

Frese OPTIMIZER Twin Flow Controller 2-pipe heating and cooling systems

Description

The Frese OPTIMIZER Twin Flow Controller is used in 2 pipe heating and cooling systems.

It automatically switches between the sizing flow values for cooling and for heating purposes and modulates the flow via the valve to meet the current load conditions.

The Frese OPTIMIZER Twin Flow Controller can be also used to control the media supply and return temperatures difference to optimize the pumping energy consumption.

Operation

During the cooling and the heating seasons different sizing (maximum) flows are required in the terminal unit or in a circuit.

Since one Frese OPTIMA Compact is used to control both the flows, only one sizing flow value can be set on the valve. It is always the greater flow value of the two.

The Frese OPTIMIZER Twin Flow Controller is designed to be used with Frese OPTIMA Compact and it can control both the flows for heating and for cooling.

The highest flow is usually required for cooling purposes. It is set on the setting scale of Frese Optima Compact whereas the lower flow – for the sizing conditions in heating - is limited by the controller.

The Frese OPTIMIZER Twin Flow Controller can operate with two temperature sensors.

Following the internal algorithm the controller can optimize the supply and the return temperatures difference, ΔT .

If the detected ΔT is below the set point the controller limits the flow to reduce the energy used for circulating water in the system.

Application

The Frese OPTIMIZER Twin Flow Controller is used in 2-pipe heating and cooling systems to:

- Control the flow to the terminal unit or in a circuit
- Detect if the system operates in the heating or in the cooling mode
- Switch between the sizing flow for cooling and for heating
- Modulate the flow for cooling and heating
- Detect the temperature difference between the supply and return lines
- Secure operation with at least the minimum temperature difference between the supply and return lines



Benefits

- Only one data point for the BMS needed
- Complete solution. No balancing valves required in the System
- Energy saving through optimum pressure independent flow limitation and regulation
- Modulating control for both cooling and heating
- Less time spent in selection and sizing. Only design flow and minimum differential pressure required
- Full comfort without recommissioning should the system be extended during the construction phase
- Compact solution with small space requirements
- Silent operation when modulating heating and cooling
- No time consuming commissioning required

Features

- The pre-setting function of the PICV has no impact on the stroke - full stroke modulation at all times, regardless of the pre-set flow
- The constant differential pressure across the modulating-control component of the PICV guarantees 100% authority
- Dynamic balancing eliminates overflows, regardless of fluctuating pressure conditions in the system
- Achieves high flows with minimal required differential pressure due to advanced design of the PICV
- Higher pre-setting precision due to stepless analogue scale of the PICV
- Control unit with 0-10 V DC feedback signal for modulating valve opening
- ΔT control for optimal energy transfer
- Option of connecting a dew point sensor to the controller to avoid condensation in the system

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Function

The Frese OPTIMIZER Twin Flow Controller is used in 2-pipe heating and cooling systems. It requires only one single data point from the BMS system and a control signal of 0.5-4.5V for cooling, 4.5-5.5V to close the valve and 5.5-10V for heating.

Full flow modulation is provided at all times even with different design flows for heating and cooling.

The design flow rate for the cooling purposes usually defines the maximum flow through the coil and it is set using the pressure independent control valve, Frese OPTIMA Compact.

The Frese OPTIMIZER Twin Flow Controller allows to reduce the flow setting for heating purposes from 100% down to 10% of the maximum flow required for cooling.

This way the sizing flow for heating purposes is not exceeded

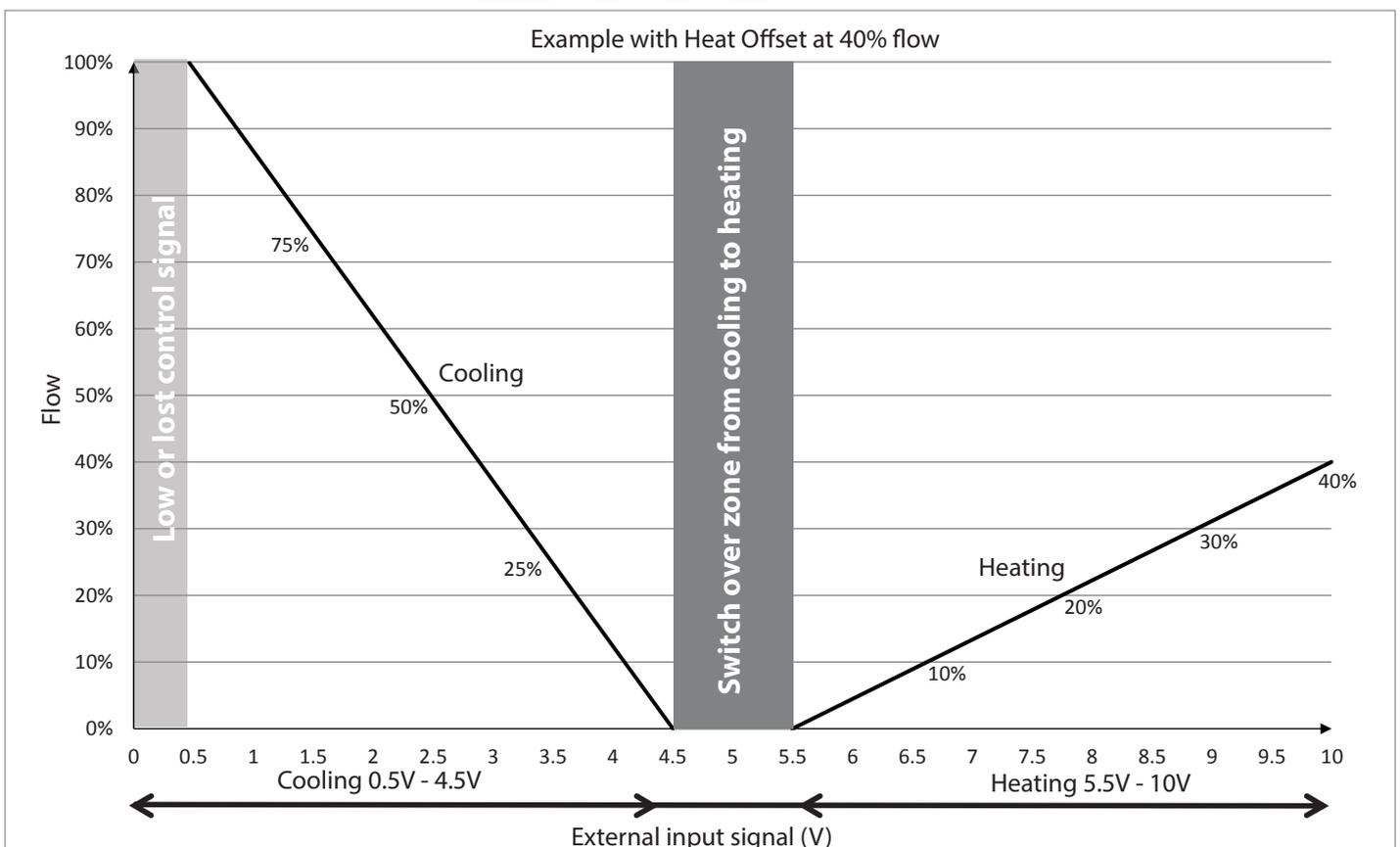
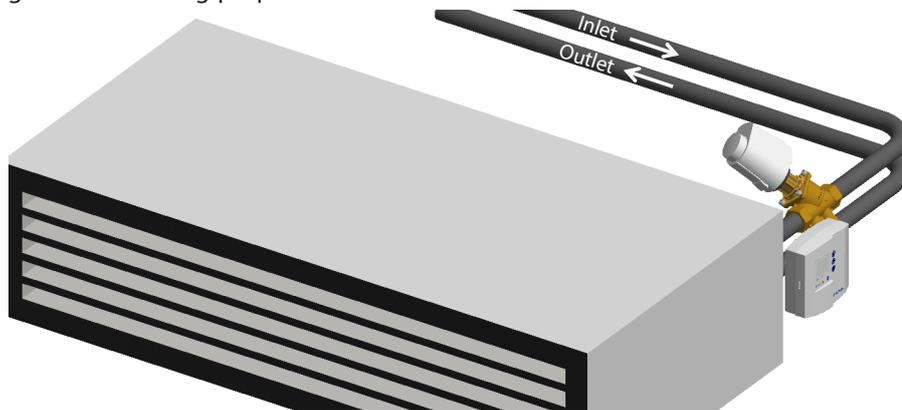
and the whole system performs with the highest efficiency.

