

COMBIFLOW 6-way

Description

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

Operation

The 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 0-10V, 4-20mA, BACnet or Modbus communication protocols. The BACnet & Modbus actuators provide an individual programming of the cooling and heating flow.



Application

The 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 BACnet & Modbus pre-setting function of the 6-way PICV allows full individual 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 BACnet or 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

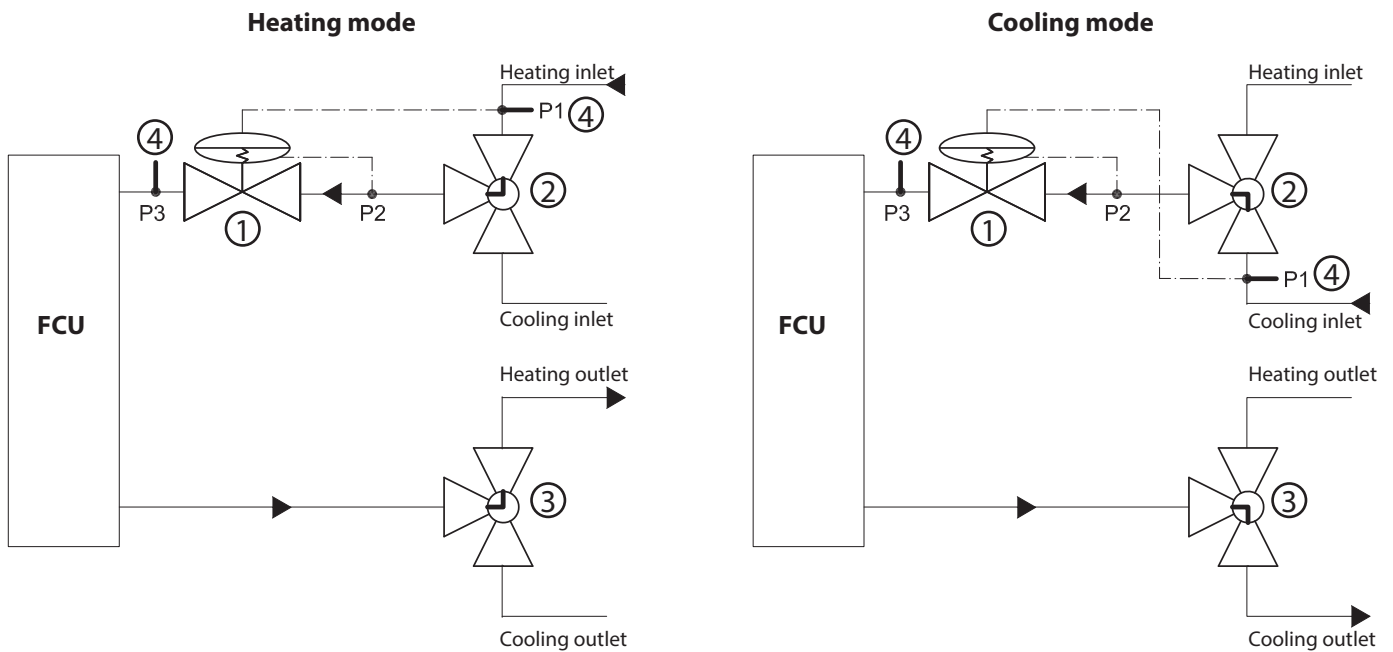
COMBIFLOW 6-way

Design

The design of COMBIFLOW 6-way PICV combines high performance with small size and compact construction.

The main components of the valve are:

- ① Differential pressure controller
- ② Characterized ball valve designed for modulating control and switching between heating or cooling (inlet)
- ③ Ball valve for switching between heating or cooling (outlet)
- ④ P/T Plugs (P3 Optional)



The innovative patented design makes it possible for the integrated differential pressure controller to maintain the differential pressure over the characterized ball valve on the inlet side, for both the heating and the cooling flow.

When the valve is changing from heating to cooling or vice versa, the inlet pressure P1 is transferred to the upper side of the differential pressure controller by an internal capillary. The capillary connection is changing from the heating to the cooling side through a hole in the spindle that is rotating from the heating to the cooling side.

In this way the differential pressure can be controlled both on the heating or the cooling side by only one differential pressure controller, thus providing full pressure independent flow control.

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Function

The COMBIFLOW 6-way PICV controls both heating and cooling flows with only one single data point from the BMS system, through a 0-10V, BACnet or MODBUS signal.

