Frese COMBIFLOW 6-way Pressure Independent Control Valve

Description

The Frese COMBIFLOW 6-way Pressure Independent Control Valve provides complete pressure independent balancing and control for 4-pipe heating and cooling systems.

Operation

The Frese COMBIFLOW 6-way provides modulating control, which works independently of any variations in the differential pressure of the system.

The valve is controlled by a rotating actuator with MODBUS control.

The MODBUS actuator provides an individually programming of the cooling and heating flow.

Application

The Frese COMBIFLOW 6-way can be used in 4-pipe systems, such as:

- Heating and cooling ceilings
- Decentralised ventilation units
- Fan coil systems
- Convection heating & cooling units

Features

- Patented 6-way PICV technology with integrated DP controller in the 6-way valve, which is capable of switching between cooling and heating and with no need for a second valve for pressure independent modulation
- The MODBUS pre-setting function of the 6-way PICV allows full individually setting of both the cooling and the heating flow
- The constant differential pressure across the modulating control component of the 6-way 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
- Ultra-high KVS value on the 6-way valve to provide minimal pressure loss

Benefits

- Only one valve for both 6-pipe connection and pressure independent modulation with fewer connection points and less risk of leakages
- Only one data point for the BMS needed
- One valve covers a wide flow range
- Complete solution. No balancing valves required in the system
- Simple and efficient flushing due to removable DP-cartridge resulting in no flow limitation when flushing the system.
- Energy saving through optimum pressure independent flow limitation and regulation
- Remote flow setting via MODBUS connection to the BMS
- Modulating control for both cooling and heating
- Lowest pressure loss on the market of 6-way solutions, resulting in significant pump energy savings
- Less time spent in selection and sizing. Only design flow and minimum differential pressure required
- Longer actuator life time due to pressure independent control where all pressure fluctuations are compensated by the integrated DP controller
- Full comfort without recommissioning should the system be extended during the construction phase
- Built-in pressure relief of the coil when the valve is in closed position without heating or cooling demands
- Compact solution with small space requirements
- No time-consuming commissioning required
- Safety function closes the modulating valve if the external input signal is lost

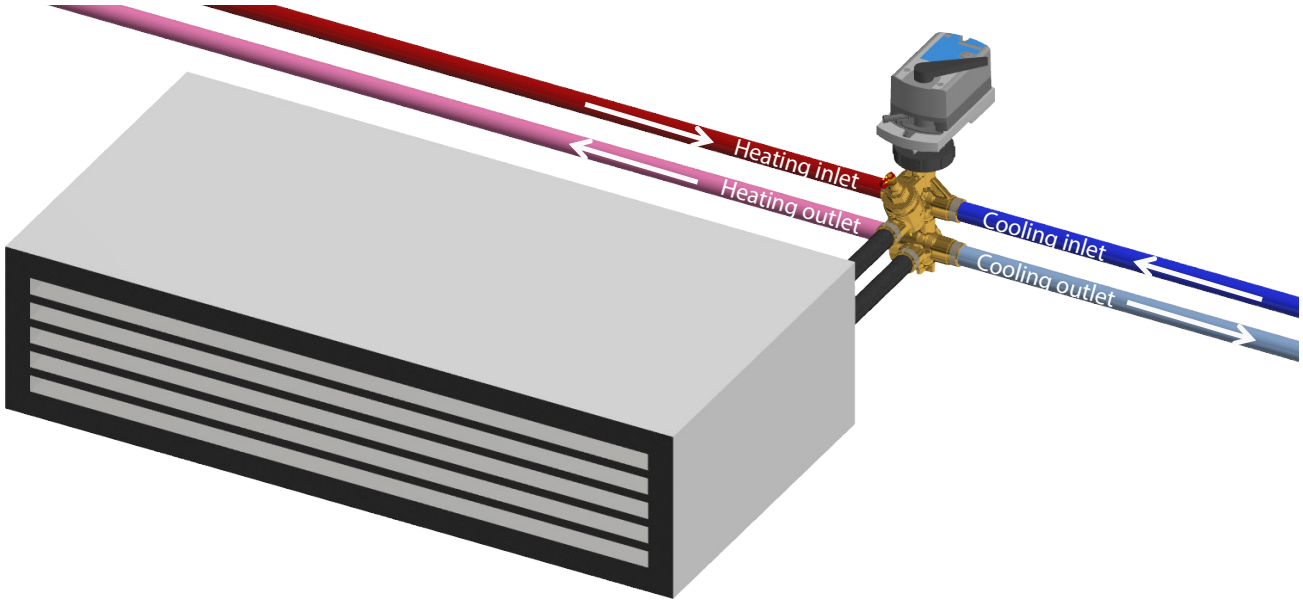
Frese COMBIFLOW 6-way
Pressure Independent Control Valve

