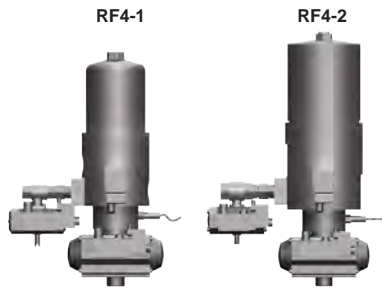


Automatic back-flushing filter AutoFilt® RF4



| Specifications | |
|---------------------|--------------|
| Nominal size: | G1" – G 1½" |
| Q _{max} : | 220 l/min |
| p _{max} : | 16 bar |
| Filtration ratings: | 30 – 1000 µm |

1. GENERAL

Product description

- Self-cleaning automatic filter
- Separation of solid particles from low viscosity fluids
- Available as a fully automatic or manual filter variant

Filter element technology

- Conical filter elements
- Wedge wire: 30 to 1000 µm
- SuperMesh wire mesh, sintered: 25 to 60 µm

Product advantages

- Fully automatic function
- Compact design
- Continuous flow of filtrate even during back-flushing
- Maximum utilisation of the filter area
- Full filtration performance after back-flushing
- Ready-to-operate unit
- Low maintenance costs
- Low operating costs

Technical data – standard models

| Size ¹⁾ | Pressure range [bar] | Connection Inlet / outlet | Connection, back-flush line | Weight ²⁾ [kg] | Volume [l] | No. of filter elements | Filter area [cm ²] | Back-flush volume [l] ³⁾ |
|--------------------|----------------------|---------------------------|-----------------------------|---------------------------|------------|------------------------|--------------------------------|-------------------------------------|
| RF4-1 | 6 | G1" | G ½" | 13 | 2.5 | 4 x KM | 548 | 4 |
| RF4-1 | 16 | G1" | G ½" | 15 | 2.5 | 4 x KM | 548 | 4 |
| RF4-2 | 6 | G1 ½" | G ¾" | 32 | 3.7 | 4 x KN | 1420 | 13 |
| RF4-2 | 16 | G1 ½" | G ¾" | 63 | 3.7 | 4 x KN | 1420 | 13 |

Legend

¹⁾ T_{s max} for all AutoFilt® RF4: 80°C

²⁾ Refers to EPT version

³⁾ Back-flush volume with a valve opening time of 1.5 seconds with a pressure difference of 1.5 bar between the filtrate line and the back-flush line

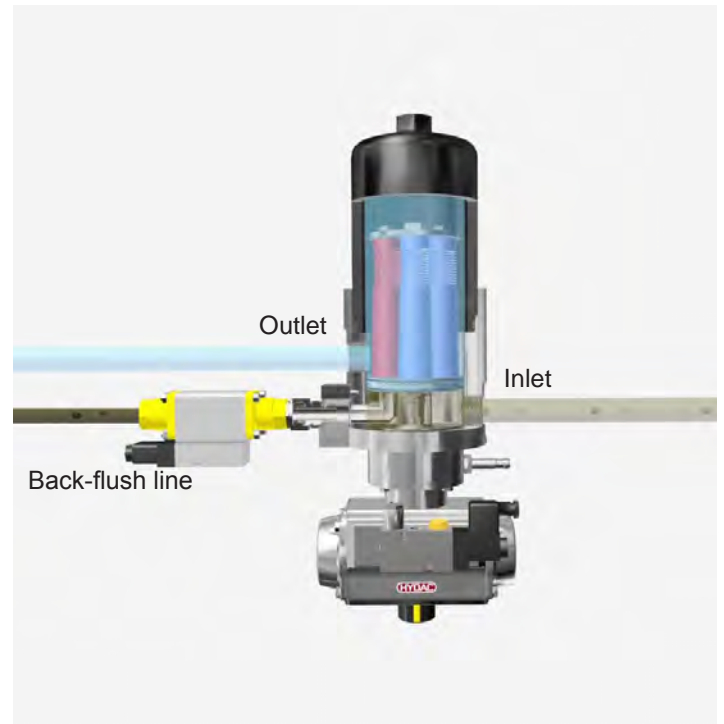
2. FUNCTION

FILTRATION

- The fluid to be filtered flows through the filter elements of the back-flushing filter, passing from the inside to the outside
- During this process, the particles deposit on the smooth inside of the filter element surface
- As the level of contamination increases, the differential pressure between the dirty and the clean side of the filter increases
- When the pressure drop reaches the pre-set differential pressure trigger point, back-flushing starts automatically