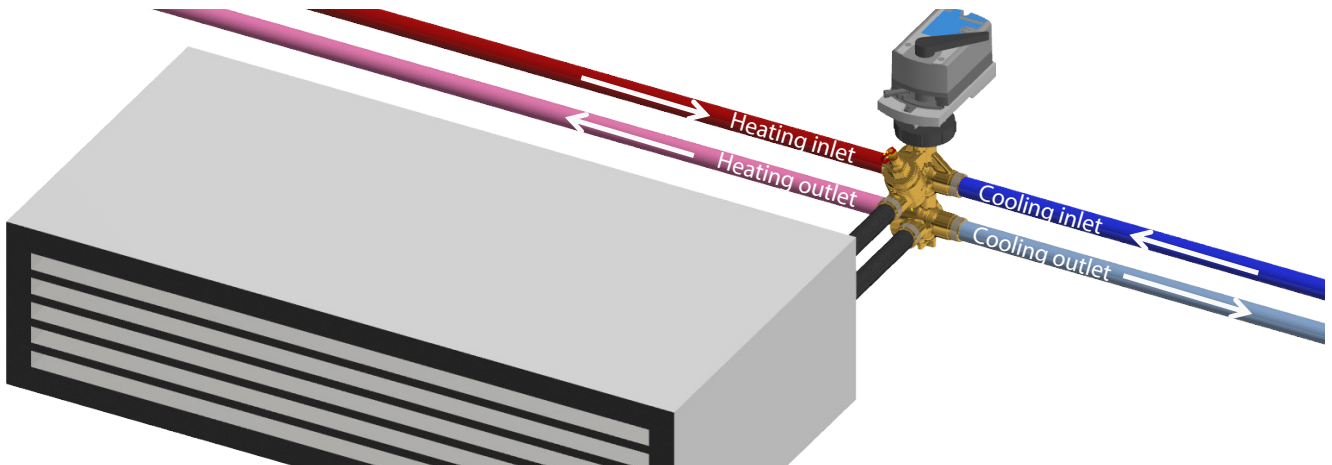
Digital control: The design flow rates are set using BACnet or MODBUS actuator. Use the Setting and Flow tables and refer to the mounting instruction.

Analog control: The design flow rates are set using 0-10V or 4-20mA input signal. Using a voltage signal to set the sizing flow for cooling, limit the voltage between 0V - 4V. To set the sizing flow for heating, limit the voltage between 6V - 10V. The actuator can be programmed from the BMS master controller. Manual presetting can also be done using the screws on the actuator. Please refer to the mounting instruction.

The actuator offers manual override function. This function can be used to temporarily set the flow when the power supply is not connected to the actuator.

Once the actuator is energised the Min. position and the Max. position must be programmed or the manual presetting by the screws on the 0-10V actuator must be set.

