HYDAC INTERNATIONAL

Automatic back-flushing filter
AutoFilt® RF4

RF4-1

RF4-2

RF4-2/3

Specifications	
Nominal size:	G1" - G 2"
Q_{max}:	385 l/min
p_{max}:	16 bar
Filtration ratings:	30 - 1000 µm

1. GENERAL INFORMATION

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
- Chemicron® 30 to 1000 µm
- Chemicron® wedge wire, sintered: 25 to 60 µm

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

Technical data for standard version

Size [1]	Connection inlet/outlet	Connection back-flush line	No. of filter elements	Filter area [cm²]	Pressure level [bar]	Weight [2] [kg]	Volume [l]	Back-flush volume [3] [l]
RF4-1	G1"	G ½"	4 x KM	548	16	15	2.5	4
RF4-2-x-NNE	G1 ½"	G 3/4"	4 x KN	1420	16	63	3.7	13
RF4-2-x-AAE	G1 ½"	G 3/4"	4 x KN	1420	16	23	9	13
RF4-2F-x-AAE	G1 ½"	G 3/4"	6 x KN	2140	16	23	9	19
RF4-2G-x-AAE	G1 ½"	G 3/4"	7 x KN	2505	16	23	9	22
RF4-3-x-AAE	G2"	G 3/4"	6 x KN	2140	16	23	9	19
RF4-3G-x-AAE	G2"	G 3/4"	7 x KN	2505	16	23	9	22

