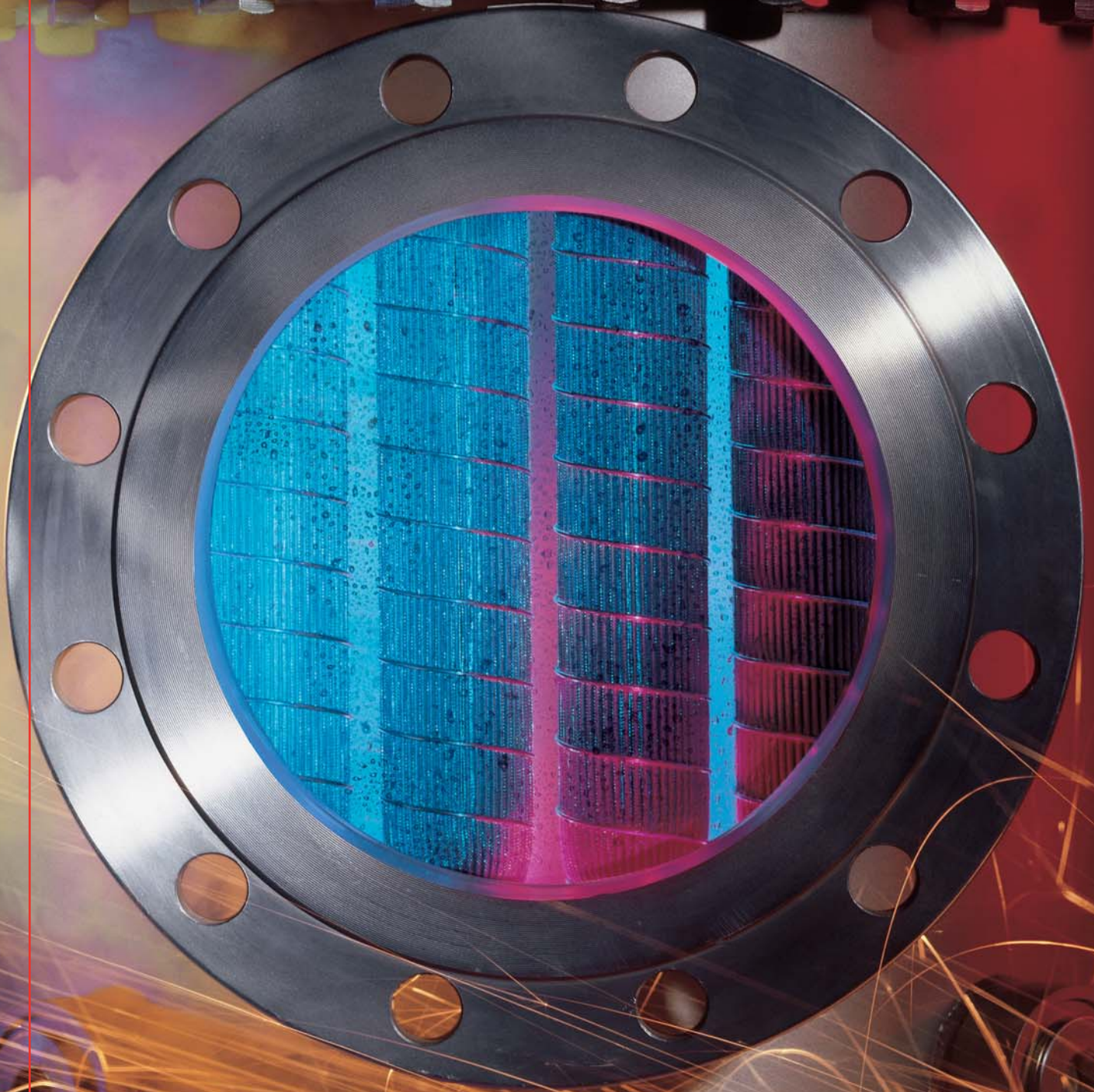


HYDAC

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: Longer service life, maximising the quality of the fluid to be filtered and the possibility of repeat use of the filter elements, together with low maintenance costs, 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 back-flushing.

Furthermore we also manufacture filter elements according to customer specification. Our filter elements in Chemicron® (metal fibre), wire mesh or in slotted tube design have already proved 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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Process Filter Low, Medium, High Pressure PFL, PFM, PFH Q_{\max} up to 120 l/min; p_{\max} up to 100 bar; brochure no.: 7.723../..	91	PFL PFM PFH
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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 de-scaling and for water conditioning for the cooling of blast furnaces and rolling mills. Emulsion filtration in cold 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.



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

Maximising the quality of the cooling lubricants and therefore extending the lifetimes. In addition, protection of the tools and the uniform quality of the parts produced.



Mining

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



Oil and gas industry

Filtration of produced water, injection water, cooling 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. Conditioning of industrial water in sewage treatment plants.



District heating

Protection of heat exchangers to prevent blockage 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 requirement.

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 back-flushing filters for maintenance-free and continuous operation
- 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 – what 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 is the minimum and maximum flow rate?
- 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 filtration rating do you require? Remember the principle: ***Not necessarily as fine as possible, but as fine as necessary.***
- 8 Economic factors** – Would you like manual or automatic operation?

For further product-specific sizing 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 filter elements form the core of a filter. These are the result of many years' 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 rating

Retention rates for wire mesh and slotted tubes:

Nominal retention rates


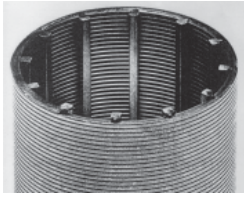
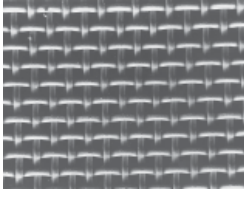

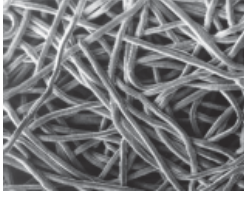

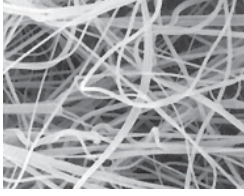
The filtration ratings given in the model code for these qualities are based on a HYDAC factory standard filter test. This test is carried out by introducing a large amount of dust (ISO MTD) at the beginning of the filter test and subsequently separating the contamination particles over 1 hour. The test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

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

Absolute retention rate

The 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 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 ($\beta_x = 100$), which denotes absolute filtration.

3.2.2 Summary of filter materials and filtration ratings

Filtration rating	Material	Description
3,000 - 10,000 μm nominal		Cleanable perforated sheet: Preferred application in strainer filters; Filtration direction from inside to outside; All-stainless steel.
50 - 3,000 μm nominal		Cleanable slotted tube: Used in Back-flushing filters AutoFilt® RF 3 and RF4 in conical design, and in many inline filters. The very 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® RF 3 and RF4. 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		Non-cleanable glass fibre Betamicron®: Very high contamination retention capacity and retention characteristics with low purchase costs.
1 - 100 μm absolut		Non-cleanable filter candles in polypropylene or polyester: Melt blown (Deka Rheo) or pleated (Mega Rheo) 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, in others, on the other hand, very fine filtration is required, complete cascade solutions are also possible.

3.2.3 Cleaning filter elements

In general the filter materials can be divided into cleanable and non-cleanable 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 himself. 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 point test 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, having regard to the spray pressure, water temperature and spray direction 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 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 temperature 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.

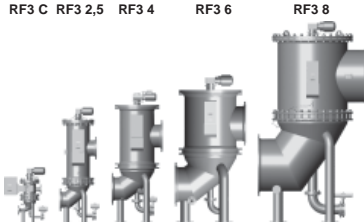
When non-cleanable filter elements are used, HYDAC Process Technology GmbH and the whole HYDAC group of companies sets great store by filter elements which can be incinerated for thermal recovery.

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



1. TECHNICAL SPECIFICATIONS

1.1 GENERAL

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

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

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

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

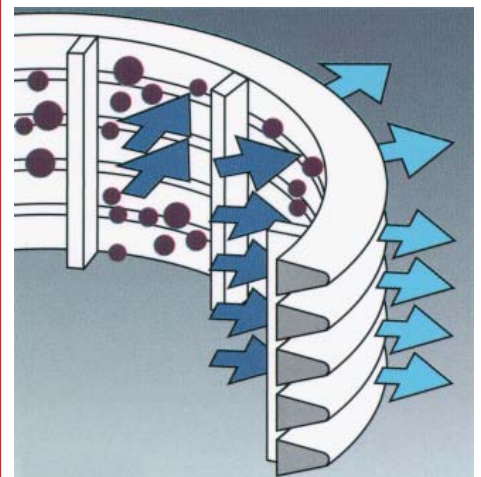
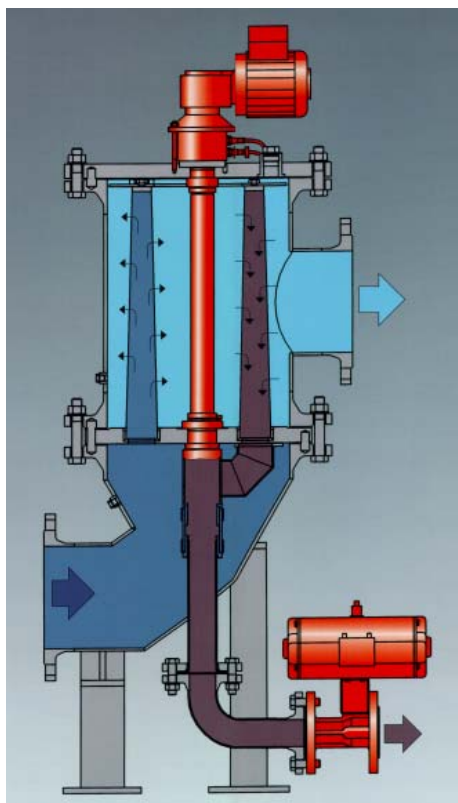
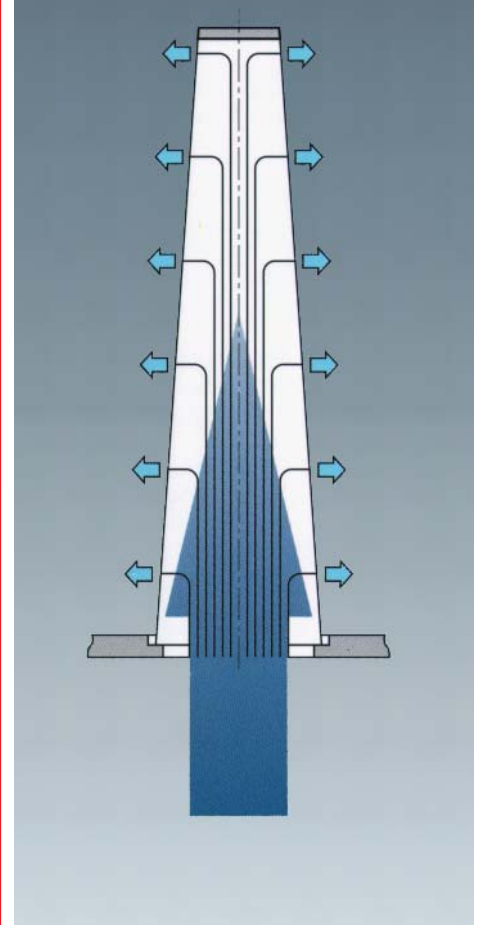
1.2 OPERATION OF THE AUTOFILT® RF3 Filtration

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

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

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

Filtration



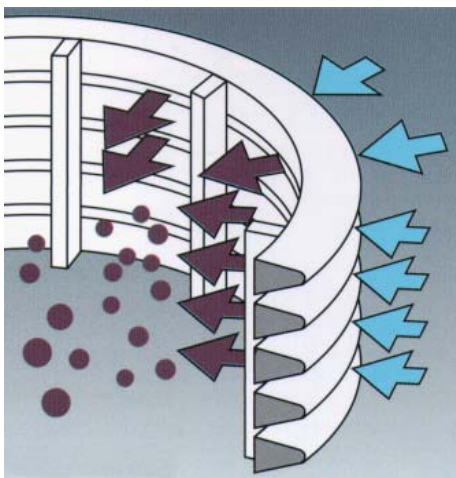
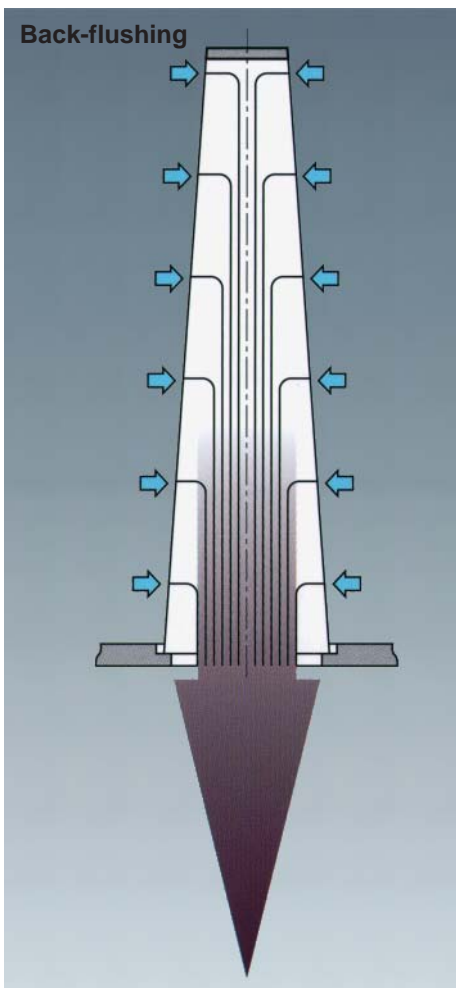
Triggering automatic back-flushing

Back-flushing is triggered automatically:

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

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

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



1.3 SPECIAL FEATURES OF THE A AUTOFILT® RF3

Isokinetic filtering and back-flushing

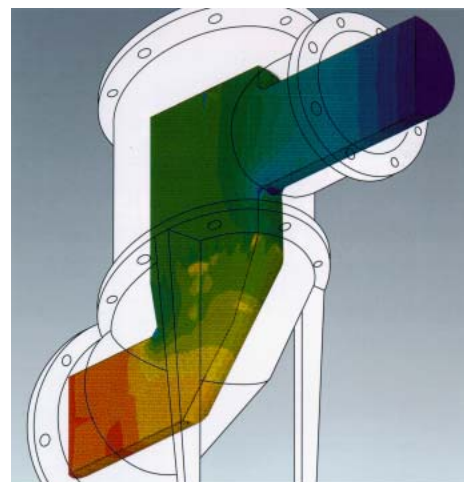
The special conical shape and configuration of the filter elements allows even flow, resulting in low pressure drop and complete cleaning of the elements. The advantage: fewer back-flushing cycles and lower loss of back-flushing fluid.

Pulse-aided back-flushing

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

Low back-flushing quantities due to cyclic control

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



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

2. FILTER SPECIFICATIONS

2.1 STANDARD CONFIGURATIONS

2.1.1 Control parameters

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

2.1.2 Connection voltages

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

2.1.3 Reservoir mounting / flange connections

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

2.1.4 Variable flange geometry

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

2.1.5 Housing materials

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

2.1.6 Material of internal parts

- Stainless steel

2.1.7 Material of elements

- Stainless steel

2.1.8 External corrosion protection

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

2.1.9 Internal corrosion protection

- 2K-epoxy coating
- Rubber coating

2.1.10 Differential pressure gauge

- Aluminium
- Stainless steel
- Brass
- Chemical seal

2.1.11 Filtration ratings

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

2.1.12 Electrical protection class

- IP55

2.1.13 Pressure ranges

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

2.2 OPTIONAL VERSIONS

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

2.2.1 Control / electrical components / voltage supply

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

2.2.2 Housing manufacture

- ASME Code design with or without U stamp

2.2.3 Flange connections

- ANSI
- JIS

2.2.4 Housing materials

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

2.2.5 Cover plate lifting device

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

2.2.6 Materials of internal parts and elements

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

2.2.7 Corrosion protection, external

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

2.2.8 Corrosion protection, internal

- Glass flake lining
- Special coatings according to customer specification

2.2.9 Explosion protection

- ATEX according to Directive 94/9/EC

2.2.10 Documentation

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

Further optional models on request

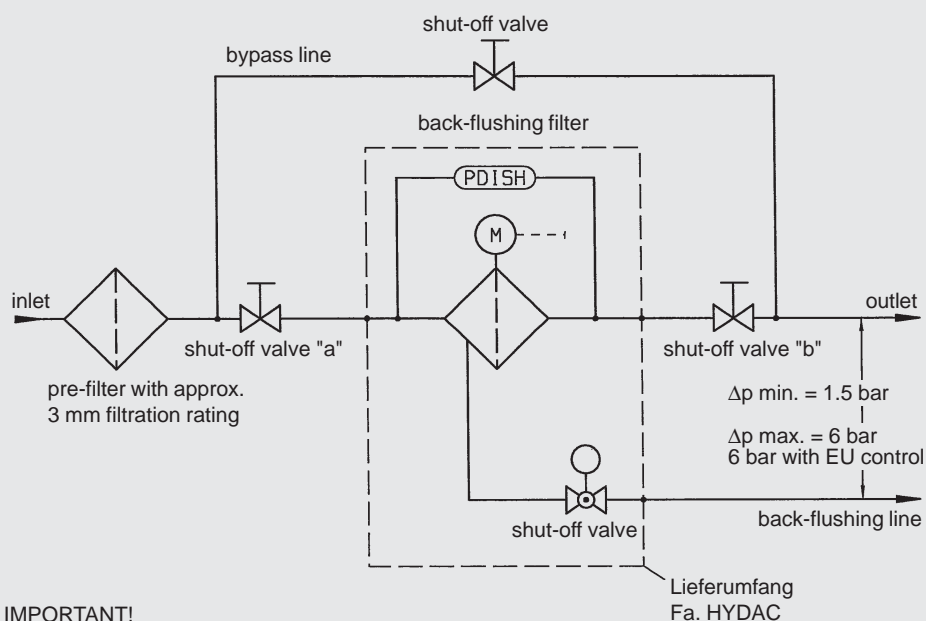
2.3 OVERVIEW OF TECHNICAL SPECIFICATIONS OF STANDARD MODELS

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

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

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

2.4 CIRCUIT DIAGRAM



IMPORTANT!

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

3. MODEL CODE AUTOFILT® RF3

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

Type AutoFilt _____

Size filter _____

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

Type of control / input supply voltage _____

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

Housing material / corrosion protection _____

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

Material of shut-off valve _____

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

Differential pressure gauge _____

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

Flange position inlet and outlet _____

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

Modification number _____

- X = the latest version is always supplied

Element set _____

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

Size of element set _____

Identical to size of filter

Drawing number _____

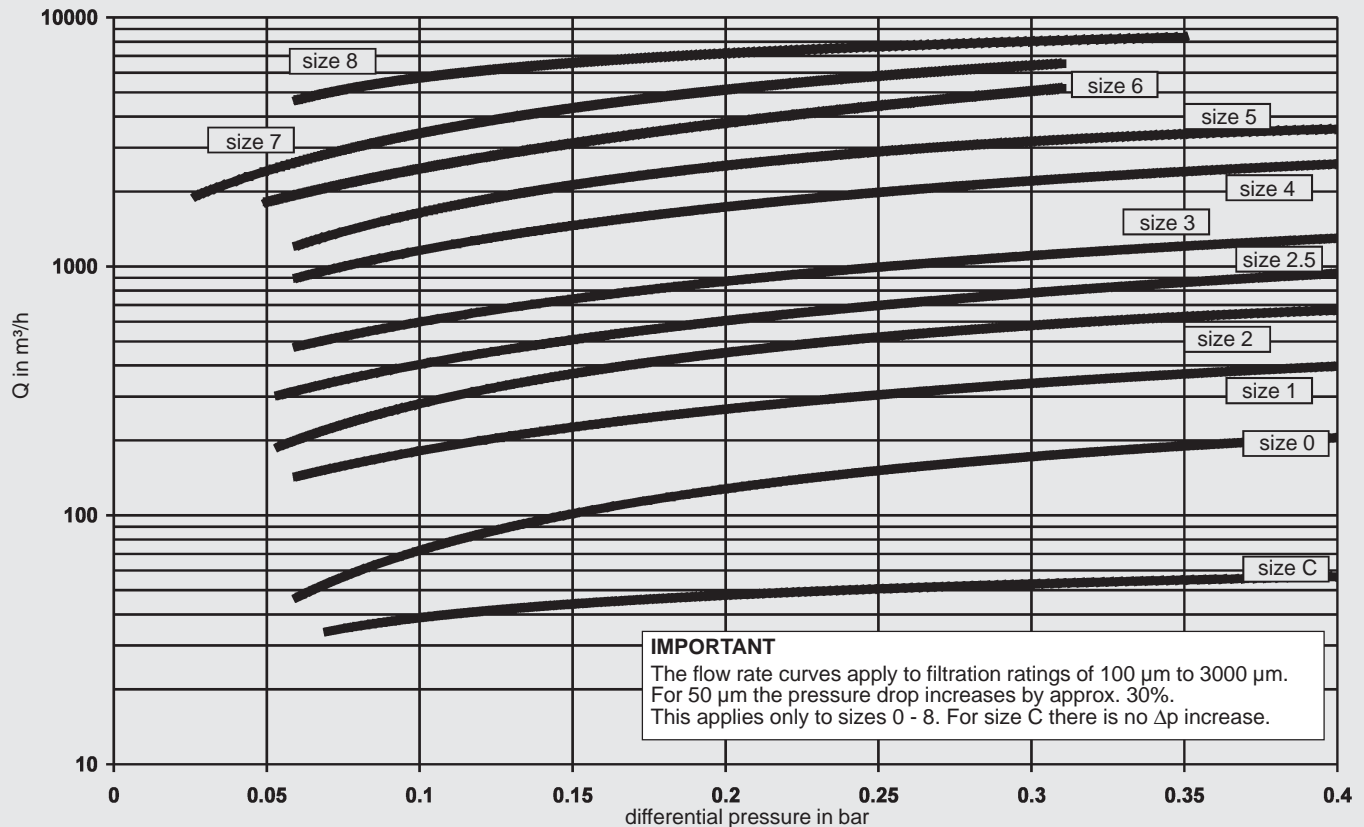
For special models
(number is allocated after technical clarification at Head Office)

¹⁾ stainless steel housing PN16

4. FILTER CALCULATION / SIZING

4.1 PRESSURE DROP CURVES

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



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

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

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

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

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

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

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

4.2 CALCULATION TABLES

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

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

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

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

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

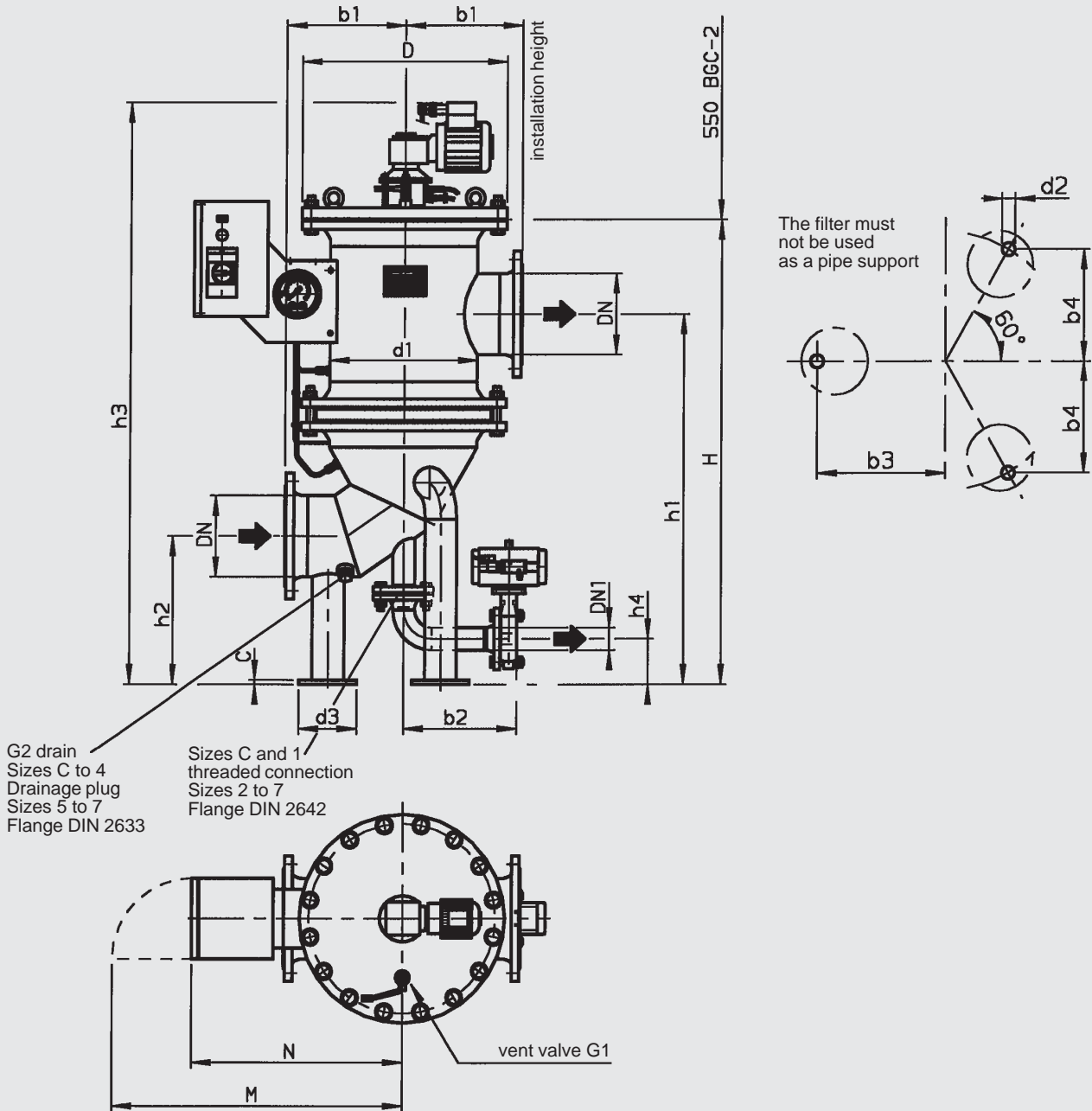
4.2.2 Emulsion applications (cooling lubricants, washing fluids)

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 according to Table 2.3.

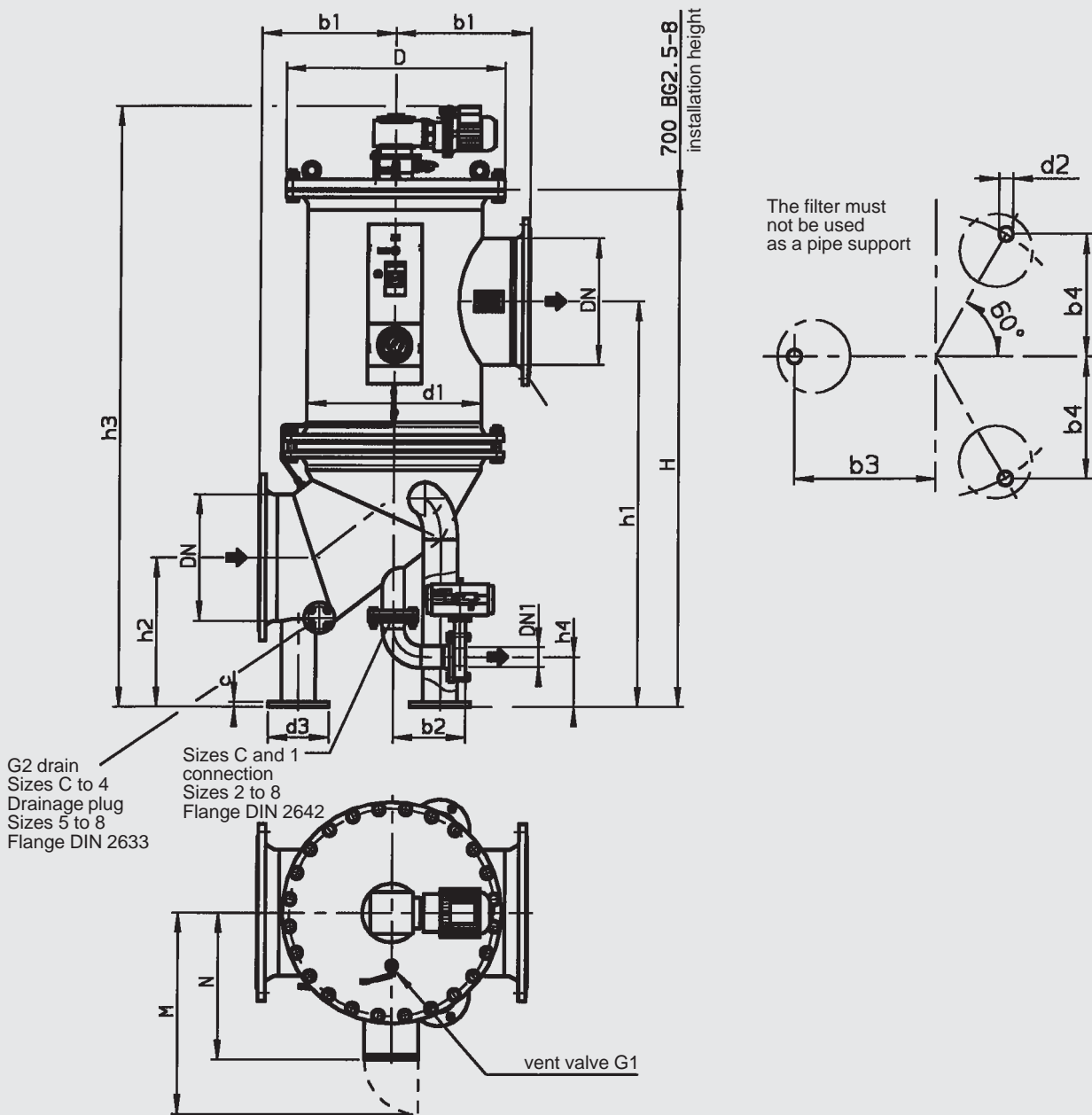
5.1 DIMENSIONS OF SIZES C TO 2



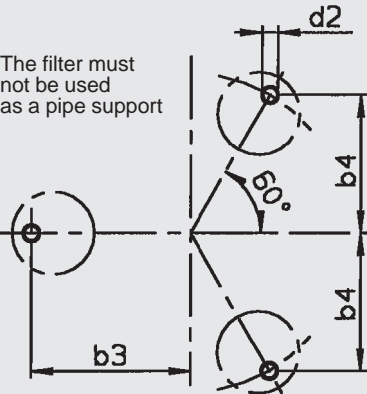
The dimensions indicated have ± 5 mm tolerances

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

5.2 DIMENSIONS OF SIZES 2.5 TO 8



The filter must not be used as a pipe support



The dimensions indicated have ± 5 mm tolerances

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

NOTE

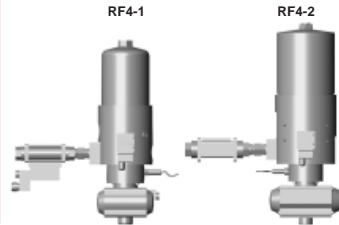
The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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Backflushing Filter AutoFilt® RF4



1. TECHNICAL SPECIFICATIONS

1.1 GENERAL

The automatic back-flushing filter AutoFilt® RF4 is a self-cleaning system for removing particles from low-viscosity fluids. Its robust construction and automatic back-flushing capability make a major contribution to operational reliability and **reduce operating and maintenance costs.**

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

Automatic cleaning starts as soon as the elements become contaminated.

The flow of filtrate is not interrupted during the back-flushing procedure.

Two sizes allow **flow rates from 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.

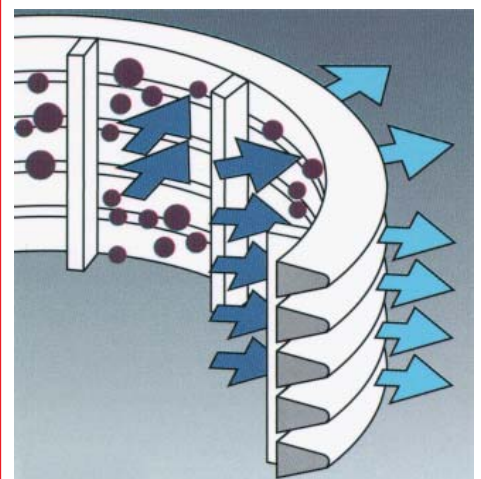
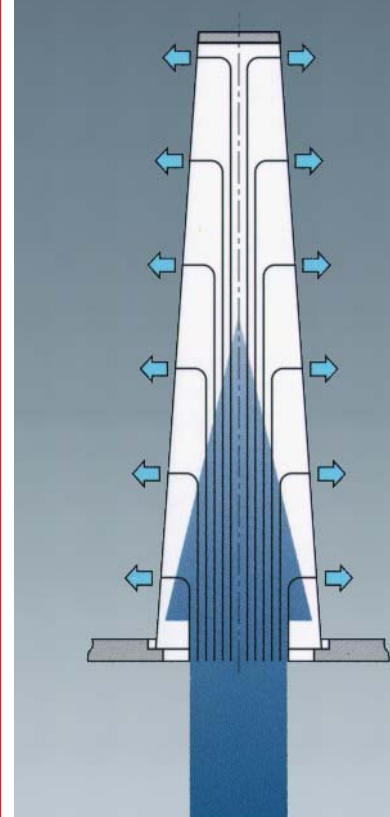
1.2 OPERATION OF THE AUTOFILT® RF4 Filtration

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

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

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

Filtration



Triggering automatic back-flushing

Back-flushing is triggered automatically when the triggering differential pressure is exceeded.

As soon as back-flushing has been triggered, the filter starts to clean the filter elements.

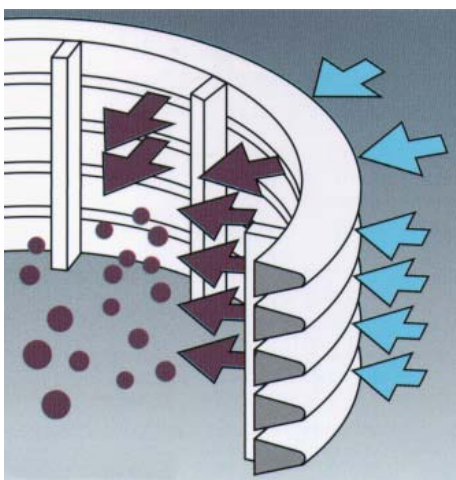
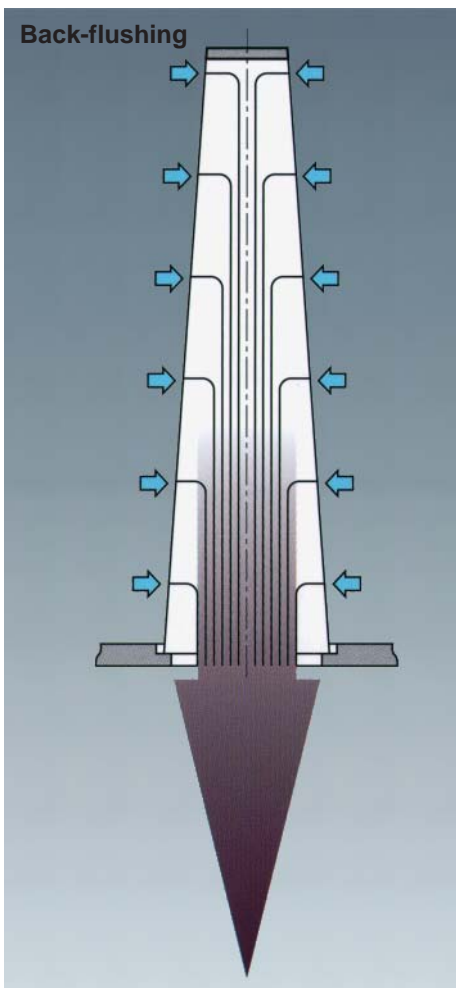
Triggering back-flushing on manual version

As soon as the visual clogging indicator responds, back-flushing is started manually.

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

- The turning drive turns the element plate through an angle of 90°. This brings a clean filter element into filtration, a contaminated filter element is positioned over the fixed flushing connection.
- The back-flushing valve is opened.
- The pressure drop between filtrate side and back-flushing line flushes a small part of the filtrate backwards into the filter elements to be cleaned. The contamination particles collected on the inside of the filter elements are loosened and flushed into the back-flushing line via the flushing arm.
- As soon as the "back-flushing time per element" has elapsed, the back-flushing valve is closed. In this way all the filter elements are flushed in succession. A back-flushing cycle is terminated when all the filter elements have been cleaned.

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



1.3 SPECIAL FEATURES OF THE AUTOFILT® RF3

Isokinetic filtering and back-flushing

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

Pulse-aided back-flushing

The filter element to be back-flushed remains in the flushing position for only a few seconds. Rapid opening of the pneumatic back-flushing valve generates a pressure surge in the openings of the filter elements that provides an additional cleaning effect to the back-flushing process.

Low back-flushing quantities due to cyclic control

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

2. FILTER SPECIFICATIONS

2.1 STANDARD CONFIGURATIONS

2.1.1 Control parameters

- EPT: electro-pneumatic cyclic control
- ET: electrical 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 240 V AC 50 Hz
- Control voltage 24 V DC, drive 115 V AC 60 Hz

2.1.3 Housing materials (combinations)

- Aluminium, anodised
- Stainless steel
- Carbon steel, nickel-plated
- Polyamide (PA)

2.1.4 Material of internal parts

- Stainless steel

2.1.5 Material of elements

- Stainless steel

2.1.6 Back flushing valve

- Coaxial valve
- Lateral valve
- Stainless steel ball valve
- Carbon steel ball valve

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 Super-Mesh
- 50 µm to 1000 µm slotted tube

2.1.9 Electrical protection class

- IP54

2.1.10 Pressure ranges

- 6 bar
- 16 bar
- 25 bar

2.2 OPTIONAL VERSIONS

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

2.2.1 Control / electrical components / voltage supply

- Special voltages
- Customised special solutions

2.2.2 Filter elements

- Superflush element technology
- Elements with magnetic filtration technology

2.2.3 Documentation

- Manufacturer's test certificates
- Material certificates 3.1 according to DIN EN 10204

And many others on request.

Further optional models on request.