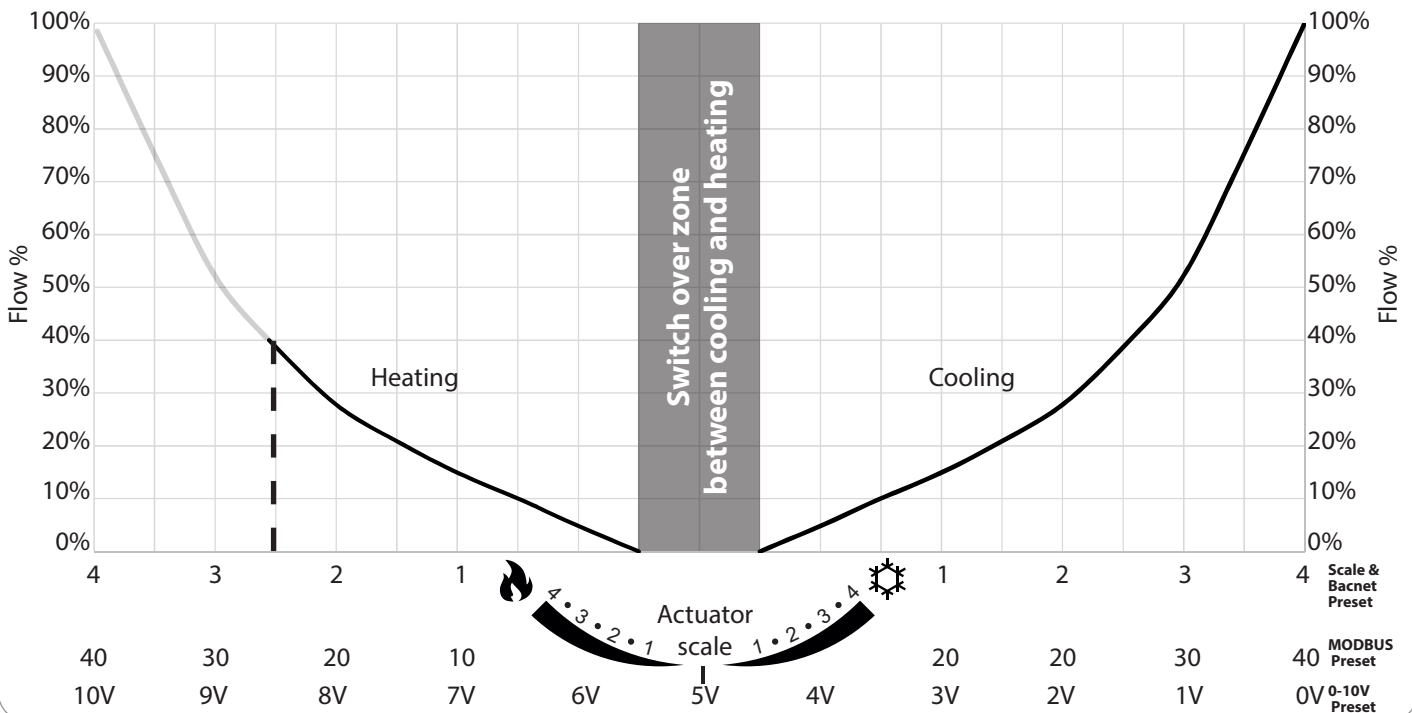
The actuator modulates the flow based on the current load conditions in reference to the control signal from the BMS.



Example with Cooling at 100% and Heating at 40% of maximum flow

Heating side limited to preset 2.5 on scale (BACnet preset 2.5, MODBUS preset 25 or Voltage preset 8.5V)

