PCMTV20-32

Pressure independent control valves, DN20-DN32 with integrated flow limiter and differential pressure regulator for thermal emitters

PCMTV valves are intended for use in fan-coil units, air handling units, chilled beams, etc. They can be used as constant flow limiters in constant volume systems (without an actuator) or as true PICVs in variable volume systems (with an actuator).

- ✓ Precise hydronic balance gives an increased comfort and reduces energy consumption
- ✓ Accurate flow control, stable maximum flow rate and compensated variations in differential pressure result in a steady and enduring system
- ✓ Flow adjustable pre-setting knob offer a remarkable adjustment flexibility
- ✓ Easy selection as no authority nor ratio calculations are needed

Application

The PCMTV DN20-32 valves are temperature control valves with full authority over the entire flow range and measuring ports. This means that each individual terminal receives the flow required even in part load conditions. The PCMTV valves do not require any setting ratio calculation or valve authority calculation.

The valves have a compact design that allows them to be mounted in small spaces such as fan-coils or narrow supply spaces.

The valves are supplied with a plastic lid which can also be used to close them manually.

The valves are used to control hot and cold water (with max. 50 % glycol) in heating and cooling systems. Typical applications are fan-coil units (FCU), air handling units (AHU), chilled beams (CB), air curtains, heating/cooling interface units and heat exchangers. The PCMTV valves can also be used as maximum flow limiters (without an actuator).

Function

The PCMTV valves offer remarkable adjustment flexibility. They can be accurately set to a specific flow rate value and allow precise modulating control. To determine which pressure dependant valve size to use, the following formula is helpful, $Q = Kv\sqrt{\Delta P}$.

Water flow through a valve varies as a function of the area of passage and the pressure differential across that valve.

Thanks to the integrated differential pressure regulator (1) the differential pressure across the valve seats remains constant, meaning that the flow is only dependent of the area of passage. The control valve (2) has equal percentage flow characteristics. It is also possible to set any flow rate value and to maintain it

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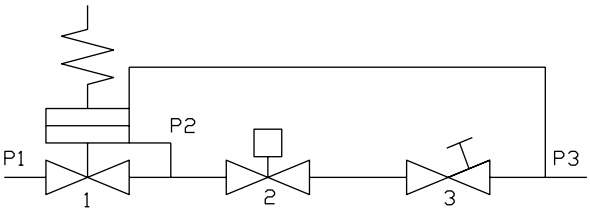
stable. Since flow rate is the only parameter to be considered, choosing the suitable valve is easy and fast, and the formula to use is Q= Kv.

As the differential pressure variations are instantly corrected, temperature variations and adjustment movements are considerably reduced while the valve and moving devices' lifespans are improved.

The valves' maximum adjustment matches the maximum flow rate allowed by the pipe size, on the basis of the values established by international standards.



The graduated (10-100%) adjustment knob (3) allows the flow rate to be set without disassembling the actuator. The percentage value, indicated on the scale, matches the maximum flow rate percentage. This value can be changed by turning the adjustment knob until it reaches the selected position (matching the percentage indicated on the scale). A locking mechanism ensures that the valve set values are not changed inadvertently.