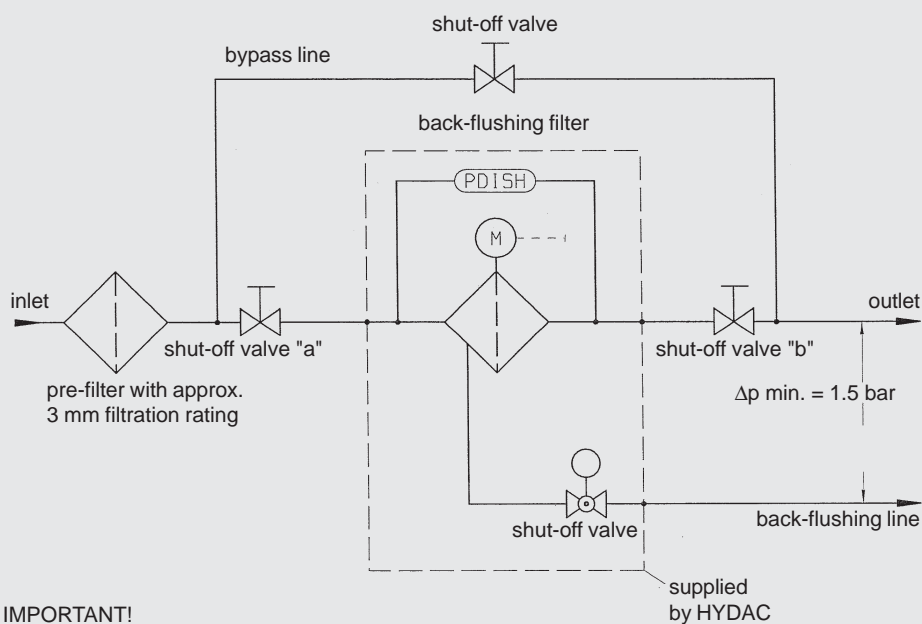
2.3 OVERVIEW OF TECHNICAL SPECIFICATIONS OF STANDARD MODELS

Size	Pressure ¹⁾ range [bar]	Connection ²⁾ Inlet / outlet	Connection Back-flush line (PN16)	Weight [kg]	Volume [l]	No. of elements	Filtration area [cm ²]	Back-flush vol. ²⁾ [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) Pressure range: 6 bar for quick-clamp fastening, 16 bar for screw-type model
- 2) based on EPT/ET control mode with opening time of back-flushing valve of 1.5 seconds and 1.5 bar differential pressure between outlet and back-flushing line.

2.4 CIRCUIT DIAGRAM



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

3. MODEL CODE AUTOFILT® RF4

RF4 - 2 - EPT1 - AE - E - CO - 1 - 06 - X / KMS1000 - 1234567

Filter types

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

Type of control

M = manual (only for RF4-1)
EPT = electro-pneumatic cyclic control (including pneumatic drive)
ET = electrical control (only for RF4-1)

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:

1A = control voltage 24 V DC, drive 240 V AC 50Hz
1B = control voltage 24 V DC, drive 115 V AC 60 Hz

Materials

	Lower part of filter	Upper part of filter	Note
AA	= Aluminium ALMG3	Aluminium ALMG3	Only RF4-1, 16 bar
AE	= Aluminium ALMG3	Stainless steel	Only RF4-2, 6 bar
AP	= Aluminium ALMG3	Polyamide PA 66 GF 35	Only RF4-1, 6 bar
EE	= Stainless steel	Stainless steel	RF4-1, RF4-2, 6 bar
NN	= Carbon steel	Carbon steel	Only RF4-2, 16 bar

Internal parts

E = stainless steel

Back-flushing valve

0 = without back-flushing valve
CO = coaxial valve
LA = lateral valve (only on EPT model)
KN = ball valve, carbon steel (only on manual version)
KE = ball valve, stainless steel (only on manual version)

Differential pressure monitoring

0 = without differential pressure monitoring
1 = fixed value: 0.5 bar, type DS 32
2 = adjustable: 0.1 - 1 bar, type DS 31

Pressure range

06 = 6 bar (housing fastened with clamp)
16 = 16 bar (filter upper section threaded)

Modification number

X = the latest version is always supplied

Elemente / filtration rating

For RF4-1:

KMS = slotted tubes 50 µm - 1000 µm
KDM = SuperMesh 25 µm, 40 µm, 60 µm
SKMS = slotted tube Superflush 50 µm to 1000 µm
SKMD = Supermesh Superflush 25 µm, 40 µm, 60 µm

For RF4-2:

KNS = slotted tubes 50 µm - 1000 µm
KND = SuperMesh 25 µm, 40 µm, 60 µm
SKNS = slotted tube Superflush 50 µm to 1000 µm
SKND = Supermesh Superflush 25 µm, 40 µm, 60 µm

Drawing number

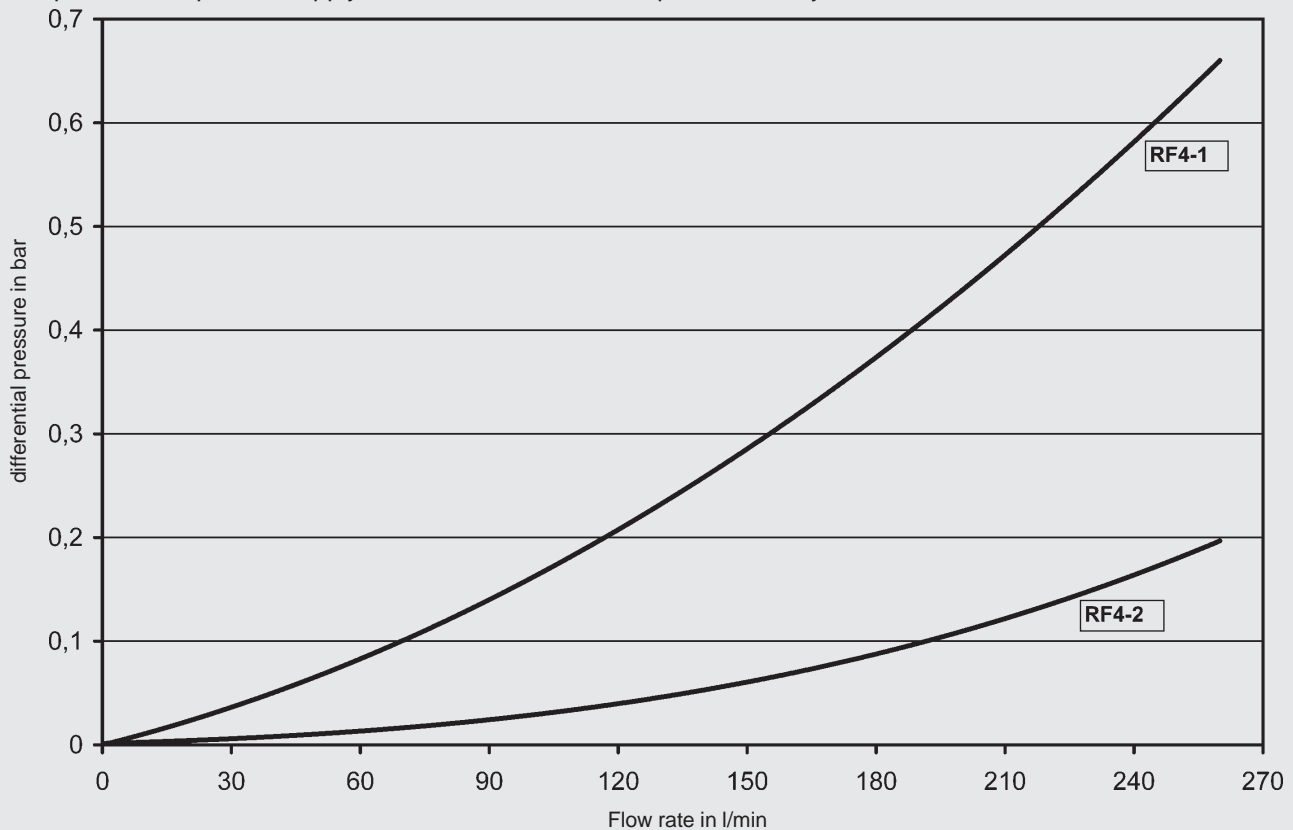
For special models

* Supply voltage of control 230 V AC, 50 Hz

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® RF4 that there is a differential pressure between the back-flushing line and filter outlet of at least 1.5 bar. This minimum pressure differential ensures the operation of the filter.

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

- Flow rate
- Type of medium
- Materials / resistance
- Viscosity
- Required filtration rating
- Particulate loading in the fluid
- Type of contamination
- Operating pressure
- Operating temperature - must be below the boiling point of the medium
- Power supply and compressed air supply
- Pressure ratios after the AutoFilt® RF4 (is there any back pressure?)
- Integration of the AutoFilt® RF4 in the whole system

The pressure drop curves and the tables, included one for special emulsion applications, can be used to calculate the AutoFilt® RF4. Generally speaking, an initial Δp (clean condition of the filter) of 0.2 bar should not be exceeded. The pressure drop curve applies to filtration ratings of 100 - 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 flange inlet. It should not exceed 4 m/s.

When sizing the AutoFilt® RF4, the calculation of water applications and emulsion applications must be treated separately because of the different contamination load (see point 4.2. Calculation tables).

4.2 CALCULATION TABLES

The calculation tables form an important basis for deciding the choice of AutoFilt® RF4.

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

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

- Table applies to emulsions and oils with a viscosity of up to 15 mm²/s
- For applications in the areas of cast iron machining, grinding and honing and for fluids with a viscosity above 15 mm²/s, Head Office must be consulted without fail.

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

Machined material	Type of machining	Max. flow rate [l/min]	
		RF4-1	RF4-2
Aluminium	Cutting	100	220
Cast iron ¹⁾	Cutting	70	180
Carbon steel	Cutting	80	200
Stainless steel	Cutting	80	200
Aluminium	Grinding	90	200
Cast iron ¹⁾	Grinding	50	140
Carbon steel	Grinding	60	150
Stainless steel	Grinding	60	150

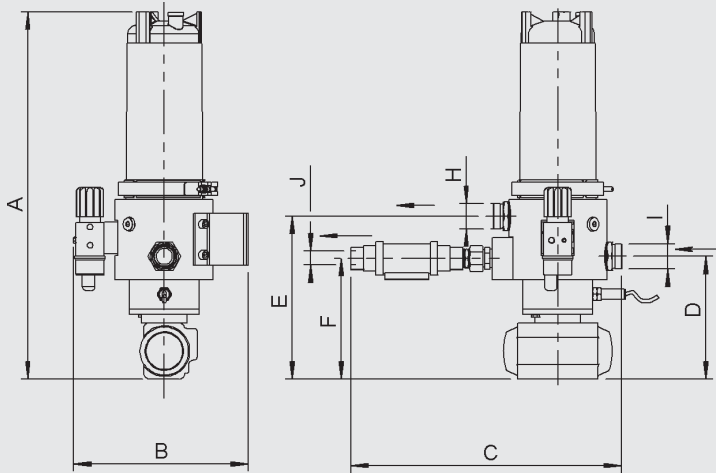
The flow rate ranges indicated apply to filtration ratings $\geq 100 \mu\text{m}$ and a maximum contamination capacity of 200 mg/l.

¹⁾ wire mesh is generally unsuitable for cast iron applications.

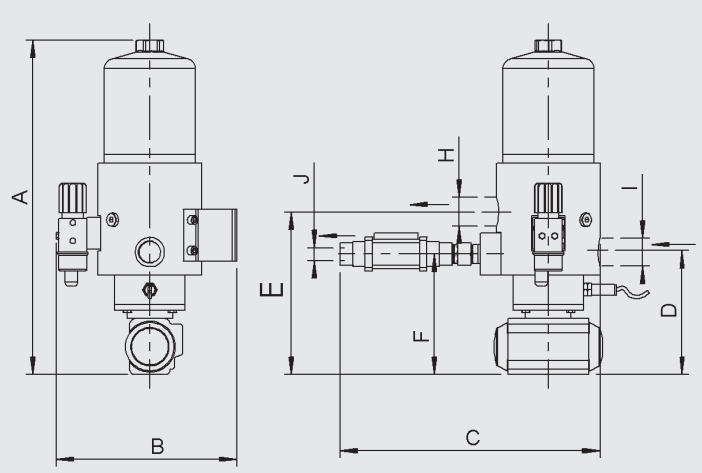
5. DIMENSIONS

5.1 DIMENSIONS OF SIZE 1

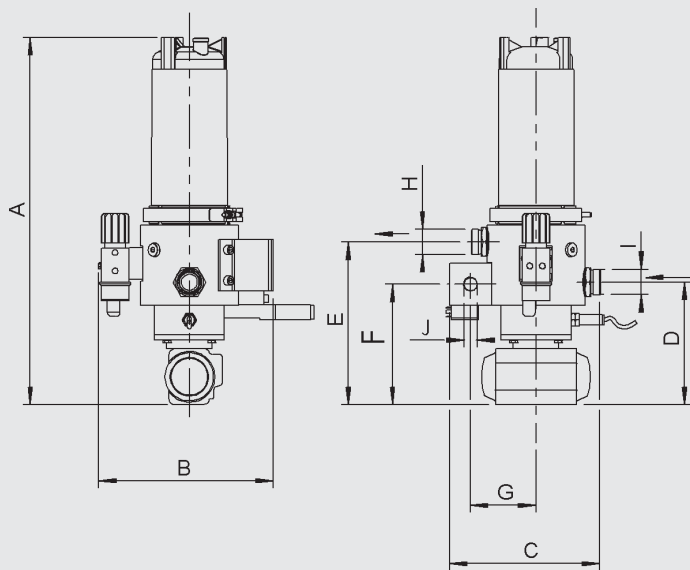
RF4-1 (6 bar with coaxial valve)



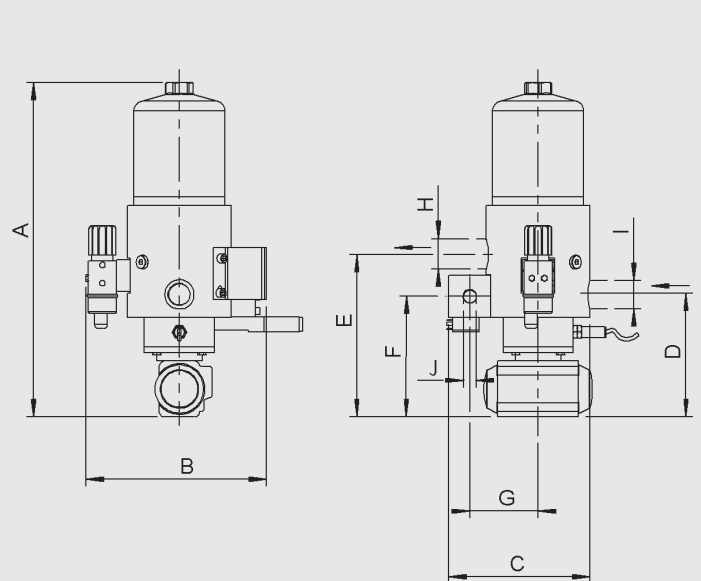
RF4-1 (16 bar with coaxial valve)



RF4-1 (6 bar with lateral valve)



RF4-1 (16 bar with lateral valve)

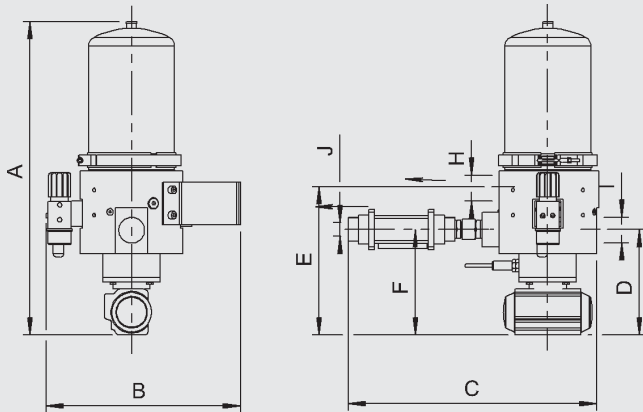


- The filter must not be used as a pipe support
- The dimensions indicated have ± 5 mm tolerances

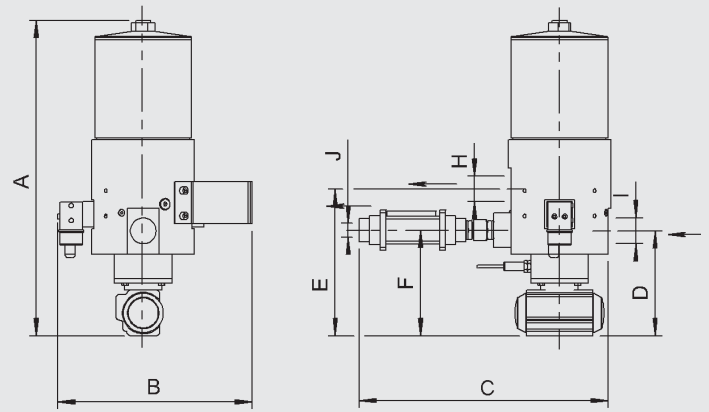
Type:	A	B	C	D	E	F	G	H	I	J
RF4-1 (6 bar / coaxial valve)	537	250	387	188	245	185	-	1"	1"	1/2"
RF4-1 (6 bar / lateral valve)	537	250	214	188	245	185	94	1"	1"	1/2"
RF4-1 (16 bar / coaxial valve)	490	258	372	188	245	185	-	1"	1"	1/2"
RF4-1 (16 bar / lateral valve)	490	258	250	188	245	185	94	1"	1"	1/2"

5.2 DIMENSIONS OF SIZE 2

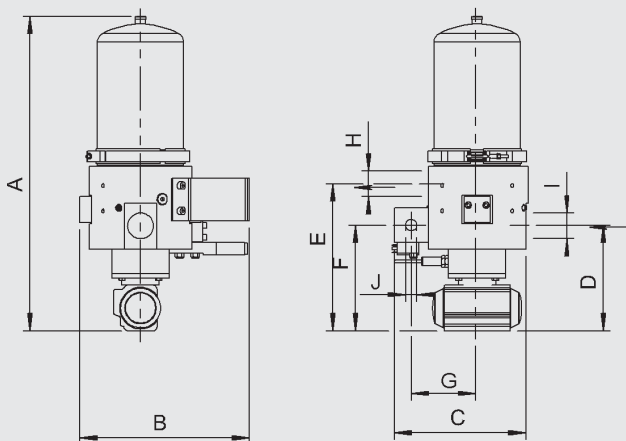
RF4-2 (6 bar with coaxial valve)



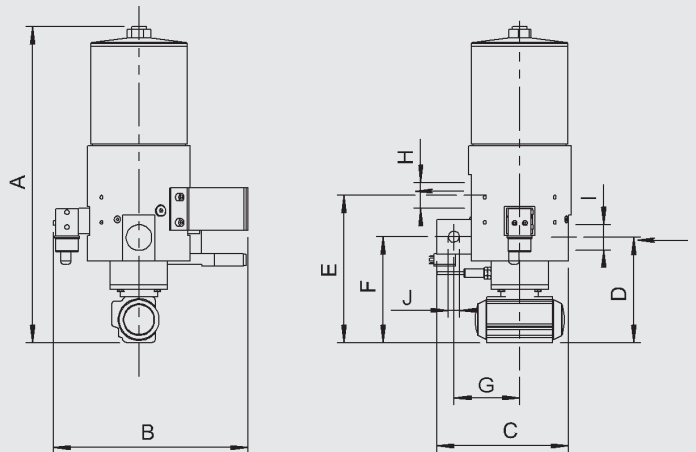
RF4-2 (16 bar with coaxial valve)



RF4-2 (6 bar with lateral valve)



RF4-2 (16 bar with lateral valve)



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

Type:	A	B	C	D	E	F	G	H	I	J
RF4-2 (6 bar coaxial valve)	559	339	433	196	269	197	–	1 1/2"	1 1/2"	3/4"
RF4-2 (6 bar lateral valve)	559	339	230	196	269	197	114	1 1/2"	1 1/2"	1/2"
RF4-2 (16 bar coaxial valve)	559	296	433	196	269	197	–	1 1/2"	1 1/2"	3/4"
RF4-2 (16 bar lateral valve)	559	339	230	196	269	197	114	1 1/2"	1 1/2"	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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Backflush Treatment Unit BTU



1. TECHNICAL SPECIFICATIONS

1.1 GENERAL

The BTU unit with integral back-flushing 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 general consists of:

- Back-flushing filter for the main filtration
- Process twist sieve (PTS) to treat the back-flushed volume
- Buffer tank with components (only BTU-1)
- Control

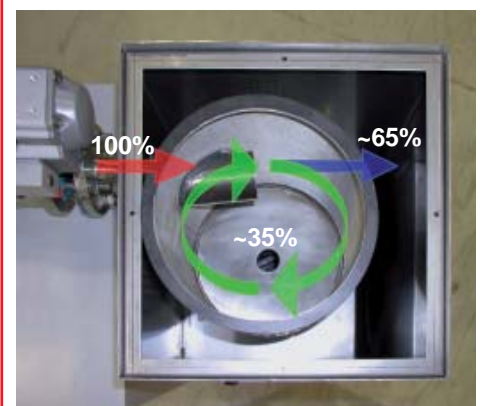
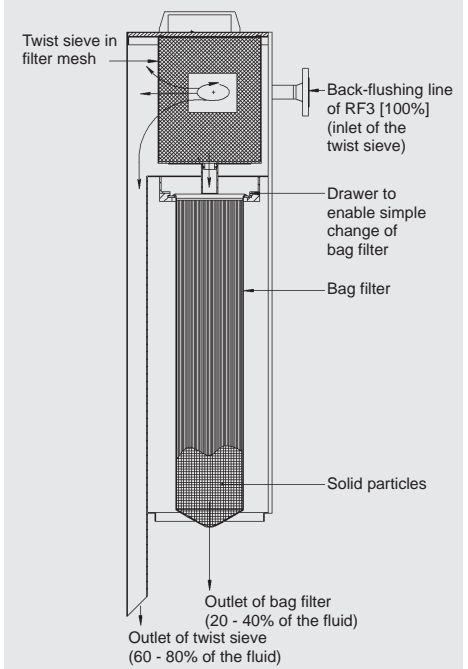
The process twist sieve (PTS) is a component which is fitted downstream from the back-flushing filter to filter the back-flushed volume. So with the help of the twist sieve a further filtration process is carried out via the back-flushing line.

The solid particles from the back-flushing volume are collected in a bag filter which is suspended under the twist sieve. When this is full, it is easy to change by opening 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 back-flushing 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 back-flushing 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 back-flushing 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

- 15 µm to 150 µm SuperMesh

2.1.3 Back-flushing filter

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

2.1.4 Bag filter

- P: polyester
- 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 back-flushing 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 back-flushing 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

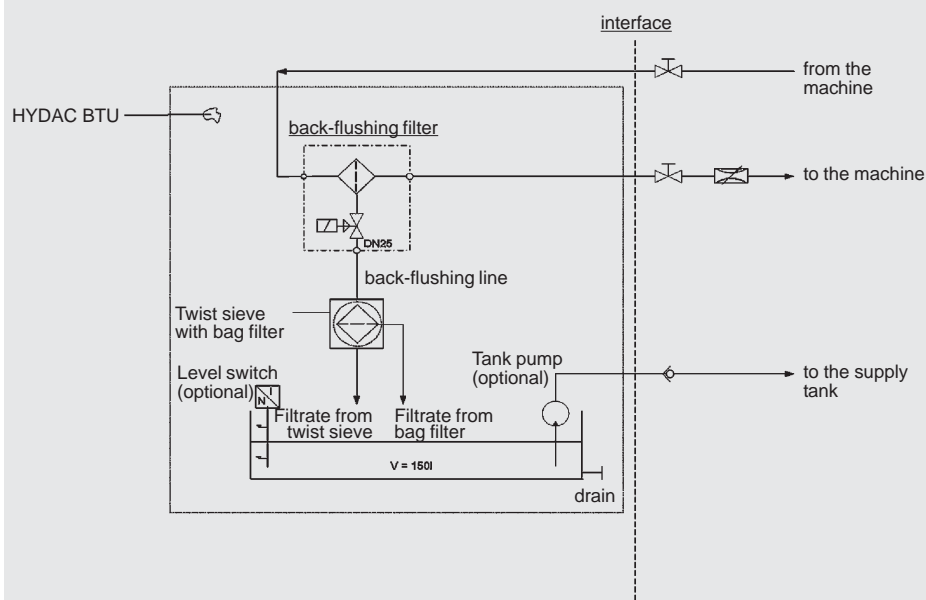
2.1.9 Filtration ratings

- 25 µm, 40 µm and 60 µm Super-Mesh
- 50 µm to 150 µm slotted tube

2.1.10 Electrical protection class

- IP54

2.2 CIRCUIT DIAGRAM



2.3 OPTIONAL VERSIONS

There is 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 back-flushing 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 back-flush fluid treatment is selected according to the back-flushing filter used:

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

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

- 15 = D15
- 25 = D25
- 40 = D40
- 60 = D60
- 80 = D80
- 100 = D100
- 150 = D150

Back-flushing filter type

As per separate Model code (see 3.3)

Bag filter material

- P = polyester
- 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 = without control function
- N1 = level monitoring of buffer tank
- N2 = level monitoring of bag filter (only for twist sieve Ø = 250 mm)
- N3 = level monitoring of buffer tank and bag filter (only for twist sieve Ø = 250 mm)
- 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
- 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:

- 0 = without control, without solenoid valve
- 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 = N: carbon steel, external primer
- 1 = NM: carbon steel, external primer, internal coating
- 3 = E: stainless steel

For RF4-1 only:

- AP = Configuration (APE): aluminium, polyamide, stainless steel
- AA = Configuration (AAE): aluminium, aluminium, stainless steel

For RF4-2 only:

- AE = Configuration (AEE): aluminium, stainless steel, stainless steel
- NN = Configuration (NNE): carbon steel, carbon steel, stainless steel

Note: The back-flushing filter is supplied in the standard pressure range

Materials of shut-off valve

For RF3 only:

- N = carbon steel
- E = stainless steel

For RF4 only:

- 1 = coaxial 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

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
A	= KD15	KMD15	KND15
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 _____
15 = D15
25 = D25
40 = D40
60 = D60
80 = D80
100 = D100
150 = D150

Diameter _____
180 = Ø 180 mm (only for RF4, without bracket)
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)
2 = with level switch brass (only for diameters 250 mm, 450 mm)

Bag filter material _____
P = polyester
N = nylon

Bag filter 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

BTU

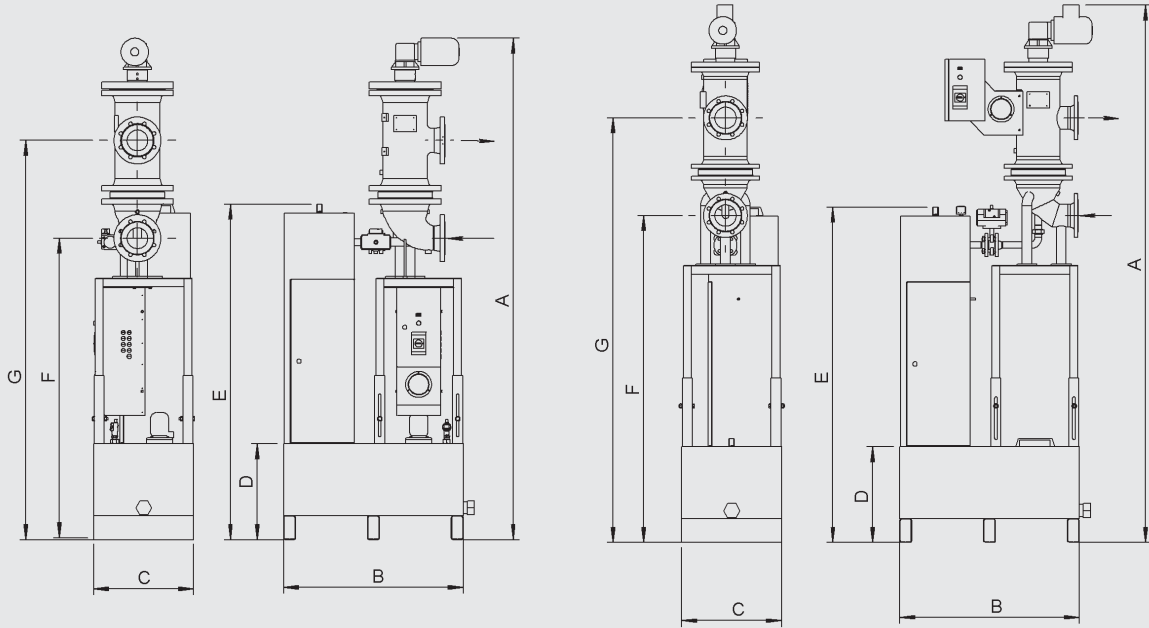
E 7.718.0/07.07

4. DIMENSIONS

4.1 DIMENSIONS OF BTU1 WITH RF3-0

BTU1-x-Exxxx3x-x-0-xS-T

BTU1-x-D/Fxxxx3x-0-x0-0

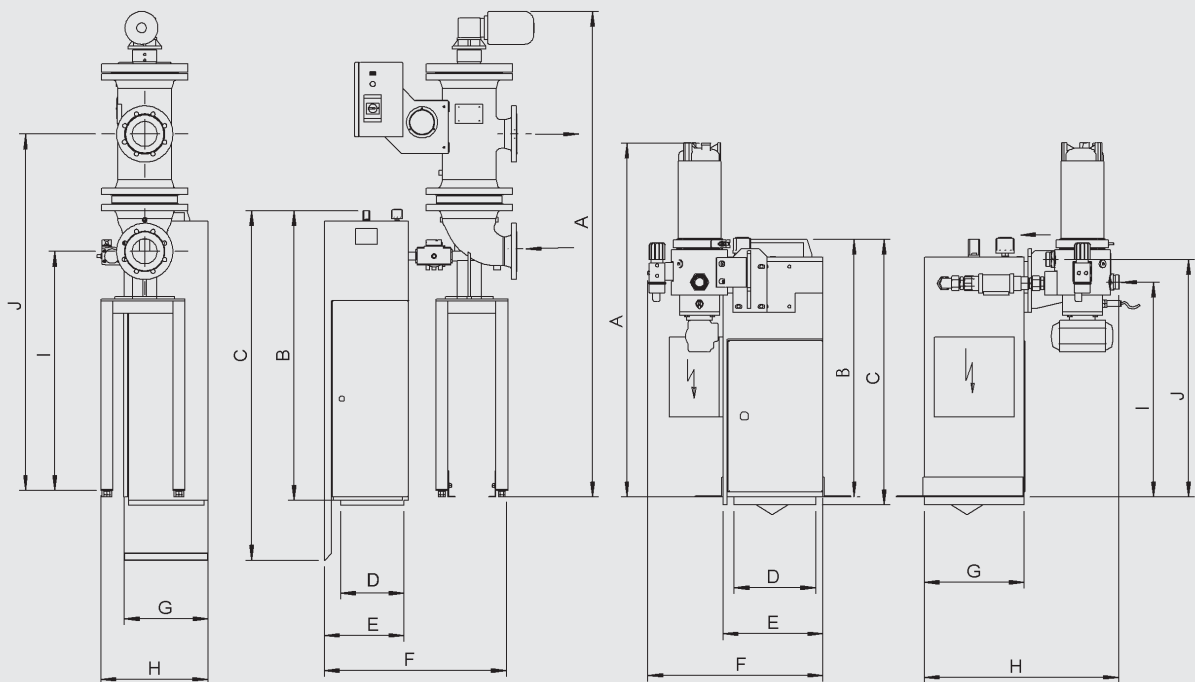


Type	A	B	C	D	E	F	G
BTU1-x-Exxxx3x-x-0-xS-T	2512	900	500	480	1680	1520	2000
BTU1-x-D/Fxxxx3x-0-x0-0	2692	900	500	480	1680	1638	2127

4.2 DIMENSIONS OF BTU3 WITH RF3-0 OR RF4-1

BTU3-x-Exxxx1x-x-0-x0-0

BTU3-x-RF4-1-EPT1/2-x-0-x-0-0



Type	A	B	C	D	E	F	G	H	I	J
BTU3-x-x-Exxxx1x-x-0-x-0-0	2028	1210	1460	264	332	765	350	447	998	1488
BTU3-x-RF4-1-EPT1/2-x-0-x-0-0	887	645	665	204	250	436	250	487	538	595

NOTE

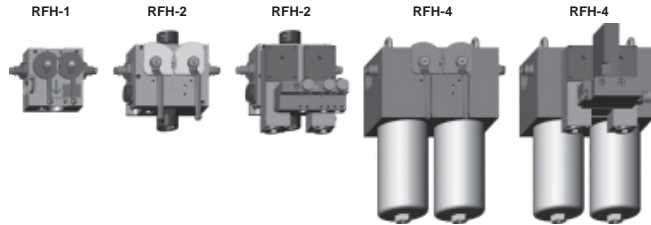
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Subject to technical modifications.

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Back-Flushing High Pressure Filter RFH



1. TECHNICAL SPECIFICATIONS

1.1 GENERAL

The back-flushing high pressure filter RFH is an easy-to-operate back-flushing 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, in the 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 back-flushing 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

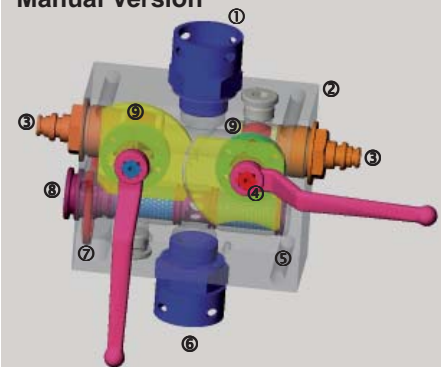
Sizes RFH-1 and RFH-2 consist of stainless steel housing blocks which can be mounted to the supporting structure by means of the bore holes in the corners of the housing.

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 back-flushing ports are on the side. Ensure connection of the back-flushing 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 in the filters RFH-1 and RFH-2, respectively. In the RFH-4 two divided elements are fitted. Each filter chamber or each element is back-flushed manually by switching a ball valve.

Construction of RFH-1 / 2 Manual Version

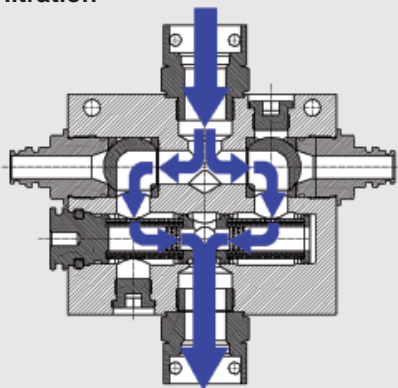


- 1 Inlet
- 2 Housing block
- 3 Back-flushing connections
- 4 Switch locking mechanism
- 5 Mounting borehole
- 6 Outlet
- 7 Retaining clip for element
- 8 Element
- 9 Change-over ball valve

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

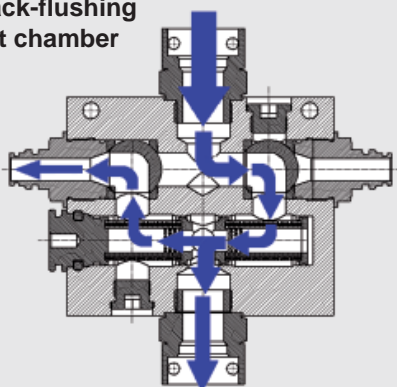


Back-flushing:

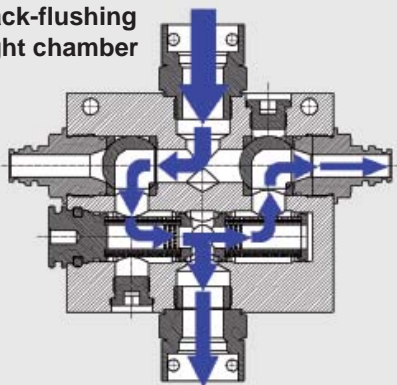
Both filter chambers are back-flushed one after the other using their own filtrate when the relevant lever is switched. When back-flushing, the flow is reversed into the relevant element segment and removes the contamination from the surface. During the back-flushing process, filtration continues via 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.

