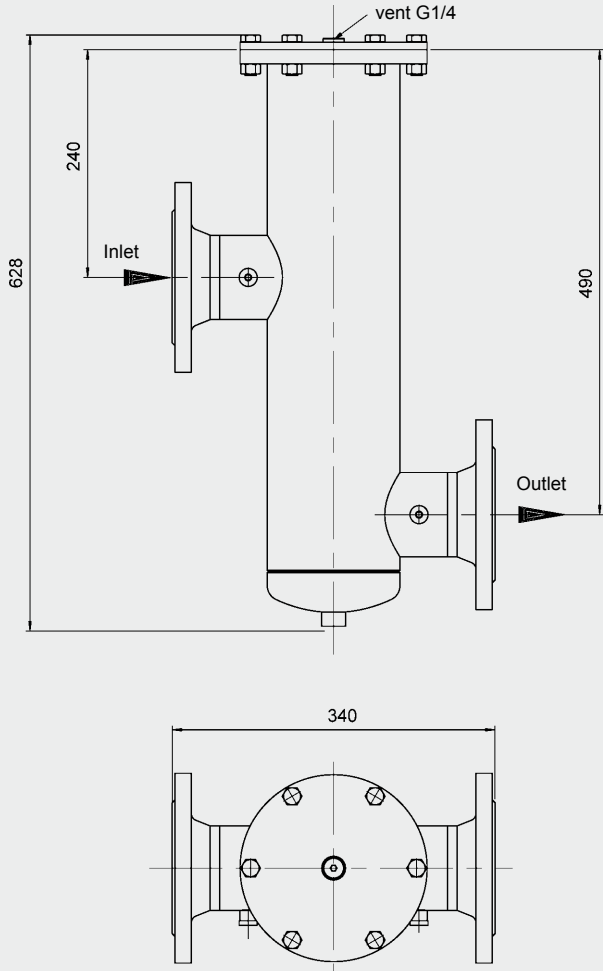


PRFL 85x (cast version)

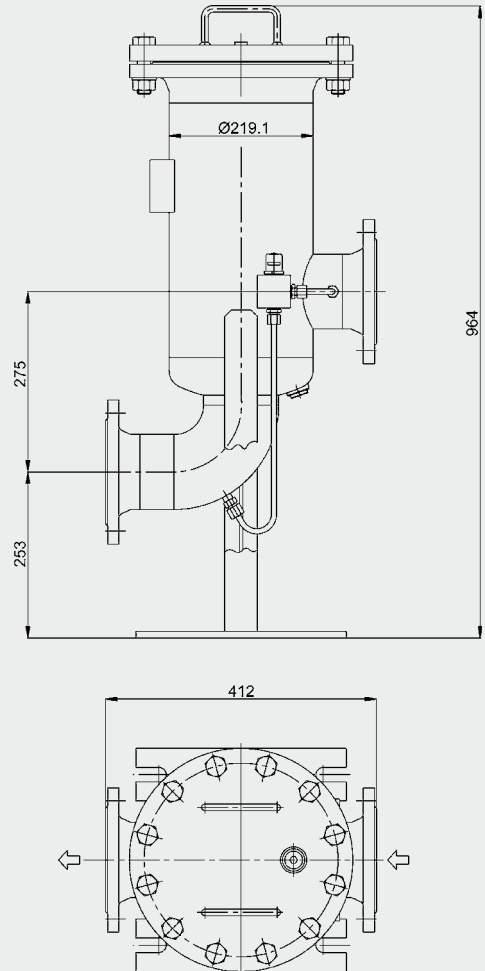


- The filter must not be used as a pipe support.
- The dimensions quoted have ± 5 mm tolerances.

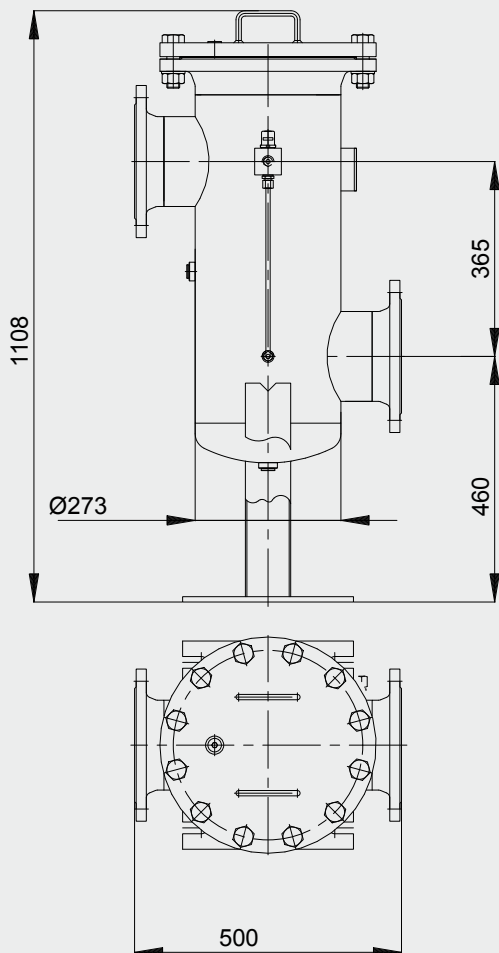
PRFL 853 (welded version, stainless steel)



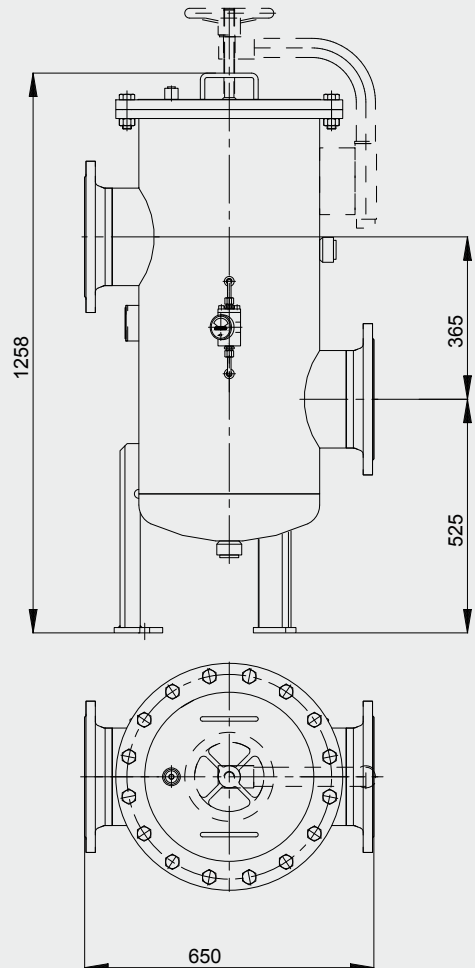
PRFL 130x



PRFL 250x

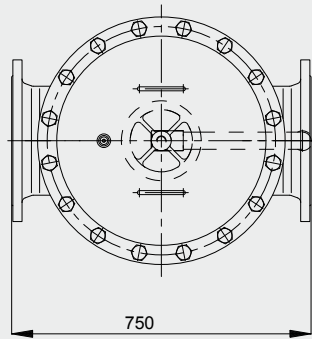
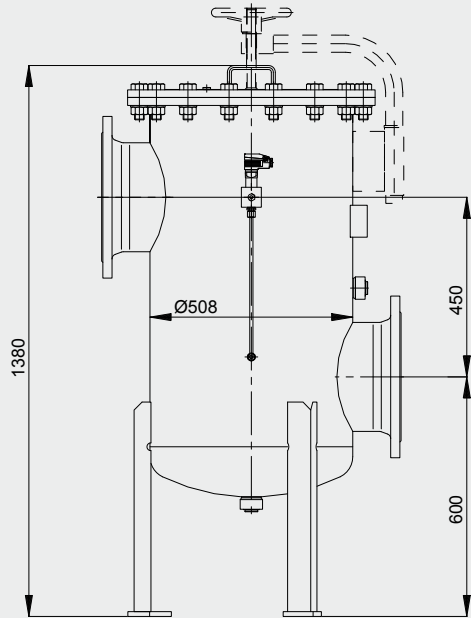


PRFL 520x

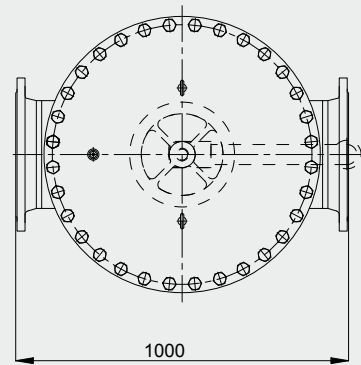
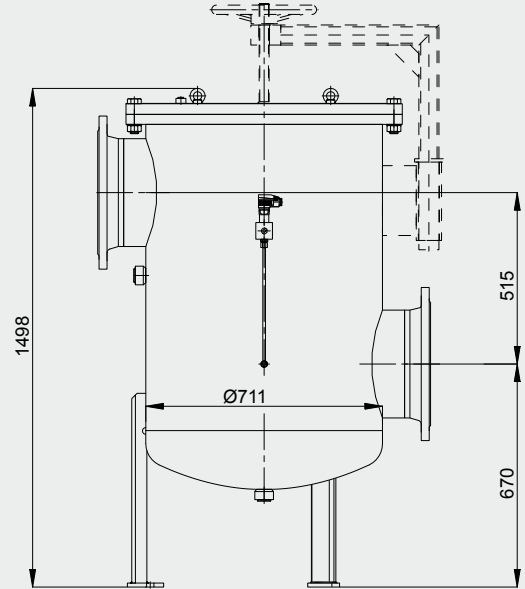


- The filter must not be used as a pipe support.
- The dimensions quoted have ± 5 mm tolerances.

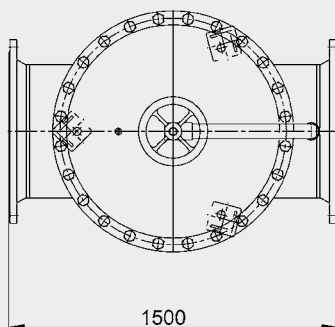
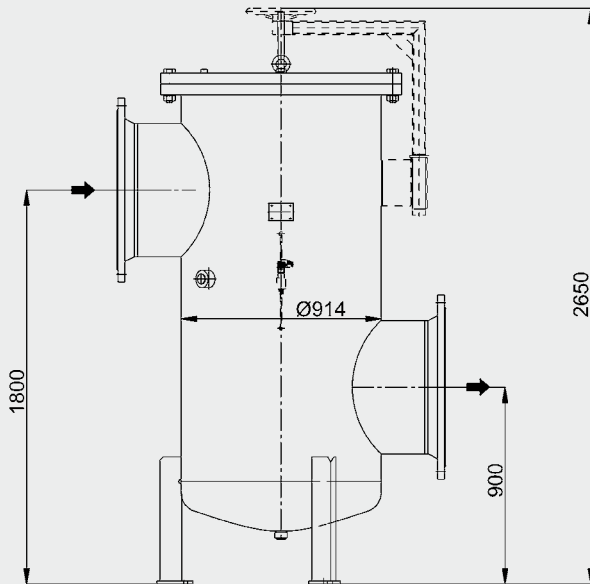
PRFL 650x



PRFL 1500x

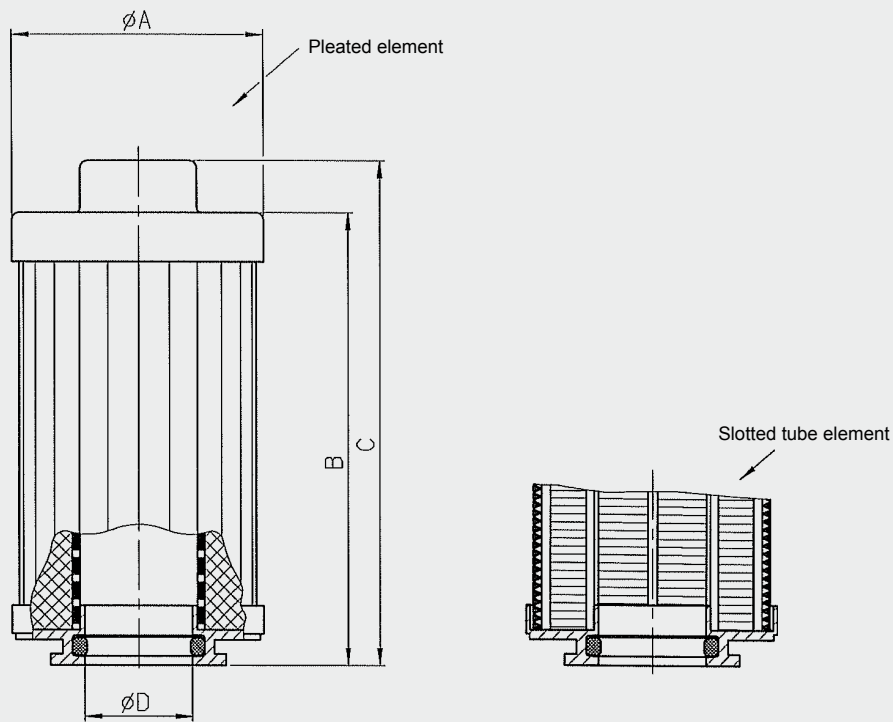


PRFL 2500x



- The filter must not be used as a pipe support.
- The dimensions quoted have ± 5 mm tolerances.

5.2 DIMENSIONS OF ELEMENTS



Size	A	B	C	D
L-503	95	263	276	48.1
L-853	114	394	414	68.1
L-1303	143	458	483	96.1
L-2603	143	897	822	96.1

All dimensions in mm

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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 E-Mail: prozess-technik@hydac.com



Process Inline Filter Change-over PRFLD

PRFLD-PRFLD-
503 85x

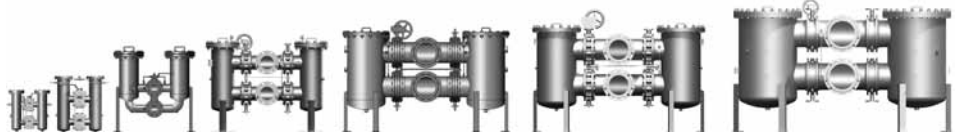
PRFLD-
130x

PRFLD-
250x

PRFLD-
520x

PRFLD-
650x

PRFLD-
1500x



1. TECHNICAL SPECIFICATIONS

1.1 GENERAL

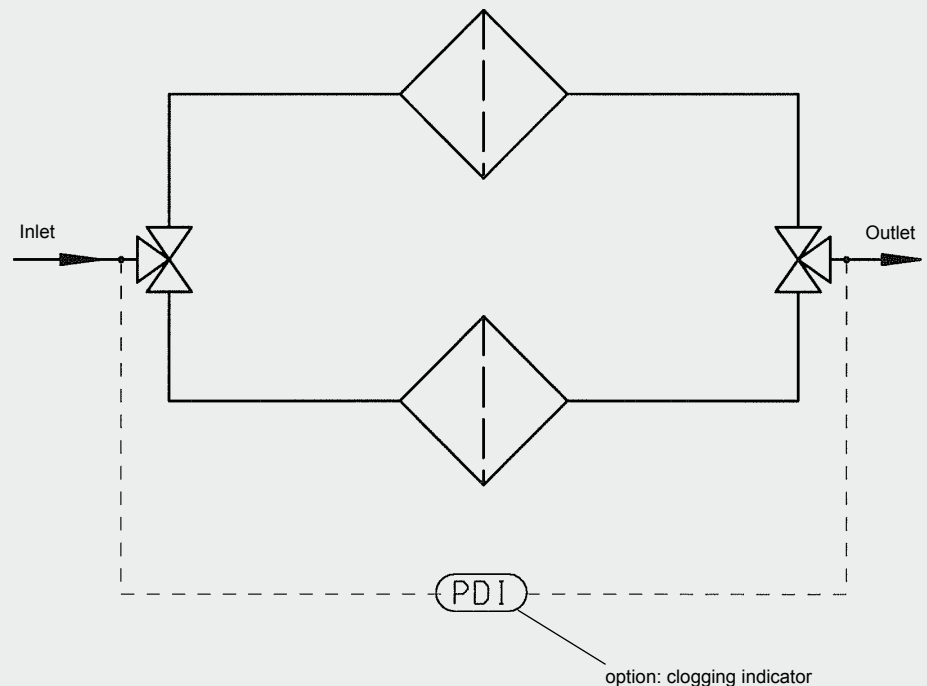
Duplex inline filters, type PRFLD are designed for process engineering and chemical plants. They are suitable for filtering solid contamination from water based fluids. The choice of seven standard sizes means that a suitable filter can be found for the particular application. According to the required cleanliness level, various filter materials with different filtration ratings can be used. By using clogging indicators which monitor the differential pressure, the condition of the filter can be determined at any time. The filter materials can be cleaned and reused, and this therefore reduces operating costs. Filter housings are available in carbon steel with an internal epoxy coating and in stainless steel.

1.2 SUMMARY OF AVAILABLE SIZES AND CONNECTIONS

Connection size	Series						
	50x	85x	130x	250x	520x	650x	1500x
DN 50	●		●				
DN 80		●	●				
DN 100			●	●			
DN 150				●	●		
DN 200				●	●	●	
DN 250					●	●	●
DN 300						●	●
DN 400							●

The selection of the connection size depends on the level of contamination of the fluid and the associated filter area.

1.3 CIRCUIT DIAGRAM



2. FILTER SPECIFICATIONS

2.1 SUMMARY OF TECHNICAL SPECIFICATIONS OF THE FILTER HOUSING (STANDARD CONFIGURATION)

Series	Type	Connection size			Materials						Pressure range*				Temp. [°C]	Weight [kg]	Volume [l]
		SAE	Pipe thread G	DIN DN	Stainless steel	Carbon steel					PN 16	PN 25	PN40	PN64			
						Cast stainless steel	Welded without int. corrosion protection	Welded with int. corrosion protection	Cast without int. corrosion protection	Cast with internal corrosion protection							
50x	503	2"	2"	50	●	●						●			-10 to 90	38	2 x 4
	504									●							
	505										●						
85x	853	3"	3"	80	●	●						●	●	-10 to 90	90	2 x 9.5	
	854									●							
	855										●						
130x	1303			50 / 80 / 100 / 150	●							●		-10 to 90	180	2 x 20	
	1304								●								
	1305				●					●							
250x	2503			100 / 150 / 200	●							●		-10 to 90	300	2 x 46	
	2504								●								
	2505				●					●							
520x	5203	-	-	150 / 200 / 250	●							●		-10 to 90	660	2 x 118	
	5204								●								
	5205				●					●							
650x	6503			200 / 250 / 300	●							●		-10 to 90	800	2 x 213	
	6504								●								
	6505				●					●							
1500x	15003			250 / 300 / 400	●							●		-10 to 90	920	2 x 433	
	15004								●								
	15005				●					●							

* Other pressure ranges for welded versions on request.

2.2. FURTHER SPECIFICATIONS OF THE STANDARD FILTER HOUSING

2.2.1 Seal materials

FPM (Viton), EPDM, PTFE, asbestos free gasket

2.2.2 Corrosion protection, external

2 layer primer (not required for stainless steel filters)

2.2.3 Corrosion protection, internal

2K-epoxy primer (not required for stainless steel filters)

2.2.4 Documentation

Operating and maintenance instructions

2.3 SUMMARY OF TECHNICAL SPECIFICATIONS OF FILTER ELEMENTS

Series	Number of filter elements per side part	Filter element type	Filtration area [cm ²] per side part		Filter materials and filtration ratings [µm]				Permiss. diff. pressure across element [bar]
			Slotted tube	Pleated materials	Betamicon® (glass fibre)	Chemicon® (metal fibre)	Wire mesh	Slotted tube	
50x	1	L-503-...	667	5665	3, 5, 10, 20	not available	25, 40, 60, 100, 150, 200, 250, 300, 400, 500, 1000, 2000, 3000	3, 5, 10, 20	10 bar except for Slotted tube Size 853 1303 2603 6 bar
85x	1	L-853-...	1300	11171					
130x	1	L-1303-...	1890	16825					
250x	3	L-853-...	3900	33513					
520x	4	L-1303-...	7560	67300					
650x	5	L-1303-...	9450	84125					
1500x	10	L-1303-...	18900	168250					

2.4. OPTIONAL VERSIONS

There is a range of optional versions available for the process inline filter PRFLD. For technical details and prices, please contact our Technical Sales Department at Head Office.

2.4.1 Housing manufacture

- AD Rules / PED 97/23/EC
- ASME Code Design (with or without U-Stamp)

2.4.2 Flange connections

- ANSI
- JIS

2.4.3 Housing materials

- Various qualities of stainless steel*
 - Various qualities of carbon steel*
- *not for cast versions

2.4.4 Materials of internal parts and elements

- Various qualities of stainless steel
- Various qualities of carbon steel*
- Various qualities of Duplex/ Superduplex

2.4.5 Cover lifting devices

- Stainless steel version
- Carbon steel version

2.4.6 Seal materials

- Various seal materials on request, depending on the resistance to the fluid.

2.4.7 Corrosion protection and external finishes

- RAL colours acc. customer requirements (for carbon steel qualities)
- Various multi layer coatings

2.4.8 Differential pressure monitoring

- Visual
- Electrical
- Visual electrical
- Differential pressure gauge with 2 microswitches

2.4.9 Documentation

- Manufacturer's test certificates
- Material certificates (3.1 according to DIN EN 10204))
- 3rd parties (TÜV, ABS, Lloyds, etc.)
- Welding procedure specifications (WPS) / Procedure Qualification Record (PQR)
- Inspection plan
- and many other documents available on request

Further optional models on request.

3. MODEL CODE

PRFL - BN - 1303 - AF3 - 10 - 0 - 1 - X

3.1 INLINE FILTER PRFL / PRFLD

Type

PRFL = Inline filter

PRFLD = Inline filter duplex (change-over)

Material of filter element

BN = Betamicron®

D = wire mesh (cleanable)

S = slotted tube (cleanable) end cap: polyamide, bonded

SW = slotted tube (cleanable) end cap: stainless steel, welded

M = Chemicron® (only size 50x)

Size

50x = DN 50 (with PRFLD-*-504 only SAE 2" flanges possible!)

85x = DN 80

130x = DN 50 / 80 / 100 / 150

250x = DN 100 / 150 / 200

520x = DN 150 / 200 / 250

650x = DN 200 / 250 / 300

1500x = DN 250 / 300 / 400 / 500

2500x = DN 500 / 600 / 700 (only with single filter PRFL)

End code x

x = 3 stainless steel housing

x = 4 housing carbon steel + epoxy internal coating

x = 5 housing carbon steel without coating

Type of connection (see table)

F = flange to followed by nominal width e.g. F100

AF = flange to ANSI followed by nominal width in inches

G = threaded connection followed by nominal width in inches (only for size PRFLD 504/505)

S = SAE connection followed by nominal width in inches (only for size 3")

SC = SAE connection with mating flange and welding end

Filtration rating in µm

3, 5, 10, 20 (absolute) (Betamicron®)

1, 3, 5, 10, 20 (absolute) (Chemicron®)

25, 40, 60, 100, 150, 200, 250, 500 (wire mesh)

50, 100, 200, 300, 500, 1000, 2000, 3000 (slotted tube)

Equipment

0 = without additional equipment

1 = cover plate lifting device

2 = vent and drain ball valve

Type of clogging indicator

0 = without clogging indicator

1 = visual indicator PVD 2 B.1

2 = visual-electrical indicator PVD 2 D.0

3 = visual-electrical-analogue indicator V01

4 = visual-analogue indicator in aluminium with 2 adjustable contacts (0...4 bar) (only conditionally possible with cast material)

5 = visual-analogue indicator in stainless steel with 2 adjustable contacts (0...4 bar) Please contact the Head Office

6 = electrical differential pressure switch PVD 2 C.0

Modification number

Supplementary details

Drawing number for special equipment

3.2 INLINE FILTER ELEMENT

L - 1303 - D - 100 - V

Element construction

Inline filter element

Size

113, 503, 853, 1303, 2603

Material of filter element

BN3HC = Betamicron® glass fibre

M = Chemicron® metal fibre (only size L-503)

D = wire mesh

S = slotted tube, end cap: polyamide, bonded

SW = slotted tube, end cap: stainless steel, welded

Filtration rating in µm

Betamicron® 3, 5, 10, 20 (absolute)

Chemicron® 1, 3, 5, 10, 20 (absolute)

wire mesh 25, 40, 60, 100, 150, 200, 250, 500

slotted tube 50, 100, 200, 300, 500, 1000, 2000, 3000

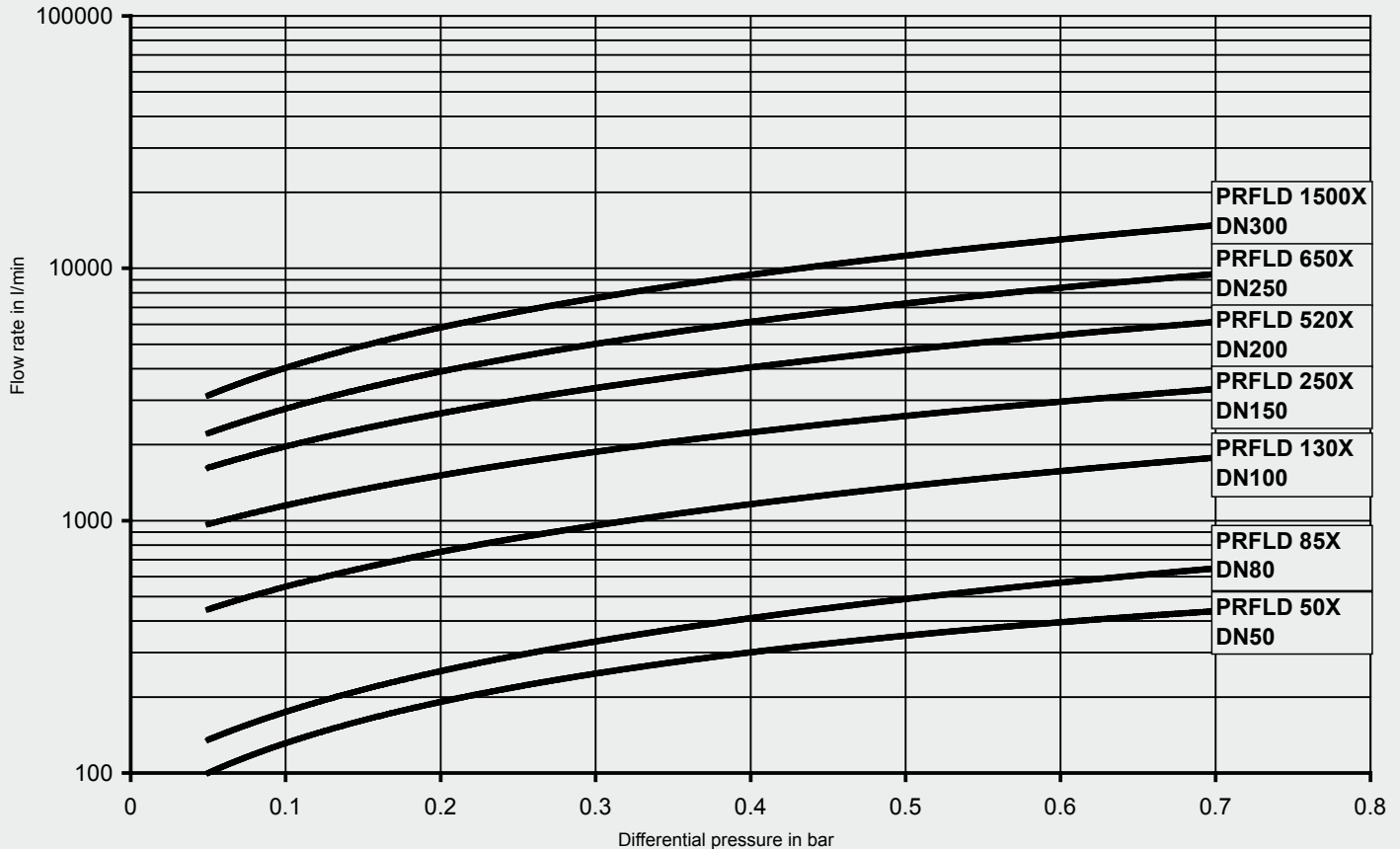
Seal material

V = Viton

4. FILTER CALCULATION / SIZING

4.1 PRESSURE DROP CURVES HOUSING INCLUDING CHANGE-OVER VALVE

The curves apply to water at 20 °C or fluids to 15 mm²/s.



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

Use the pressure drop curves to calculate the Process Inline Filter PRFLD. Generally speaking, an initial - Δp (clean filter condition) of > 0.2 bar should not be exceeded. When using 50 μm slotted tubes, the pressure drop increases by approx. 30 %. The pressure drop curves are valid for filtration ratings of 100 – 3000 μm slotted tube. The stated housing pressure drop increases by approx. 30 % for filtration ratings of 50 μm .

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

4.2 FILTRATION PERFORMANCE

- Retention rates for wire mesh and slotted tube:

Nominal retention rates

The filtration rating given in the model code is based on a HYDAC factory standard filter test.

This test is carried out by introducing a large amount of dust (ISO MTD) at the beginning of the filter test and subsequently separating the contamination particles over 1 hour.

The test filter must retain 90 - 95 % of all particles larger than the given filtration rating.

- Retention rates for Betamicron® (glass fibre), Chemicron® (metal fibre):

Absolute retention rate

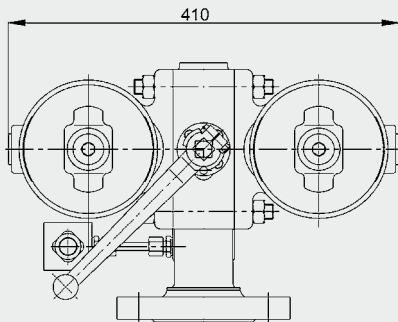
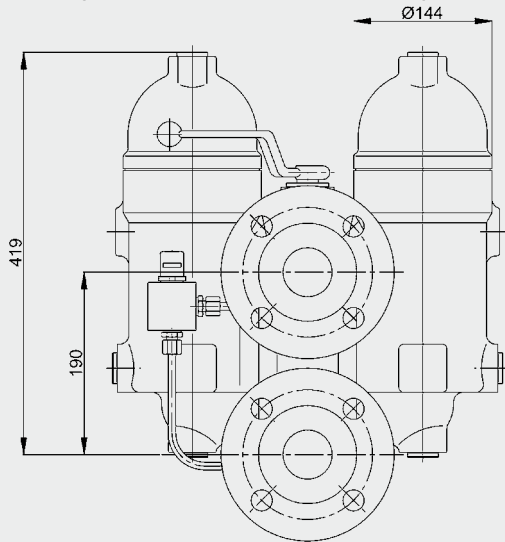
The filtration rates given in the brochure are determined by the multi-pass test carried out on the HYDAC test rig, based on ISO 4572 (multi-pass test for the determination and proof of the filtration performance, extended to finest filtration).

In this test at least 99 % of all particles larger than the given rating must be retained, and this up to the max. permissible differential pressure across the filter element. A filtration rate of 99 % corresponds to a β_x -value of 100, which denotes absolute filtration.

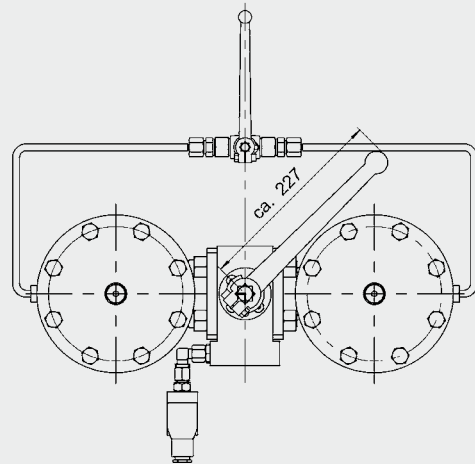
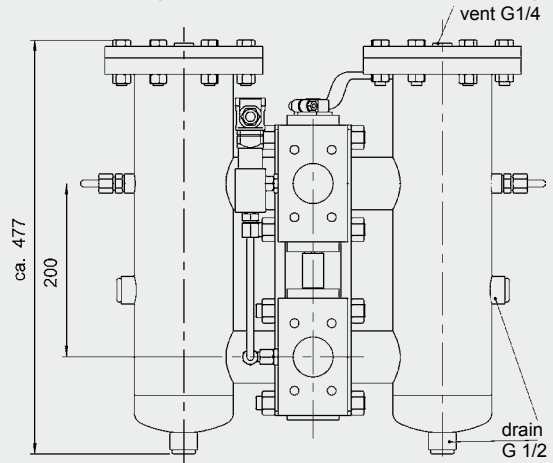
5. DIMENSIONS

5.1 FILTER HOUSING

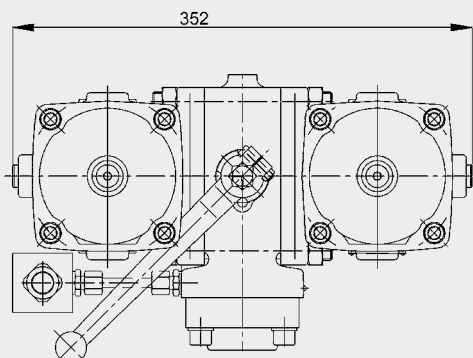
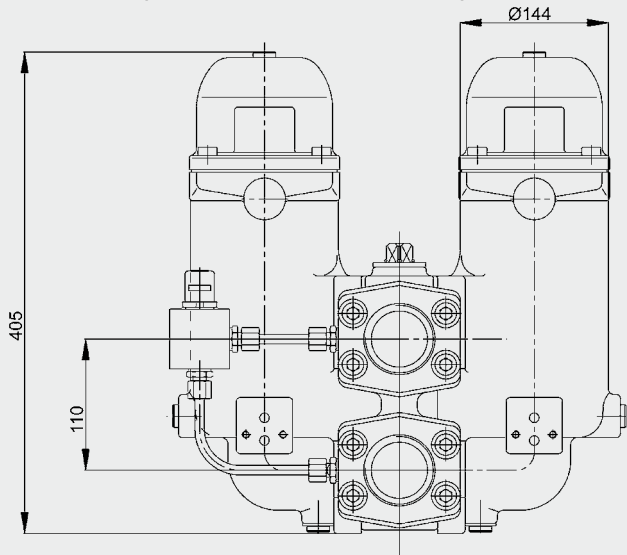
PRFLD 503 (cast version, stainless steel)



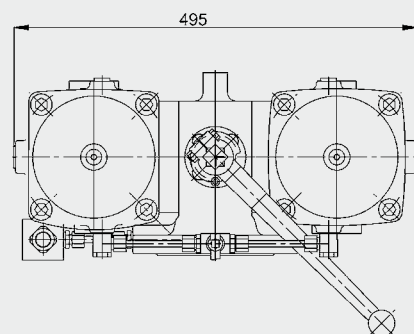
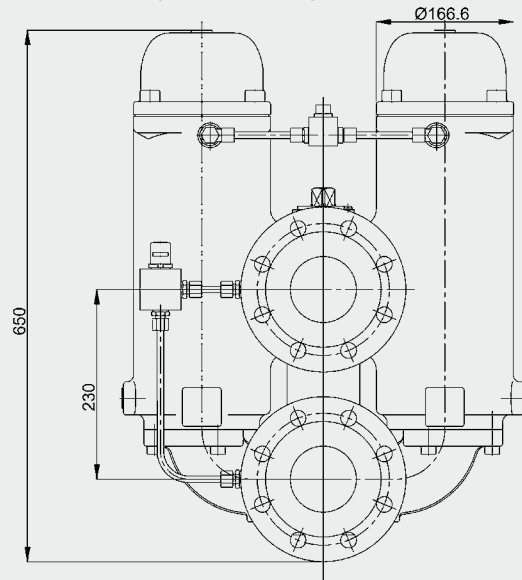
PRFLD 503 (welded version, stainless steel)



PRFLD 50x (cast version, carbon steel)

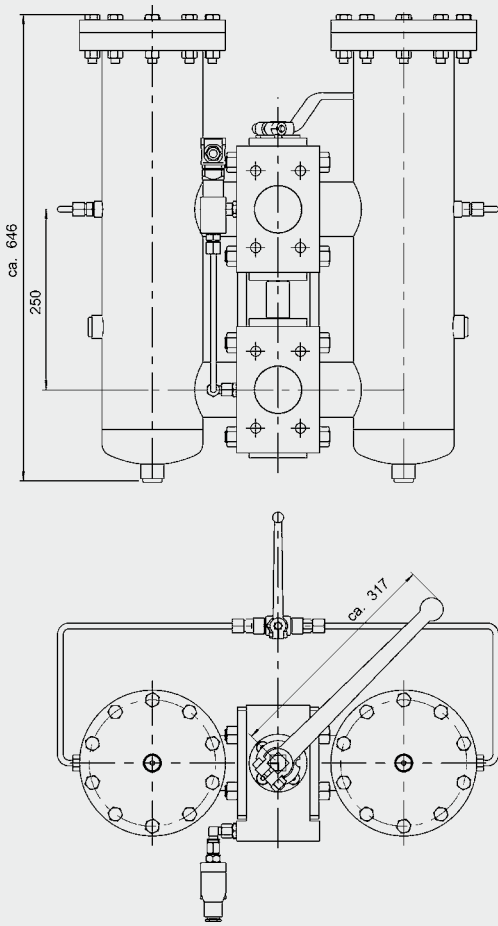


PRFLD 85x (cast version)

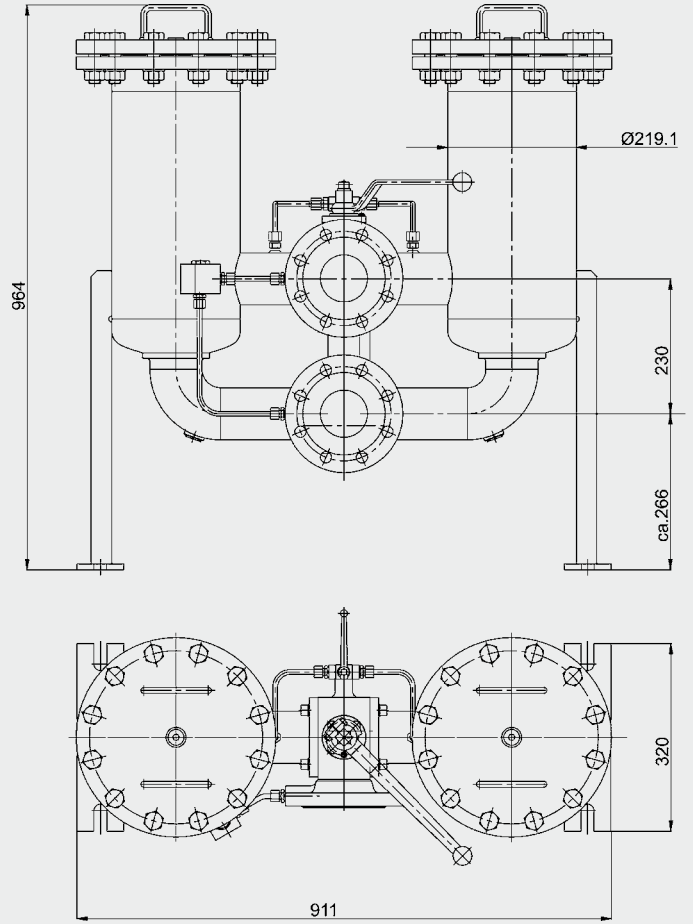


- The filter must not be used as a pipe support.
- The dimensions quoted have ± 5 mm tolerances.