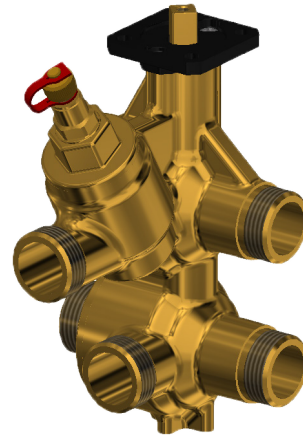
Please note: The graph is just an illustration of the function and mA-values are not shown. The exact values are in the Setting and Flow tables



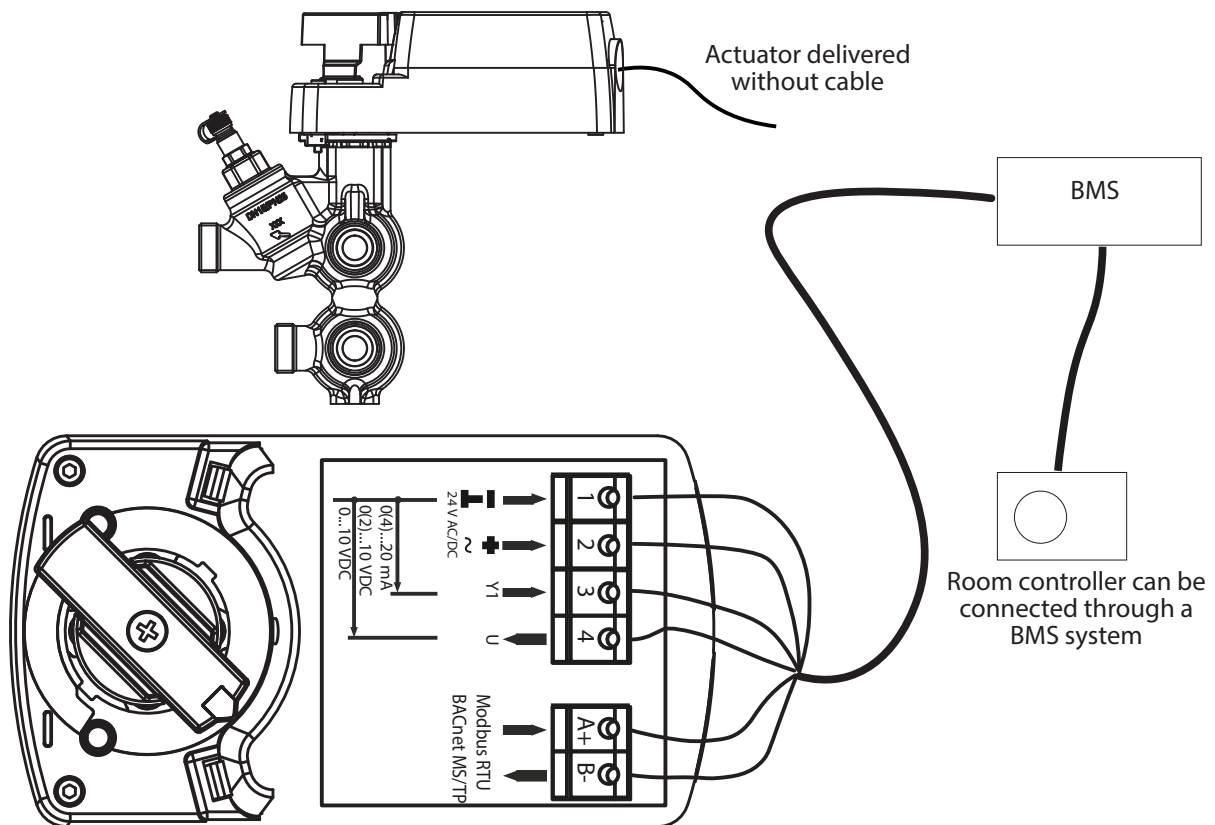
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Technical Data - COMBIFLOW 6-Way