Back-flushing
left chamber



Back-flushing
right chamber



2. FILTER SPECIFICATIONS

2.1 STANDARD CONFIGURATIONS

2.1.1 Control versions

- Manual back-flushing with two manual levers for all sizes
- Automatic back-flushing - hydraulic actuation (only sizes 2 & 4) via external operating fluid, pilot operation of the actuators via hydraulic fluid
- Automatic back-flushing - electrohydraulic actuation (only sizes 2 & 4) via external fluid ($p > 100$ bar), pilot operation of the actuators via weather-proof solenoid valves (12 V 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 electro-hydraulic version

2.1.3 Housing materials (combinations)

- Stainless steel
- Brass
- Nickel-plated steel (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 Material of seals

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

2.1.6 Differential pressure monitoring (only 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

2.1.8 Pressure range of filter housing

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

2.1.9 Permissible differential pressure across element

- Δp max. 350 bar for wire mesh elements
- Δp max. 80 bar for slotted tube elements

2.1.10 Documentation

- Operating and maintenance instructions
- ATEX conformity 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

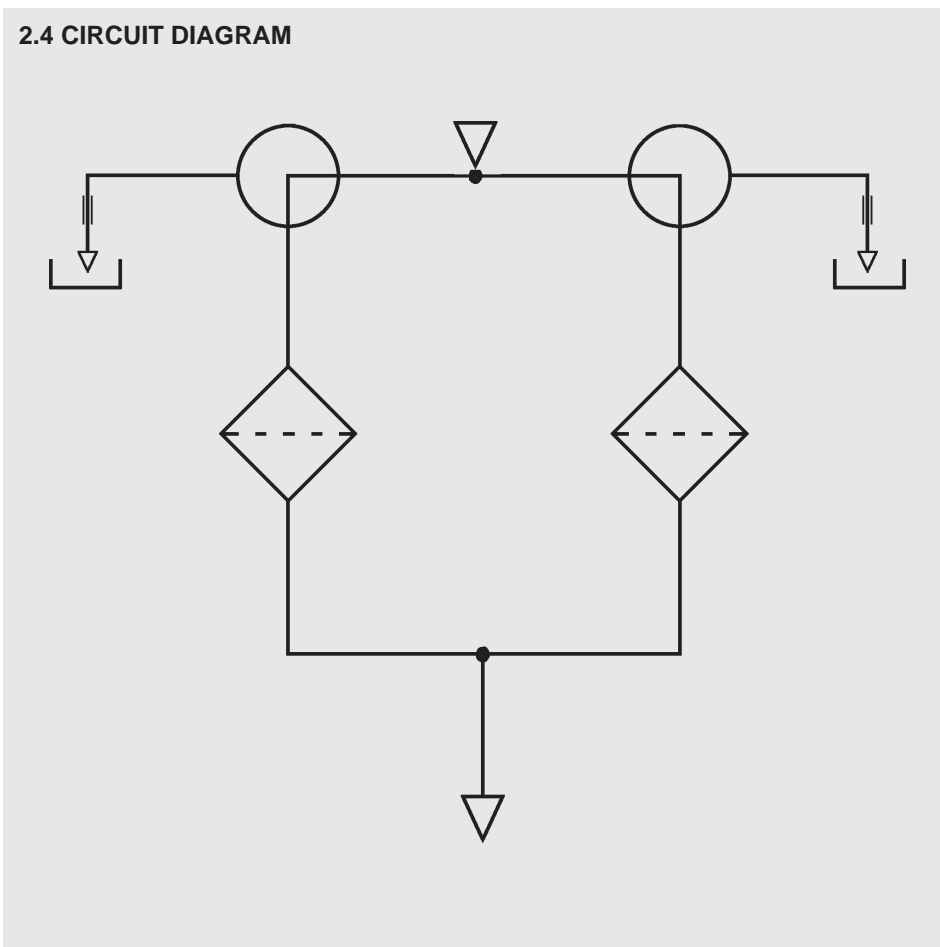
- Protective guard for pressure gauge
- Other optional versions on request

2.3 SUMMARY OF TECHNICAL SPECIFICATIONS OF THE STANDARD MODELS

	RFH-1	RFH-2	RFH-4
Operating pressure	350 bar	350 bar	350 bar
Control pressure	150 - 350 bar	150 - 350 bar	150 - 350 bar
Max. Δp across element ¹⁾	350 bar	350 bar	350 bar
Max. operating temperature	90 °C	90 °C	90 °C
Main dimensions (BxLxH) (manual version)	≈ 230 x 155 x 110	≈ 230 x 265 x 170	≈ 345 x 475 x 265
Weight (with actuator)	8.5 kg	20.5 kg (38 kg)	95 kg (112 kg)
Volume of pressure chamber	0.25 l	0.42 l	4.2 l
Control options	manual	Manual, hydraulic, electrohydraulic	Manual, hydraulic, electrohydraulic
Inlet/Outlet	SteckO DN25	SteckO DN25	G 2/SteckO DN50
Back-flushing line	SteckO DN12	SteckO DN12	SteckO DN19
Control pressure connection	Not available	SteckO DN10	SteckO DN10
Filter area	50 cm ²	80 cm ²	1094 cm ²
Nominal flow rate	400 l/min	600 l/min	800 l/min
Material of housing	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 80 bar

2.4 CIRCUIT DIAGRAM



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
- 4 = 1100 cm² / 500 ltr

Type of connection

- F = flange
- S = SteckO (staple lock)
- G = thread (inch)
- M = metric thread
- N = NPT thread

Connection size

e.g. 25 mm

Material

Important: pressure range is dependent on material

- M = brass
- E = stainless steel
- M/E = combination brass/stainless steel

Special equipment

- 0 = without special equipment
- 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 and RFH-4)
- 3 = actuator: electro-hydraulic (only for RFH-2 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 = back-flushing high pressure element

Element size

Identical to filter size

Filtration rating

Slotted tube: 50; 100; 200 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

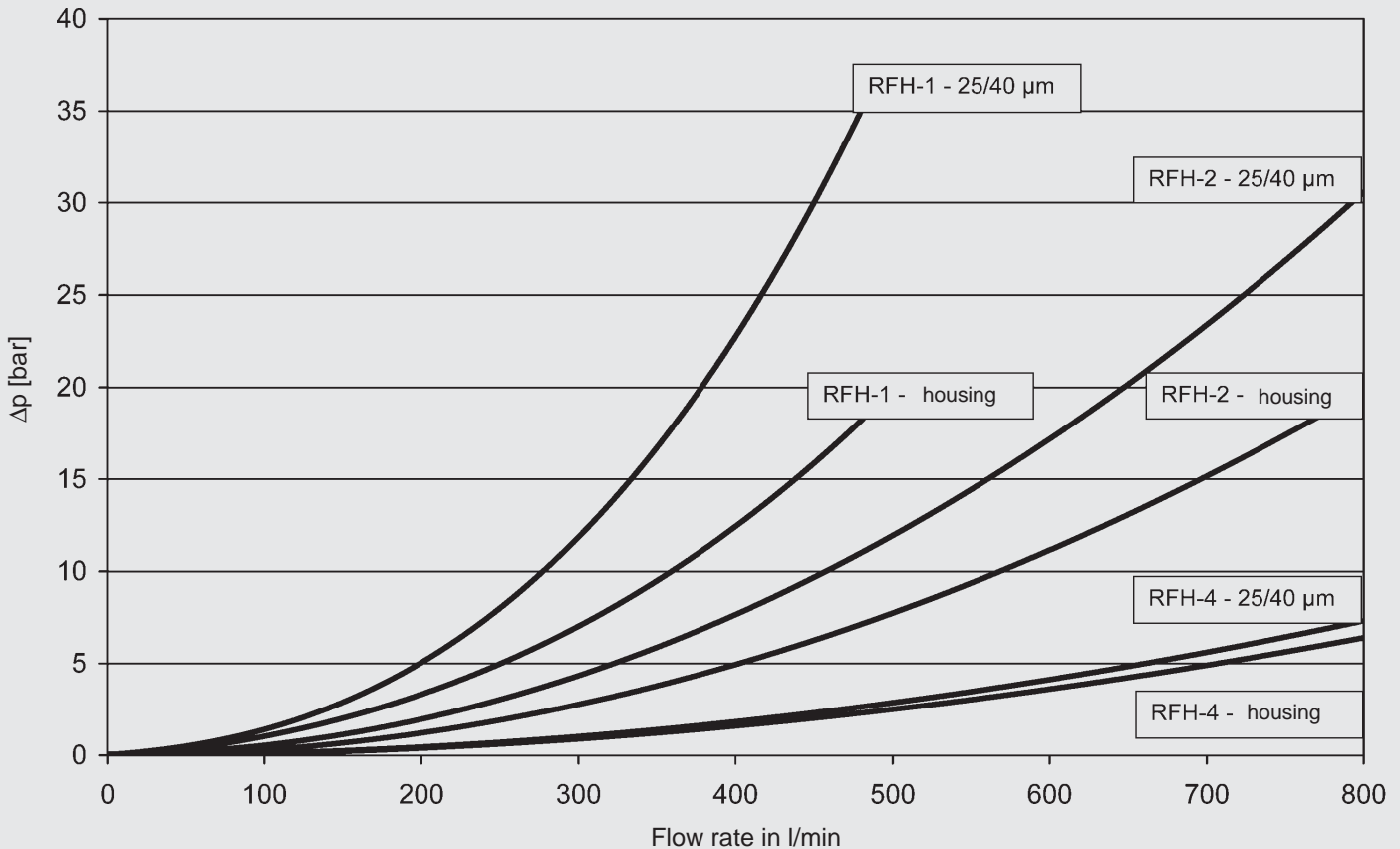
For special models

* only RFH-4

4. FILTER CALCULATION / SIZING

4.1 PRESSURE DROP CURVES

The pressure drop curves apply to water and other fluids with a viscosity of up to 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 mesh.
- 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 (cf 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 in 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-4 is also suitable for higher particle concentrations. As with all back-flushing filters, fibres and sticky substances cause problems when back-flushing 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.

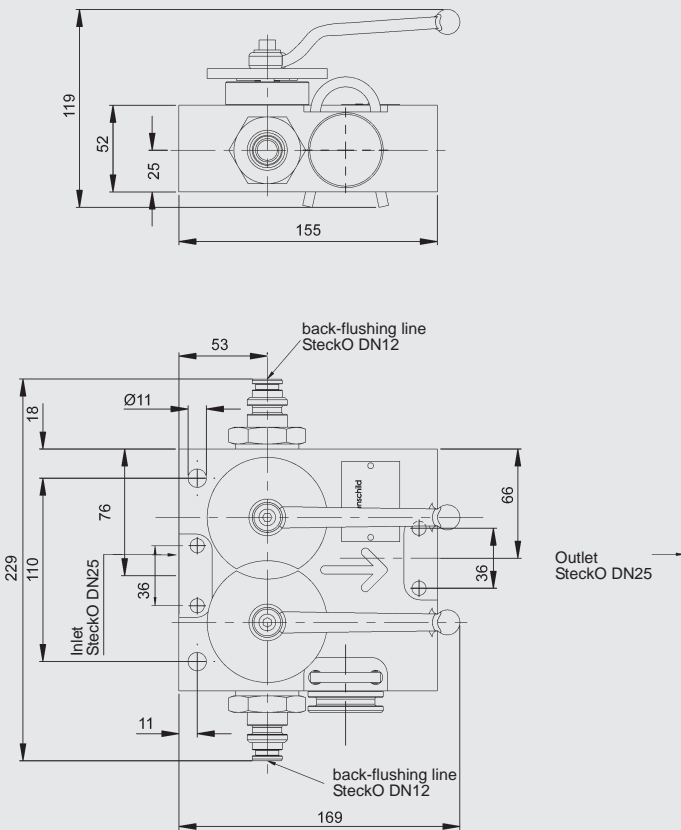
The shield hydraulics in coal mining represent a special case.

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

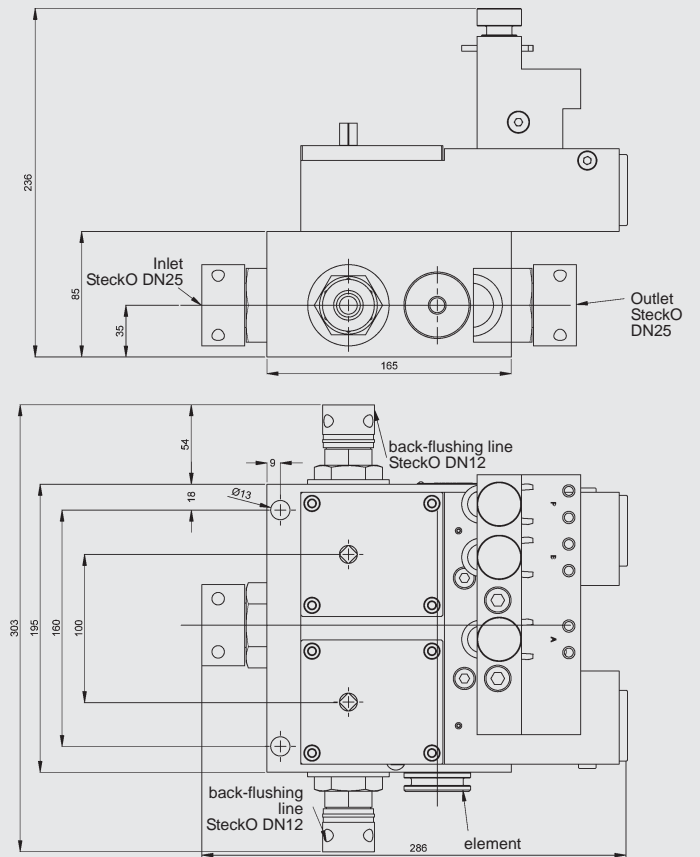
- RFH-1 max = 400 l/min
initial- Δp approx. 23 bar
- RFH-2 max = 600 l/min
initial- Δp approx. 17 bar
- RFH-4 max = 800 l/min
initial- Δp approx. 8 bar

5. DIMENSIONS

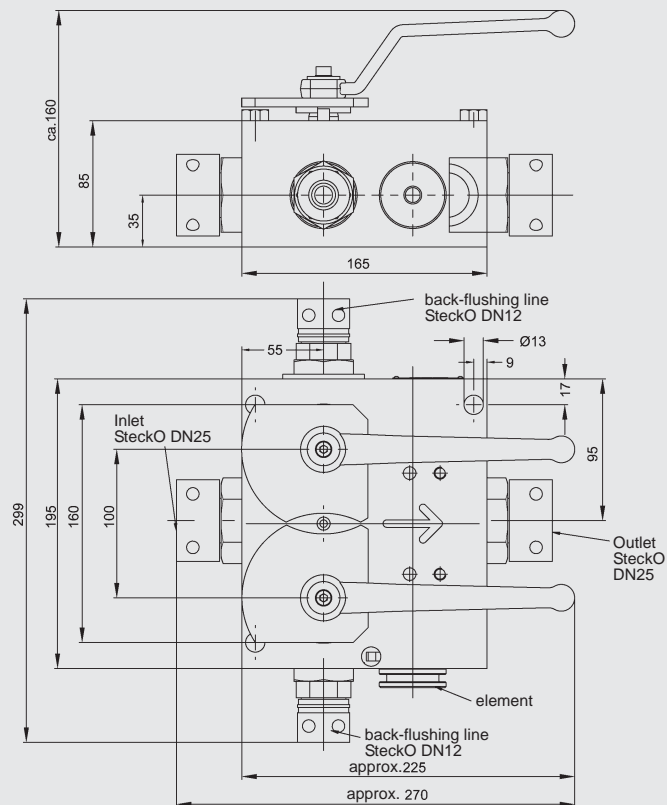
5.1 DIMENSIONS RFH-1 MANUAL



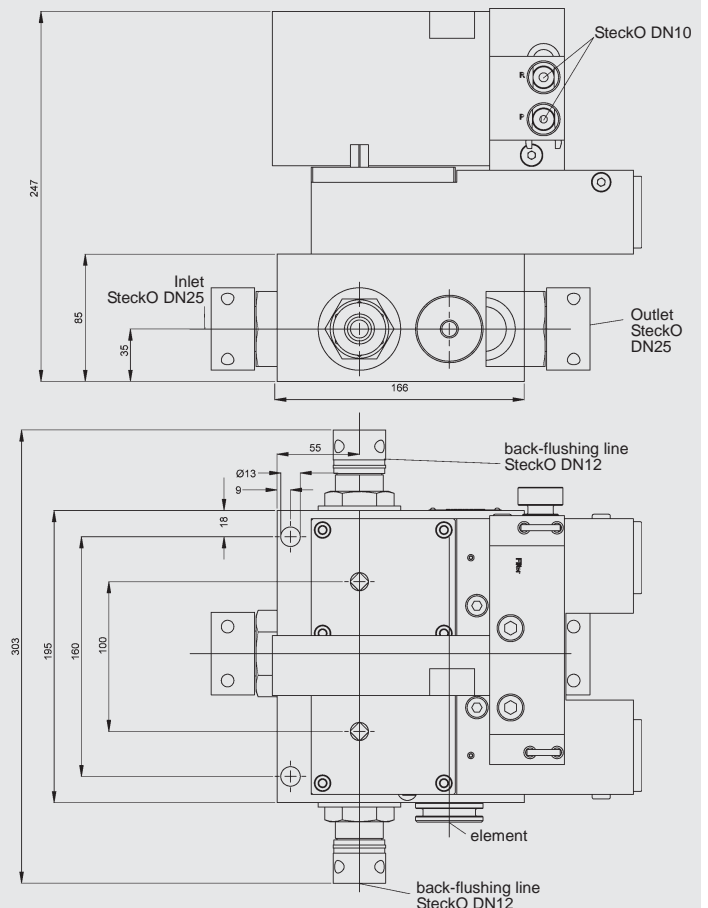
5.3 DIMENSIONS RFH-2 HYDRAULIC



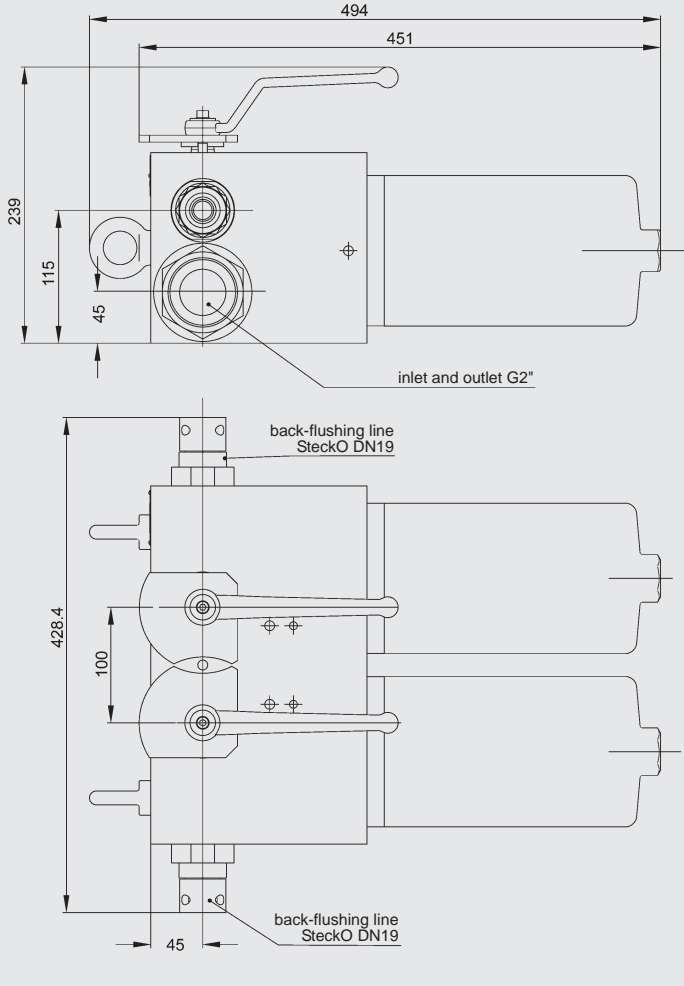
5.2 DIMENSIONS RFH-2 MANUAL



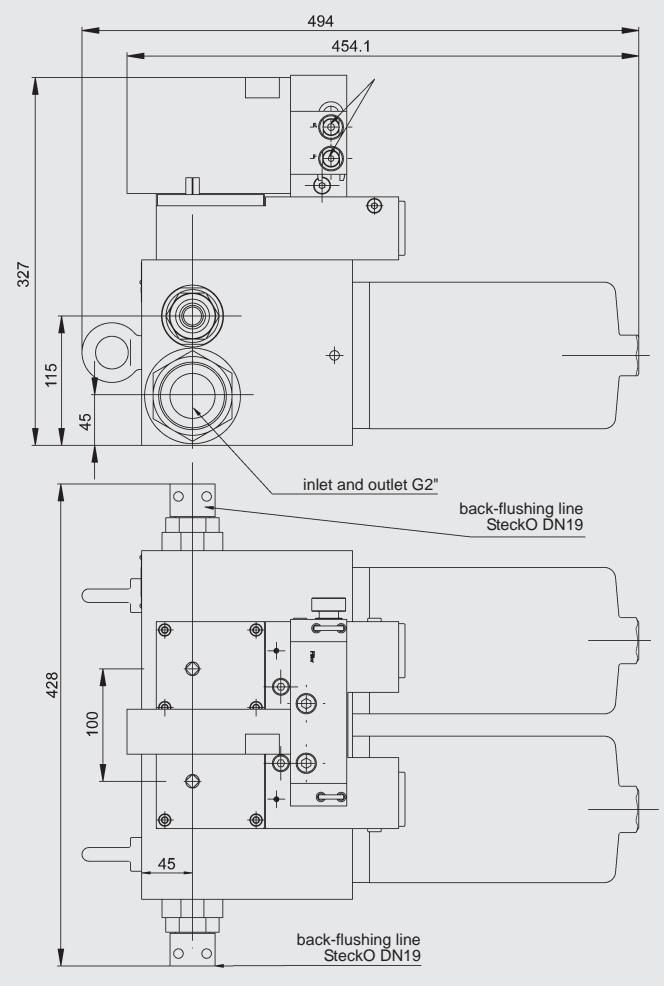
5.4 DIMENSIONS RFH-2 ELECTRO-HYDRAULIC



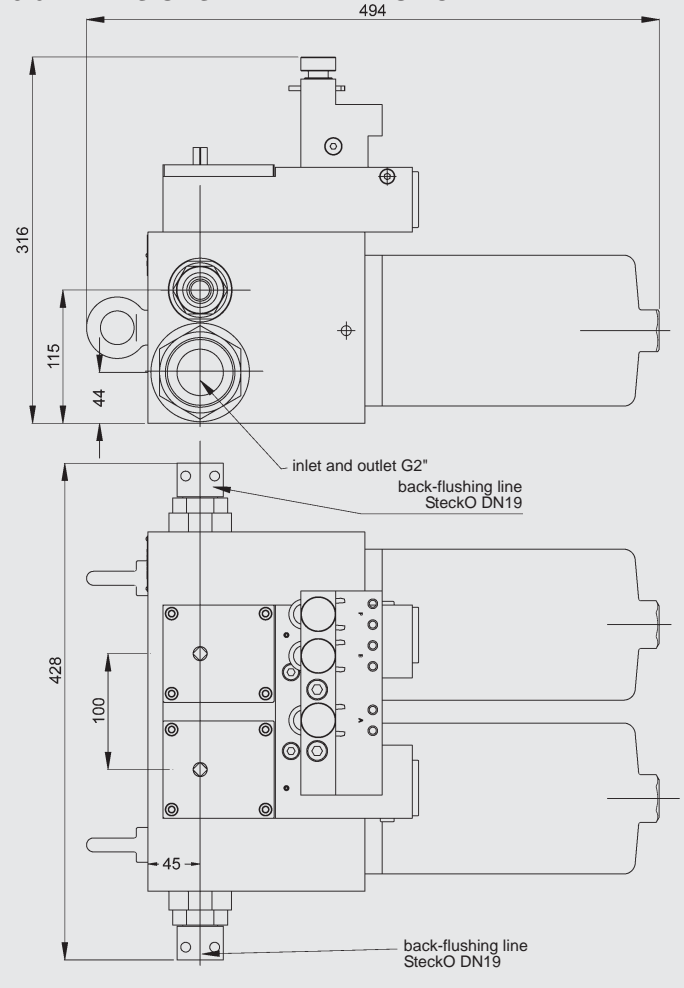
5.5 DIMENSIONS RFH-4 MANUAL



5.7 DIMENSIONS RFH-4 ELECTRO-HYDRAULIC



5.6 DIMENSIONS RFH-4 HYDRAULIC



NOTE

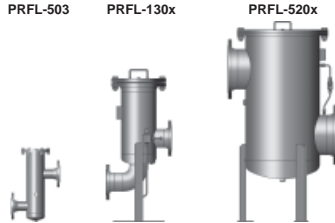
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Process Inline Filter PRFL



1. TECHNICAL SPECIFICATIONS

1.1 GENERAL

Inline filters, type PRFL and duplex inline filters, type PRFLD, are designed for process engineering and chemical plants. They are suitable for filtering solid contamination from water-based media. The choice of eight standard sizes means that a suitable filter can be found for the particular application.

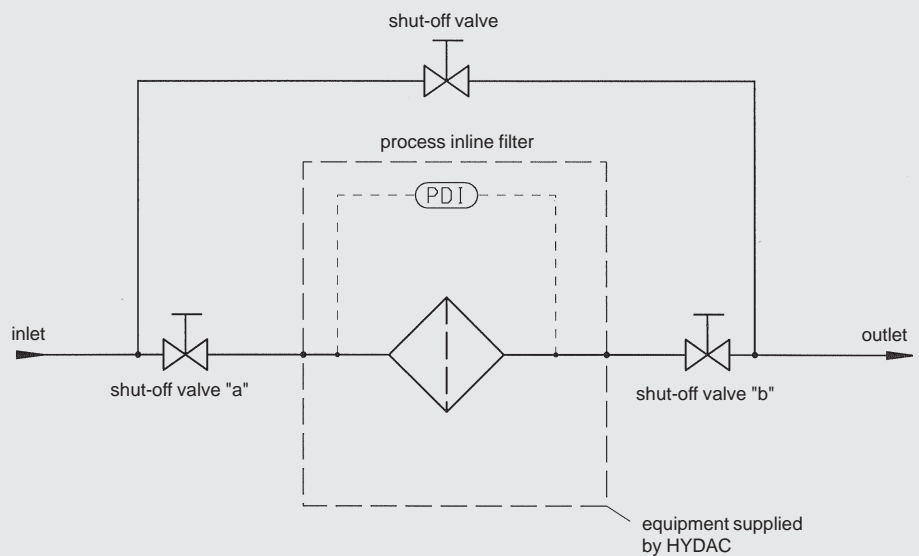
According to the required cleanliness level, various filter materials with different filtration ratings can be used. By using clogging indicators which monitor the differential pressure, the condition of the filter can be determined at any time. Some filter materials can be cleaned and reused, therefore 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 DATA ON FILTER HOUSINGS (STANDARD CONFIGURATION)

Serie	Types	Connection size			Materials						Pressure range*				Temperature [°C]	Weight [kg]	Volume [l]				
		SAE	Pipe thread G	DIN DN	Stainless steel	Cast stainless steel	Carbon steel				PN16	PN25	PN40	PN64							
							Welded without int. corrosion protection	Welded with int. corrosion protection	Cast without int. corrosion protection	Cast with int. corrosion protection											
50x	503	2"	2"	50	●	●						●				-10 to 90	19	3.9			
	504																				
	505																				
85x	853	3"	-	80	●	●						●	●		-10 to 90		38	9.5			
	854																				
	855																				
130x	1303	-	-	50 / 80 / 100	●							●					-10 to 90	80	20		
	1304																				
	1305																				
250x	2503			100 / 150 / 200	●									●					-10 to 90	130	46
	2504																				
	2505																				
520x	5203			150 / 200 / 250	●									●		-10 to 90		300		118	
	5204																				
	5205																				
650x	6503			-	-	200 / 250 / 300	●							●				-10 to 90		360	213
	6504																				
	6505																				
1500x	15003	250 / 300 / 400 / 500	●											●			-10 to 90		460	433	
	15004																				
	15005																				
2500x	25003	500 / 600 / 700	●											●		-10 to 90			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-coat primer (not required for stainless steel housings)

2.2.3 Corrosion protection, internal

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

2.2.4 Documentation

Operating and maintenance instructions

2.3 SUMMARY OF TECHNICAL SPECIFICATIONS FOR FILTER ELEMENTS

Series	No. of filter elements	Filter element type	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	50, 100, 150, 200, 250, 300, 400, 500, 1000, 2000, 3000	25
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	16825					
2500x	17	L-2603-...	64426	57205					

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 Notices / 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 plate 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 according to customer requirement (for carbon steel qualities)
- Various multi-layer coatings

2.4.8 Differential pressure monitoring

- Visual
- Electrical
- Visual-electrical
- Differential pressure gauge with 2 micro switches

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 others 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
85x = DN 80
130x = DN 50 / 80 / 100
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 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 DIN 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 possible up to 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...1.6 bar)
5 = visual-analogue indicator in stainless steel with 2 adjustable contacts (0...1.6 bar)
6 = electrical differential pressure switch PVD 2 C.0

Modification number

X = the latest version is always supplied

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 = Chemicron® metal fibre (only size L503)

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

Seal material

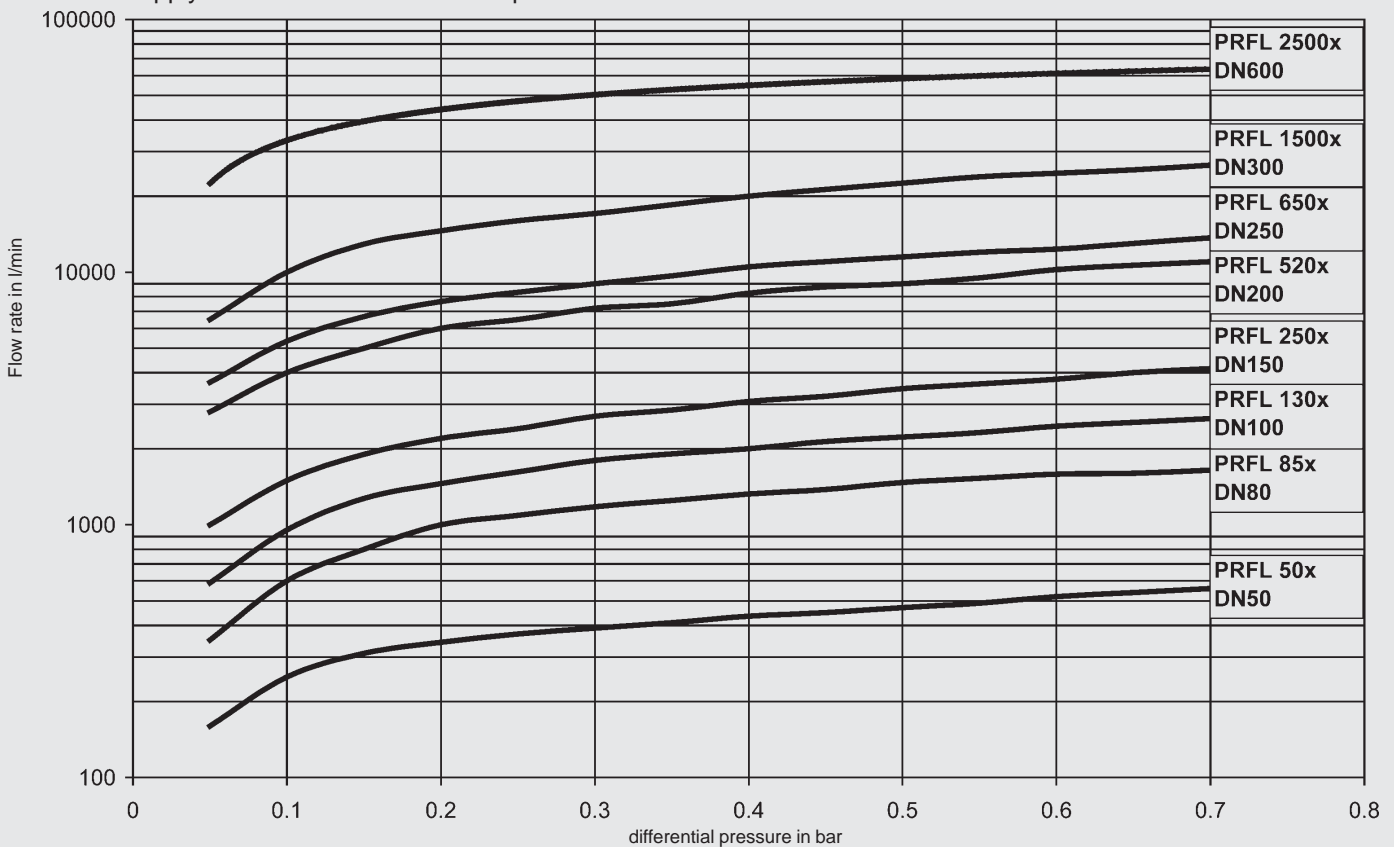
V = Viton

4. FILTER CALCULATION / SIZING

4.1 PRESSURE DROP CURVES FOR HOUSING

For filter elements in wire mesh (all filtration ratings) and for slotted tubes 100 µm, the housing curves apply to the total pressure drop. For 50 µm slotted tubes approx. 30% must be added to the housing pressure drop.

The curves apply to water at 20 °C or fluids up 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 Filters PRFL and PRFLD. Generally speaking, an initial Δp (clean condition of the filter) of > 0.2 bar should not be exceeded. The pressure drop curves apply to filtration ratings of 100 - 3000 µm slotted tube. For 50 µm filtration rating approx. 30% must be added to the given housing pressure drop.

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 tubes:

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), Chemicon® (metal fibre):

Absolute retention rate.

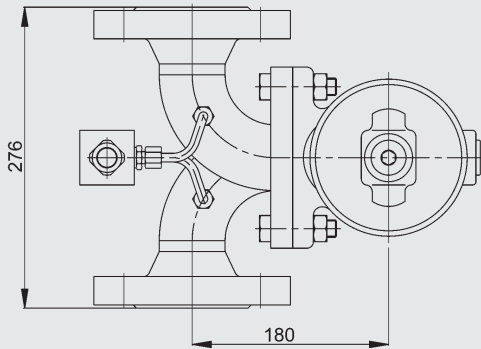
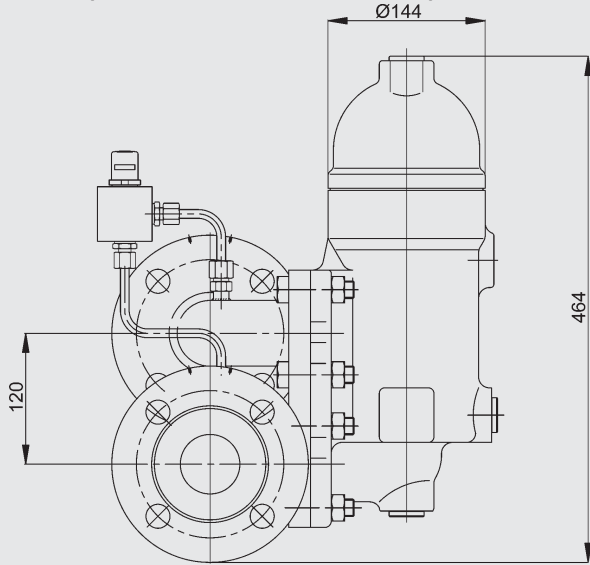
The filtration rates given in the brochure are determined by the multi-pass test carried out on the HYDAC test rig, based on ISO 4572 (multi-pass test for the determination and proof of the filtration performance, extended to finest filtration).

In this test at least 99 % of all particles larger than the given 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 ($\beta_x = 100$), which denotes absolute filtration.

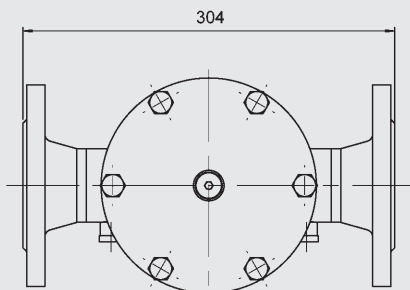
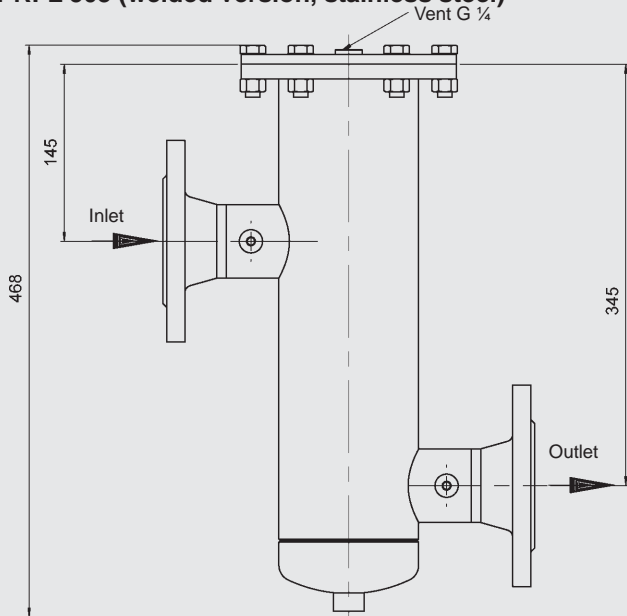
5. DIMENSIONS

5.1 FILTER HOUSING

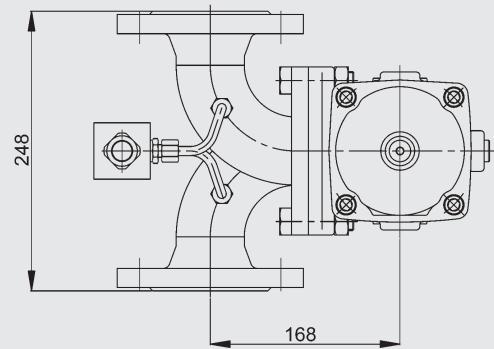
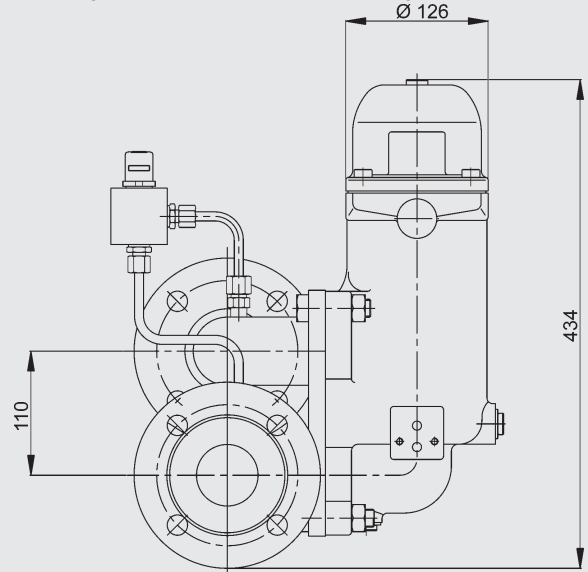
PRFL 503 (cast version, stainless steel)



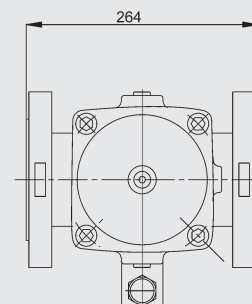
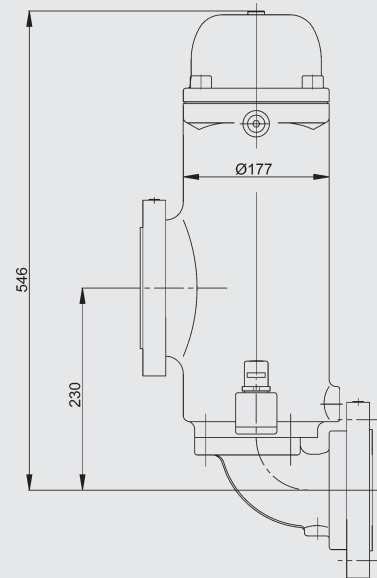
PRFL 503 (welded version, stainless steel)



PRFL 504 (cast version, carbon steel)

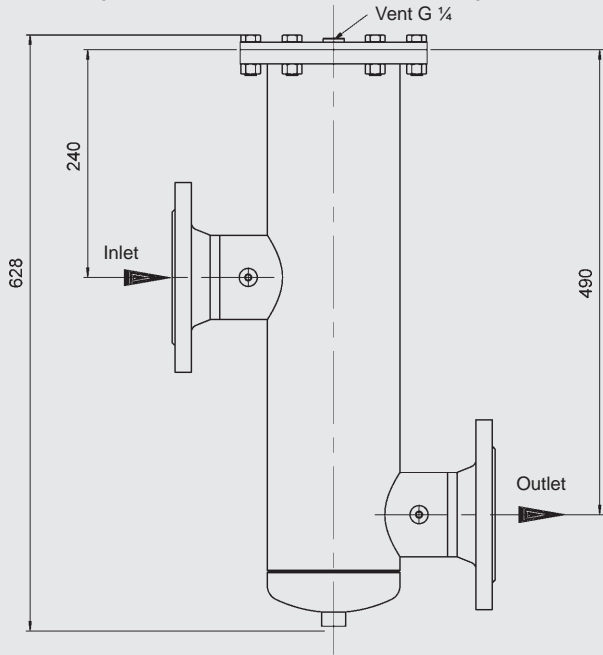


PRFL 85x (cast version)

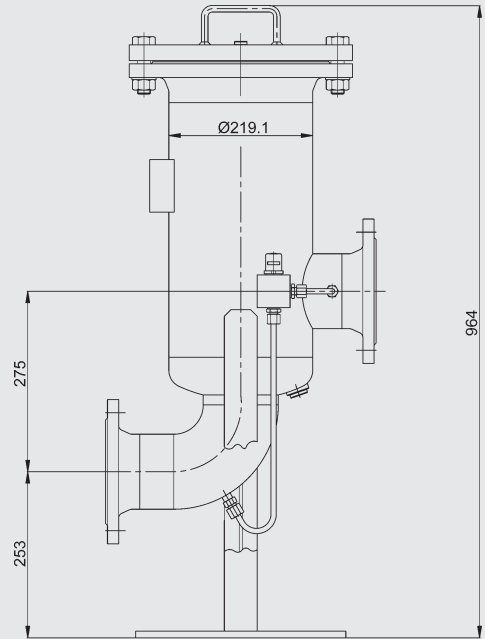


- The filter must not be used as a pipe support
- The dimensions quoted have ± 5 mm tolerances

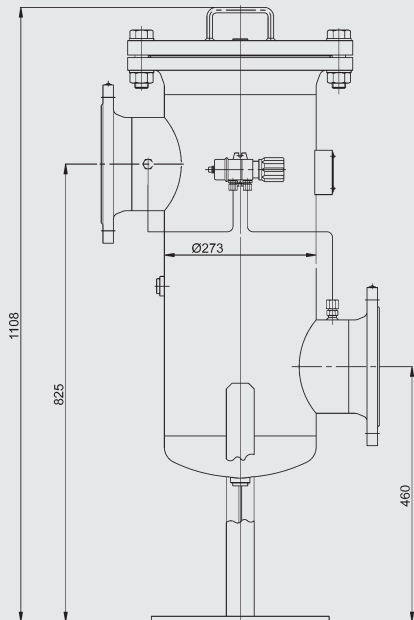
PRFL 853 (welded version, stainless steel)