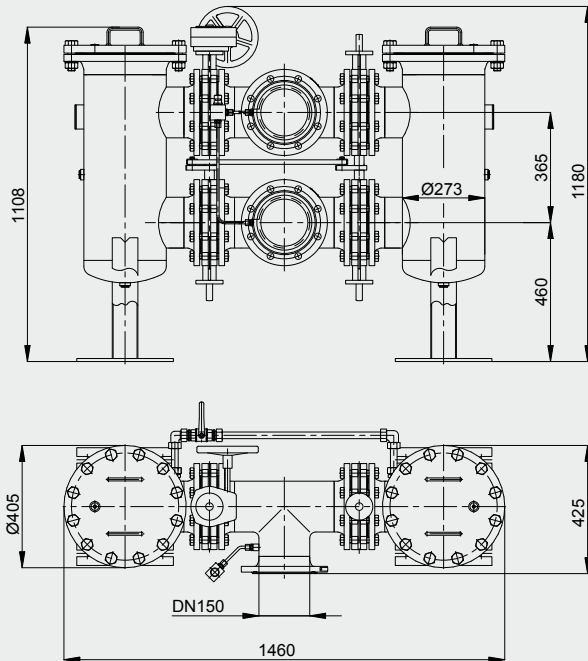
PRFLD 853 (welded version, stainless steel)



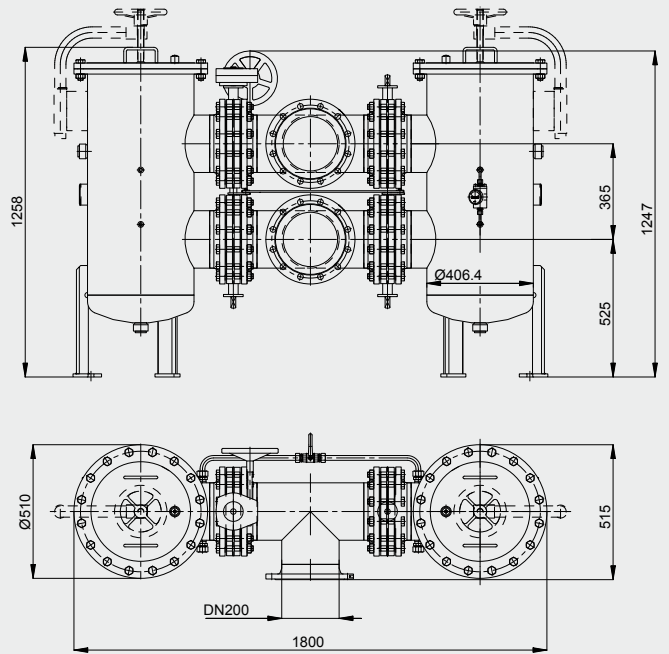
PRFLD 130x



PRFLD 250x

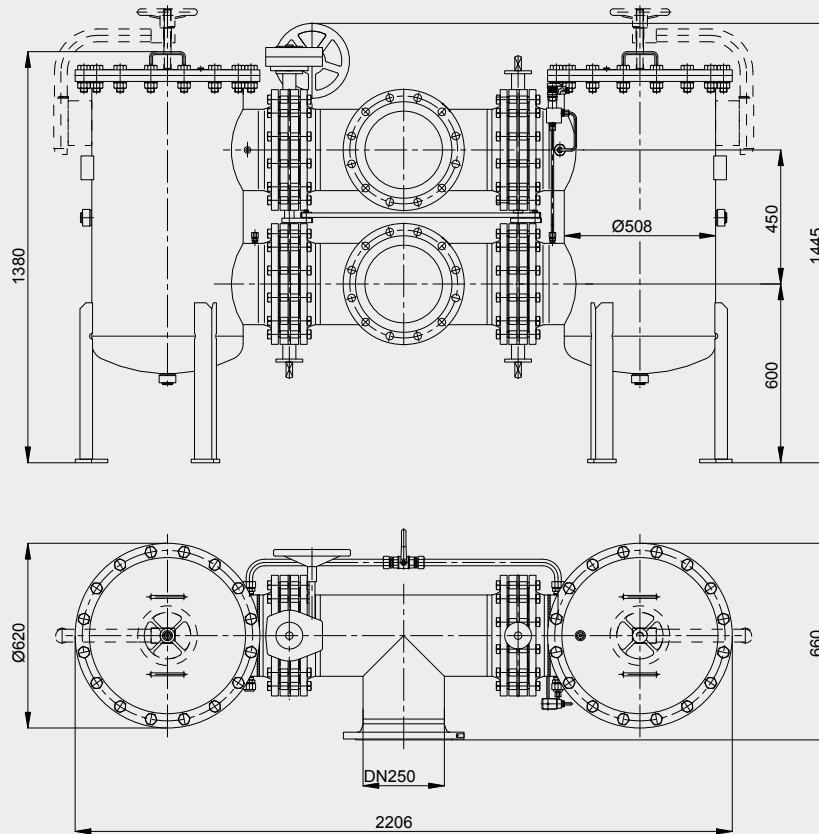


PRFLD 520x

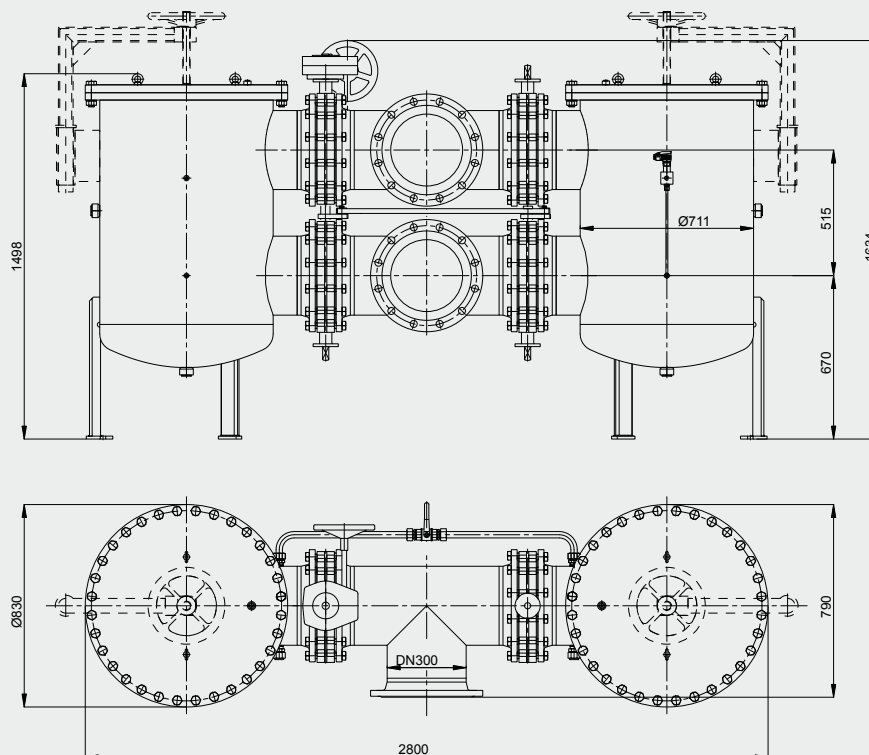


- The filter must not be used as a pipe support.
- The dimensions quoted have ± 5 mm tolerances.

PRFLD 650x

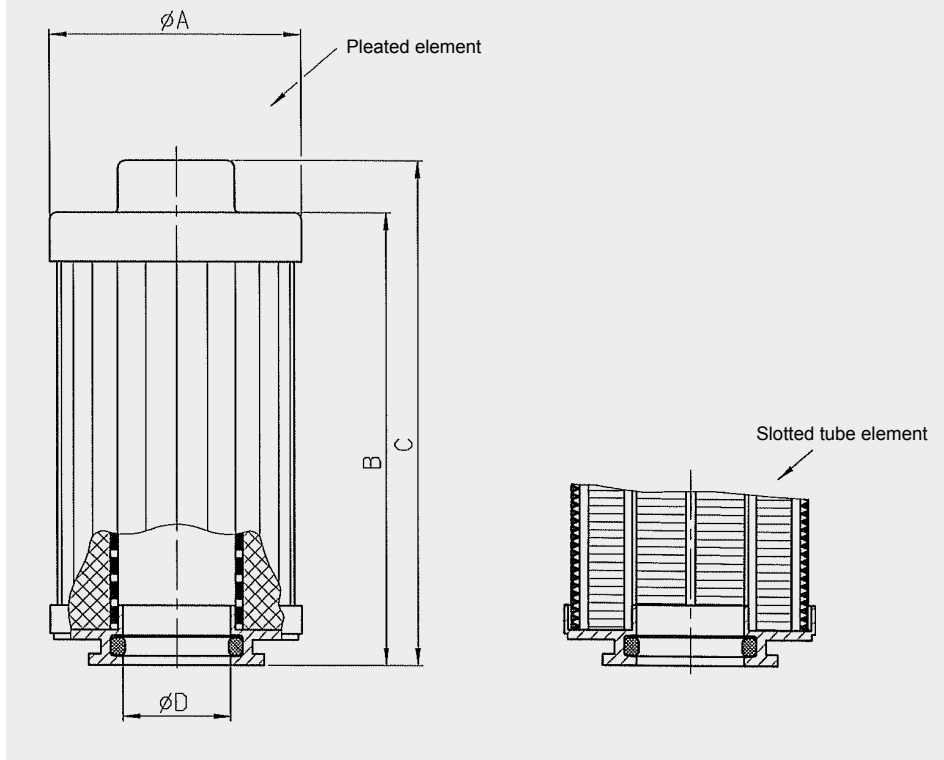


PRFLD 1500x



- The filter must not be used as a pipe support.
- The dimensions quoted have ± 10 mm tolerances.

5.2 DIMENSIONS OF ELEMENTS



Size	A	B	C	D
L-503	95	263	276	48.1
L-853	114	394	414	68.1
L-1303	143	458	483	96.1
L-2603	143	897	822	96.1

All dimensions in mm

NOTE

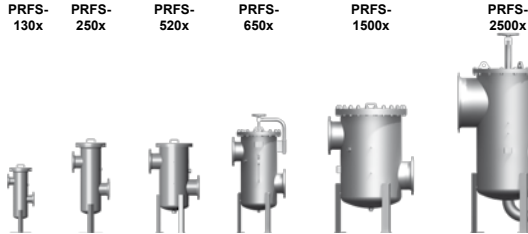
The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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Process Screen Basket Filter PRFS



1. TECHNICAL SPECIFICATIONS

1.1 GENERAL

Screen basket filters are used mainly as coarse filters or prefilters. The direction of flow is from the inside to the outside. The separated solid contamination is collected in the stainless steel screen basket and can be disposed of quickly and conveniently. By using clogging indicators which monitor the differential pressure, the condition of the screen basket filter can be determined at any time. The filter materials can be cleaned and reused, and this therefore reduces operating costs. Filter housings are available in carbon steel with an internal epoxy coating and in stainless steel.

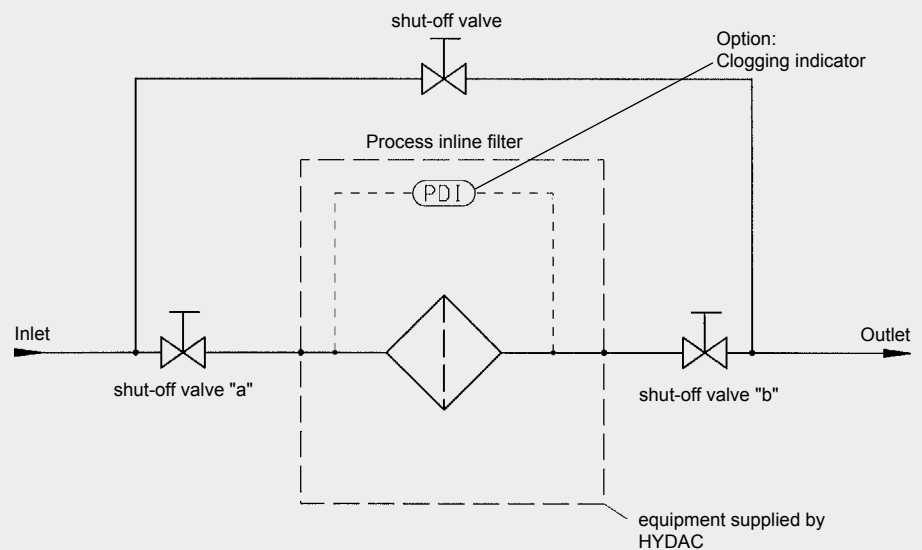


1.2 SUMMARY OF AVAILABLE SIZES AND CONNECTIONS

Connection size	Series					
	130x	250x	520x	650x	1500x	2500x
DN 50	●					
DN 80	●					
DN 100	●	●				
DN 150		●	●			
DN 200		●	●	●		
DN 250			●	●	●	
DN 300				●	●	
DN 400					●	
DN 500					●	●
DN 600						●
DN 700						●

The selection of the connection size depends on the level of contamination of the fluid and the associated filter area.

1.3 CIRCUIT DIAGRAM



2. FILTER SPECIFICATIONS

2.1 SUMMARY OF TECHNICAL SPECIFICATIONS OF THE STANDARD FILTER HOUSING

Series	Type	Connection size according to DIN DN	Materials			Pressure range*	Temp. [°C]	Weight [kg]	Volume [l]
			Stainless steel	Carbon steel					
				without int. corrosion protection	with int. corrosion protection				
130x	1303	50/	●			PN 16	-10 to 90	80	25
	1304	80/			●				
	1305	100/150		●					
250x	2503	100/	●					130	46
	2504	150/			●				
	2505	200		●					
520x	5203	150/	●					300	118
	5204	200/			●				
	5205	250		●					
650x	6503	200/	●					360	213
	6504	250/			●				
	6505	300		●					
1500x	15003	300/	●			460	433		
	15004	400/			●				
	15005	500		●					
2500x	25003	500/	●			990	1330		
	25004	600/			●				
	25005	700		●					

* Other pressure ranges on request.

2.2. FURTHER TECHNICAL SPECIFICATIONS OF THE STANDARD FILTER HOUSING

2.2.1 Seal materials

FPM (Viton), asbestos free gasket

2.2.2 Corrosion protection, external

2 layer primer (not required for stainless steel filters)

2.2.3 Corrosion protection, internal

2K-epoxy primer (not required for stainless steel filters)

2.2.4 Documentation

Operating and maintenance instructions

2.3 SUMMARY OF TECHNICAL SPECIFICATIONS OF FILTER ELEMENTS

Series	No. of screen baskets	Filter element type	Overall filter area [cm²]	Filter materials and filtration ratings [µm]			Permiss. diff. pressure across element [bar]
				Wire mesh (reinforced with perforated plate)	Slotted tube	Perforated plate	
130x	1	SK-3-...	2035	25, 40,	50,	3000	6
250x	1	SK-4-...	2850	60, 80,	100, 200,		
520x	3	SK-3-...	6105	100, 150,	250, 300,		
650x	4	SK-4-...	11400	200, 250,	500,		
1500x	7	SK-4-...	19950	500, 1000,	2000,		
2500x	5	SK-5-...	37000	1000	3000		

2.4. OPTIONAL VERSIONS

There is a range of optional versions available for the Process Screen Basket Filter PRFS. For technical details and prices, please contact our Technical Sales Department at Head Office.

2.4.1 Housing manufacture

- AD Rules / PED 97/23/EC
- ASME Code Design (with or without U-Stamp)

2.4.2 Flange connections

- ANSI
- JIS

2.4.3 Housing materials

- Various qualities of stainless steel*
- Various qualities of carbon steel*

2.4.4 Materials of internal parts and elements

- Various qualities of stainless steel
- Various qualities of carbon steel*
- Various qualities of duplex/ superduplex

2.4.5 Cover lifting devices

- Stainless steel version
- Carbon steel version

2.4.6 Seal materials

- Various seal materials on request, depending on the resistance to the fluid.

2.4.7 Corrosion protection and external finishes

- RAL colours acc. customer requirements (for carbon steel qualities)
- Various multi layer coatings

2.4.8 Differential pressure monitoring

- Visual
- Electrical
- Visual/electrical
- Differential pressure gauge with 2 microswitches

2.4.9 Documentation

- Manufacturer's test certificates
- Material certificates (3.1 according to DIN EN 10204)
- 3rd parties (TÜV, ABS, Lloyds, etc.)
- Welding procedure specifications (WPS) / Procedure Qualification Record (PQR)
- Inspection plan
- and many other documents available on request

Further optional models on request.

3. MODEL CODE

PRFS - S - 1303 - AF3 - 100 - 0 - 1 - X

3.1 SCREEN BASKET FILTER PRFS / PRFSD

Filter type

PRFS = Screen basket filter

PRFSD = Screen basket filter, duplex (change-over)

Filter material

D = wire mesh, reinforced with perforated plate (cleanable)

DS = wire mesh, reinforced with perforated plate on both sides (cleanable)

S = slotted tube (cleanable)

L = perforated plate (cleanable)

Size

130x = DN 50 / 80 / 100 / 150

250x = DN 100 / 150 / 200

520x = DN 150 / 200 / 250

650x = DN 200 / 250 / 300

1500x = DN 250 / 300 / 400

2500x = DN 500 / 600 / 700 (only for single filter PRFS)

End code x

x = 3 stainless steel housing

x = 4 housing carbon steel + epoxy internal coating

x = 5 housing carbon steel without coating

Type of connection (see table)

F = flange to DIN followed by nominal width
e.g. F100

AF = flange to ANSI followed by nominal width in inches

Filtration rating in μm

25, 40, 60, 80, 100, 150, 200, 250, 500, 1000 (wire mesh)

50, 100, 200, 300, 500, 1000, 2000, 3000 (slotted tube)

3000 (perforated plate)

Equipment

0 = without additional equipment

1 = cover plate lifting device

2 = bleed and drain ball valve

Type of clogging indicator

0 = without clogging indicator

1 = visual indicator PVD 2 B.1

2 = visual-electrical indicator PVD 2 D.0

3 = visual-electrical-analogue indicator V01

4 = visual-analogue indicator in aluminium with 2 adjustable contacts (0...4 bar)

5 = visual-analogue indicator in stainless steel with 2 adjustable contacts (0...4 bar)

6 = electrical differential pressure switch PVD 2 C.0

Modification number

Supplementary details

Drawing number for special equipment

3.2 SCREEN BASKET FILTER ELEMENT

SK - 4 - S - 1000 - 0

Element construction

Screen basket element with handle

Size

1, 2, 3, 4, 5

Material of filter element

D = wire mesh, reinforced with perforated plate

DS = wire mesh, reinforced with perforated plate on both sides

S = slotted tube

L = perforated plate

Filtration rating in μm

25, 40, 60, 80, 100, 150, 200, 250, 500, 1000 wire mesh

50, 100, 200, 300, 500, 1000, 2000, 3000 slotted tube

3000 perforated plate

Seal material

0 = no seal for filtration rating > 500

V = Viton

N = NBR

EP = EPDM

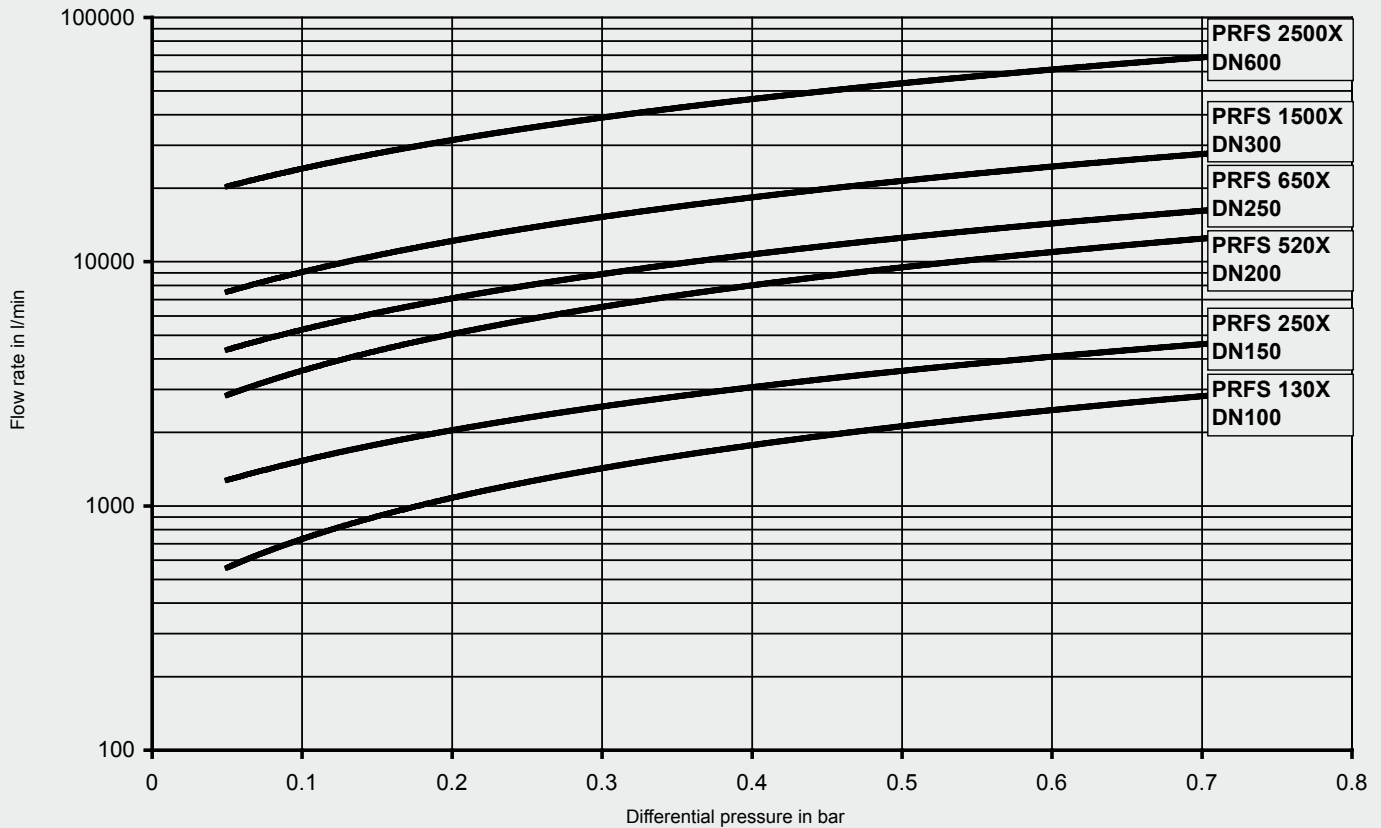
SI = Silicon

K = Klingersil gasket (only on L, D, DS versions)

4. FILTER CALCULATION / SIZING

4.1 PRESSURE DROP CURVES HOUSING INCLUDING BASKET INSERT

The curves apply to water at 20 °C or fluids to 15 mm²/s!



4.2 CALCULATION CRITERIA

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

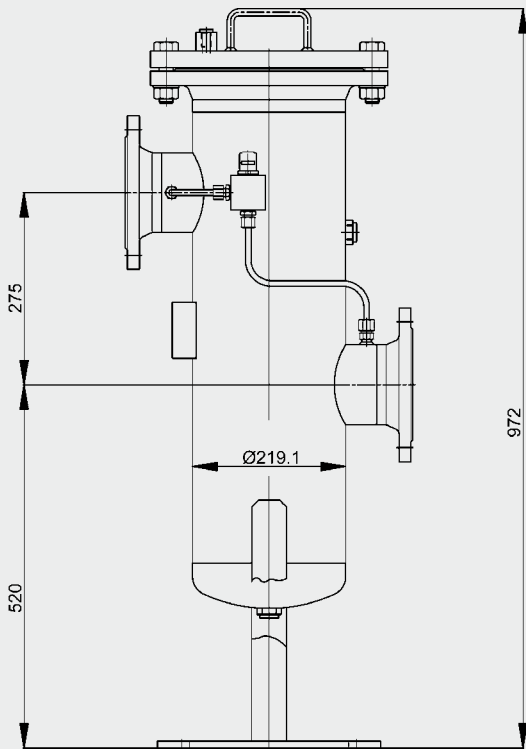
- Flow rate
- Type of medium
- Materials/resistance
- Viscosity
- Required filtration rating
- Particulate loading in the fluid
- Type of contamination
- Operating pressure
- Operating temperature

Use the pressure drop curves to calculate the Process Screen Basket Filter PRFS. Generally speaking, an initial - Δp (clean filter condition) of > 0.2 bar should not be exceeded.

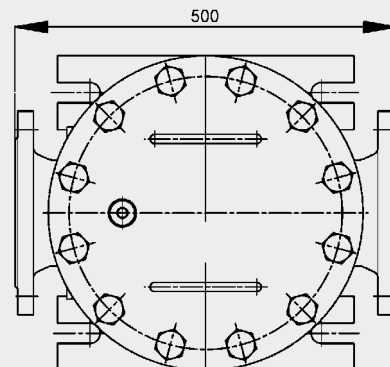
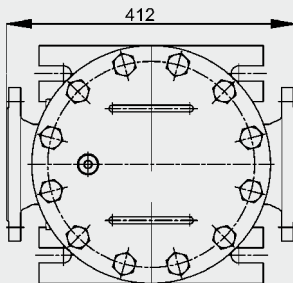
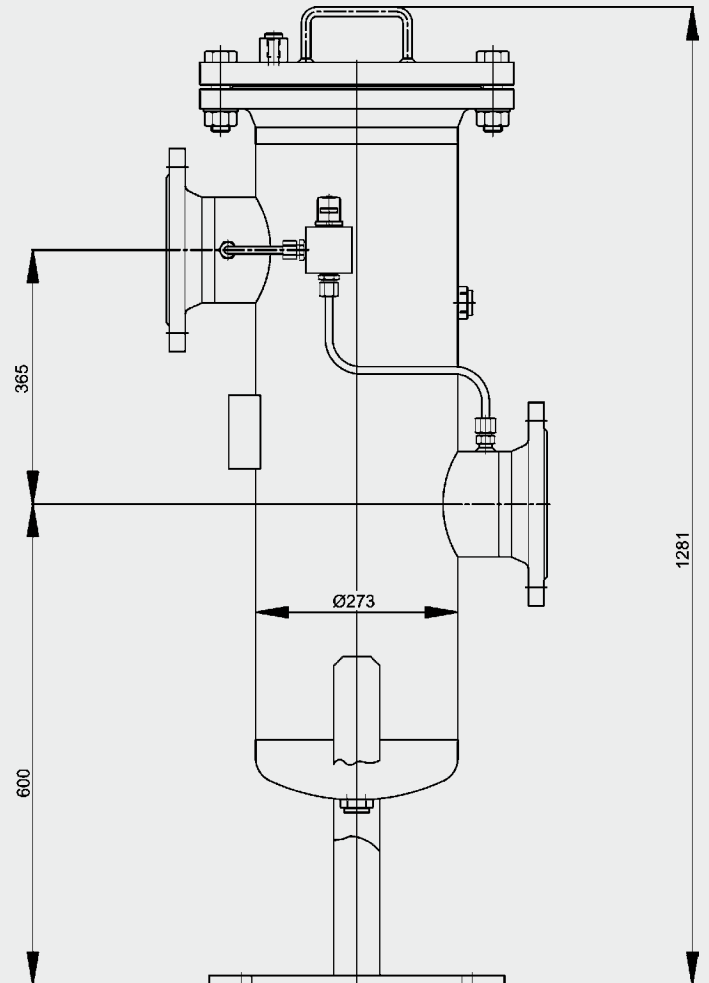
The pressure drop curves are valid for all filtration ratings and basket materials. Exception: With 50 μm slotted tube screen baskets, the pressure drop increases by 30 %.

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

5. DIMENSIONS
5.1 FILTER HOUSING
PRFS 130x



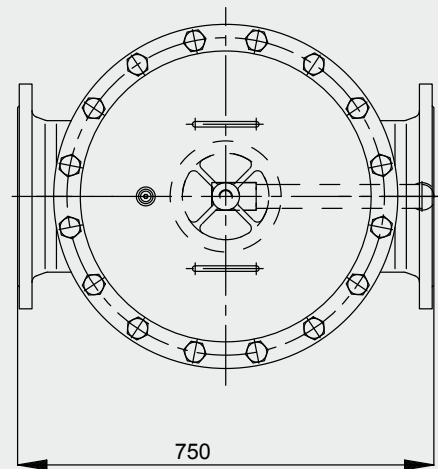
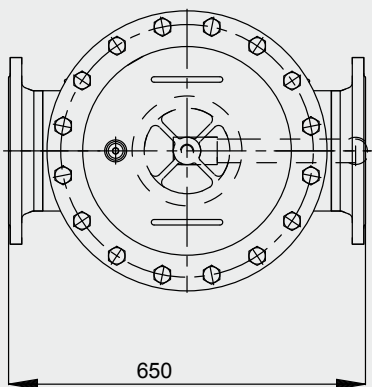
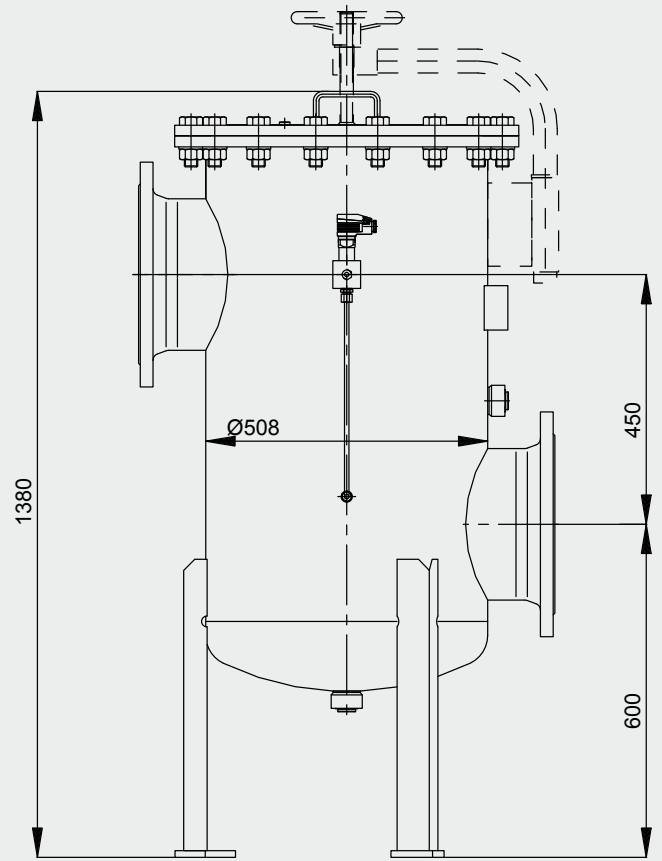
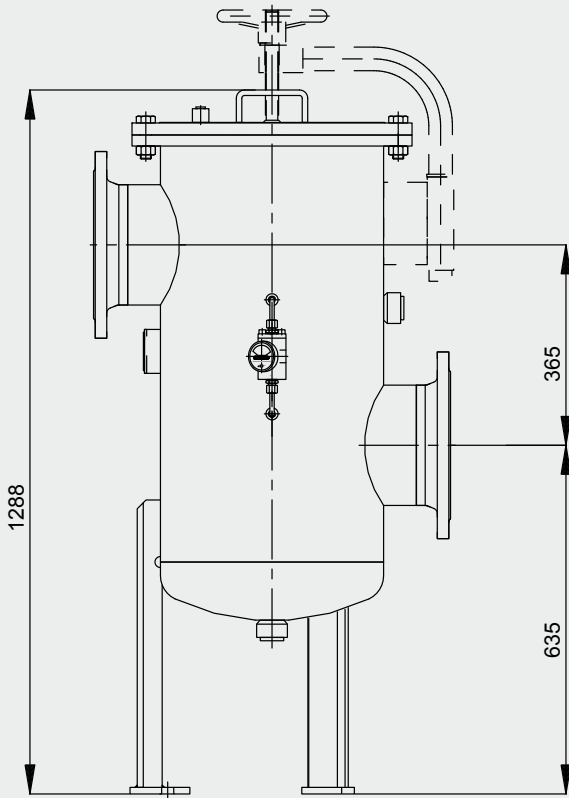
PRFS 250x



- The filter must not be used as a pipe support.
- The dimensions quoted have ± 5 mm tolerances.

PRFS 520x

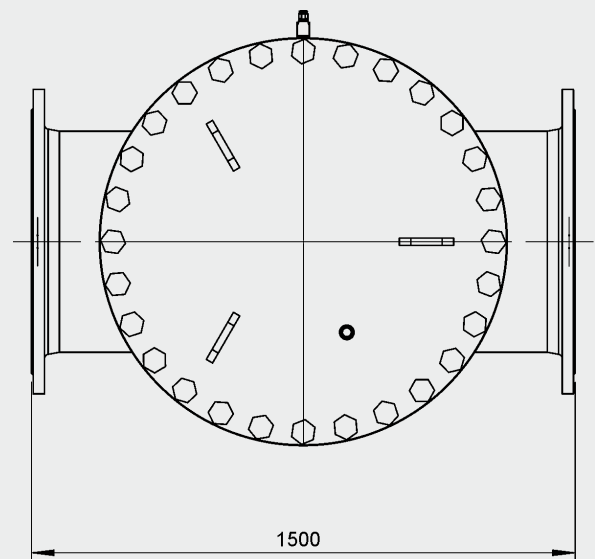
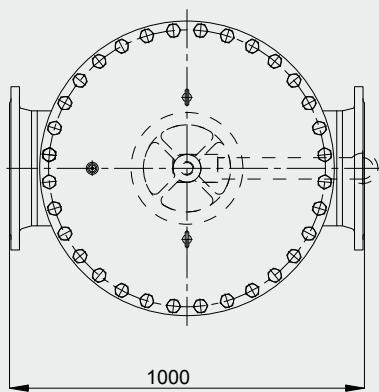
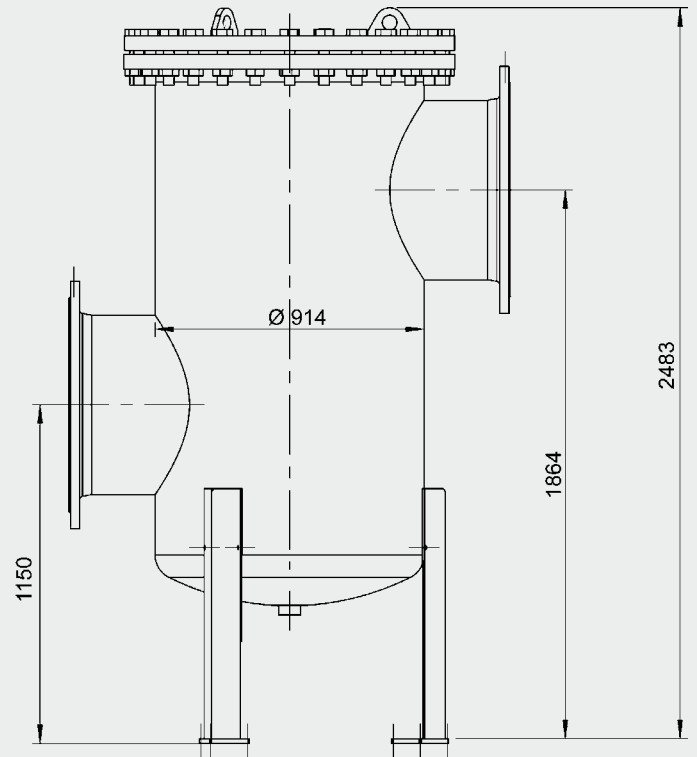
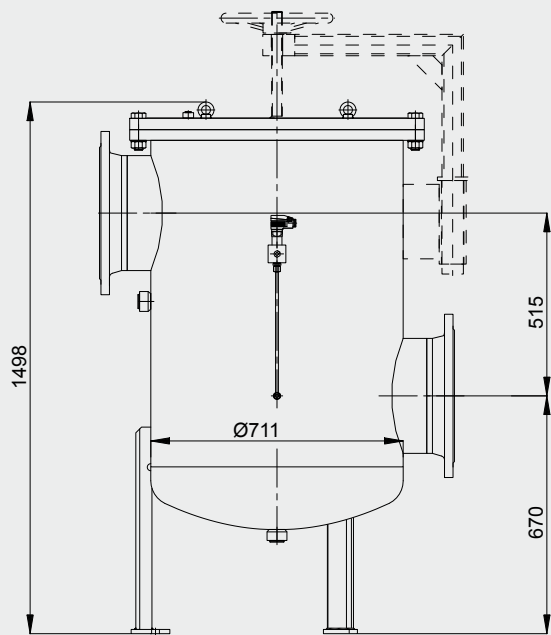
PRFS 650x



- The filter must not be used as a pipe support.
- The dimensions quoted have ± 10 mm tolerances.

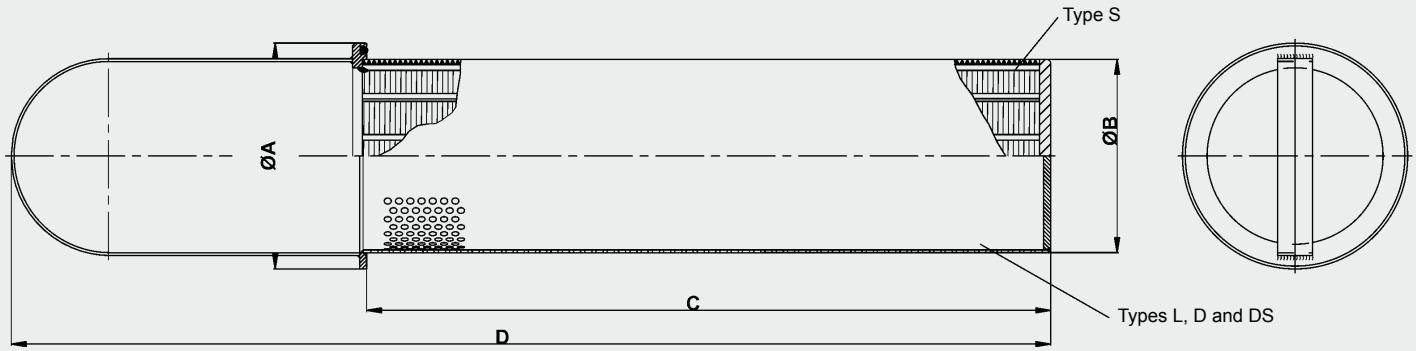
PRFS 1500x

PRFS 2500x



- The filter must not be used as a pipe support.
- The dimensions quoted have ± 10 mm tolerances.

5.2 SCREEN BASKET INSERT



Size	A	B	C	D
SK-3	160	137	486	738.5
SK-4	187	164	566	913
SK-5	300	260	910	1619

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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Process Screen Basket Filter Change-over PRFSD

PRFSD-130x PRFSD-250x

PRFSD-520x

PRFSD-650x

PRFSD-1500x



1. TECHNICAL SPECIFICATIONS

1.1 GENERAL

Screen basket filters are used mainly as coarse filters or prefilters. The direction of flow is from the inside to the outside. The separated solid contamination is collected in the stainless steel screen basket and can be disposed of quickly and conveniently. By using clogging indicators which monitor the differential pressure, the condition of the screen basket filter can be determined at any time. The filter materials can be cleaned and reused, and this therefore reduces operating costs. Filter housings are available in carbon steel with an internal epoxy coating and in stainless steel.