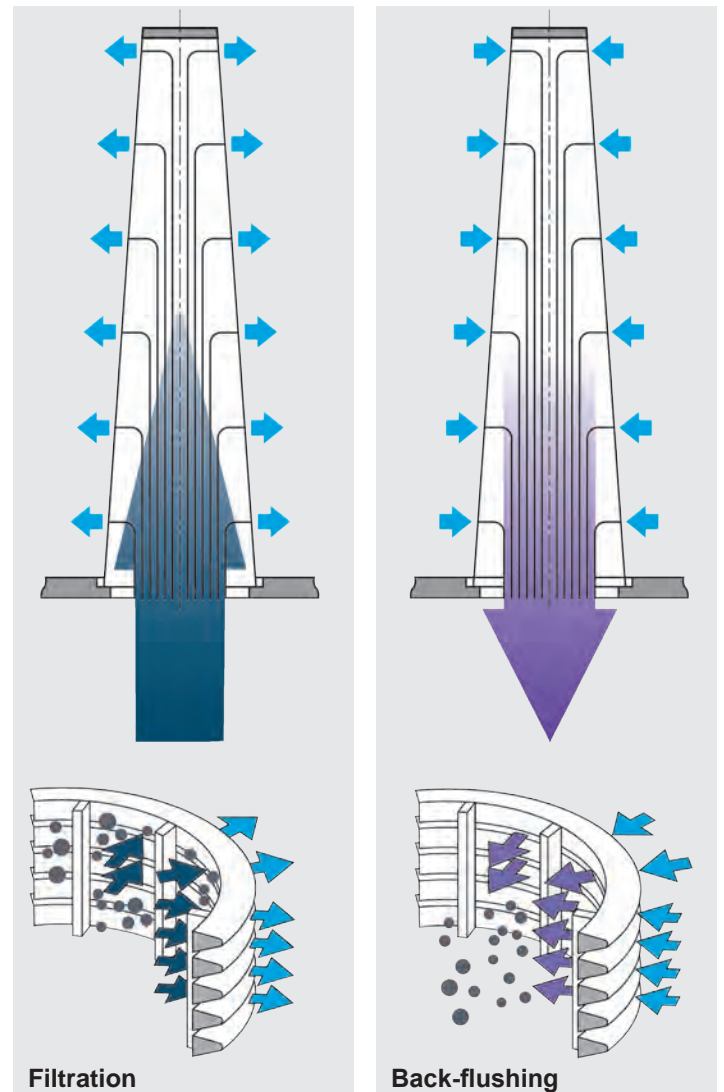
TRIGGERING BACK-FLUSHING

- Automatic: automatic back-flushing is triggered when the pre-set differential pressure trigger point is exceeded
- Manual: when the visual clogging indicator is triggered



BACK-FLUSHING OF THE FILTER ELEMENTS – BACK-FLUSHING CYCLE

- The rotary drive rotates the filter element mounting plate, along with the filter elements, into position so that a clogged filter element is located above a flush opening
- The back-flushing valve is opened
- The pressure drop between the filtrate side and the back-flush line flushes a small amount of the filtrate back through the filter element to be cleaned
- The contaminant particles deposited on the inside of the filter elements are loosened and flushed into the back-flush line via the flushing arm
- Once the “back-flush time per filter element” has elapsed, the back-flushing valve is closed
- In this way, all the filter elements are back-flushed, one after the other
- A back-flushing cycle is complete once all the filter elements have been cleaned
- In the AutoFilt® RF4 with manual back-flushing, the filter element mounting plate is turned along with the filter elements, and the back-flushing valve is opened manually
- The flow of filtrate is not interrupted during back-flushing



3. SPECIAL FEATURES

FILTER ELEMENT TECHNOLOGY

Conical filter elements

Robust wedge wire or SuperMesh filter elements made from stainless steel are used in the HYDAC AutoFilt® RF4 automatic back-flushing filter. The conical shape of the filter elements provides maximum efficiency during filtration and optimum effectiveness during back-flushing.

SuperFlush non-stick coating

For waste-water treatment applications, the filter elements can also be given a special non-stick coating (SuperFlush).

Advantages of the SuperFlush coating:

- Unique coating technology
- Available for conical filter elements
- Prevents particle build-up on the filter element surface
- Gel-like particles do not adhere to the filter element surface
- Reduces biofouling
- Increases the service life
- Increases effectiveness

ISOKINETIC FILTRATION AND BACK-FLUSHING

The conical shape and alignment of the filter elements allow uniform flow, resulting in a low pressure drop and effective cleaning of the filter elements.

Advantages:

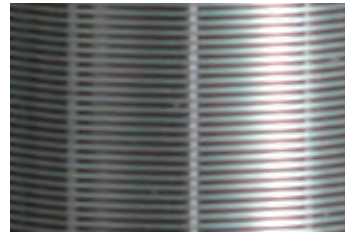
- Fewer back-flushing cycles
- Lower back-flushing losses

PULSE-AIDED BACK-FLUSHING

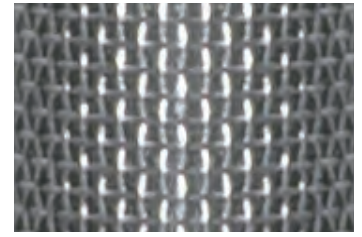
In the EPT control types, the filter element to be back-flushed remains in the flushing position for only a few seconds. Rapid opening of the back-flushing valve generates a pressure surge in the filter element openings, providing an additional cleaning effect to the back-flushing process.