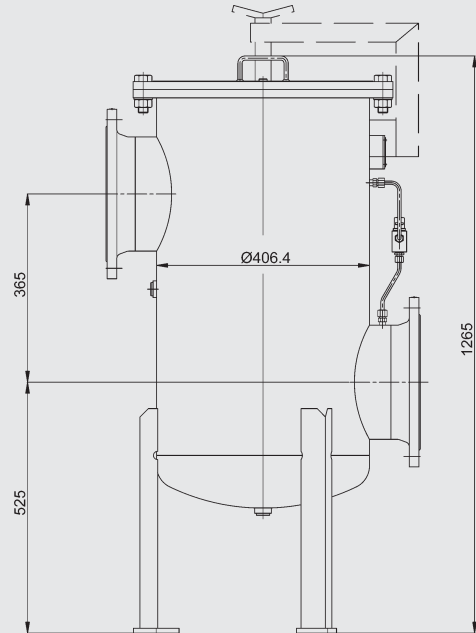
PRFL 130x



PRFL 250x

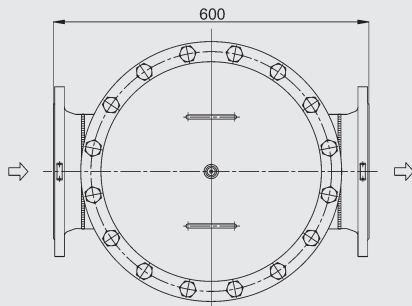
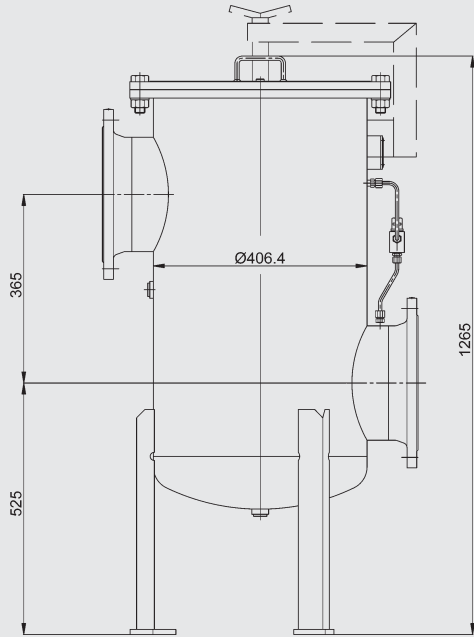


PRFL 520x

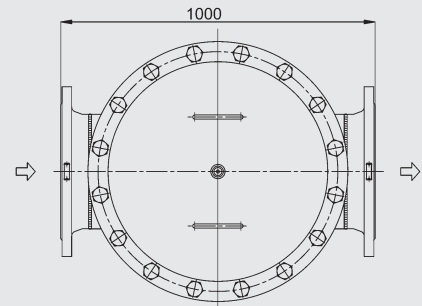
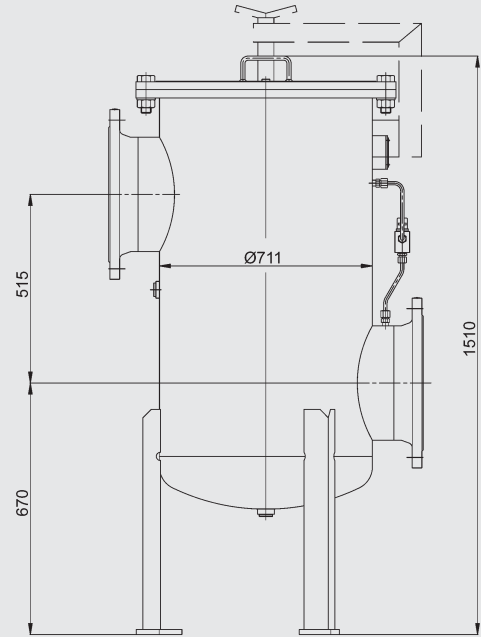


- The filter must not be used as a pipe support
- The dimensions quoted have ± 5 mm tolerances

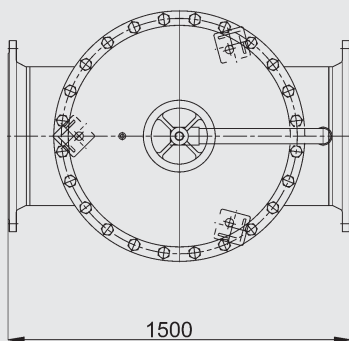
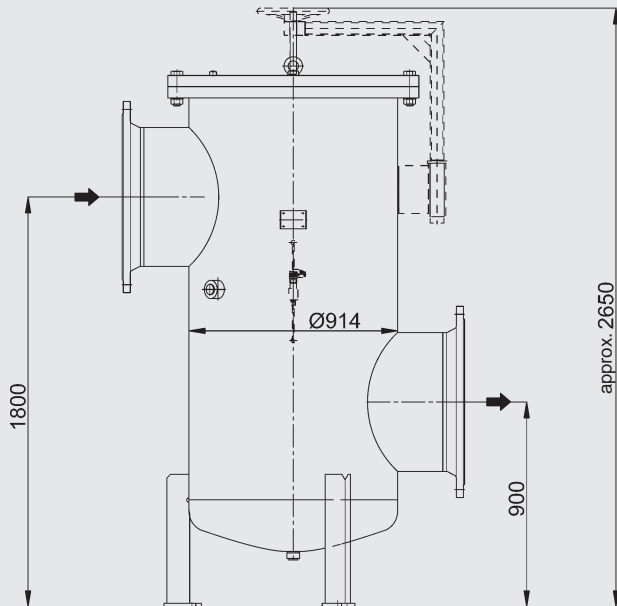
PRFL 650x



PRFL 1500x

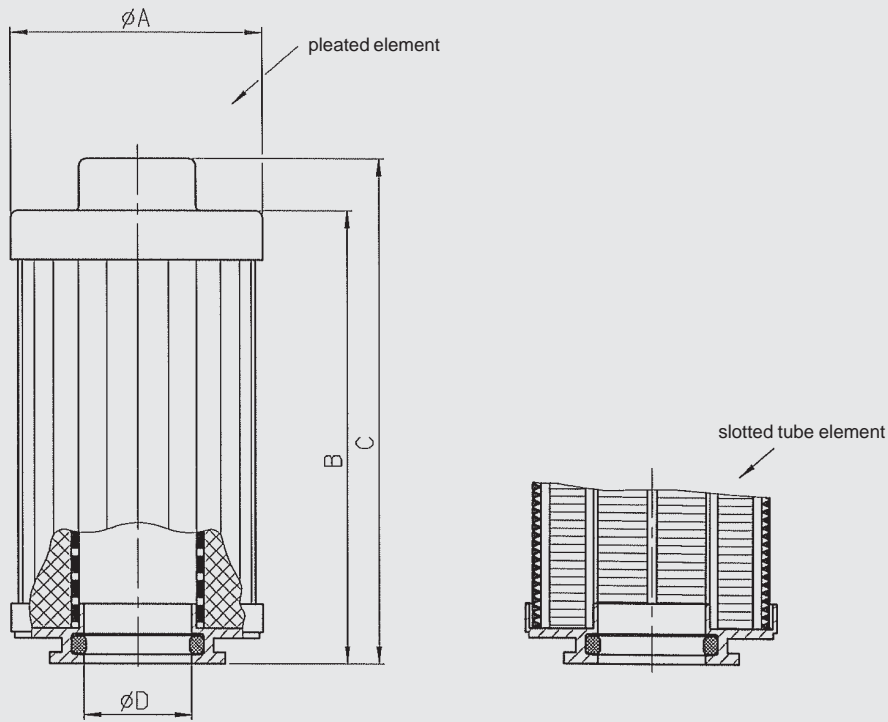


PRFL 2500x



- 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
L-503	95	263	276
L-853	114	394	414
L-1303	143	458	483
L-2603	143	897	822

NOTE

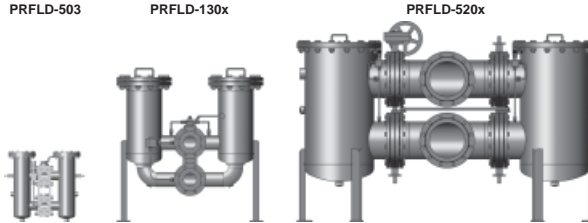
The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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Process Inline Filter, Change-Over PRFLD



1. TECHNICAL SPECIFICATIONS

1.1 GENERAL

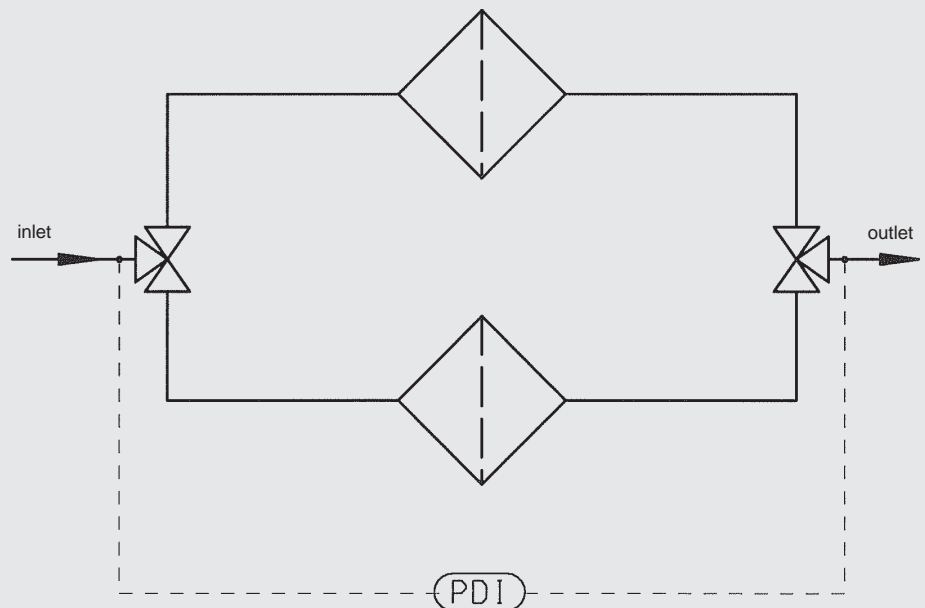
Inline filters, types PRFL and duplex inline filters PRFLD are designed for process engineering and chemical plants. They are suitable for filtering solid contamination from water-based media. The choice of eight standard sizes means that a suitable filter can be found for the particular application. Depending on 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
DN 50	●		●				
DN 80		●	●				
DN 125			●				
DN 100			●	●			
DN 150			●	●	●		
DN 200				●	●	●	
DN 250					●	●	●
DN 300						●	●

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

1.3 CIRCUIT DIAGRAM



2. FILTER SPECIFICATIONS

2.1 SUMMARY OF TECHNICAL SPECIFICATIONS OF FILTER HOUSINGS (STANDARD CONFIGURATION)

Series	Types	Connection size			Materials						Pressure range*	Temperature	Weight	Volume				
		SAE	Pipe thread G	DIN DN	Stainless steel	Cast stainless steel	Carbon steel											
							Welded without int. corrosion protection	Welded with int. corrosion protection	Cast without int. corrosion protection	Cast with int. corrosion protection								
50x	503	2"	2"	50	●	●					●	●	-10 to 90	46	2 x 4			
	504									●	●							
	505															●	●	
85x	853	3"	3"	80	●	●					●	●		90	2 x 9,5			
	854											●				●		
	855															●	●	
130x	1303	-	-	50 / 80 / 100	●						●	●		180	2 x 20			
	1304															●	●	
	1305																●	●
250x	2503			100 / 150 / 200	●									●	●	300	2 x 46	
	2504														●			●
	2505																	●
520x	5203			150 / 200 / 250	●									●	●	660	2 x 118	
	5204														●			●
	5205																	●
650x	6503			200 / 250 / 300	●								●	●	800	2 x 213		
	6504													●			●	
	6505																●	●
1500x	15003			250 / 300	●								●	●	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), asbestos-free gasket

2.2.2 Corrosion protection, external

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

2.2.3 Corrosion protection, internal

2K epoxy coating (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	Filter area [cm ²]		Filter materials and filtration ratings [µm]				Permiss. Diff. pressure across element [bar]
			Slotted tube	Pleated materials	Betamicon® (glass fibre)	Chemicon® (Metallfaservlies)	Wire mesh	Slotted tube	
50x	2	L-503-...	1334	11330	3, 5, 10, 20	Not available	25, 40, 60, 100, 150, 200, 250	50, 100, 150, 200, 250, 300, 400, 500, 1000, 2000, 3000	25
85x	2	L-853-...	2600	22342					
130x	2	L-1303-...	3780	33650					
250x	6	L-853-...	23400	201078					
520x	8	L-1303-...	60480	538400					
650x	10	L-1303-...	94500	841250					
1500x	20	L-1303-...	378000	3365000					

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 Notices / 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 plate 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 according to customer requirement (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 others 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
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 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 DIN 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 possible up to 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...1.6 bar)
5 = visual-analogue indicator in stainless steel with 2 adjustable contacts (0...1.6 bar)
6 = electrical differential pressure switch PVD 2 C.0

Modification number

X = the latest version is always supplied

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 L503)

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

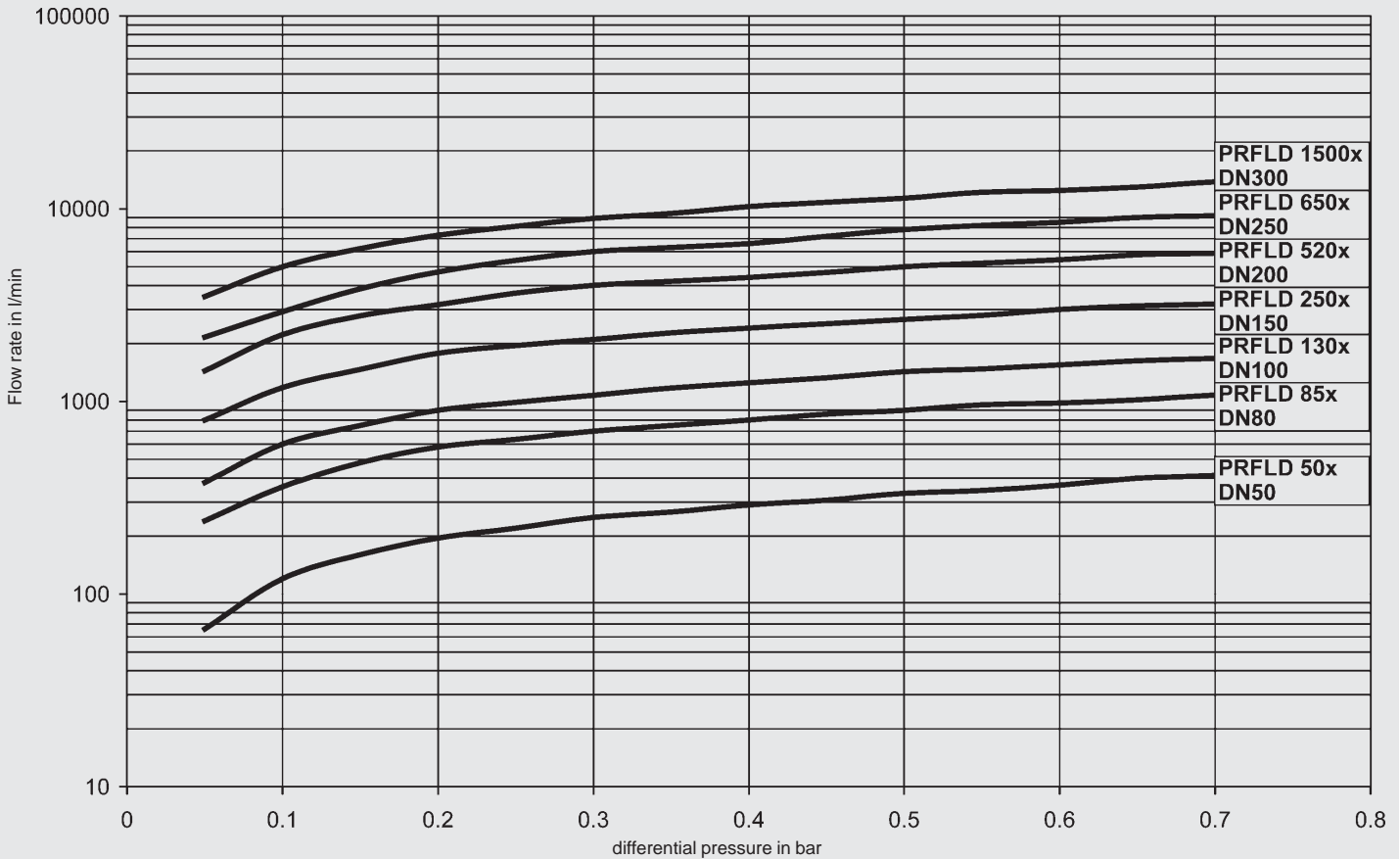
Seal material

V = Viton

4. FILTER CALCULATION / SIZING

4.1 PRESSURE DROP CURVES FOR HOUSING

The curves apply to water at 20 °C or fluids up 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 Filters PRFL and PRFLD. Generally speaking, an initial Δp (clean condition of the filter) of > 0.2 bar should not be exceeded. The pressure drop curves apply to filtration ratings of 100 - 3000 μm slotted tube. For 50 μm filtration rating approx. 30% must be added to the given housing pressure drop.

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 tubes:

Nominal retention rates

The filtration ratings given in the model code for these qualities are 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), Chemicon® (metal fibre):

Absolute retention rate

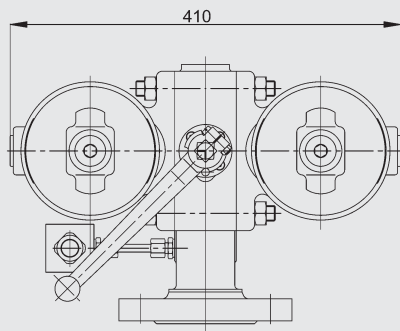
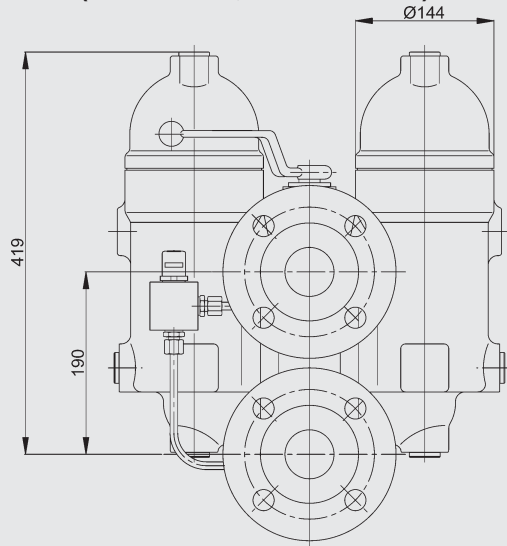
The rates given in the brochure are determined by the multi-pass test carried out on the HYDAC test rig, based on ISO 4572 (multi-pass test for the determination and proof of the filtration performance, extended to finest filtration).

In this test at least 99 % of all particles larger than the given 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 ($\beta_x = 100$), which denotes absolute filtration.

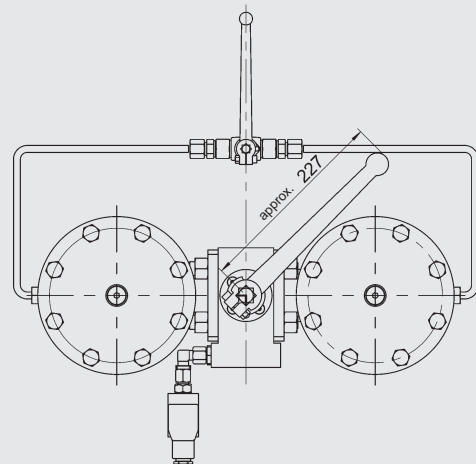
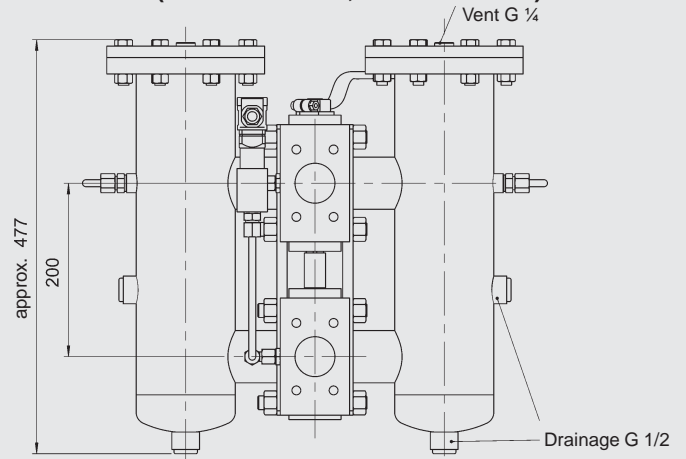
5. DIMENSIONS

5.1 FILTER HOUSING

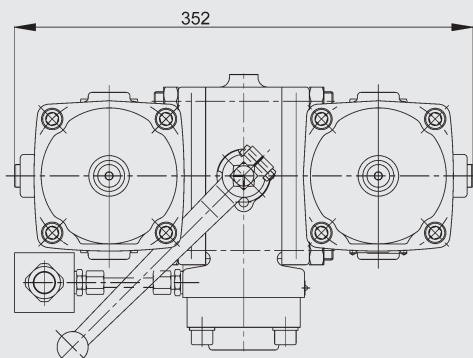
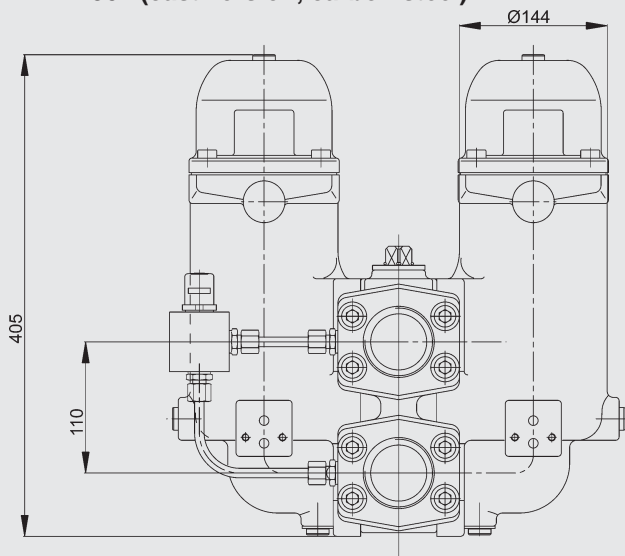
PRFLD 503 (cast version, stainless steel)



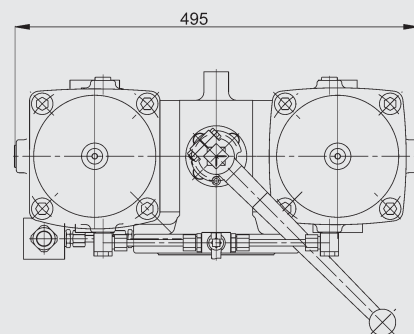
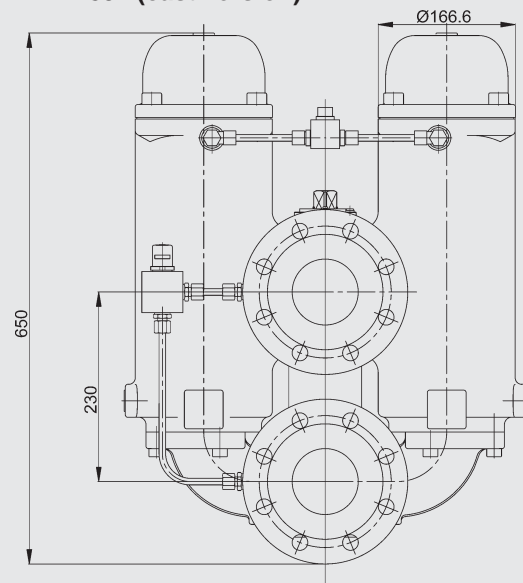
PRFLD 503 (welded version, stainless steel)



PRFLD 50x (cast version, carbon steel)

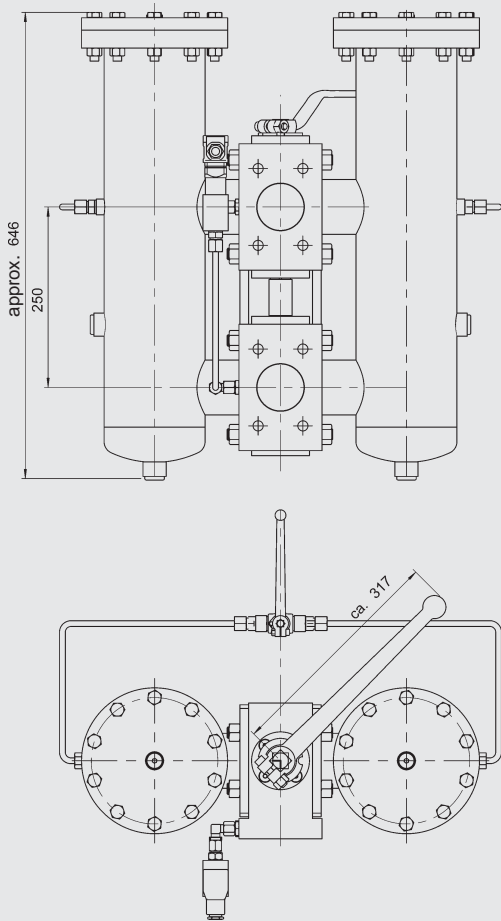


PRFL 85x (cast version)

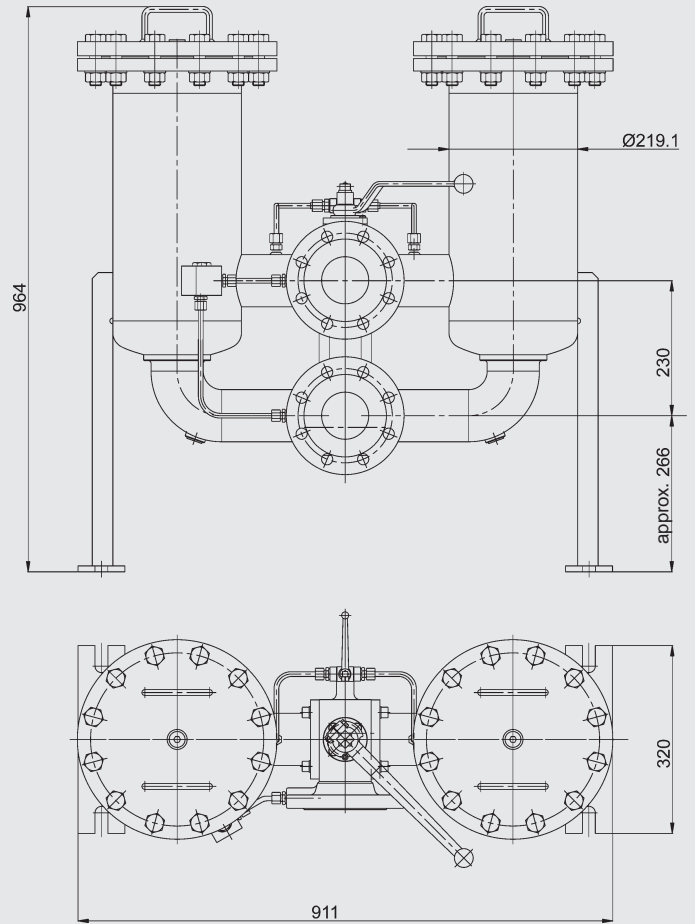


- The filter must not be used as a pipe support
- The dimensions quoted have ± 5 mm tolerances

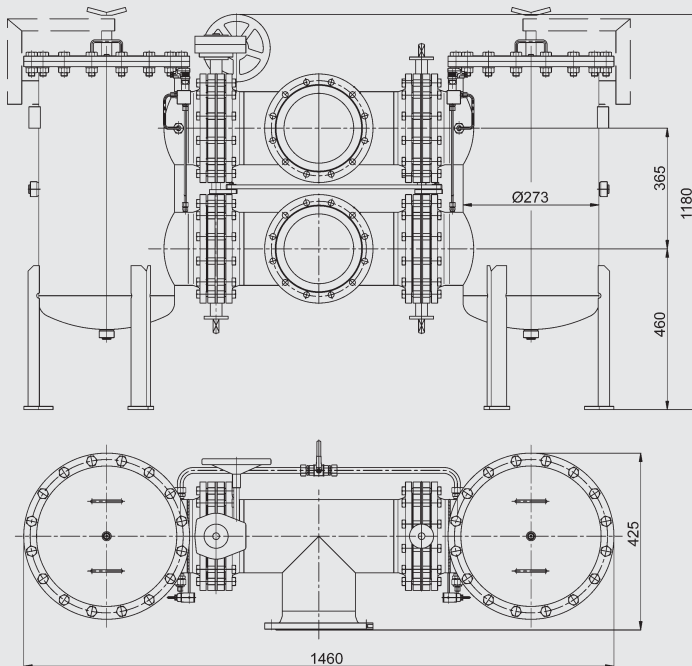
PRFLD 853 (welded version, stainless steel)



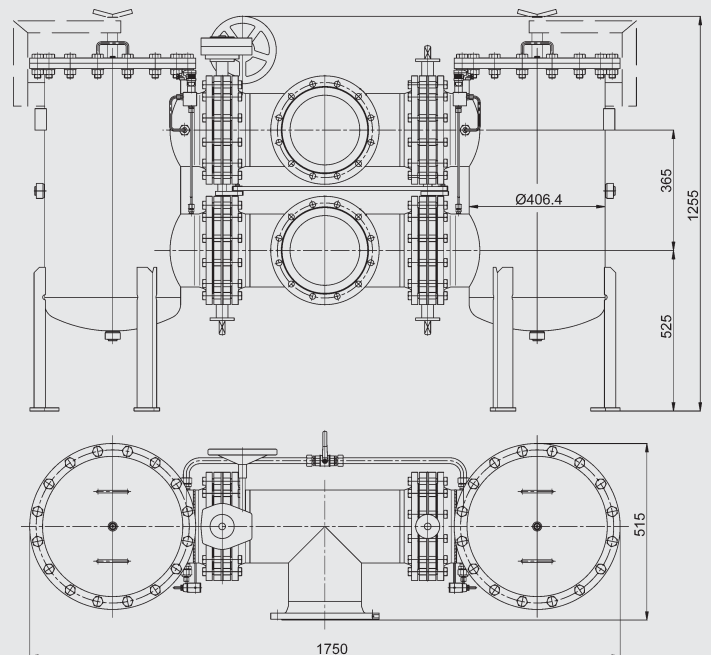
PRFLD 130x



PRFLD 250x

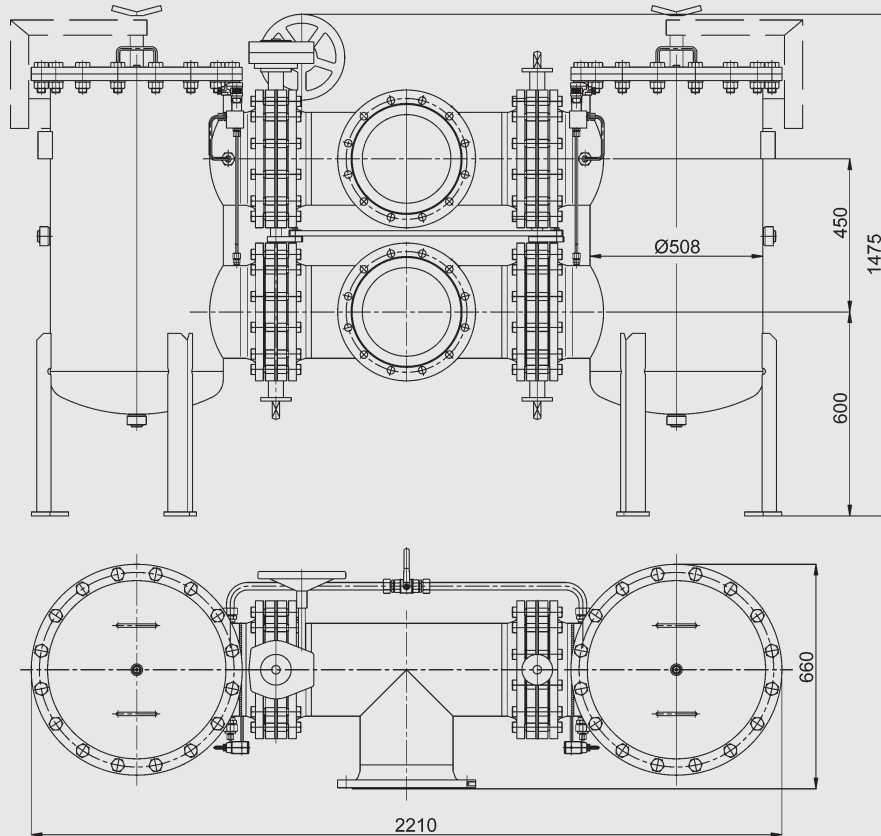


PRFLD 520x

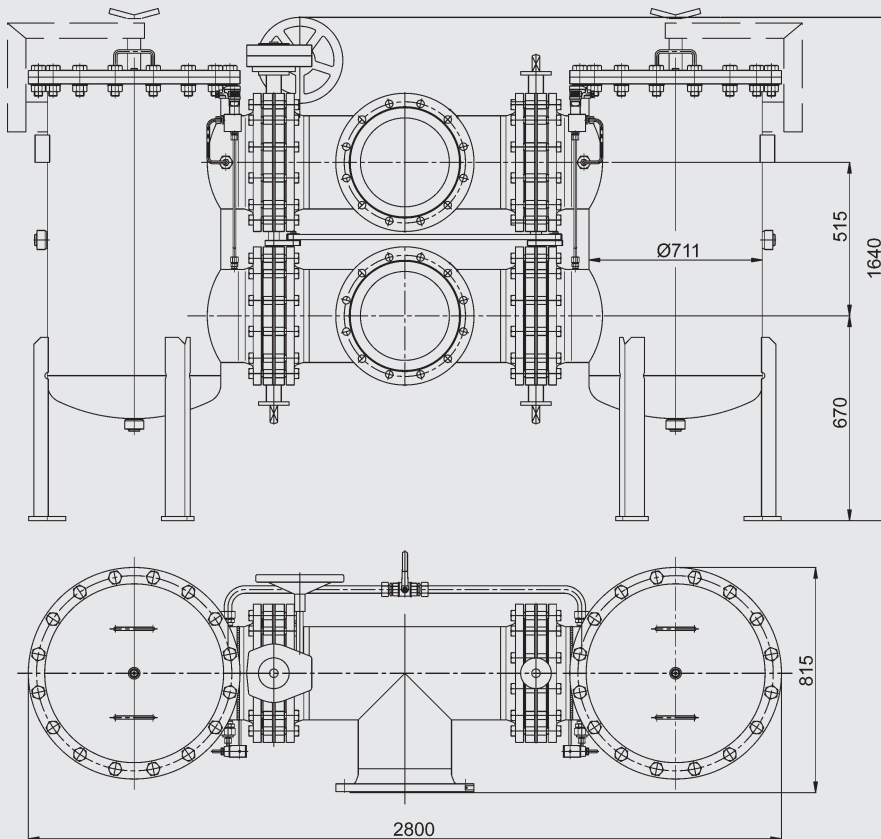


- The filter must not be used as a pipe support
- The dimensions quoted have ± 5 mm tolerances

PRFLD 650x



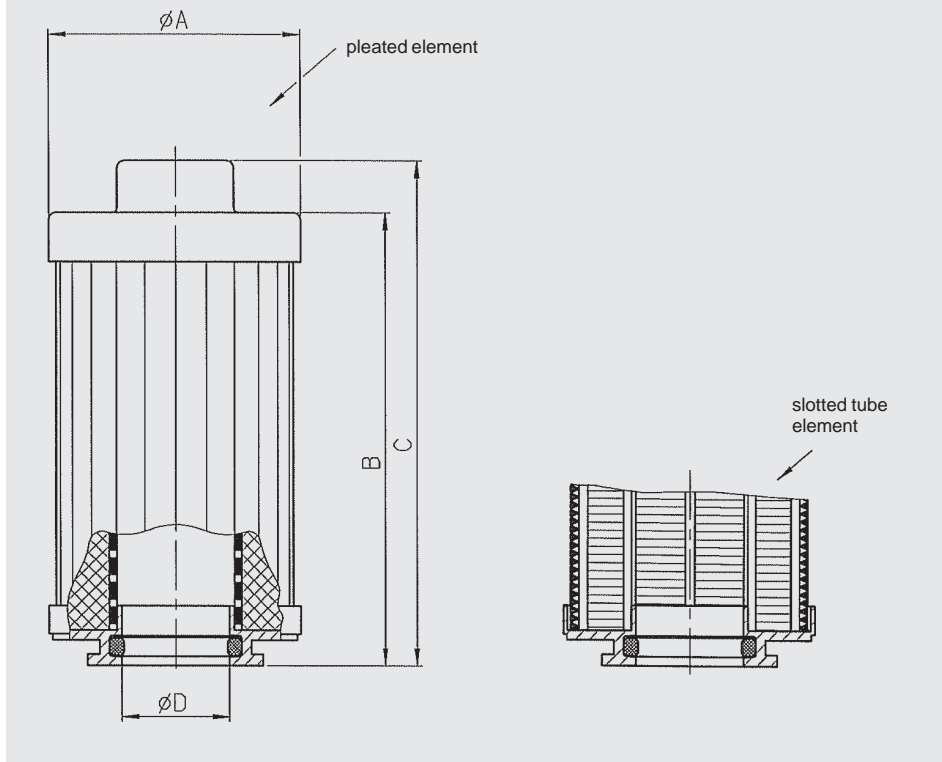
PRFLD 1500x



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

Series	Flange	A	B	C	D	E	F	G	No. of elements	Element size
520x	DN 200	600	1265	525	365	406.4	490	510	4 St.	L-1303
650x	DN 250	750	1380	600	450	508	490	620	5 St.	L-1303
1500x	DN 300	1000	1510	670	515	711	490	830	10 St.	L-1303

5.2 DIMENSIONS OF ELEMENTS



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

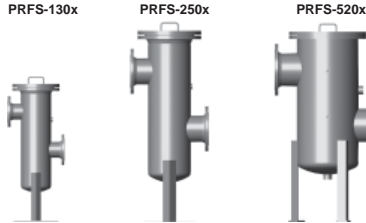
NOTE

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

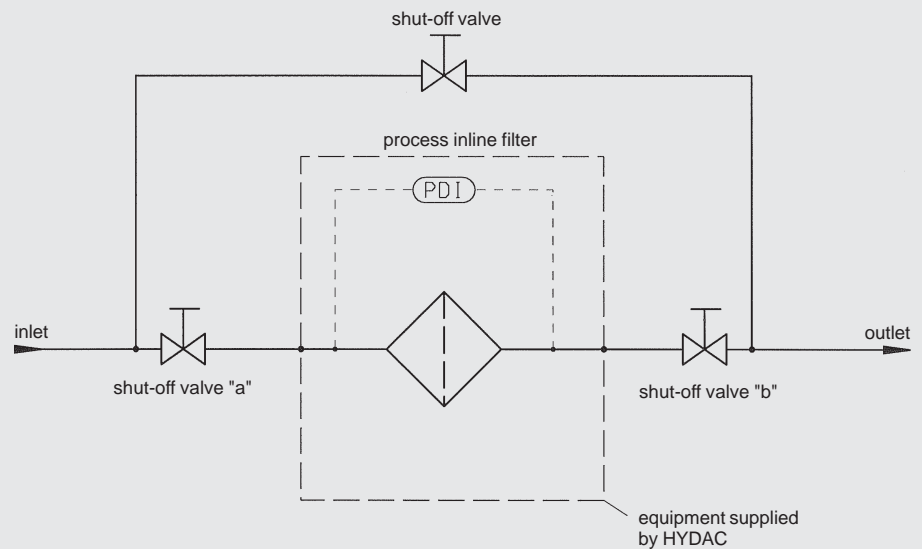
Screen basket filters are used mainly as coarse filters or pre-filters. The direction of flow is from the inside to the outside. The separated solid contamination is collected in the stainless steel screen basket and can be disposed of quickly and conveniently. By using clogging indicators which monitor 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						●

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 STANDARD FILTER HOUSINGS

Series	Type	Connection size DIN DN	Materials			Pressure range*	Temperature [°C]	Weight [kg]	Volume [l]
			Stainless steel	Carbon steel without int. corrosion protection	Carbon steel with int. corrosion protection				
130x	1303	50/	●			PN 16	-10 to 90	80	20
	1304	80/			●				
	1305	100		●					
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 for welded versions on request.