The sizing flow setting for heating is performed using the UP and DOWN buttons on the Frese OPTIMIZER Twin Flow Controller and approved by the OK button.

The switch over from cooling to heating and the opposite direction is done after the Frese OPTIMIZER Twin Flow Controller receives a signal from the BMS system.

The Frese OPTIMA Compact pressure independent control valve is closed during the switch over period for approximately 5 minutes.

The switch over condition is signalled by the simultaneous flashing of the red & blue LEDs on the controller.



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Operation

The design flow for cooling will normally be higher than the design flow for heating due to lower ΔT and thereby defines the maximum flow rate required through the coil.

The maximum flow rate required is set using the Frese OPTIMA Compact PICV (see page 8-11).

The design flow for heating is set as a percentage (10 – 100%) of the design flow for cooling.

Example: Setup without ΔT control

Example:

Design flow, cooling: 600 l/h
Design flow, heating: 180 l/h (flow % = **30**)

Control unit setup:

Press the OK-button (1)
The red LED (2) for heating is lit and the display is blinking. Set the percentage for heating to **30** using the UP and DOWN buttons (5). Press OK-button (1) to confirm.



Example: Setup with ΔT control

The Frese OPTIMIZER Twin Flow Controller automatically detects when the temperature sensors are connected.

Once this has been done the controller engages the ΔT functionality to optimize the temperature difference between the supply and the return lines, based on the user's settings.

Example:

Design flow, cooling: 600 l/h
Design flow, heating: 180 l/h (flow % = **30**)

Design temperatures:
Cooling: 7°C - 12°C ($\Delta T = 5^\circ\text{C}$)
Heating: 60°C - 30°C ($\Delta T = 30^\circ\text{C}$)

Control unit setup:

Press the OK-button (1)
The red LED (2) for heating is lit and the display is blinking. Set the ΔT for heating to **30** using the UP and DOWN (5) buttons. Press OK-button (1) to confirm
The blue LED (3) for cooling is lit and the display is blinking. Set the ΔT for cooling to **5** using the UP and DOWN buttons (5). Press OK-button (1) to confirm.
The green LED (4) for setpoint is lit and the display is blinking. Set the percentage for heating to **30** using the UP and DOWN buttons (5). Press OK-button (1) to confirm.

Example: Valve selection and pump head calculation

Design flow, cooling: 600 l/h
Design flow, heating: 180 l/h
Pipe size: DN15

The valve selection is determined by the maximum flow required through the coil: 600 l/h.

In this case the Frese OPTIMA Compact with flow range 220-1330 l/h is chosen.

Using the flow graph on page 9 the pre-setting and the

required pressure loss min. Δp for the Frese OPTIMA Compact can be determined:

Max. flow required: 600 l/h
Pre-set: 1.8
Min. Δp : 18.7 kPa

The Min. Δp is used for the pump sizing.

An easy selection of the valve is possible by the use of Quickcalc which is available for downloads at www.frese.eu.

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Technical Data - Frese OPTIMA Compact PICV

Valve housing:	DZR Brass, CW602N
DP controller:	PPS 40% glass
Spring:	Stainless steel
Diaphragm:	HNBR
O-rings:	EPDM
Pressure class:	PN25
Max. differential pressure:	800 kPa
Medium temperature range:	0°C to 120°C



Technical Data - Frese Thermic Actuator for PICV

Characteristics:	Thermic actuator, normally closed
Protection class:	IP 54 to EN 60529
Supply:	24V AC
Frequency:	50/60 Hz
Control signal:	0-10V DC
Actuating force:	100 N
Stroke:	max. 5.5 mm
Running time:	30 s/mm, 0-10 V DC
Ambient operating conditions:	0°C to 60°C
Cable length:	1.0 m



Technical Data - Frese OPTIMIZER Twin Flow Controller

Material control unit housing:	ABS/PC
Protection class:	IP 23 to EN 60529
Supply:	24V AC/DC
Power consumption	Max 4 VA (total group)
Control signal:	0-10V DC distributed as follows: 0.5-4.5V flow modulation in cooling 4-5-5.5V - closed 5.5-10V flow modulation in heating The control signal must be provided from the BMS system or a room controller.
Ambient operating conditions:	0°C to 50°C, 20-90% RH