Key

[1] $T_{s\,max}$ for all AutoFilt® RF4: 80 °C

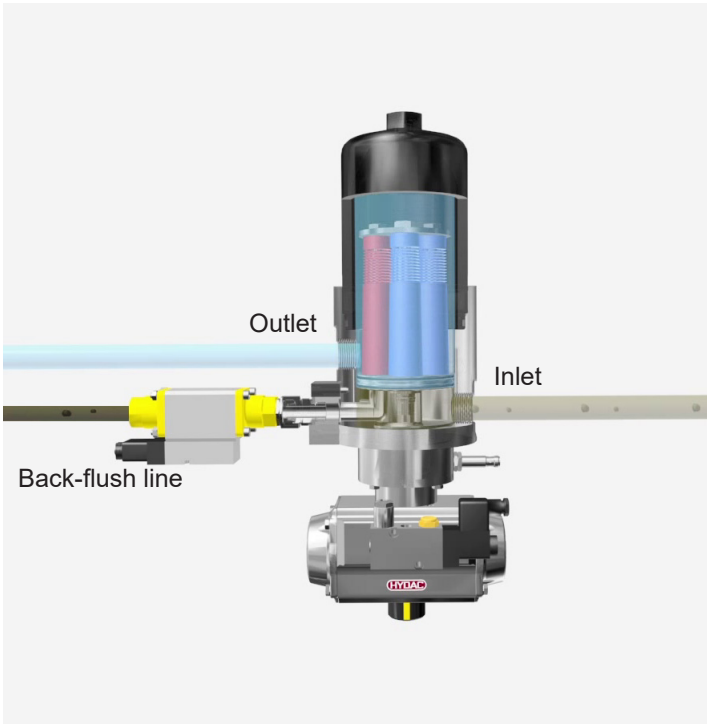
[2] Refers to EPT version

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

2. FUNCTION

FILTRATION

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

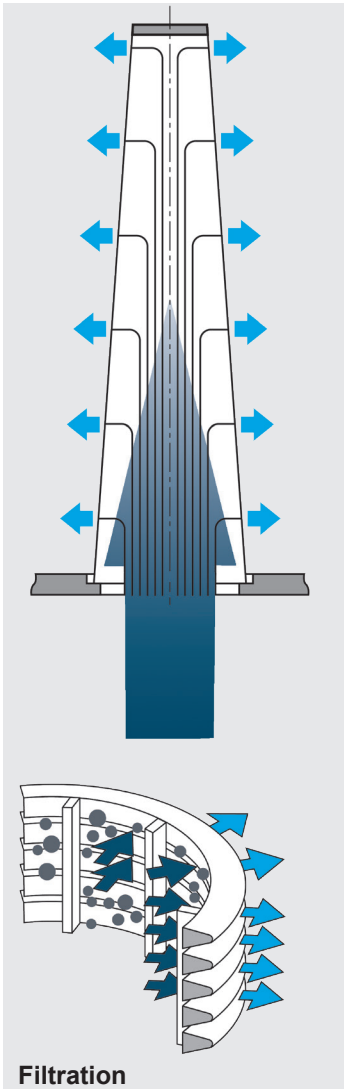


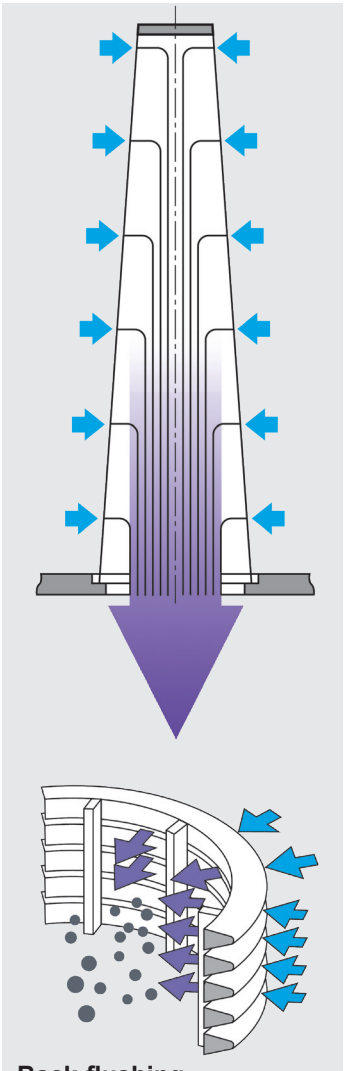
TRIGGERING BACK-FLUSHING

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

BACK-FLUSHING THE FILTER ELEMENTS – BACK-FLUSH CYCLE

- The rotary drive rotates the filter element plate including the filter elements into position, so that a contaminated filter element is located above the flushing opening
- The back-flushing valve is opened
- The pressure drop between the filtrate side and back-flush line flushes a small amount of the filtrate back through the contaminated filter element
- The contamination particles deposited on the inside of the filter elements are loosened and flushed into the back-flush line via the flushing arm
- After the "back-flushing time per filter element" has elapsed, the back-flush valve is closed
- In this way, all the filter elements are back-flushed, one after the other
- A full back-flush cycle is complete once all filter elements have been cleaned
- With the AutoFilt® RF4 with manual back-flushing, the filter element mounting plate, including the filter elements, is rotated and the back-flush valve is opened by hand
- During the back-flushing process, the flow of filtrate is not interrupted





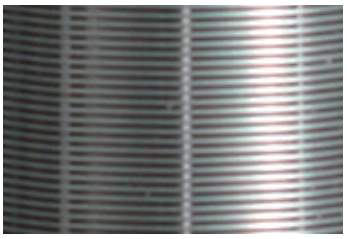
3. SPECIAL FEATURES

FILTER ELEMENT TECHNOLOGY

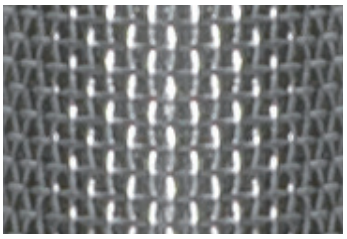
Conical filter elements
The HYDAC AutoFilt® RF4 automatic back-flushing filter is fitted with robust Chemicron®stainless steel wedge wire or SuperMesh filter elements. The filter elements' conical shape makes them extremely efficient during filtration and highly effective during back-flushing.

SuperFlush non-stick coating
The SuperFlush element coating offers another option for optimal adjustment of the filter elements and fulfilling individual customer requirements.

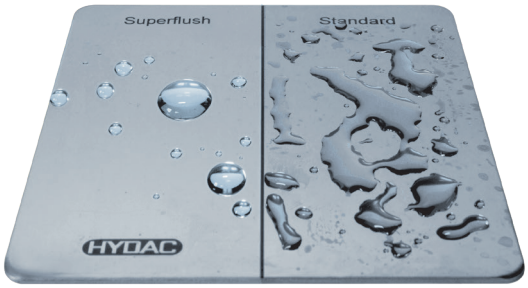
SuperFlush advantages:
- Unique coating technology
- Available for conical filter elements
- No deposits on the filter element surface
- No adhesion of sticky particles on the filter element surface
- Reduces biofouling
- Increases the service life
- Increases efficiency



Chemicron® wedge wire



Chemicron® SuperMesh wire mesh, sintered with or without support structure



With | Without SuperFlush
Non-stick coating for filter elements

ISOKINETIC FILTRATION AND BACK-FLUSHING

The conical shape and arrangement of the filter elements enables flow to pass through them uniformly, resulting in low pressure loss and effective cleaning of the filter elements.

Advantages:
- Fewer back-flushing cycles
- Reduced back-flushing losses

Filter elements:
cylindrical vs. conical

Back-flushing efficiency

PULSE-AIDED BACK-FLUSHING

For the EPT control types, the filter element only remains in the flushing position for a few seconds. Rapid opening of the back-flush valve generates a pressure surge in the filter element openings, and supplements the cleaning effect of the back-flushing process.

SMALL BACK-FLUSH VOLUMES THANKS TO CYCLIC CONTROL

For the EPT control types, the back-flush valve opens and closes during back-flushing for each filter element.

4. CHOOSING THE RIGHT FILTER*

FILTER DIMENSIONING CHECKLIST

Step 1: Checking the basic prerequisites

- In order to be able to use the AutoFilt® RF4, there needs to be a minimum pressure difference of 1.5 bar** between the filter outlet and back-flush line
- This minimum pressure difference enables the filter to operate correctly
- The application data has to be determined using the filter questionnaire
- The flow velocity at the filter inlet must not exceed 4 m/s
- The maximum permitted operating temperature for the AutoFilt® RF4 is 80 °C
- The flow rate must not drop below the minimum level of 40 l/min

Step 2: Filter dimensioning

- Determined on the basis of the pressure loss graphs and especially for coolant emulsion applications on the basis of the dimensioning table
- The initial differential pressure (Δp) when the filter is clean must not exceed 0.2 bar
- The pressure loss graph is valid for filtration ratings of 100 to 1000 µm wedge wire and 25 µm / 40 µm and 60 µm SuperMesh filter elements
- The flow velocity at the filter inlet must not exceed 4 m/s

Step 3: Dimensioning tables

The dimensioning table is an important basis for decision-making when selecting the AutoFilt® RF4.

➔ The greater contamination load for coolant emulsion applications in particular calls for more generous filter dimensioning

➔ Validity of tables for emulsions and oil up to viscosities of 15 mm²/s

** For a variety of coolant applications, the filtrate pressure needs to be adjusted to suit the particular application.

DIMENSIONING TABLES

WATER APPLICATIONS

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

The flow ranges specified are valid for filtration ratings ≥ 100 µm

COOLANT EMULSIONS

Applications only on consultation with head office

Conditions for correct performance in typical application areas	
Filtration rating	≥ 100 µm
Pre-separation	< 1000 µm
Contamination load	< 200 mg/l
Viscosity	< 15 cSt