SMALL BACK-FLUSH VOLUMES DUE TO CYCLIC CONTROL

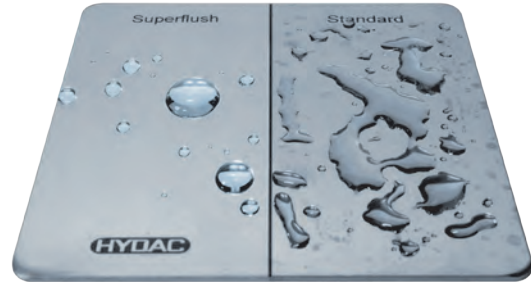
In the EPT control types, the back-flushing valve opens and closes during back-flushing of each filter element.



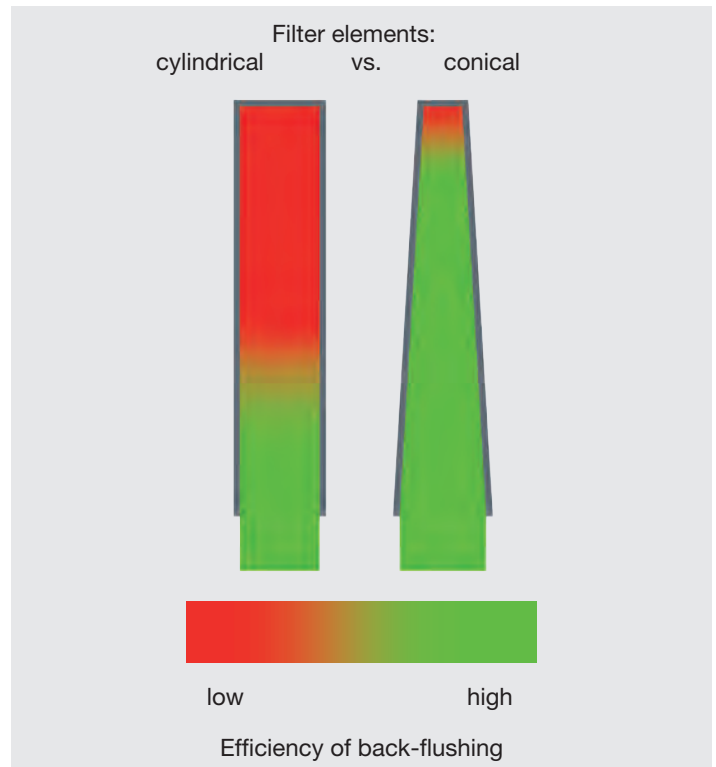
Wedge wire



SuperMesh – Wire mesh, sintered, with or without support structure



With | Without SuperFlush
Non-stick coating for filter elements



4. FILTER CALCULATION*

CHECKLIST, FILTER CALCULATION

Step 1: Checking the prerequisites

- The determining factor for operating the AutoFilt® RF4 is the presence of a pressure difference of at least 1.5 bar** between the filter outlet and the back-flush line
- This minimum pressure difference is vital for the filter operation
- Application data is determined using filter questionnaires
- The flow velocity of 4 m/s at the filter inlet should not be exceeded
- The maximum permitted operating temperature for every AutoFilt® RF4 is 80°C
- The flow must not drop below the minimum flow rate of 40 l/min

Step 2: Filter sizing

- Determined on the basis of the pressure drop curves and, specially for cooling lubricant emulsion applications, on the basis of the calculation table
- The initial pressure difference (Δp) when the filter is in a clean condition must not exceed 0.2 bar
- The pressure drop curve applies to filtration ratings of 100 to 1000 μm wedge wire and to 25 μm / 40 μm and 60 μm SuperMesh filter elements
- The flow velocity of 4 m/s at the filter inlet should not be exceeded

Step 3: Calculation tables

The calculation tables form an important decision-making basis for selection of the AutoFilt® RF4.

- In particular, the higher contamination load in the cooling lubricant emulsion applications requires that the filter be calculated more generously
- Validity of the tables for emulsions and oils up to a viscosity of 15 mm²/s

** For diverse cooling lubricant applications, the filtrate pressure must be adjusted to suit the particular application.

* Please contact our Head Office if you have any queries regarding the filter calculation

CALCULATION TABLES

WATER APPLICATIONS

| Fluid | Filter size / max. flow rate [l/min] | |
|-------|--------------------------------------|-------|
| | RF4-1 | RF4-2 |
| Water | 120 | 220 |