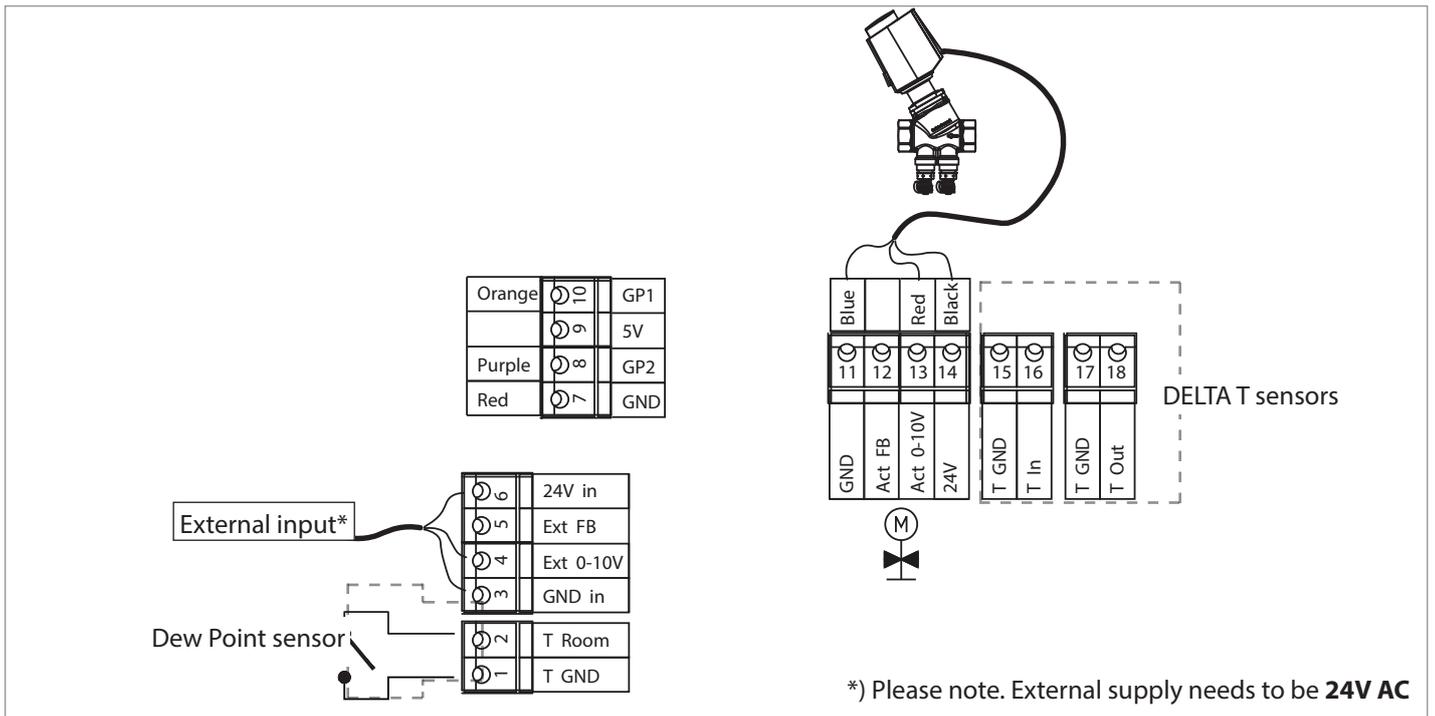
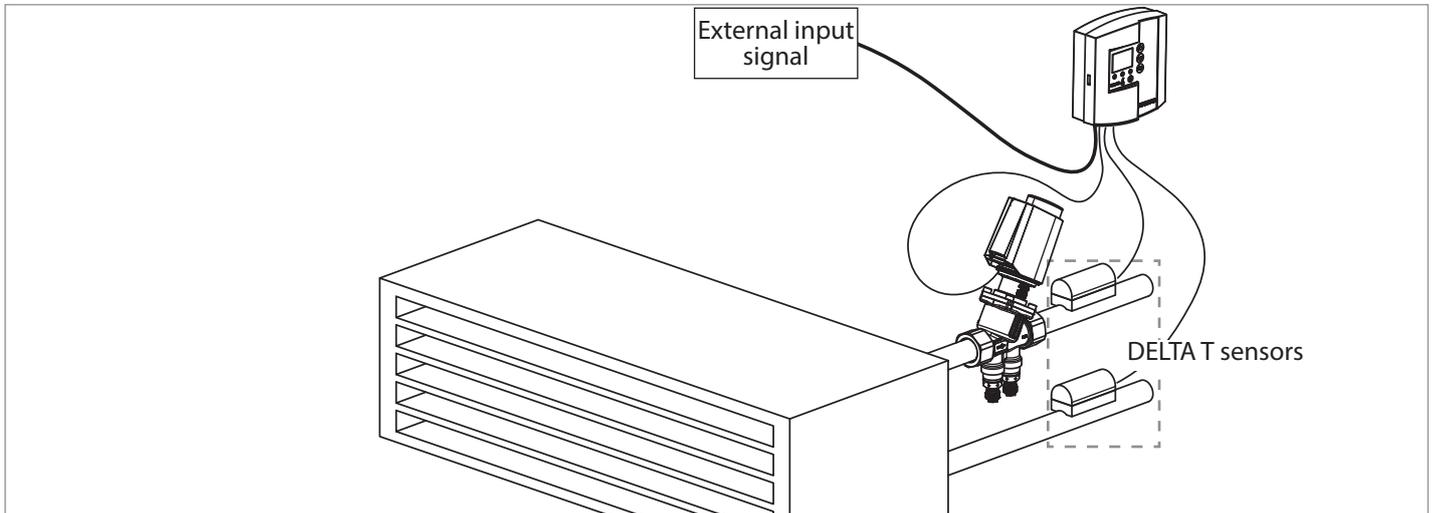
Frese DELTA T sensor (accessory)

Material sensor housing:	ABS
Cable type:	Silicon -40°C to 180°C
Cable length:	2 m



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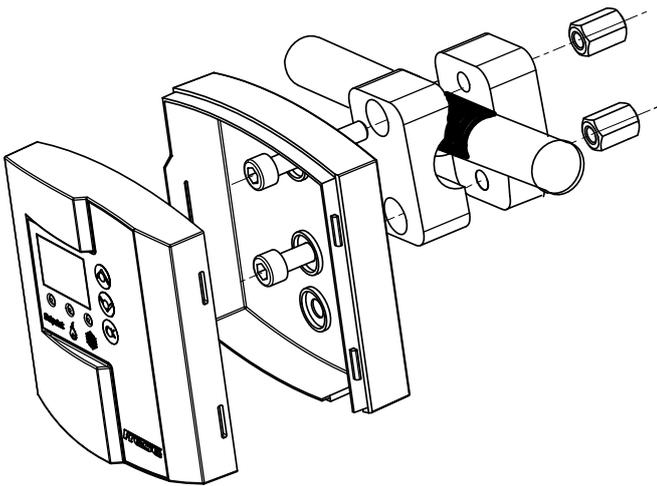
Installation & Electrical wiring



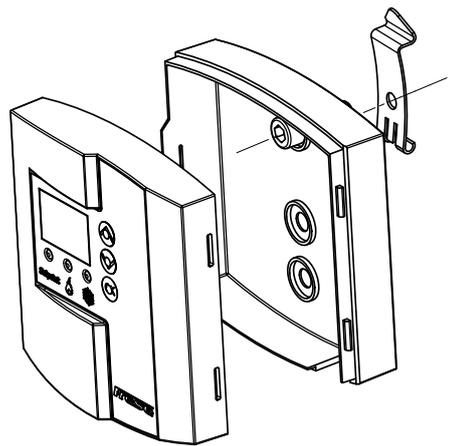
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Mounting of Control Unit

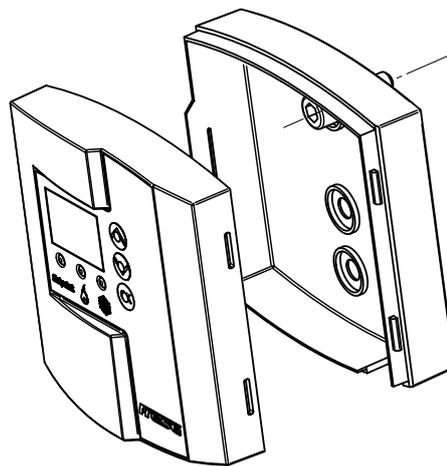
The Frese OPTIMIZER Twin Flow Controller can be mounted to either a pipe using the pipe connectors, a DIN rail using the DIN rail clips, or directly on the wall.