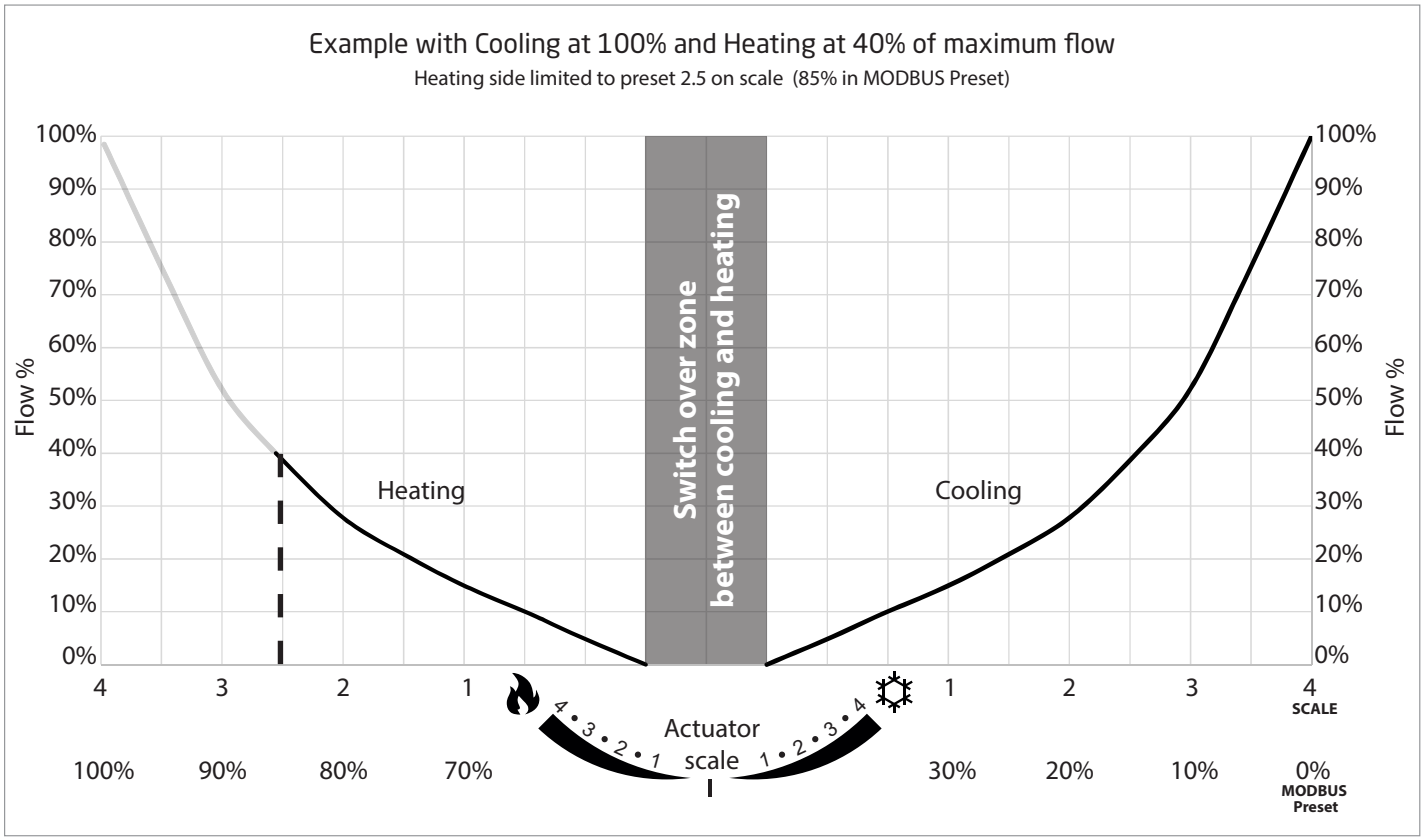
Function

The Frese COMBIFLOW 6-way PICV controls both heating and cooling with only one single data point from the BMS system, through a MODBUS signal.