Medium	Type of contamination	Processing	Max. flow rate [l/min]			
			RF4-1	RF4-2-x-NNE / RF4-2-x-AAE	RF4-2F-x-AAE / RF4-3-x-AAE	RF4-2G-x-AAE / RF4-3G-x-AAE
Emulsion	Aluminium	■Milling ■Drilling ■Lathing	100	220	330	385
	Cast iron		70	180	270	315
	Carbon steel		80	200	300	350
	Stainless steel		80	200	300	350

➔ The flow ranges specified are valid for filtration ratings ≥ 100 µm and maximum contamination loads of 120 mg/l

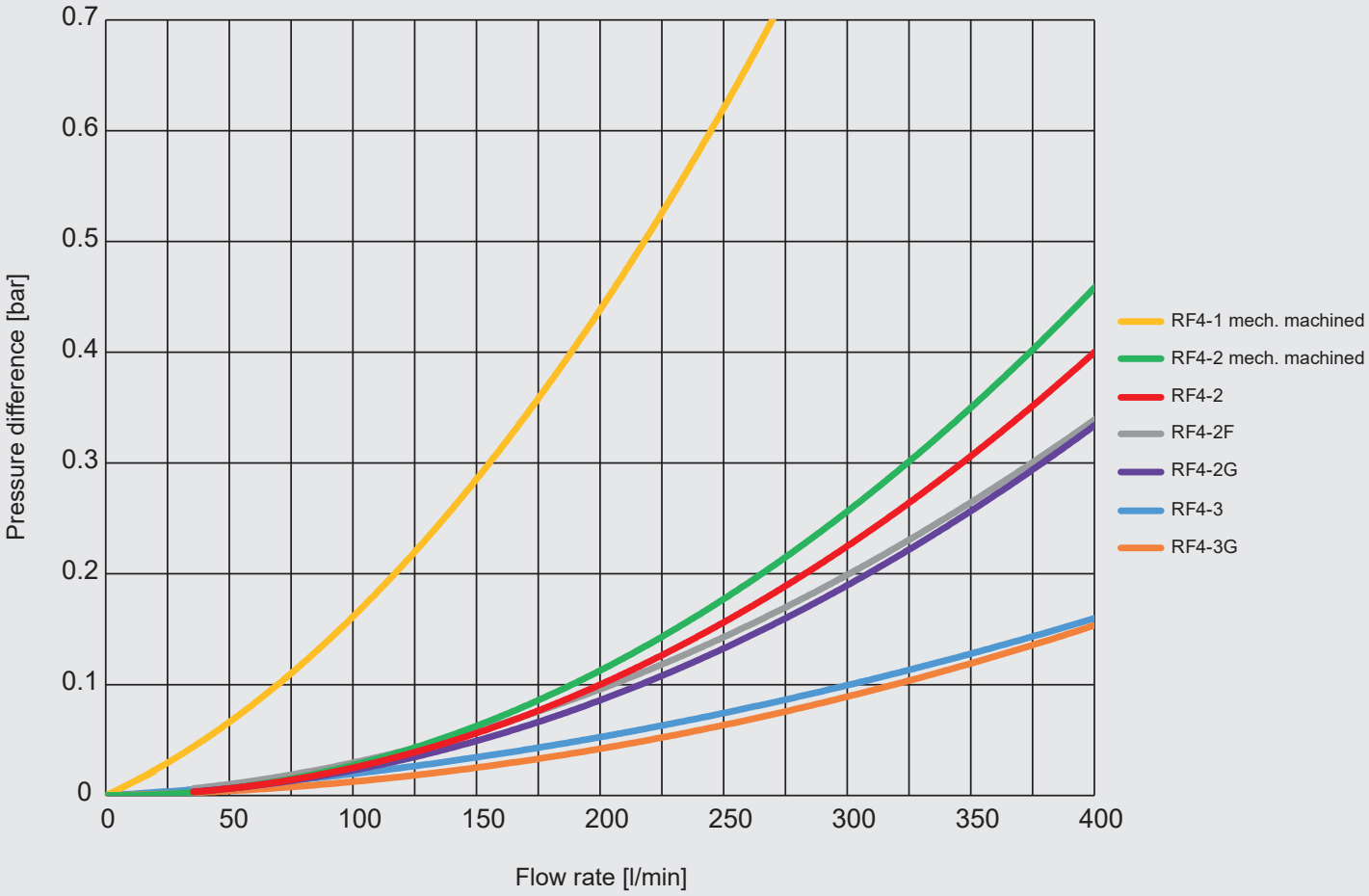
➔ Validity of tables for emulsions and oil up to viscosities of 15 mm²/s

➔ For applications involving compacted graphite iron, grinding and honing and for fluids with viscosities above 15 mm²/s, consultation with our head office is essential