Frese OPTIMIZER Twin Flow Controller mounted with pipe connector on a pipe



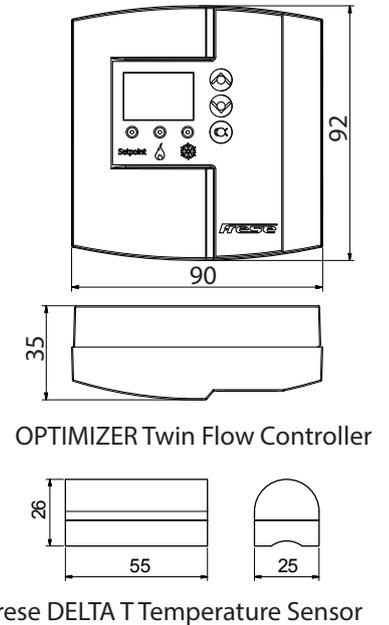
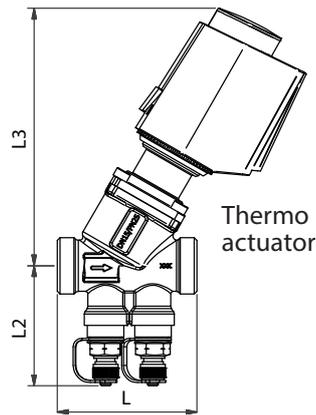
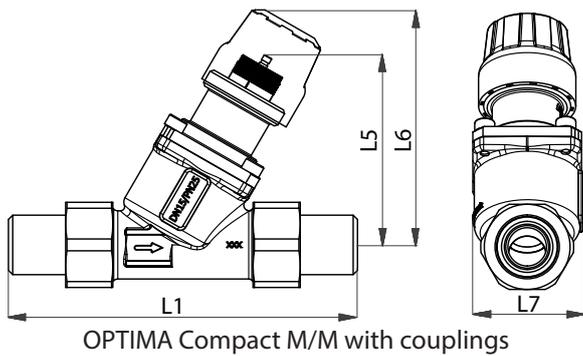
Frese OPTIMIZER Twin Flow Controller mounted with DIN rail mounting clips



Frese OPTIMIZER Twin Flow Controller mounted on a wall

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Dimensions



Dimension & Weight

Dim.	DN10	DN15		DN20		DN25/DN25L		DN32		
Thread	M/M G 1/2	M/M G 3/4	F/F G 1/2	M/M G 1	F/F G 3/4	M/M G 1-1/4	F/F G 1	M/M G 1-1/2	F/F G 1-1/4	
Length	L	65	65	75	70	79	78/ 104	83/ 100	104	104
	L1	114	122	-	131	-	-	-	-	-
	L2	57	57	57	57	57	59/ 63	59/ 63	68	68
	L3	121	121	121	121	121	124/ 139	124/ 139	139	139
	L5	68	68	68	68	68	68/ 85	68/ 85	85	85
	L6	83	83	83	83	83	83/ 100	83/ 100	100	100
	L7	38	38	38	38	38	38/ 63	38/ 63	63	63
Weight kg	Basic	0.36	0.38	0.42	0.40	0.45	0.51/ 1.02	0.55/ 1.04	1.17	1.17
	P/T	0.45	0.47	0.52	0.50	0.54	0.62/ 1.12	0.65/ 1.14	1.27	1.27

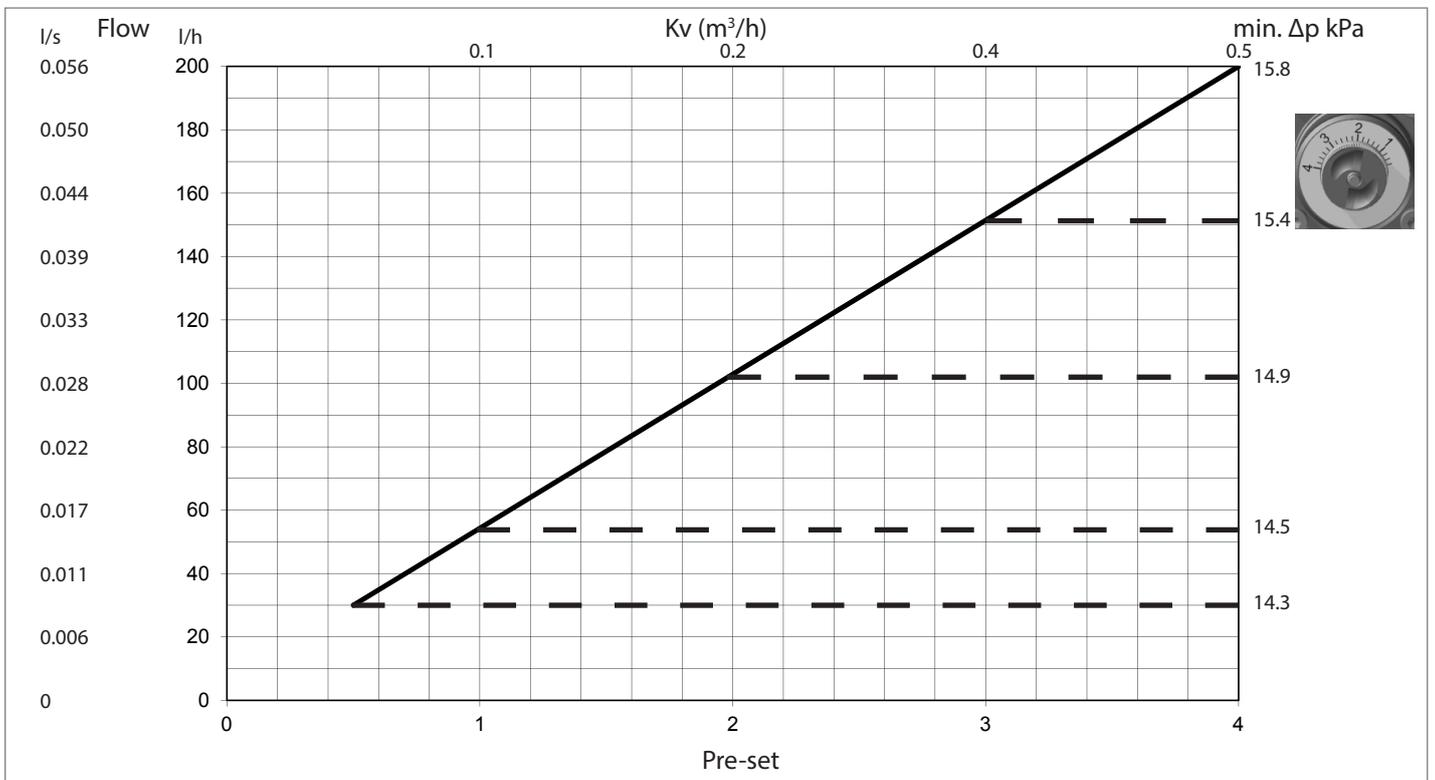
Flow

Dim.		DN10 - DN15		DN15 - DN20		DN20	DN25	DN25L	DN32
Type		Low		High		High	Low	High	-
Stroke	mm	2.5	5.0	2.5	5.0	5.5	5.5	5.5	5.5
Flow	l/h	30 - 200	65 - 370	100 - 575	220 - 1,330	300-1,800	280-1,800	600-3,609	550-4,001
	l/s	0.008-0.056	0.018-0.103	0.028-0.160	0.061-0.369	0.083-0.500	0.078-0.500	0.167-1.003	0.153-1.111
	gpm	0.13 - 0.88	0.29 - 1.63	0.44 - 2.53	0.97 - 5.85	1.32-7.93	1.23-7.93	2.64-15.89	2.42-17.62