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

The design flow rate for the cooling and heating system is set using the MODBUS or mechanical setting on the actuator.

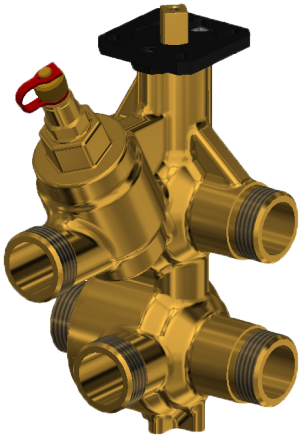




Frese COMBIFLOW 6-way
Pressure Independent Control Valve

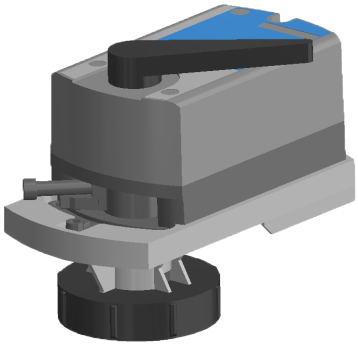
Technical Data - Frese COMBIFLOW 6-Way

Valve housing:	DZR Brass, CW602N
Balls	DZR Brass, nickel plated
Gasket	PTFE, Glass and carbon fiber reinforced
DP controller:	PPS 40% glass
Spring:	Stainless steel
Diaphragm:	HNBR
O-rings:	EPDM
Mounting plate for actuator	PPS GF40
Rotator for DP-pressure	PPO
Pressure class:	PN25
Max. differential pressure:	400 kPa
Medium temperature range:	0°C to 90°C