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

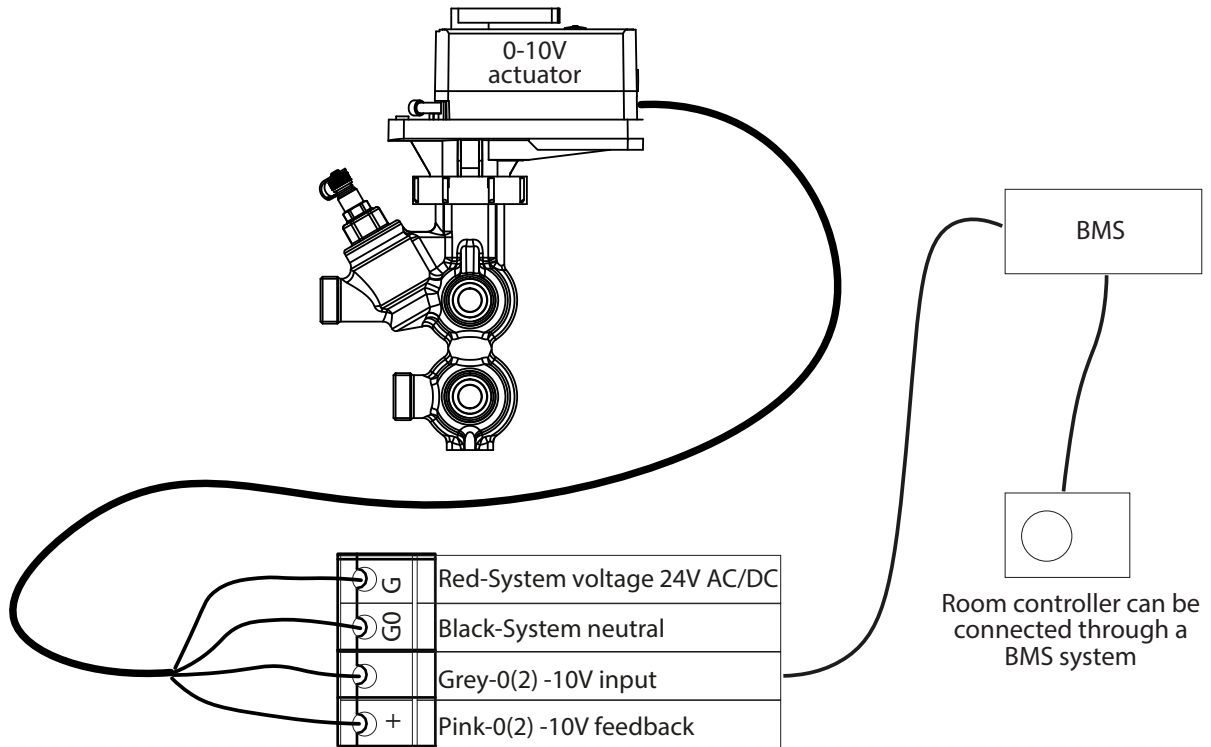


Installation & Electrical wiring Multi Rotary actuator

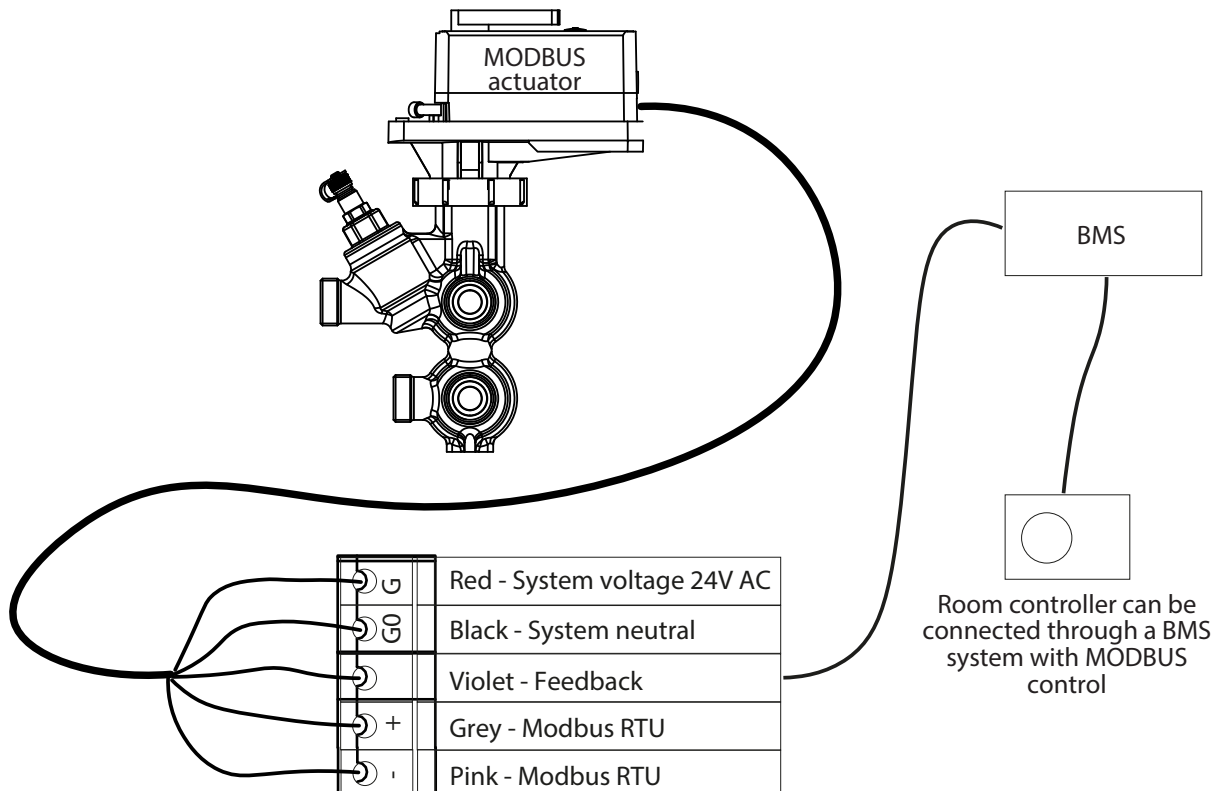


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Installation & Electrical wiring 0-10 V Rotary actuator