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

COOLING LUBRICANT EMULSIONS

Applications only following consultation with our Head Office

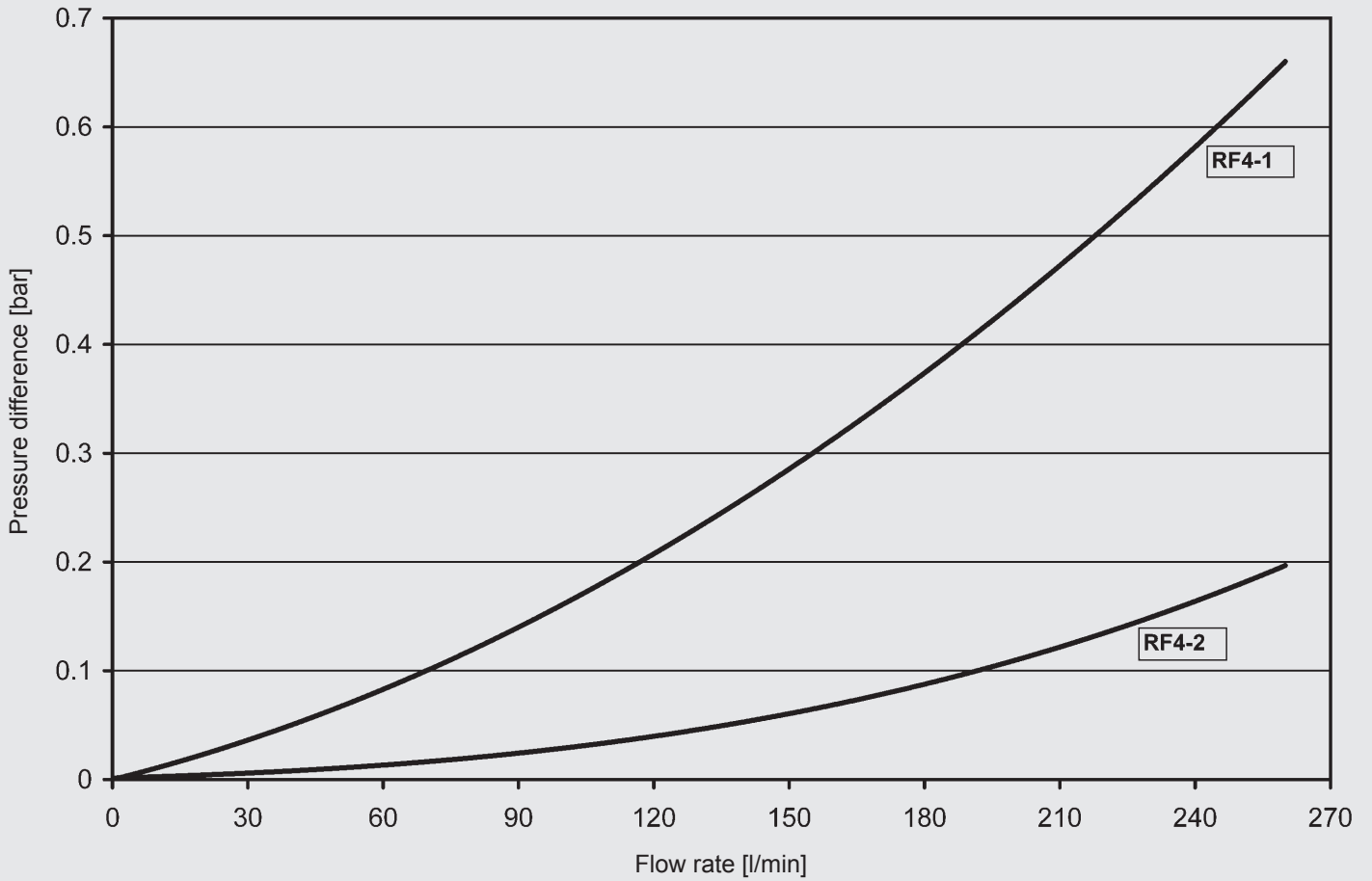
| Conditions for correct performance in standard areas of application | |
|---|------------------------|
| Filtration rating | $\geq 100 \mu\text{m}$ |
| Pre-filtration | $< 1000 \mu\text{m}$ |
| Contamination content | $< 120 \text{ mg/l}$ |
| Viscosity | $< 15 \text{ cSt}$ |

| Fluid | Type of contamination | Machining | Max. flow rate [l/min] | |
|----------|-----------------------|--|------------------------|-------|
| | | | RF4-1 | RF4-2 |
| Emulsion | Aluminium | <ul style="list-style-type: none"> • Milling • Boring • Turning | 100 | 220 |
| | Cast iron | | 70 | 180 |
| | Carbon steel | | 80 | 200 |
| | Stainless steel | | 80 | 200 |