2.2 FURTHER SPECIFICATIONS ON THE STANDARD FILTER HOUSING

2.2.1 Seal materials

FPM (Viton), asbestos-free gasket

2.2.2 Corrosion protection, external

2-coat 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	Filter area [cm²]	Filter materials and filtration ratings [µm]		Permiss. Diff. pressure across element [bar]
				Slotted tube	Perforated plate	
130x	1	SK-3-...	1890	50,	4000, 5000, 10000	10
250x	1	SK-4-...	3900	100,		
520x	3	SK-3-...	7560	200,		
650x	4	SK-4-...	9450	250,		
1500x	7	SK-4-...	18900	300,		
2500x	5	SK-5-...	36000	500,		
				1000,		
				2000,		
				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 Notices / 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 plate 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 according to customer requirement (for carbon steel qualities)
- Various multi-layer coatings

2.4.8 Differential pressure monitoring

- Visual
- Electrical
- Visual-electrical
- Differential pressure gauge with 2 micro switches

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 others on request

Further optional models on request.

3. MODEL CODE

PRFS - S - 1303 - AF3 - 10 - 0 - 1 - X

3.1 SCREEN BASKET FILTER PRFS / PRFSD

Type

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

Material of filter element

D = wire mesh (cleanable)
S = slotted tube (cleanable), end cap: polyamide, bonded
L = perforated plate (cleanable)

Size

130x = DN 50 / 80 / 100
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

50, 100, 200, 300, 500, 1000, 2000, 3000 (slotted tube)
3000, 4000, 5000, 10000 (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...1.6 bar)
5 = visual-analogue indicator in stainless steel with 2 adjustable contacts (0...1.6 bar)
6 = electrical differential pressure switch PVD 2 C.0

Modification number

X = the latest version is always supplied

Supplementary details

Drawing number for special equipment

3.2 SCREEN BASKET ELEMENT

SK - 4 - S - 1000 - 0

Element construction

Screen basket element with handle

Size

1, 2, 3, 4, 5

Material of filter element

S = slotted tube
L = perforated plate

Filtration rating in μm

50, 100, 200, 300, 500, 1000, 2000, 3000 (slotted tube)
3000, 4000, 5000, 10000 (perforated plate)

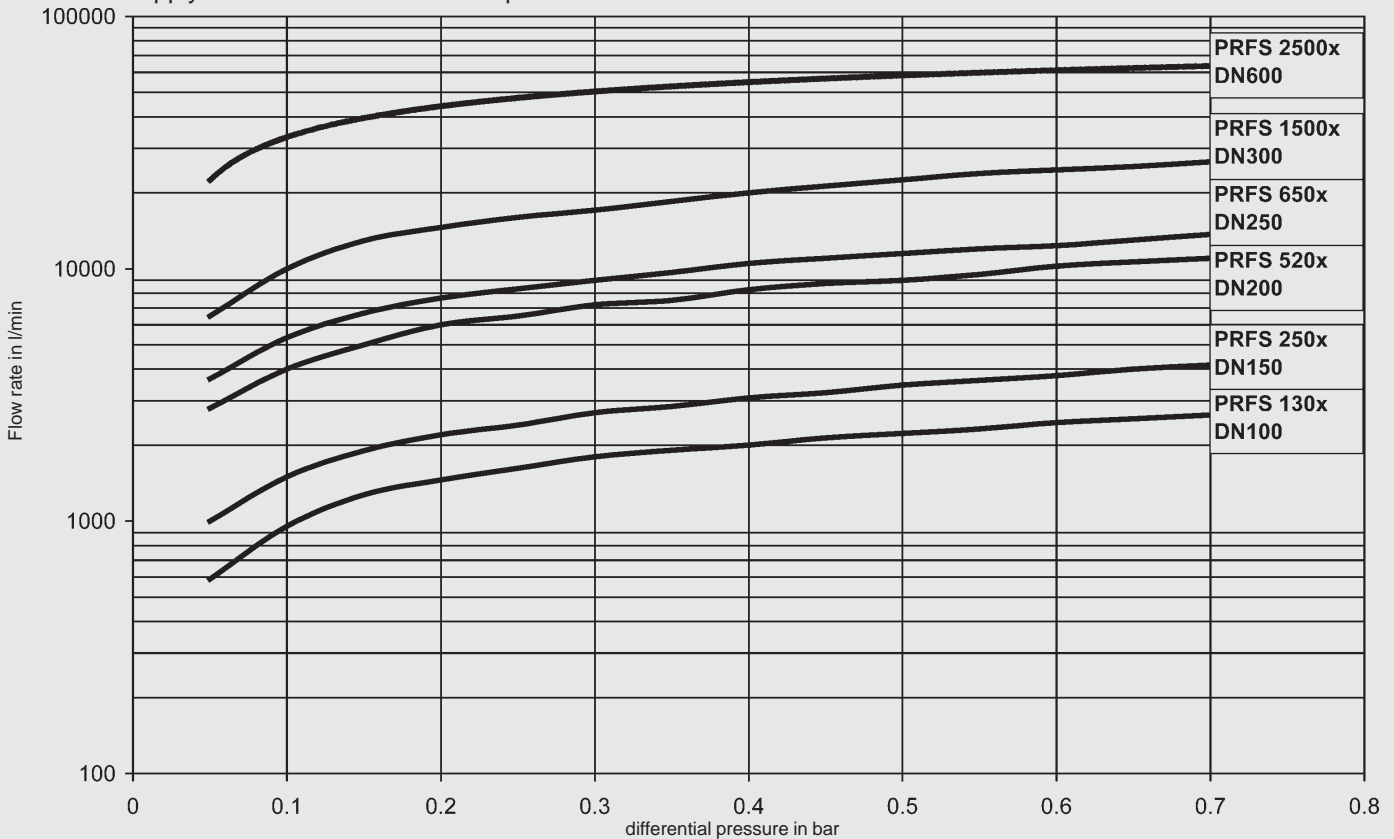
Seal material

0 = no seal for filtration rating > 500
V = Viton
N = NBR
EP = EPDM
SI = Silicon

4. FILTER CALCULATION / SIZING

4.1 PRESSURE DROP CURVES FOR HOUSING

The curves apply to water at 20°C or fluids up 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 Filters PRFS and PRFSD.

Generally speaking, an initial Δp (clean condition of the filter) of > 0.2 bar should not be exceeded.

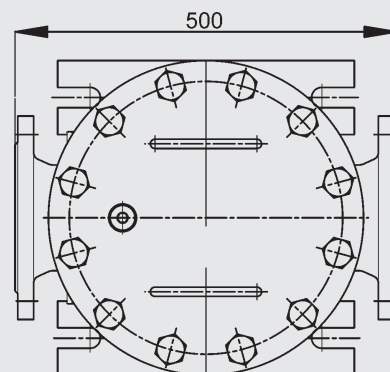
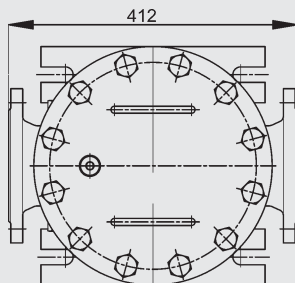
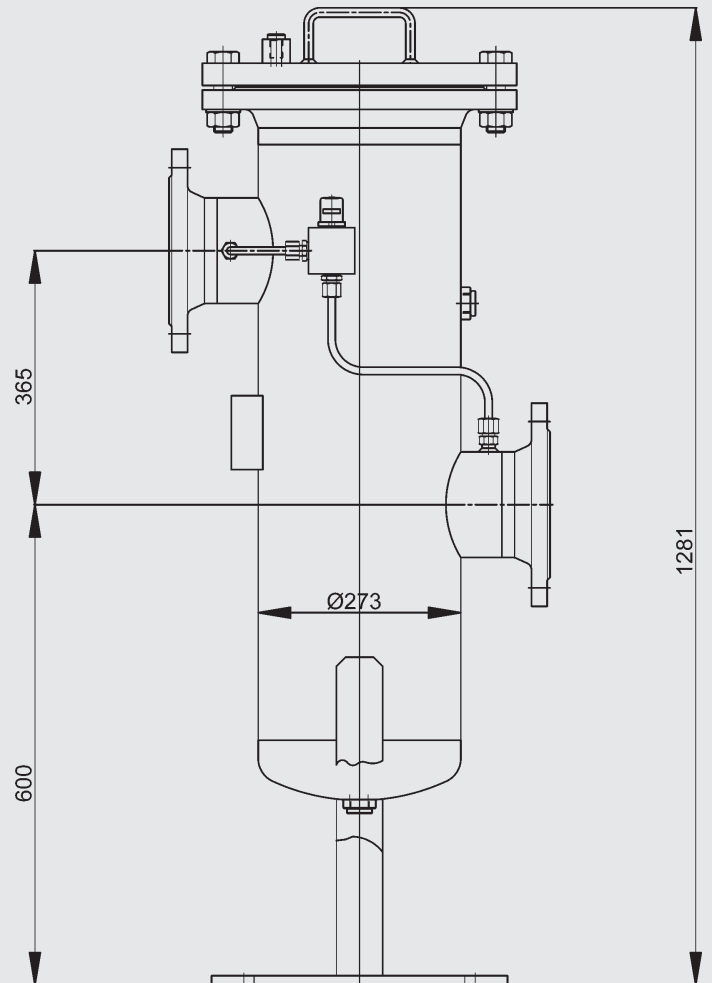
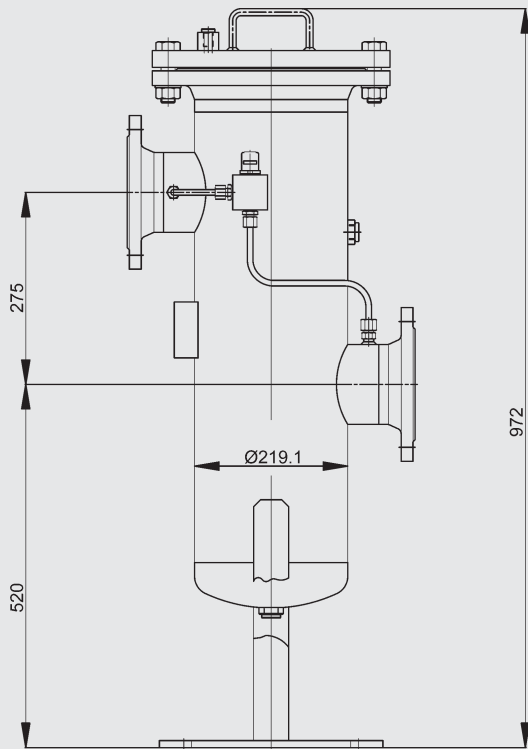
A further factor in the calculation is the flow velocity through the flange inlet. It should not exceed 4 m/s.

5. DIMENSIONS

5.1 FILTER HOUSING

PRFS 130x

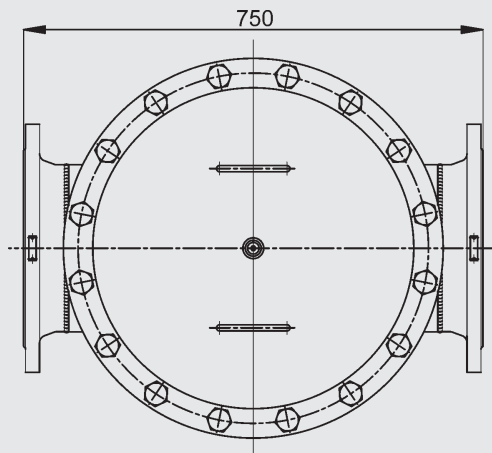
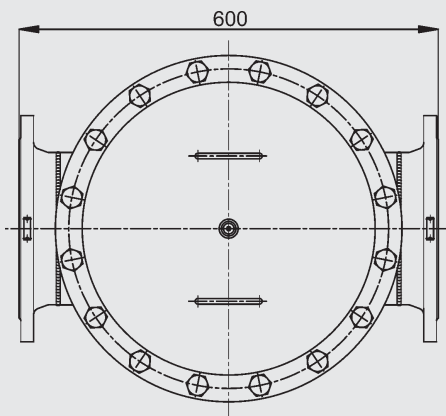
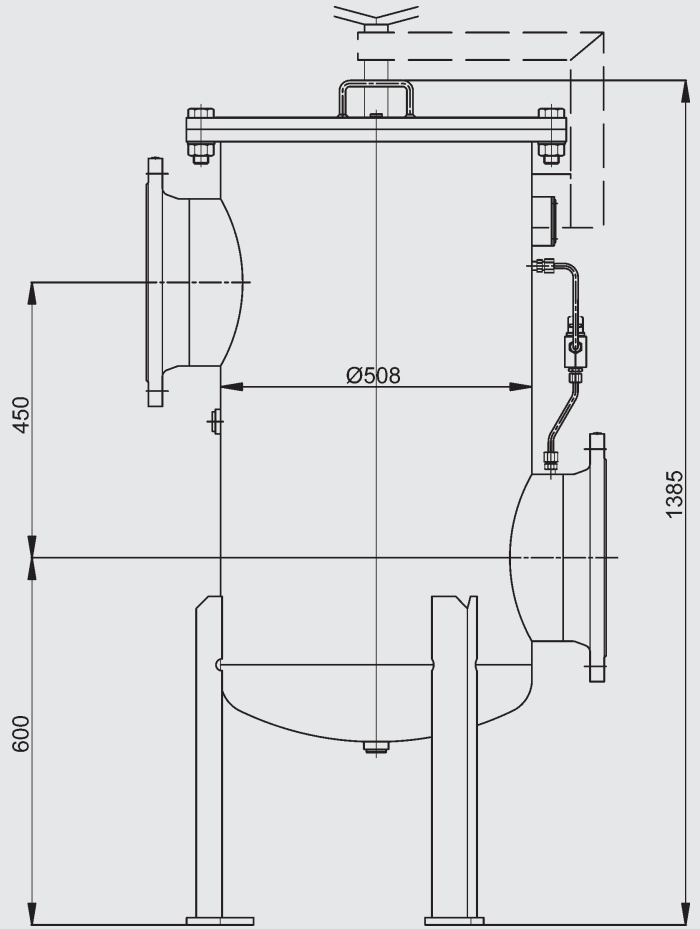
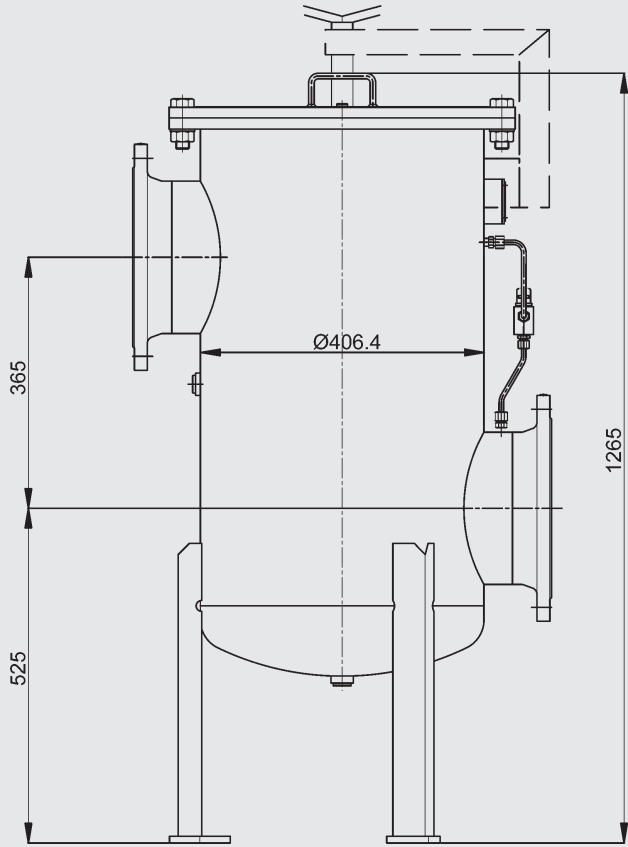
PRFS 250x



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

PRFS 520x

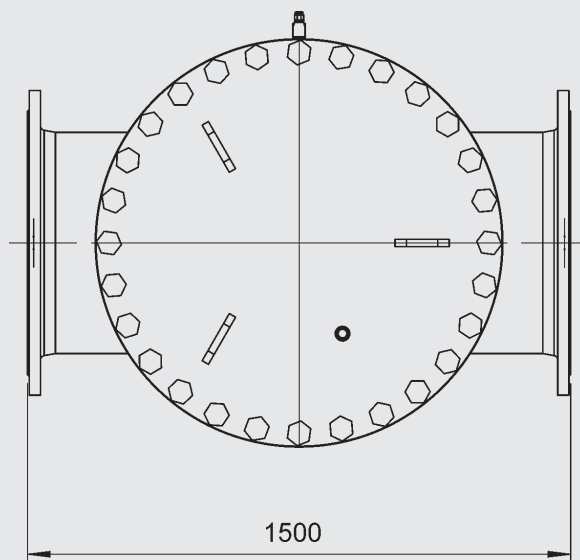
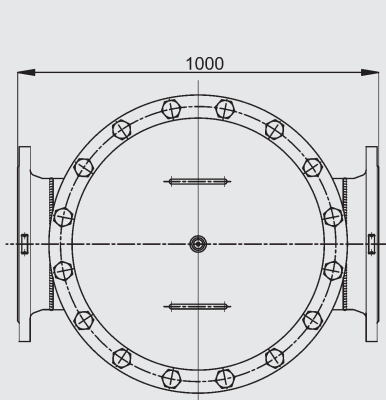
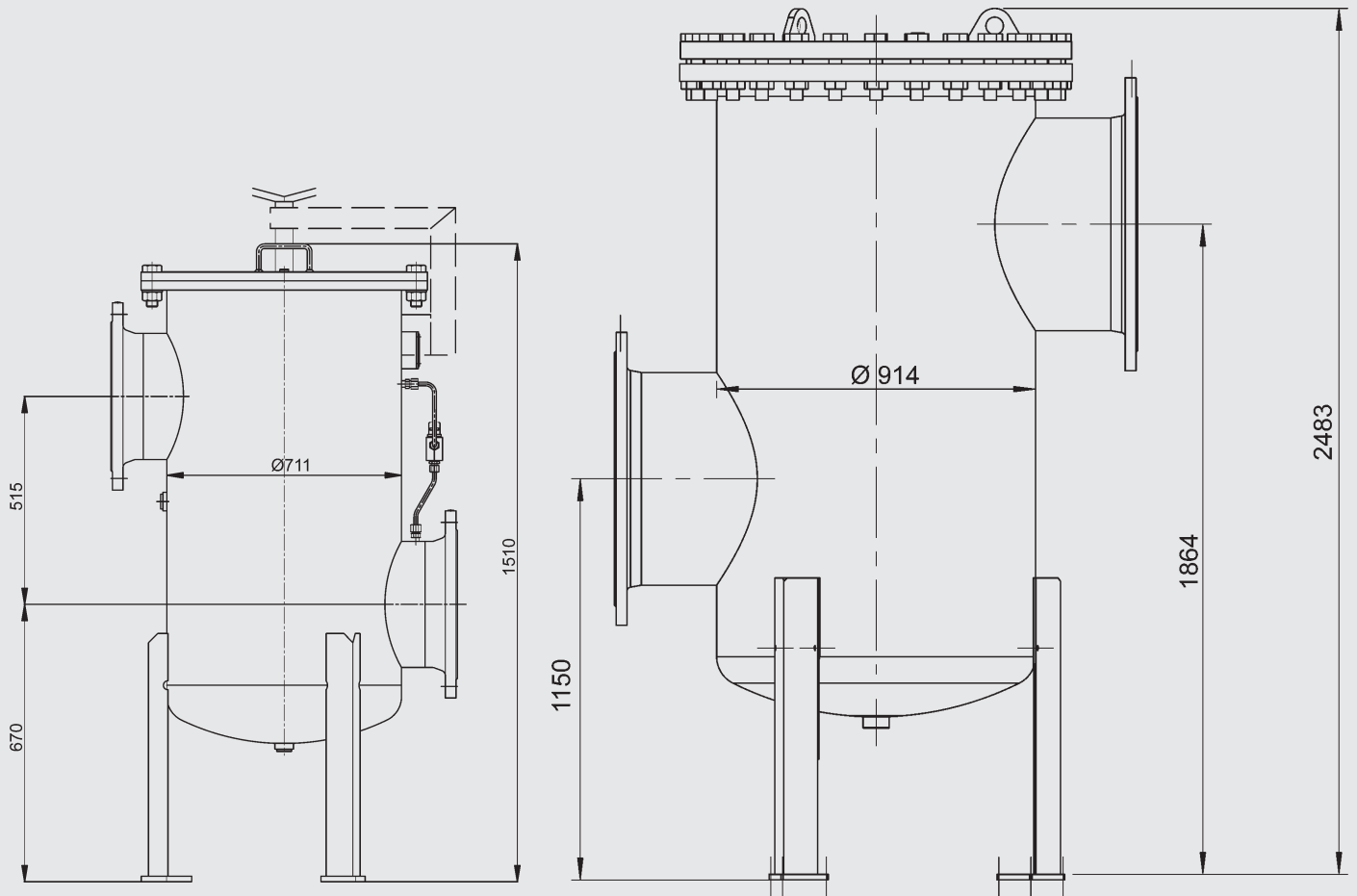
PRFS 650x



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

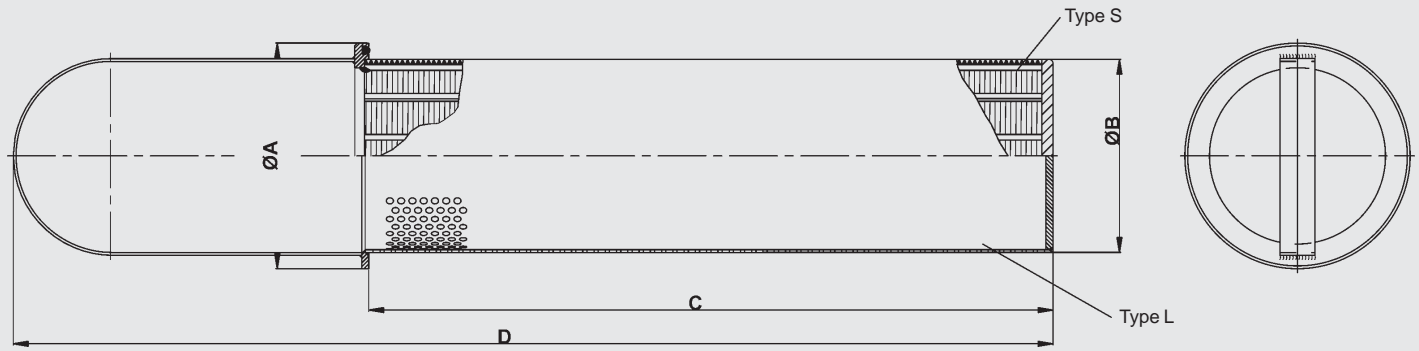
PRFS 1500x

PRFS 2500x



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

5.2 FILTER ELEMENT



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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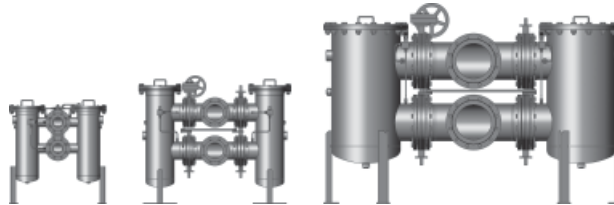


Process Screen Basket Filter, Change-Over Version PRFSD

PRFSD-130x

PRFSD-250x

PRFSD-520x



1. TECHNICAL SPECIFICATIONS

1.1 GENERAL

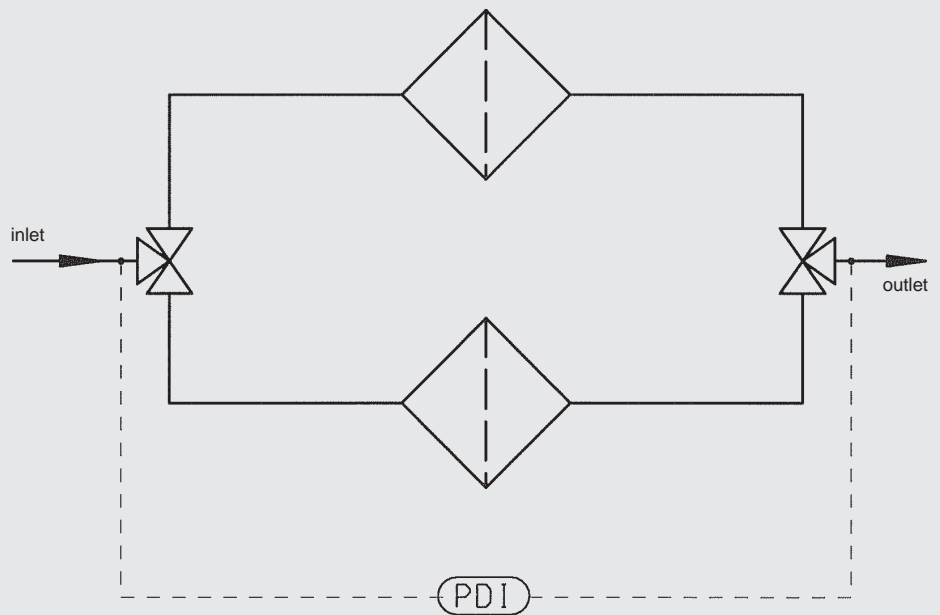
Screen basket filters are used mainly as coarse filters or pre-filters. The direction of flow is from the inside to the outside. The separated solid contamination is collected in the stainless steel screen basket and can be disposed of quickly and conveniently. By using clogging indicators which monitor 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				●	●

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 STANDARD FILTER HOUSINGS

Series	Type	Connection size DIN DN	Materials			Pressure range*	Temperature [°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	20
	1304	80/			●				
	1305	100		●					
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				●				
	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), asbestos-free gasket

2.2.2 Corrosion protection, external

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

2.2.3 Corrosion protection, internal

2K epoxy coating (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 area [cm²]	Filter element type	Filter materials and filtration ratings [µm]		Permiss. Diff. pressure across element [bar]
				Slotted tube	Perforated plate	
130x	1	1890	SK-3-...	50, 100, 200, 250, 300, 500, 1000, 2000, 3000	4000, 5000, 10000	10
250x	1	3900	SK-4-...			
520x	3	7560	SK-3-...			
650x	4	9450	SK-4-...			
1500x	7	18900	SK-4-...			

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 Notices / 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 plate 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 according to customer requirement (on 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 others on request

Further optional models on request

3. MODEL CODE

PRFS - S - 1303 - AF3 - 10 - 0 - 1 - X

3.1 SCREEN BASKET FILTER PRFS / PRFSD

Type

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

Material of filter element

D = wire mesh (cleanable)
S = slotted tube (cleanable), end cap: polyamide, bonded
L = perforated plate (cleanable)

Size

130x = DN 50 / 80 / 100
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

50, 100, 200, 300, 500, 1000, 2000, 3000 (slotted tube)
3000, 4000, 5000, 10000 (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...1.6 bar)
5 = visual-analogue indicator in stainless steel with 2 adjustable contacts (0...1.6 bar)
6 = electrical differential pressure switch PVD 2 C.0

Modification number

X = the latest version is always supplied

Supplementary details

Drawing number for special equipment

3.2 SCREEN BASKET ELEMENT

SK - 4 - S - 1000 - 0

Element construction

Screen basket element with handle

Size

1, 2, 3, 4, 5

Material of filter element

S = slotted tube
L = perforated plate

Filtration rating in μm

50, 100, 200, 300, 500, 1000, 2000, 3000 (slotted tube)
3000, 4000, 5000, 10000 (perforated plate)

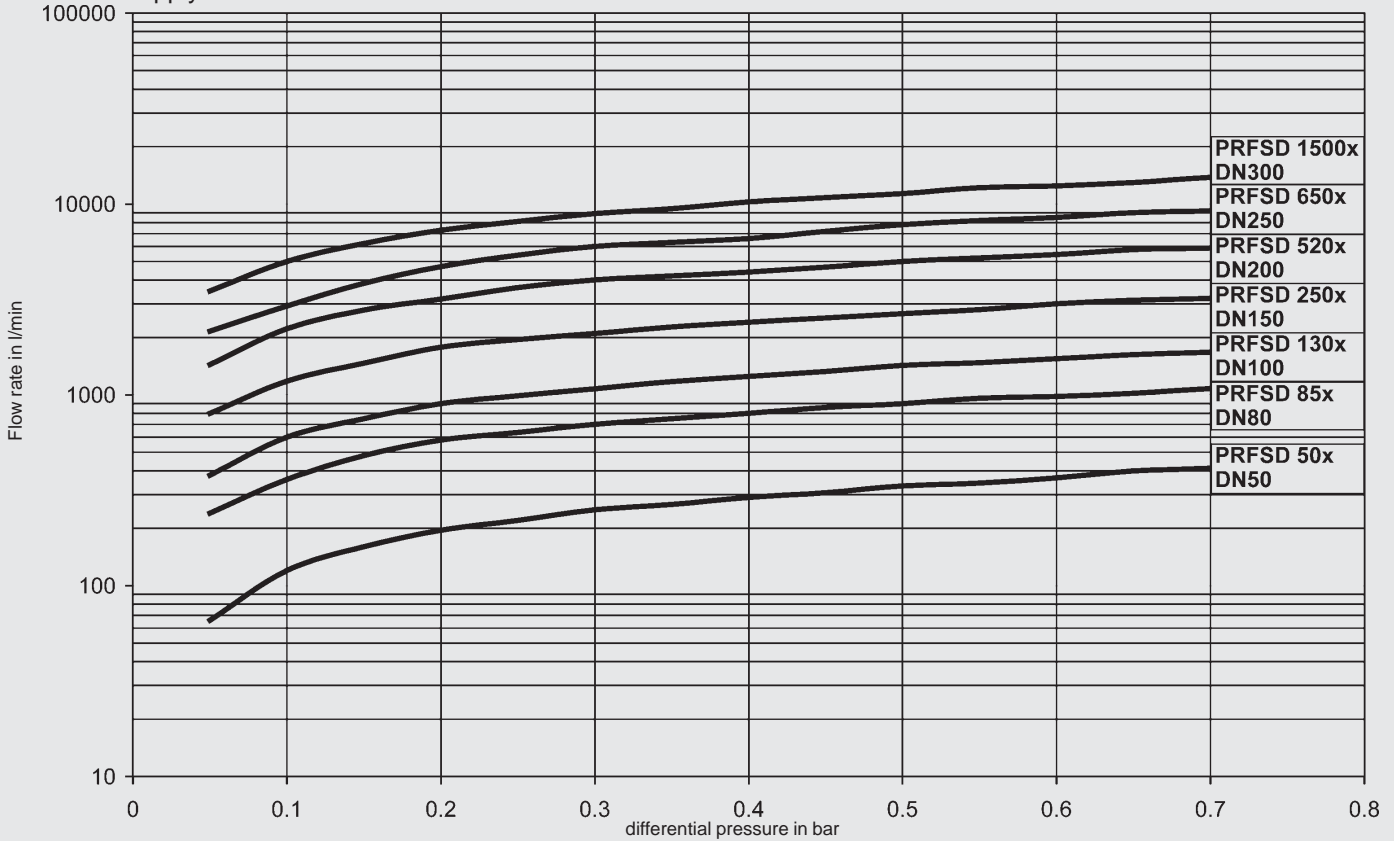
Seal material

0 = no seal for filtration rating > 500
V = Viton
N = NBR
EP = EPDM
SI = Silicon

4. FILTER CALCULATION / SIZING

4.1 PRESSURE DROP CURVES FOR HOUSING

The curves apply to water at 20°C



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

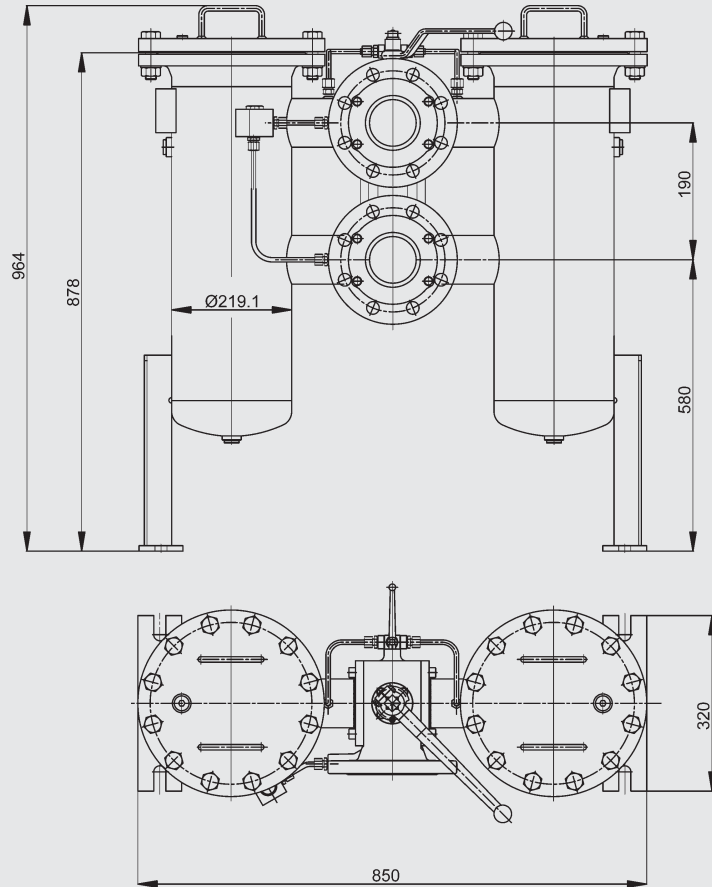
Use the pressure drop curves to calculate the Process Inline Filters PRFS and PRFSD.