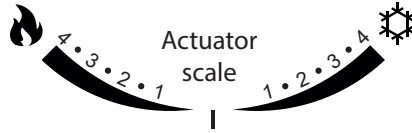


Installation & Electrical wiring MODBUS Rotary actuator



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Setting and Flow DN15 Low

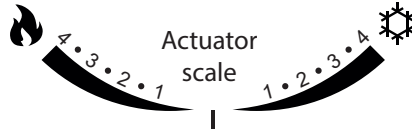


DN15 Low - 925 l/h

	Flow cooling [l/h]	Flow heating [l/h]	Preset scale & BACnet setting	Modbus setting	Voltage 0-10 V [V]	Current 4-20 mA [mA]	Min DP [kPa] for flow verification	Total pressure loss [kPa] for pump calculation
	925	0	4.0	40	0.0	4.0	22	30
	872	0	3.8	38	0.2	4.3	20	27
	819	0	3.6	36	0.5	4.8	18	24
	738	0	3.4	34	0.7	5.1	17	22
	628	0	3.2	32	0.9	5.4	15	19
	518	0	3.0	30	1.1	5.8	13	16
	432	0	2.8	28	1.3	6.1	12	15
	346	0	2.6	26	1.6	6.6	12	14
	276	0	2.4	24	1.8	6.9	11	12
	221	0	2.2	22	2.0	7.2	11	11
	166	0	2.0	20	2.2	7.5	10	10
	142	0	1.8	18	2.4	7.8	9	9
	117	0	1.6	16	2.7	8.3	8	8
	99	0	1.4	14	2.9	8.6	8	8
	86	0	1.2	12	3.1	9.0	7	7
	73	0	1.0	10	3.3	9.3	6	6
	58	0	0.8	8	3.5	9.6	5	5
	43	0	0.6	6	3.8	10.1	4	4
35	0	0.5	5	3.9	10.2	4	4	
Switch over zone								
	0	35	0.5	5	6.1	13.8	4	4
	0	43	0.6	6	6.2	13.9	4	4
	0	58	0.8	8	6.5	14.4	5	5
	0	73	1.0	10	6.7	14.7	6	6
	0	86	1.2	12	6.9	15.0	7	7
	0	99	1.4	14	7.1	15.4	8	8
	0	117	1.6	16	7.3	15.7	8	8
	0	142	1.8	18	7.6	16.2	9	9
	0	166	2.0	20	7.8	16.5	10	10
	0	221	2.2	22	8.0	16.8	11	11
	0	276	2.4	24	8.2	17.1	11	12
	0	346	2.6	26	8.4	17.4	12	14
	0	432	2.8	28	8.7	17.9	12	15
	0	518	3.0	30	8.9	18.2	13	16
	0	628	3.2	32	9.1	18.6	15	19
	0	738	3.4	34	9.3	18.9	17	22
	0	819	3.6	36	9.5	19.2	18	24
	0	872	3.8	38	9.8	19.7	20	27
0	925	4.0	40	10.0	20.0	22	30	

COMBIFLOW 6-way

Setting and Flow DN15

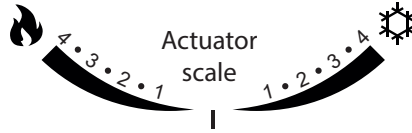


DN15 - 1200 l/h

	Flow cooling [l/h]	Flow heating [l/h]	Preset scale & BACnet setting	Modbus setting	Voltage 0-10V [V]	Current 4-20 mA [mA]	Min DP [kPa] for flow verification	Total pressure loss [kPa] for pump calculation
	1200	0	4.0	40	0.0	4.0	23	36
	1176	0	3.8	38	0.2	4.3	22	34
	1152	0	3.6	36	0.5	4.8	21	32
	1096	0	3.4	34	0.7	5.1	21	31
	1007	0	3.2	32	0.9	5.4	20	29
	919	0	3.0	30	1.1	5.8	19	27
	811	0	2.8	28	1.3	6.1	18	25
	704	0	2.6	26	1.6	6.6	17	23
	619	0	2.4	24	1.8	6.9	17	21
	556	0	2.2	22	2.0	7.2	16	19
	493	0	2.0	20	2.2	7.5	15	17
	438	0	1.8	18	2.4	7.8	15	17
	383	0	1.6	16	2.7	8.3	15	16
	327	0	1.4	14	2.9	8.6	15	16
	268	0	1.2	12	3.1	9.0	15	15
	210	0	1.0	10	3.3	9.3	15	15
Switch over zone								
	0	210	1.0	10	6.7	14.7	15	15
	0	268	1.2	12	6.9	15.0	15	15
	0	327	1.4	14	7.1	15.4	15	16
	0	383	1.6	16	7.3	15.7	15	16
	0	438	1.8	18	7.6	16.2	15	17
	0	493	2.0	20	7.8	16.5	15	17
	0	556	2.2	22	8.0	16.8	16	19
	0	619	2.4	24	8.2	17.1	17	21
	0	704	2.6	26	8.4	17.4	17	23
	0	811	2.8	28	8.7	17.9	18	25
	0	919	3.0	30	8.9	18.2	19	27
	0	1007	3.2	32	9.1	18.6	20	29
	0	1096	3.4	34	9.3	18.9	21	31
	0	1152	3.6	36	9.5	19.2	21	32
	0	1176	3.8	38	9.8	19.7	22	34
	0	1200	4.0	40	10.0	20.0	23	36