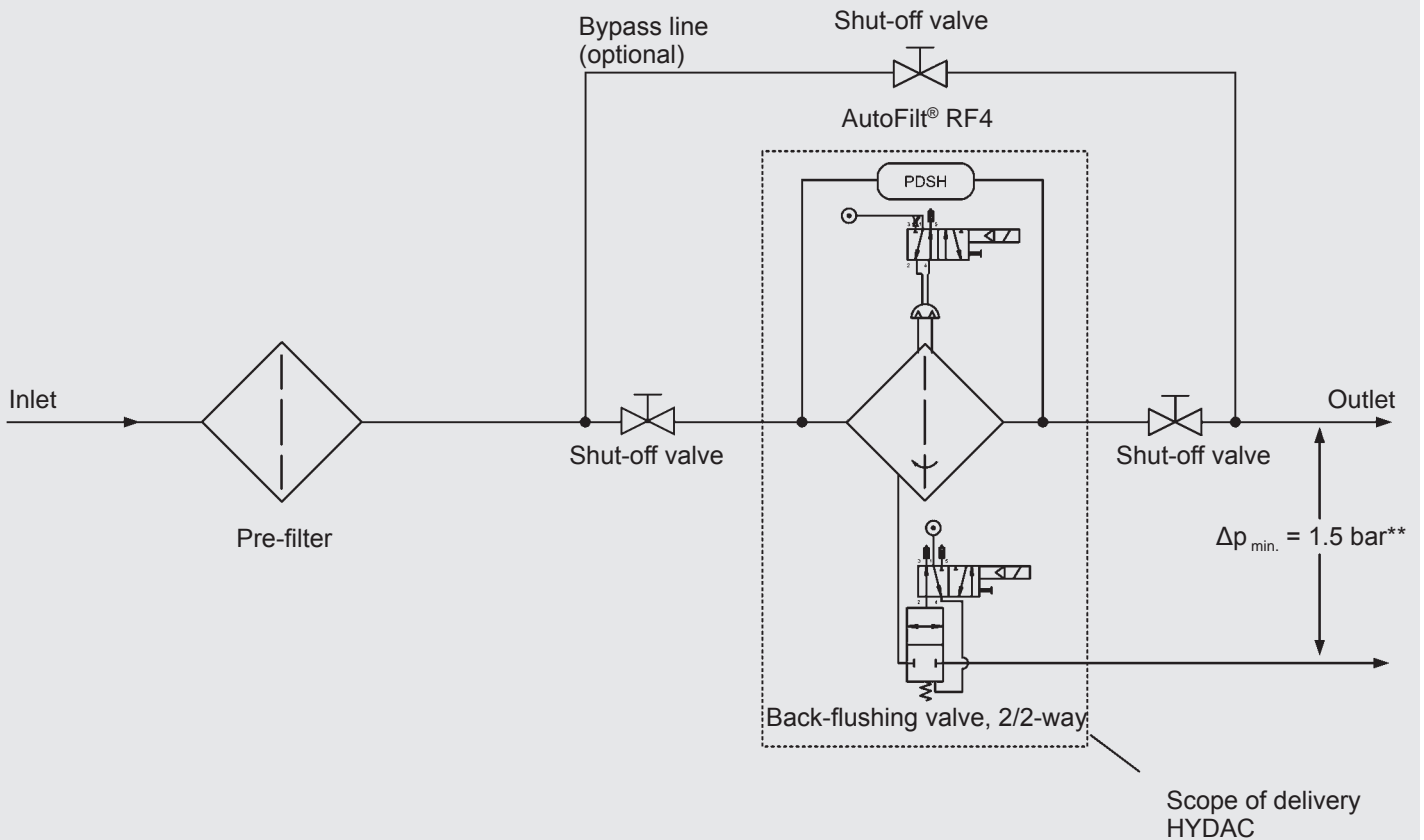
- The flow rate ranges indicated apply to filtration ratings $\geq 100 \mu\text{m}$ and a maximum contamination content of 120 mg/l
- Validity of the tables for emulsions and oils up to a viscosity of 15 mm²/s
- Our Head Office must be consulted for applications involving compacted graphite iron, grinding, honing and fluids with a viscosity greater than 15 mm²/s

PRESSURE DROP CURVES

The pressure drop curves apply to water and fluids with a similar viscosity



CIRCUIT DIAGRAM



** For diverse cooling lubricant applications, the filtrate pressure must be adjusted to suit the particular application.

5. FILTER CONFIGURATION*

| | Standard | Optional |
|----------------------------------|--|---|
| Types of control | <ul style="list-style-type: none"> • EPT: electro-pneumatic cyclic control • ET: electrical cyclic control (electrical only) • M: manual | Customised special solutions |
| Connection voltages | <ul style="list-style-type: none"> • 230 V AC main voltage • 230 V AC or 24 V DC control voltage • For ET control variants only: control voltage 24 V DC, drive 3 x 400 V / N / PE, 50 Hz | Special voltages |
| Electrical protection classes | IP65 | |
| Housing materials (combinations) | <ul style="list-style-type: none"> • Aluminium, anodised • Stainless steel: 1.4571 or similar (Group 316) • Carbon steel, nickel-plated | |
| Material of internal parts | <ul style="list-style-type: none"> • Stainless steel: 1.4301 or similar (Group 304) | |
| Back-flushing valve | <ul style="list-style-type: none"> • Coaxial valve • Stainless steel ball valve • Ball valve, brass, nickel-plated | |
| Filter elements | <p>SuperMesh filter elements:</p> <ul style="list-style-type: none"> • SuperMesh wire mesh, sintered, with or without support structure: 1.4401 or similar (Group 316) • Nominal filtration rating: 30 – 60 µm <p>Wedge wire:</p> <ul style="list-style-type: none"> • Robust wedge wire • Stainless steel: 1.4435 or similar (Group 316) • Nominal filtration rating: 30 – 1000 µm | <ul style="list-style-type: none"> • SuperFlush non-stick coating for filter elements • Filter elements with solenoid technology |
| Differential pressure monitoring | <ul style="list-style-type: none"> • Differential pressure switch with or without setting options | |
| Pressure ranges | <ul style="list-style-type: none"> • 6 bar (stainless steel version only) • 16 bar | 25 bar |
| Documentation | <ul style="list-style-type: none"> • Operating and maintenance instructions | <ul style="list-style-type: none"> • Material certificates according to EN 10204, 3.1 for the pressurised components in contact with media (stainless steel version only) • Manufacturer inspection certificate according to DIN 55350, Part 18 "M" for final inspection and pressure testing |

* Other versions and customised special solutions following consultation with our Head Office.