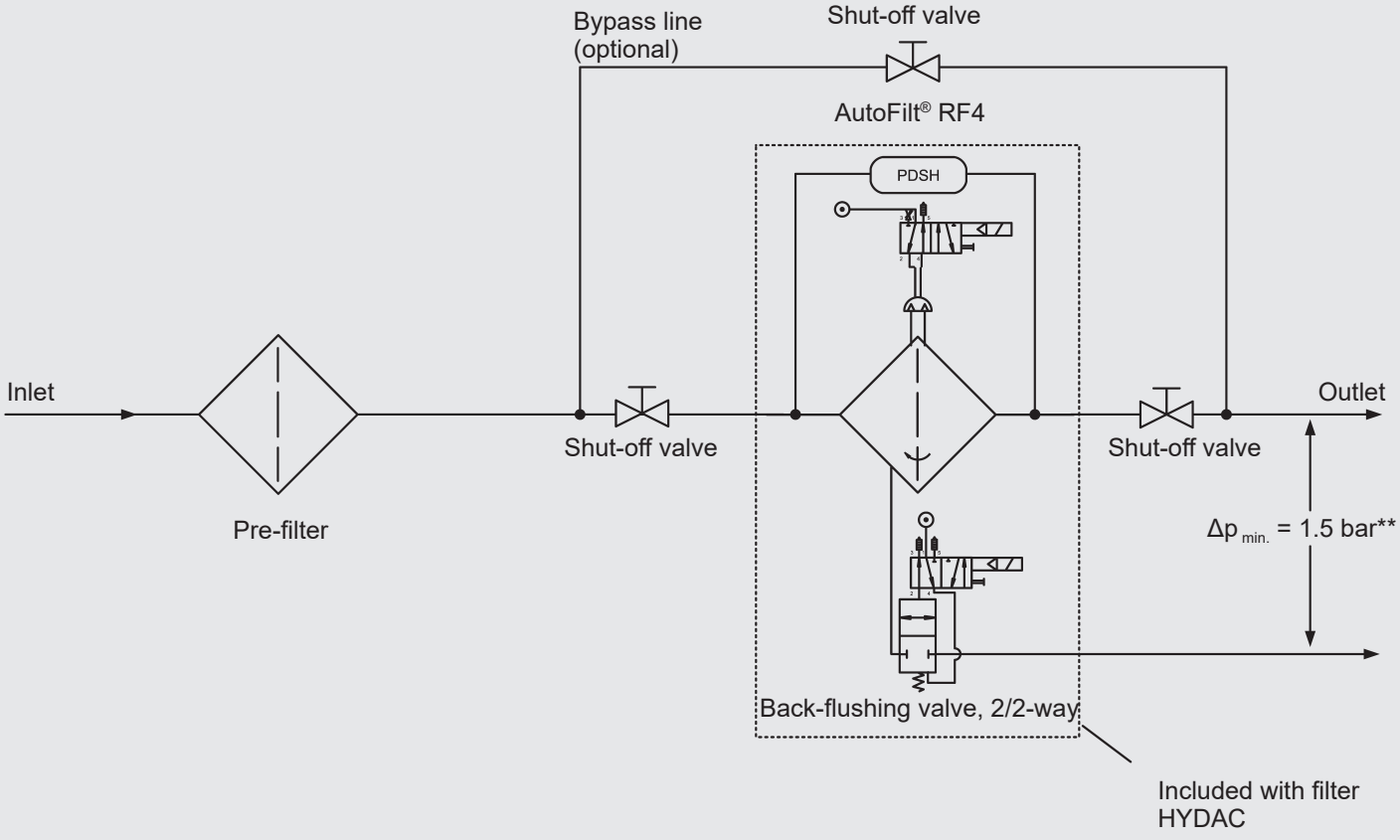
* If you have any questions regarding filter calculation, please contact the head office.

PRESSURE LOSS GRAPH

The pressure loss graphs are valid for water and fluids with similar viscosities



PIPING DIAGRAM



** For a variety of coolant applications, the filtrate pressure needs to be adjusted to suit the particular application.

5. FILTER CONFIGURATION*

	Standard	Optional
Control types	■ EPT: electro-pneumatic cyclic control ■ ET: electric cyclic control (purely electrical) ■ M: Manual	Special custom solutions
Supply voltages	■ 230 V AC main voltage ■ 230 V AC or 24 V DC control voltage ■ Only for ET control variants: Control voltage 24 V DC, drive 3 x 400 V / N / PE, 50 Hz	Special voltages
IP protection ratings	■ IP65	
Housing materials (combinations)	■ Aluminium ■ Stainless steel: 1.4571 or similar (Group 316) ■ Carbon steel, nickel-plated	
Materials, inner parts	■ Stainless steel: 1.4301 or similar (Group 304)	
Back-flushing valve	■ Coaxial valves ■ Stainless steel ball valve ■ Ball valve, brass, nickel-plated	
Filter elements	**SuperMesh filter elements:** ■ SuperMesh wire mesh, sintered, with or without support structure: 1.4401 or similar (Group 316) ■ Nominal filtration rating: 30 - 60 µm **Wedge wire:** ■ Robust wedge wire ■ Stainless steel: 1.4435 or similar (Group 316) ■ Nominal filtration rating: 30 - 1000 µm	■ SuperFlush non-stick coating for filter elements ■ Filter elements with magnet technology
Differential pressure monitoring	■ Differential pressure switch with or without setting options	
Pressure ranges	■ 16 bar	■ 6 bar (stainless steel version only) ■ 25 bar
Documentation	■ Operation and maintenance instructions	■ Material certificates in accordance with EN10204, 3.1 for the pressure-bearing wetted components (stainless steel version only) ■ Manufacturer's test certificate in acc. with DIN 55350, Part 18 "M" for construction and pressure testing

* Other versions/features and customer-specific solutions also available subject to prior consultation.

6. MODEL CODE

MODEL CODE FOR AutoFilt® RF4

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

Filter type

RF4-1 = AutoFilt® RF4, size 1, (G 1" -> 4 filter elements)
RF4-2 = AutoFilt® RF4, size 2, (G 1 1/2" -> 4 filter elements)
RF4-3 = AutoFilt® RF4, size 3, (G 2" -> 6 filter elements)
For RF4-2-x-AAE or RF4-3-x-AAE only – number of elements different from standard:
D = 4 elements (for RF4-3)
F = 6 elements (for RF4-2)
G = 7 elements (for RF4-2 or RF4-3)

Control

M = manual
EPT = electro-pneumatic cyclic control (incl. pneumatic drive)
ET = electric cyclic control
EU = electric circulation control

Control type / supply voltage

Only for EPT control:
0 = without control, without solenoid valve
1 = with control S7, 1x230V/N/PE 50 Hz, solenoid valve 230 V AC
2 = with control S7, 1x230V/N/PE 50 Hz, solenoid valve 24 V DC
2M = with control S7, 1x230V/N/PE 50 Hz, solenoid valve 24 V DC/M12x1 plug 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 plug connector
5A = with control AutoFilt® Control Unit ACU, 1 x 230 V / N / PE, 50 Hz
5C = with control AutoFilt® Control Unit ACU, 3 x 380 - 420 V / N / PE, 50/60 Hz
5D = with control AutoFilt® Control Unit ACU, 3 x 380 - 420 V / x / PE, 50/60 Hz