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

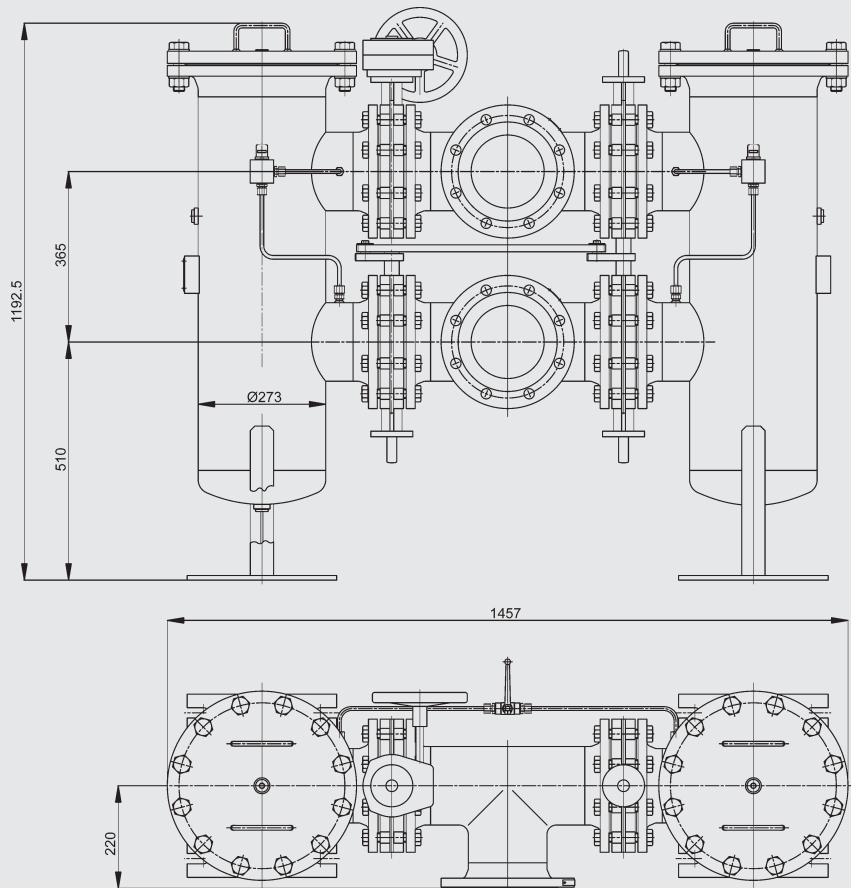
5. DIMENSIONS

5.1 FILTER HOUSING

PRFSD 130x

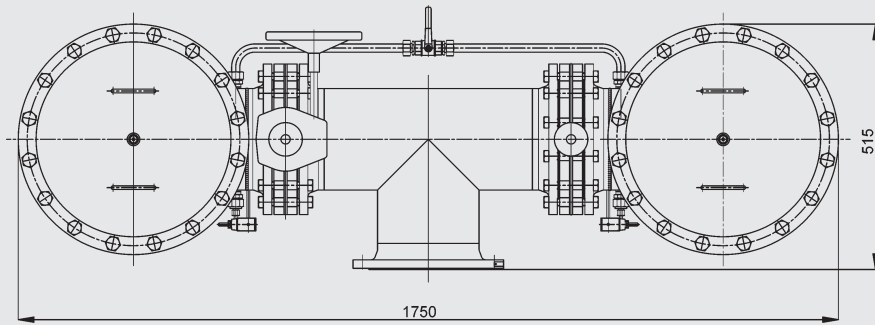
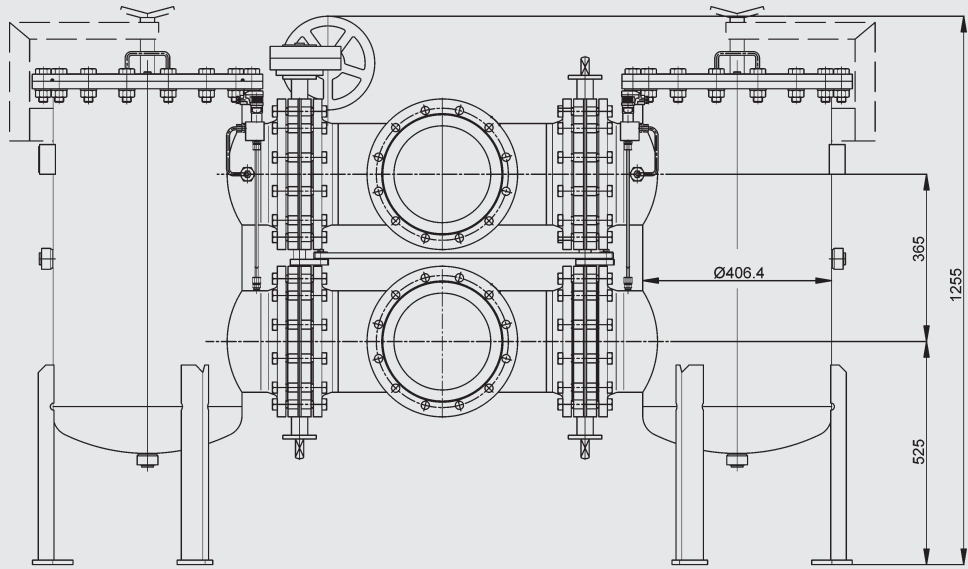


PRFSD 250x

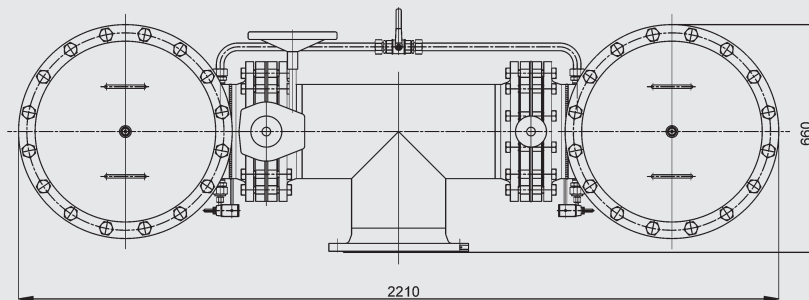
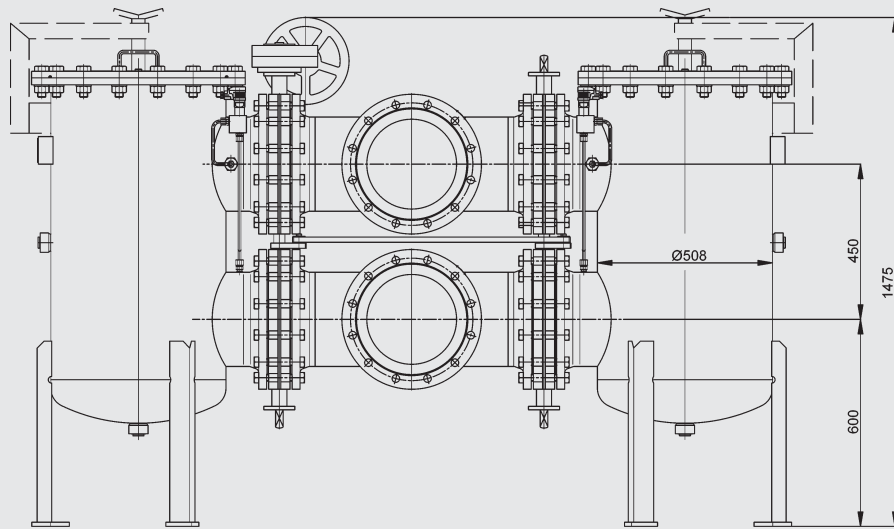


- The filter must not be used as a pipe support
- The dimensions quoted have ± 10 mm tolerances

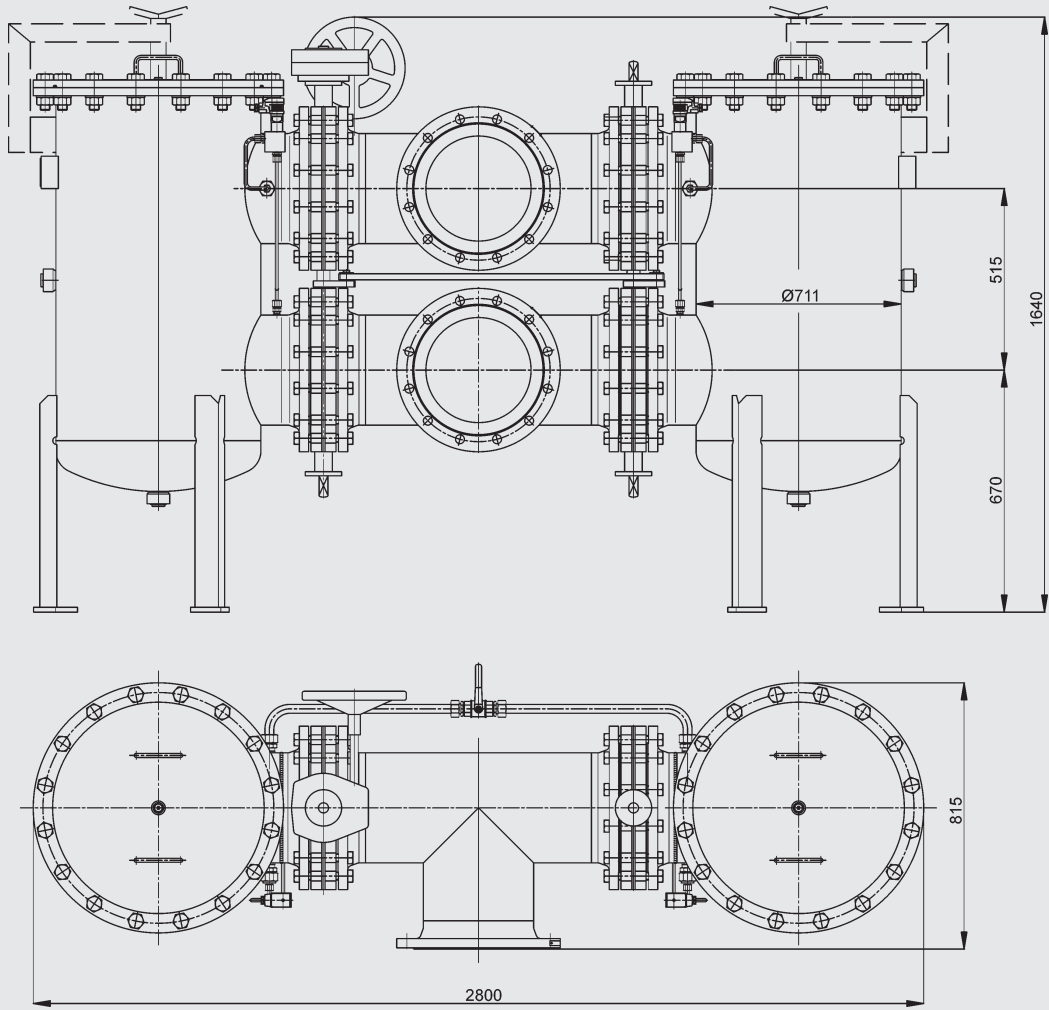
PRFSD 520x



PRFS 650x

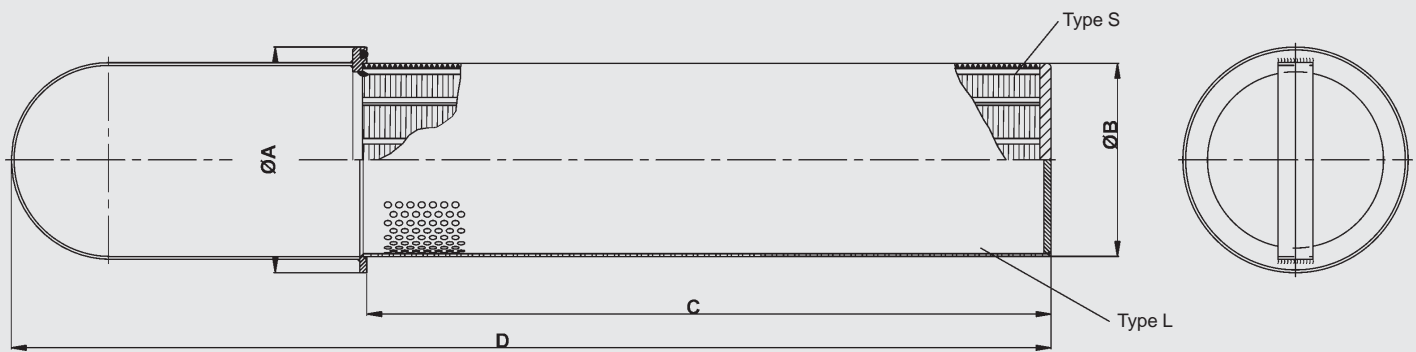


- The filter must not be used as a pipe support
- The dimensions quoted have ± 10 mm tolerances



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

5.2 FILTER ELEMENT



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

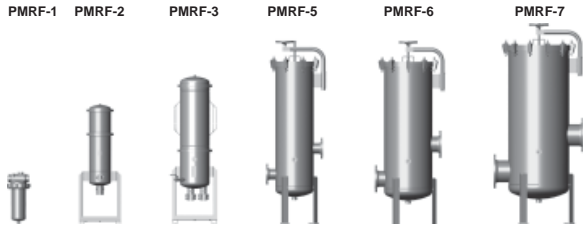
NOTE

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 Process Multi-Rheo Filter (for duplex filter, see PMRFD) completes the HYDAC Process Technology inline filter series. These filters use HYDAC DekaRheo or MegaRheo 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 of 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 DekaRheo elements

DekaRheo filter elements (meltblown fibre) are elements for separating particles from fluids with a broad distribution spectrum. Due to optimised depth filtration with high contamination retention capacity, very high levels of filtrate cleanliness can be achieved.

1.3.2 MegaRheo elements

MegaRheo filter elements are suitable for filtering particles of defined particle distribution. They feature low pressure drops at high flow rates. The pleated construction of the elements results in a large filter area with optimum contamination retention capacities.



2. FILTER SPECIFICATIONS

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

Size	Length [inches]				Connection size			Materials			Pressure range					Temperature [°C]	Weight ²⁾ [kg]	Volume ²⁾ [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 plate 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-coat 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 is 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 according to customer requirement (on carbon steel qualities)
- 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 others on request
- Further optional models on request.

2.4 SUMMARY OF TECHNICAL SPECIFICATIONS OF FILTER ELEMENTS

2.4.1 DekaRheo (DR)

Size	No. of filter elements	Filter element type	Filter materials and filtration ratings [μm]	
			Polypropylene	Polyester
1	1	DekaRheo (DR)	1, 3, 5, 10, 20, 30, 40, 50, 70, 90	1, 3, 5, 10, 20, 30, 40, 50, 70, 90
2	3 or 5	DekaRheo (DR)		
3	7 or 11	DekaRheo (DR)		
4	17	DekaRheo (DR)		
5	22	DekaRheo (DR)		
6	36	DekaRheo (DR)		
7	52	DekaRheo (DR)		

2.4.2 MegaRheo (MR)

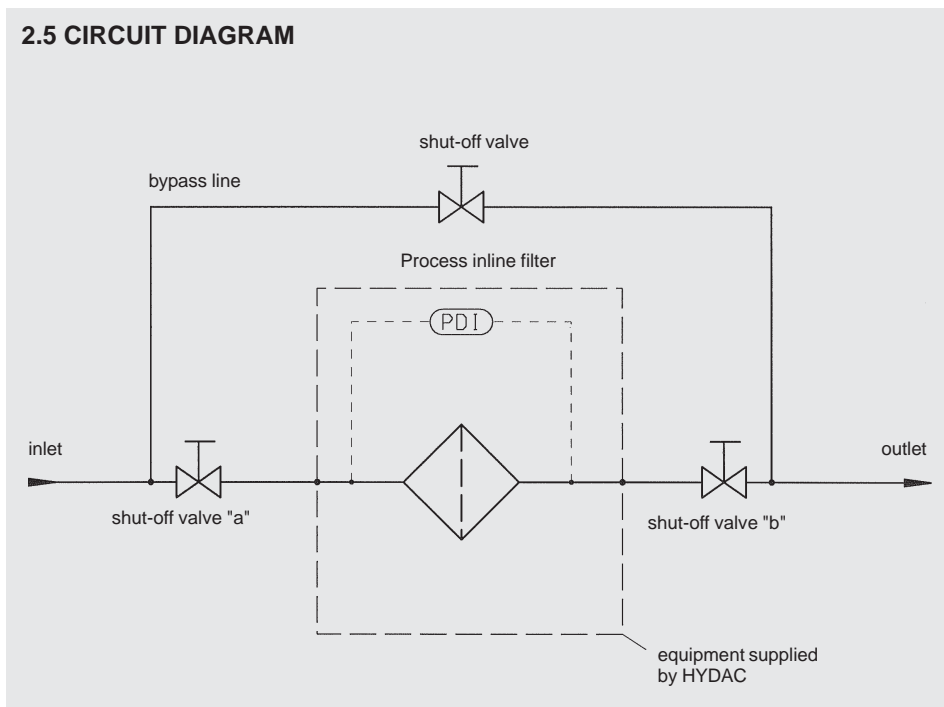
Size	No. of filter elements	Filter element type	Filter materials and filtration ratings [μm]	
			Polypropylene	Polyester
1	1	MegaRheo (MR)	Not available	1, 3, 5, 10, 20, 30, 40, 50, 70, 90
2	3 or 5	MegaRheo (MR)		
3	7 or 11	MegaRheo (MR)		
4	17	MegaRheo (MR)		
5	22	MegaRheo (MR)		
6	36	MegaRheo (MR)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

2.4.3 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
-10 ... + 30 °C	8 bar	5 bar
-10 ... + 60 °C	6.5 bar	2 bar
-10 ... +100 °C	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 (Point 2.1) **Bold = standard**

No. 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

Type of connection _____

		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		2	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 clogging indicator
 1 = visual indicator PVD 2 B.1
 2 = visual-electrical indicator PVD 2 D.0/-L
 3 = visual-electrical-analogue indicator V01
 4 = differential pressure gauge AL (measuring range 4 bar)
 5 = differential pressure gauge Stainless steel (measuring range 4 bar)
 6 = electrical pressure switch PVD 2 C.0

See Brochure no.: E 7.706.../.. Clogging Indicators for Process Filters

Modification number _____

X = the latest version is always supplied

3.1 MODEL CODE RHEO FILTER ELEMENTS

N - 40 - MR - 005 - PES - 1 - F

Element length

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

Element type

- MR = Mega Rheo
- DR = Deka Rheo

Filtration rating

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

Material of filter element

- PP = polypropylene for element type: DR
- PES = polyester for element type: MR, DR

End cap form

- 1 = 'plug in' end cap (1 x 222 O-ring), flat end cap

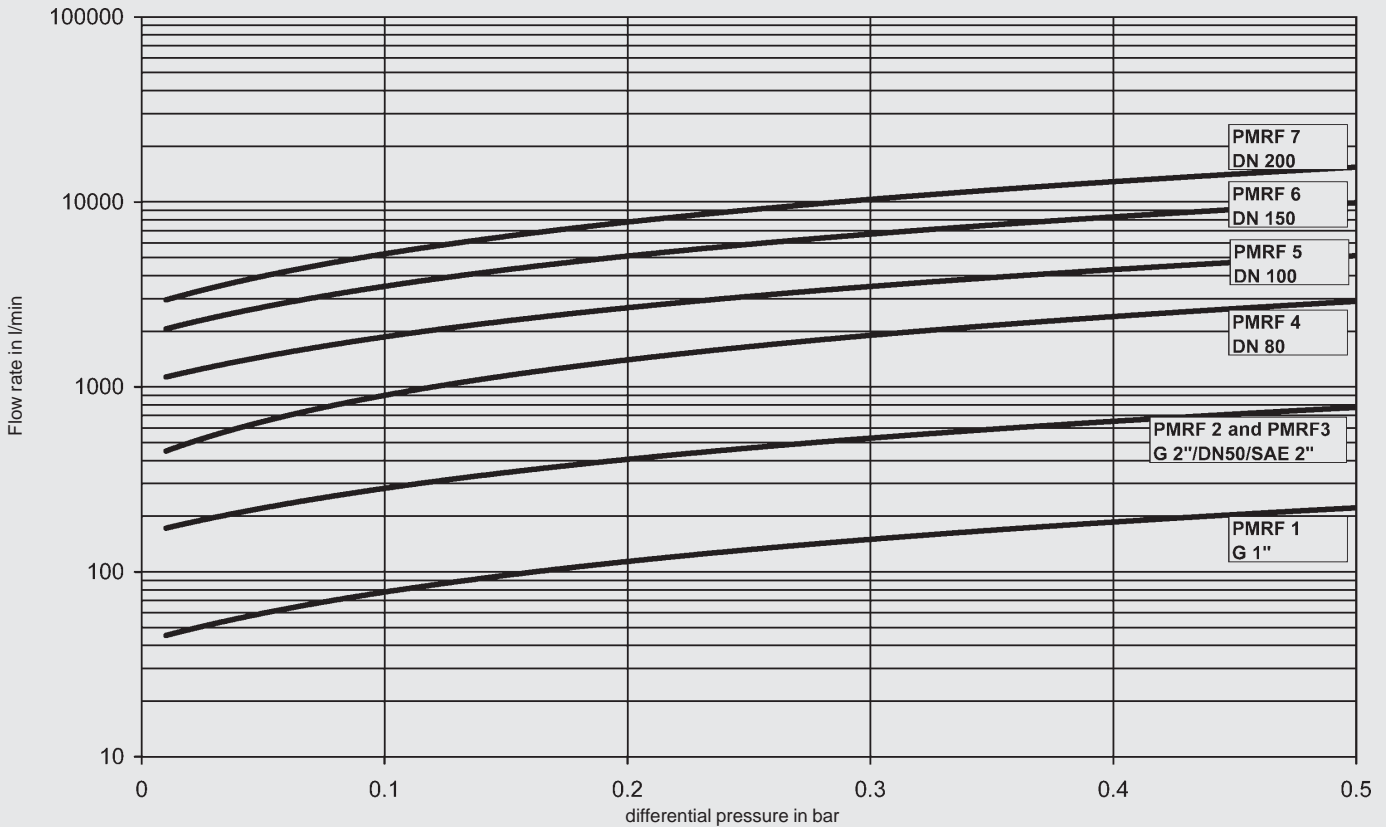
Seal material

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

4. FILTER CALCULATION / SIZING

4.1 PRESSURE DROP CURVES HOUSING

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



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

Use the pressure drop curves above to determine the pressure drop of the housing. 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 in 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 the 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]

MegaRheo R-Factor PES (polyester)

Filtration rating [μm]	Water-based fluids	Oils
1	32.0	10.4
3	24.0	7.5
5	18.0	4.4
10	17.0	1.8
20	15.0	1.8
30	14.0	0.9
40	14.0	0.9
50	13.0	0.6
70	12.0	0.5
90	12.0	0.5

DekaRheo R-Factor PES (polyester)

Filtration rating [μm]	Water-based fluids	Oils
1	196.0	267.0
3	154.0	201.0
5	98.0	121.0
10	74.0	94.0
20	42.0	21.0
30	35.0	13.0
40	30.0	7.3
50	25.0	2.9
70	25.0	2.6
90	20.0	2.3

DekaRheo R-Factor PP (polypropylene)

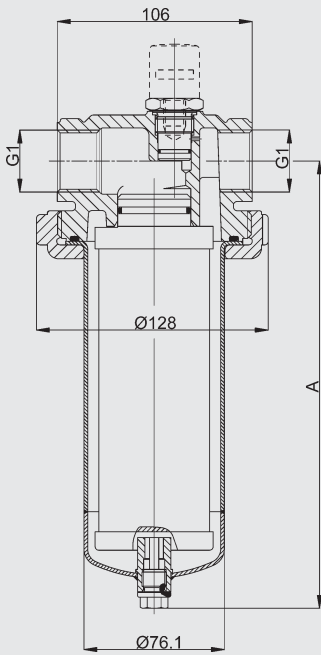
Filtration rating [μm]	Water-based fluids	Oils
1	300.0	
3	223.0	
5	138.0	
10	97.0	
20	55.0	
30	47.0	
40	41.0	
50	34.0	
70	34.0	
90	34.0	

5. DIMENSIONS

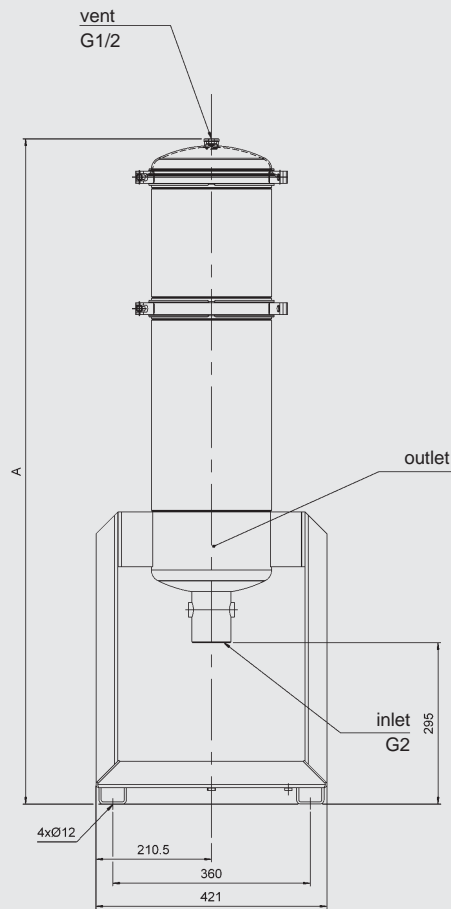
5.1 DIMENSIONS OF FILTER HOUSING

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.

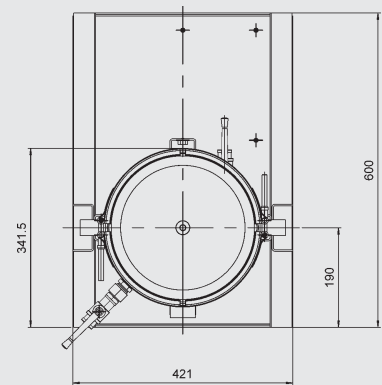
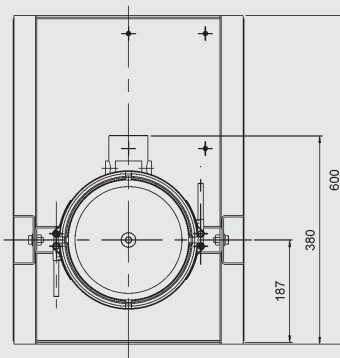
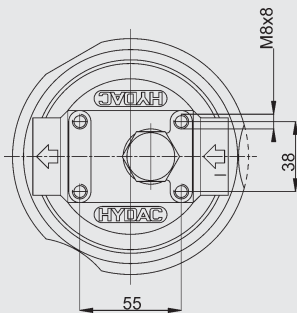
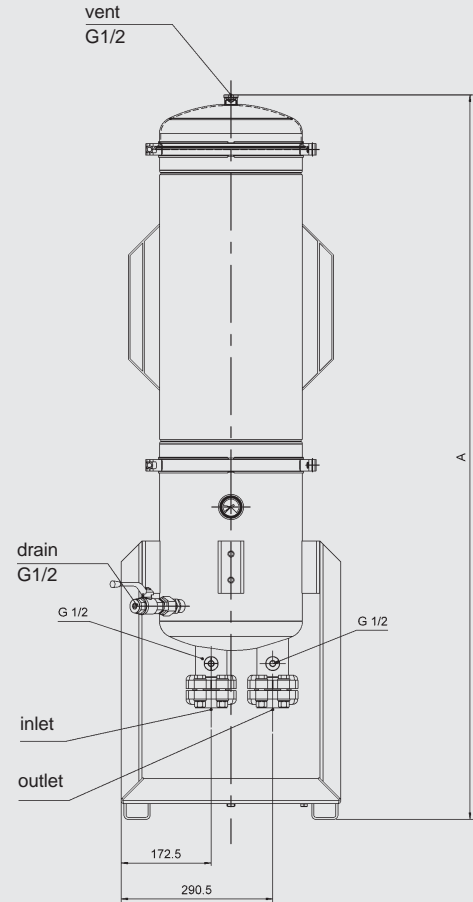
PMRF 1



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

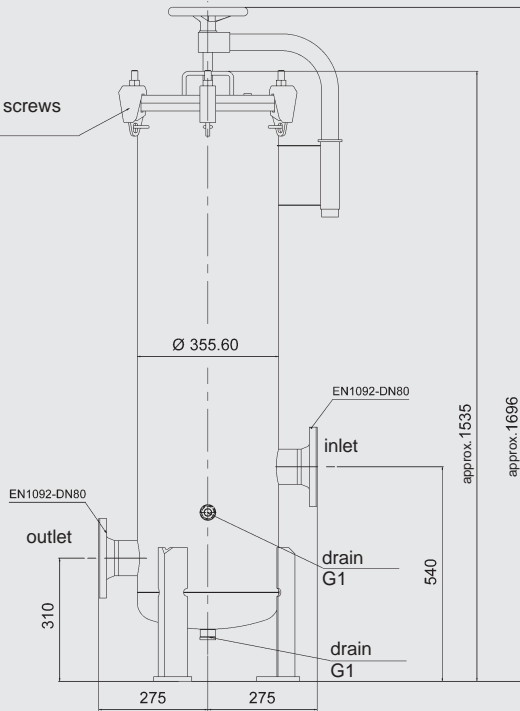
Length	A	Volume [l]
10"	798	20
20"	1066	40
30"	1323	50
40"	1578	65

- 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

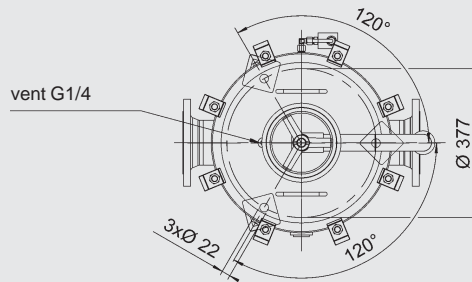
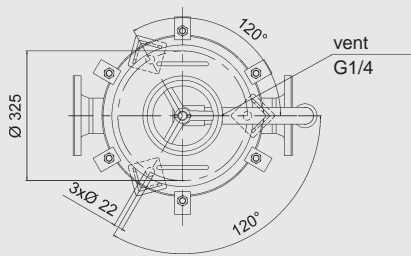
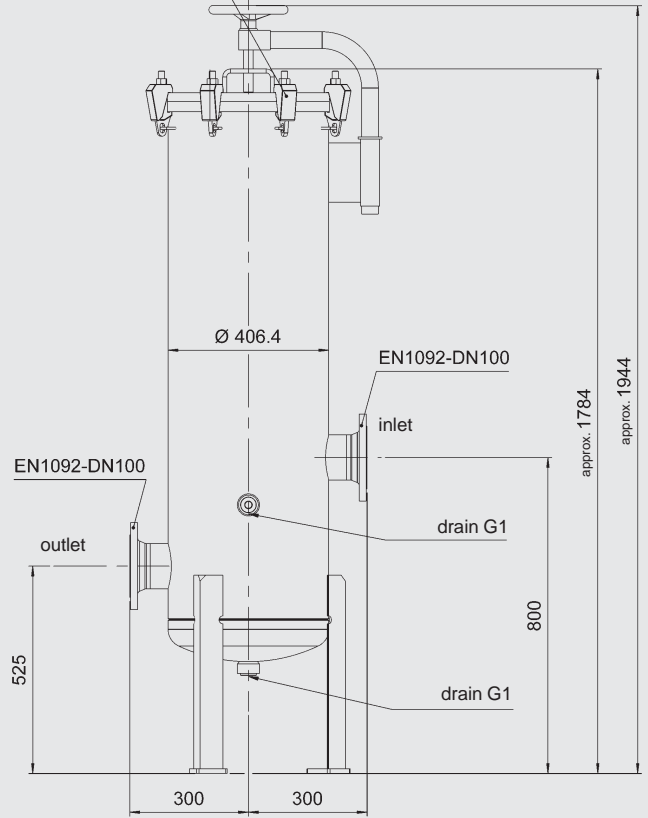
PMRF 4

PMRF 5

bracket screws
6xM16

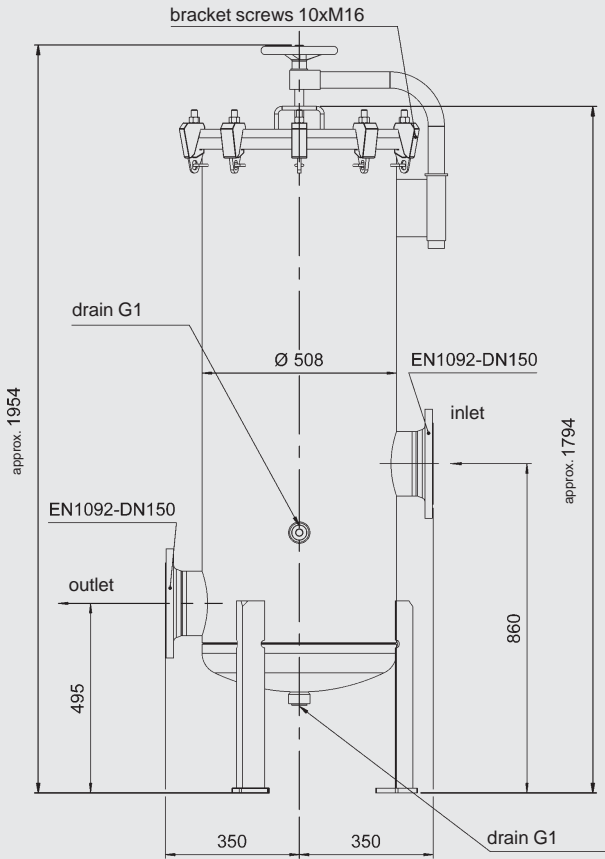


bracket screws 8xM16

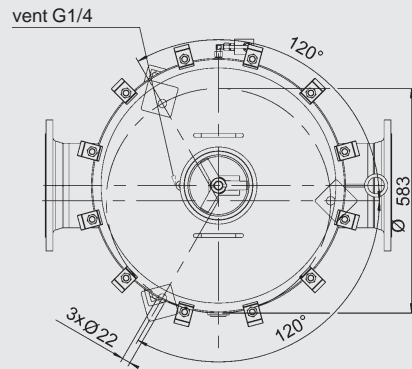
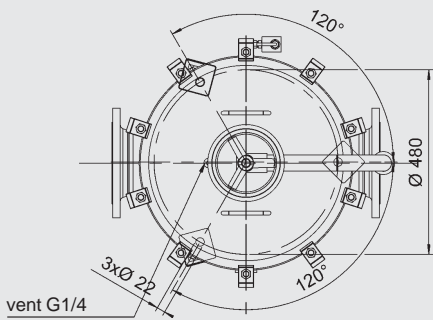
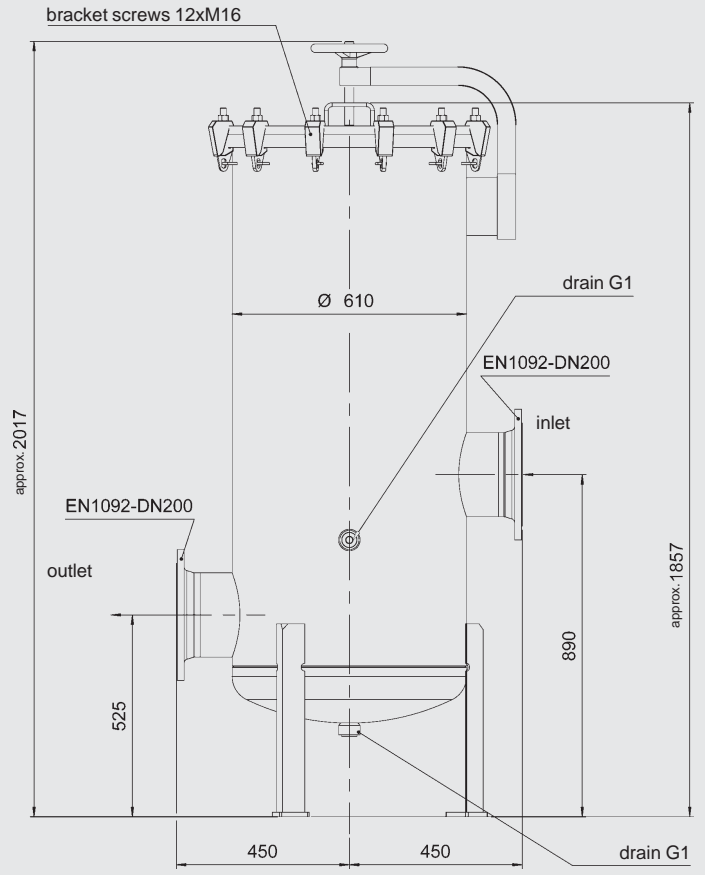


- The filter must not be used as a pipe support
- The dimensions quoted have ± 5 mm tolerances for sizes up to 3
- The dimensions quoted have ± 10 mm tolerances for sizes 4 upwards

PMRF 6



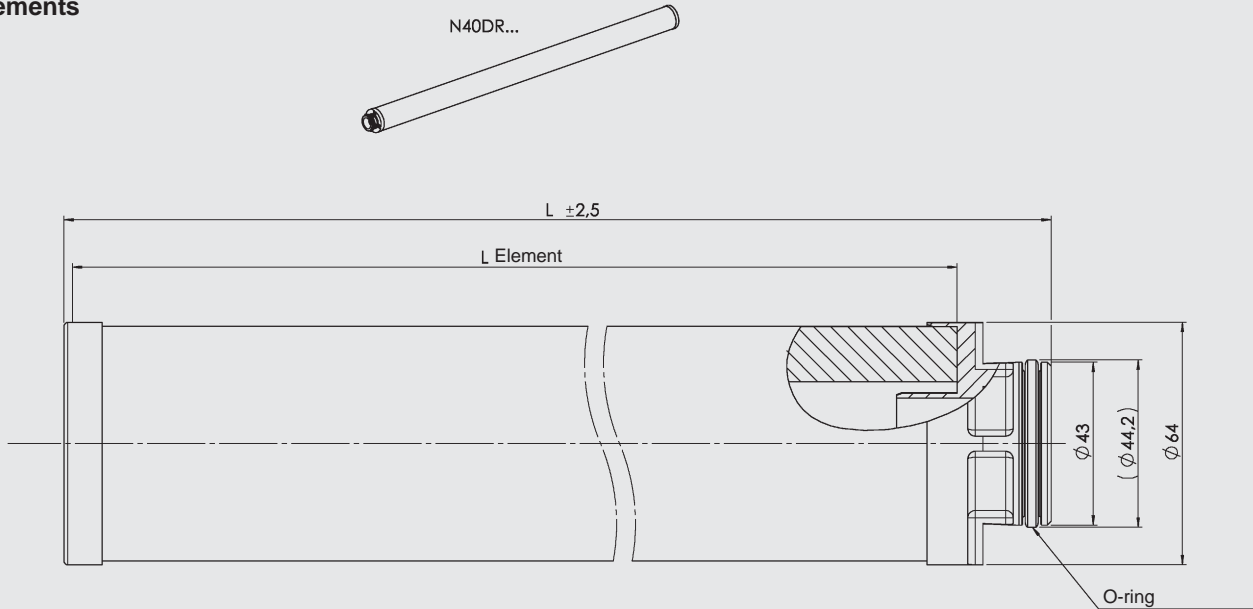
PMRF 7



- 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

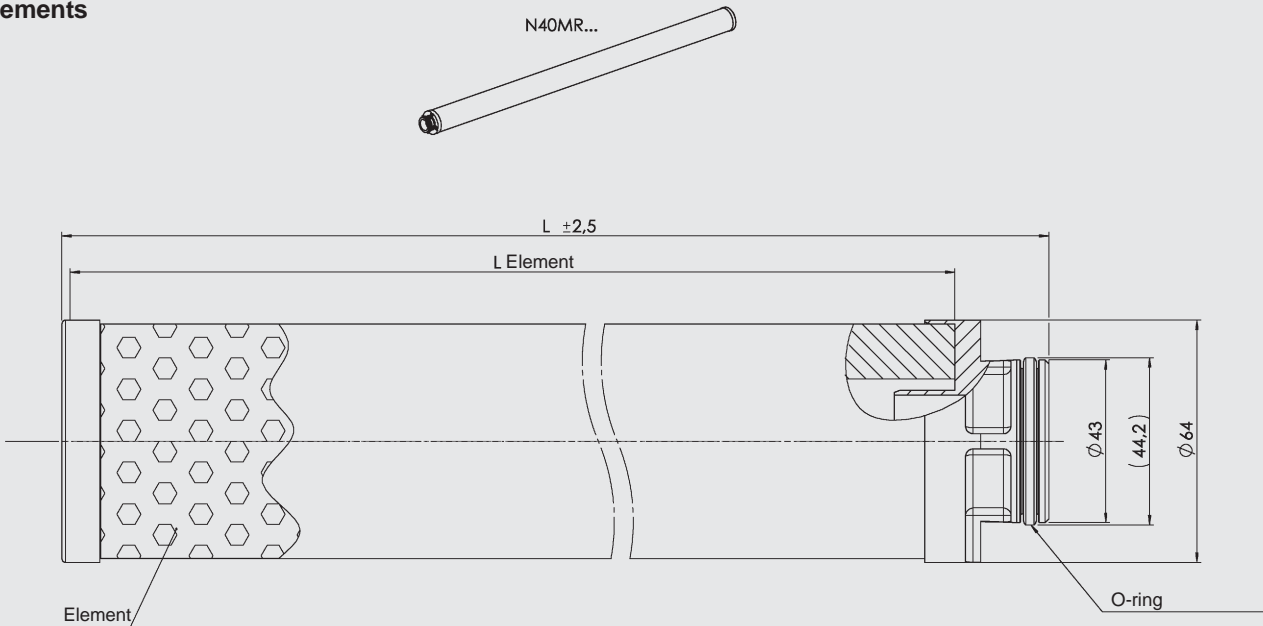
5.2 DIMENSIONS OF FILTER ELEMENTS

DR elements



Designation	Length
(nominal length in inches = L Element)	L in mm
N10DR...	281
N20DR...	535
N30DR...	789
N40DR...	1043

MR elements



Designation	Length
(nominal length in inches = L Element)	L in mm
N10MR...	281
N20MR...	535
N30MR...	789
N40MR...	1043

NOTE

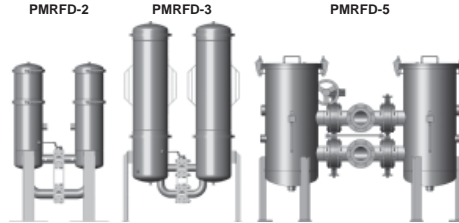
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Process Multi-Rheo Filter, Duplex Change-Over PMRFD



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 Dekarheo or MegaRheo 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 of 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 Dekarheo elements

Dekarheo filter elements (meltblown fibre) are elements for filtering fluids with a broad distribution of particles. Due to optimised depth filtration with high contamination retention capacity, very high levels of filtrate cleanliness can be achieved.

1.3.2 MegaRheo elements

MegaRheo filter elements are suitable for filtering particles of defined particle distribution. They feature low pressure drops at high flow rates. The pleated construction of the elements results in a large filter area with optimum contamination retention capacities.



2. FILTER SPECIFICATIONS

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

Size	Length [inches]				Connection size		Materials			Pressure range					Temperature	Weight ²⁾	Volume ²⁾
	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			
1	●	●	●	●		1"		●				●					
2	●	●	●	●	2"	2", 1.5"	50	●			●	●					
3	●	●	●	●	2"	2", 1.5"	50	●			●	●					
4 ³⁾				●			50/ 80/ 100	●	●	●		●	●	●			2x 120
5 ³⁾				●			80/ 100/ 150	●	●	●		●	●	●			2x 180
6 ³⁾				●			100/ 150/ 200	●	●	●		●	●	●			2x 240
7 ³⁾				●			150/ 200/ 250	●	●	●		●	●	●			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 plate 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-coat 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 is 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 according to customer requirement (on carbon steel qualities)
- 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 others on request
- Further optional models on request.