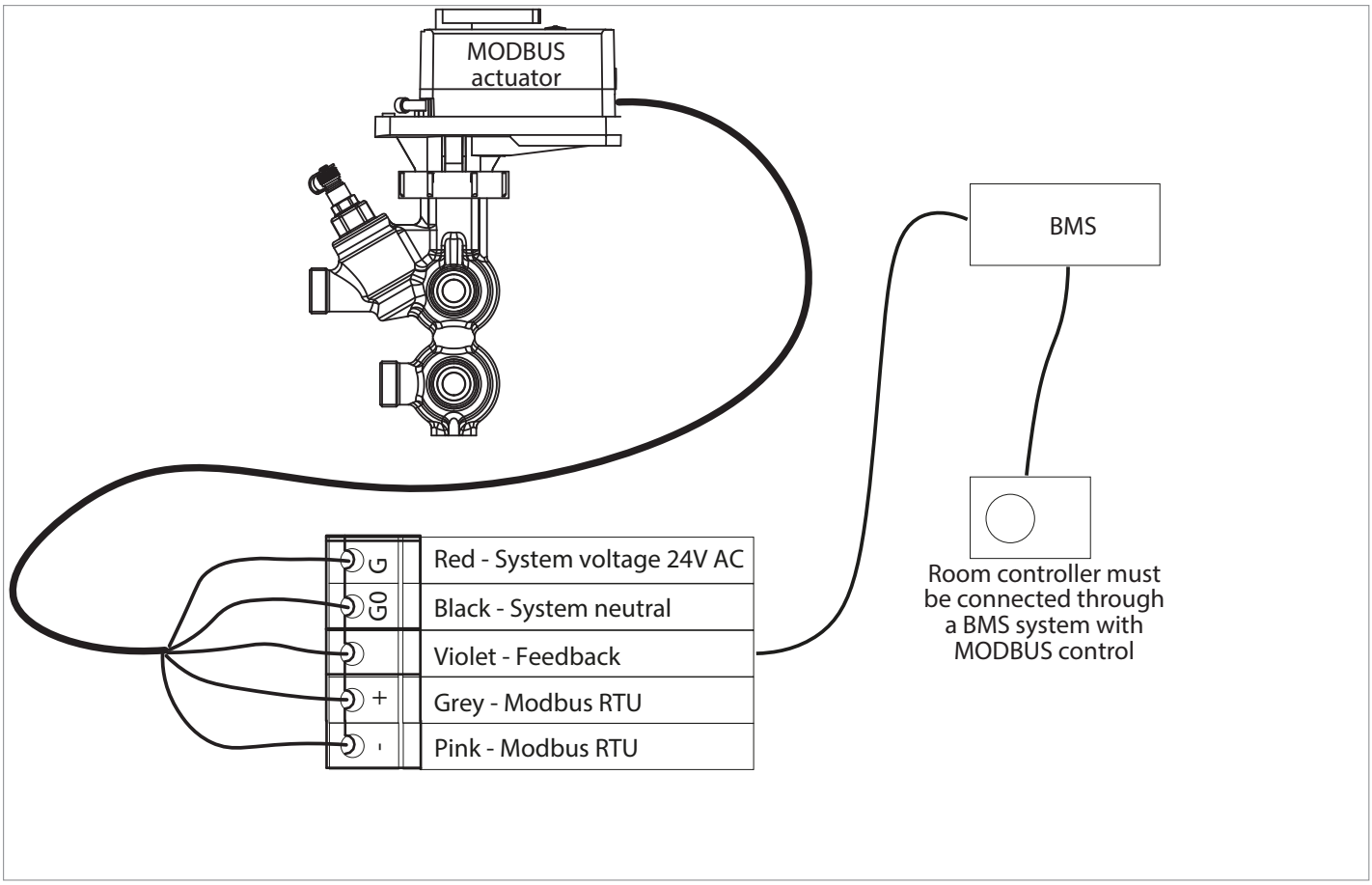
Technical Data - Frese COMBIFLOW Modbus Rotating Actuator

Characteristics:	Motoric rotating actuator
Protection class:	IP 54 to EN 60529
Supply:	24V AC
Frequency:	50/60 Hz
Control signal:	MODBUS (RTU285)
Actuating moment:	10 Nm
Running time:	150 s @ 90°
Ambient operating conditions:	-20°C to 50°C
Cable length:	0.9 m
Weight:	0.75 kg



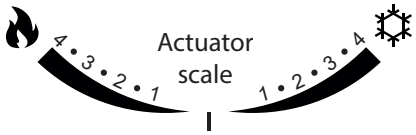
Frese COMBIFLOW 6-way
Pressure Independent Control Valve

Installation & Electrical wiring



Frese COMBIFLOW 6-way
Pressure Independent Control Valve

Setting and Flow



DN15 - 1400 l/h						
	Flow cooling [l/h]	Flow heating [l/h]	Preset %	Preset scale	Min DP [kPa] For flow verification	Total pressure loss [kPa] For pump calculation
	1400	0	0	4.0	23	30
	1350	0	3	3.7	22	29
	1300	0	5	3.6	22	28
	1250	0	7	3.4	21	27
	1200	0	8	3.3	20	25
	1150	0	9	3.2	20	25
	1100	0	10	3.1	19	23
	1050	0	11	3.0	19	23
	1000	0	12	2.9	19	23
	950	0	13	2.8	19	22
	900	0	14	2.7	19	22
	850	0	15	2.7	19	22
	800	0	16	2.6	18	20
	750	0	17	2.5	18	20
	700	0	18	2.4	17	19
	650	0	19	2.3	17	19
	600	0	20	2.2	16	17
	550	0	21	2.1	16	17
	500	0	22	2.0	16	17
	450	0	23	1.9	16	17
	400	0	24	1.8	16	17
	350	0	26	1.7	15	15
	300	0	28	1.5	15	15
	250	0	30	1.3	15	15
Switch over zone						
	0	150	70	1.3	15	15
	0	200	71	1.4	15	15
	0	250	73	1.6	15	15
	0	300	75	1.8	15	15
	0	350	77	1.9	15	15
	0	400	78	2.0	16	17
	0	450	80	2.2	16	17
	0	500	81	2.3	16	17
	0	550	82	2.4	16	17
	0	600	84	2.6	16	17
	0	650	85	2.7	17	19
	0	700	86	2.7	17	19
	0	750	87	2.8	18	20
	0	800	88	2.9	18	20
	0	850	89	3.0	19	22
	0	900	90	3.1	19	22
	0	950	91	3.2	19	22
	0	1000	92	3.3	19	23
	0	1050	93	3.4	19	23
	0	1100	94	3.5	19	23
	0	1150	95	3.6	20	25
	0	1200	96	3.6	20	25
	0	1250	97	3.7	21	27
	0	1300	98	3.8	22	28
	0	1350	99	3.9	22	29
	0	1400	100	4.0	23	30