6. MODEL CODE

MODEL CODE AutoFilt® RF4

RF4-2 - EPT 2 - NN E - CO - 3 - 16 - 1 / SKNS100 - 1234567

Filter type

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

Control

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

Control type / connection voltage

For EPT control only:

0 = without control, without solenoid valve
1 = with S7 control, 1 x 230 V / N / PE 50 Hz, solenoid valve 230 V AC
2 = with S7 control, 1 x 230 V / N / PE 50 Hz, solenoid valve 24 V DC
2M = with S7 control, 1 x 230 V / N / PE 50 Hz, solenoid valve 24 V DC / M12x1 male connector
3 = without control, with solenoid valve 230 V AC
4 = without control, with solenoid valve 24 V DC
4M = without control, with solenoid valve 24 V DC / M12x1 male connector
5A = with AutoFilt® Control Unit ACU control, 1 x 230 V/N/PE 50 Hz
5C = with AutoFilt® Control Unit ACU control, 3 x 380–420 V / N / PE 50/60 Hz
5D = with AutoFilt® Control Unit ACU control, 3 x 380–420 V / x / PE 50/60 Hz

For ET control only:

0A = without control, drive 1 x 230 V / N / PE, 50 Hz
Back-flushing valve 1 x 230 V / N / PE, 40–60 Hz
Sensor system 24 V DC
0C = without control, drive 3 x 380–420 V / x / PE, 50/60 Hz
Back-flushing valve 1 x 230 V / N / PE, 40–60 Hz
Sensor system 24 V DC
1A = with S7 control, 1 x 230 V / N / PE, 50 Hz
1C = with S7 control, 3 x 380–420 V / N / PE, 50/60 Hz
1D = with S7 control, 3 x 380–420 V / x / PE, 50/60 Hz
2A = with AutoFilt® Control Unit ACU control, 1 x 230 V / N / PE, 50 Hz
2C = with AutoFilt® Control Unit ACU control, 3 x 380–420 V / N / PE, 50/60 Hz
2D = with AutoFilt® Control Unit ACU control, 3 x 380–420 V / x / PE, 50/60 Hz
Other voltages on request!

Materials

| Bottom filter section | Top filter section | Note |
|----------------------------------|--|--------------------|
| AA = aluminium ALMG3 | aluminium ALMG3 | Only RF4-1, 16 bar |
| NN = carbon steel, nickel-plated | carbon steel, nickel-plated | Only RF4-2, 16 bar |
| EE = stainless steel | stainless steel: 1.4571 or similar (Group 316) | RF4-1/2, 16 bar |

Internal parts

E = stainless steel: 1.4301 or similar (Group 304)

Back-flushing valve

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

Differential pressure monitoring

0 = without differential pressure monitoring
1 = fixed value: 0.5 bar, type DS 32, normally open contact (n. o.)
2 = adjustable: 0.1–1 bar, type DS 31, normally open contact (n. o.)
3 = fixed value: 0.5 bar, type DS 32, normally closed contact (n. c.)
4 = adjustable: 0.1–1 bar, type DS 31, normally closed contact (n. c.)
5 = Visual clogging indicator (for manual version only)
7 = fixed value 0.5 bar, type VL 1 GW (aluminium), normally closed contact (n. c.)
8 = fixed value 0.5 bar, type PVL 1 GW (1.4301), normally closed contact (n. c.)
9 = 2 x HDA 4700 stainless steel (4–20 mA), standard in combination with AutoFilt® Control Unit ACU control

Pressure range

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

Modification number

1 = the latest version is always supplied

Filter elements / filtration rating

M = "M" added in front for solenoid technology
S = "S" added in front for SuperFlush

For RF4-1:

KMS = wedge wire 30 µm to 1000 µm
KMD = SuperMesh 25 µm / 40 µm / 60 µm; other filtration ratings on request

For RF4-2:

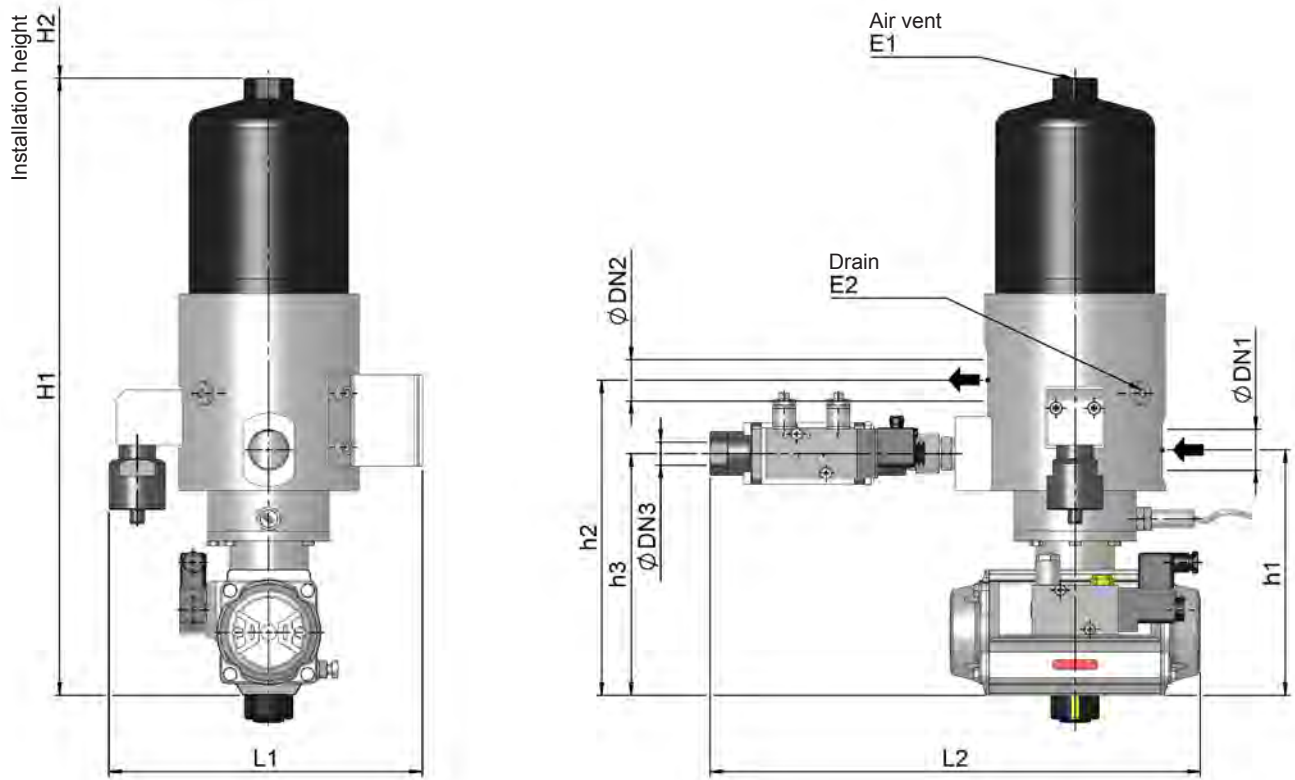
KNS = wedge wire 30 µm to 1000 µm
KND = SuperMesh 25 µm / 40 µm / 60 µm; other filtration ratings on request