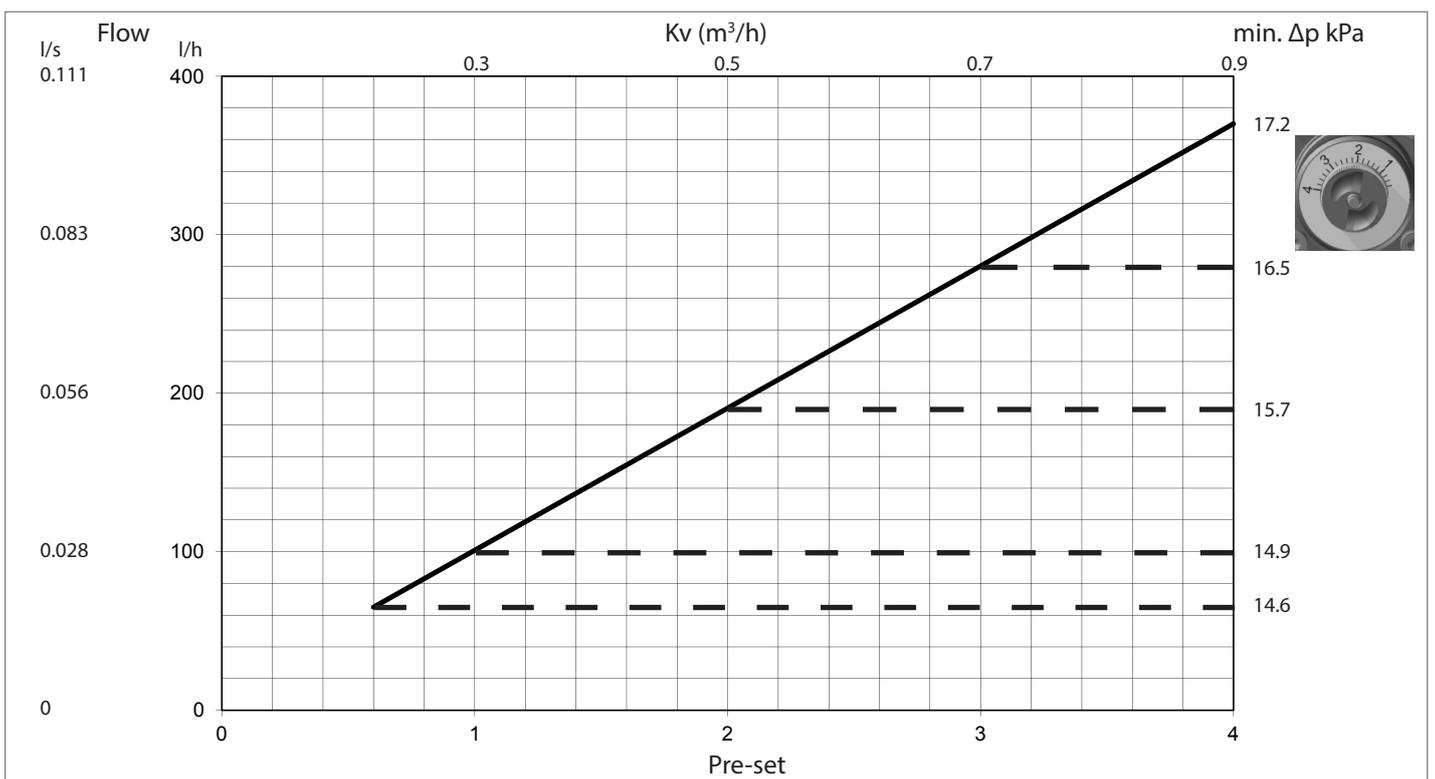
The pipe system shall be properly ventilated to avoid risk of air pockets. Glycolic mixtures up to 50% are applicable (both ethylene and propylene).
Frese A/S can accept no responsibility if another actuator is used instead of the Frese actuator.
Recommendation: Water treatment to VDI 2035.

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Frese OPTIMA Compact · Low 2.5 DN10/15