Only for ET control:
0A = without control, drive 1 x 230 V / N / PE, 50 Hz; back-flushing valve 1 x 230 V / N / PE, 40 - 60 Hz; sensors 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; sensors 24 V DC
1A = with control S7, 1 x 230 V / N / PE, 50 Hz
1C = with control S7, 3 x 380 - 420 V / N / PE, 50/60 Hz
1D = with control S7, 3 x 380 - 420 V / x / PE, 50/60 Hz
2A = with control AutoFilt® Control Unit ACU, 1 x 230 V / N / PE, 50 Hz
2C = with control AutoFilt® Control Unit ACU, 3 x 380 - 420 V / N / PE, 50/60 Hz
2D = with control AutoFilt® Control Unit ACU, 3 x 380 - 420 V / x / PE, 50/60 Hz
Other voltages on request!

Only for EU control:
0A = without control, drive 1 x 230 V / N / PE, 50 Hz; sensors and back-flushing ball valve 24 V DC
04 = without control, drive 24 V DC/10V DC control voltage; sensors 24 V DC

Materials

	Lower filter part	*Upper filter part*	*Note*
AA =	aluminium	aluminium	only RF4-1/2/3 16 bar
NN =	carbon steel, nickel-plated	carbon steel, nickel-plated	only RF4-2 / 16 bar
EE =	stainless steel	stainless steel	RF4-1/2 / 16 bar

Inner parts

E = stainless steel

Back-flushing valve

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

Differential pressure monitoring

0 = without differential pressure monitoring
1 = fixed value: 0.5 bar, type DS 32, NO contact
2 = adjustable: 0.1 - 1 bar, type DS 31, NO contact
3 = fixed value: 0.5 bar, type DS 32, NC contact
4 = adjustable: 0.1 - 1 bar, type DS 31, NC contact
5 = visual clogging indicator (only for manual version)
7 = fixed value 0.5 bar, type VL 1 GW (alu), NC contact
8 = fixed value 0.5 bar, type PVL 1 GW (1.4301), NC contact
9 = 2 x HDA 4700 stainless steel (4 - 20 mA), standard in combination with control ACU
A = fixed value 0.5 bar, type VL 1 GW (alu), NO contact
B = fixed value 0.5 bar, type PVL 1 GW (1.4301), NO contact

Pressure range

06 = 6 bar (housing locked with tension clamp), only for housing in stainless steel version
16 = 16 bar
25 = 25 bar, only for RF4-1 (only on request!)

Modification number

1 = the latest version of the specific type is always supplied

Filter elements / filtration rating

S = "S" added as additional prefix for SuperFlush
For AutoFilt® RF4-1:
KMS = wedge wire 30 µm to 1000 µm
KMD = SuperMesh 25 µm/ 40 µm/ 60 µm/ other filtration ratings on request
For AutoFilt® RF4-2 (4 pcs. = standard) / RF4-3 (6 pcs. = standard):
KNS = wedge wire 30 µm to 1000 µm
KND = SuperMesh 25 µm / 40 µm / 60 µm; other filtration ratings on request