Drawing number

For special designs

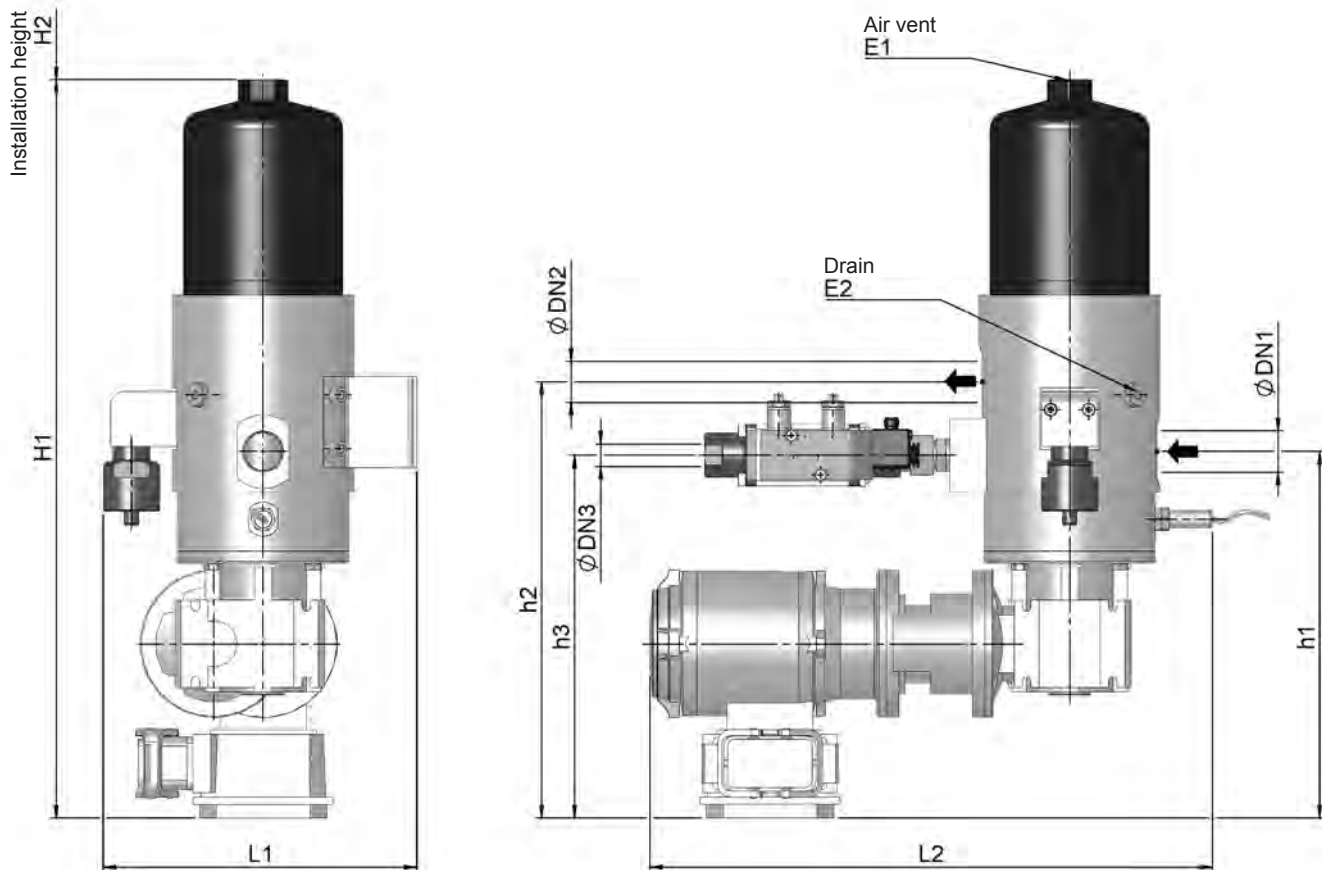
7. DIMENSIONS

RF4-1/2 Coax



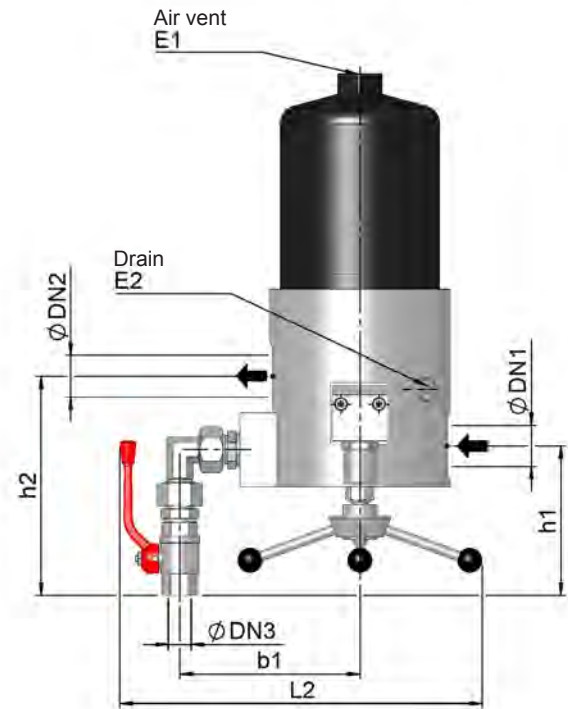
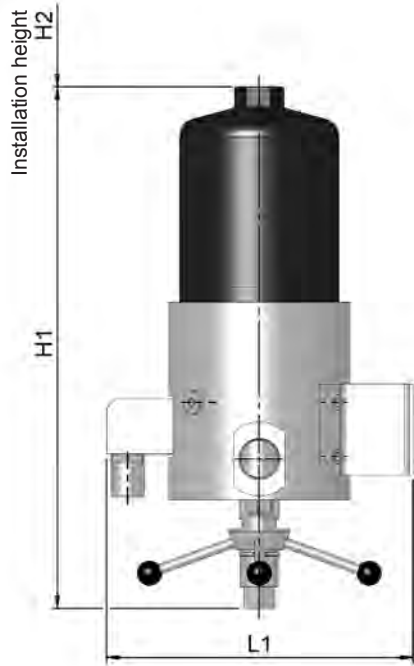
| Size | DN1 | DN2 | DN3 | h1 | h2 | h3 | H1 | H2 | L1 | L2 | E1 | E2 |
|-------|--------|--------|------|-----|-----|-----|-----|-----|-----|-----|------|------|
| RF4-1 | G1 | G1 | G1/2 | 199 | 256 | 196 | 501 | 110 | 255 | 399 | G1/2 | G1/4 |
| RF4-2 | G1 1/2 | G1 1/2 | G3/4 | 206 | 282 | 210 | 572 | 106 | 342 | 452 | G1/2 | G1/4 |

RF4-1/2 electrical



| Size | DN1 | DN2 | DN3 | h1 | h2 | h3 | H1 | H2 | L1 | L2 | E1 | E2 |
|-------|--------|--------|------|-----|-----|-----|-----|-----|-----|-----|------|------|
| RF4-1 | G1 | G1 | G1/2 | 298 | 355 | 295 | 600 | 110 | 255 | 437 | G1/2 | G1/4 |
| RF4-2 | G1 1/2 | G1 1/2 | G3/4 | 304 | 379 | 307 | 672 | 206 | 342 | 458 | G1/2 | G1/4 |

RF4-1/2 manual



| Size | DN1 | DN2 | DN3 | h1 | h2 | h3 | H1 | H2 | L1 | L2 | E1 | E2 |
|-------|--------|--------|------|-----|-----|-----|-----|-----|-----|-----|------|------|
| RF4-1 | G1 | G1 | G1/2 | 121 | 178 | 147 | 423 | 110 | 249 | 294 | G1/2 | G1/4 |
| RF4-2 | G1 1/2 | G1 1/2 | G3/4 | 115 | 190 | 178 | 480 | 206 | 336 | 337 | G1/2 | G1/4 |

The dimensions indicated have ± 10 mm tolerances.
Subject to technical modifications.

NOTE

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

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

Subject to technical modifications.

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