2.4 SUMMARY OF TECHNICAL SPECIFICATIONS OF FILTER ELEMENTS

2.4.1 DekaRheo (DR)

Size	No. of filter elements	Filter element type	Filter materials and filtration ratings [μm]	
			Polypropylene	Polyester
1	1	DekaRheo (DR)	1, 3, 5, 10, 20, 30, 40, 50, 70, 90	1, 3, 5, 10, 20, 30, 40, 50, 70, 90
2	3 or 5	DekaRheo (DR)		
3	7 or 11	DekaRheo (DR)		
4	17	DekaRheo (DR)		
5	22	DehaRheo (DR)		
6	36	DekaRheo (DR)		
7	52	DekaRheo (DR)		

2.4.2 MegaRheo (MR)

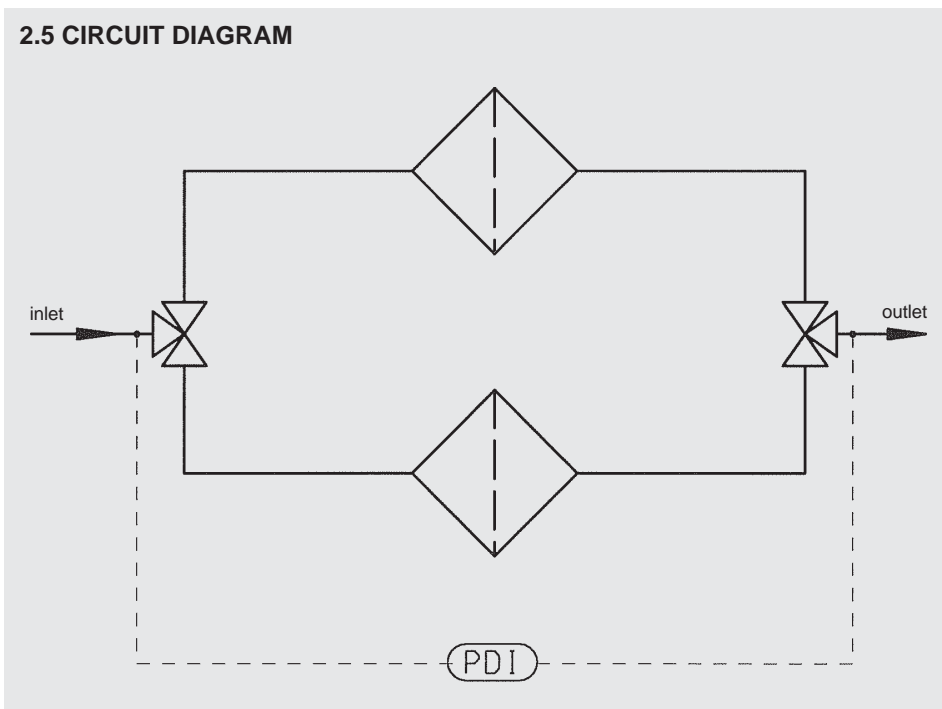
Size	No. of filter elements	Filter element type	Filter materials and filtration ratings [μm]	
			Polypropylene	Polyester
1	1	MegaRheo (MR)	Not available	1, 3, 5, 10, 20, 30, 40, 50, 70, 90
2	3 or 5	MegaRheo (MR)		
3	7 or 11	MegaRheo (MR)		
4	17	MegaRheo (MR)		
5	22	MegaRheo (MR)		
6	36	MegaRheo (MR)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

2.4.3 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
-10 ... + 30 °C	8 bar	5 bar
-10 ... + 60 °C	6.5 bar	2 bar
-10 ... +100 °C	5 bar	–

2.5 CIRCUIT DIAGRAM



3. MODEL CODE PMRFD

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

Type _____
 PMRF = 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 (Point 2.1) **Bold** = standard

No. 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

Type of connection _____

		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		2	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 clogging indicator
 1 = visual indicator PVD 2 B.1
 2 = visual-electrical indicator PVD 2 D.0/-L
 3 = visual-electrical-analogue indicator V01
 4 = differential pressure gauge AL (measuring range 4 bar)
 5 = differential pressure gauge Stainless steel (measuring range 4 bar)
 6 = electrical pressure switch PVD 2 C.0

See Brochure no.: E 7.706.../.. Clogging Indicators for Process Filters

Modification number _____

X = the latest version is always supplied

3.1 MODEL CODE RHEO FILTER ELEMENTS

N - 40 - MR - 005 - PES - 1 - F

Element length

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

Element type

- MR = Mega Rheo
- DR = Deka Rheo

Filtration rating

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

Material of filter element

- PP = polypropylene for element type: DR
- PES = polyester for element type: MR, DR

End cap form

- 1 = 'plug in' end cap (1 x 222 O-ring), flat end cap

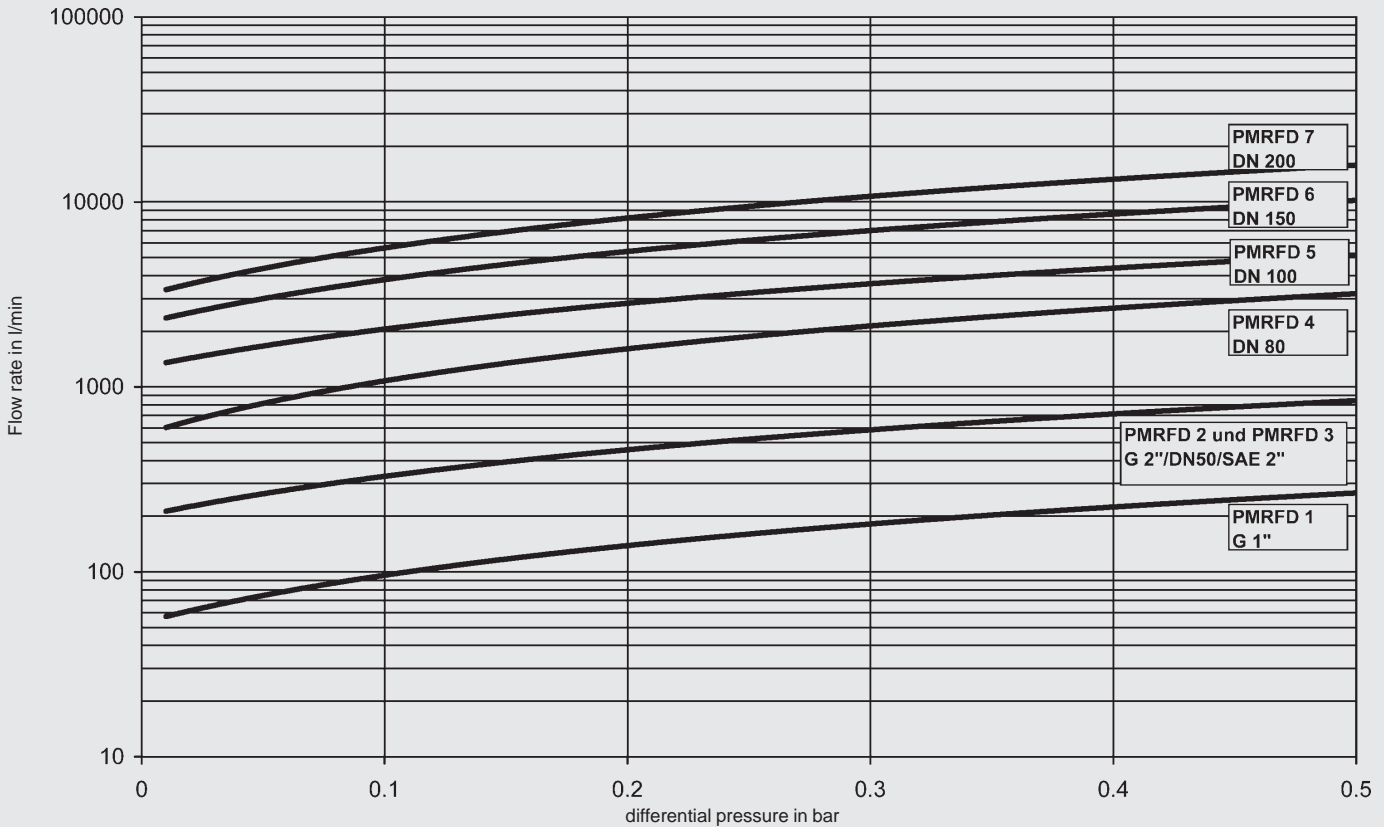
Seal material

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

4. FILTER CALCULATION / SIZING

4.1 PRESSURE DROP CURVES HOUSING

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



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

Use the pressure drop curves above to determine the pressure drop of the housing. 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 in 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 the 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]

MegaRheo R-Factor PES (polyester)

Filtration rating [μm]	Water-based fluids	Oils
1	32.0	10.4
3	24.0	7.5
5	18.0	4.4
10	17.0	1.8
20	15.0	1.8
30	14.0	0.9
40	14.0	0.9
50	13.0	0.6
70	12.0	0.5
90	12.0	0.5

DekaRheo R-Factor PES (polyester)

Filtration rating [μm]	Water-based fluids	Oils
1	196.0	267.0
3	154.0	201.0
5	98.0	121.0
10	74.0	94.0
20	42.0	21.0
30	35.0	13.0
40	30.0	7.3
50	25.0	2.9
70	25.0	2.6
90	20.0	2.3

DekaRheo R-Factor PP (polypropylene)

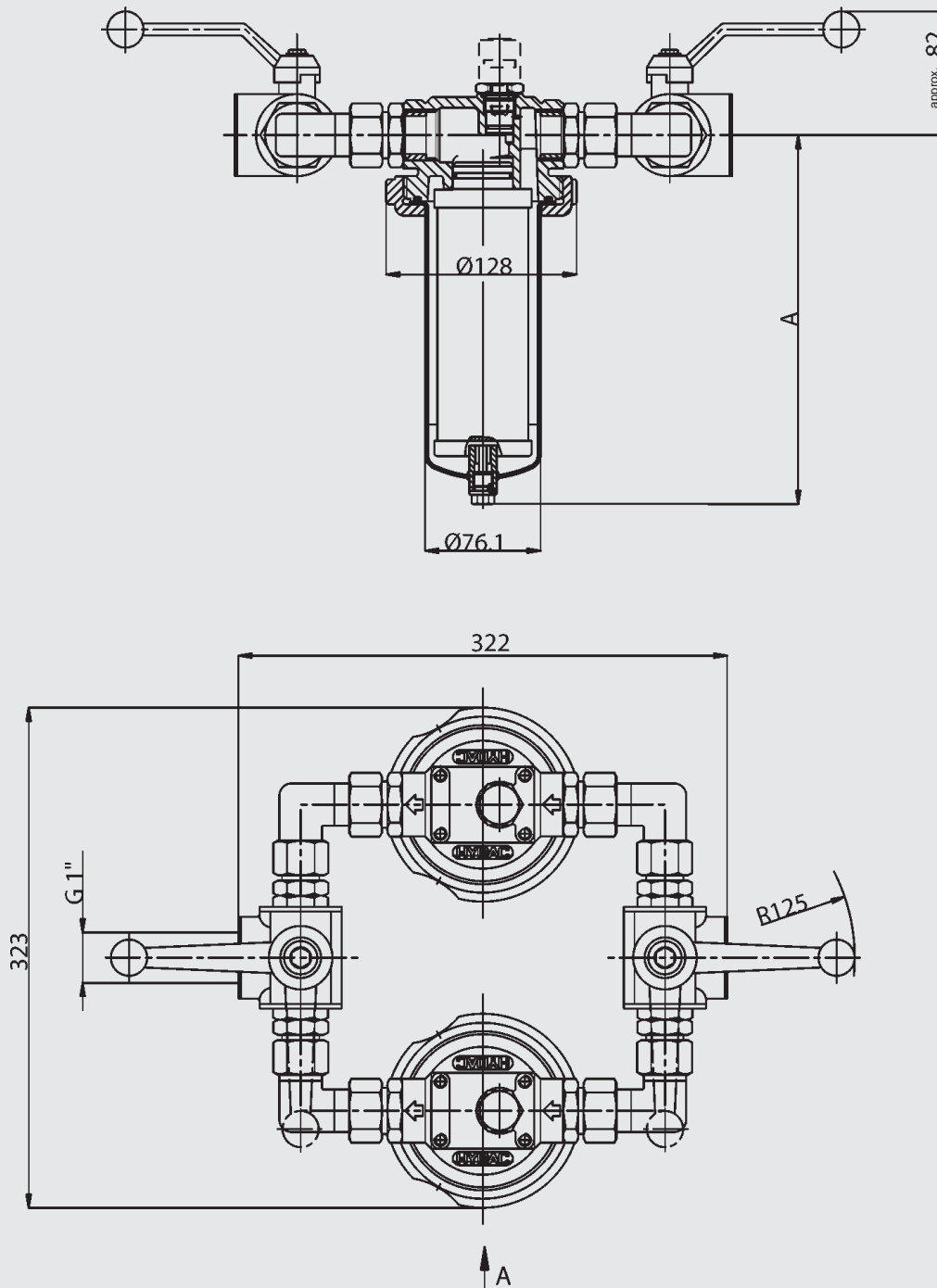
Filtration rating [μm]	Water-based fluids	Oils
1	300.0	
3	223.0	
5	138.0	
10	97.0	
20	55.0	
30	47.0	
40	41.0	
50	34.0	
70	34.0	
90	34.0	

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.

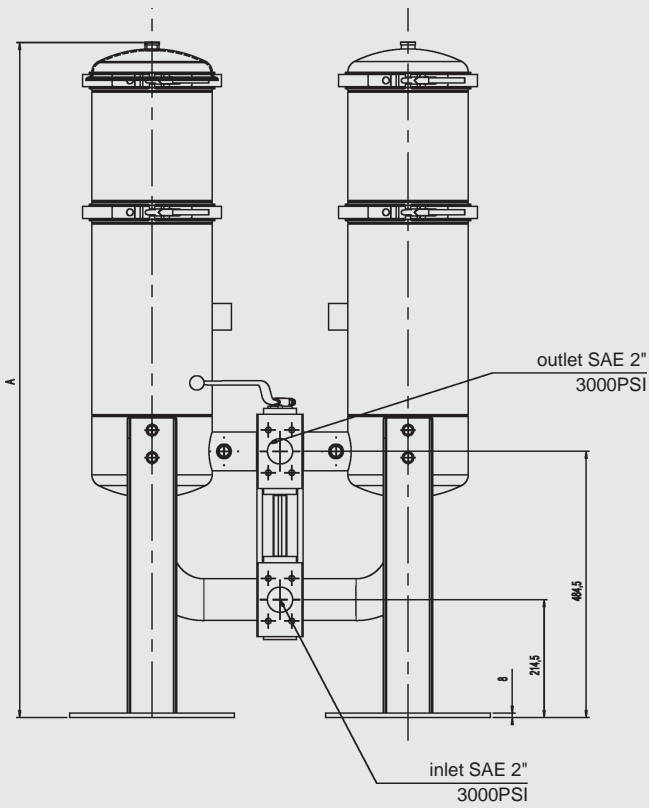
PMRFD 1



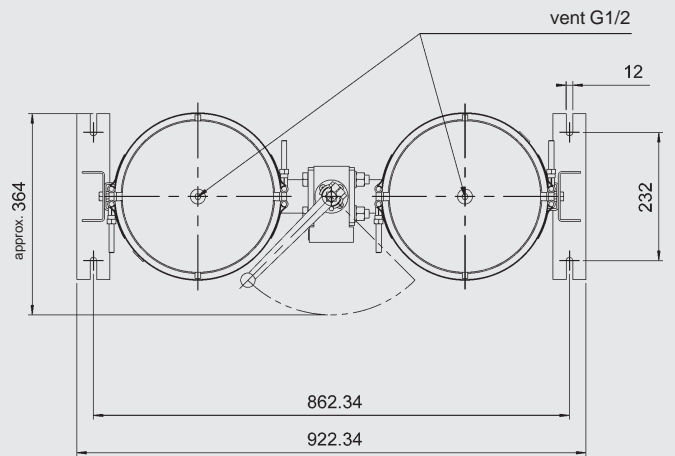
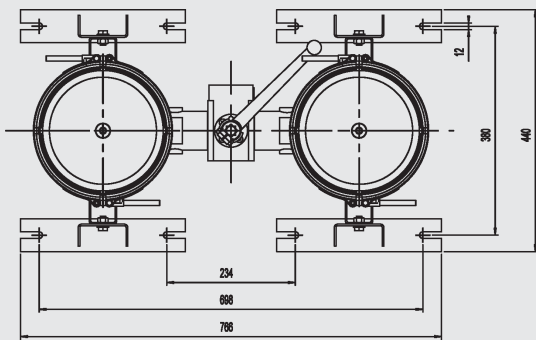
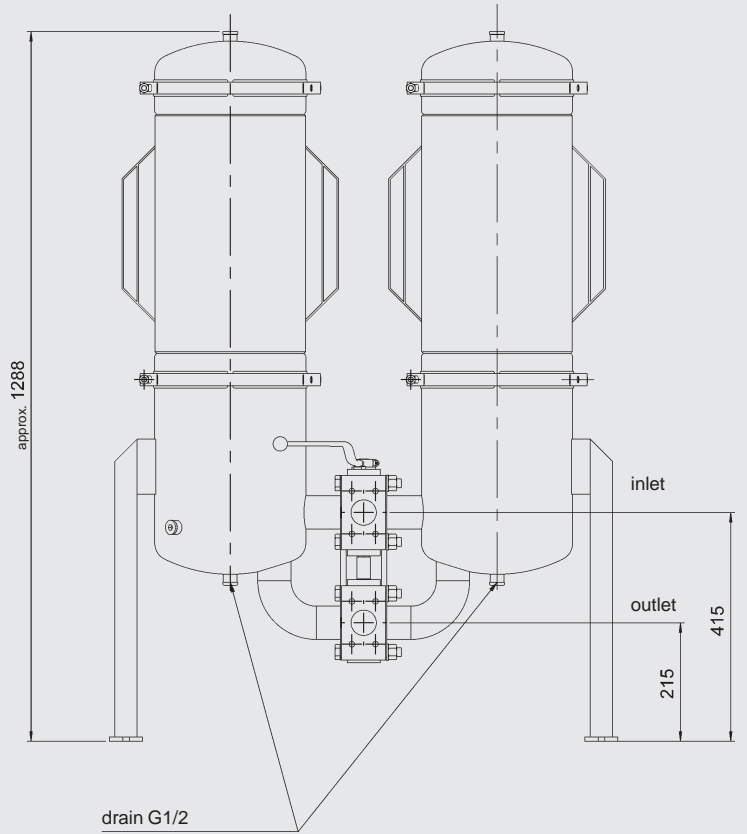
Length	A	Volume [l]
10"	332.5	2 x 1.1
20"	586.5	2 x 2.1
30"	816	2 x 3
40"	1094.5	2 x 4

- 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



PMRFD 3

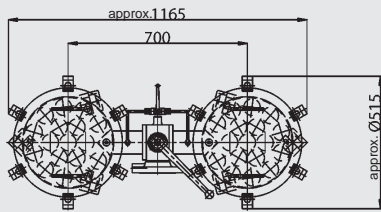
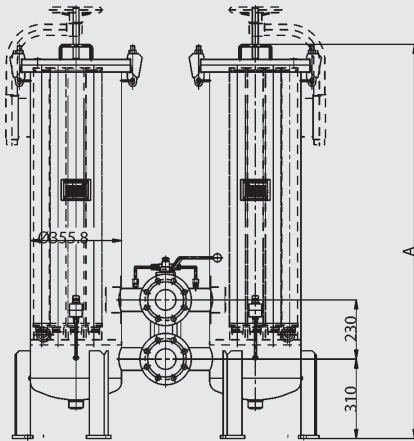


Length	A	Volume [l]
10"	975	2 x 17
20"	1215	2 x 26
30"	1433	2 x 35
40"	1682	2 x 45

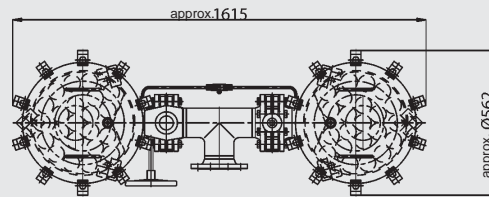
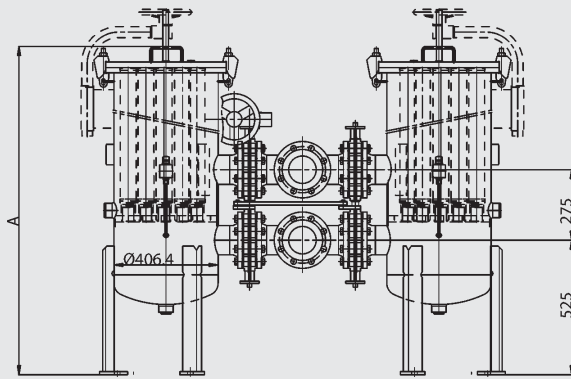
Length	A	Volume [l]
10"	798	2 x 20
20"	1066	2 x 40
30"	1323	2 x 50
40"	1578	2 x 65

- 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

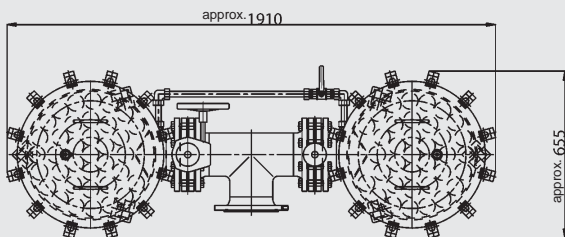
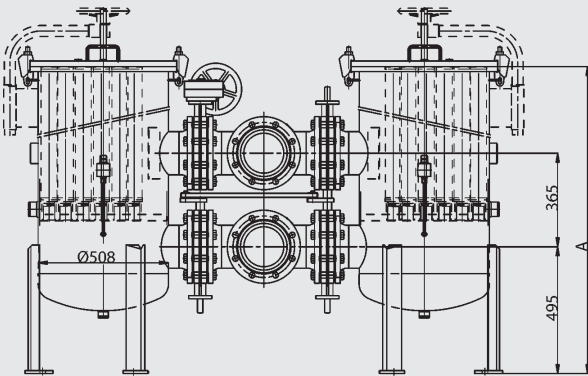
PMRFD 4



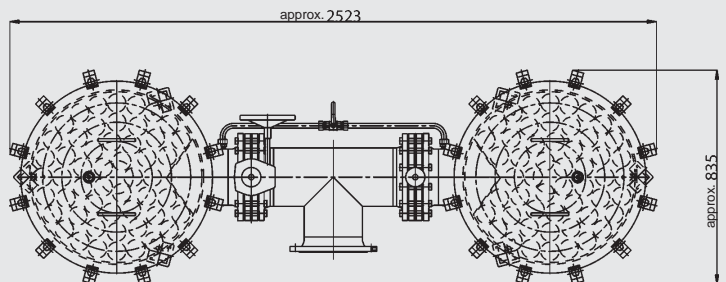
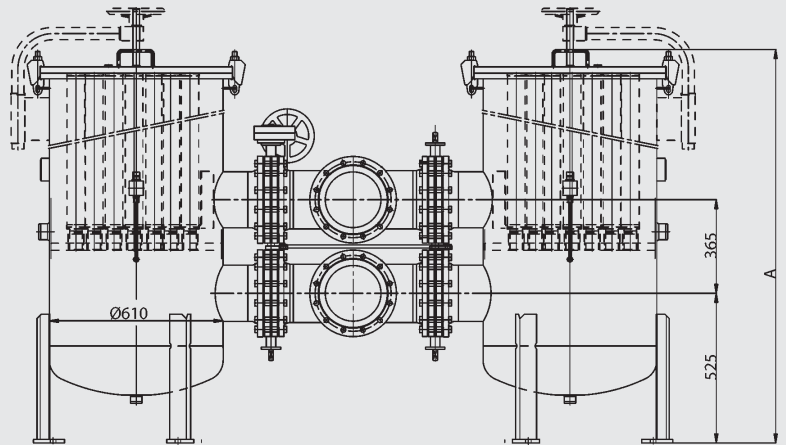
PMRFD 5



PMRFD 6



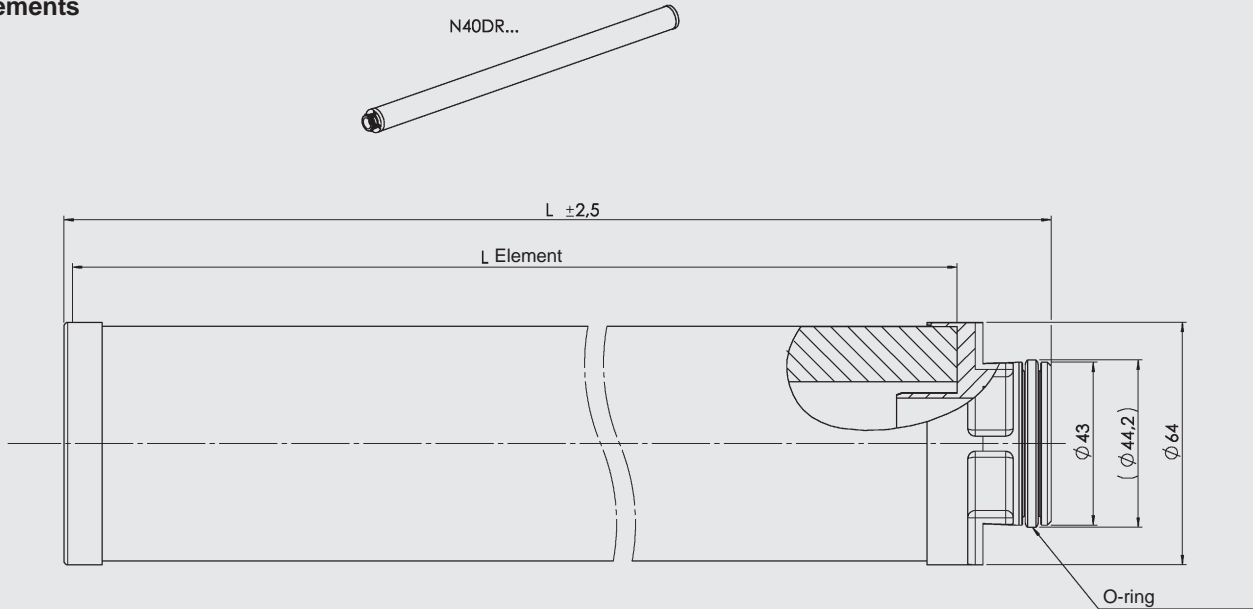
PMRFD 7



- 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

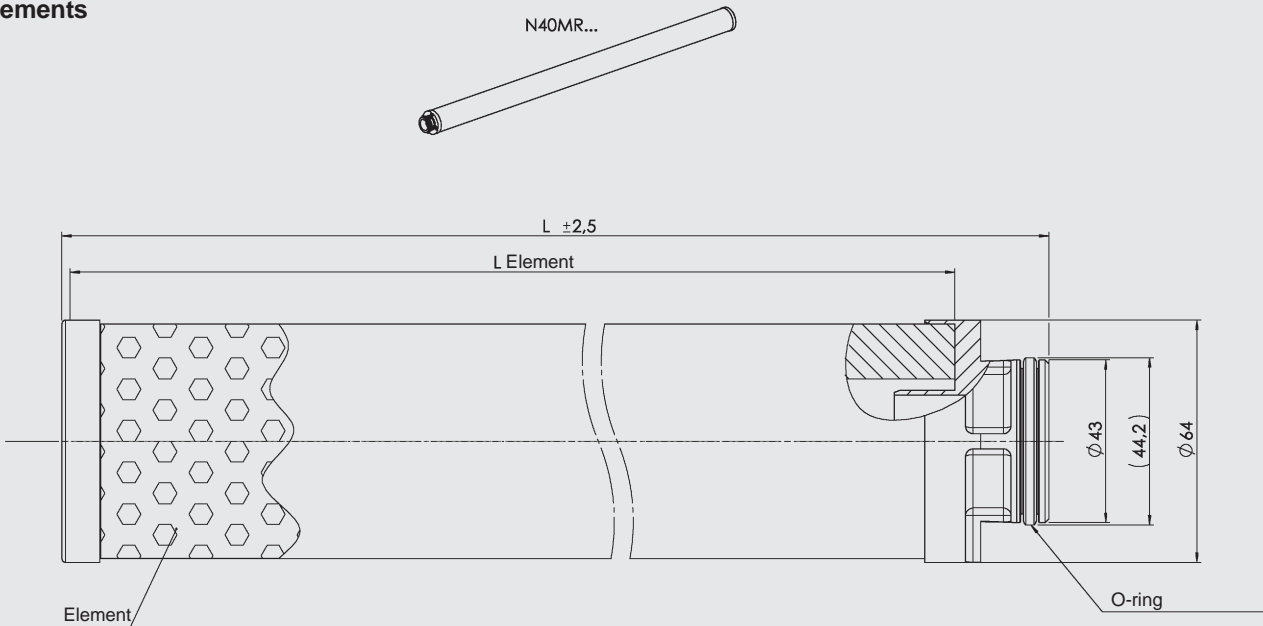
5.2 DIMENSIONS OF FILTER ELEMENTS

DR elements



Designation (nominal length in inches = L Element)	Length L in mm
N10DR...	281
N20DR...	535
N30DR...	789
N40DR...	1043

MR elements



Designation (nominal length in inches = L Element)	Length L in mm
N10MR...	281
N20MR...	535
N30MR...	789
N40MR...	1043

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.

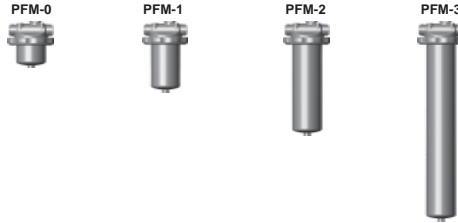
Subject to technical modifications.

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Process Filters Low, Medium, High Pressure PFL, PFM, PFH

up to 120 l/min, up to 100 bar



1. TECHNICAL SPECIFICATIONS

1.1 GENERAL

HYDAC stainless steel inline filters, type PFL, PFM and PFH are designed for use in industrial processing 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.

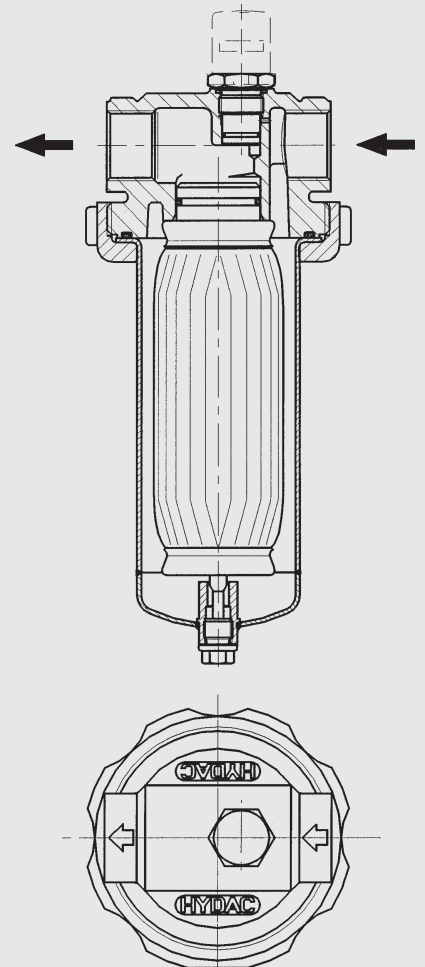
The direction of flow through the filter elements is from the outside to the inside. They can be cleaned several times, thereby saving the costs of disposal and re-purchase.

1.2 SUMMARY OF AVAILABLE SIZES AND CONNECTIONS

Series	Connection size	Pressure range
PFL	G 1	PN 10
PFM	G 1	PN 40
PFH	G 1	PN 100

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

1.3 SECTIONAL FUNCTION DRAWING



2. FILTER SPECIFICATIONS

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

Series	Size	Connection size	Materials		Max. operating pressure [bar]	Max. temperature [°C]	Weight [kg]	Volume [l]	
			Housing	Lock nut					
PFL	0	G 1	Stainless steel	Synthetic	PN 10	100	3.7	0.4	
	1						4.1	0.8	
	2						4.7	1.6	
	3						5.9	3.2	
PFM	0			Stainless steel	Stainless steel		PN 40	4.4	0.4
	1							4.9	0.8
	2							5.6	1.6
	3							6.8	3.2
PFH	0				Stainless steel		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 $p_{max} = 16$ bar
 PFH: max. 200 °C at $p_{max} = 75$ bar

2.2 FURTHER SPECIFICATIONS OF THE FILTER HOUSING (STANDARD CONFIGURATION)

2.2.1 Seal materials
 FPM (Viton)

2.2.2 Documentation
 Operating and maintenance instructions

2.3 SUMMARY OF TECHNICAL SPECIFICATIONS OF FILTER ELEMENTS

Size	Filter area [cm ²]		Filter materials and filtration ratings [µm]				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	25, 40, 60, 100, 150, 200, 250	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 PFL/PFM/PFH process filters. For technical details and prices, please contact our Technical Sales Department at Head Office.

2.4.1 Flange connections

Verschiedene Adaptionen des zylindrischen Rohrgewindes auf Flansche sind möglich:

- DIN
- ANSI
- JIS

This can be either 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 PFL, PFM and 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

3. MODEL CODE

3.1 FILTER HOUSING PFL/PFM/PFH

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

Filter type

- PFL (synthetic lock nut)
- PFM (stainless steel lock nut)
- PFH (stainless steel lock nut)
- PFLU **
- PFMU **
- PFHU **

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
VA (PVD 2 D.0/-L..)
- 6 = electrical clogging indicator
(PVD 2 C.0)

*)

Seal material

- V = FPM (Viton)
- T = FEP encapsulated
- Other seals on request

Modification number

- X = the latest version is always supplied

Supplementary details

Element code

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

** on request

3.3 FILTER ELEMENT

SZ - 1 - 20 - M - V

Type of element

Size

- 0
- 1
- 2
- 3

Filtration rating in µm

- 1; 3; 5; 10; 20 Chemicon® (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 = Chemicon® (metal fibre)
- MS = Chemicon® (metal fibre) with support spring
- D = wire mesh
- DS = wire mesh with support spring
- S = slotted tube

Seal material

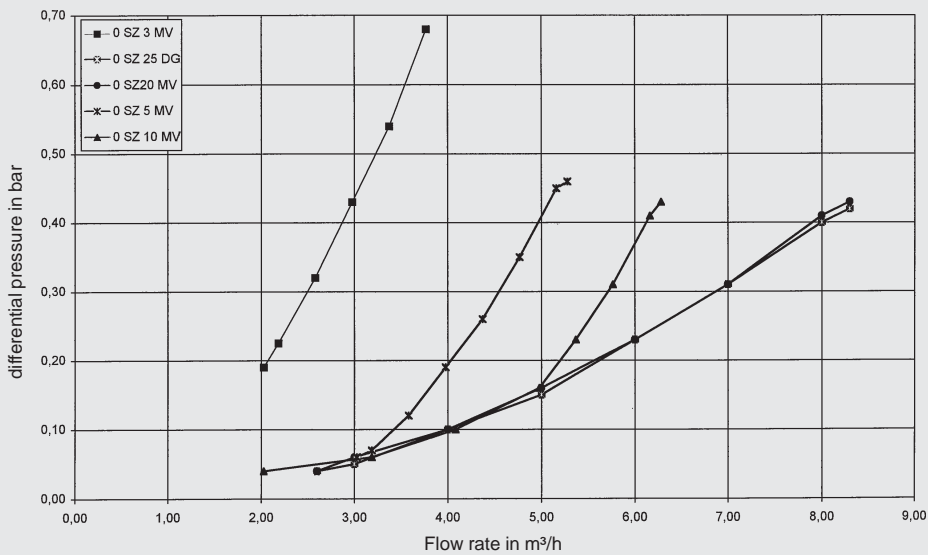
- V = FPM (Viton) O-ring
- T = FEP encapsulated O-ring
- Other seals on request

4. FILTER CALCULATION / SIZING

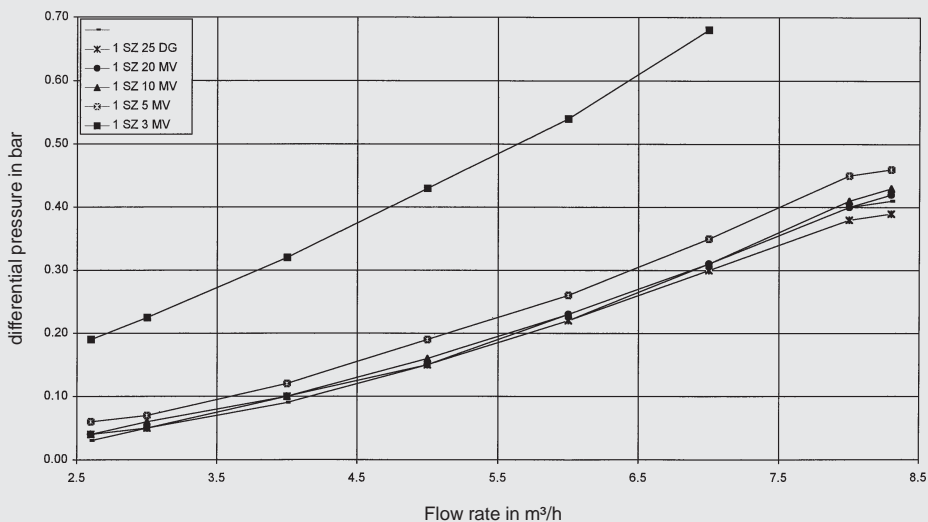
The curves apply to water at 20°C or fluids up to 15 mm²/s

4.1 PRESSURE DROP CURVES HOUSING

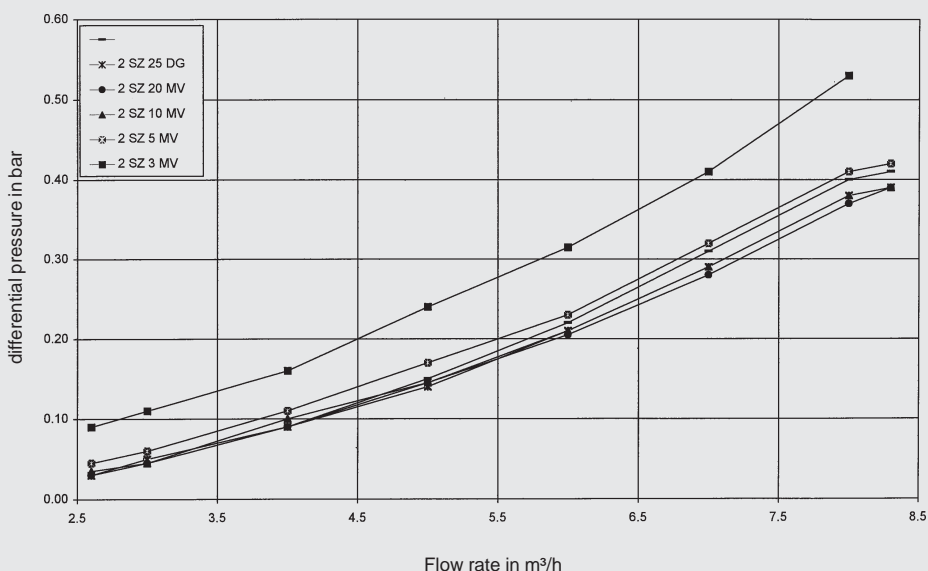
4.1.1 Pressure drop PFL/PFM/PFH Size 0



4.1.2 Pressure drop PFL/PFM/PFH Size 1



4.1.3 Pressure drop PFL/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 Process Inline Filters PFL, PFM and PFH. Generally speaking, an initial Δp (clean condition of the filter) of > 0.2 bar should not be exceeded.