DN20 - 4500 l/h						
	Flow cooling [l/h]	Flow heating [l/h]	Preset %	Preset scale	Min DP [kPa] For flow verification	Total pressure loss [kPa] For pump calculation
	4500	0	0	4.0	32	52
	4300	0	1	3.9	31	49
	4100	0	1	3.9	30	46
	3900	0	2	3.8	30	45
	3700	0	3	3.7	29	42
	3500	0	3	3.7	28	40
	3300	0	4	3.6	27	38
	3100	0	5	3.6	26	35
	2900	0	6	3.5	25	33
	2700	0	7	3.4	25	32
	2500	0	9	3.2	24	30
	2300	0	10	3.1	23	28
	2100	0	12	2.9	23	27
	1900	0	13	2.8	23	27
	1700	0	15	2.7	22	25
	1500	0	17	2.5	21	23
	1300	0	19	2.3	20	22
	1100	0	22	2.0	20	21
	900	0	24	1.8	20	21
	700	0	26	1.7	19	19
	500	0	29	1.4	19	19
	300	0	31	1.2	19	19
Switch over zone						
	0	300	70	1.3	19	19
	0	500	72	1.5	19	19
	0	700	75	1.8	19	19
	0	900	78	2.0	20	21
	0	1100	81	2.3	20	21
	0	1300	84	2.6	20	22
	0	1500	86	2.7	21	23
	0	1700	88	2.9	22	25
	0	1900	89	3.0	23	27
	0	2100	90	3.1	23	27
	0	2300	92	3.3	23	28
	0	2500	93	3.4	24	30
	0	2700	94	3.5	25	32
	0	2900	95	3.6	25	33
	0	3100	95	3.6	26	35
	0	3300	96	3.6	27	38
	0	3500	97	3.7	28	40
	0	3700	98	3.8	29	42
	0	3900	98	3.8	30	45
	0	4100	99	3.9	30	46
	0	4300	100	4.0	31	49
	0	4500	100	4.0	32	52

Frese COMBIFLOW 6-way Pressure Independent Control Valve

Frese COMBIFLOW Modbus Programming Tool

The Frese COMBIFLOW Modbus Programming Tool is operated by five keys.

- Keys UP (3) and DOWN (4) are used to navigate to a menu item.
- If pressing ENTER (5) on a highlighted menu item, the value can be changed with UP/DOWN (if not protected or read-only).
- Pressing ENTER confirms the value change.
- By pressing ESCAPE (2), a value change can be cancelled or a menu page can be left to the next higher level.
- To reset the Programming Tool, press RESET (1) until the display gets dark. The restart takes app. 20 seconds.