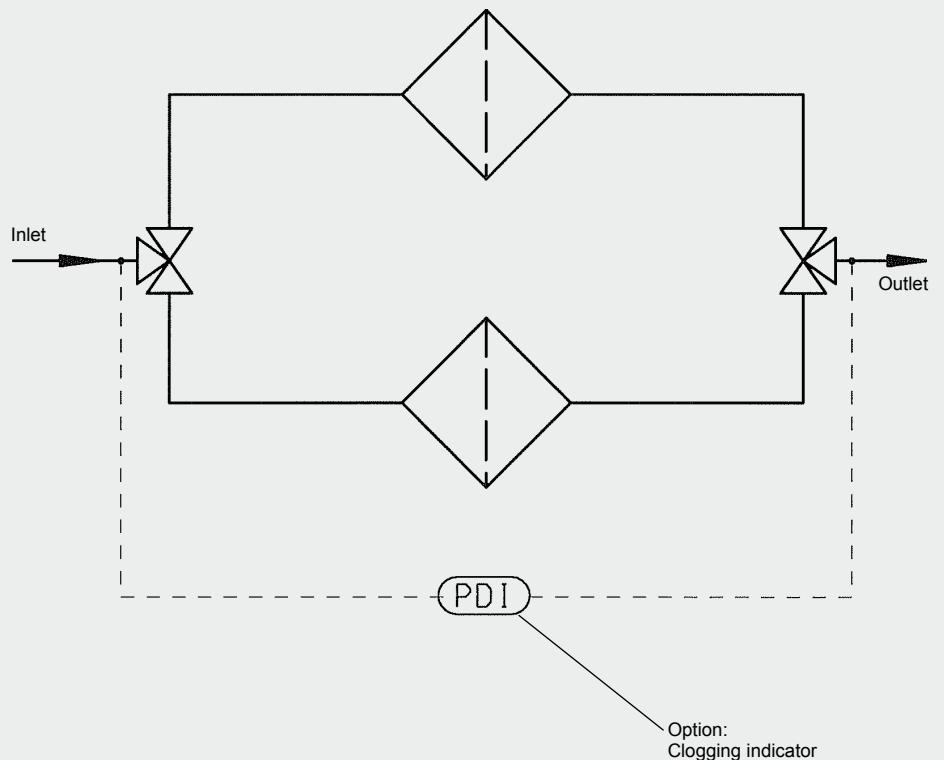


1.2 SUMMARY OF AVAILABLE SIZES AND CONNECTIONS

Connection size	Series				
	130x	250x	520x	650x	1500x
DN 50	●				
DN 80	●				
DN 100	●	●			
DN 150		●	●		
DN 200		●	●	●	
DN 250			●	●	●
DN 300				●	●
DN 400					●

The selection of the connection size depends on the level of contamination of the fluid and the associated filter area.

1.3 CIRCUIT DIAGRAM



2. FILTER SPECIFICATIONS

2.1 SUMMARY OF TECHNICAL SPECIFICATIONS OF THE STANDARD FILTER HOUSING

Series	Type	Connection size according to DIN DN	Materials			Pressure range*	Temp. [°C]	Weight [kg]	Volume [l]
			Stainless steel	Carbon steel					
				without int. corrosion protection	with int. corrosion protection				
130x	1303	50/	●			PN 16	-10 to 90	200	2 x 25
	1304	80/			●				
	1305	100/150		●					
250x	2503	100/	●					300	2 x 46
	2504	150/			●				
	2505	200		●					
520x	5203	150/	●					660	2 x 118
	5204	200/			●				
	5205	250		●					
650x	6503	200/	●					800	2 x 213
	6504	250/			●				
	6505	300		●					
1500x	15003	250/	●			1150	2 x 433		
	15004	300/			●				
	15005	400		●					

* Other pressure ranges on request.

2.2. FURTHER SPECIFICATIONS OF THE STANDARD FILTER HOUSING

2.2.1 Seal materials

FPM (Viton), EPDM, PTFE, asbestos free gasket

2.2.2 Corrosion protection, external

2 layer primer (not required for stainless steel filters)

2.2.3 Corrosion protection, internal

2K-epoxy primer (not required for stainless steel filters)

2.2.4 Documentation

Operating and maintenance instructions

2.3 SUMMARY OF TECHNICAL SPECIFICATIONS OF FILTER ELEMENTS

Series	Number of screen baskets / per side part	Filter element type	Overall filtration area / per side part [cm ²]	Filter materials and filtration ratings [µm]			Permiss. diff. pressure across element [bar]
				Wire mesh (reinforced with perforated plate)	Slotted tube	Perforated plate	
130x	1	SK-3-...	2035	25, 40, 60, 80, 100, 150, 200, 250, 500, 1000	50, 100, 200, 250, 300, 500, 1000, 2000, 3000	3000	6
250x	1	SK-4-...	2850				
520x	3	SK-3-...	6105				
650x	4	SK-4-...	11400				
1500x	7	SK-4-...	19950				

2.4. OPTIONAL VERSIONS

There is a range of optional versions available for the Process Screen Basket Filter PRFSD. For technical details and prices, please contact our Technical Sales Department at Head Office.

2.4.1 Housing manufacture

- AD Rules / PED 97/23/EC
- ASME Code Design (with or without U-Stamp)

2.4.2 Flange connections

- ANSI
- JIS

2.4.3 Housing materials

- Various qualities of stainless steel
- Various qualities of carbon steel

2.4.4 Materials of internal parts and elements

- Various qualities of stainless steel
- Various qualities of carbon steel
- Various qualities of Duplex/ Superduplex

2.4.5 Cover lifting devices

- Stainless steel version
- Carbon steel version

2.4.6 Seal materials

- Various seal materials on request, depending on the resistance to the fluid.

2.4.7 Corrosion protection and external finishes

- RAL colours acc. customer requirements (for carbon steel qualities)
- Various multi layer coatings

2.4.8 Differential pressure monitoring

- Visual
- Electrical
- Visual electrical
- Differential pressure gauge with 2 microswitches

2.4.9 Documentation

- Manufacturer's test certificates
- Material certificates (3.1 according to DIN EN 10204))
- 3rd parties (TÜV, ABS, Lloyds, etc.)
- Welding procedure specifications (WPS) / Procedure Qualification Record (PQR)
- Inspection plan
- and many other documents available on request

Further optional models on request.

3. MODEL CODE

PRFS - S - 1303 - AF3 - 100 - 0 - 1 - X

3.1 SCREEN BASKET FILTER PRFS / PRFSD

Filter type

PRFS = Screen basket filter

PRFSD = Screen basket filter, duplex (change-over)

Filter material

D = wire mesh, reinforced with perforated plate (cleanable)

DS = wire mesh, reinforced with perforated plate on both sides (cleanable)

S = slotted tube (cleanable)

L = perforated plate (cleanable)

Size

130x = DN 50 / 80 / 100 / 150

250x = DN 100 / 150 / 200

520x = DN 150 / 200 / 250

650x = DN 200 / 250 / 300

1500x = DN 250 / 300 / 400

2500x = DN 500 / 600 / 700 (only for single filter PRFS)

End code x

x = 3 stainless steel housing

x = 4 housing carbon steel + epoxy internal coating

x = 5 housing carbon steel without coating

Type of connection (see table)

F = flange to DIN followed by nominal width e.g. F100

AF = flange to ANSI followed by nominal width in inches

Filtration rating in μm

25, 40, 60, 80, 100, 150, 200, 250, 500, 1000 (wire mesh)

50, 100, 200, 300, 500, 1000, 2000, 3000 (slotted tube)

3000 (perforated plate)

Equipment

0 = without additional equipment

1 = cover plate lifting device

2 = vent and drain ball valve

Type of clogging indicator

0 = without clogging indicator

1 = visual indicator PVD 2 B.1

2 = visual-electrical indicator PVD 2 D.0

3 = visual- electrical-analogue indicator V01

4 = visual-analogue indicator in aluminium with 2 adjustable contacts (0...4 bar)

5 = visual-analogue indicator in stainless steel with 2 adjustable contacts (0...4 bar)

6 = electrical differential pressure switch PVD 2 C.0

Modification number

Supplementary details

Drawing number for special equipment

3.2 SCREEN BASKET FILTER ELEMENT

SK - 4 - S - 1000 - 0

Element construction

Screen basket element with handle

Size of basket filter

1, 2, 3, 4, 5

Material of filter element

D = wire mesh, reinforced with perforated plate

DS = wire mesh, reinforced with perforated plate on both sides

= slotted tube

L = perforated plate

Filtration rating in μm

25, 40, 60, 80, 100, 150, 200, 250, 500, 1000 wire mesh

50, 100, 200, 300, 500, 1000, 2000, 3000 slotted tube

3000 perforated plate

Seal material

0 = no seal for filtration rating > 500

V = Viton

N = NBR

EP = EPDM

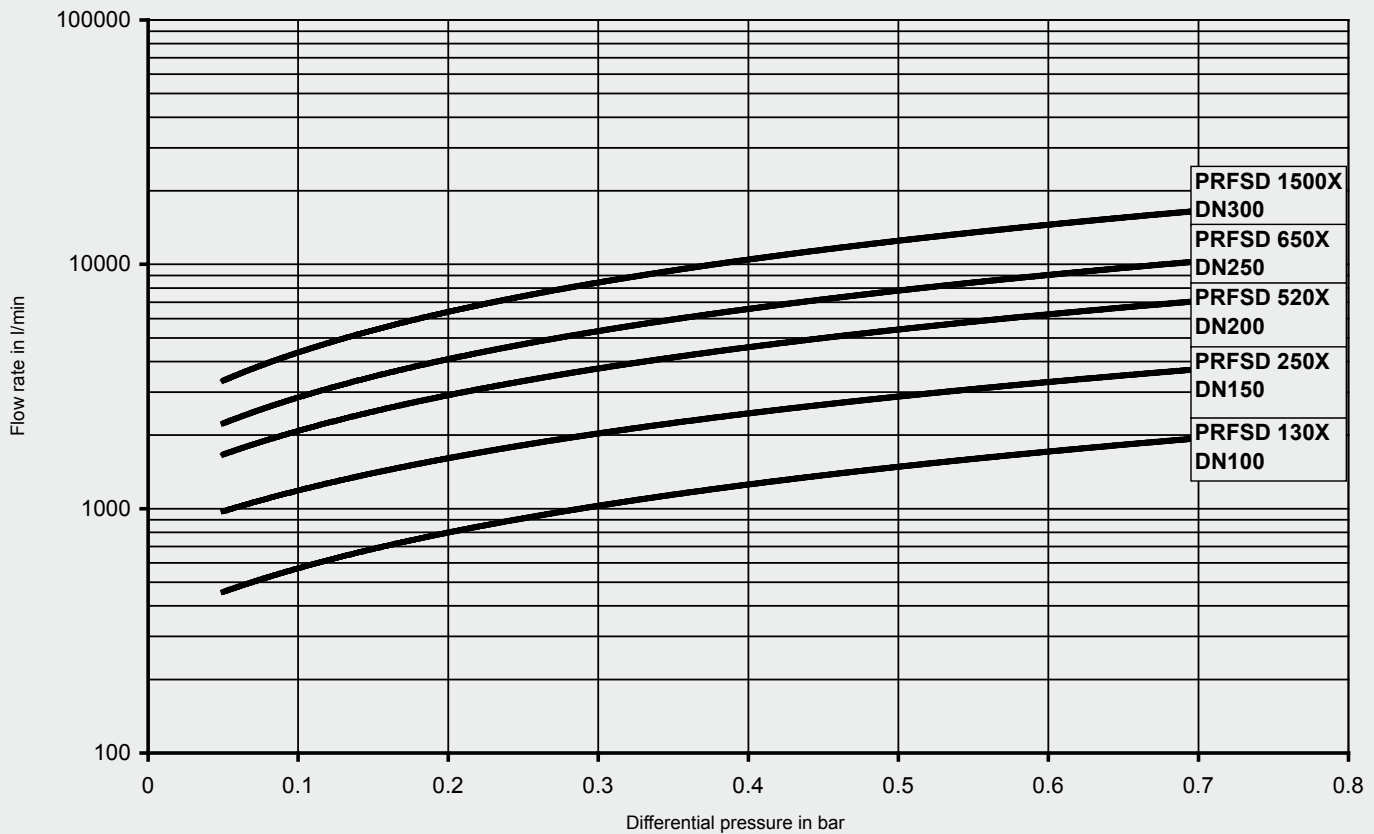
SI = Silicon

K = Klingsil gasket (only on L, D, DS versions)

4. FILTER CALCULATION / SIZING

4.1 PRESSURE DROP CURVES HOUSING WITH SCREEN BASKETS (INC. CHANGE-OVER VALVE)

The curves apply to water at 20 °C or fluids to 15 mm²/s!



4.2 CALCULATION CRITERIA

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

Use the pressure drop curves to calculate the Process Screen Basket Filter PRFSD.

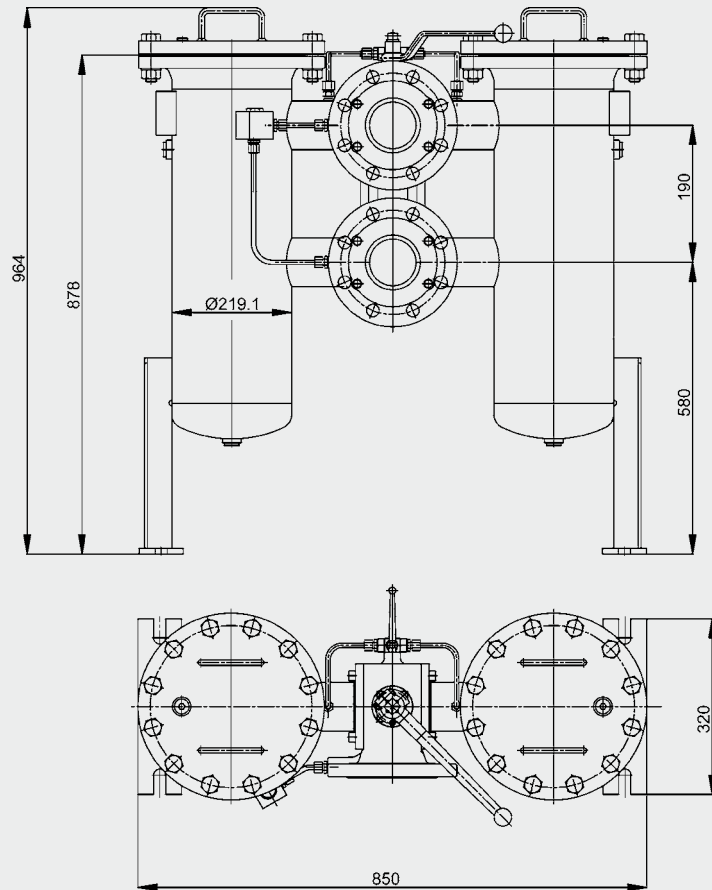
The pressure drop curves are valid for all filtration ratings and basket materials. Exception: With 50 µm slotted tube screen baskets, the pressure drop increases by 30 %.

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

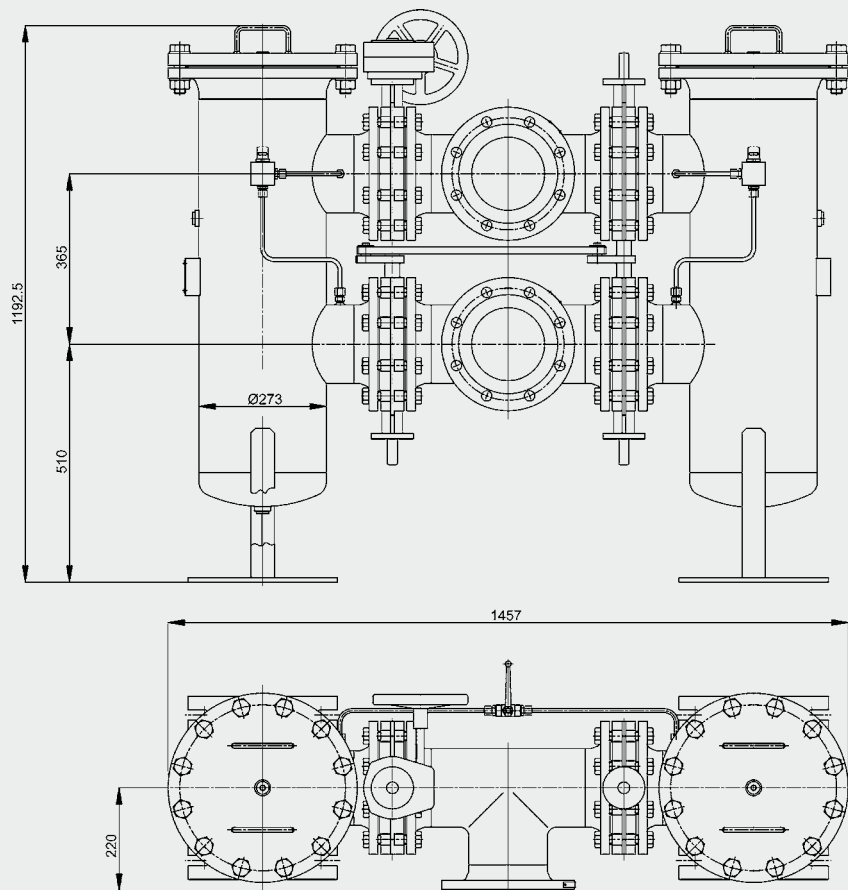
5. DIMENSIONS

5.1 FILTER HOUSING

PRFSD 130x

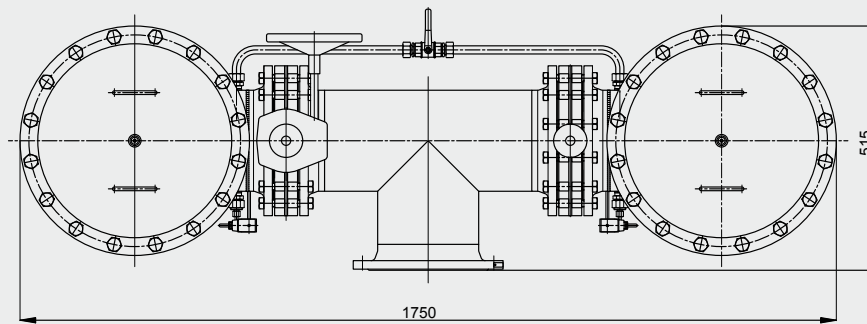
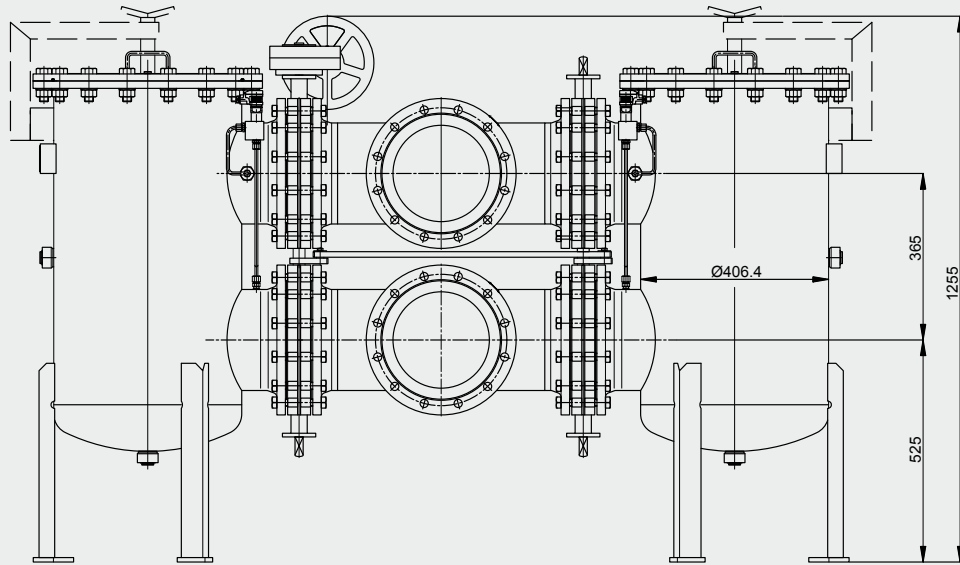


PRFSD 250x

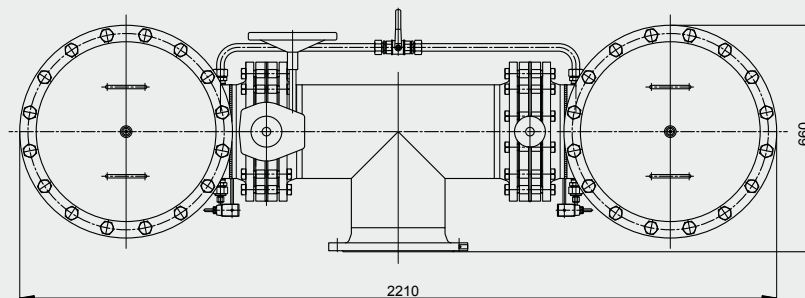
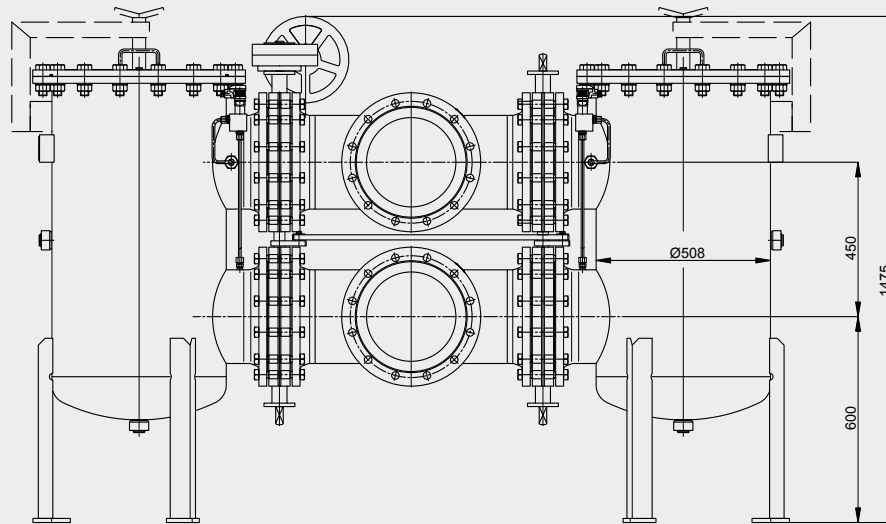


- The filter must not be used as a pipe support.
- The dimensions quoted have ± 10 mm tolerances.

PRFSD 520x

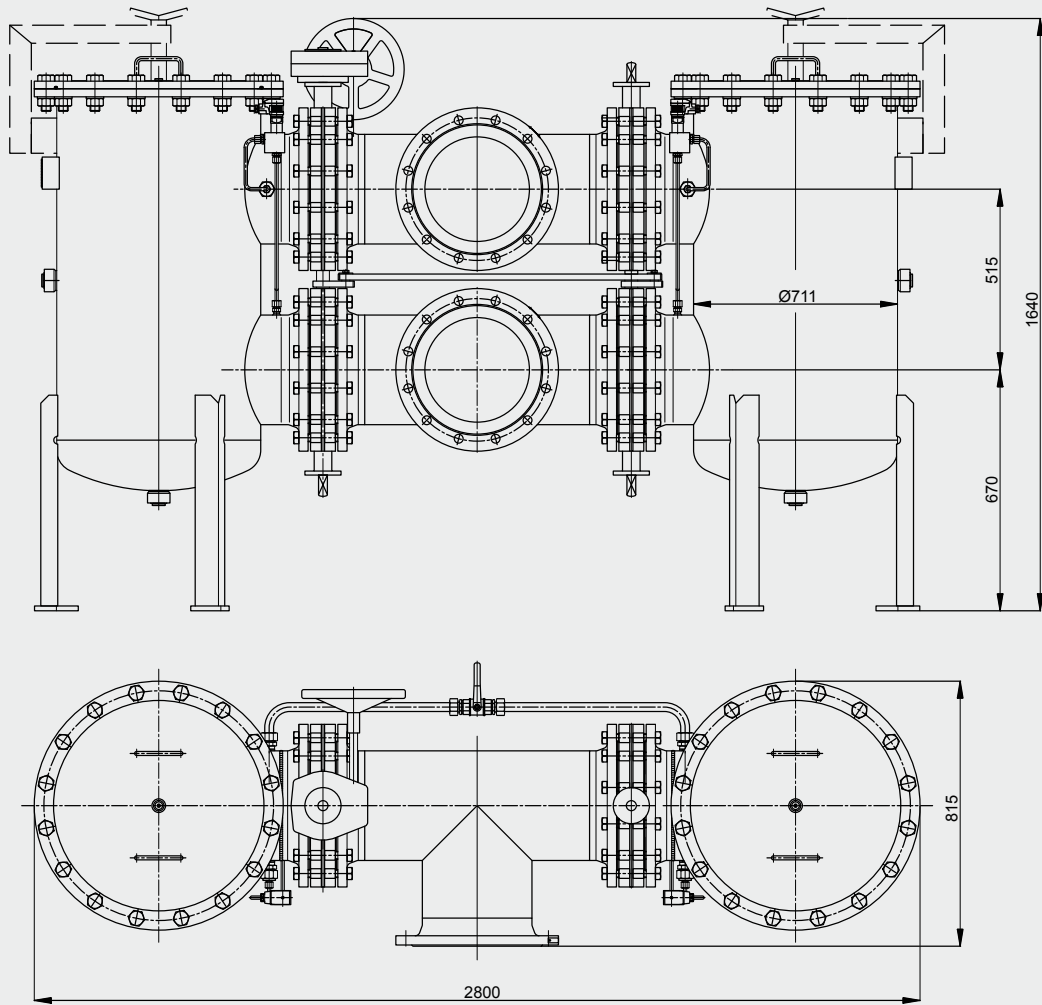


PRFSD 650x



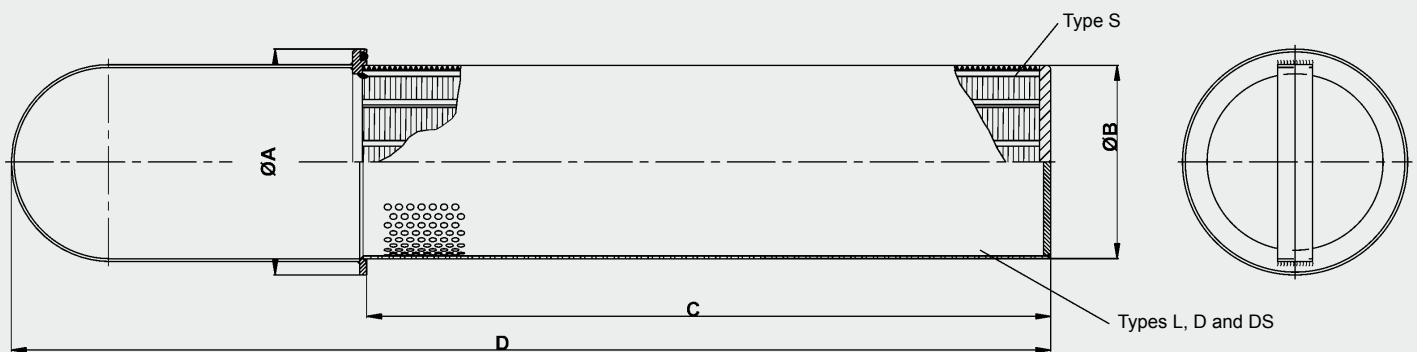
- The filter must not be used as a pipe support.
- The dimensions quoted have ± 10 mm tolerances.

PRFSD 1500x



- The filter must not be used as a pipe support.
- The dimensions quoted have ± 10 mm tolerances.

5.2 SCREEN BASKET INSERT



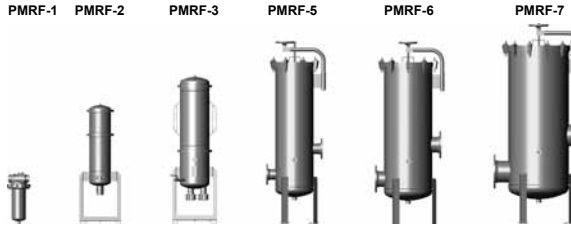
Size	A	B	C	D
SK-3	160	137	486	738.5
SK-4	187	164	566	913
SK-5	300	260	910	1619

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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Process Multi-Rheo Filter PMRF



1. TECHNICAL SPECIFICATIONS

1.1 GENERAL

The filter series PMRF (for duplex filters see PMRFD) Process Multi-Rheo Filter completes the HYDAC Process Technology inline filter series. These filters use HYDAC FlexMicron filter elements. The elements feature outstanding contamination retention capacities. The filter housings are available in 7 different sizes and lengths and therefore a suitable filter can be found for every process. By using clogging indicators which monitor the differential pressure, the condition of the filter can be determined at any time.

Typical areas of application for this filter series are:

- Process water treatment
- Filtration of cooling lubricants and washing fluids
- Pure and ultrapure water production
- Boiler feed water
- Extending the service life of circulating fluids
- Protection filtration for UV and membrane systems

1.2 HOUSING

The filter housings in the PMRF series are designed in accordance with international regulations. They are available in carbon steel or stainless steel and in various lengths.

1.3 FILTER ELEMENTS

1.3.1 FlexMicron E (Economy)

The filter elements in the FlexMicron E (Economy) product line are depth filter elements produced using melt-blown technology. They are used particularly in applications where an average level of fluid cleanliness and material purity is required and they provide a cost-effective solution. Available lengths 10", 20", 30", 40" with filtration rates of 95 %.

1.3.2 FlexMicron S (Standard)

The filter elements in the FlexMicron S (Standard) product line are SpunSpray depth filter elements produced using melt-blown technology. They are used particularly in applications where a high level of fluid cleanliness and

material purity is required. Available lengths 10", 20", 30", 40" with filtration rates of up to 99.8 %.

1.3.3 FlexMicron P (Premium)

The filter elements in the FlexMicron P (Premium) product line are heavy-duty elements using Pleat Technology, produced in melt-blown or high-quality glass fibre technology. They are used particularly in applications requiring high levels of cleanliness. Available lengths 10", 20", 30", 40" with a filtration rate of up to 99.99 %.



2. FILTER SPECIFICATIONS

2.1 SUMMARY OF TECHNICAL SPECIFICATIONS OF THE FILTER HOUSING (STANDARD CONFIGURATION)

Size	Length [inches]				Connection		Materials			Pressure range					Temperature [°C]	Weight [kg]	Volume [l]		
	10	20	30	40	SAE	Pipe thread G	DIN DN	Stainless steel ¹⁾	Carbon steel with int. corrosion protection	Carbon steel without int. corrosion protection	PN6	PN10	PN16	PN25				PN40	
1	●	●	●	●		1"		●				●			●	-10 to 90	7.4	8.4	
2	●	●	●	●		2"	2", 1.5"	50	●			●	●					34	38
3	●	●	●	●		2"	2", 1.5"	50	●			●	●					44	65
4 ³⁾				●				50/ 80/ 100	●	●	●	●	●	●				140	120
5 ³⁾				●				80/ 100/ 150	●	●	●	●	●	●				200	180
6 ³⁾				●				100/ 150/ 200	●	●	●	●	●	●				280	240
7 ³⁾				●				150/ 200/ 250	●	●	●	●	●	●				370	465

¹⁾ Size 1 in stainless steel 1.4571, sizes 2 to 7 in stainless steel 1.4301

²⁾ based on length of 40 inches

³⁾ includes cover lifting device

2.2 FURTHER SPECIFICATIONS OF THE FILTER HOUSING

2.2.1 Seal materials

- NBR
- FPM (Viton)
- EPDM

2.2.2 Corrosion protection, external

- 2 layer primer (not required for stainless steel filters)

2.2.3 Corrosion protection, internal

- 2K epoxy coating (not required for stainless steel filters or for type NU)

2.2.4 Documentation

- Operating and maintenance manual

2.3 OPTIONAL VERSIONS OF FILTER HOUSING

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

2.3.1 Housing manufacture

- ASME Code Design (with or without U-Stamp)

2.3.2 Flange connections

- ANSI
- JIS

2.3.3 Housing materials

- Various qualities of stainless steel
- Various qualities of carbon steel

2.3.4 Seal materials

- Various seal materials on request, depending on the resistance to the fluid.

2.3.5 Corrosion protection and external finishes

- RAL colours acc. customer requirements
- Various multi layer coatings

2.3.6 Differential pressure monitoring

- Visual
- Electrical
- Visual electrical
- Differential pressure gauge with 2 microswitches

2.3.7 Documentation

- Manufacturer's test certificates
 - Material certificates (3.1 according to DIN EN 10204)
 - 3rd parties (TÜV, ABS, Lloyds, etc.)
 - Welding procedure specifications (WPS) / Procedure Qualification Record (PQR)
 - Inspection plan and many other documents available on request
- Further optional models on request.

2.4 SUMMARY OF TECHNICAL SPECIFICATIONS OF FILTER ELEMENTS

2.4.1 FlexMicron E (Economy)

Size	No. of filter elements	Filter element type	Filter materials and filtration ratings [μm]	
			Polypropylene	Polyamide
1	1	FlexMicron E	Not available	
2	3 or 5	FlexMicron E	1, 3, 5, 10, 20, 30, 40, 50, 70, 90	
3	7 or 11	FlexMicron E		
4	17	FlexMicron E		
5	22	FlexMicron E		
6	36	FlexMicron E		
7	52	FlexMicron E		

2.4.2 FlexMicron S (Standard)

Size	No. of filter elements	Filter element type	Filter materials and filtration ratings [μm]	
			Polypropylene	Polyamide
1	1	FlexMicron S	Not available	
2	3 or 5	FlexMicron S	1, 3, 5, 10, 20, 30, 40, 50, 70, 90	
3	7 or 11	FlexMicron S		
4	17	FlexMicron S		
5	22	FlexMicron S		
6	36	FlexMicron S		
7	52	FlexMicron S		

2.4.3 FlexMicron P (Premium)

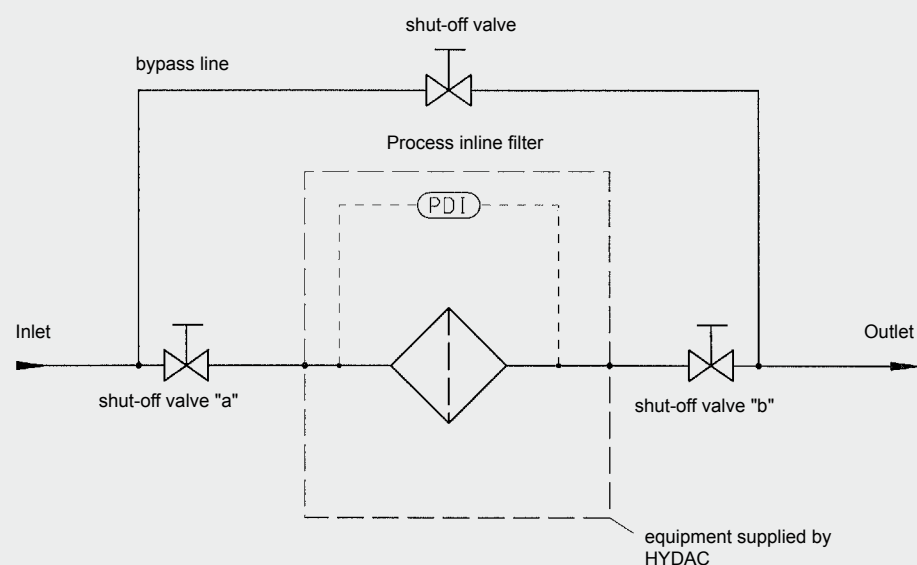
Size	No. of filter elements	Filter element type	Filter materials and filtration ratings [μm]	
			Polyester	Glass fibre
1	1	FlexMicron P	Not available	
2	3 or 5	FlexMicron P	1, 3, 5, 10, 20, 30, 40, 50, 70, 90	
3	7 or 11	FlexMicron P		
4	17	FlexMicron P		
5	22	FlexMicron P		
6	36	FlexMicron P		
7	52	FlexMicron P		

2.4.4 Permissible differential pressure

The maximum permissible differential pressure of the elements is dependent on the temperature in the application. Please refer to the table below:

Temperature	Filter material		
	PES / GF	PP	PA
-10 ... + 30 °C	8 bar	4 bar	7 bar
-10 ... + 60 °C	6.5 bar	2 bar	5.5 bar
-10 ... +100 °C	5 bar	–	3.5 bar

2.5 CIRCUIT DIAGRAM



3. MODEL CODE PMRF 1/2/3/4/5/6/7

PMRF - 4 - E / 17 - Q - 40 - 10 - F - 1 - X

Type
PMRF = Process Multi Rheo Filter

Size
1 = approx. 76 mm housing diameter
2 = approx. 223 mm housing diameter
3 = approx. 274 mm housing diameter
4 = approx. 355 mm housing diameter
5 = approx. 406 mm housing diameter
6 = approx. 508 mm housing diameter
7 = approx. 610 mm housing diameter

Housing material

	for size						
	1	2	3	4	5	6	7
E = stainless steel*							
NU = carbon steel uncoated*				4	5	6	7
NM = carbon steel with internal 2K epoxy coating*				4	5	6	7

* For quality, see technical specifications

Bold = standard

Number of elements

	for size						
1 = 1 filter element	1						
3 = 3 filter elements		2					
5 = 5 filter elements		2					
7 = 7 filter elements			3				
11 = 11 filter elements			3				
17 = 17 filter elements				4			
22 = 22 filter elements					5		
36 = 36 filter elements						6	
52 = 52 filter elements							7

Connection type

	for size						
D = G 1"	1	2	3				
F = G1/ 1/2"		2	3				
G = G 2"		2	3				
L = SAE DN50		2	3				
J = DIN DN 50		2	3				
Q = DIN DN 80				4			
R = DIN DN 100					5		
V = DIN DN 150						6	
W = DIN DN 200							7

Element size

	for size						
10 = 10 "	1	2	3				
20 = 20 "	1	2	3				
30 = 30 "	1	2	3				
40 = 40 "	1	2	3	4	5	6	7

Pressure range

	for size						
6 = 6 bar			3				
10 = 10 bar	1	2	3	4	5	6	7
16 = 16 bar				4	5	6	7
25 = 25 bar				4	5	6	7
40 = 40 bar	1			4	5	6	7

Bold = standard

Seal material

N = NBR
F = FPM (Viton)
E = EPDM

Clogging indicator

0 = without
1 = with visual indicator (PVD 2B.1)
2 = with visual-electrical indicator (PVD 2D.0/-L..)
3 = V01
4 = differential pressure gauge AL (measuring range 4 bar)
5 = differential pressure gauge Stainless steel (measuring range 4 bar)
6 = with electrical indicator (PVD 2C.0)