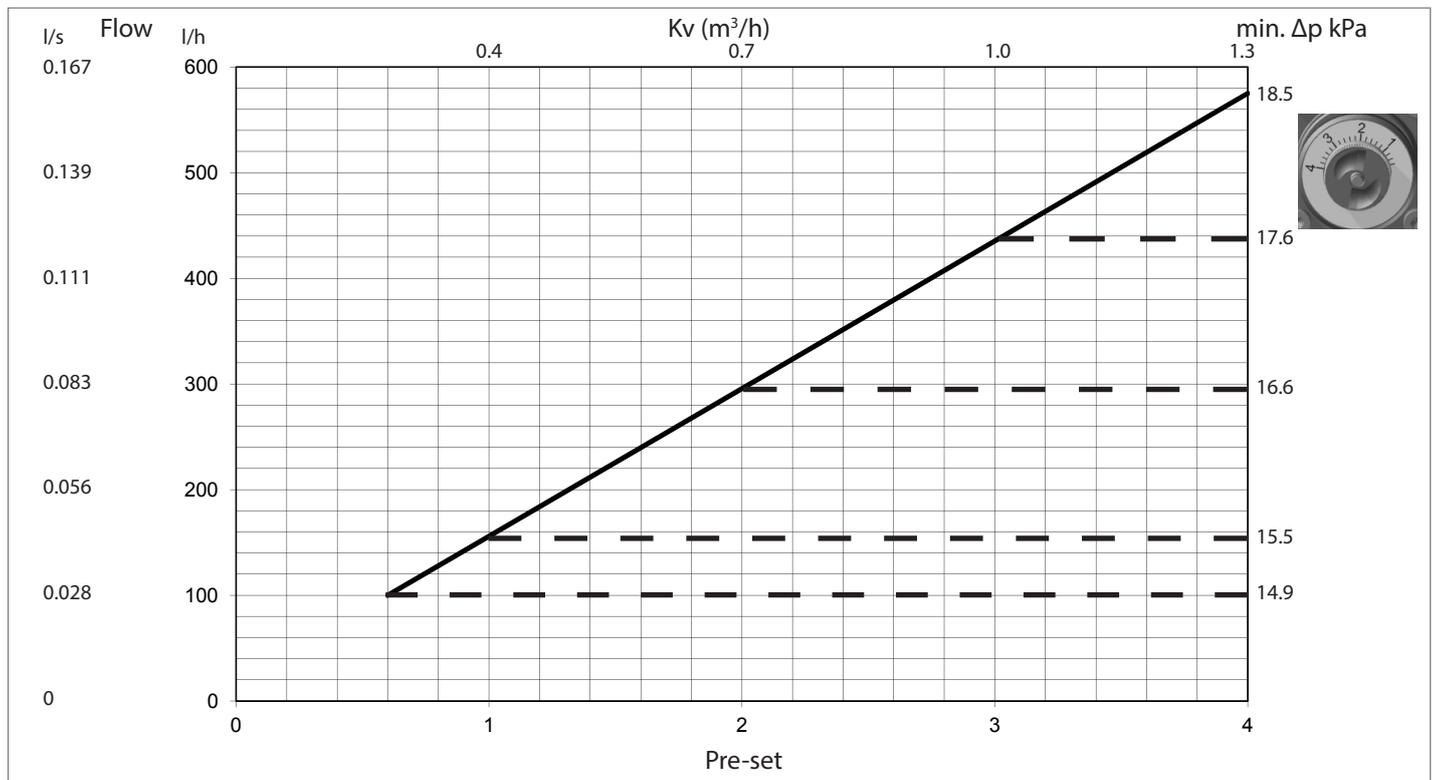


Frese OPTIMA Compact · Low 5.0 DN10/15

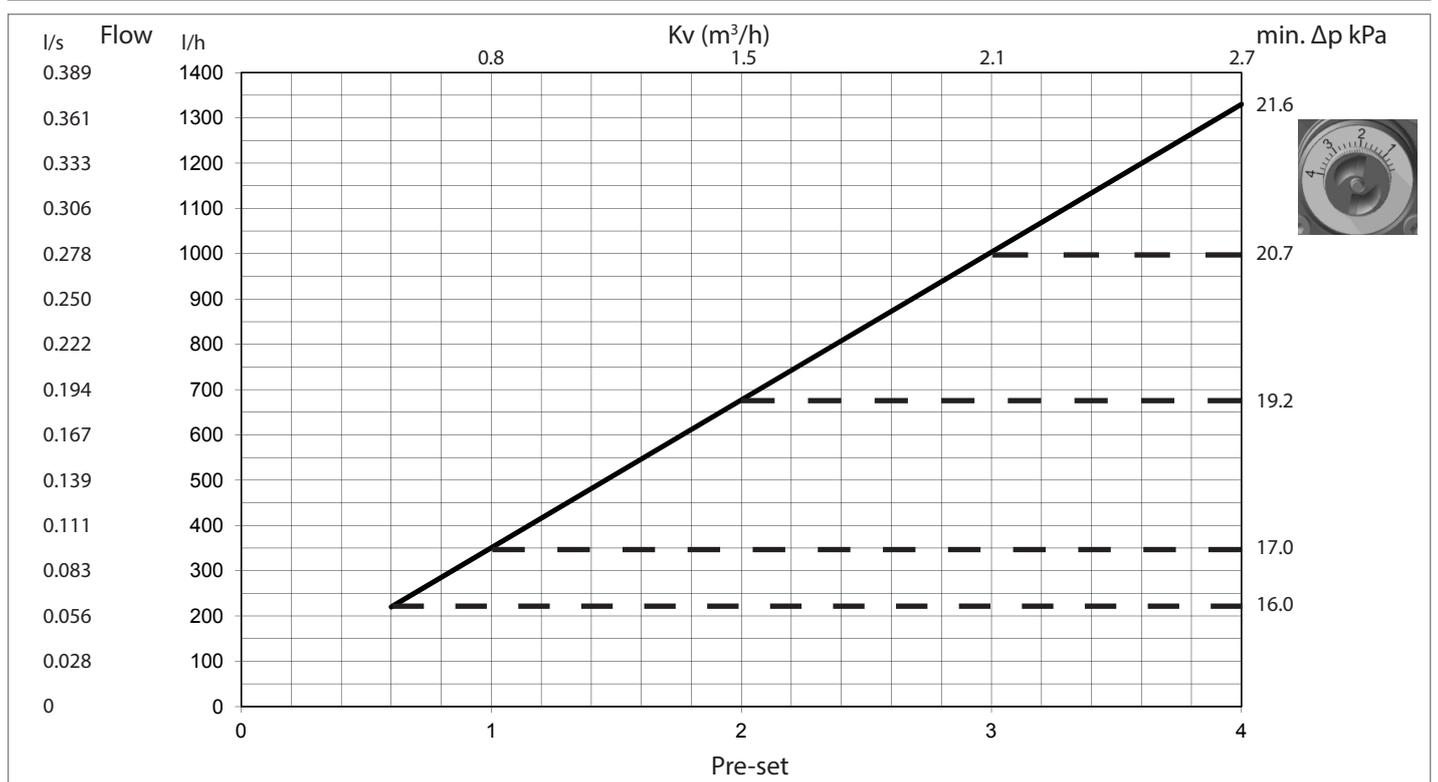


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Frese OPTIMA Compact · High 2.5 DN15/20