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 tubes:

Nominal retention rates

The filtration ratings given in the model code for these qualities are 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):

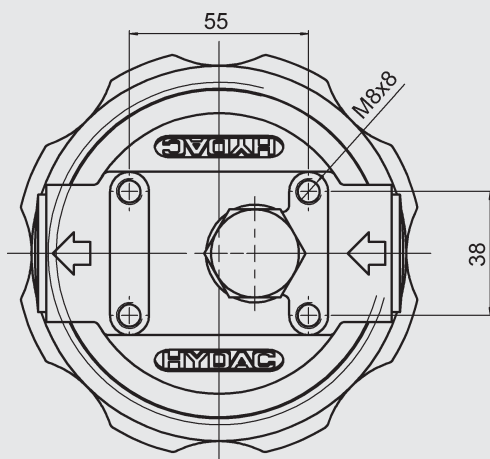
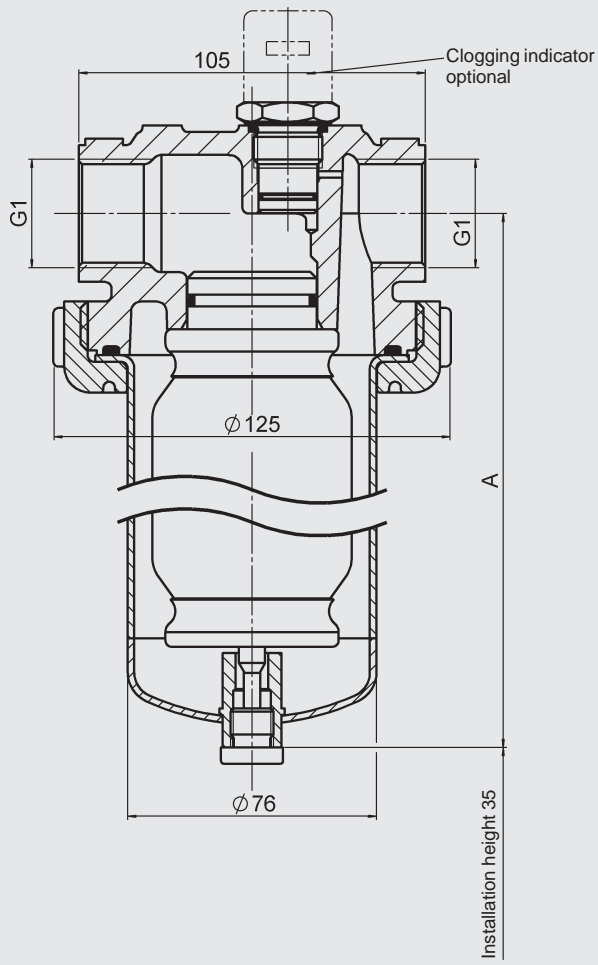
Absolute retention rate

The 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 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 ($\beta_x = 100$), which denotes absolute filtration.

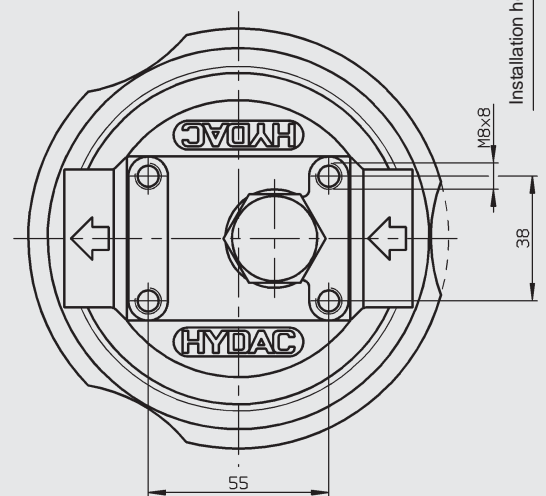
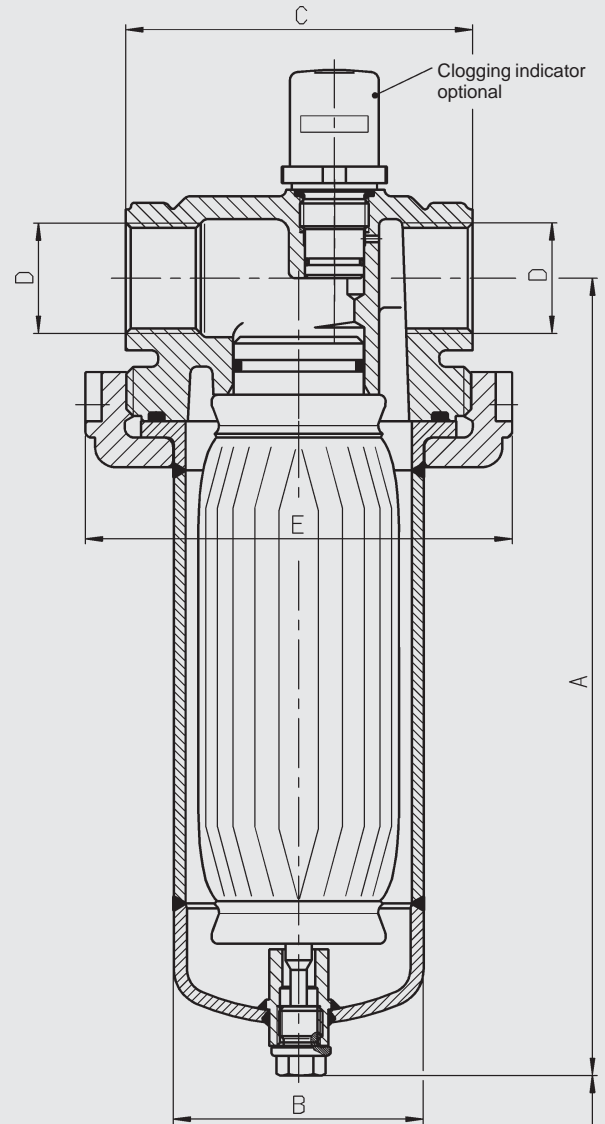
5. DIMENSIONS

5.1 SINGLE HOUSING PFL/PFM



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

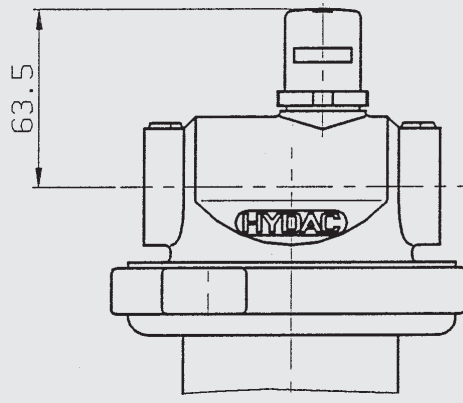
5.2 SINGLE HOUSING PFH



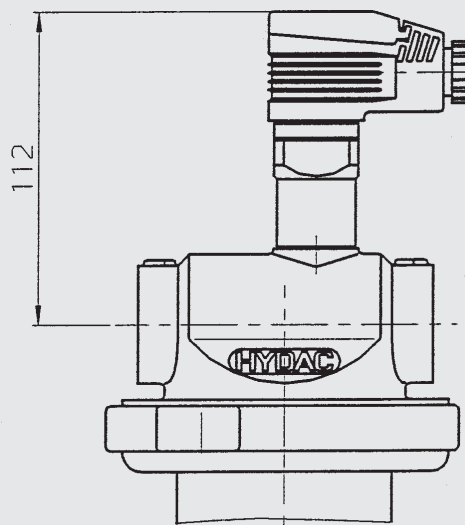
Size	A	B	C	D	E	F
0	146	76.1	106	G1	130	35
1	240	76.1	106	G1	130	35
2	400	76.1	106	G1	130	35
3	729.5	76.1	106	G1	130	35

5.3 CLOGGING INDICATORS

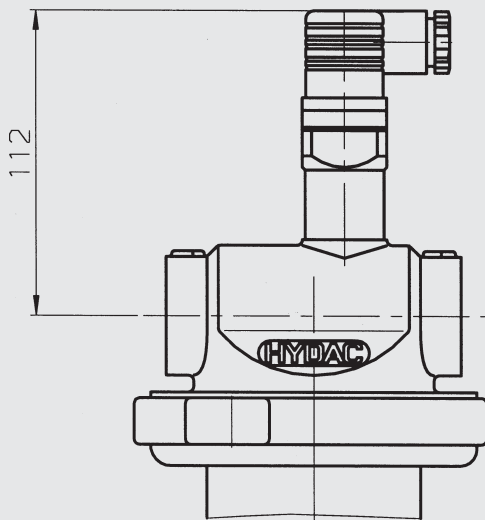
5.3.1 Visual clogging indicator



5.3.2 Visual electrical indicator

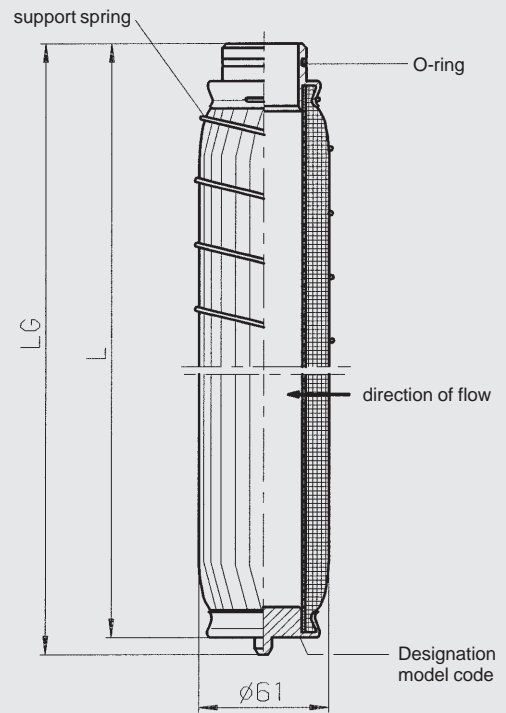


5.3.3 Electrical clogging indicator



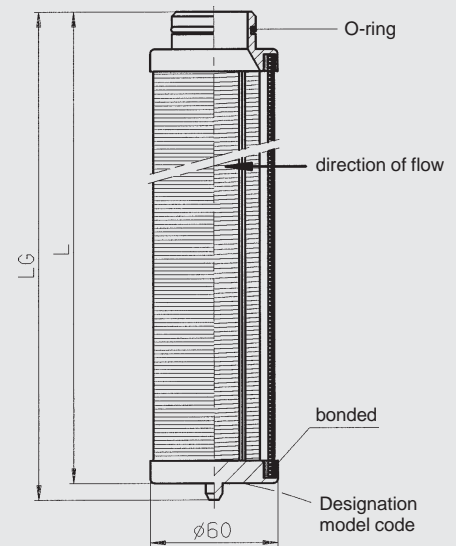
5.4 FILTER ELEMENTS

5.4.1 Wire mesh



Size	L	LG	O-ring size
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 size
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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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 5 different sizes, filter materials and sealing materials means that the filters can be adapted to a wide variety of 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 the filter can be used up to 200 °C. The max. permissible operating 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.

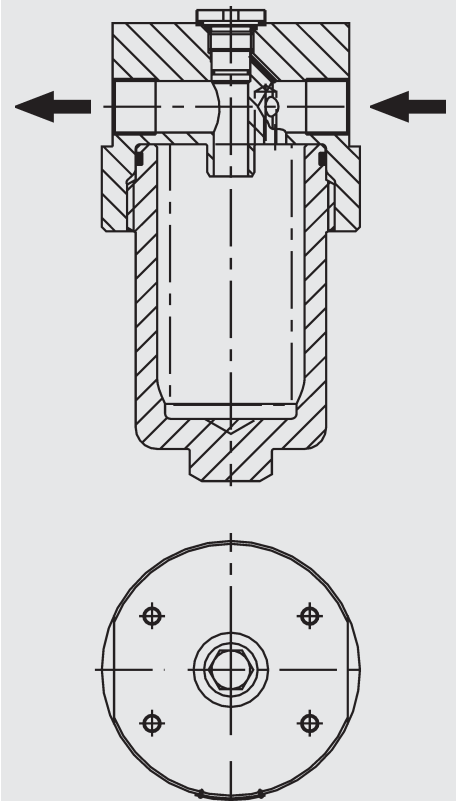
The filter elements can be cleaned several times, thereby saving the costs of disposal and re-purchase.

1.2 SUMMARY OF AVAILABLE SIZES AND CONNECTIONS

Connection size	Series				
	060	160	330	660	990
G ¾"	●				
G 1 ¼"		●			
G 1 ½"			●	●	●
G 2"			●	●	●
SAE 1 ½"			●	●	●
SAE 2"			●	●	●

The selection of connection size depends on the level of contamination in the fluid and on the corresponding filter area load.

1.3 SECTIONAL FUNCTION DRAWING



2. FILTER SPECIFICATIONS

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

Size	Connection size		Materials	Max. * operating pressure [bar]	Temperature		Weight [kg]	Volume [l]
	SAE	Pipe thread G			[°C]**			
060	–	¾"	Stainless steel 1.4571	400	FPM EPDM FEP Stainless steel	+200 +120 +200 +400	8.5	0.23
160	–	1 ¼"					14.5	0.69
330	1 ½" 2"	1 ½" 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

Two types of element are available for the stainless steel pressure filter EDF, one with radial sealing (EDFR) and one with axial sealing (EDFA):

- DR elements: suitable for EDFR
- DA elements: suitable for EDFA

In addition, filter elements from HYDAC Process Technology GmbH are available for the pressure filters of HYDAC Filtrertechnik (DF series)

- DH elements: suitable for DF Filters (HYDAC Filtrertechnik)

2.2.1 Filter elements DR and DA

Size	Filter area [cm²]	Type of filter element	Filter materials and filtration ratings [µm]			Permiss. Diff. pressure across element [bar]
			Betamicron® (glass fibre)	Chemicon® (metal fibre)	wire mesh	
060	430	DR / DA	3, 5, 10, 20	1, 3, 5, 10, 20	25, 40, 60, 100, 150, 200, 250	210
160	1230	DR / DA				
330	2100	DR / DA				
660	4410	DR / DA				
990	6350	DR / DA				

2.2.2 Filter elements DH

Size	Filter area [cm²]	Type of filter element	Filter materials and filtration ratings [µm]			Permiss. Diff. pressure across element [bar]
			Betamicron® (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				
500	3430	DH				
660	4515	DH				

2.3 FURTHER SPECIFICATIONS OF THE FILTER HOUSING (STANDARD CONFIGURATION)

2.3.1 Seal materials

- FPM (Viton) up to + 200°C
- EPDM up to +120°C
- FEP encapsulated up to + 200°C
- Stainless steel up to +400°C (only for EDFA with axial seal)

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
EDFA (on request)
EDFRU (on request)

Material of filter element

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../..)

Size

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)
For EFDA only:
E = stainless steel (max. + 400 °C)

Modification number

X = the latest version is always supplied

Supplementary details

Light voltage for visual-electrical
clogging indicator (L24 or L22)

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 filters (up to max. + 200°C)

Filtration rating in µm

1, 3, 5, 10, 20 (Chemicon®)
25, 40, 60, 100, 150, 200, 250 (wire mesh)

Material of filter element

M = Chemicon® (1,5 - 20 µm absolute)
D = wire mesh (25 - 250 µm nominal)

Seal material

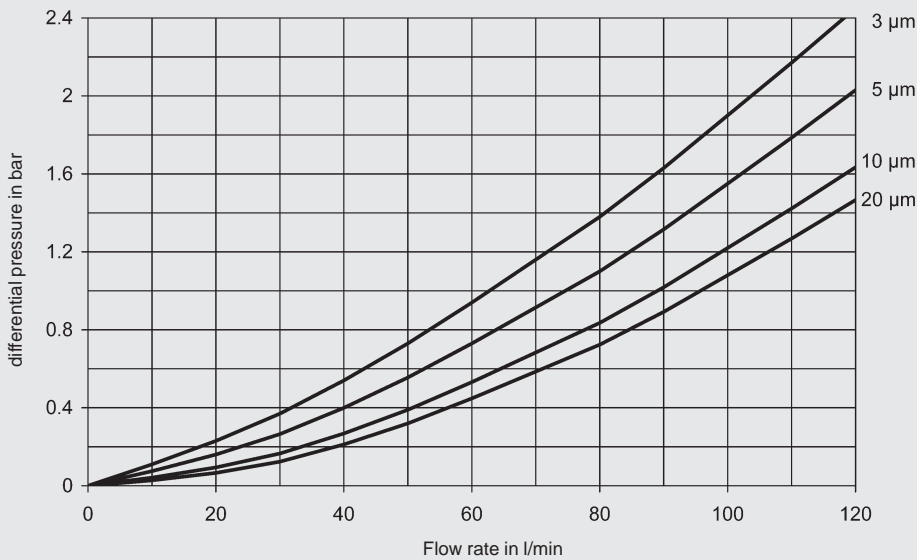
V = FPM (Viton)
E = EPDM
T = FEP encapsulated (Teflon)
E = stainless steel (DA only)
Other seals on request

4. FILTER CALCULATION / SIZING

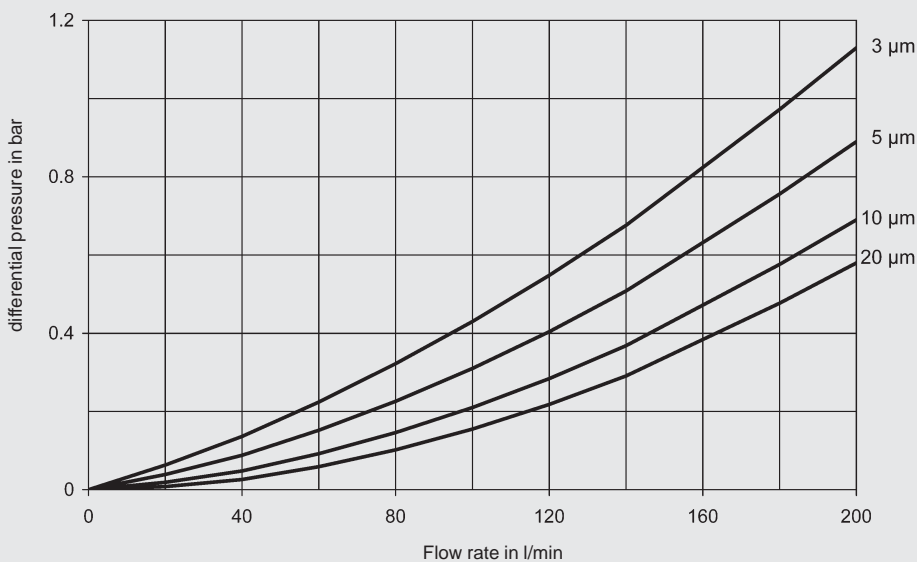
The curves apply to water at 20°C or other fluids up to 15 mm²/s viscosity

4.1 PRESSURE DROP CURVES

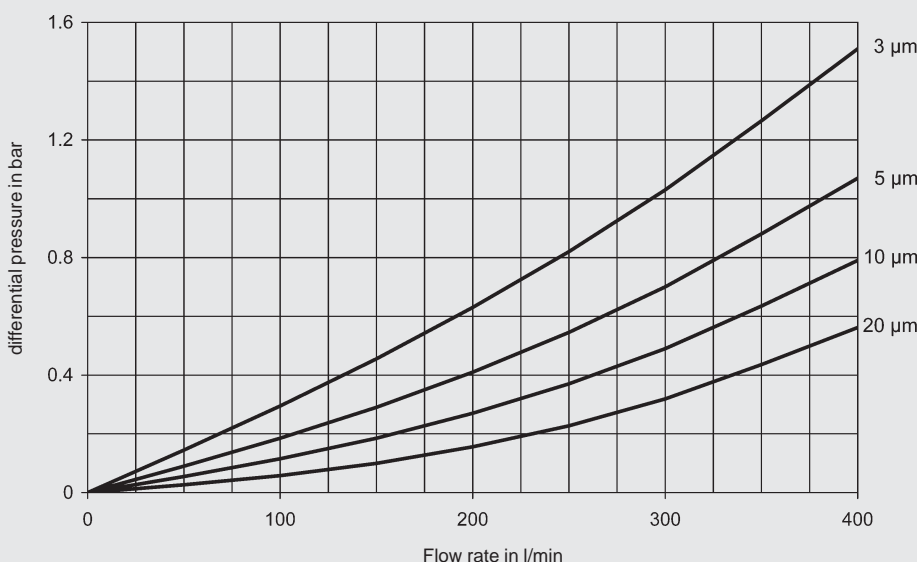
4.1.1 Curve for size 060



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 tubes:

Nominal retention rates

The filtration ratings given in the model code are 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):

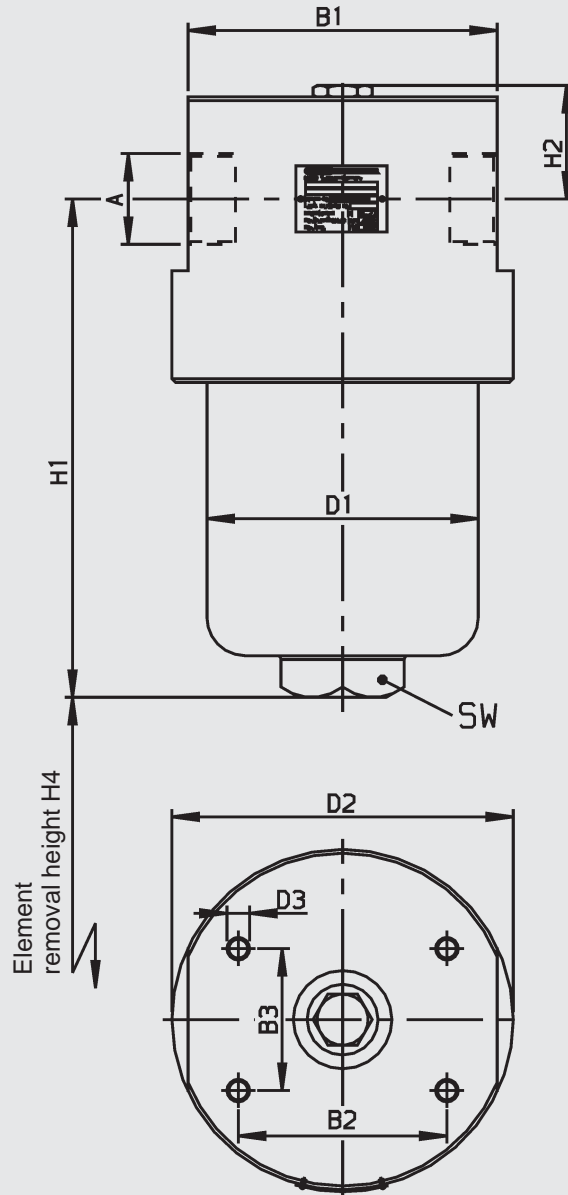
Absolute retention rate

The filtration rates 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 ($\beta_x = 100$), which denotes absolute filtration.

5. DIMENSIONS

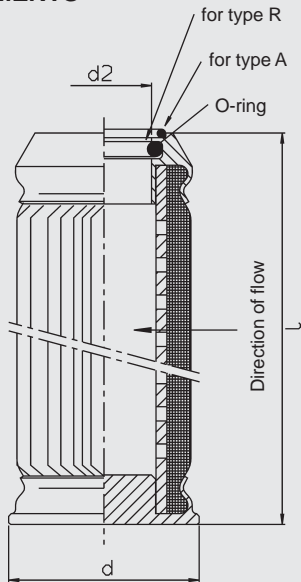
5.1 SINGLE HOUSING



Size	A	B1	B2	B3	D1	D2	D3	H1	H2	H4	SW
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

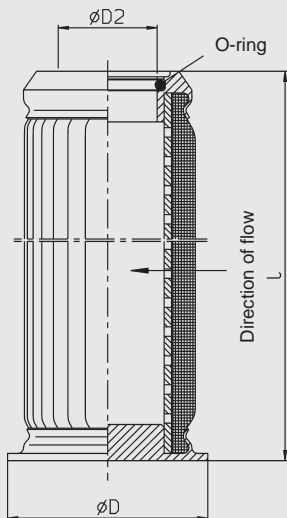
5.2 FILTER ELEMENTS

5.2.1 DR/DA



DA	DR	Nominal size	Area	L	d	d2	O-ring
	x	030	310	93.5	35	12.3	12.37 x 2.62
X	x	060	430	91	44.2	22.1	22 x 3.5
X	X	160	1230	129	60	34.1	34 x 3.5
X	X	330	2100	180	76.6	48.1	48 x 3
	X	660	4410	349	76.6	48.1	48 x 3
	X	990	6350	518	76.6	48.1	48 x 3

5.2.2 DH



Nominal size	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

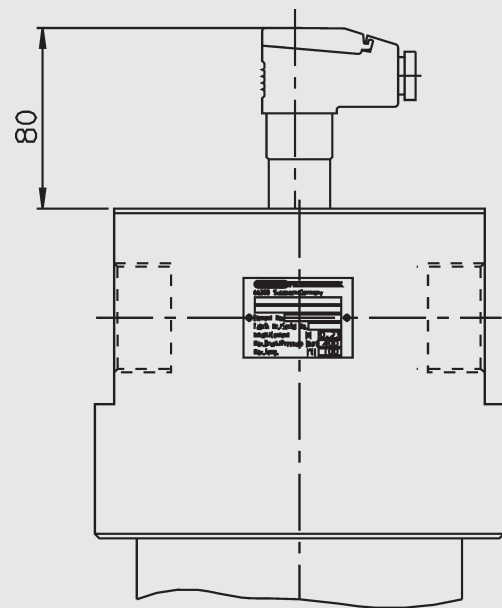
NOTE

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.

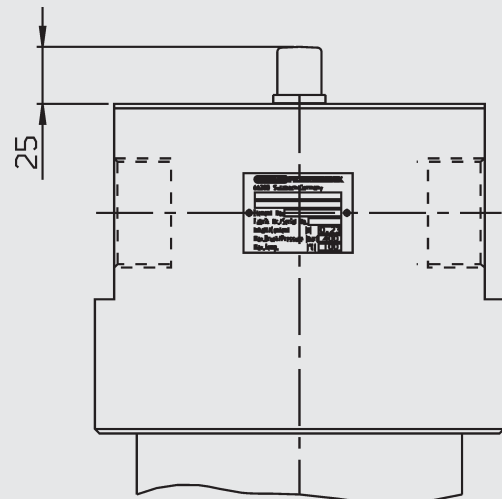
Subject to technical modifications.

5.3 CLOGGING INDICATORS

5.3.1 Visual electrical indicator



5.3.2 Visual clogging indicator



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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

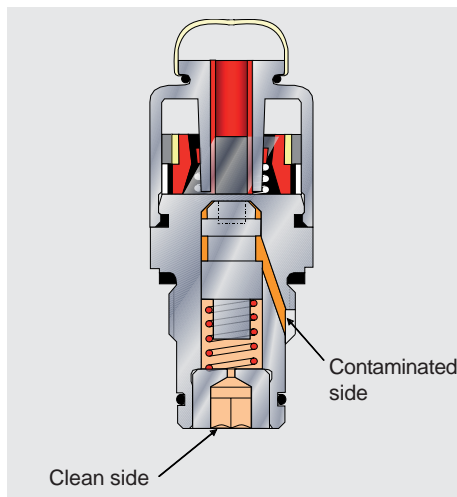
Differential pressure indicators are used on all process filters. They react to the pressure differential between the filter inlet and filter outlet which rises as the level of contamination in the element increases.

The simplest fitting of the differential pressure indicator:

G 1/2" cavity
(to 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 required clogging indicator for your filter.

Type	Filter types				
	PRFL PRFLD	PRFS PRFSD	PFL 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

Pressure setting

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 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


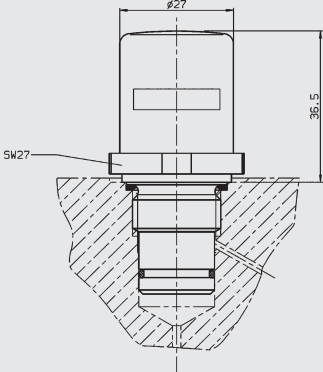
Differential pressure gauge DS11 electrical

Indication range:	0 - 1.6 bar
Permissible operating pressure:	25 bar
Pressure chamber in aluminium:	order number 639311
Pressure chamber in stainless steel:	order number 639586


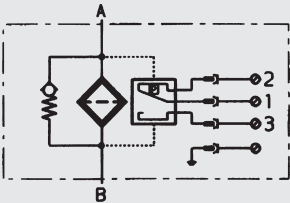
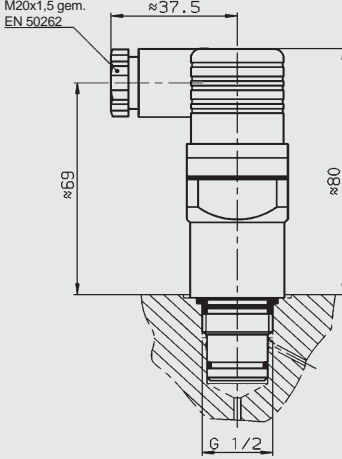
Other models on request

4. SPECIFICATIONS

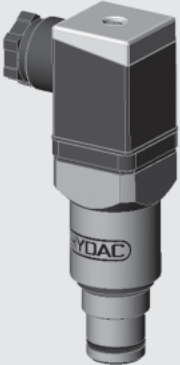
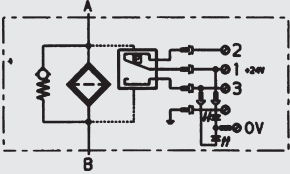
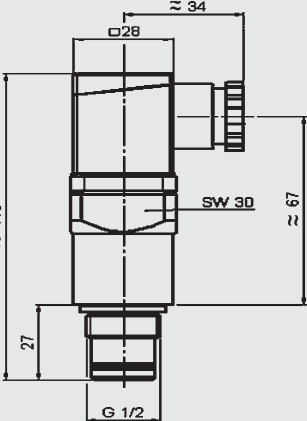
PVD x B.x

	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	
	Connection thread	G ½	
	Max. torque value	100 Nm	
	Switching type	–	
	Max. switching voltage	–	
	Electrical connection	–	
	Max. switching output at resistive load	–	
	Switching capacity	–	
	Prot. class to DIN 40050	–	
	Order example	PVD 2 B.1	


PVD x C.x

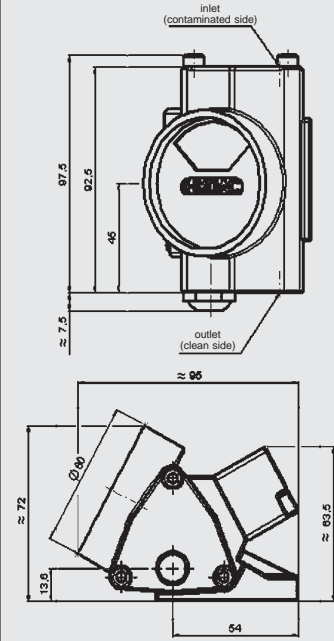
 	Type of indication	Electrical switch	
	Weight	220 g	
	Cracking pressure or indication range	1 bar ± 10% 3 bar ± 10% 1.5 bar ± 10% 5 bar ± 10% 2 bar ± 10% 8 bar ± 10%	
	Perm. operating pressure	420 bar	
	Perm. temperature range	-20 °C to +100 °C	
	Connection thread	G ½	
	Max. torque value	100 Nm	
	Switching type	N/C or N/O (change-over contacts)	
	Max. switching voltage	230 V	
	Electrical connection	Male connection M20x1.5 to EN 50262 Female connector to DIN 43650	
	Max. switching output 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 ~	
	Prot. class to DIN 40050	IP 65 (only if the connector is wired and fitted correctly)	
	Order example	PVD 5 C.0	

PVD x D.x /-L...

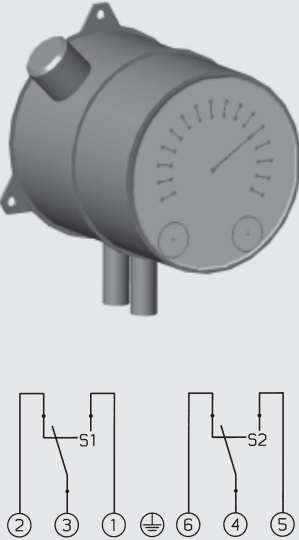
 	Type of indication	Visual indicator and electrical switch	
	Weight	250 g	
	Cracking pressure or indication range	1 bar ± 10% 3 bar ± 10% 1.5 bar ± 10% 5 bar ± 10% 2 bar ± 10% 8 bar ± 10%	
	Perm. operating pressure	420 bar	
	Perm. temperature range	-20 °C to +100 °C	
	Connection thread	G ½	
	Max. torque value	100 Nm	
	Switching type	N/C or N/O (change-over contacts)	
	Max. switching voltage	24, 48, 110, 230V depending on the light insert	
	Electrical connection	Male connection M20x1.5 to EN 50262 Female connector to DIN 43650	
	Max. switching output 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 ~	
	Prot. class to DIN 40050	IP 65 (only if the connector is wired and fitted correctly)	
	Order example	PVD 2 D.0 /-L24	

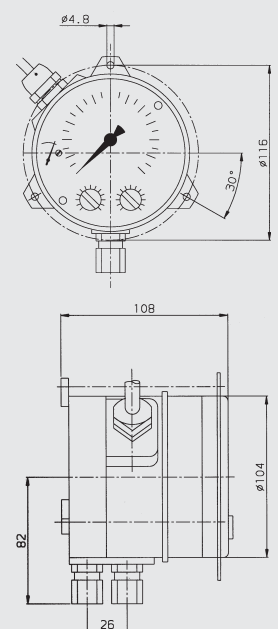
V01 x VZ.x

	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	
	Connection 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 to EN 50262	
	Max. switching output 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 max. 250 V ~	
	Prot. class to DIN 40050	IP 55	
	Order example	V01 2 VZ.0	



Differenzdruckmanometer 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	-20 °C to +100 °C	
	Connection 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 output at resistive load	I _{max} = 5 A, I _{max} = 0.4 A,	P _{max.} = 250VA P _{max.} = 10 W
Switching capacity	-		
Prot. class to DIN 40050	IP 55		
Order example	Pressure chamber in aluminium: 639311 Pressure chamber in stainless steel: 639586		



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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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 (Chemicron® metal fibre and wire mesh), or a combination of these, are used for the filtration process.

Chemicron® 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%.



Chemicron® metal fibre

NOTE

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Subject to technical modifications.

3. APPLICATION

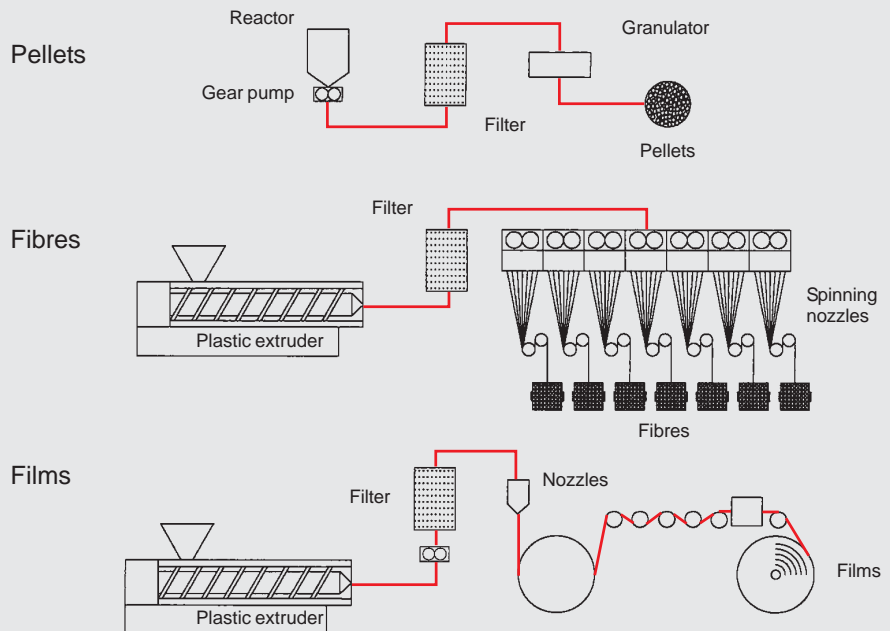
A specialist area of fluid filtration is in the production and processing of plastics.

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 / filter disks with Chemicron® (metal fibre), in filtration ratings of 1 and 75 µm absolute has proved 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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HYDAC INTERNATIONAL

Filter Questionnaire

How can we contact you?

Please fill in your contact details:

Company:	_____	Telephone / Fax:	_____
Name:	_____	Mobile:	_____
Address:	_____	Email:	_____

Please give us the most accurate description possible of the application, so that we can provide you with the best solution for your filtration project.

Description of application: (if necessary, enclose sketches) _____

Medium	_____	Flow rate	_____	m ³ /h
Operating pressure	_____	bar	Design pressure	_____
Operating temperature*	_____	°C	Design temperature	_____
Filtration rating	_____	µm	Viscosity	_____
Fluid group (PED 97/23/EC)	Group 1 (hazardous) <input type="checkbox"/>		Group 2 (non-hazardous) <input type="checkbox"/>	
Safety data sheet / CAS Nr.:	_____	(only if applicable)		

Required filter types	Single filter <input type="checkbox"/>	Duplex filter <input type="checkbox"/>	Automatic filter <input type="checkbox"/>
Material of filter elements	Disposable <input type="checkbox"/>	Re-usable <input type="checkbox"/>	
Clogging indicator**	Visual <input type="checkbox"/>	Visual-electrical <input type="checkbox"/>	Electrical <input type="checkbox"/>

Required materials _____

Type of contamination _____

Contamination content _____ mg/l

Electrical voltage _____

Compressed air*** Yes No if yes, please indicate: _____ bar

Connection size Inlet/Outlet _____

Required Approvals/Certificates _____

Quantity _____

* If the maximum operating temperature of the fluid exceeds its boiling point, please contact Head Office

** Not required when using an automatic back-flushing filter

*** This information only required when using an automatic back-flushing filter

ATEX Check List

Customer: _____

Project: _____

Which product is to be used? _____

PRODUCT 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 (Staub) (Zone 20)	G (Gas) (Zone 1)	D (Staub) (Zone 21)	G (Gas) (Zone 2)	D (Staub) (Zone 22)
For equipment with a very high safety level . Continued operation under occasional malfunction.	For equipment with a high safety level . 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.2.0.1or 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

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.

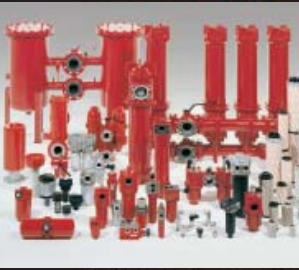
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