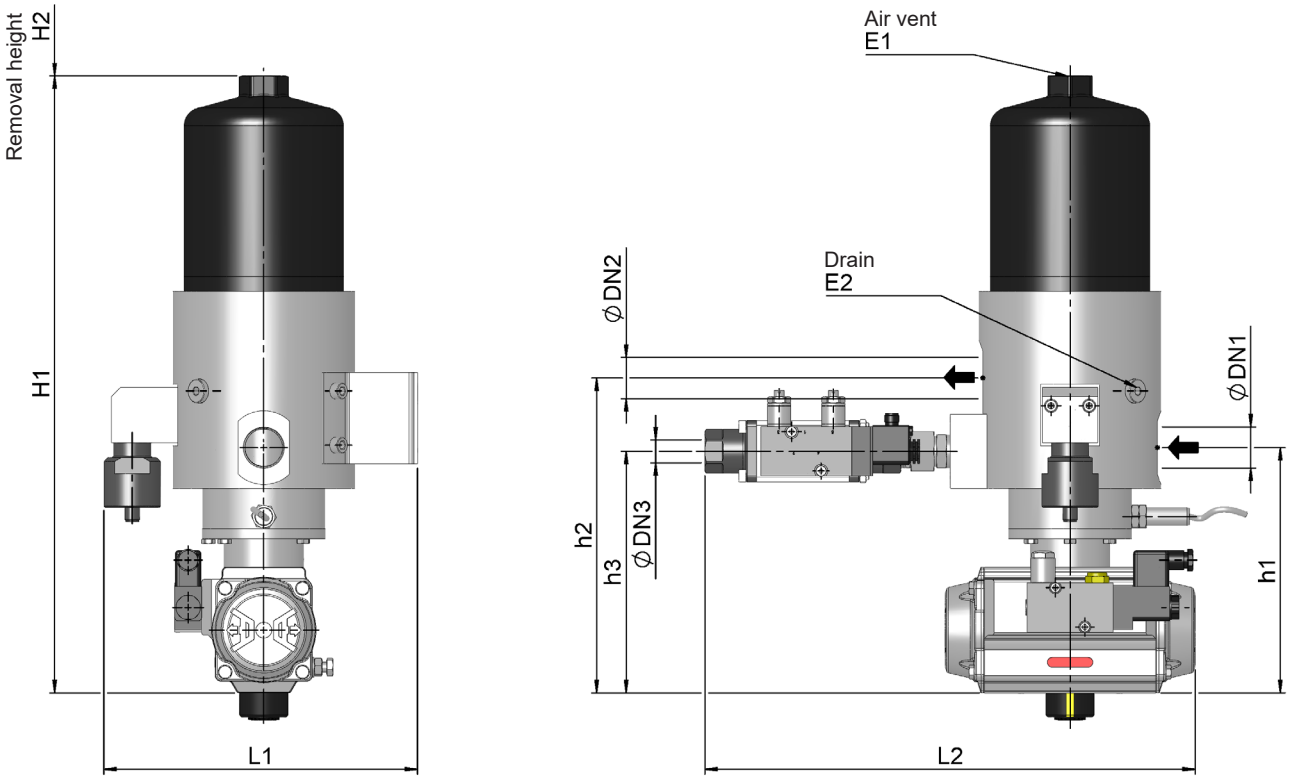
ID number of custom design

For customer design

Doc. no.: 3191290 - Rev. C

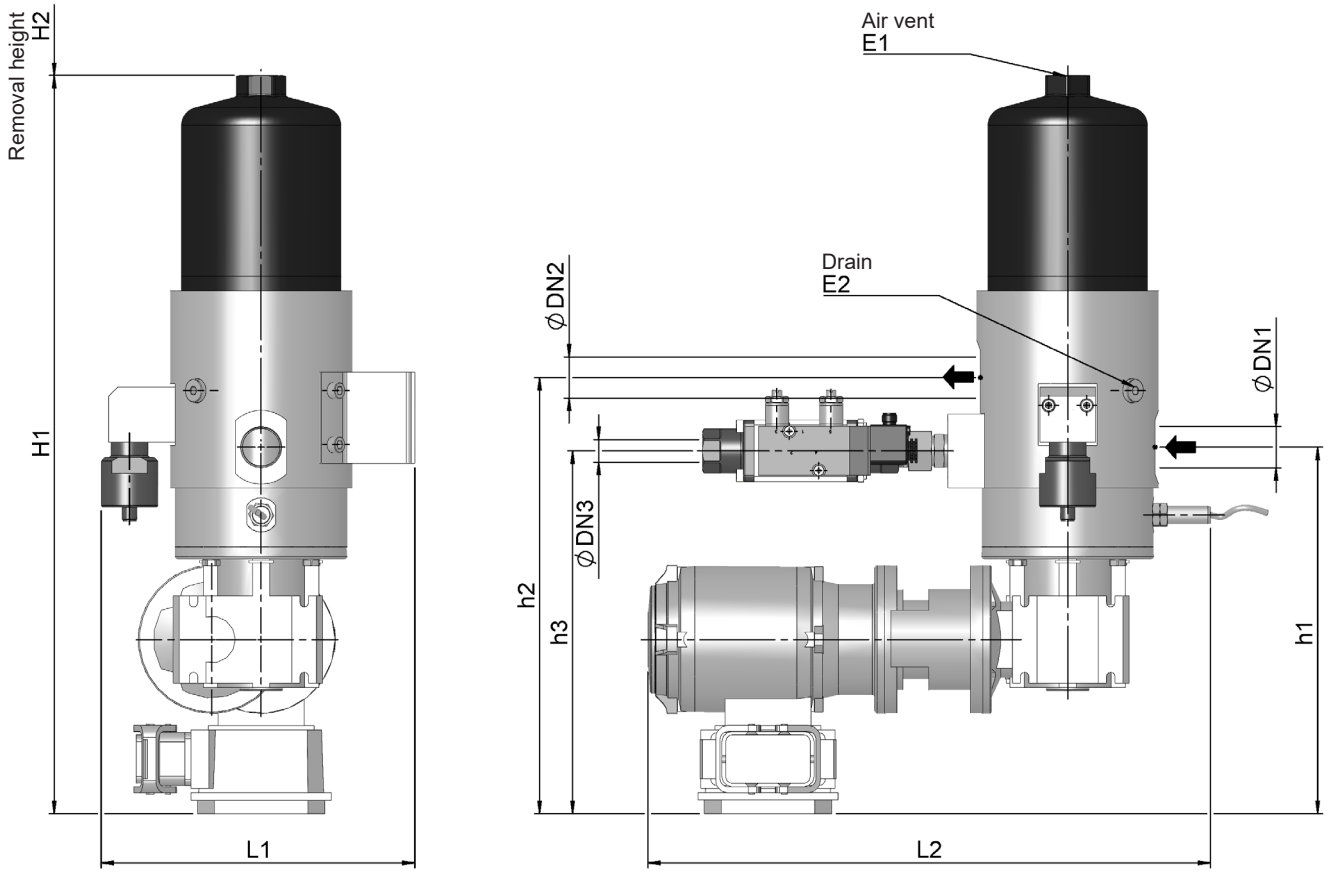
7. DIMENSIONS

RF4-1/2 – mechanically machined version – coaxial valve



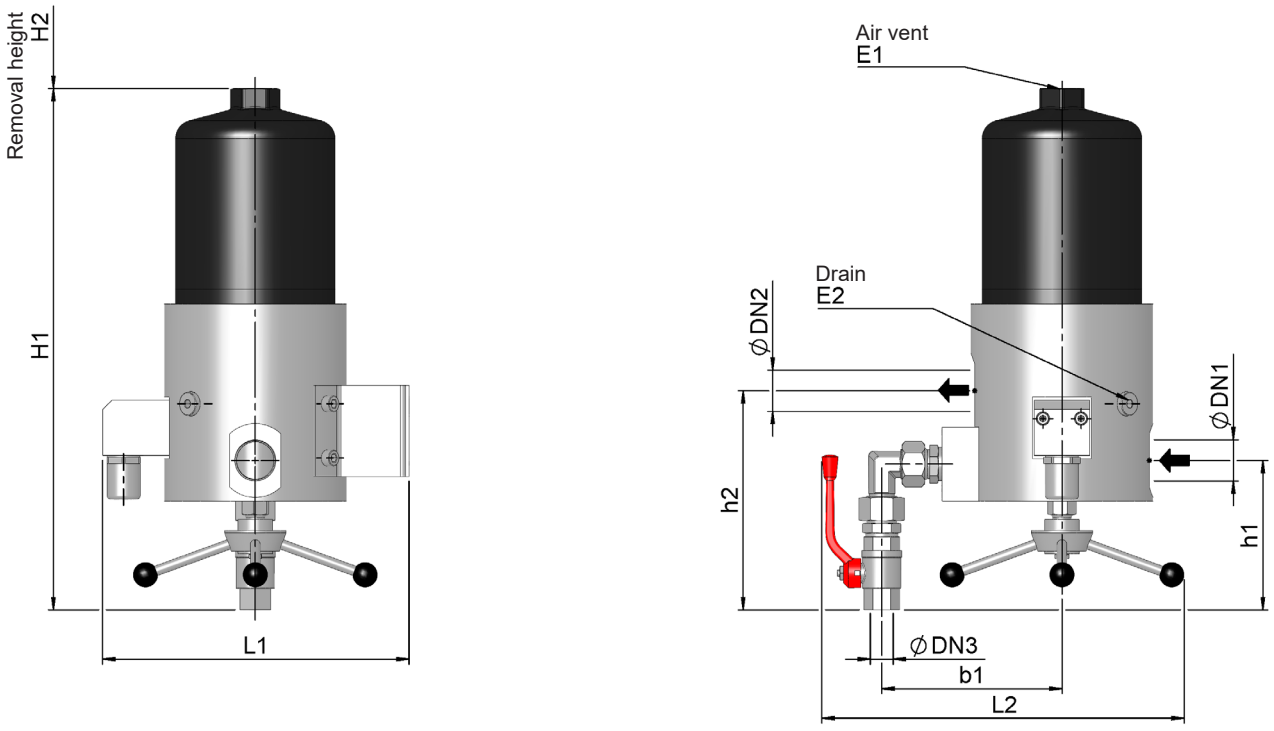
Size	DN1	DN2	DN3	h1	h2	h3	H1	H2	L1	L2	E1	E2
RF4-1	G1	G1	G1/2	199	256	196	501	110	255	399	G1/2	G1/4