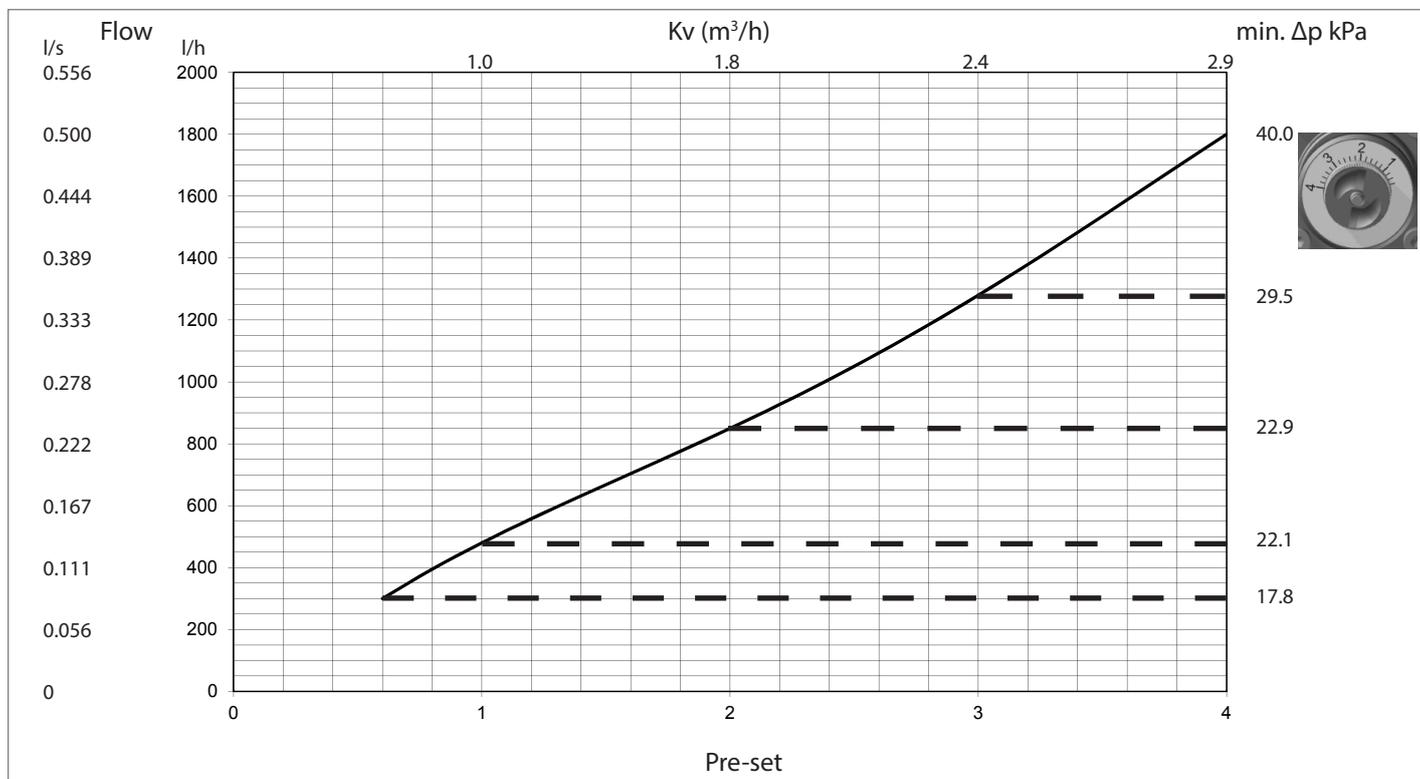


Frese OPTIMA Compact · High 5.0 DN15/20

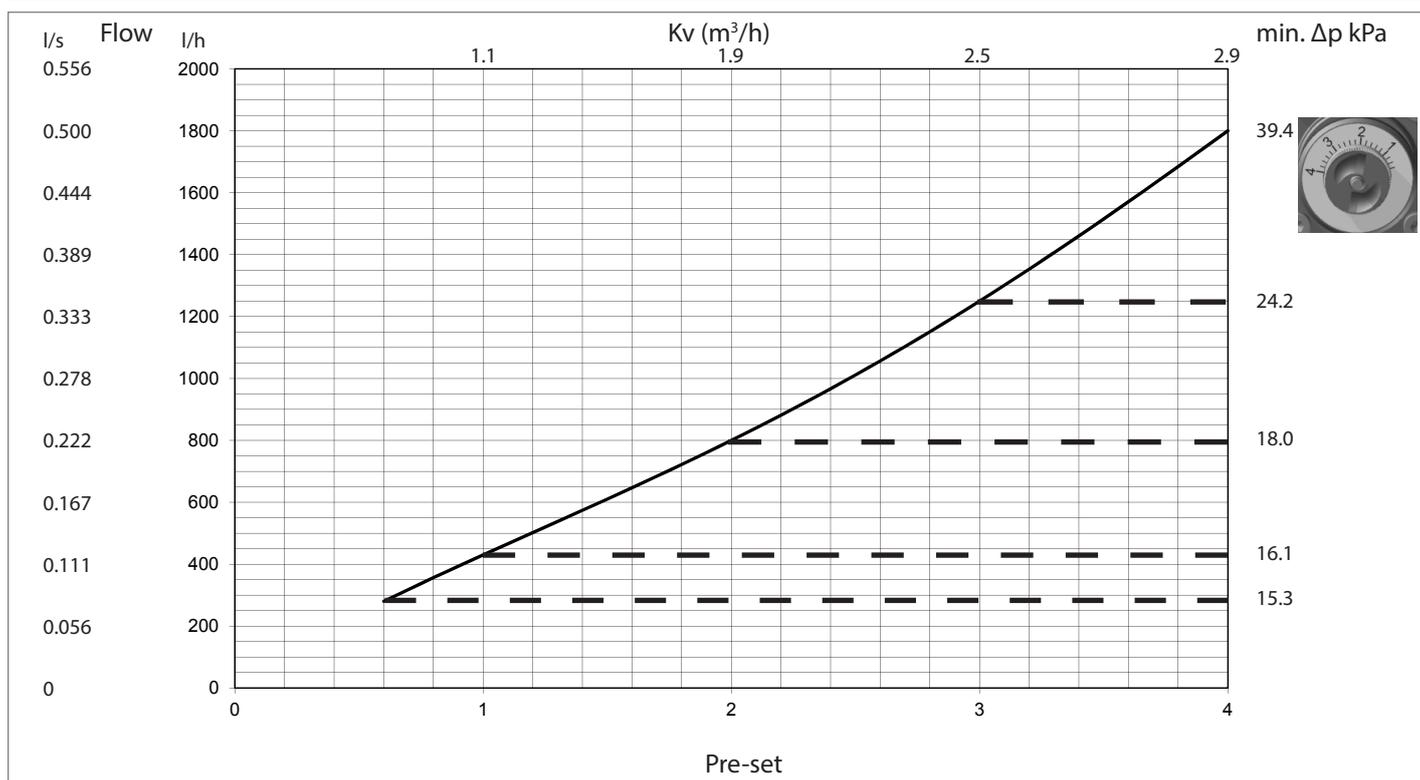


Frese OPTIMIZER Twin Flow Controller 2-pipe heating and cooling systems

Frese OPTIMA Compact · High 5.5 DN20

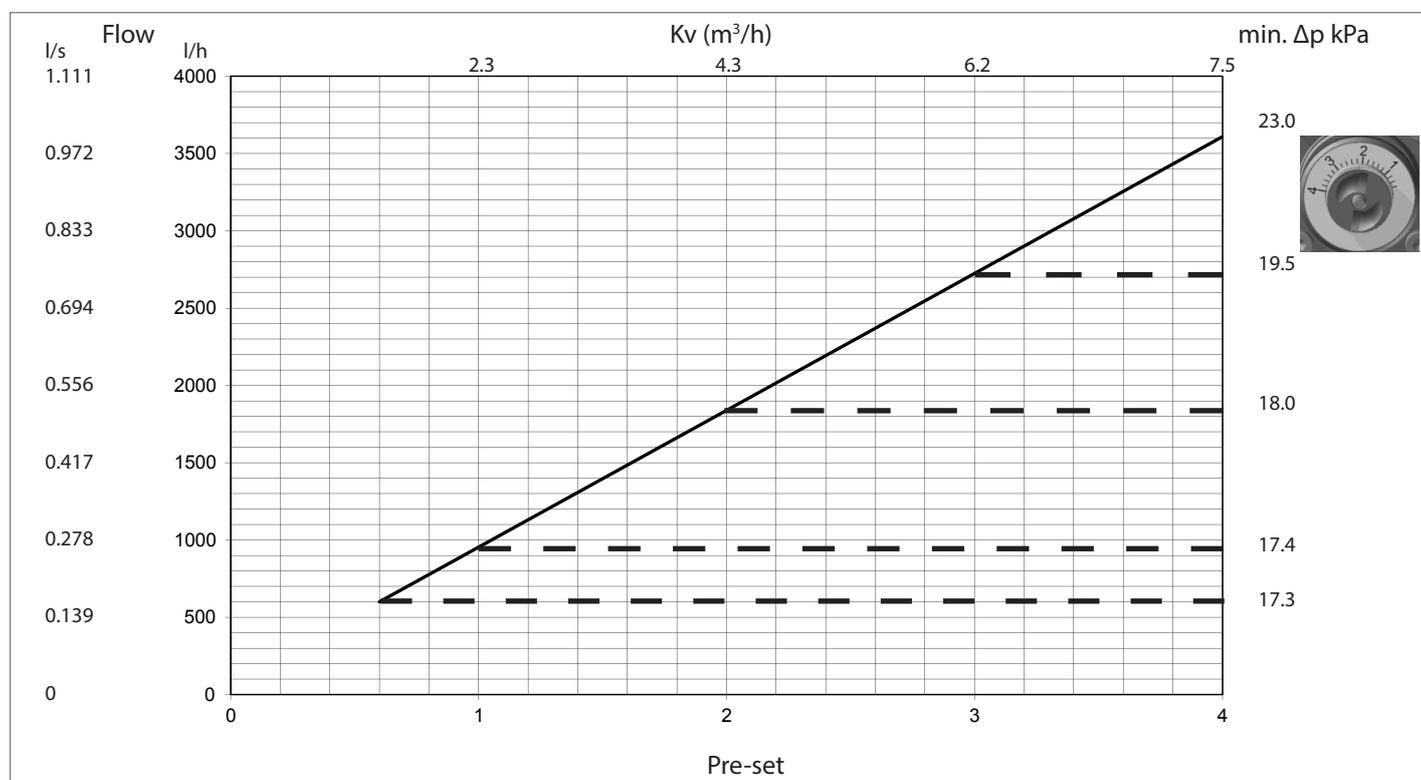


Frese OPTIMA Compact · Low 5.5 DN25

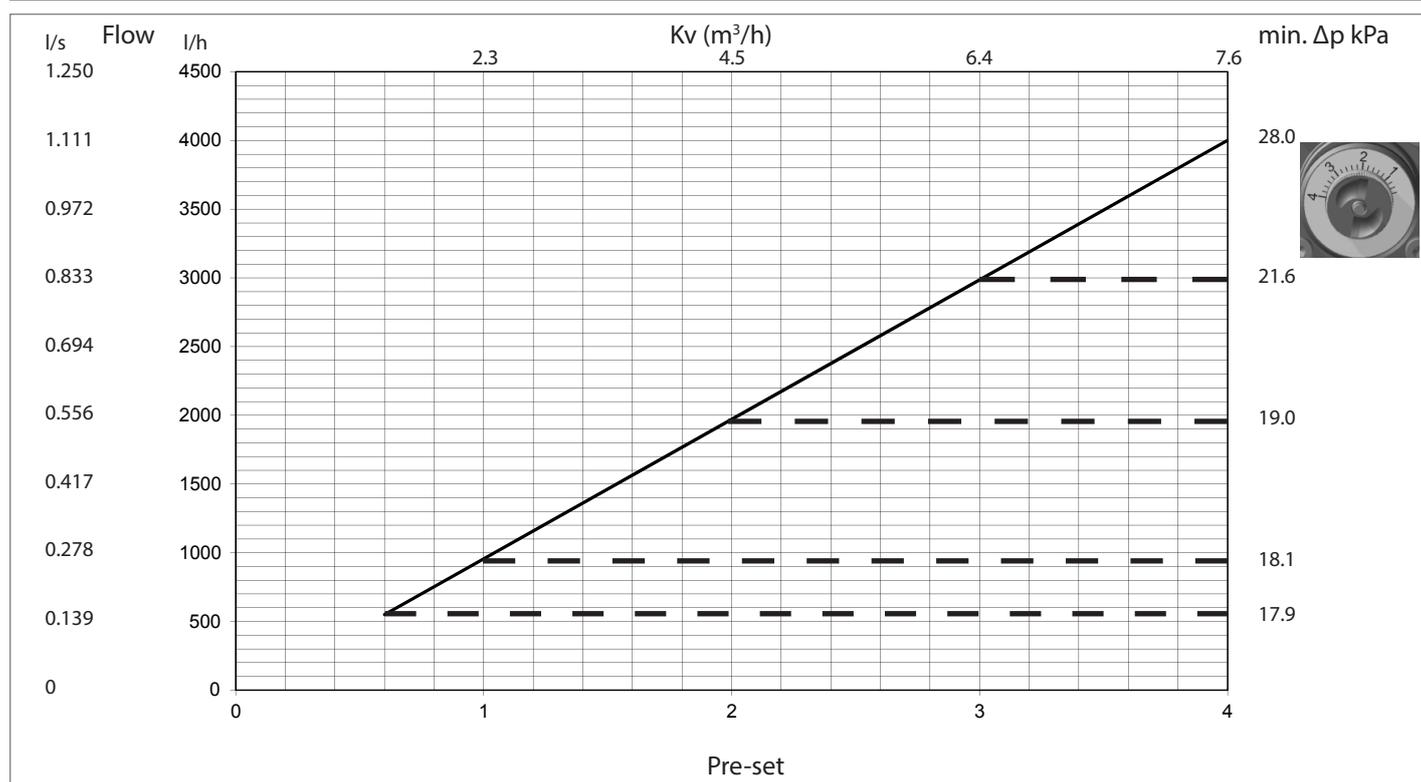


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Frese OPTIMA Compact · High 5.5 DN25L



Frese OPTIMA Compact · DN32

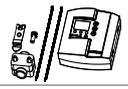


Frese OPTIMIZER Twin Flow Controller 2-pipe heating and cooling systems

Product programme · Frese OPTIMA Compact

Dim.	Type	Flow l/h	Flow l/s	 M/M	 M/M, PT plugs	 F/F	 F/F, PT plugs
DN10	Low 2.5 mm	30-200	0.008-0.056	53-1300	53-1320	-	-
	Low 5.0 mm	65-370	0.018-0.103	53-1309	53-1329	-	-
DN15	Low 2.5 mm	30-200	0.008-0.056	53-1302	53-1322	53-1342	53-1362
	Low 5.0 mm	65-370	0.018-0.103	53-1310	53-1330	53-1350	53-1370
	High 2.5 mm	100-575	0.028-0.160	53-1304	53-1324	53-1344	53-1364
	High 5.0 mm	220-1,330	0.061-0.369	53-1305	53-1325	53-1345	53-1365
DN20	High 2.5 mm	100-575	0.028-0.160	53-1312	53-1332	53-1352	53-1372
	High 5.0 mm	220-1,330	0.061-0.369	53-1308	53-1328	53-1348	53-1368
	High 5.5 mm	300-1,800	0.083-0.500	53-1311	53-1331	53-1318	53-1338
DN25	Low 5.5 mm	280-1,800	0.078-0.500	53-1317	53-1337	53-1319	53-1339
DN25L	High 5.5 mm	600-3,609	0.167-1.003	53-1313	53-1333	53-1353	53-1373
DN32	5.5 mm	550-4,001	0.153-1.111	53-1314	53-1334	53-1354	53-1374

Product programme · Frese OPTIMIZER Twin Flow Controller & Frese DELTA T temperature sensors

	Type	Frese no.
	Frese OPTIMIZER Twin Flow Controller incl. mounting kit	48-5546
	Frese DELTA T temperature sensors, 2 m cable & cable ties	48-5547