See Brochure no.:D7.706.1... Clogging Indicators for Process Filters

Modification number

X = the latest version is always supplied

3.1 MODEL CODE FLEXMICRON E (ECONOMY) FILTER ELEMENTS

N - 40 - FM-E - 005 - PP - 1 - F

Element length

10 = 10" 30 = 30"
20 = 20" 40 = 40"

Element type

FM-E= FlexMicron E (Economy)

Filtration rating

001 = 1 µm 010 = 10 µm 040 = 40 µm 090 = 90 µm
003 = 3 µm 020 = 20 µm 050 = 50 µm
005 = 5 µm 030 = 30 µm 070 = 70 µm

Material of filter element

PP = polypropylene

End cap type

0 = compression ring (DOE), no cap or seal (Ø 64 mm)
1 = plug-in adapter (1x 222 O-ring), flat end cap (Ø 64 mm)
2 = plug-in adapter (2x 222 O-ring), flat end cap (Ø 64 mm)
10 = gasket (DOE) (Ø 64 mm)
13 = plug-in adapter (2x 222 O-ring), locating spigot (Ø 64 mm)
14 = bayonet (2x 226 O-ring), locating spigot (Ø 64 mm)
others on request

Seal material

N = NBR
F = FPM (Viton)
E = EPDM

Other element models available on request

3.1 MODEL CODE FLEXMICRON S (STANDARD) FILTER ELEMENTS

N - 40 - FM-S - 005 - PP - 1 - F

Element length

10 = 10" 30 = 30"
20 = 20" 40 = 40"

Element type

FM-S= FlexMicron S (Standard)

Filtration rating

001 = 1 µm 010 = 10 µm 040 = 40 µm 090 = 90 µm
003 = 3 µm 020 = 20 µm 050 = 50 µm
005 = 5 µm 030 = 30 µm 070 = 70 µm

Material of filter element

PP = polypropylene
PA = polyamide

End cap type

0 = compression ring (DOE), no cap or seal (Ø 64 mm)
1 = plug-in adapter (1x 222 O-ring), flat end cap (Ø 64 mm)
2 = plug-in adapter (2x 222 O-ring), flat end cap (Ø 64 mm)
10 = gasket (DOE) (Ø 64 mm)
13 = plug-in adapter (2x 222 O-ring), locating spigot (Ø 64 mm)
14 = bayonet (2x 226 O-ring), locating spigot (Ø 64 mm)
others on request

Seal material

N = NBR E = EPDM
F = FPM (Viton) Z = No seal (only for end cap form 0)

Other element models available on request

3.1 MODEL CODE FLEXMICRON P (PREMIUM) FILTER ELEMENTS

N - 40 - FM-P - 005 - PES - 1 - F

Element length

10 = 10" 30 = 30"
20 = 20" 40 = 40"

Element type

FM-P= FlexMicron P (Premium)

Filtration rating

001 = 1 µm 010 = 10 µm 040 = 40 µm
003 = 3 µm 020 = 20 µm
005 = 5 µm 030 = 30 µm

Filter material

PES = Polyester
GF = Glass fibre

End cap type

1 = plug-in adapter (1x 222 O-ring), flat end cap, (Ø 64 mm)
2 = plug-in adapter (2x 222 O-ring), flat end cap, (Ø 64 mm)
3 = plug-in adapter (2x 222 O-ring), flat end cap, (Ø 70 mm)
5 = plug-in adapter (2x 222 O-ring), locating spigot, (Ø 70 mm)
7 = bayonet (2x 226 O-ring), locating spigot, (Ø 70 mm)
10 = open (gasket DOE), (Ø 64 mm)
12 = Cuno adapter (hanging elements), (Ø 64 mm)
others on request

Seal material

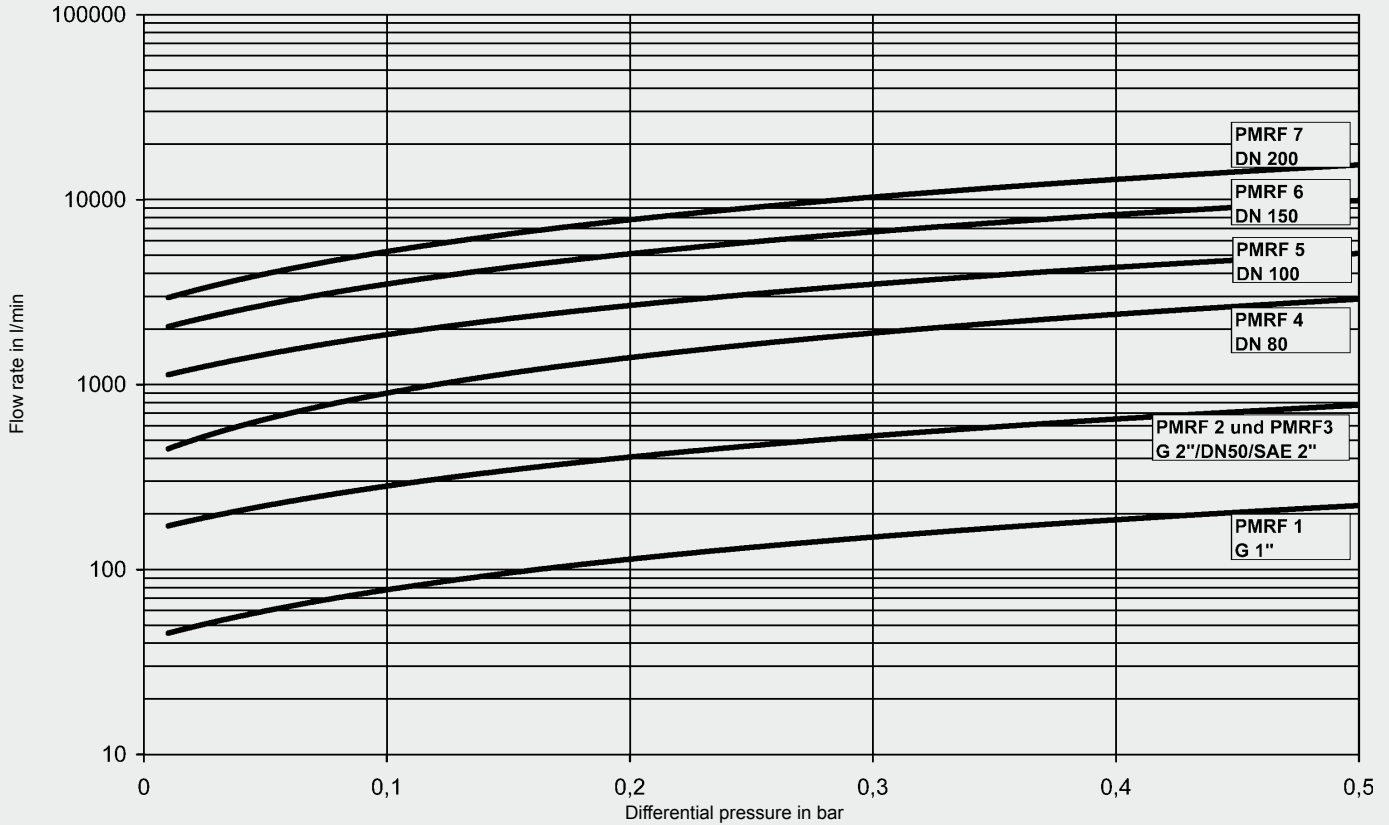
N = NBR
F = FPM (Viton)
E = EPDM

Other element models available on request

4. FILTER CALCULATION / SIZING

4.1 PRESSURE DROP CURVES HOUSING

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



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

The housing pressure drop can be determined using the following pressure drop curves. The pressure drop of the elements is calculated using the R factors.

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
- Integration of the PMRF into the whole system

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

4.2 PRESSURE DROP CALCULATION FOR ELEMENTS

The pressure drop for elements in clean condition is calculated as follows:

$$\Delta p [\text{bar}] = \frac{R \times V [\text{mm}^2/\text{s}] \times Q [\text{l}/\text{min}]}{n \times l [\text{inch}] \times 1000}$$

R = R factor
 V = viscosity [mm²/s]
 Q = flow rate [l/min]
 n = no. of elements
 L = element length [inch]

FlexMicron E (Economy) R (resistance) factor

Filtration rating [μm]	Water-based fluids PP
1	37
3	29
5	20
10	11
20	8
30	6.8
40	5.4
50	4.2
70	3.1

FlexMicron S (Standard) R (resistance) factor

Filtration rating [μm]	Water-based fluids	
	PA	PP
1	274	321
3	116	186
5	42	132
10	15	99
20	11	54
30	6	16
40	3.8	12
50	1.9	10
70	1.1	8
90	0.6	6

FlexMicron P (Premium) R (resistance) factor

Filtration rating [μm]	Water-based fluids PES*	Oils	
		PES*	GF**
1	32	10.4	5.4
3	24	7.5	-
5	18	4.4	4.3
10	17	1.8	3.2
20	15	1.8	-
30	14	0.9	-
40	14	0.9	-

* β > 5000

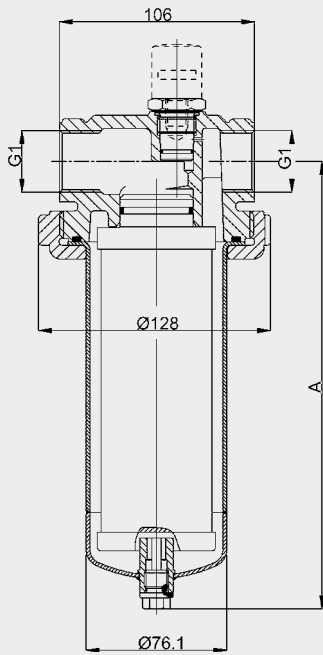
** β > 20000

5. DIMENSIONS

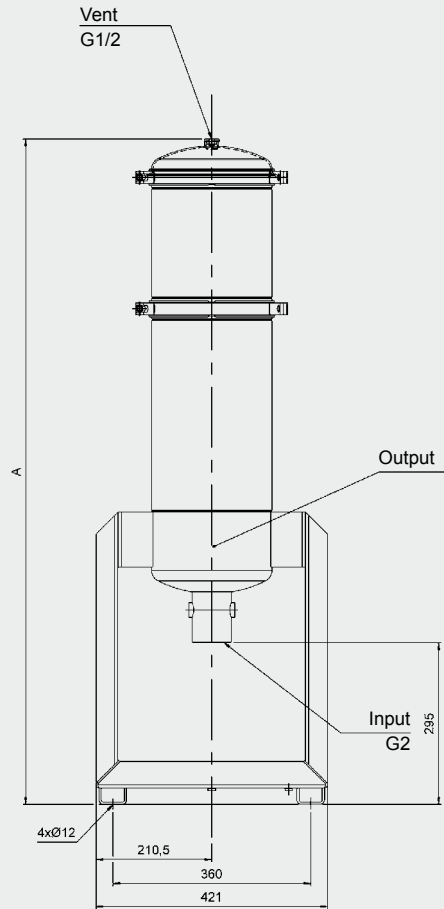
5.1 DIMENSIONS OF FILTER HOUSING

The dimensions given below are based on standard pressure ranges in combination with stainless steel or uncoated carbon steel housings. For carbon steel with internal coating, the filter housing is divided into an upper and lower section. This increases the overall height of the housing.

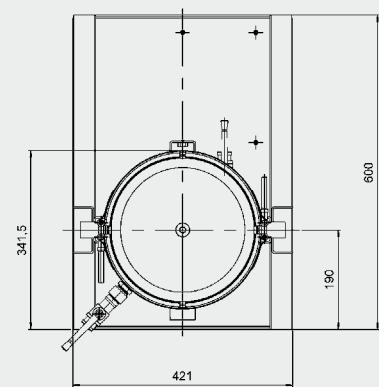
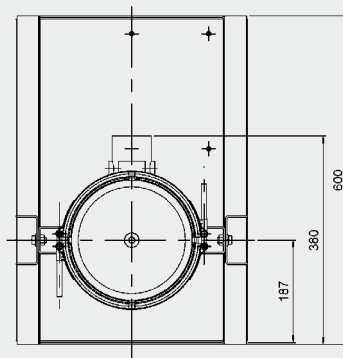
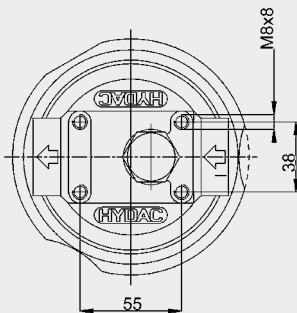
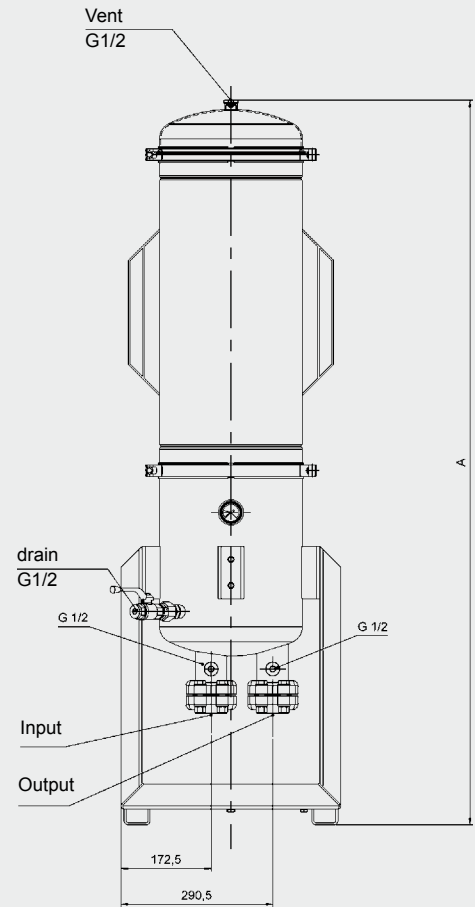
PMRF 1



PMRF 2



PMRF 3



Length	A	Volume [l]
10"	332.5	1.1
20"	586.5	2.1
30"	816	3
40"	1094.5	4

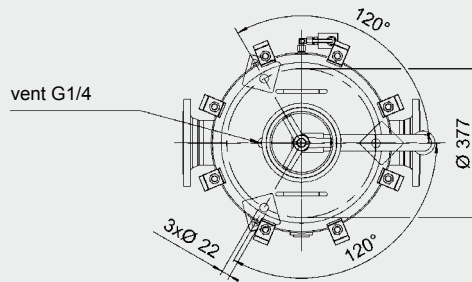
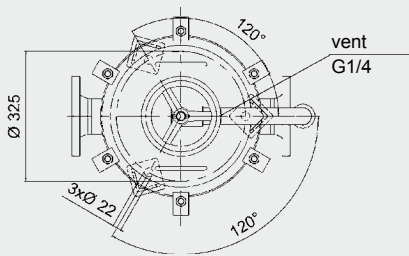
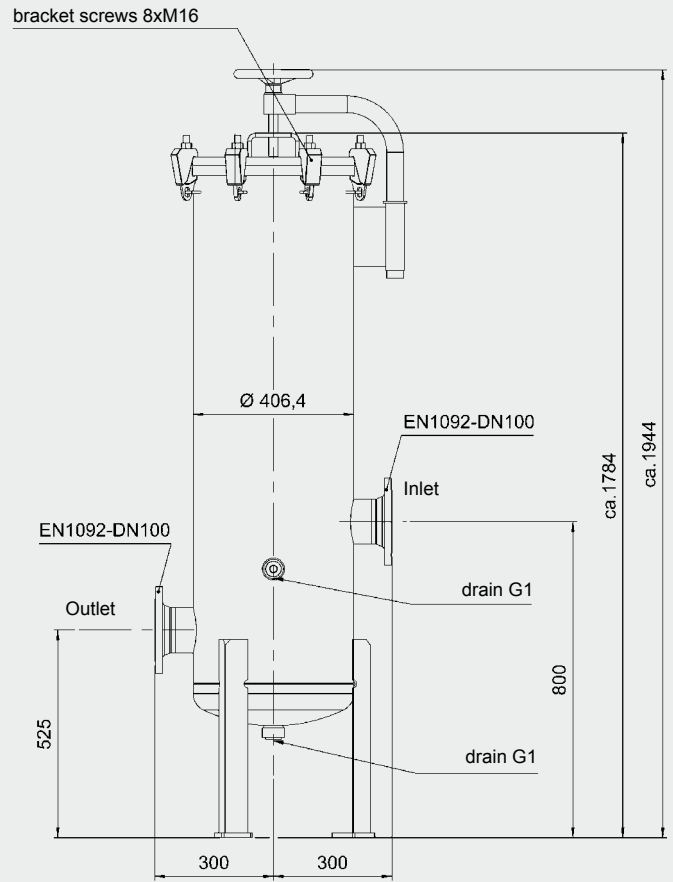
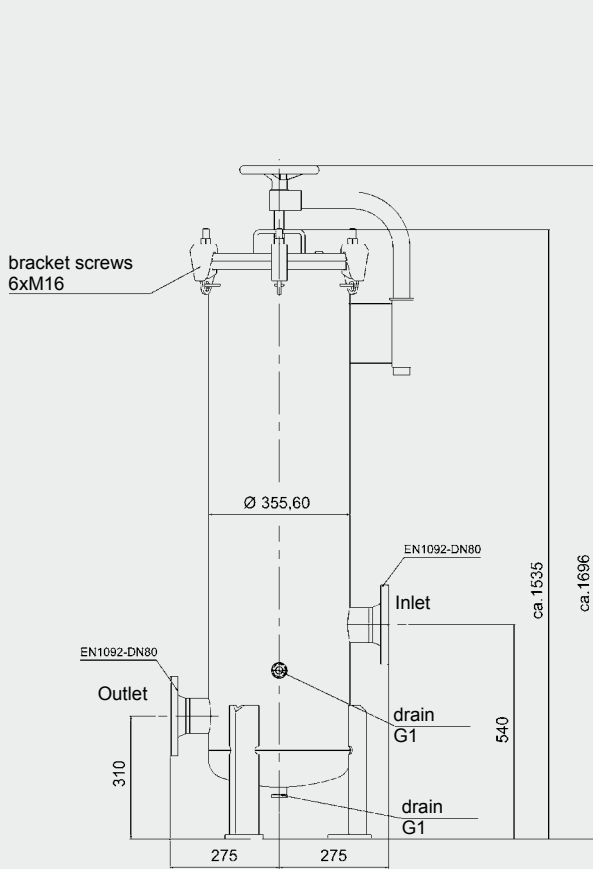
Length	A	Volume [l]
10"	975	17
20"	1215	26
30"	1433	35
40"	1682	45

Length	A	Volume [l]
10"	798	20
20"	1066	40
30"	1323	50
40"	1578	65

- The filter must not be used as a pipe support.
- The dimensions quoted have ± 5 mm tolerances for sizes up to 3.
- The dimensions quoted have ± 10 mm tolerances for sizes 4 upwards.

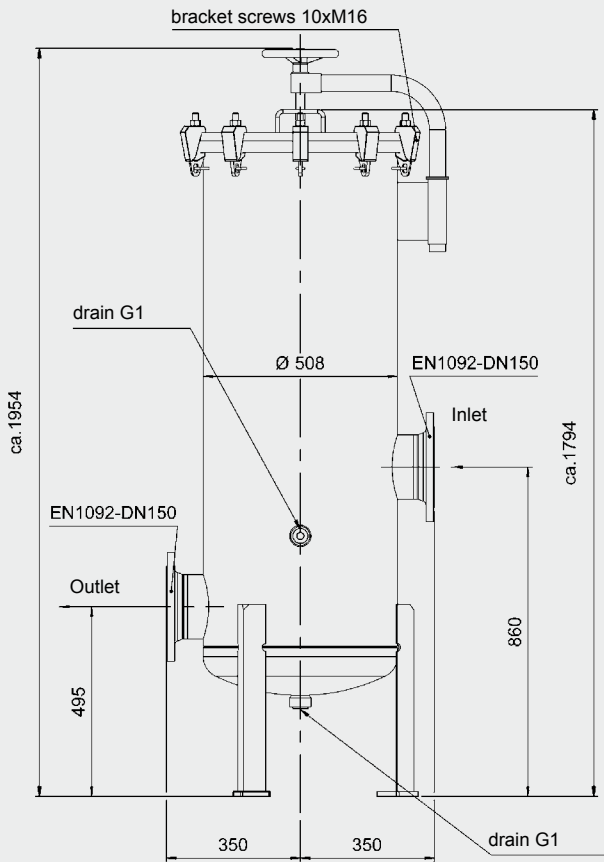
PMRF 4

PMRF 5

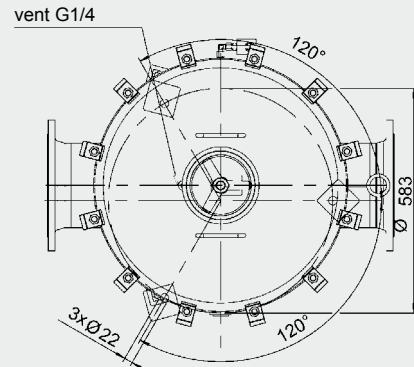
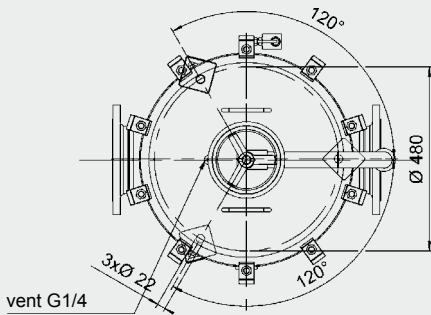
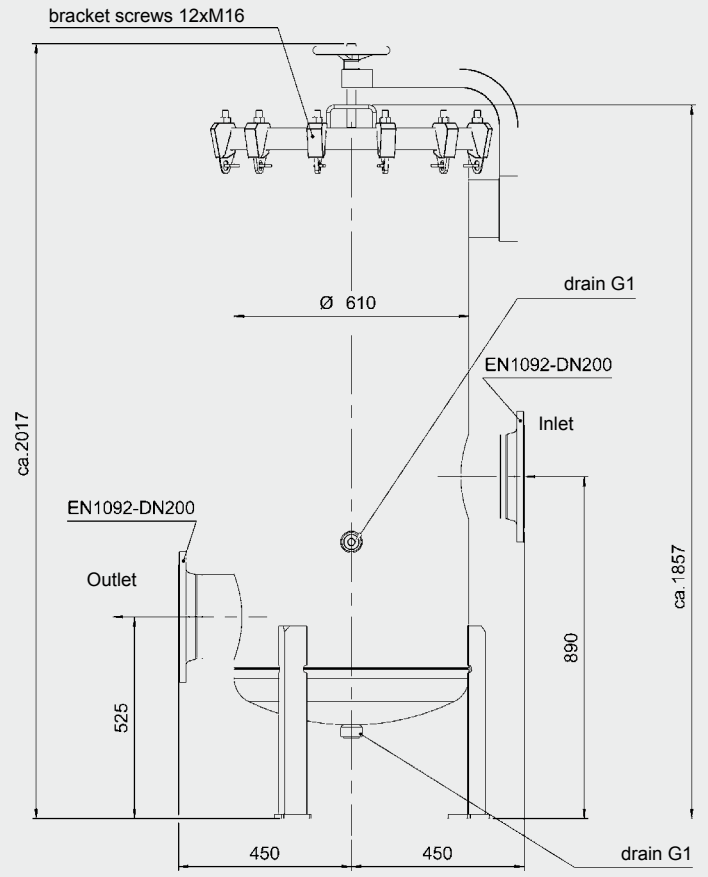


- The filter must not be used as a pipe support.
- The dimensions quoted have ± 5 mm tolerances for sizes up to 3.
- The dimensions quoted have ± 10 mm tolerances for sizes 4 upwards.

PMRF 6



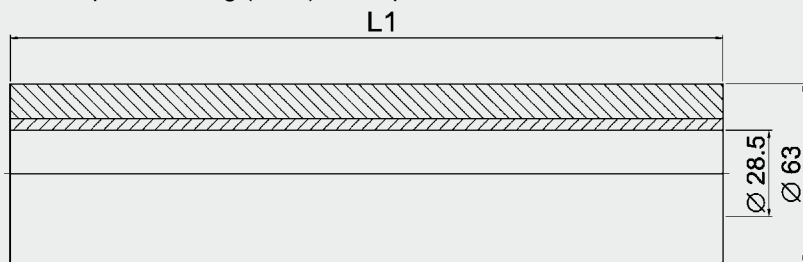
PMRF 7



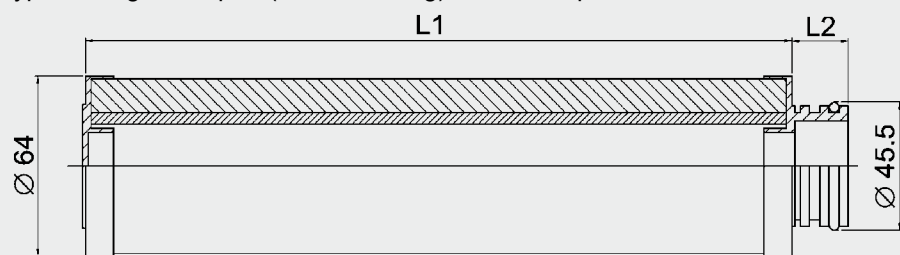
- The filter must not be used as a pipe support.
- The dimensions quoted have ± 5 mm tolerances for sizes up to 3.
- The dimensions quoted have ± 10 mm tolerances for sizes 4 upwards.

5.2 DIMENSIONS OF FLEXMICRON E ELEMENTS

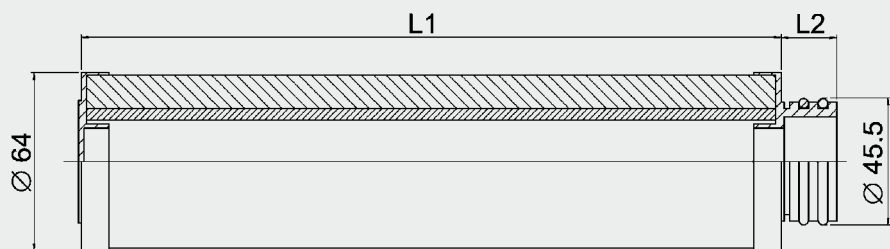
Type 0: Compression ring (DOE), no cap or seal



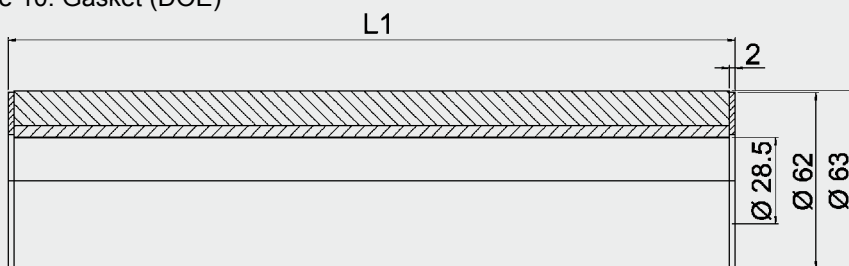
Type 1: Plug-in adapter (1 x 222 O-ring), flat end cap



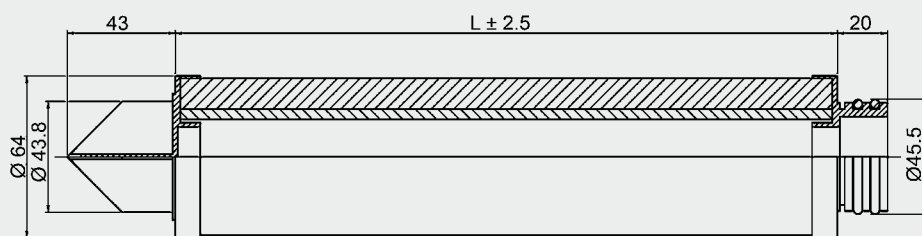
Type 2: Plug-in adapter (2 x 222 O-ring), flat end cap



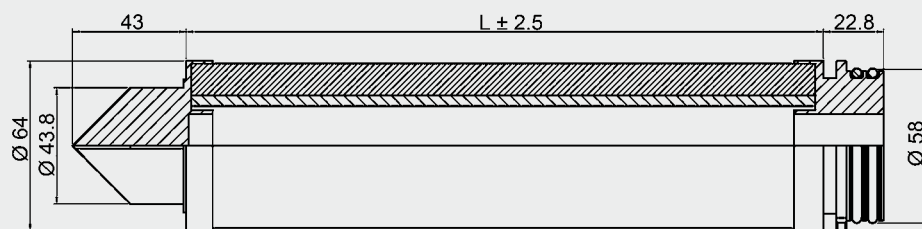
Type 10: Gasket (DOE)



Type 13: Plug-in adapter (2x 222 O-ring), locating spigot



Type 14: Bayonet (2x 226 O-ring), locating spigot



Code	L1 in mm
N10FM-E...	254
N20FM-E...	508
N30FM-E...	762
N40FM-E...	1016

Designation	L1 in mm	L2 in mm
N10FM-E...	254	20
N20FM-E...	508	20
N30FM-E...	762	20
N40FM-E...	1016	20

Designation	L1 in mm	L2 in mm
N10FM-E...	254	20
N20FM-E...	508	20
N30FM-E...	762	20
N40FM-E...	1016	20

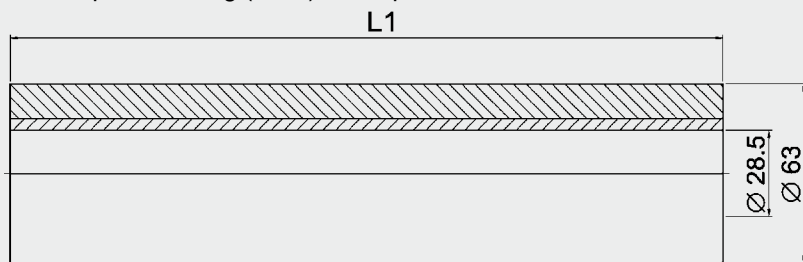
Designation	L1 in mm
N10FM-E...	254
N20FM-E...	508
N30FM-E...	762
N40FM-E...	1016

Designation	L1 in mm	L2 in mm
N10FM-E...	254	43
N20FM-E...	508	43
N30FM-E...	762	43
N40FM-E...	1016	43

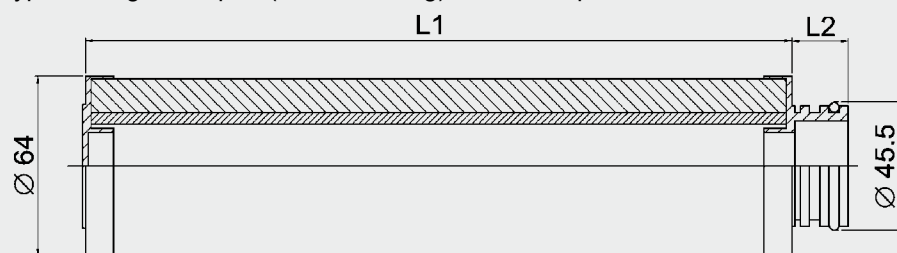
Designation	L1 in mm	L2 in mm
N10FM-E...	235	43
N20FM-E...	489	43
N30FM-E...	743	43
N40FM-E...	997	43

5.3 DIMENSIONS OF FLEXMICRON S ELEMENTS

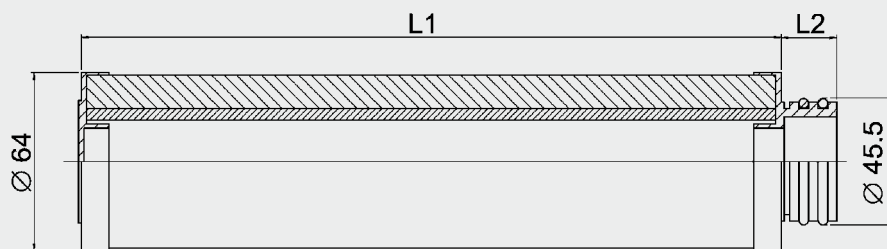
Type 0: Compression ring (DOE), no cap or seal



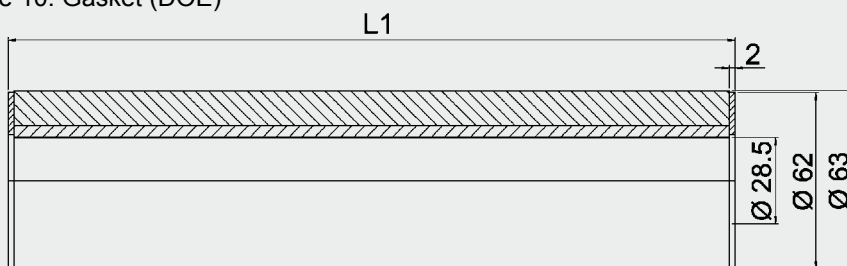
Type 1: Plug-in adapter (1 x 222 O-ring), flat end cap



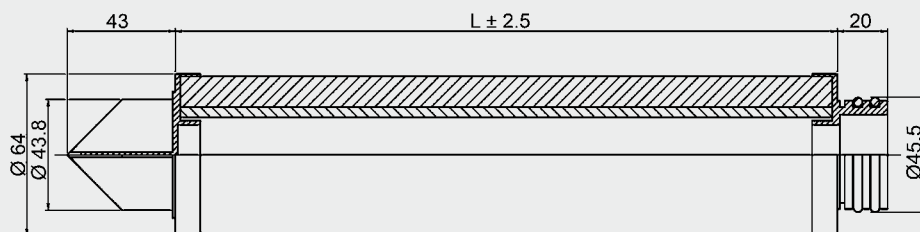
Type 2: Plug-in adapter (2 x 222 O-ring), flat end cap



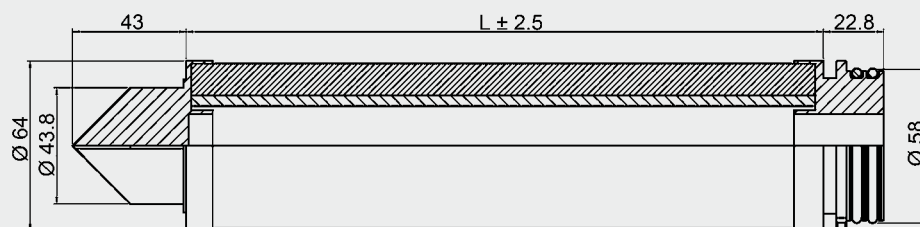
Type 10: Gasket (DOE)



Type 13: Plug-in adapter (2x 222 O-ring), locating spigot



Type 14: Bayonet (2x 226 O-ring), locating spigot



Code	L1 in mm
N10FM-S...	254
N20FM-S...	508
N30FM-S...	762
N40FM-S...	1016

Designation	L1 in mm	L2 in mm
N10FM-S...	254	20
N20FM-S...	508	20
N30FM-S...	762	20
N40FM-S...	1016	20

Designation	L1 in mm	L2 in mm
N10FM-S...	254	20
N20FM-S...	508	20
N30FM-S...	762	20
N40FM-S...	1016	20

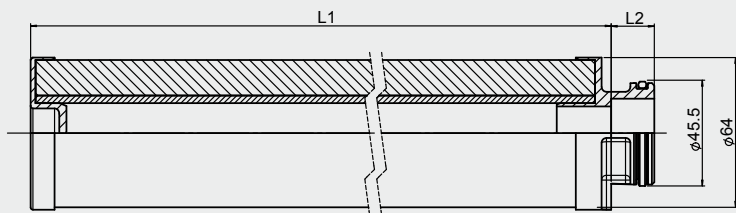
Designation	L1 in mm
N10FM-S...	254
N20FM-S...	508
N30FM-S...	762
N40FM-S...	1016

Designation	L1 in mm	L2 in mm
N10FM-S...	254	43
N20FM-S...	508	43
N30FM-S...	762	43
N40FM-S...	1016	43

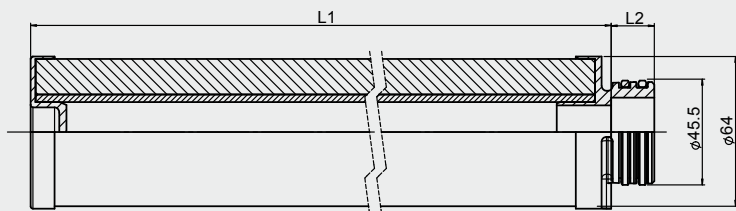
Designation	L1 in mm	L2 in mm
N10FM-S...	235	43
N20FM-S...	489	43
N30FM-S...	743	43
N40FM-S...	997	43

5.4 DIMENSIONS OF FLEXMICRON P (PREMIUM)

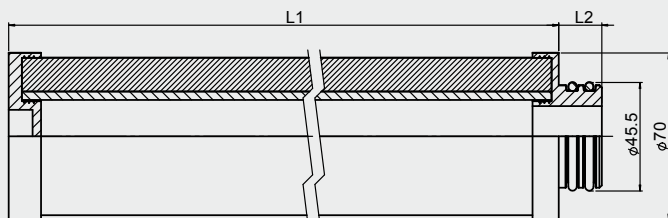
Type 1: Plug-in adapter (1 x 222 O-ring), flat end cap



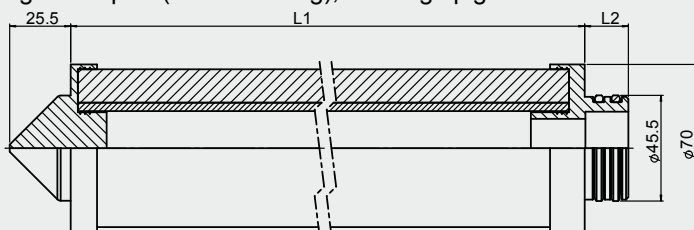
Type 2: Plug-in adapter (2 x 222 O-ring), flat end cap



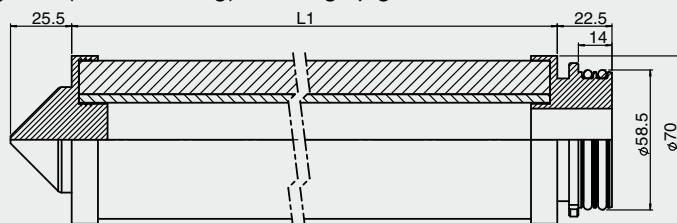
Type 3: Plug-in adapter (2 x 222 O-ring), flat end cap



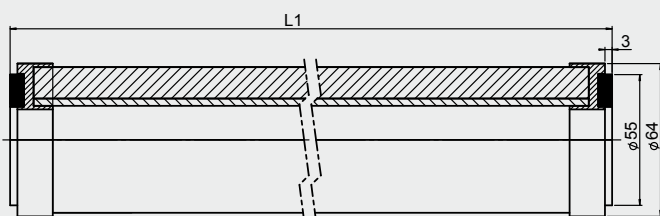
Type 5: Plug-in adapter (2x 222 O-ring), locating spigot



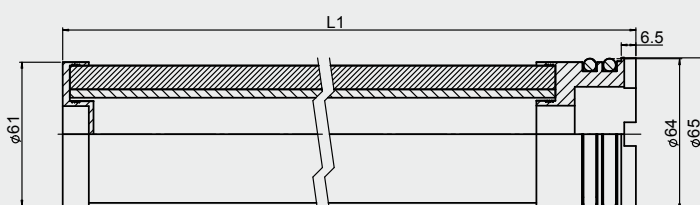
Type 7: Bayonet (2x 226 O-ring), locating spigot



Type 10: Gasket (DOE), open



Type 12: Cuno adaptor (suspended elements)



Code	L1 in mm	L2 in mm
N10MR-P...	263	18
N13MR-P...	339	18
N20MR-P...	517	18
N30MR-P...	771	18
N40MR-P...	1025	18

Designation	L1 in mm	L2 in mm
N10MR-P...	263	18
N13MR-P...	339	18
N20MR-P...	517	18
N30MR-P...	771	18
N40MR-P...	1025	18

Designation	L1 in mm	L2 in mm
N10FM-P...	263	18
N13FM-P...	339	18
N20FM-P...	517	18
N30FM-P...	771	18
N40FM-P...	1025	18

Designation	L1 in mm	L2 in mm
N10FM-P...	263	18
N13FM-P...	339	18
N20FM-P...	517	18
N30FM-P...	771	18
N40FM-P...	1025	18

Designation	L1 in mm
N10FM-P...	241
N13FM-P...	317
N20FM-P...	495
N30FM-P...	749
N40FM-P...	1003

Designation	L1 in mm
N10MR-P...	254
N13MR-P...	330
N20MR-P...	508
N30MR-P...	762
N40MR-P...	1016
N40MR-P...-990	988

Designation	L1 in mm
N37FM-P...	977

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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E 7.714.1/04.14



Process Multi-Rheo Filter, Duplex Change-Over PMRFD

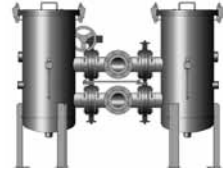
PMRFD-2



PMRFD-3



PMRFD-5



1. TECHNICAL SPECIFICATIONS

1.1 GENERAL

The filter series PMRFD (for single filters see PMRF) Process Multi-Rheo Change-over Filter completes the HYDAC Process Technology inline filter series. These filters use HYDAC FlexMicron filter elements. The elements feature outstanding contamination retention capacities. The filter housings are available in 7 different sizes and lengths and therefore a suitable filter can be found for every process. By using clogging indicators which monitor the differential pressure, the condition of the filter can be determined at any time.