RF4-2	G1 1/2	G1 1/2	G3/4	206	282	210	572	106	342	452	G1/2	G1/4

RF4-1/2 – mechanically machined version – electric



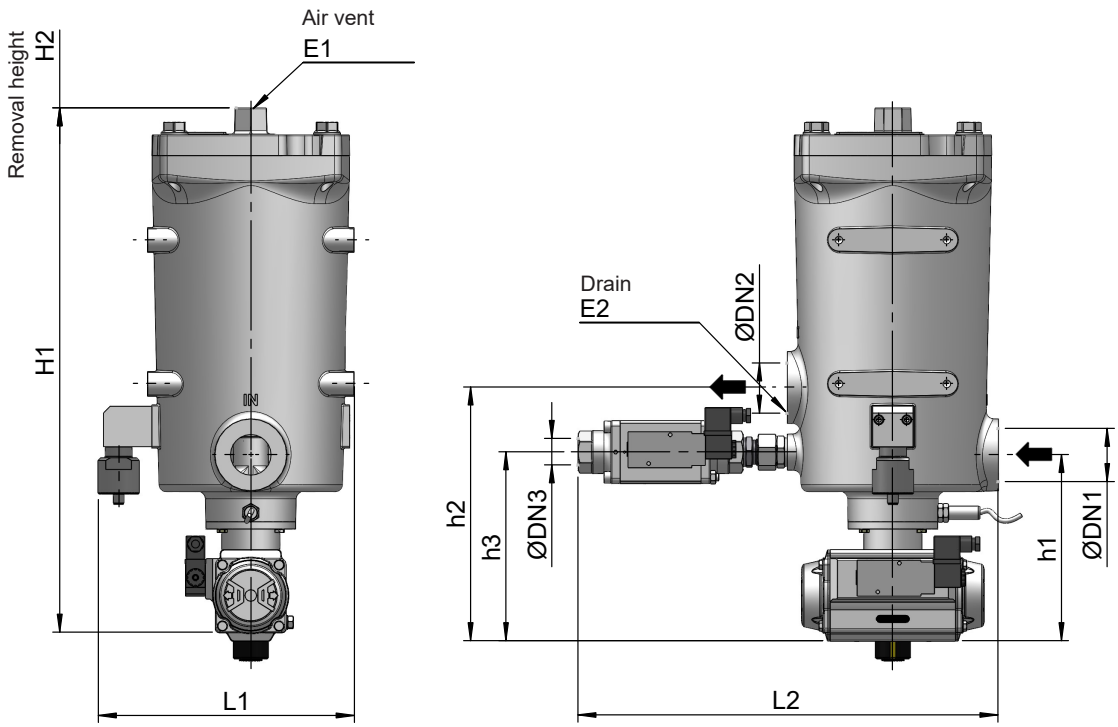
Size	DN1	DN2	DN3	h1	h2	h3	H1	H2	L1	L2	E1	E2
RF4-1	G1	G1	G1/2	298	355	295	600	110	255	437	G1/2	G1/4
RF4-2	G1 1/2	G1 1/2	G3/4	304	379	307	672	206	342	458	G1/2	G1/4

RF4-1/2 – mechanically machined version – 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