Frese OPTIMIZER Twin Flow Controller 2-pipe heating and cooling systems

Technical Specification Text

- The pressure independent control group shall, with only one data point from the external BMS system, ensure modulating control for both heating and cooling.
- The maximum flow for cooling shall be set on the pressure independent control valve and the heating flow shall be set on the control unit in the range from 10% to 100% of maximum cooling flow.
- The pressure independent control group shall be delivered as a total valve package and shall consist of:
 - 1 pcs. PICV with a 0-10V thermic modulating actuator.
 - 1 pcs. control unit with a pipe connection bracket.
- The system shall safeguard loss of voltage by closure of flow.
- The control unit shall be capable of providing a 0-10V DC feedback signal.
- Protection class for the actuators shall be IP 54 according to EN 60529.
- The valve housings shall be made in dezinification resistant brass (DZR).
- The pressure independent control valve shall have full stroke modulation and not be restricted by the flow setting position.
- The pressure independent control valve shall have a maximum operating differential pressure of 800 kPa (8 bar)
- The pressure independent control valve shall be capable of closing against a maximum differential pressure of 600 kPa (6 bar) DN15-20 and 800 kPa (8 bar) DN25 with a leakage rate at maximum 0.01% of the maximum rated volumetric flow and comply to EN1349 Class IV.
- The pressure independent control valve must be tested in accordance with the BSRIA document BTS.1 "Test Method for Pressure Independent Controls Valves" and manufacturer must be able to provide the test results upon request.

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