Typical areas of application for this filter series are:

- Process water treatment
- Filtration of cooling lubricants and washing fluids
- Pure and ultrapure water production
- Boiler feed water
- Extending the service life of circulating fluids
- Protection filtration for UV and membrane systems

1.2 HOUSING

The filter housings in the PMRFD series are designed in accordance with international regulations. They are available in carbon steel or stainless steel and in various lengths.

1.3 FILTER ELEMENTS

1.3.1 FlexMicron E (Economy)

The filter elements in the FlexMicron E (Economy) product line are depth filter elements produced using melt-blown technology. They are used particularly in applications where an average level of fluid cleanliness and material purity is required and they provide a cost-effective solution.

Available lengths 10", 20", 30", 40" with a filtration rate of 95 %.

1.3.2 FlexMicron S (Standard)

The filter elements in the FlexMicron S (Standard) product line are SpunSpray depth filter elements produced using melt-blown technology. They are used particularly in applications where a high level of fluid cleanliness and

material purity is required.

Available lengths 10", 20", 30", 40" with a filtration rate of 99.8 %.

1.3.3 FlexMicron P (Premium)

The filter elements in the FlexMicron P (Premium) product line are heavy-duty pleated elements, produced using melt-blown or top-quality glass fibre technology. They are used particularly in applications requiring high levels of cleanliness. Available lengths 10", 20", 30", 40" with a filtration rate of up to 99.99 %.



2. FILTER SPECIFICATIONS

2.1 SUMMARY OF TECHNICAL SPECIFICATIONS OF THE FILTER HOUSING (STANDARD CONFIGURATION)

Size	Length [inches]				Connection		Materials			Pressure range					Temperature [°C]	Weight [kg]	Volume [l]	
	10	20	30	40	SAE	Pipe thread G	DIN DN	Stainless steel ¹⁾	Carbon steel with int. corrosion protection	Carbon steel without int. corrosion protection	PN6	PN10	PN16	PN25				PN40
1	●	●	●	●		1"		●				●			●	-10 to 90	14	2x 8.4
2	●	●	●	●		2"	2", 1.5"	50	●			●	●				85	2x 38
3	●	●	●	●		2"	2", 1.5"	50	●			●	●				100	2x 65
4 ³⁾				●			50/ 80/ 100		●	●	●	●	●	●			290	2x 120
5 ³⁾				●			80/ 100/ 150		●	●	●	●	●	●			470	2x 180
6 ³⁾				●			100/ 150/ 200		●	●	●	●	●	●			730	2x 240
7 ³⁾				●			150/ 200/ 250		●	●	●	●	●	●			890	2x 465

¹⁾ Size 1 in stainless steel 1.4571, sizes 2 to 7 in stainless steel 1.4301

²⁾ based on length of 40 inches

³⁾ includes cover lifting device

2.2 FURTHER SPECIFICATIONS OF THE FILTER HOUSING

2.2.1 Seal materials

- NBR
- FPM (Viton)
- EPDM

2.2.2 Corrosion protection, external

- 2 layer primer (not required for stainless steel filters)

2.2.3 Corrosion protection, internal

- 2K epoxy coating (not required for stainless steel filters or for type NU)

2.2.4 Documentation

- Operating and maintenance instructions

2.3 OPTIONAL VERSIONS OF FILTER HOUSING

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

2.3.1 Housing manufacture

- ASME Code Design (with or without U-Stamp)

2.3.2 Flange connections

- ANSI
- JIS

2.3.3 Housing materials

- Various qualities of stainless steel
- Various qualities of carbon steel

2.3.4 Seal materials

- Various seal materials on request, depending on the resistance to the fluid.

2.3.5 Corrosion protection and external finishes

- RAL colours acc. customer requirements
- Various multi layer coatings

2.3.6 Differential pressure monitoring

- Visual
- Electrical
- Visual electrical
- Differential pressure gauge with 2 microswitches

2.3.7 Documentation

- Manufacturer's test certificates
 - Material certificates (3.1 according to DIN EN 10204)
 - 3rd parties (TÜV, ABS, Lloyds, etc.)
 - Welding procedure specifications (WPS) / Procedure Qualification Record (PQR)
 - Inspection plan and many other documents available on request
- Further optional models on request.

2.4 SUMMARY OF TECHNICAL SPECIFICATIONS OF FILTER ELEMENTS

2.4.1 FlexMicron E (Economy)

Size	No. of filter elements	Filter element type	Filter materials and filtration ratings [μm]	
			Polypropylene	Polyamide
1	1	FlexMicron E	Not available	
2	3 or 5	FlexMicron E	1, 3, 5, 10, 20, 30, 40, 50, 70, 90	
3	7 or 11	FlexMicron E		
4	17	FlexMicron E		
5	22	FlexMicron E		
6	36	FlexMicron E		
7	52	FlexMicron E		

2.4.2 FlexMicron S (Standard)

Size	No. of filter elements	Filter element type	Filter materials and filtration ratings [μm]	
			Polypropylene	Polyamide
1	1	FlexMicron S	Not available	
2	3 or 5	FlexMicron S	1, 3, 5, 10, 20, 30, 40, 50, 70, 90	
3	7 or 11	FlexMicron S		
4	17	FlexMicron S		
5	22	FlexMicron S		
6	36	FlexMicron S		
7	52	FlexMicron S		

2.4.2 FlexMicron P (Premium)

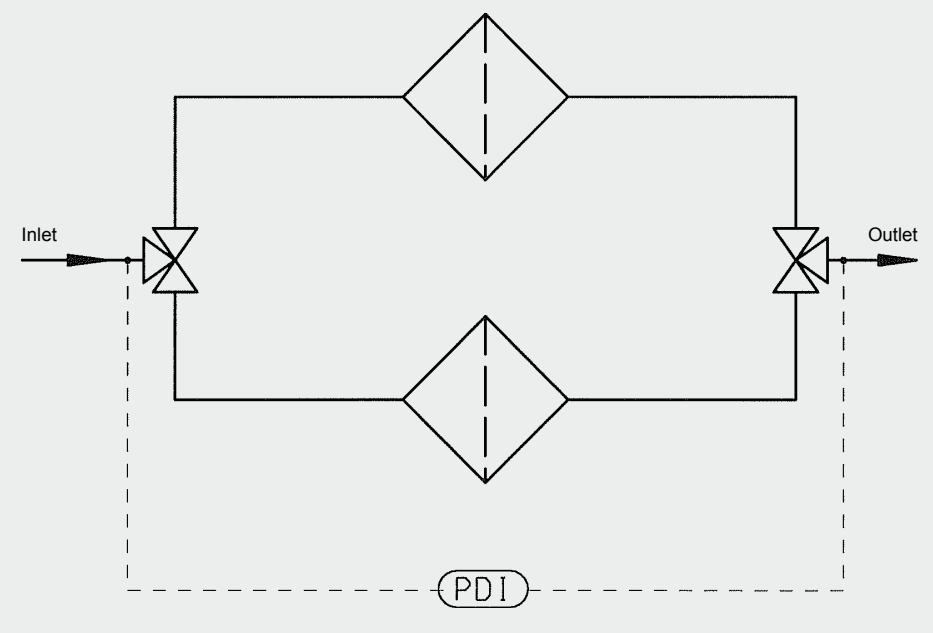
Size	No. of filter elements	Filter element type	Filter materials and filtration ratings [μm]	
			Polyester	Glass fibre
1	1	FlexMicron P	Not available	
2	3 or 5	FlexMicron P	1, 3, 5, 10, 20, 30, 40, 50, 70, 90	
3	7 or 11	FlexMicron P		
4	17	FlexMicron P		
5	22	FlexMicron P		
6	36	FlexMicron P		
7	52	FlexMicron P		

2.4.4 Permissible differential pressure

The maximum permissible differential pressure of the elements is dependent on the temperature in the application. Please refer to the table below:

Temperature	Filter material		
	PES	PP	PA
-10 ... + 30 °C	8 bar	4 bar	7 bar
-10 ... + 60 °C	6.5 bar	2 bar	5.5 bar
-10 ... +100 °C	5 bar	–	3.5 bar

2.5 CIRCUIT DIAGRAM



3. MODEL CODE PMRFD

PMRFD - 4 - E / 17 - Q - 40 - 10 - F - 1 - X

Type

PMRFD = Process Multi Rheo Change-Over Filter

Size

- 1 = approx. 76 mm housing diameter
- 2 = approx. 223 mm housing diameter
- 3 = approx. 274 mm housing diameter
- 4 = approx. 355 mm housing diameter
- 5 = approx. 406 mm housing diameter
- 6 = approx. 508 mm housing diameter
- 7 = approx. 610 mm housing diameter

Housing material

	for size						
	1	2	3	4	5	6	7
E = stainless steel*							
NU = carbon steel uncoated*				4	5	6	7
NM = carbon steel with internal 2K epoxy coating*				4	5	6	7

* For quality, see technical specifications

Bold = standard

Number of elements

	for size						
	1	2	3	4	5	6	7
1 = 1 filter element	1						
3 = 3 filter elements		2					
5 = 5 filter elements		2					
7 = 7 filter elements			3				
11 = 11 filter elements			3				
17 = 17 filter elements				4			
22 = 22 filter elements					5		
36 = 36 filter elements						6	
52 = 52 filter elements							7

Connection type

	for size						
	1	2	3	4	5	6	7
D = G 1"							
F = G1/ 1/2"		2	3				
G = G 2"		2	3				
L = SAE DN50		2	3				
J = DIN DN 50		2	3				
Q = DIN DN 80				4			
R = DIN DN 100					5		
V = DIN DN 150						6	
W = DIN DN 200							7

Element size

	for size						
	1	2	3	4	5	6	7
10 = 10"							
20 = 20"							
30 = 30"							
40 = 40"							

Pressure range

	for size						
	1	2	3	4	5	6	7
6 = 6 bar			3				
10 = 10 bar	1	2	3	4	5	6	7
16 = 16 bar				4	5	6	7
25 = 25 bar				4	5	6	7
40 = 40 bar	1			4	5	6	7

Bold = standard

Seal material

- N = NBR
- F = FPM (Viton)
- E = EPDM

Clogging indicator

- 0 = without
- 1 = with visual indicator (PVD 2B.1)
- 2 = with visual-electrical indicator (PVD 2D.0/-L..)
- 3 = V01
- 4 = differential pressure gauge AL (measuring range 4 bar)
- 5 = differential pressure gauge stainless steel (measuring range 4 bar)
- 6 = with electrical indicator (PVD 2C.0)

See Brochure no.:D7.706.1... Clogging Indicators for Process Filters

Modification number

- X = the latest version is always supplied

3.1 MODEL CODE FLEXMICRON E (ECONOMY) ELEMENTS

N - 40 - FM-E - 005 - PP - 1 - F

Element length

10 = 10" 30 = 30"
20 = 20" 40 = 40"

Element type

FM-E= FlexMicron E (Economy)

Filtration rating

001 = 1 µm 010 = 10 µm 040 = 40 µm 090 = 90 µm
003 = 3 µm 020 = 20 µm 050 = 50 µm
005 = 5 µm 030 = 30 µm 070 = 70 µm

Material of filter element

PP = polypropylene

End cap type

0 = compression ring (DOE), no cap or seal (Ø 64 mm)
1 = plug-in adapter (1x 222 O-ring), flat end cap (Ø 64 mm)
2 = plug-in adapter (2x 222 O-ring), flat end cap (Ø 64 mm)
10 = gasket (DOE) (Ø 64 mm)
13 = plug-in adapter (2x 222 O-ring), locating spigot (Ø 64 mm)
14 = bayonet (2x 226 O-ring), locating spigot (Ø 64 mm)
others on request

Seal material

F = FPM
N = NBR
E = EPDM
Z = no seal (only for end cap form 0)
Other types of element on request

3.2 MODEL CODE FLEXMICRON S (STANDARD) ELEMENTS

N - 40 - FM-S - 005 - PP - 1 - F

Element length

10 = 10" 30 = 30"
20 = 20" 40 = 40"

Element type

FM-S= FlexMicron S (Standard)

Filtration rating

001 = 1 µm 010 = 10 µm 040 = 40 µm 090 = 90 µm
003 = 3 µm 020 = 20 µm 050 = 50 µm
005 = 5 µm 030 = 30 µm 070 = 70 µm

Material of filter element

PP = polypropylene
PA = polyamide

End cap type

0 = compression ring (DOE), no cap or seal (Ø 64 mm)
1 = plug-in adapter (1x 222 O-ring), flat end cap (Ø 64 mm)
2 = plug-in adapter (2x 222 O-ring), flat end cap (Ø 64 mm)
10 = gasket (DOE) (Ø 64 mm)
13 = plug-in adapter (2x 222 O-ring), locating spigot (Ø 64 mm)
14 = bayonet (2x 226 O-ring), locating spigot (Ø 64 mm)
others on request

Seal material

F = FPM
N = NBR
E = EPDM
Z = no seal (only for end cap form 0)
Other types of element on request

3.1 MODEL CODE FLEXMICRON P (PREMIUM) ELEMENTS

N - 40 - FM-P - 005 - PES - 1 - F

Element length

10 = 10" 30 = 30"
20 = 20" 40 = 40"

Element type

FM-P= FlexMicron P (Premium)

Filtration rating

001 = 1 µm 010 = 10 µm 020 = 20 µm 040 = 40 µm
003 = 3 µm 005 = 5 µm 030 = 30 µm

Material of filter element

PP = polypropylene
GF = glass fibre

End cap type

0 = compression ring (DOE), no cap or seal (Ø 64 mm)
1 = plug-in adapter (1x 222 O-ring), flat end cap (Ø 64 mm)
2 = plug-in adapter (2x 222 O-ring), flat end cap (Ø 64 mm)
10 = gasket (DOE) (Ø 64 mm)
13 = plug-in adapter (2x 222 O-ring), locating spigot (Ø 64 mm)
14 = bayonet (2x 226 O-ring), locating spigot (Ø 64 mm)
others on request

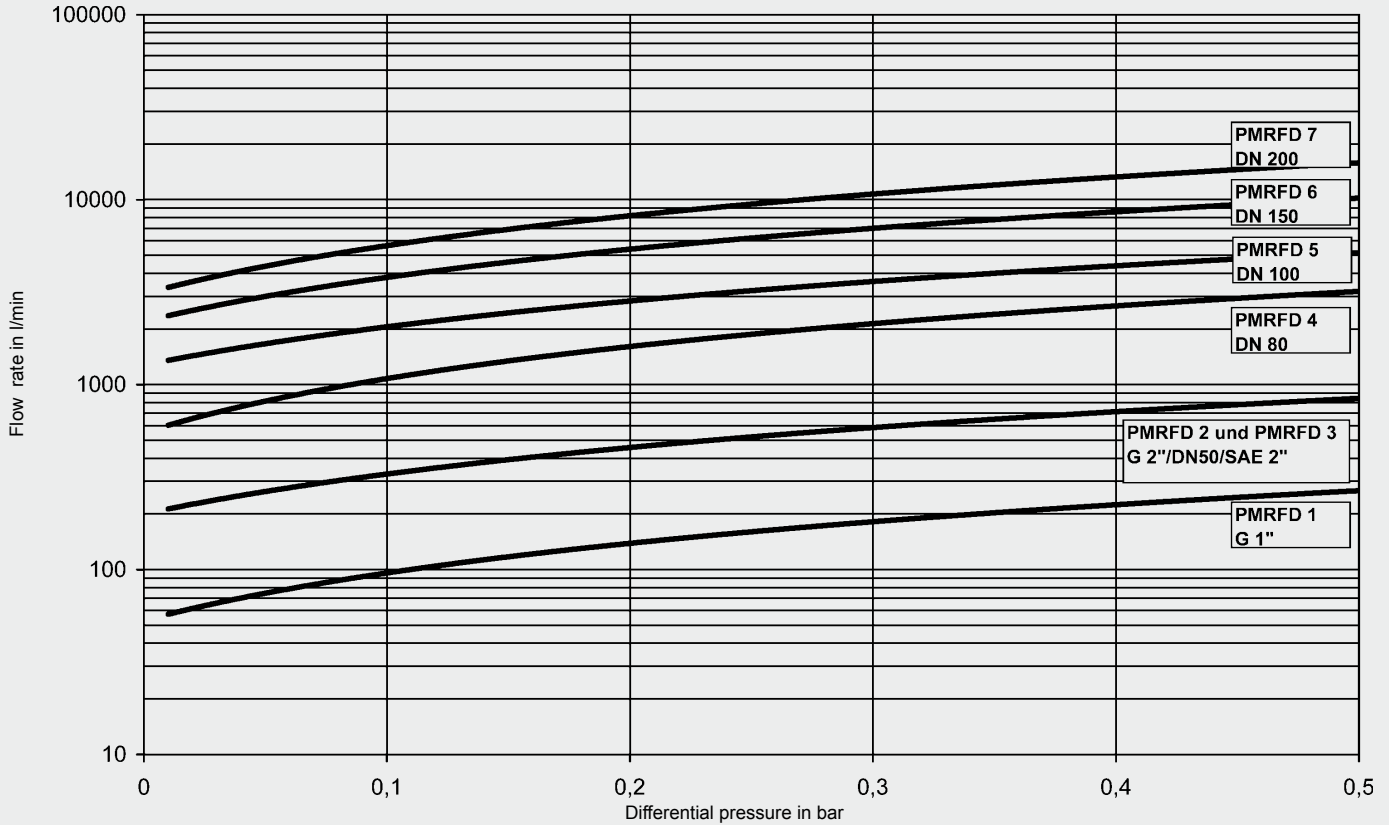
Seal material

F = FPM
N = NBR
E = EPDM
Other types of element on request

4. FILTER CALCULATION / SIZING

4.1 PRESSURE DROP CURVES HOUSING

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



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

The housing pressure drop can be determined using the following pressure drop curves. The pressure drop of the elements is calculated using the R factors.

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
- Integration of the PMRFD into the whole system

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

4.2 PRESSURE DROP CALCULATION FOR ELEMENTS

The pressure drop for elements in clean condition is calculated as follows:

$$\Delta p [\text{bar}] = \frac{R \times V [\text{mm}^2/\text{s}] \times Q [\text{l}/\text{min}]}{n \times l [\text{inch}] \times 1000}$$

R = R factor
 V = viscosity [mm²/s]
 Q = flow rate [l/min]
 n = no. of elements
 L = element length [inch]

FlexMicron E (Economy) R (resistance) factors

R factors	Water-based fluids	
	PA	PP
Filtration rating [μm]	1	37.0
	3	29.0
	5	20.0
	10	11.0
	20	8.0
	30	6.8
	40	5.4
	50	4.2
	70	3.1

FlexMicron S (Standard) R (resistance) factors

R factors	Water-based fluids		
	PA	PP	
Filtration rating [μm]	1	274	321
	3	116	186
	5	42	132
	10	15	99
	20	11	54
	30	6	16
	40	3.8	12
	50	1.9	10
	70	1.1	8
	90	0.6	6

FlexMicron P (Premium) R (resistance) factors

R factors	Water-based fluids			
	PES*	PES*	GF**	
Filtration rating [μm]	1	32	10.4	5.4
	3	24	7.5	-
	5	18	4.4	4.3
	10	17	1.8	3.2
	20	15	1.8	-
	30	14	0.9	-
	40	14	0.9	-

*β > 5000

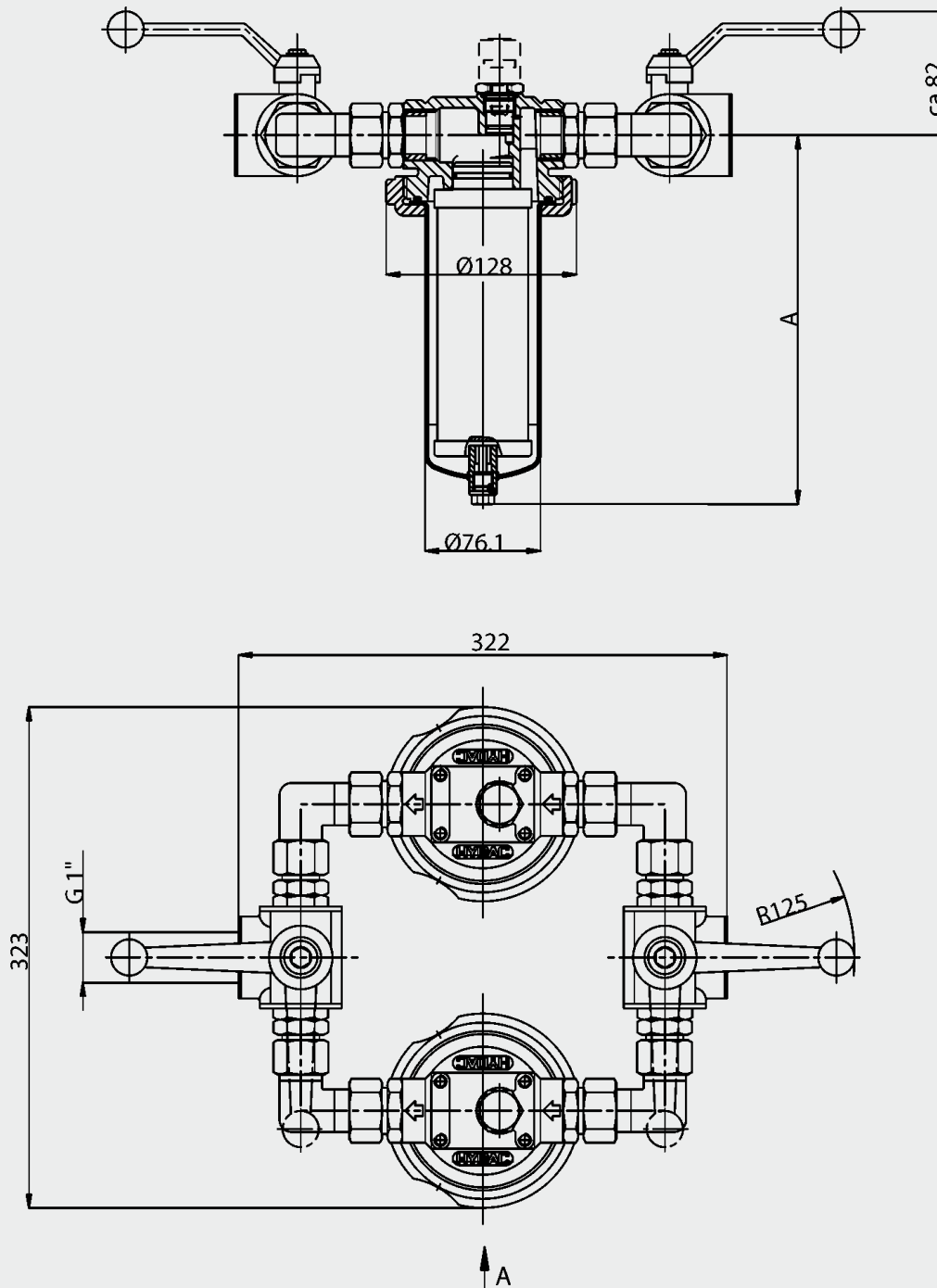
**β > 20000

5. DIMENSIONS

5.1 DIMENSIONS OF FILTER HOUSING

The dimensions given below are based on standard pressure ranges in combination with stainless steel or uncoated carbon steel housings. For carbon steel with internal coating, the filter housing is divided into an upper and lower section. This increases the overall height of the housing.

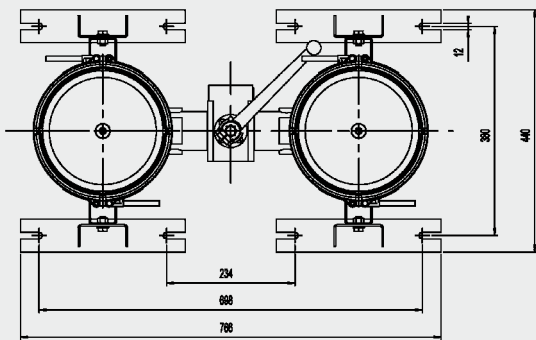
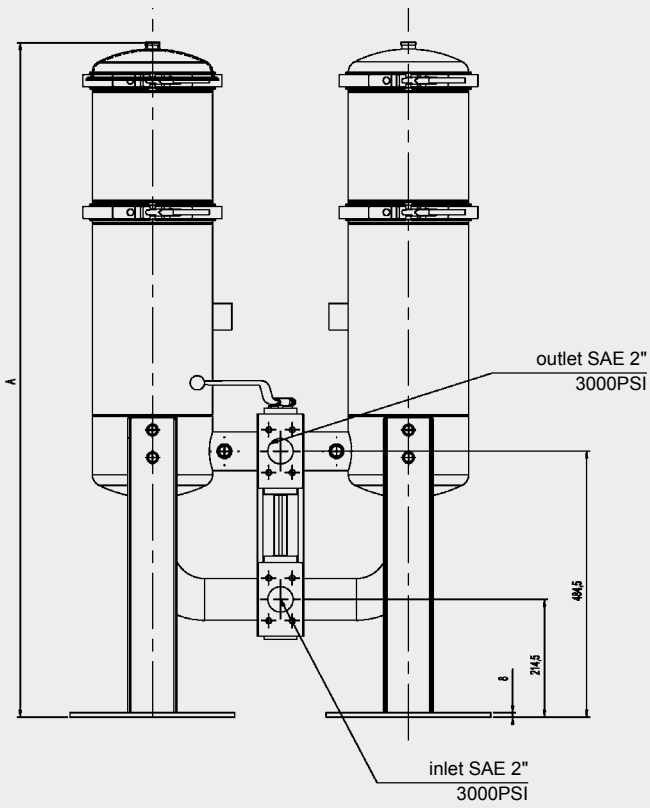
PMRFD 1



Length	A	Volume [l]
10"	332.5	2 x 1.1
20"	586.5	2 x 2.1
30"	816	2 x 3
40"	1094.5	2 x 4

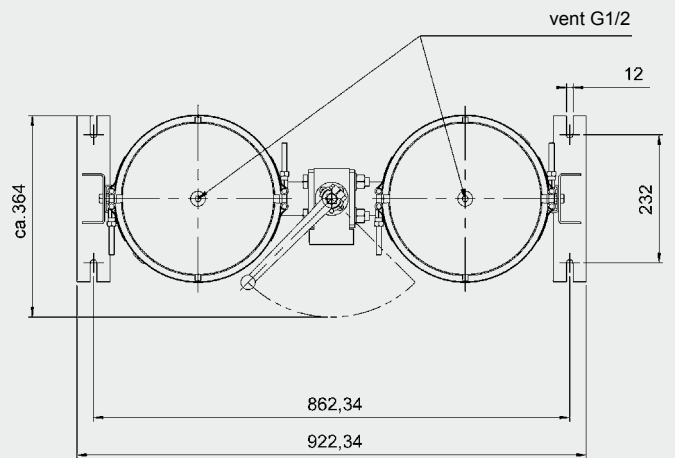
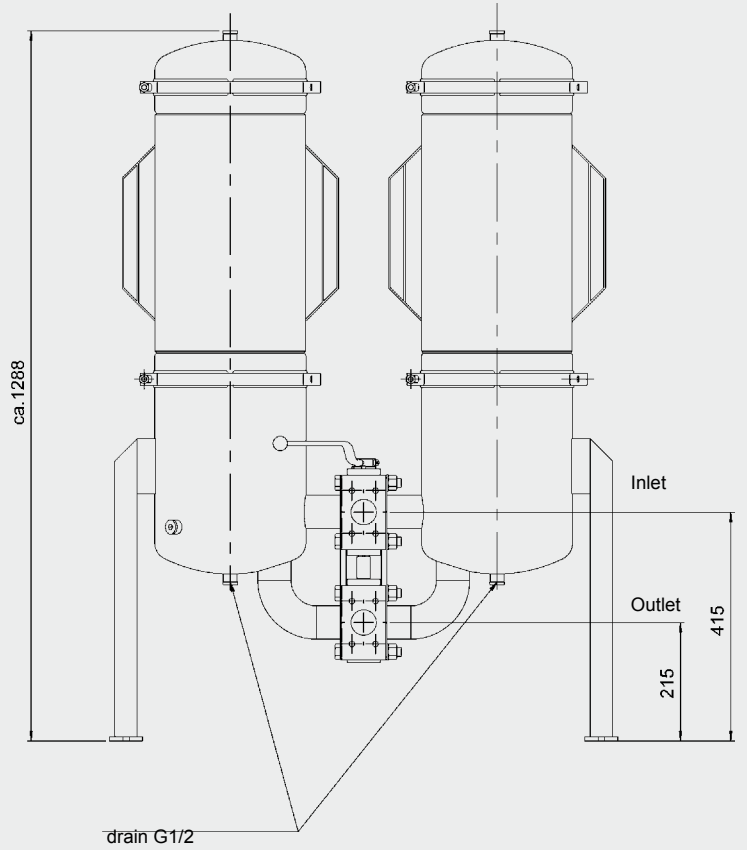
- The filter must not be used as a pipe support.
- The dimensions quoted have ± 5 mm tolerances for sizes up to 3.
- The dimensions quoted have ± 10 mm tolerances for sizes 4 upwards.

PMRFD 2



Length	A	Volume [l]
10"	975	2 x 17
20"	1215	2 x 26
30"	1433	2 x 35
40"	1682	2 x 45

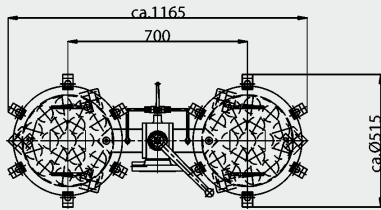
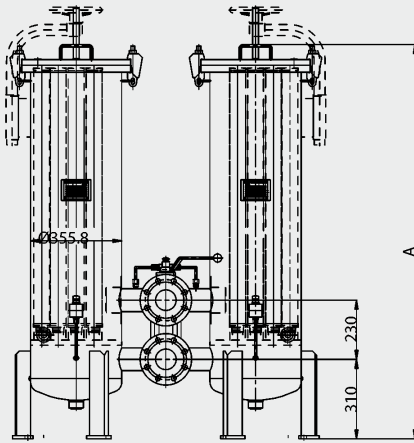
PMRFD 3



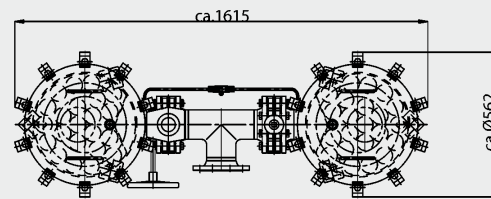
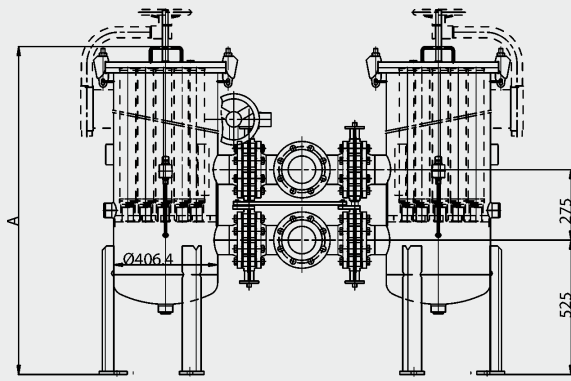
Length	A	Volume [l]
10"	798	2 x 20
20"	1066	2 x 40
30"	1323	2 x 50
40"	1578	2 x 65

- The filter must not be used as a pipe support.
- The dimensions quoted have ± 5 mm tolerances for sizes up to 3.
- The dimensions quoted have ± 10 mm tolerances for sizes 4 upwards.

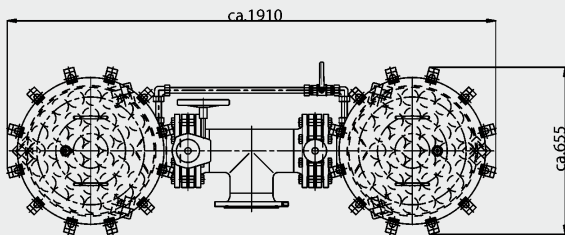
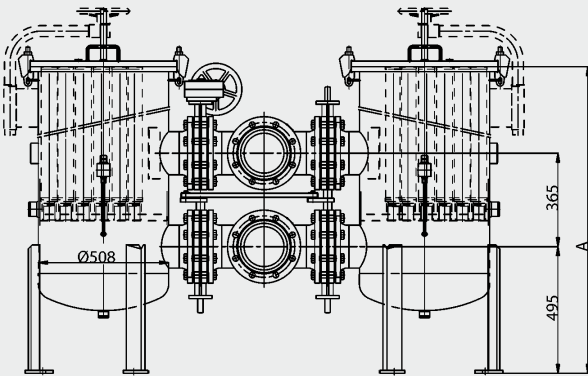
PMRFD 4



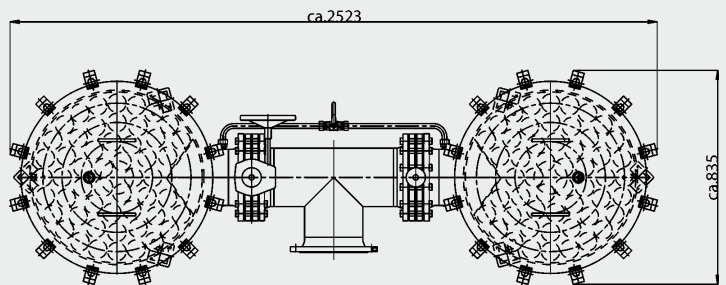
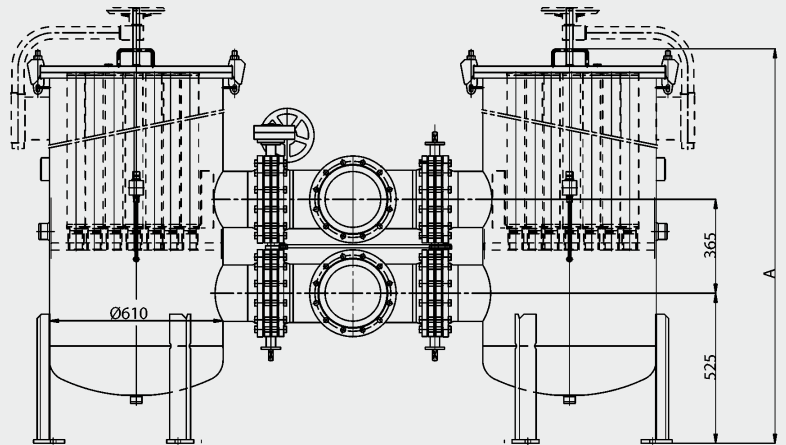
PMRFD 5



PMRFD 6



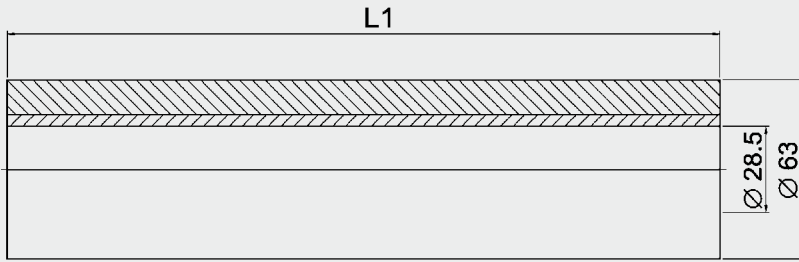
PMRFD 7



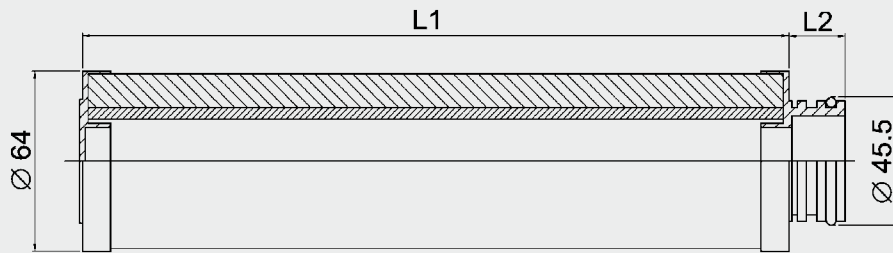
- The filter must not be used as a pipe support.
- The dimensions quoted have ± 5 mm tolerances for sizes up to 3.
- The dimensions quoted have ± 10 mm tolerances for sizes 4 upwards.