Operation keys:

1. RESET
2. ESCAPE
3. UP
4. DOWN
5. ENTER

Example
Preset a DN15 valve

AST20 <> BVA MODBUS	1/1
Online view	>
Field device configuration	>
Bus configuration	>
Diagnostic and maintenance	>
AST20 settings	>
Mass configuration	>

ENTER →

Cooling 750 l/h *(See table below)*
Set min. position to 17%

Field device configuration	1/1
Opening dir	**CCW**
Adaptive pos	**Off**
Min position	**17%**
Max position	**100%**
Startup setpoint	**0%**

ENTER →

AST20 <> BVA MODBUS	1/1
Online view	>
Field device configuration	>
Bus configuration	>
Diagnostic and maintenance	>
AST20 settings	>
Mass configuration	>

ENTER →

Heating 250 l/h *(See table below)*
Set max position to 73%

Field device configuration	1/1
Opening dir	**CCW**
Adaptive pos	**Off**
Min position	**17%**
Max position	**73%**
Startup setpoint	**0%**

ENTER →

Closing position

The Frese COMBIFLOW 6-way valve is closed in the middle position (no flow from heating nor from cooling to the terminal unit). The Frese COMBIFLOW Modbus Rotary Actuator calculates its middle position based on the flow setting values. Because of this the middle position of the valve equals the middle position of the actuator only when the maximum flow for heating (100%) and the maximum flow for cooling (0%) has been provided.

Consequently, if the flow for cooling (Min. position in %) is much greater than the flow for heating (Max. position in %), or the opposite, the middle position calculated by the actuator would move away from the middle position required by the valve to close completely.

In order to be able to close the valve regardless of the flow setting values the master BMS controller must be programmed to lock the closing position of the actuator. The following formula should be used for this:

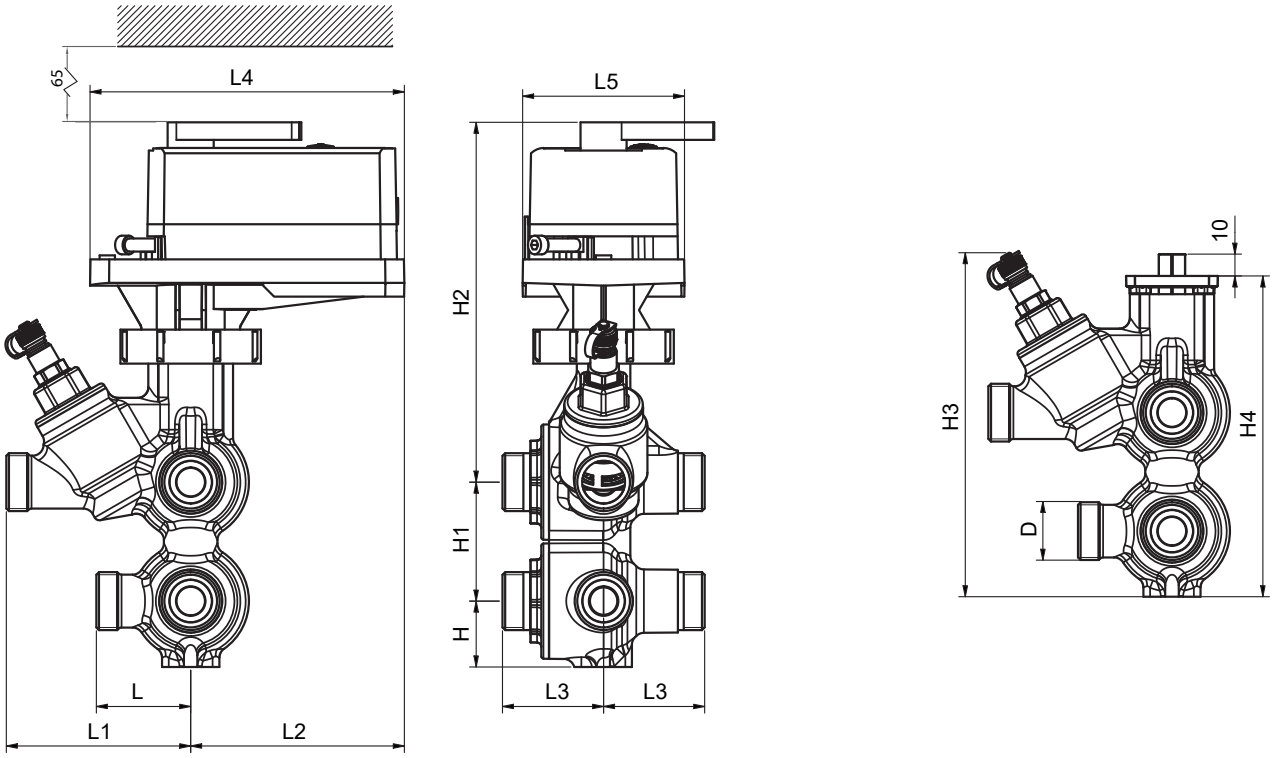
$$\textbf{Closing position} = \frac{50 - \text{Min. position \%}}{\text{Max. position \%} - \text{Min. position \%}}$$