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Setting and Flow DN20

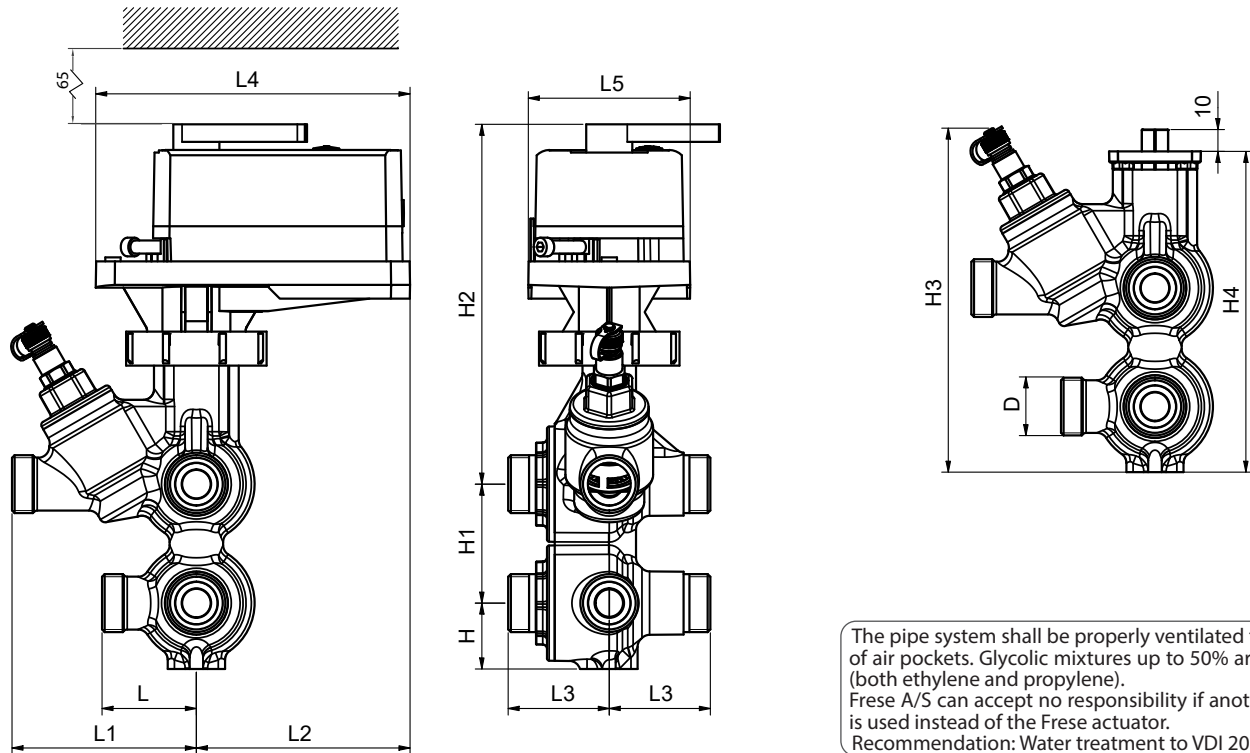


DN20 - 4250 l/h

	Flow cooling [l/h]	Flow heating [l/h]	Preset scale & BACnet setting	Modbus setting	Voltage 0-10V [V]	Current 4-20 mA [mA]	Min DP [kPa] for flow verification	Total pressure loss [kPa] for pump calculation
	4250	0	4.0	40	0.0	4.0	38	56
	3992	0	3.8	38	0.2	4.3	35	51
	3734	0	3.6	36	0.5	4.8	32	46
	3406	0	3.4	34	0.7	5.1	29	40
	3007	0	3.2	32	0.9	5.4	26	35
	2608	0	3.0	30	1.1	5.8	23	30
	2318	0	2.8	28	1.3	6.1	22	28
	2029	0	2.6	26	1.6	6.6	21	26
	1769	0	2.4	24	1.8	6.9	20	24
	1540	0	2.2	22	2.0	7.2	19	22
	1310	0	2.0	20	2.2	7.5	18	20
	1114	0	1.8	18	2.4	7.8	18	19
	919	0	1.6	16	2.7	8.3	18	19
	749	0	1.4	14	2.9	8.6	17	18
	604	0	1.2	12	3.1	9.0	17	18
	460	0	1.0	10	3.3	9.3	17	17
Switch over zone								
	0	460	1.0	10	6.7	14.7	17	17
	0	604	1.2	12	6.9	15.0	17	18
	0	749	1.4	14	7.1	15.4	17	18
	0	919	1.6	16	7.3	15.7	18	19
	0	1114	1.8	18	7.6	16.2	18	19
	0	1310	2.0	20	7.8	16.5	18	20
	0	1540	2.2	22	8.0	16.8	19	22
	0	1769	2.4	24	8.2	17.1	20	24
	0	2029	2.6	26	8.4	17.4	21	26
	0	2318	2.8	28	8.7	17.9	22	28
	0	2608	3.0	30	8.9	18.2	23	30
	0	3007	3.2	32	9.1	18.6	26	35
	0	3406	3.4	34	9.3	18.9	29	40
	0	3734	3.6	36	9.5	19.2	32	46
	0	3992	3.8	38	9.8	19.7	35	51
	0	4250	4.0	40	10.0	20.0	38	56

COMBIFLOW 6-way

Dimensions Valve and Rotary Actuators



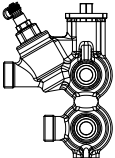
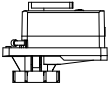

Dimensions

Size		DN15		DN20	
		Rotary Actuator 0-10V & Modbus 48-5397 & 48-5398	Multi Rotary Actuator 48-5395	Rotary Actuator 0-10V & Modbus 48-5397 & 48-5398	Multi Rotary Actuator 48-5395
Length [mm]	L	43		50	
	L1	84		120	
	L2	97	145	97	145
	L3	46		55	
	L4	143	180	143	180
	L5	74	100	74	100
Height [mm]	H	30		38	
	H1	54		69	
	H2	164	127	171	134
	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