5.2 DIMENSIONS OF FLEXMICRON E ELEMENTS

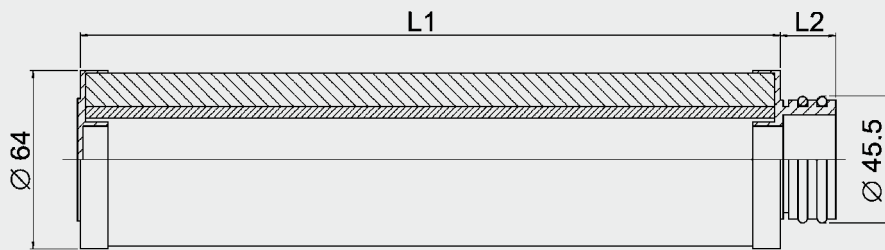
Type 0: Compression ring (DOE), no cap or seal



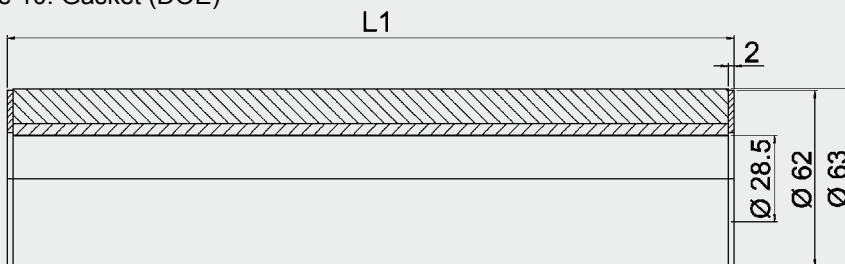
Type 1: Plug-in adapter (1 x 222 O-ring), flat end cap



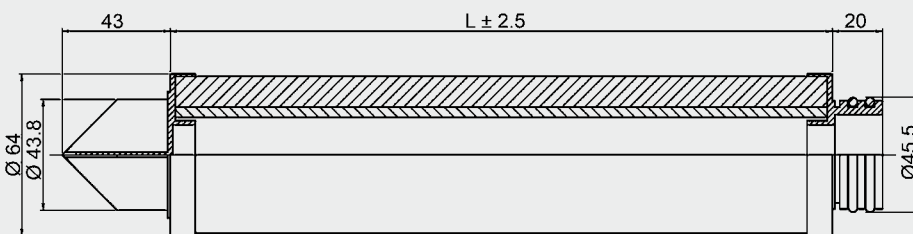
Type 2: Plug-in adapter (2 x 222 O-ring), flat end cap



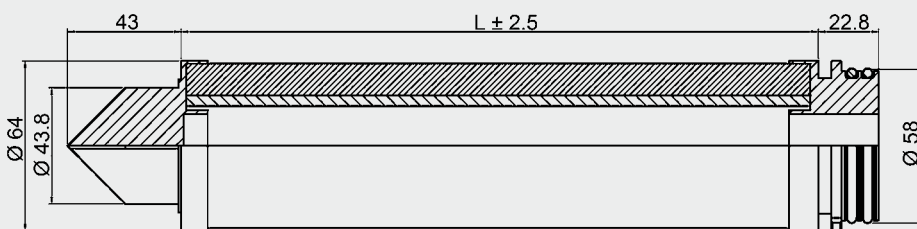
Type 10: Gasket (DOE)



Type 13: Plug-in adapter (2x 222 O-ring), locating spigot



Type 14: Bayonet (2x 226 O-ring), locating spigot



Code	L1 in mm
N10FM-E...	254
N20FM-E...	508
N30FM-E...	762
N40FM-E...	1016

Designation	L1 in mm	L2 in mm
N10FM-E...	254	20
N20FM-E...	508	20
N30FM-E...	762	20
N40FM-E...	1016	20

Designation	L1 in mm	L2 in mm
N10FM-E...	254	20
N20FM-E...	508	20
N30FM-E...	762	20
N40FM-E...	1016	20

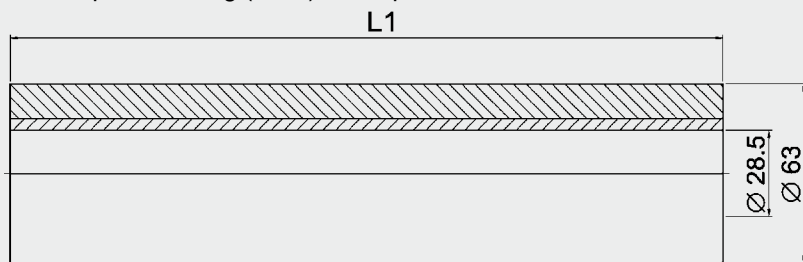
Designation	L1 in mm
N10FM-E...	254
N20FM-E...	508
N30FM-E...	762
N40FM-E...	1016

Designation	L1 in mm	L2 in mm
N10FM-E...	254	43
N20FM-E...	508	43
N30FM-E...	762	43
N40FM-E...	1016	43

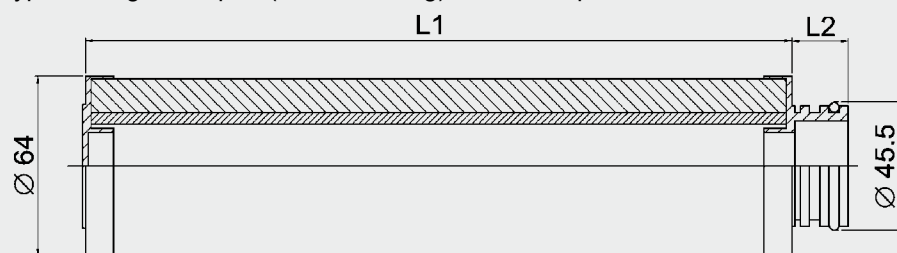
Designation	L1 in mm	L2 in mm
N10FM-E...	235	43
N20FM-E...	489	43
N30FM-E...	743	43
N40FM-E...	997	43

5.3 DIMENSIONS OF FLEXMICRON S ELEMENTS

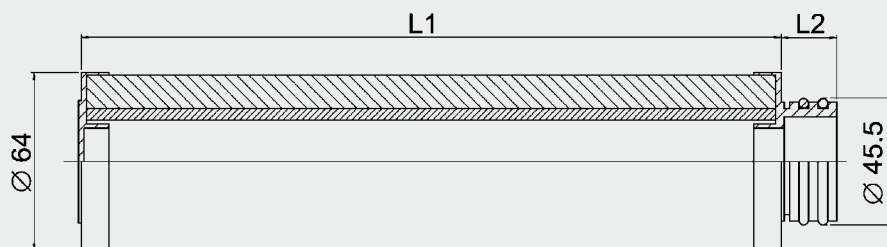
Type 0: Compression ring (DOE), no cap or seal



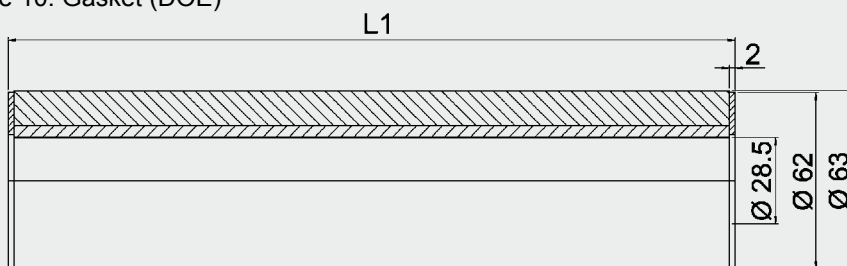
Type 1: Plug-in adapter (1 x 222 O-ring), flat end cap



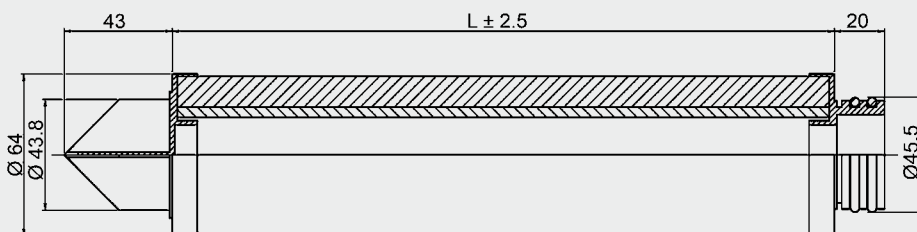
Type 2: Plug-in adapter (2 x 222 O-ring), flat end cap



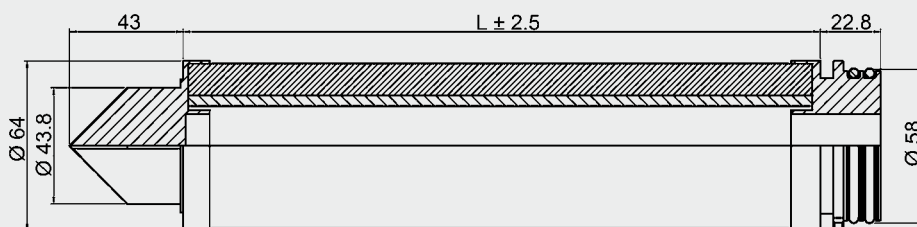
Type 10: Gasket (DOE)



Type 13: Plug-in adapter (2x 222 O-ring), locating spigot



Type 14: Bayonet (2x 226 O-ring), locating spigot



Code	L1 in mm
N10FM-S...	254
N20FM-S...	508
N30FM-S...	762
N40FM-S...	1016

Designation	L1 in mm	L2 in mm
N10FM-S...	254	20
N20FM-S...	508	20
N30FM-S...	762	20
N40FM-S...	1016	20

Designation	L1 in mm	L2 in mm
N10FM-S...	254	20
N20FM-S...	508	20
N30FM-S...	762	20
N40FM-S...	1016	20

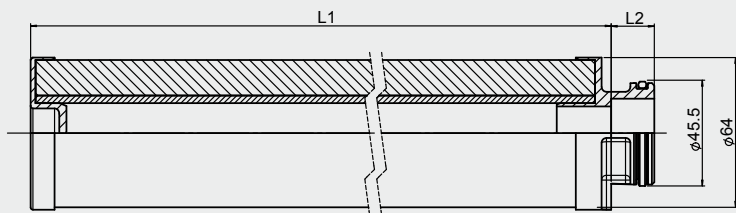
Designation	L1 in mm
N10FM-S...	254
N20FM-S...	508
N30FM-S...	762
N40FM-S...	1016

Designation	L1 in mm	L2 in mm
N10FM-S...	254	43
N20FM-S...	508	43
N30FM-S...	762	43
N40FM-S...	1016	43

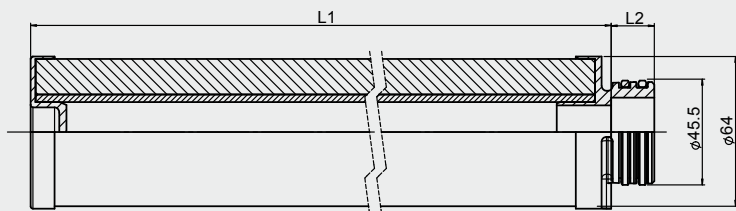
Designation	L1 in mm	L2 in mm
N10FM-S...	235	43
N20FM-S...	489	43
N30FM-S...	743	43
N40FM-S...	997	43

5.4 DIMENSIONS OF FLEXMICRON P (PREMIUM)

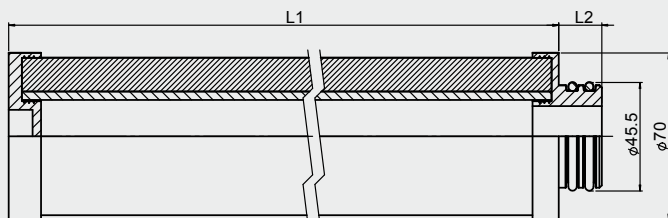
Type 1: Plug-in adapter (1 x 222 O-ring), flat end cap



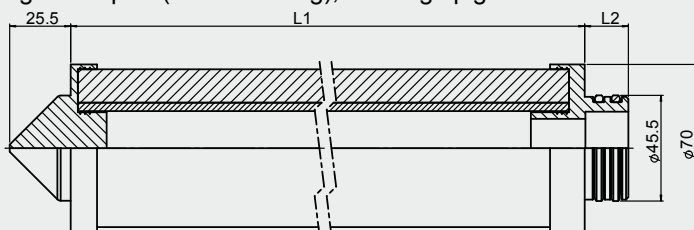
Type 2: Plug-in adapter (2 x 222 O-ring), flat end cap



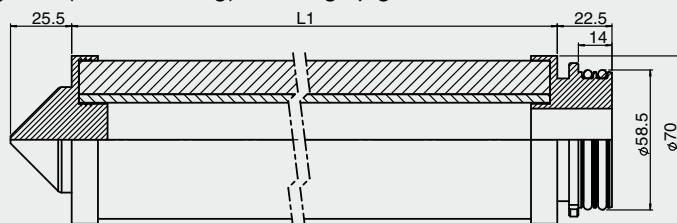
Type 3: Plug-in adapter (2 x 222 O-ring), flat end cap



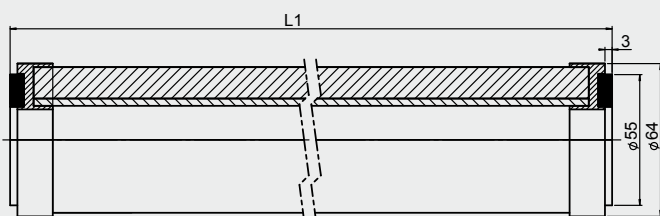
Type 5: Plug-in adapter (2x 222 O-ring), locating spigot



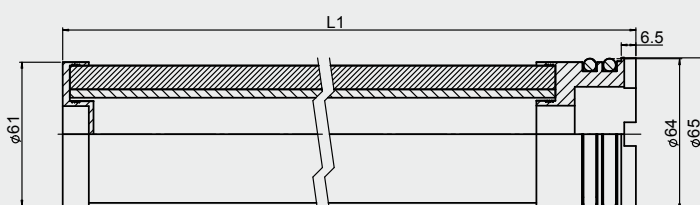
Type 7: Bayonet (2x 226 O-ring), locating spigot



Type 10: Gasket (DOE), open



Type 12: Cuno adaptor (suspended elements)



Code	L1 in mm	L2 in mm
N10MR-P...	263	18
N13MR-P...	339	18
N20MR-P...	517	18
N30MR-P...	771	18
N40MR-P...	1025	18

Designation	L1 in mm	L2 in mm
N10MR-P...	263	18
N13MR-P...	339	18
N20MR-P...	517	18
N30MR-P...	771	18
N40MR-P...	1025	18

Designation	L1 in mm	L2 in mm
N10FM-P...	263	18
N13FM-P...	339	18
N20FM-P...	517	18
N30FM-P...	771	18
N40FM-P...	1025	18

Designation	L1 in mm	L2 in mm
N10FM-P...	263	18
N13FM-P...	339	18
N20FM-P...	517	18
N30FM-P...	771	18
N40FM-P...	1025	18

Designation	L1 in mm
N10FM-P...	241
N13FM-P...	317
N20FM-P...	495
N30FM-P...	749
N40FM-P...	1003

Designation	L1 in mm
N10MR-P...	254
N13MR-P...	330
N20MR-P...	508
N30MR-P...	762
N40MR-P...	1016
N40MR-P...-990	988

Designation	L1 in mm
N37FM-P...	977

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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Internet: www.hydac.com
E-Mail: prozess-technik@HYDAC.com

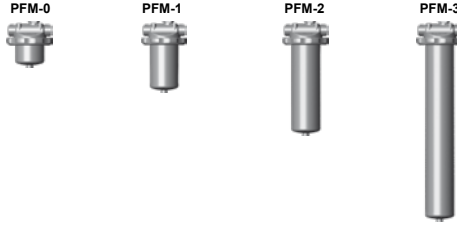
E 7.713.1/04.14





Process Filter Medium, High Pressure PFM, PFH

up to 120 l/min, up to 100 bar



1. TECHNICAL SPECIFICATIONS

1.1 GENERAL

HYDAC stainless steel inline filters, types PFM and PFH are designed for use in process engineering and chemical plants. They are suitable for separating contamination from low and high viscosity fluids. The range of different sizes, filter materials and sealing materials means that the filters can be adapted to the particular application conditions.

Depending on the required cleanliness level, the following stainless steel filter elements can be used: Chemicon®, pleated wire mesh or slotted tube. Contamination of the filter elements can be monitored by means of a clogging indicator (differential pressure monitoring) fitted to the filter.

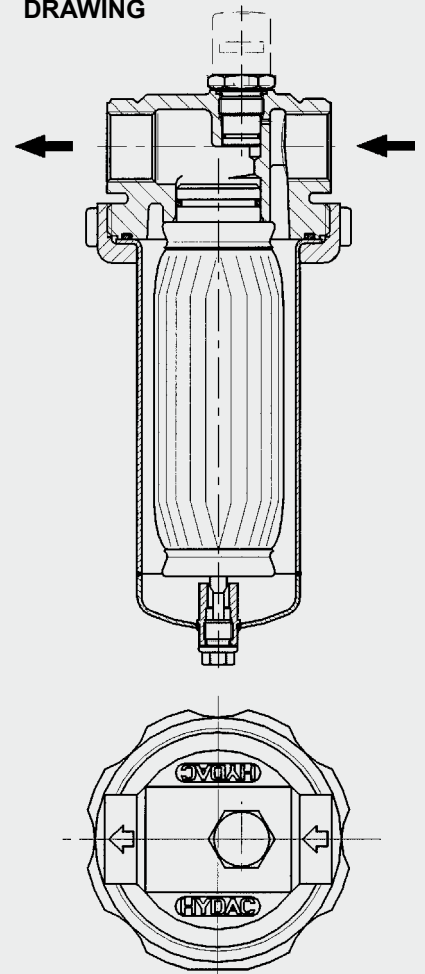
The direction of flow through the filter elements is from the outside to the inside. They can be cleaned several times, thereby saving the costs of disposal and re-purchase.

1.2 SUMMARY OF AVAILABLE SIZES AND CONNECTIONS

Series	Connection size	Pressure range
PFM	G 1	PN 40
PFH	G 1	PN 100

The selection of the filter bowl length depends on the level of contamination of the fluid and on the associated filter area.

1.3 SECTIONAL FUNCTIONAL DRAWING



2. FILTER SPECIFICATIONS

2.1 SUMMARY OF TECHNICAL SPECIFICATIONS OF THE FILTER HOUSING (STANDARD CONFIGURATION)

Series	Size	Connection size	Materials		Max. operating pressure [bar]	Max. temperature [°C]	Weight [kg]	Volume [l]
			Cover	Lock nut				
PFM	0	G 1	Stainless steel	Stainless steel	PN 40	100	4.4	0.4
	1						4.9	0.8
	2						5.6	1.6
	3						6.8	3.2
PFH	0				PN 100		4.5	0.4
	1						5.0	0.8
	2						5.7	1.6
	3	6.9	3.2					

* max. operating temperatures will reduce the pressure range:

PFM: max. 200 °C at Pmax = 16 bar

PFH: max. 200 °C at Pmax = 75 bar

2.2 FURTHER SPECIFICATIONS OF THE FILTER HOUSING (STANDARD CONFIGURATION)

2.2.1 Material of seal

FPM (Viton)

2.2.2 Documentation

Operating and Maintenance Instructions

2.3 SUMMARY OF TECHNICAL SPECIFICATIONS OF FILTER ELEMENTS

Size	Filter area		Filter materials and filtration ratings				Permiss. diff. pressure across element [bar]
	Pleated element	Slotted tube	Chemicon® (metal fibre)	Wire mesh	Slotted tube (with bonded end caps)	Slotted tube (with welded end caps)	
SZ-0	676	116	1, 3, 5, 10, 20	25, 40, 60, 100, 150, 200, 250	50, 100, 200, 300, 500, 1000, 1500, 2000	40	
SZ-1	1710	262					
SZ-2	3421	552					
SZ-3	6842	1133					

2.4. OPTIONAL VERSIONS

There are a range of optional versions available for the PFM/PFH process filters. For technical details and prices, please contact our Technical Sales Department at Head Office.

2.4.1 Flange connections

Various adaptations to the cylindrical pipe thread are available to suit flanges

- DIN
- ANSI
- JIS

These can either be piped or welded.

2.4.2 Seal materials

- FEP encapsulated Viton seals
- Various seal materials on request, depending on the resistance to the fluid

2.4.3 Differential pressure monitoring

- Visual
- Electrical
- Visual electrical
- Option of piping indicator separately for fluid temperatures > 100 °C

2.4.4 Filter elements

- Welded end caps on slotted tube filter elements
- Support spring

2.4.5 Duplex filter model

All PFM, PFH are available as duplex filters including pipework and change-over valve.

2.4.6 Documentation

- Manufacturer's test certificates
 - Material certificates (3.1 according to DIN EN 10204)
 - and many others on request
- Further optional models on request.

3. MODEL CODE

3.1 FILTER HOUSING PFM/PFH

PFM - 1 - G - 2 - V - X - L24 / ES

Filter type

PFM (stainless steel lock nut)
PFH (stainless steel lock nut)

Size

0 = short filter bowl
1 = medium filter bowl
2 = long filter bowl
3 = very long filter bowl

Type of connection

G = threaded connection 1"

Clogging indicator

0 = without clogging indicator
1 = visual indicator (PVD 2 B.1)
2 = visual-electrical indicator (PVD 2 D.0/-L..)
6 = electrical clogging indicator (PVD 2 C.0) *

Seal material

V = FPM (Viton), (max. +200 °C, standard)
E = EPDM (max. +150 °C)
N = NBR (max. +120 °C)
T = FEP encapsulated O-ring (max. +150 °C)
Other seals on request

Modification number

Supplementary details

Element code

* see Brochure on Clogging Indicators for Process Filters
No. 7.706.../...

3.2 FILTER ELEMENT

SZ - 1 - 20 - M - V

Element type

Size

0
1
2
3

Filtration rating in µm

1; 3; 5; 10; 20 Chemicron® (metal fibre)
25; 40; 60; 100; 150; 200; 250 (wire mesh)
50; 100; 200; 300; 500; 1000; 1500; 2000 (slotted tube)

Material of filter element

M = Chemicron® (metal fibre)
MS = Chemicron® (metal fibre) with support spring
D = wire mesh
DS = wire mesh with support spring
S = slotted tube

Seal material

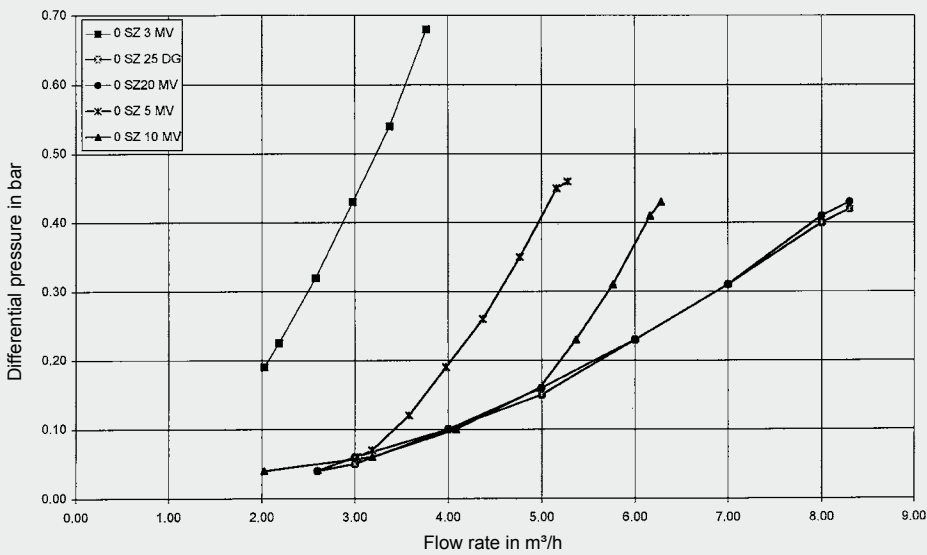
V = FPM (Viton) (max. +200 °C, standard)
E = EPDM (max. +150 °C)
N = NBR (max. +120 °C)
T = FEP encapsulated O-ring (max. +150 °C)
Other seals on request

4. FILTER CALCULATION / SIZING

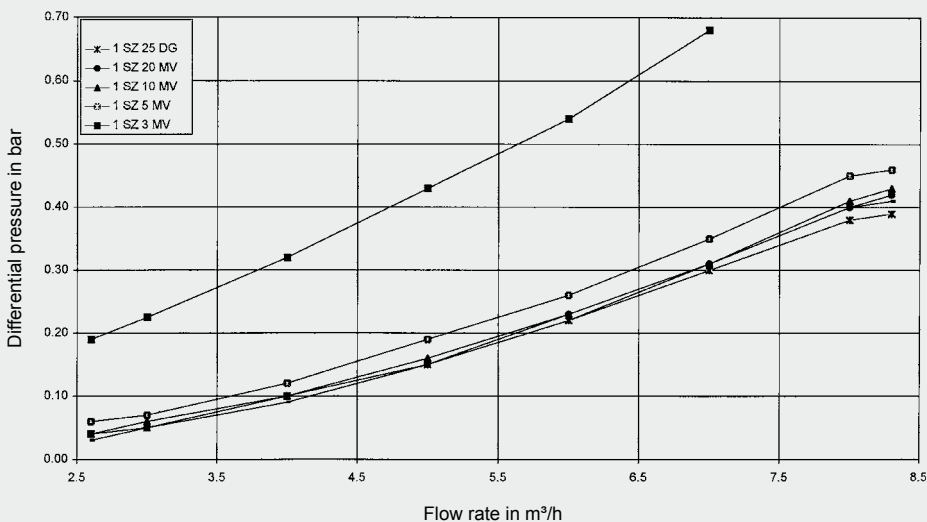
The curves apply to water at 20 °C or fluids to 15 mm²/s.

4.1. PRESSURE DROP CURVES HOUSING

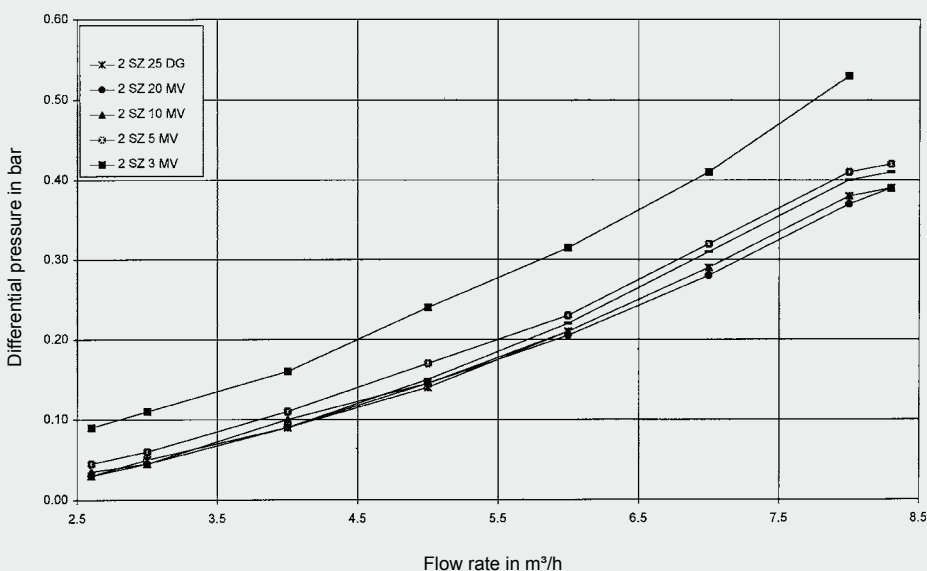
4.1.1 Pressure drop PFM/PFH Size 0



4.1.2 Pressure drop PFM/PFH Size 1



4.1.3 Pressure drop PFM/PFH Sizes 2 and 3



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

Use the pressure drop curves to calculate the Stainless Steel Process Inline Filters PFM, PFH. Generally speaking, an initial - Δp (clean filter condition) of 0.2 bar should not be exceeded.

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

3.2.1 FILTRATION PERFORMANCE

- Retention rates for wire mesh and slotted tube:

Nominal retention rates

The filtration rating given in the model code is based on a HYDAC factory standard filter test.

This test is carried out by introducing a large amount of dust (ISO MTD) at the beginning of the filter test and subsequently separating the contamination particles over 1 hour. The test filter must retain 90 - 95 % of all particles larger than the given filtration rating.

- Retention rates for Chemicon® (metal fibre):

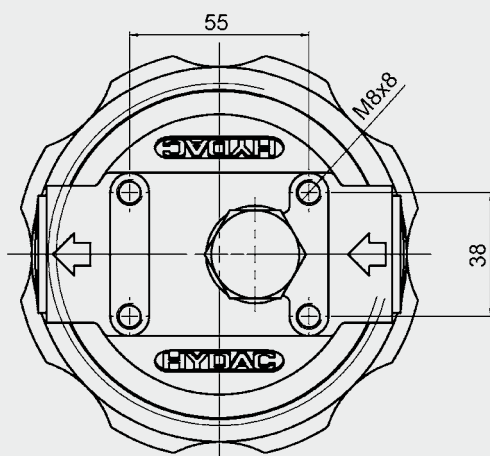
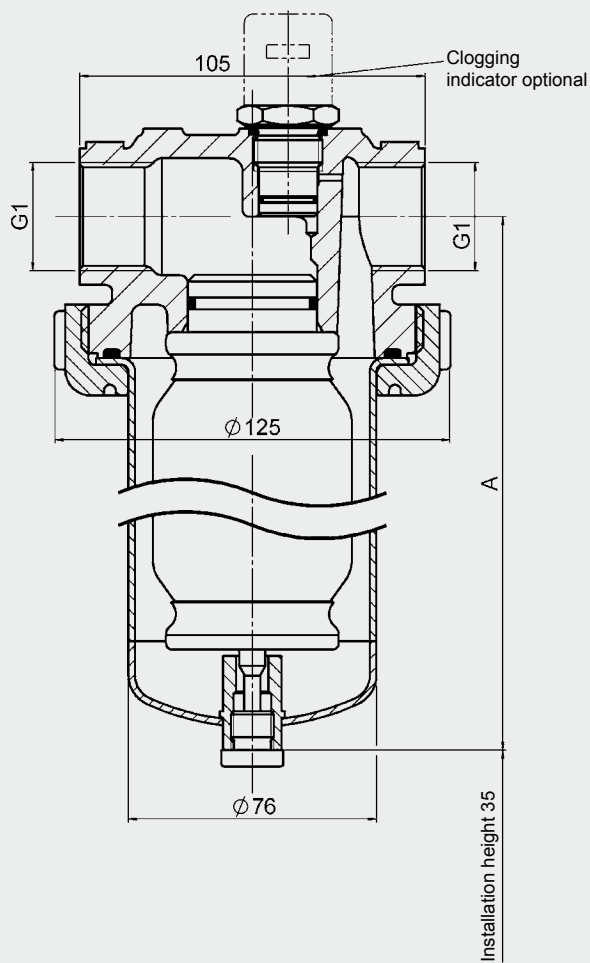
Absolute retention rate

The filtration rates given in the brochure are determined by the multi-pass test carried out on the HYDAC test rig, based on ISO 4572 (multi-pass test for the determination and proof of the filtration performance, extended to finest filtration).

In this test at least 99 % of all particles larger than the given rating must be retained, and this up to the max. permissible differential pressure across the filter element. A filtration rate of 99 % corresponds to a β_x -value of 100, which denotes absolute filtration.

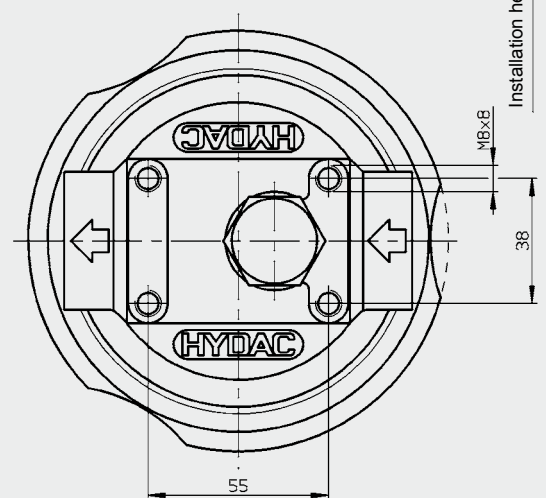
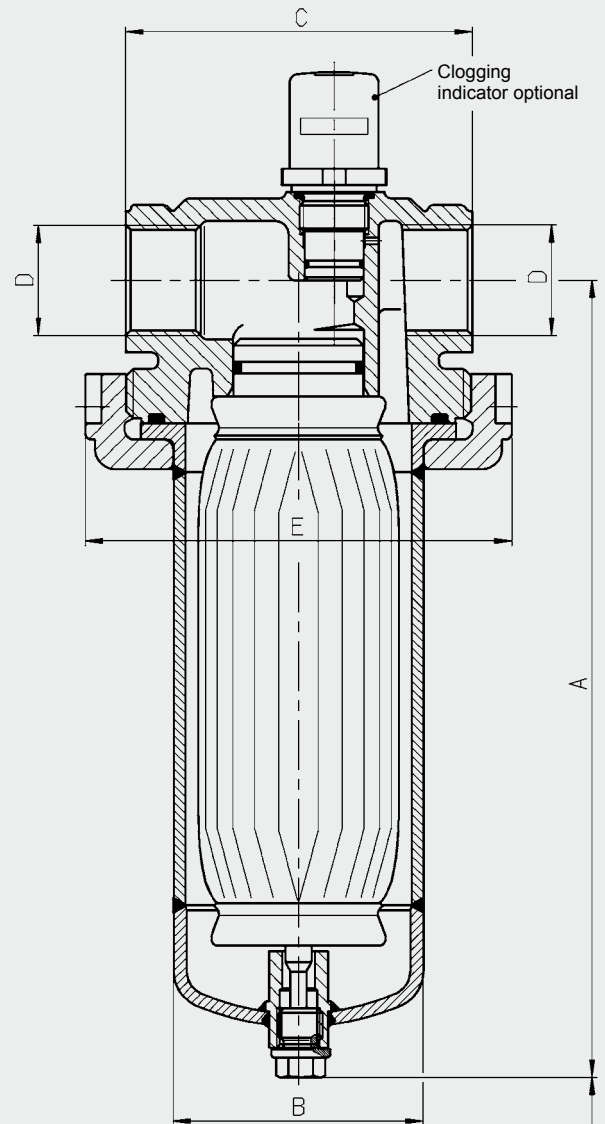
5. DIMENSIONS

5.1 SINGLE HOUSING PFM



Size	A	Installation height
0	146	35
1	240	35
2	400	35
3	725	35

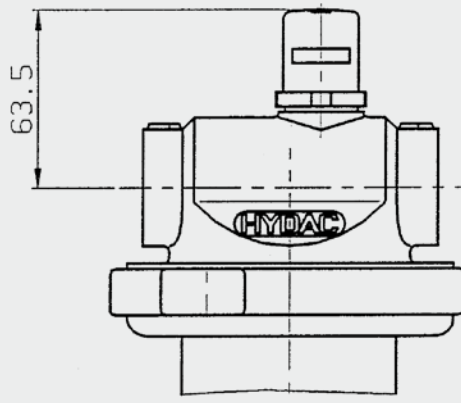
5.2 SINGLE HOUSING PFH



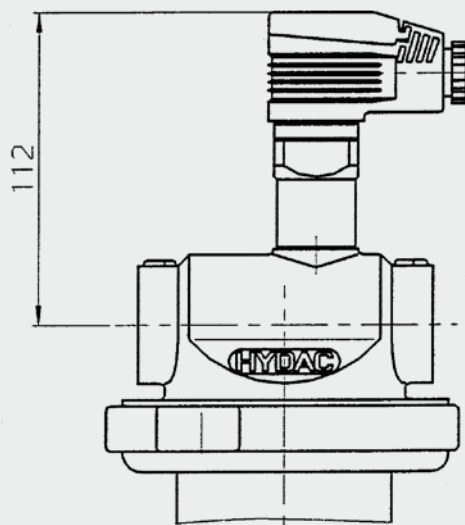
Size	A	B	C	D	E	F
0	146	76.1	106	G1	130	35
1	240	76.1	106	G1	130	35
2	400	76.1	106	G1	130	35
3	729.5	76.1	106	G1	130	35

5.3. CLOGGING INDICATORS

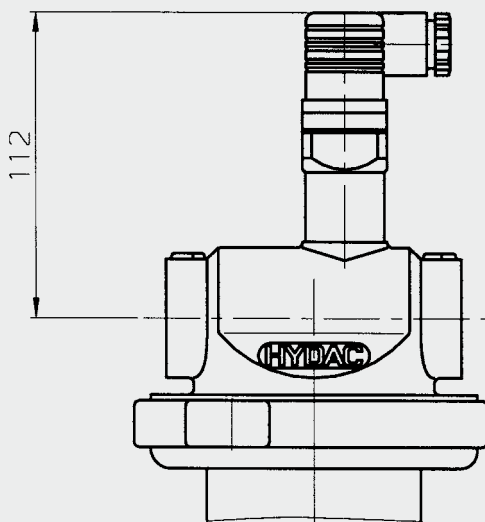
5.3.1 Visual clogging indicator



5.3.2 Visual-electrical clogging indicator

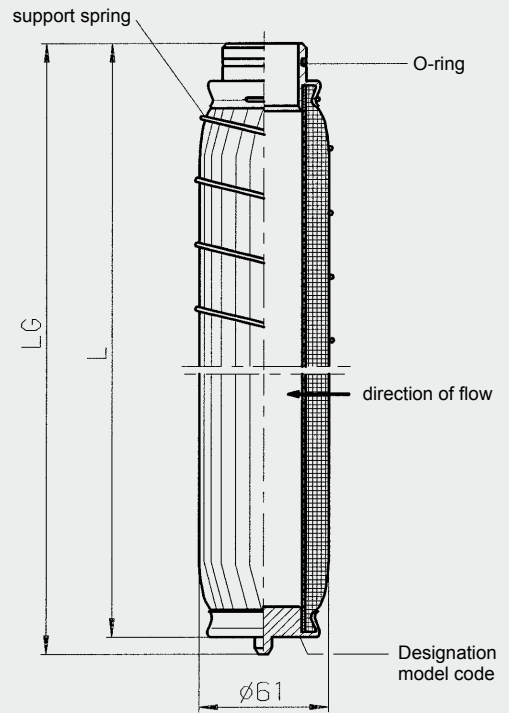


5.3.3 Electrical clogging indicator



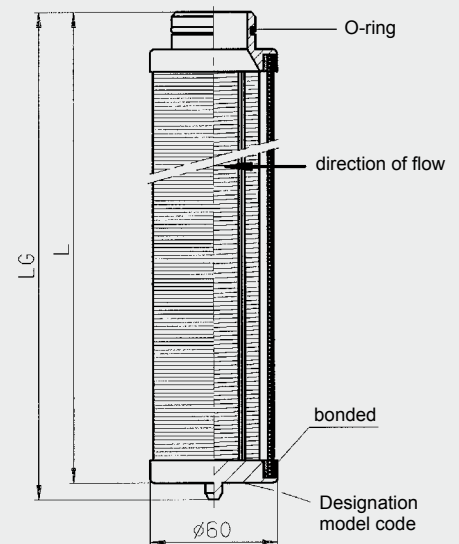
5.4. FILTER ELEMENTS

5.4.1 Wire mesh



Size	L	LG	O-ring dimensions
0	88	96	34.6 x 2.6
1	185	193	34.6 x 2.6
2	347	355	34.6 x 2.6
3	672	680	34.6 x 2.6

5.4.2 Slotted tube



Size	L	LG	O-ring dimensions
0	88	96	34.6 x 2.6
1	185	193	34.6 x 2.6
2	347	355	34.6 x 2.6
3	672	680	34.6 x 2.6

NOTE

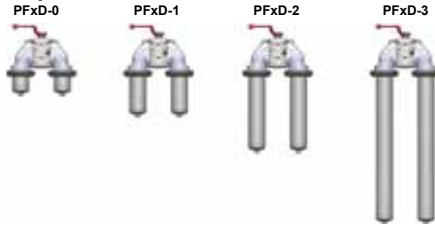
The information in this brochure relates to the operating conditions and applications described.
For applications or operating conditions not described, please contact the relevant technical department.
Subject to technical modifications.