Note:

When setting the flows for heating and for cooling using either the Frese COMBIFLOW Modbus Programming Tool or the BMS master controller the closing position must always be programmed in the BMS master controller.

Frese COMBIFLOW 6-way
Pressure Independent Control Valve

Dimensions



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.

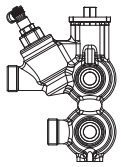
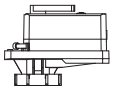
Dimension Table

Size		DN15	DN20
Length [mm]	L	43	50
	L1	84	120
	L2	97	97
	L3	46	55
	L4	143	143
	L5	74	74
Height [mm]	H	30	38
	H1	54	69
	H2	164	171
	H3	157	193
	H4	147	177
Thread	D	M/M G 3/4	M/M G 1
Weight* [kg]		1.9	3.4

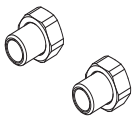
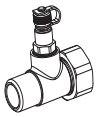
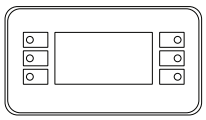
*) Weight without actuator

Frese COMBIFLOW 6-way
Pressure Independent Control Valve

Product programme

	Size	Type	Flow l/h	Frese no.
	DN15	Frese COMBIFLOW 6-way	1400	53-1844
	DN20	Frese COMBIFLOW 6-way	4500	53-1845
	-	Frese COMBIFLOW Rotary Actuator 0-10V	-	Will be released later 2020
		Frese COMBIFLOW Modbus Rotary Actuator	-	48-5398

Accessories

	Type	For COMBIFLOW size	Coupling dimensions	Frese no.
	Couplings DZR brass CW602N (2 pieces incl. gaskets)	DN15	G 1/2 - R 3/4	43-2330
			G 3/4 - R 3/4	48-0042
		DN20	G 3/4 - R 1	43-3330
			G 1- R1	43-3331
	PT Coupling	DN15	G 1/2 - R 3/4	48-0038
			G 3/4 - R 3/4	48-0041
		DN20	G 3/4 - R 1	48-0039
			G 1- R1	48-0040
	Frese COMBIFLOW Modbus Programming Tool	DN15-DN20		48-5399

Frese COMBIFLOW 6-way
Pressure Independent Control Valve

Technical Specification Text

- The solution must be one valve providing both change-over between heating and cooling, and pressure independent modulating flow control with one common DP-controller for both heating and cooling side.
- When the valve is in closed position without heating or cooling demands it shall provide pressure relief of the coil.
- The 6-way pressure independent control valve, with only one data point from the external BMS system, must ensure modulating control for both heating and cooling.
- Remote flow setting of the valve shall be possible via MODBUS connection to the BMS
- The valve must contain a removable DP-controller to allow for full flusing without flow limitation throgh the valve.
- The maximum flow for both cooling and heating shall be set individually in the range from 20% or lower to 100% of maximum flow.
- The actuator shall be capable of providing a 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 a maximum operating differential pressure of 400 kPa (4 bar)
- The pressure independent control valve shall be capable of closing against a maximum differential pressure of 400 kPa (4 bar) with a leakage rate at maximum 0.01% of the maximum rated volumetric flow and comply to EN1349 Class IV.

Frese A/S assumes no responsibility for errors, if any, in catalogues, brochures, and other printed matter. Frese A/S reserves the right to modify its products without prior notice, including already ordered products, if this does not alter existing specifications. All registered trademarks in this material are the property of Frese A/S. All rights reserved.

Frese A/S
Sørøvej 8
DK- 4200 Slagelse
Tel: +45 58 56 00 00
info@frese.dk