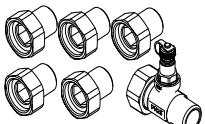
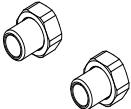
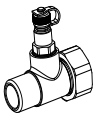
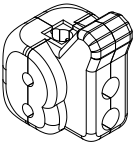
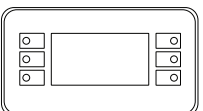
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Product programme

	Size	Type	Flow [l/h]	Control signal	Frese no.
	DN15 Low	COMBIFLOW 6-way	35-925	-	53-1839
	DN15	COMBIFLOW 6-way	210-1200	-	53-1844
	DN20	COMBIFLOW 6-way	460-4250	-	53-1845
	-	COMBIFLOW Analog Rotary Actuator	-	0-10V	48-5397
		COMBIFLOW Modbus Rotary Actuator	-	Modbus	48-5398
	-	COMBIFLOW Multi Rotary Actuator	-	Modbus, BACnet 0-10 V, 4-20 mA (2-10 V, 0-20 mA)	48-5395

Please note: For further actuator details please refer to the specific actuator Technote

Accessories

	Type	For COMBIFLOW valve size	Coupling connection to pipe system	Frese no.
	Complete coupling set 5 couplings & 1 PT coupling incl. gaskets	DN15	DN15 Male	48-0081
			DN20 Male	48-0082
		DN20	DN20 Male	48-0083
			DN25 Male	48-0084
	Couplings DZR brass CW602N (2 pieces incl. gaskets)	DN15	DN15 Male	43-2330
			DN20 Male	48-0042
		DN20	DN20 Male	43-3330
			DN25 Male	43-3331
	PT Coupling	DN15	DN15 Male	48-0038
			DN20 Male	48-0041
		DN20	DN20 Male	48-0039
			DN25 Male	48-0040
	Insulation cover	DN15	-	38-0879
		DN20	-	38-0880
	COMBIFLOW Modbus Programming Tool For 48-5398 actuator	DN15-DN20	-	48-5399

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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 digital flow setting of the valve shall be possible via BACnet or MODBUS connection to the BMS
- Remote analog flow setting of the valve shall be possible via a 0-10V or 4-20mA input signal from BMS
- The valve must contain a removable DP-controller to allow for full flushing without flow limitation through 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.

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