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E-Mail: prozess-technik@hydac.com



Process Duplex Filter Medium, High Pressure PFMD, PFHD

up to 120 l/min, up to 100 bar



1. TECHNICAL SPECIFICATIONS

1.1 GENERAL

HYDAC stainless steel inline duplex filters, types PFMD and PFHD, are designed for use in process engineering and chemical plants. They are suitable for removing contamination from low and high viscosity fluids. The range of different sizes, filters and sealing materials means that the filters can be adapted to the particular application conditions.

Depending on the required cleanliness level, the following stainless steel filter elements can be used: Chemicon®, pleated wire mesh or slotted tube. Contamination of the filter elements can be monitored by means of a clogging indicator (differential pressure monitoring) fitted to the filter.

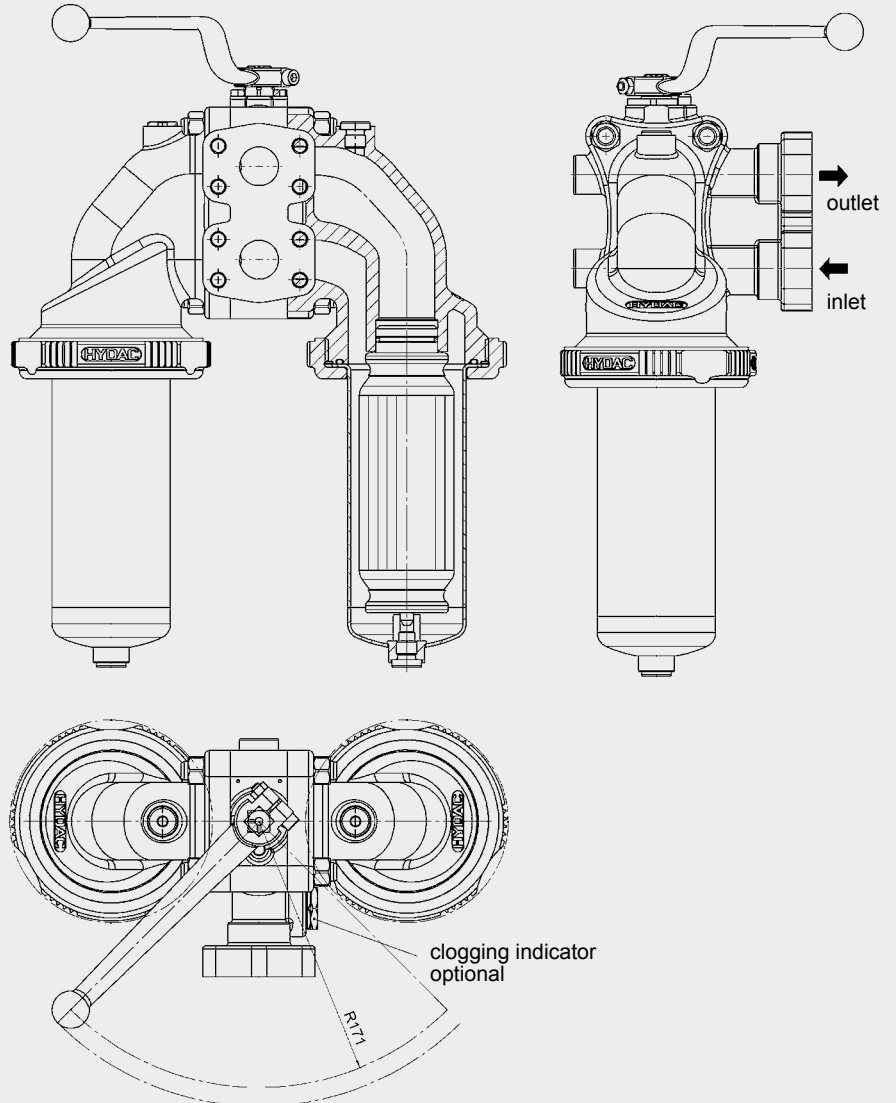
The direction of flow through the filter elements is from the outside to the inside. They can be cleaned several times, thereby saving the costs of disposal and re-purchase.

1.2 SIZES AND CONNECTIONS

Series	Connection size	Pressure range
PFMD	G 1 / SAE 1"	PN 40
PFHD	G 1 / SAE 1"	PN 100

The selection of the filter bowl length depends on the level of contamination of the fluid and on the associated filter area.

1.3 SECTIONAL FUNCTION DRAWING



2. FILTER SPECIFICATIONS

2.1 SUMMARY OF TECHNICAL SPECIFICATIONS FOR FILTER HOUSING (STANDARD CONFIGURATION)

Series	Size	Con- nection size	Materials		Max. operating pressure [bar]	Max. temp- erature [°C]	Wt. [kg]	Volume [l]
			Cover	Lock nut				
PFMD	0	G 1 SAE 1"	Stainless steel	Stainless steel	PN 40	100	14.75	1.7
	1						15.5	2.5
	2						16.7	3.8
	3						19	6.4
PFHD	0				PN 100		15.4	1.7
	1						16.5	2.5
	2						18.75	3.8
	3	22.8	6.4					

* max. operating temperatures will reduce the pressure range:

PFMD: max. 200 °C at Pmax = 16 bar

PFHD: max. 200 °C at Pmax = 75 bar

2.2 FURTHER SPECIFICATIONS FOR FILTER HOUSING (STANDARD CONFIGURATION)

2.2.1 Material of seal

FPM (Viton)

2.2.2 Documentation

Operating and maintenance instructions

2.3 SUMMARY OF TECHNICAL SPECIFICATIONS FOR FILTER ELEMENTS

Size	Filter area		Filter materials and filtration ratings				Permiss. diff. pressure across element [bar]
	Pleated element	Slotted tube	Chemicon® (metal fibre)	Wire mesh	Slotted tube (with bonded end caps)	Slotted tube (with welded end caps)	
SZ-0	676	116	1, 3, 5, 10, 20	25, 40, 60, 100, 150, 200, 250	50, 100, 200, 300, 500, 1000, 1500, 2000	40	
SZ-1	1710	262					
SZ-2	3421	552					
SZ-3	6842	1133					

2.4. OPTIONAL VERSIONS

There is a range of optional versions available for the PFMD/PFHD process filters. For technical details and prices, please contact our Technical Sales Department at Head Office.

2.4.1 Flange connections

SAE 1", available with mating flange as an option (see model code)

2.4.2 Seal material

- FEP encapsulated seals
- Various seal materials on request, depending on the resistance to the fluid

2.4.3 Differential pressure monitoring

- Visual
- Electrical
- Visual-electrical
- Option of piping indicator separately for fluid temperatures > 100 °C

2.4.4 Filter elements

- Welded end caps on slotted tube filter elements
- Support spring

2.4.5 Documentation

- Manufacturer's test certificates
 - Material certificates (3.1 according to DIN EN 10204)
 - and many others on request
- Further optional models on request.

3. MODEL CODE

3.1 FILTER HOUSING PFMD/PFHD

PFMD - 1 - G - 2 - V - X - L24 / ES

Filter type

PFMD = Filter PN 40
(stainless steel lock nut)
PFHD = Filter PN 100
(stainless steel lock nut)

Size

0 = short filter bowl
1 = medium filter bowl
2 = long filter bowl
3 = extra long filter bowl

Type of connection

G = threaded connection 1"
S = SAE connection 1"
SC = SAE connection 1"
with mating flange and butt-weld collar

Clogging indicator

0 = without clogging indicator
1 = with visual indicator (PVD 2 B.1)
2 = with visual-electrical
indicator (PVD 2 D.0/-L..)
6 = with electrical (PVD 2 C.0)

Seal material

V = FPM (Viton), (max. +200 °C, standard)
E = EPDM (max. +150 °C)
N = NBR (max. +120 °C)
T = FEP encapsulated O-ring (max. +150 °C)
Other seals on request

Modification number

Supplementary details

Element code

3.2 FILTER ELEMENT

SZ - 1 - 20 - M - V

Type of element

Size

0
1
2
3

Filtration rating in µm

Chemicon® (metal fibre)	1; 3; 5; 10; 20
Wire mesh	25; 40; 60; 100; 150; 200; 250
Slotted tube	50; 100; 200; 300; 500; 1000; 1500; 2000

Material of filter element

M = Chemicon® (metal fibre)
MS = Chemicon® (metal fibre) with support spring
D = wire mesh
DS = wire mesh with support spring
S = slotted tube

Seal material

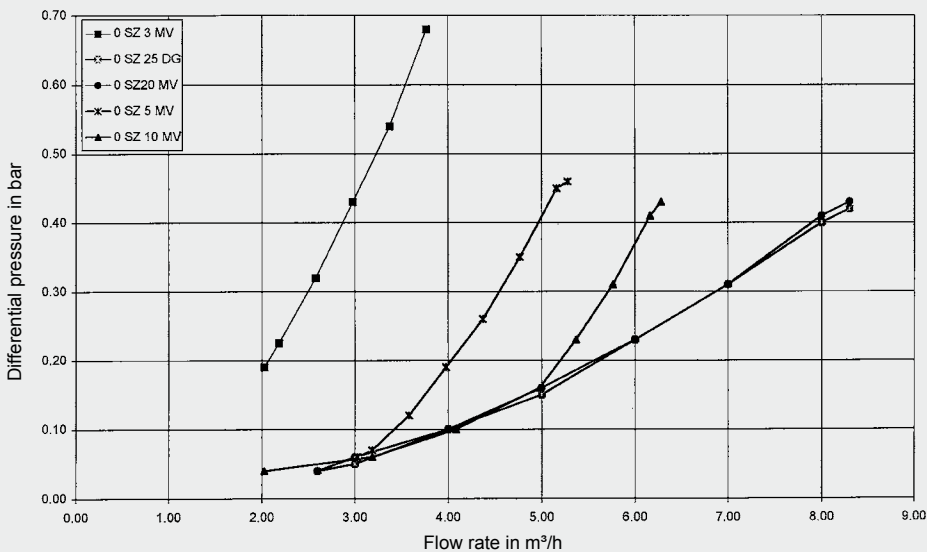
V = FPM (up to max. +200 °C)
E = EPDM (up to max. +150 °C)
NV = NBR (up to max. +120 °C)
T = FEP-encapsulated O-ring (up to max. +150 °C)
Other seals on request

4. FILTER CALCULATION / SIZING

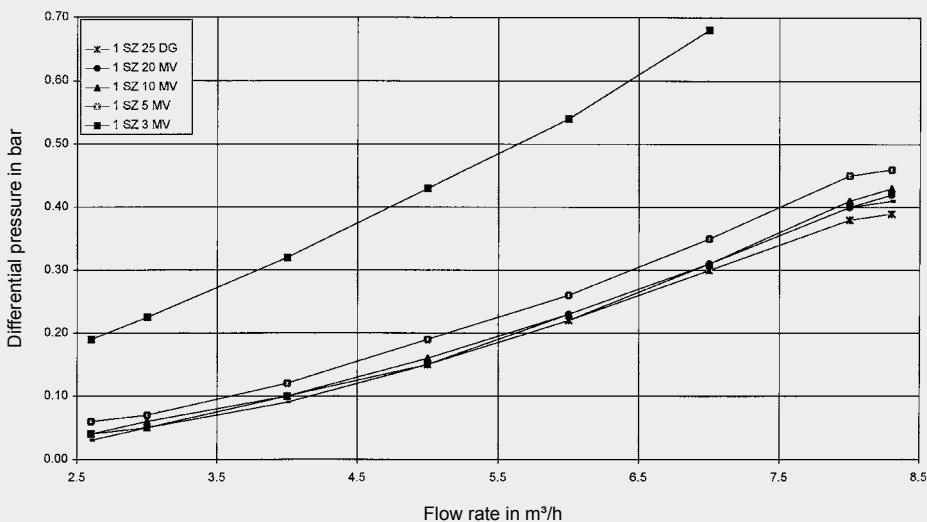
The curves apply to water at 20 °C or fluids up to 15 mm²/s

4.1. PRESSURE DROP CURVES

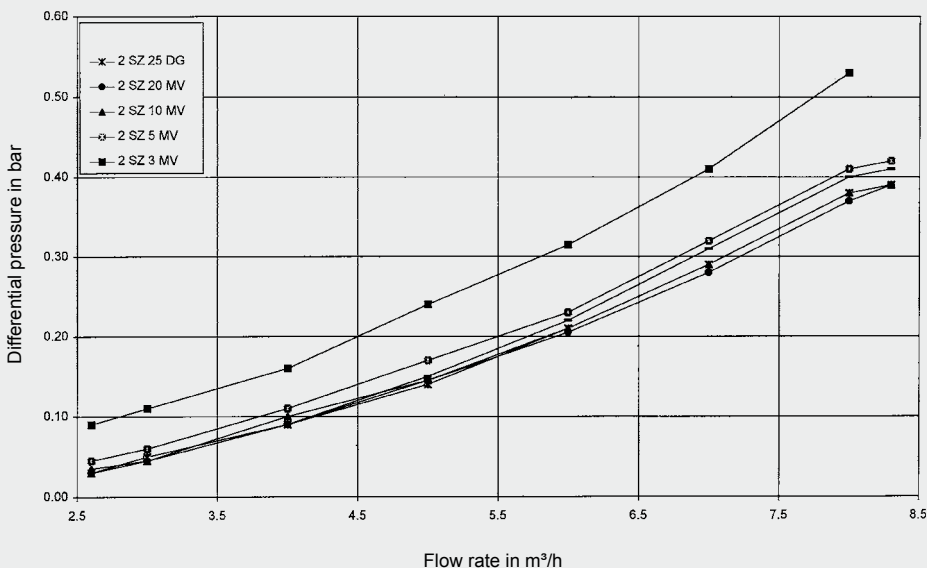
4.1.1 Pressure drop PFMD/PFHD Size 0



4.1.2 Pressure drop PFMD/PFHD Size 1



4.1.3 Pressure drop PFMD/PFHD Sizes 2 and 3



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

Use the pressure drop curves to calculate the stainless steel process inline filters PFMD and PFHD. Generally speaking, an initial Δp (clean filter condition) of > 0.2 bar should not be exceeded.

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

4.2 FILTRATION PERFORMANCE

- Retention rates for wire mesh and slotted tube:

Nominal retention rates

The filtration rating given in the model code is based on a HYDAC factory standard filter test.

This test is carried out by introducing a large amount of dust (ISO MTD) at the beginning of the filter test and subsequently separating the contamination particles over 1 hour. The test filter must retain 90 - 95 % of all particles larger than the given filtration rating.

- Retention rates for Chemicon® (metal fibre):

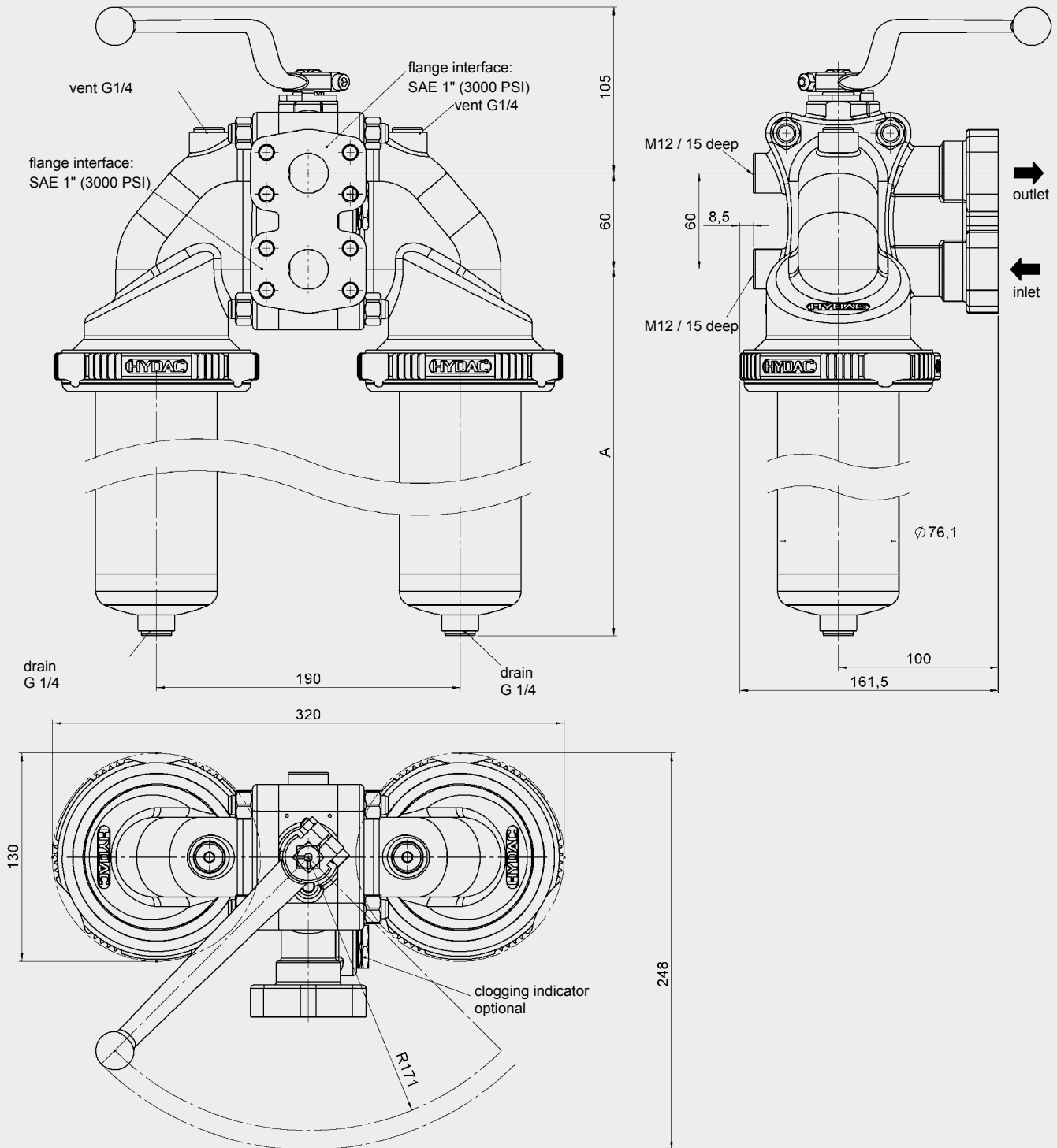
Absolute retention rate

The filtration rates given in the brochure are determined by the multi-pass test carried out on the HYDAC test rig, based on ISO 4572 (multi-pass test for the determination and proof of the filtration performance, extended to finest filtration).

In this test at least 99 % of all particles larger than the given rating must be retained, and this up to the max. permissible differential pressure across the filter element. A filtration rate of 99 % corresponds to a β_x -value of 100, which denotes absolute filtration.

5. DIMENSIONS

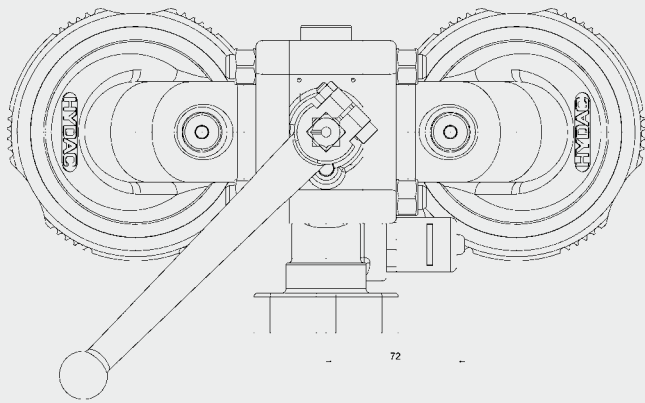
5.1 FILTER HOUSING PFMD / PFHD



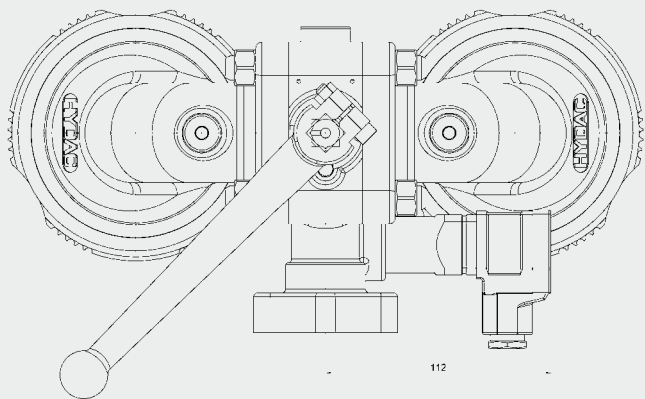
Size	A	Installation height
0	165	35
1	265	35
2	425	35
3	750	35

5.3. CLOGGING INDICATORS

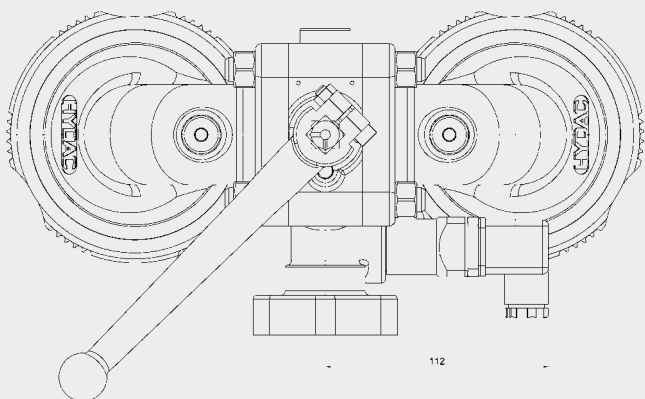
5.3.1 Visual clogging indicator



5.3.2 Visual-electrical clogging indicator

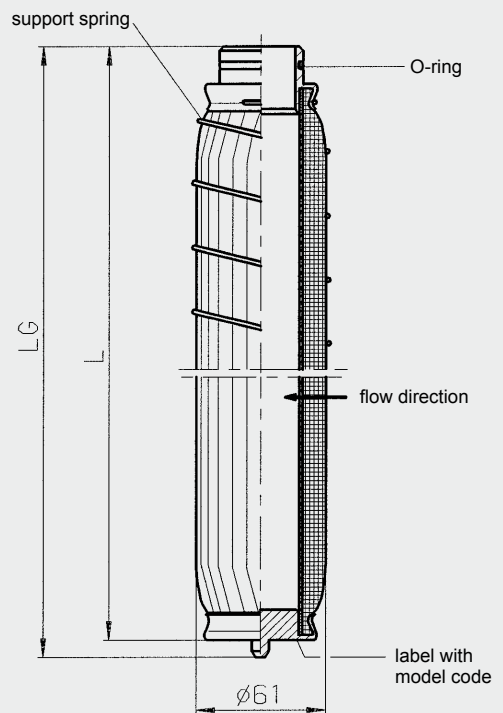


5.3.3 Electrical clogging indicator



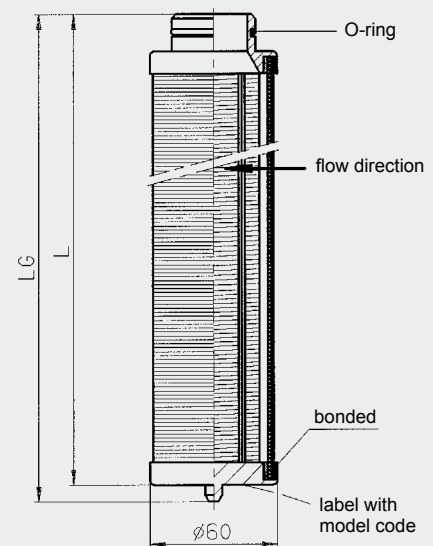
5.4. FILTER ELEMENTS

5.4.1 Wire mesh



Size	L	LG	O-ring dimensions
0	88	96	34.6 x 2.6
1	185	193	34.6 x 2.6
2	347	355	34.6 x 2.6
3	672	680	34.6 x 2.6

5.4.2 Slotted tube



Size	L	LG	O-ring dimensions
0	88	96	34.6 x 2.6
1	185	193	34.6 x 2.6
2	347	355	34.6 x 2.6
3	672	680	34.6 x 2.6

NOTE

The information in this brochure relates to the operating conditions and applications described.
For applications and operating conditions not described, please contact the relevant technical department.
Subject to technical modifications.

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Stainless Steel Pressure Filters EDF

up to 300 l/min, up to 400 bar



1. TECHNICAL SPECIFICATIONS

1.1 GENERAL

HYDAC stainless steel pressure filters are designed for use in the chemical industry and in industrial processing plants. The range of 6 different sizes, filter materials and sealing materials means that the filters can be adapted to a wide variety and application conditions.

Depending on the particular application, reusable stainless steel filter elements are available in either Chemicon® (metal fibre) or wire mesh. Disposable filter elements are available in Betamicron® (glass fibre).

The element can be changed quickly and easily without removing the filter from the pipe system. This means that the filter can be used up to 200 °C. The max. permissible operation pressure for HYDAC stainless steel pressure filters is 400 bar (higher pressures on request) at 200 °C for all sizes.

Contamination of the filter elements can be monitored by means of a clogging indicator fitted to the filter.

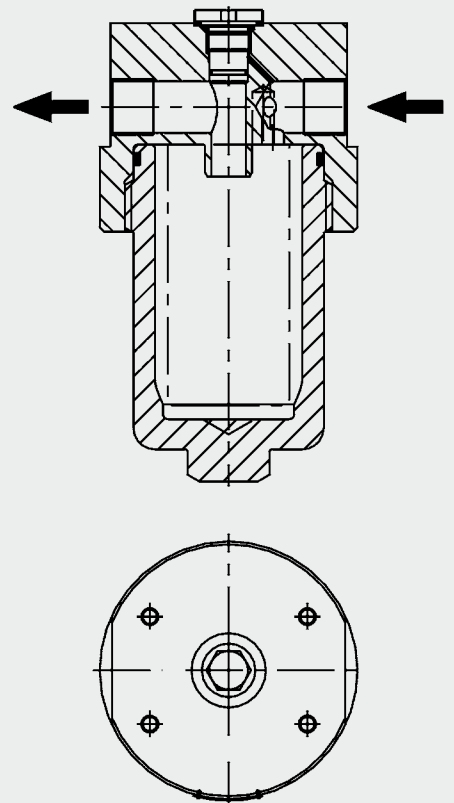
The filter elements can be cleaned several times, thereby saving the costs of disposal and re-purchase.

1.2 SUMMARY OF AVAILABLE SIZES AND CONNECTIONS

Connection size	Series					
	030	060	160	330	660	990
G 1/2"	X					
G 3/4"		X				
G 1 1/4"			X			
G 1 1/2"				X	X	X
G 2"				X	X	X
SAE 1 1/2"				X	X	X
SAE 2"				X	X	X

The selection of connection size depends on the level of contamination in the fluid and on the corresponding filter area load.

1.3 SECTIONAL FUNCTIONAL DRAWING



2. FILTER SPECIFICATIONS

2.1 SUMMARY OF TECHNICAL SPECIFICATIONS OF THE FILTER HOUSING (STANDARD CONFIGURATION)

Size	Connection size		Materials	Max. operating over-pressure*	Temperature [°C]**		Weight [kg]	Volume [l]
	SAE	Pipe thread G						
030	–	1/2"	Stainless steel 1.4571	400 bar	FPM EPDM FEP NBR FFKM	+200 °C +120 °C +200 °C +150 °C +240 °C	5	0.16
060	–	3/4"					8.5	0.23
160	–	1 1/4"					14.5	0.69
330	1 1/2" 2"	1 1/2" 2"					34.5	1.62
660							50	2.8
990							64	4.0

* at T_{max} = 200 °C

** depending on the seal material

2.2. SUMMARY OF TECHNICAL SPECIFICATIONS OF FILTER ELEMENTS

There is an element type with radial sealing (EDFR) available for the stainless steel pressure filter EDF:

● DR elements

In addition, filter elements from HYDAC Process Technology are available for the pressure filters of HYDAC Filtrertechnik (DF series):

● DH elements: suitable for D elements (HYDAC Filtrertechnik)

2.2.1 Filter elements DR

Size	Filter area [cm²]	Filter element type	Filter materials and filtration ratings [µm]			Permiss. diff. pressure across element [bar]
			Betamicon® (glass fibre)	Chemicon® (metal fibre)	Wire mesh	
030	310	DR	3, 5, 10, 20	1, 3, 5, 10, 20	25, 40, 60, 100, 150, 200, 250	210
060	430	DR				
160	1230	DR				
330	2100	DR				
660	4410	DR				
990	6350	DR				

2.2.2 Filter elements DH

Size	Filter area [cm²]	Filter element type	Filter materials and filtration ratings [µm]			Permiss. diff. pressure across element [bar]
			Betamicon® (glass fibre)	Chemicon® (metal fibre)	Wire mesh	
060	390	DH	3, 5, 10, 20	1, 3, 5, 10, 20	25, 40, 60, 100, 150, 200, 250	210
110	770	DH				
140	990	DH				
160	945	DH				
240	1475	DH				
280	3105	DH				
330	2165	DH				
660	3430	DH				
990	4515	DH				

2.3. FURTHER SPECIFICATIONS OF THE FILTER HOUSING (STANDARD CONFIGURATION)

2.3.1 Seal material

- FPM (Viton) up to +200 °C
- EPDM up to +120 °C
- FEP encapsulated up to +200 °C
- NBR up to +150 °C
- FFKM up to +240 °C

2.3.2 Documentation

Operating and Maintenance Instructions

2.4. OPTIONAL VERSIONS

There is a range of optional versions available for EDF stainless steel pressure filters. For technical details and prices, please contact our Technical Sales Department at Head Office.

2.4.1 Flange connections

- SAE connection

2.4.2 Housing materials

- Various qualities of stainless steel

2.4.3 Seal materials

- FEP encapsulated Viton seals
- Various seal materials on request, depending on the resistance to the fluid.

2.4.4 Differential pressure monitoring

- Visual
- Electrical
- Visual electrical
- Option of piping indicator separately for fluid temperatures > 100 °C

2.4.5 Duplex filter model

All sizes of EDF are available as duplex filters including pipework and change-over valve.

2.4.6 Documentation

- Manufacturer's test certificates
 - Material certificates (3.1 according to DIN EN 10204)
 - and many others on request
- Further optional models on request.

3. MODEL CODE

3.1 STAINLESS STEEL PRESSURE FILTER

EDFR - D - 060 - G - 100 - 1 - V - X - L24

Filter type

EDFR
EDFRU (on request)

Filter material

M = Chemicon®
1 µm - 20 µm absolute
D = wire mesh
25 µm - 250 µm
nominal
BH/HC = Betamicon®
3 µm - 20 µm absolute
(see brochure on Filter
Elements No. 7.200.5/)

Size

030, 060, 160, 330, 660, 990

Type of connection

G = threaded

Filtration rating in µm

1, 3, 5, 10, 20 (Chemicon®)
25, 40, 60, 100, 150, 200, 250 (wire mesh)
3, 5, 10, 20 (Betamicon®)

Clogging indicator

0 = without clogging indicator
1 = visual indicator
(PVD 5 B.1)
2 = visual-electrical indicator
(PVD 5 D.0/-L..)
6 = electrical clogging indicator
(PVD 5 C.0)

See brochure on Clogging Indicators for
Process Filters No. 7.706.0..

Seal material

V = FPM (Viton) (max. +200 °C)
E = EPDM (max. +120 °C)
T = FEP encapsulated (Teflon) (max. +200 °C)
N = NBR (nitrite butyl rubber max. +150 °C)
M = FFKM (perfluorelastomer max. +240 °C)

Modification number

Supplementary details

Light voltage for visual-electrical
clogging indicator (L24 or L220)

3.3 FILTER ELEMENT

060 - DR - 100 - D - V

Size

030, 060, 160, 330, 660, 990 (DR/DA)
060, 110, 140, 160, 240, 280, 330, 500, 660 (DH)

Type of element

DR suitable for EDFR (up to max. +200 °C)
DA suitable for EDFA (up to max. +400 °C)
DH suitable for hydraulic filter (up to max. +200 °C)

Filtration rating in µm

1, 3, 5, 10, 20 (Chemicon®)
25, 40, 60, 100, 150, 200, 250 (wire mesh)

Filter material

M = Chemicon® (1.5 - 20 µm absolute)
D = wire mesh (25 - 250 µm nominal)

Seal material

V = FPM (Viton)
E = EPDM
T = FEP encapsulated(Teflon)
N = NBR
M = FFKM

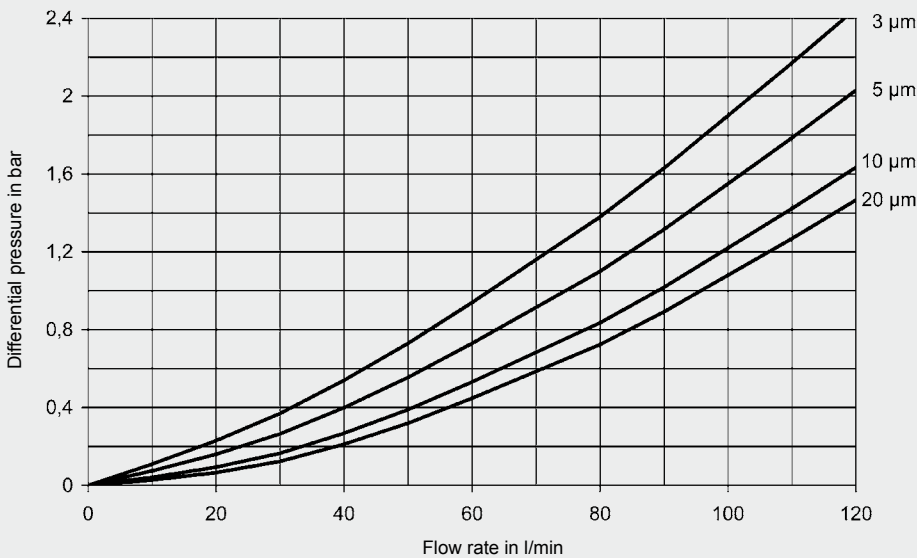
Other seals on request

4. FILTER CALCULATION / SIZING

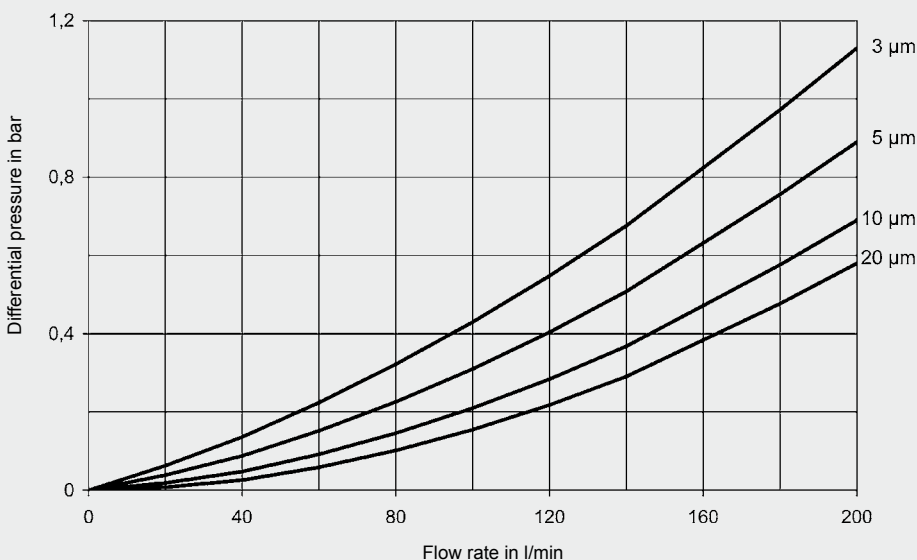
The curves apply to water at 20 °C or fluids to 15 mm²/s.

4.1. PRESSURE DROP CURVES

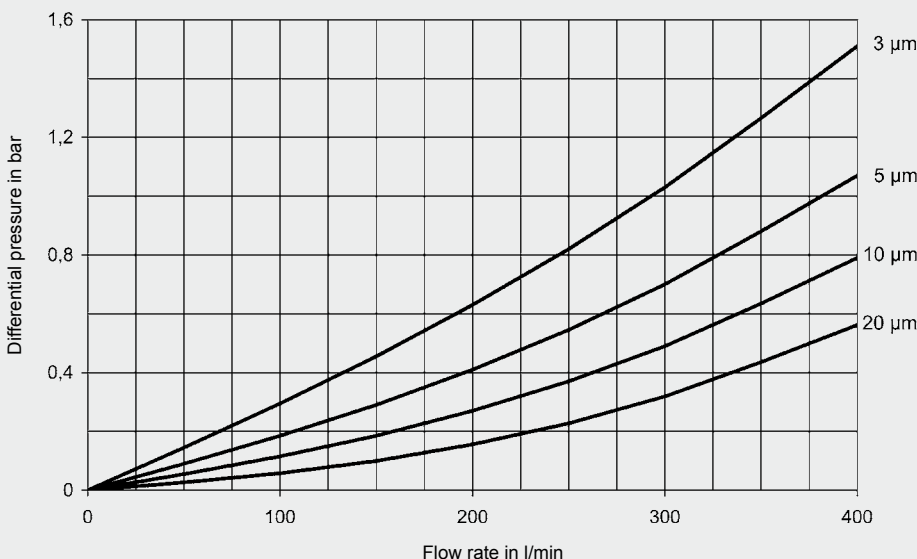
4.1.1 Curve for size 060



4.1.2 Curve for size 160



4.1.3 Curve for size 330 / 660 / 990



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

Use the pressure drop curves to calculate the stainless steel pressure filters EDF.

4.2 FILTRATION PERFORMANCE

- Retention rates for wire mesh and slotted tube:

Nominal retention rates

The filtration rating given in the model code is based on a HYDAC factory standard filter test.

This test is carried out by introducing a large amount of dust (ISO MTD) at the beginning of the filter test and subsequently separating the contamination particles over 1 hour. The test filter must retain 90 - 95 % of all particles larger than the given filtration rating.

- Retention rates for Betamicon® (glass fibre), Chemicon® (metal fibre):

Absolute retention rate

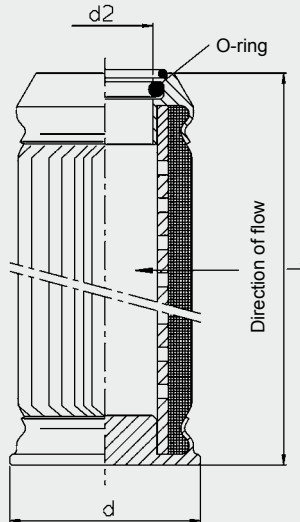
The filtration rates given in the brochure are determined by the multi-pass test carried out on the HYDAC test rig, based on ISO 4572 (multi-pass test for the determination and proof of the filtration performance, extended to finest filtration).

In this test at least 99 % of all particles larger than the given rating must be retained, and this up to the max. permissible differential pressure across the filter element. A filtration rate of 99 % corresponds to a β_x -value of 100, which denotes absolute filtration.