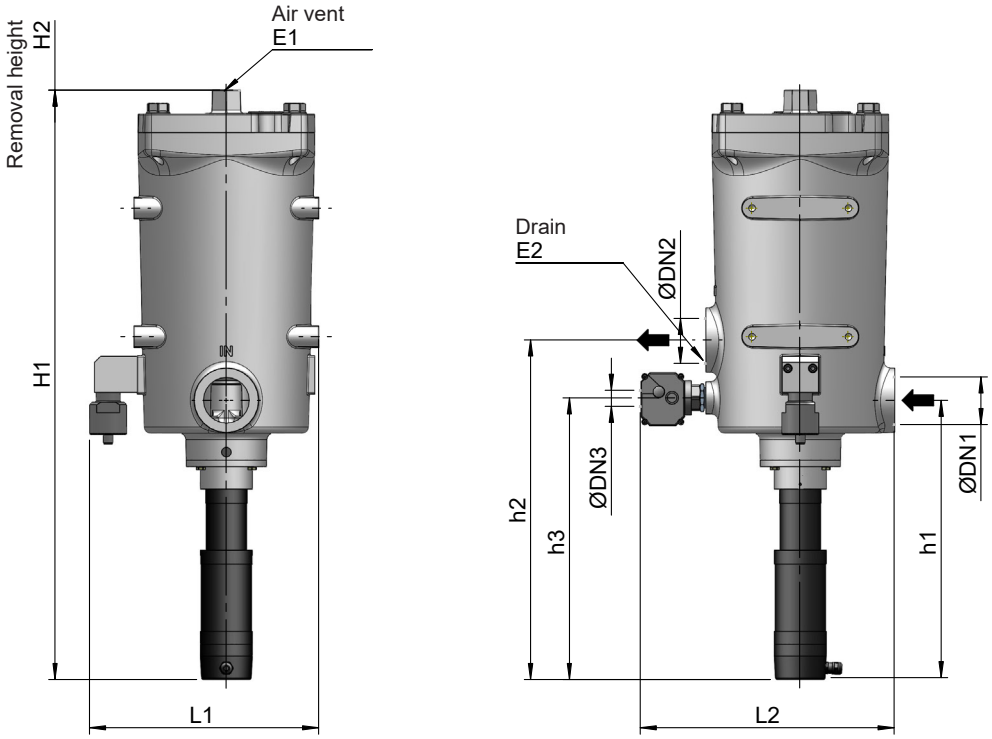
RF4 2/3 cast iron version – coaxial valve



The dimensions given here have a tolerance of ± 10 mm.
Subject to technical modifications.

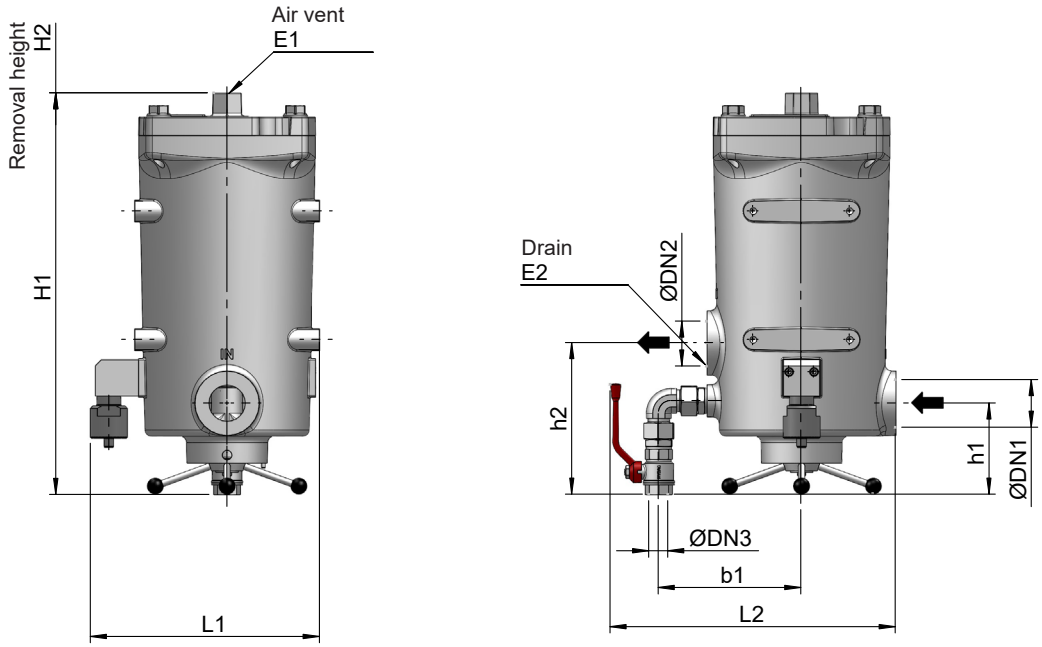
Size	DN1	DN2	DN3	h1	h2	h3	H1	H2	L1	L2	E1	E2
RF4-2	G1 1/2	G1 1/2	G3/4	230	305	233	584	360	285	468	G1/2	G1/2
RF4-3	G2	G2	G3/4	230	305	233	584	360	285	468	G1/2	G1/2

RF4 2/3 cast iron version – electric



Size	DN1	DN2	DN3	h1	h2	h3	H1	H2	L1	L2	E1	E2
RF4-2	G1 1/2	G1 1/2	G3/4	348	423	351	734	360	285	316	G1/2	G1/2
RF4-3	G2	G2	G3/4	348	423	351	734	360	285	316	G1/2	G1/2

RF4 2/3 cast iron version – manual



The dimensions given here have a tolerance of ± 10 mm.
Subject to technical modifications.

Size	DN1	DN2	DN3	h1	h2	H1	H2	L1	L2	E1	E2	E2
RF4-2	G1 1/2	G1 1/2	G3/4	113	189	500	360	285	355	G1/2	G1/2	G1/2
RF4-3	G2	G2	G3/4	113	189	500	360	285	355	G1/2	G1/2	G1/2

NOTE

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

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

Subject to technical modifications.

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