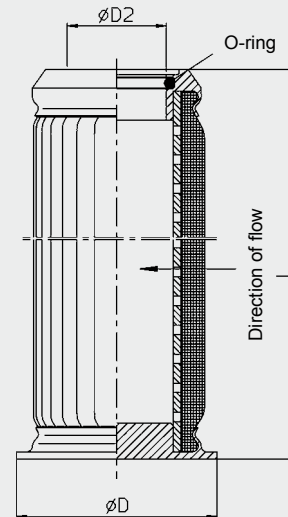
5. DIMENSIONS

5.1. FILTER ELEMENTS

DR



DH



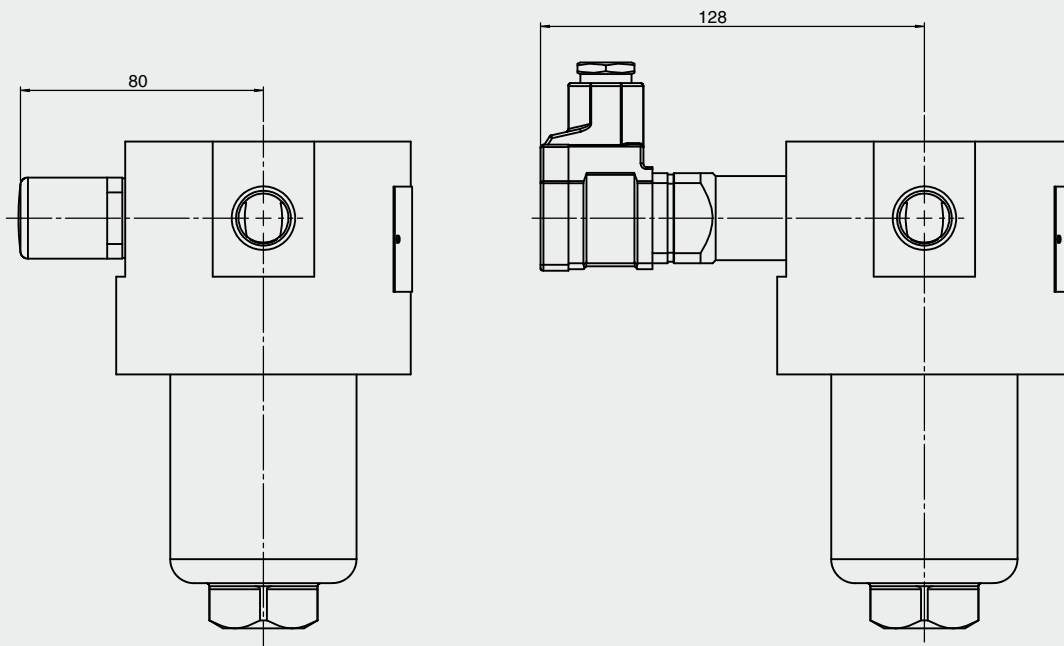
DR	Nominal- area Size	L	d	d2	O-ring
x	030	310	35	12.3	12.37 x 2.62
x	060	430	44.2	22.1	22 x 3.5
X	160	1230	60	34.1	34 x 3.5
X	330	2100	76.6	48.1	48 x 3
X	660	4410	76.6	48.1	48 x 3
X	990	6350	76.6	48.1	48 x 3

Nominal Size	Filter area	L	D	D2	O-ring
060	390	83	47	22.1	22x 3.5
110	770	152.7	47	22.1	22x 3.5
140	990	193	47	22.1	34 x 3.5
160	945	116	69	34.1	34 x 3.5
240	1475	174.75	69	34.1	34 x 3.5
280	3105	355.75	69	34.1	34 x 3.5
330	2165	163.5	90.5	48.1	48 x 3
500	3430	253	90.5	48.1	48 x 3
660	4515	329	90.5	48.1	48 x 3

5.2. CLOGGING INDICATORS

Visual clogging indicator and visual-electrical clogging indicator

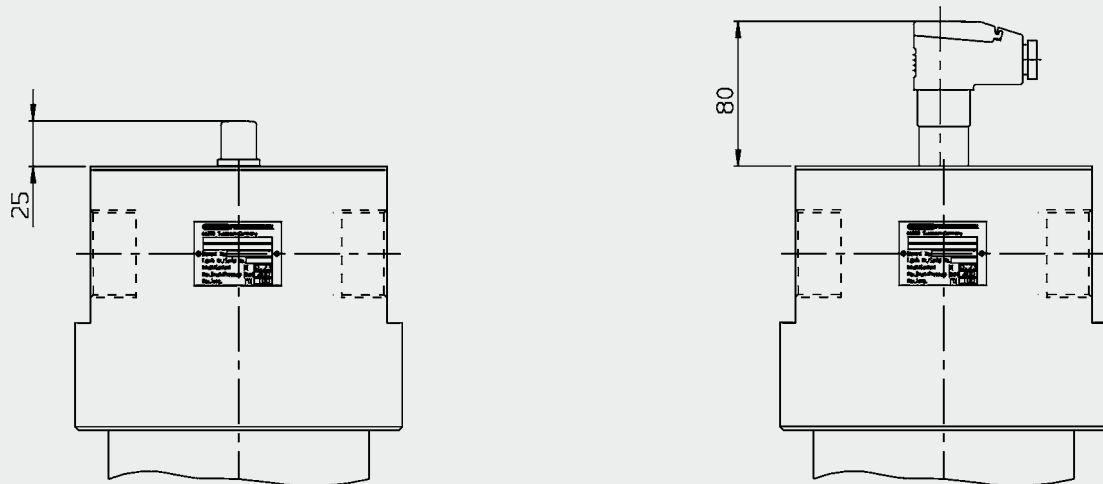
Size 030



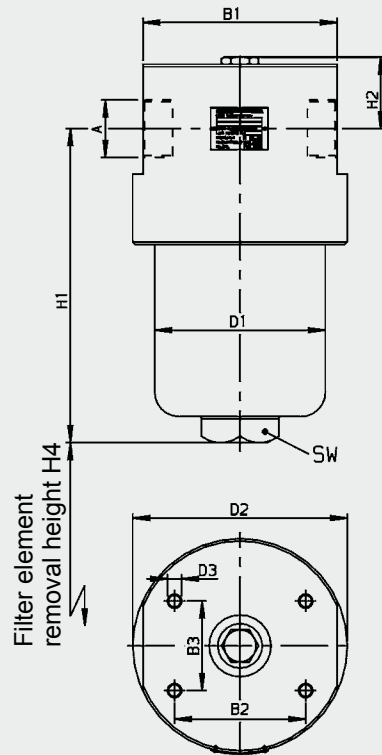
5.3. CLOGGING INDICATORS

Visual clogging indicator and visual-electrical clogging indicator

Size 060 - 990



5.4 SINGLE HOUSING



Size	A	B1	B2	B3	D1	D2	D3	H1	H2	H4	SW
030	G 1/2	92	50	40	62	98	116	136.5	25.5	45	27
060	G 3/4	110	60	40	72	120	M6	139	45	50	27
160	G 1 1/4	136	80	50	105	150	M10	197	46	60	32
330	G 1 1/2	164	110	75	143	180	M12	263	50	75	46
660	G 1 1/2	180	110	75	150	180	M12	425	50	75	41
990	G 1 1/2	180	110	75	150	180	M12	594	50	75	41

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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Process Bag Filter PBF

Flow rate: up to 500 l/min, up to 10 bar

PBF-F50-2-1



PBF-F50-2-2



PBF-F50-2-2A



1. TECHNICAL SPECIFICATIONS

1.1 GENERAL

The HYDAC Process Bag Filter PBF is suitable for continuous filtering of solid contamination from low-viscosity fluids, such as cooling lubricants, washing emulsions and processing oils. The separated contamination particles can be disposed of together with the filter bag.

In order to allow larger flow rates, bag filters can be arranged in parallel switching. Optionally, the filters can be blocked individually in order to operate continuous filtration. The housings are delivered with an adjustable base frame.

1.2 CONSTRUCTION AND FUNCTION

The filter housings consist of simple and easy to handle welding constructions made of stainless steel to hold filter bags in Sizes 1 or 2. The standard series features a vent screw and a connection for a pressure gauge.

The process bag filter housing has a pressure absorbing basket made of stainless steel and a pressure device which fixes both bags with steel ring and bags with plastic sealing lip securely and bypass-free.

The fluid enters into the side of the filter cover and flows through the filter bag from the inside to the outside. The outlet is in the centre of the lower dished end.



2. FILTER SPECIFICATIONS

2.1 SUMMARY OF TECHNICAL SPECIFICATIONS OF THE FILTER HOUSING (STANDARD CONFIGURATION)

Series	Filter bag type	Connection size DIN DN	Filter area [cm ²]	Filtration ratings [µm]	Max. operating over-pressure [bar]	Max. temp. [°C]	Weight (empty) [kg]	Volume [l]
PBF	1	50	5000	1- 1000	10	90	31	31
	2	80	2 x 5000				101	2 x 35
	2A	50	2 x 5000				97	2 x 33.5

2.2. FURTHER SPECIFICATIONS OF THE FILTER HOUSING (STANDARD CONFIGURATION)

2.2.1 Material of seal

Lid: FPM (Viton),
Flanges: asbestos free gasket (C4400)

2.2.2 Flange connections

DIN flanges DN 50 (housing)
DIN flanges DN 50 or DN 80 (piping)

2.2.3 Housing materials

Stainless steel (AISI 304 / 1.4301)

2.2.4 Material of internal parts

Stainless steel (AISI 304 / 1.4301)

2.2.5 Pressure range

10 bar

2.2.6 Operating temperature

0 to 90 °C

2.2.7 Documentation

Operating and maintenance instructions

2.3. SUMMARY OF TECHNICAL SPECIFICATIONS OF FILTER BAGS

2.3.1 Materials

Polypropylene
Polyethylene
Nylon monofilament
Filtration rating between 1 µm and 1000 µm
Sealing collar made of polypropylene, optional with stainless steel supporting ring

2.4. OPTIONAL VERSIONS

There are a range of optional versions available for the Process Bag Filter PBF. For technical details and prices, please contact our Technical Sales Department at Head Office.

2.4.1 Seal materials

- Various seal materials on request, depending on the resistance to the fluid.

2.4.2 Multiple filters

- Parallel piping up of several filters. Also further optional models on request.

2.4.3 Differential pressure monitoring

- Visual
- Electrical
- Visual electrical
- Differential pressure gauge with microswitches
- Dynamic pressure gauge

Subject to technical modifications.
The dimensions indicated have
± 3 mm tolerances.

3. MODEL CODE FOR PROCESS BAG FILTER PBF

PBF - F50 - 1 - 2 - F80 - E - F - 0 - 2 - X - L24 - 12345678

Type _____
PBF = Process bag filter

Housing connection flange _____
DIN = F 50

Size _____
1 = standard housing Size 1
2 = standard housing Size 2

Filter type _____
1 = one housing
2 = 2 housings, piped up in parallel,
2A = 2 housings, piped up in parallel
and individually lockable

Type of connection (customer interface) _____
F50 = connection DIN flange DN 50,
for filter types 1 and 2A
F80 = connection DIN flange DN 50,
for filter type 2

Housing material _____
E = stainless steel 1.4301 (AISI 304)

Sealing material _____
F = FPM (Viton)

Ventilation _____
0 = ventilation plug
1 = with ball valve

Clogging indicator _____
0 = without clogging indicator
1 = with visual indicator (PVD2B.1)
2 = with visual-electrical indicator (PVD 2D.0/-L...)
3 = with visual-analogue indicator (V01)
4 = with differential pressure gauge,
aluminium (measuring range 4 bar)
5 = with differential pressure gauge,
stainless steel (measuring range 4 bar)
6 = with electrical indicator only (PVD 2C.0)
E = with dynamic pressure gauge

Modification number _____
X = the latest version is always supplied

Supplementary information _____
Lamp voltage visual-electrical clogging indicator:
L24 = 24V power supply
L110 = 110V power supply
L230 = 230V power supply

Drawing number _____
For special models

4. FILTER CALCULATION / SIZING

4.1 CALCULATION CRITERIA

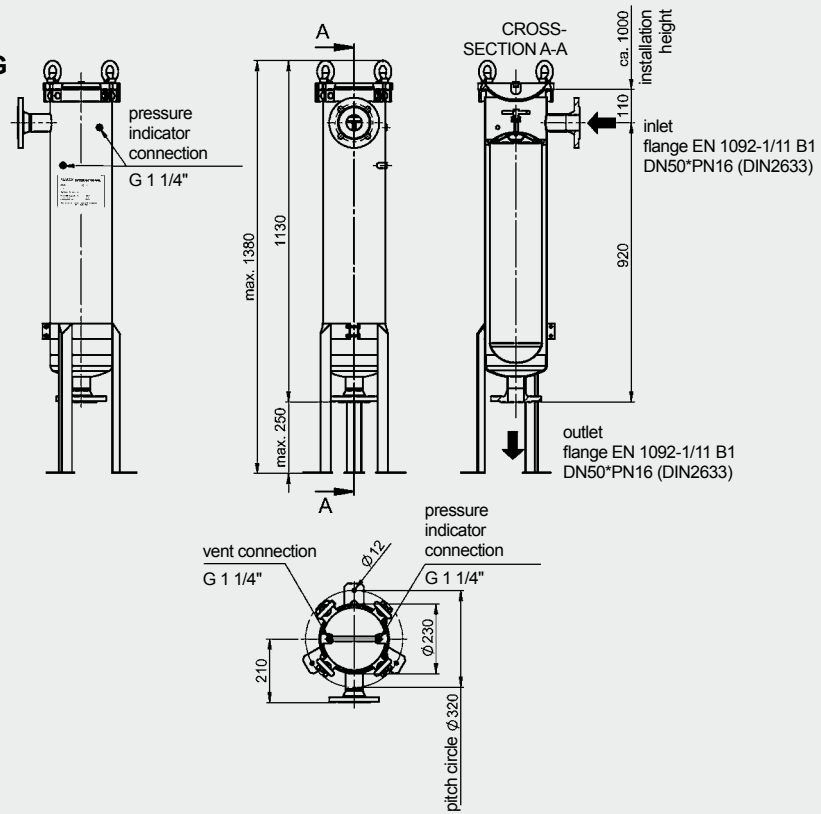
In order to be able to size the filter correctly, the following design data should be available:

- Flow rate
- Type of medium
- Materials / resistance
- Viscosity
- Required filtration rating
- Particulate loading in the fluid
- Type of contamination
- Operating pressure
- Operating temperature

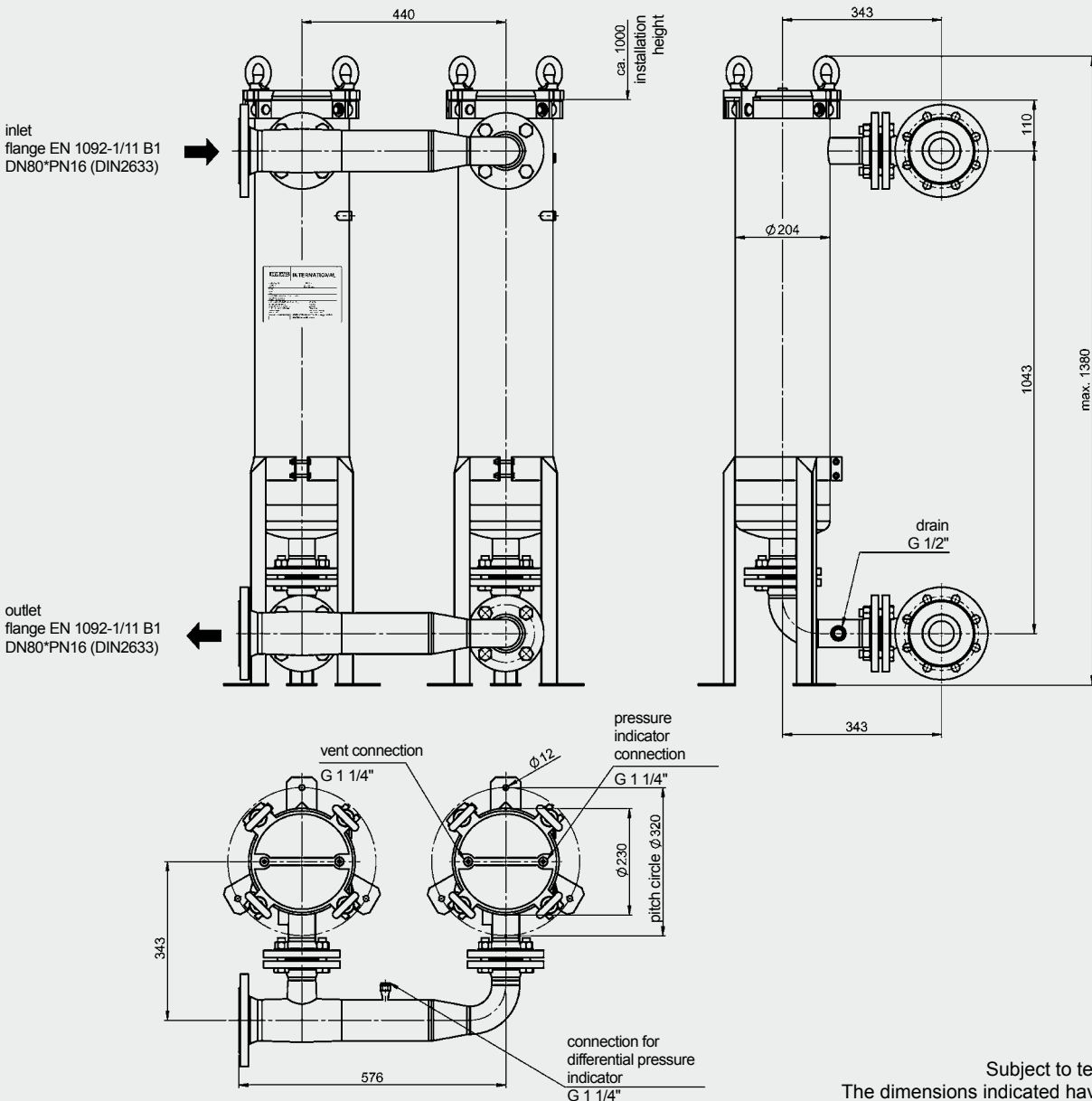
At filtration ratings > 100 µm, the flow rate 30 m³/h should not be exceeded on single housings. At filtration ratings < 100 µm, the flow rate 25 m³/h should not be exceeded.

5. DIMENSIONS

5.1 PBF-F50-x-1, SINGLE HOUSING

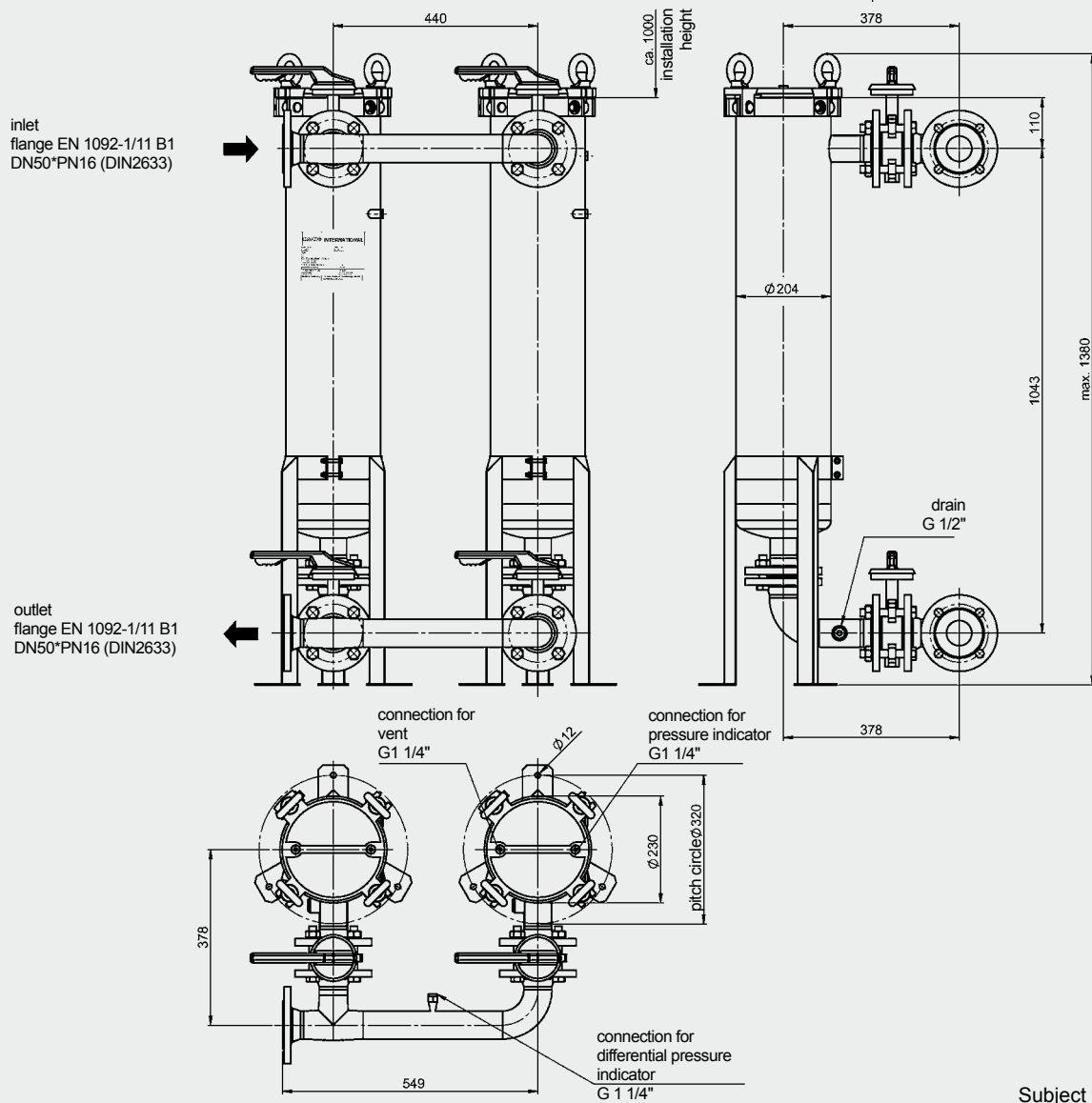


5.2 PBF-F50-x-2 DN80, 2 HOUSINGS PIPED UP IN PARALLEL



Subject to technical modifications.
The dimensions indicated have ± 3 mm tolerances.

5.3 PBF-F50-x-2A DN50, 2 HOUSINGS PIPED UP IN PARALLEL, INDIVIDUALLY LOCKABLE



Subject to technical modifications.
The dimensions indicated have ± 3 mm tolerances.

NOTE

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Clogging Indicators for Process Filters

1. TECHNICAL SPECIFICATIONS

1.1 GENERAL

HYDAC clogging indicators are designed to indicate visually and/or electrically when the filter elements must be cleaned or changed. The use of clogging indicators guarantees both the operational safety of the system and the efficient utilisation of the filter elements.

1.2 SEALS

V (=Viton) or T (=FEP encapsulated)

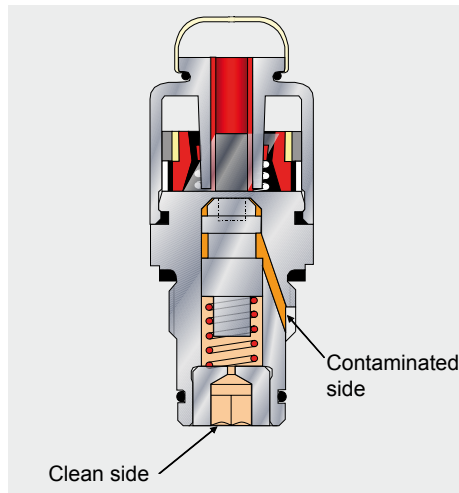
1.3 CONSTRUCTION

Differential pressure indicators are used on all process filters. They react to the pressure differential between the filter inlet and the filter outlet, which rises as the level of contamination in the element increases.

Simplest fitting of the differential pressure indicator:
G 1/2" cavity
(acc. HYDAC works standard HN 28-22)

The differential pressure indicator type V01 is piped up separately.

For duplex filter housings, the differential pressure indicators are connected using an adaptor block.



1.4 SPECIAL INDICATORS

Electrical ATEX indicators:
Optional: electrical indicator for process filters for use in potentially explosive atmospheres subject to the ATEX equipment directive 94/9/EC and the ATEX operator directive 1999/92/EC.

1.5 TORQUE VALUES - DIFFERENTIAL PRESSURE INDICATORS

Note:
The clogging indicators must only be tightened or adjusted on the spanner flats.

- PVD..B.1: SW27
- PVD..C.0: SW30
- PVD..D.0/L...: SW30
- max. torque value: 100 Nm

2. QUICK SELECTION: CLOGGING INDICATORS ACCORDING TO FILTER TYPE

Please select from the table the clogging indicator required for your filter.

Type	Filter types				
	PRFL PRFLD	PRFS PRFSD	PFM PFH	EDF	PMRF PMRFD
PVD ..B	●	●	●	●	●
PVD ..C	●	●	●	●	●
PVD ..D	●	●	●	●	●
V01 ...VZ	●	●	on request		●
Differential pressure gauge	●	●	on request		●

3. MODEL CODE

PVD 2 D. 0 / -L24

Differential pressure clogging indicator

PVD = Clogging indicator

V01 = Clogging indicator

Cracking pressure

0.8 = +0.8 bar (only for V01 indicator)

1 = +1 bar (PVD indicator)

1.5 = +1.5 bar (PVD indicator)

2 = +2 bar (all clogging indicators)

3 = +3 bar (PVD indicator)

4.3 = +4.3 bar (only for V01 indicator)

5 = +5 bar (only for PVD indicator)

8 = +8 bar (only for PVD indicator)

Type of clogging indicator

B. = visual indicator with automatic reset

C. = electrical indicator

D. = visual/electrical indicator

VZ = visual/analogue indicator with 75% and 100% switch contacts

Modification number

0 = all clogging indicators

1 = only B. type

Supplementary details (only PVD)

-L24 = light with 24 V

-L48 = light with 48 V

-L110 = light with 110 V

-L220 = light with 220 V

Differential pressure gauge DS11 electrical

Display range: 0 - 1.6 bar

Permitted operating pressure: 25 bar


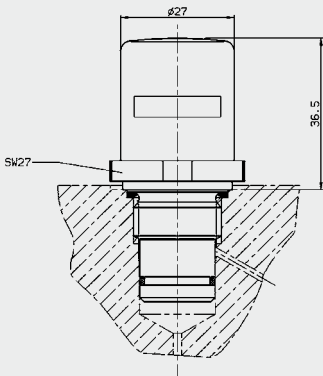
Pressure chamber in aluminium: Order no. 639311

Pressure chamber in stainless steel: Order no. 639586


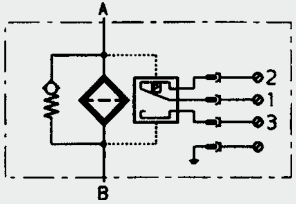
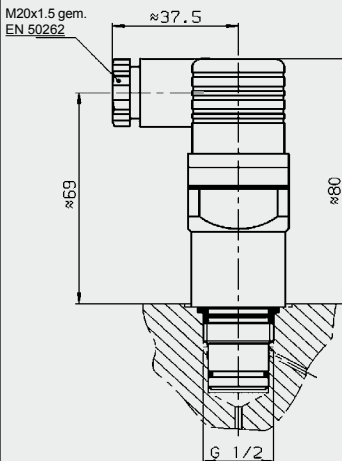
Other versions available on request

4. SPECIFICATIONS


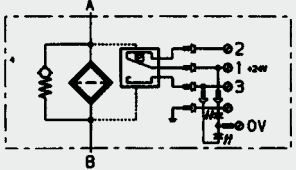
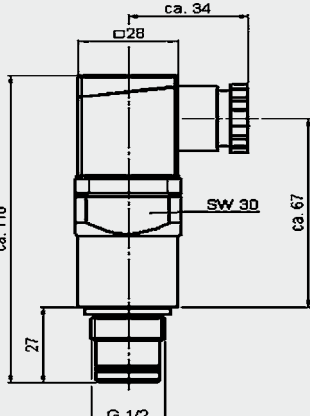
PVD x B.x

	Type of indication	Visual, red/green band Automatic reset	
	Weight	110 g	
	Cracking pressure or indication range	1 bar ± 10% 3 bar ± 10% 1.5 bar ± 10% 5 bar ± 10% 2 bar ± 10% 8 bar ± 10%	
	Perm. operating pressure	420 bar	
	Perm. temperature range	-20°C to +100°C	
	Thread	G 1/2	
	Max. torque value	100 Nm	
	Switching type	–	
	Max. switching voltage	–	
	Electrical connection	–	
	Max. switching voltage at resistive load	–	
	Switching capacity	–	
	Protection class acc. DIN 40050	–	
	Order example	PVD 2 B.1	


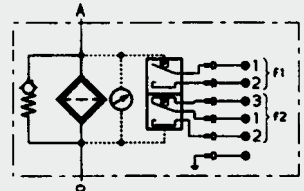
PVD x C.x

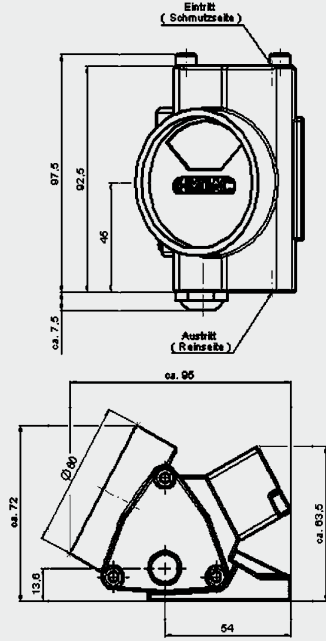
 	Type of indication	Electrical switch	
	Weight	220 g	
	Cracking pressure or indication range	1 bar ± 10% 3 bar ± 10% 1.5 bar ± 10% 5 bar ± 10% 2 bar ± 10% 8 bar ± 10%	
	Perm. operating pressure	420 bar	
	Perm. temperature range	-20°C to +100°C	
	Thread	G 1/2	
	Max. torque value	100 Nm	
	Switching type	N/C or N/O (change-over contacts)	
	Max. switching voltage	230 V	
	Electrical connection	Male connection M20x1.5 acc. EN 50262 Female connector acc. DIN 43650	
	Max. switching voltage at resistive load	60 W = 100 VA ~	
	Switching capacity	Ohmic 3 A at 24 V = Ohmic 0.03 to 5 A at max. 230 V ~	
	Protection class acc. DIN 40050	IP 65 (only if the connector is wired and fitted correctly)	
	Order example	PVD 5 C.0	

PVD x D.x /-L...


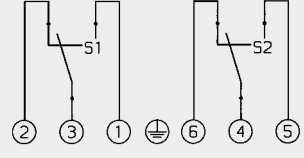
 	Type of indication	Visual indicator and electrical switch	
	Weight	250 g	
	Cracking pressure or indication range	1 bar ± 10% 3 bar ± 10% 1.5 bar ± 10% 5 bar ± 10% 2 bar ± 10% 8 bar ± 10%	
	Perm. operating pressure	420 bar	
	Perm. temperature range	-20°C to +100°C	
	Thread	G 1/2	
	Max. torque value	100 Nm	
	Switching type	N/C or N/O (change-over contacts)	
	Max. switching voltage	24, 48, 110, 230 V depending on the light insert	
	Electrical connection	Male connection M20x1.5 acc. EN 50262 Female connector acc. DIN 43650	
	Max. switching voltage at resistive load	60 W = 100 VA ~	
	Switching capacity	Ohmic 3 A at 24 V = Ohmic 0.03 to 5 A at max. 230 V ~	
	Protection class acc. DIN 40050	IP 65 (only if the connector is wired and fitted correctly)	
	Order example	PVD 2 D.0 /-L24	

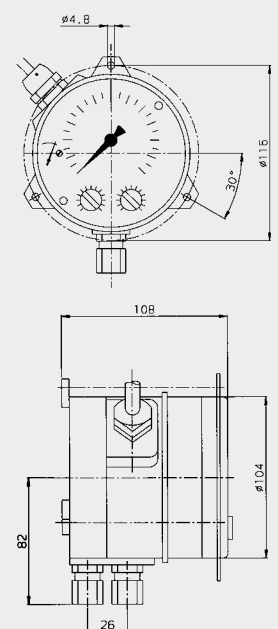
V01 x VZ.x

 	Type of indication	Visual/analogue indicator and 1 electrical switching contact at 75% and 100% of the cracking pressure	
	Weight	650 g	
	Cracking pressure or indication range	0.8 bar ± 10% 2.0 bar ± 10% 4.3 bar ± 10%	
	Perm. operating pressure	160 bar	
	Perm. temperature range	-20°C to +100°C	
	Thread	G ¼	
	Max. torque value	-	
	Switching type	75% - N/O contact 100% - N/C contact	
	Max. switching voltage	250 V	
	Electrical connection	Threaded connection M20x1.5 acc. EN 50262	
	Max. switching voltage at resistive load	75% contact 120 W = 120 VA ~	100% contact 30 W = 60 VA ~
	Switching capacity	Ohmic 2.5 A at 24 V = Ohmic 1 A at 250 V ~	
	Protection class acc. DIN 40050	IP 55	
	Order example	V01 2 VZ.0	



Differential pressure gauge DS11

 	Type of indication	2 microswitches, 1-pole change-over contacts, can be adjusted manually to recommended set values	
	Weight	1.2 - 3.5 kg	
	Cracking pressure or indication range	0 - 1.6 bar 0 - 4 bar on request	
	Perm. operating pressure	25 bar, 40 bar on request	
	Perm. temperature range	-10°C to +100°C	
	Thread	G ¼	
	Max. torque value	-	
	Switching type	Change-over contacts	
	Max. switching voltage	U~max = 250 V AC U~max = 30 V DC	
	Electrical connection	Hard-wired numbered cable, cable connector, 7 pole plug-in connection	
	Max. switching voltage at resistive load	I _{max} = 5 A, I _{max} = 0.4 A,	P _{max.} = 250VA P _{max.} = 10 W
	Switching capacity	-	
Protection class to DIN 40050	IP 55		
Order numbers	Pressure chamber in aluminium: 639311 Pressure chamber in stainless steel: 639586		



NOTE

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For applications or operating conditions not described, please contact the relevant technical department.
Subject to technical modifications.

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Filter Element Technology



1. GENERAL

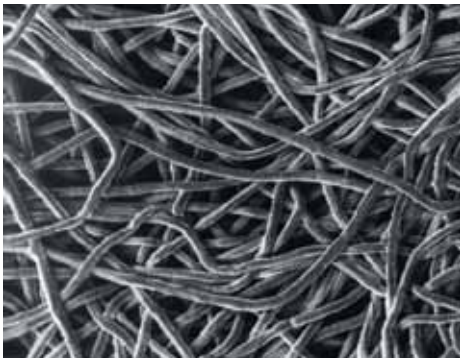
The product range comprises components for the filtration of low and high viscosity fluids for the process engineering, chemical and plastic processing industry, e.g. acids, alkalis, water, superheated steam/gas and polymer melts.

2. TECHNOLOGY

Different filter media (Chemicon® metal fibre and wire mesh) or a combination of these are used for the filtration process.

Chemicon® metal fibres consist of a multitude of very fine and evenly distributed stainless steel fibres (316L, special materials on request) which are joined together using a sintering process.

The essential advantages of this highly porous filter material over other materials, such as wire mesh and sintered metals, are the high contamination retention capacity and the high porosities up to 90 %.



Chemicon® metal fibre

3. APPLICATION

A specialist area of fluid filtration is in the production and processing of plastics.

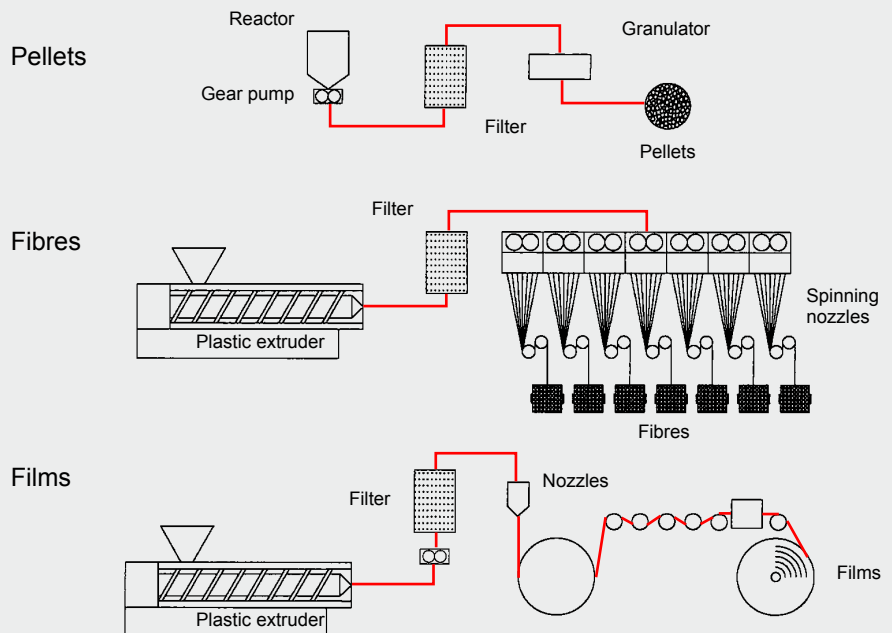
In addition to the contamination brought in from outside and present in the manufacture of raw materials, the presence of gels often causes further problems in product quality assurance.

Filtration using special filter elements

with Chemicon® (metal fibre), in filtration ratings of 1 and 100 µm absolute, has proven most effective in this field.

The filter elements are supplied in pleated form as standard or special elements.

Application schematic for production of pellets, fibres and films



For further information on element technology from HYDAC Process Technology, please contact our technical sales department.

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ATEX Check List

Customer: _____
 Project: _____
 Which product is to be used? _____

PRODUCTION GROUPS ACCORDING TO EC DIRECTIVE 94 / 9 / EC, APPENDIX I

Group I Mines, methane and/or combustible dust		Group II Potentially explosive atmosphere of gas/air, dust/air mixtures, vapours or mists					
Category M		Category 1		Category 2		Category 3	
1	2	G (Gas) (Zone 0)	D (Dust) (Zone 20)	G (Gas) (Zone 1)	D (Dust) (Zone 21)	G (Gas) (Zone 2)	D (Dust) (Zone 22)
For equipment with a very high level of safety. Continued operation under occasional malfunctions.	For equipment with a high level of safety. Intended to be de-energized in event of explosive atmosphere.	For equipment with a very high level of safety. Designed for environments where a potentially explosive atmosphere is to be always or frequently expected.		For equipment with a high level of safety. Designed for environments where a potentially explosive atmosphere is to be expected.		For equipment with a normal level of safety. Designed for environments where a potentially explosive atmosphere is rarely expected and then only for a short time.	
Annex II / No. 2.0.1 or 2.0.2		Annex II / No. 2.1		Annex II / No. 2.2		Annex II / No. 2.3	

Temperature class	max. surface temperature in °C
T1	450
T2	300
T3	200
T4	135
T5	100
T6	85

Types of ignition protection (only for electrical units)	
	without ignition protection
d	flameproof enclosure
i	intrinsic safety
m	encapsulation
e	increased safety
p	pressurized encapsulation
q	powder filling
o	oil immersion
s	special protection
n	various protection principles for Zone 2

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