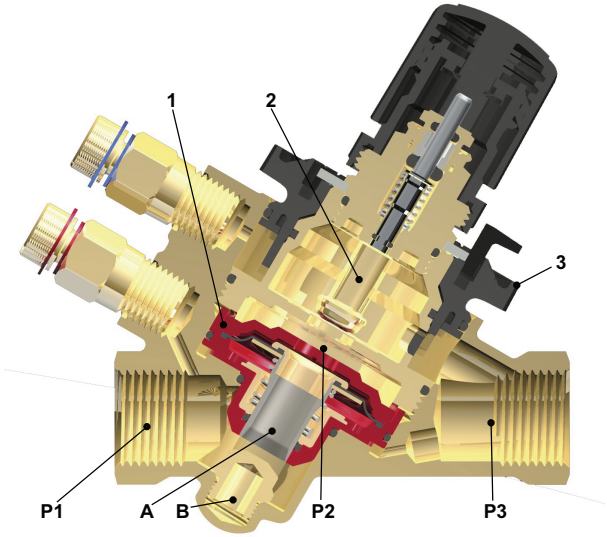
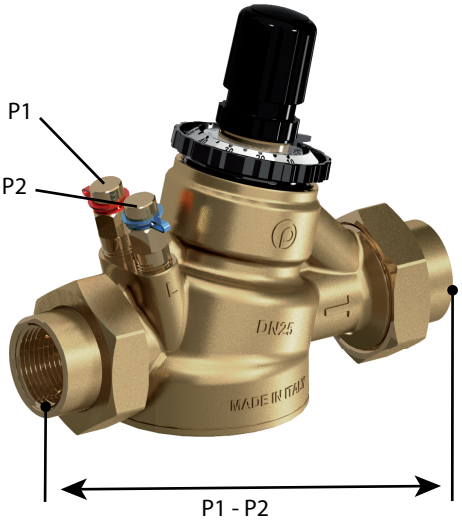


Fig. 1 1. differential pressure regulator, 2. regulating valve for flow adjustment, 3. flow presetting knob, A. shutter, B. seat, P1. incoming pressure, P2. pressure below seat, P3. outgoing pressure

Start-up pressure



Using a differential pressure gauge to measure the pressure drop the valve absorbs, allows checking whether the valve is in the operating range (and, therefore, whether the flow is constant) by simply verifying that the measured value P1 - P2 is higher than the start-up value.

If the ΔP measured value is lower than the start-up value, then the valve works as a fixed orifice valve.

The start-up value varies with the flow setting of the valve.

Each valve has its own max start-up pressure. This is the differential pressure that is needed by the valve in its 100 % flow pre-setting in order to be able to function properly as a PICV. The lower the flow preset setting, the lower the required start-up pressure will be. This is why it is designated as max start-up pressure for the 100 % flow setting.

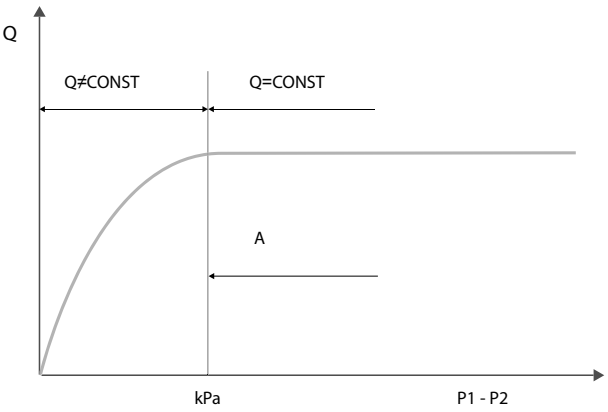


Fig. 2 If P1-P2 > Start up pressure (A), then the valve is within the working range.

Table 1 PCMTV20-F2200, PCMTV25-F2200, start-up pressures at different pre-settings

Setting %	Flow (l/h)	Flow (l/s)	Start-up ΔP (kPa)
100	2200	0.611	25
90	1980	0.550	25
80	1760	0.489	23
70	1540	0.428	20
60	1320	0.367	19
50	1100	0.306	17
40	880	0.244	17
30	660	0.183	17
20	440	0.122	17
10	220	0.061	17

Table 2 PCMTV20-F2700, PCMTV25-F2700, PCMTV32-F2700, start-up pressures at different pre-settings

Setting %	Flow (l/h)	Flow (l/s)	Start-up ΔP (kPa)
100	2700	0.750	30
90	2430	0.675	27
80	2160	0.600	23
70	1890	0.525	20
60	1620	0.450	20
50	1350	0.375	20
40	1080	0.300	18
30	810	0.225	17
20	540	0.150	17
10	270	0.075	17

Table 3 PCMTV32-F3000, start-up pressures at different pre-settings

Setting %	Flow (l/h)	Flow (l/s)	Start-up ΔP (kPa)
100	3000	0.833	35
90	2700	0.750	33
80	2400	0.667	30
70	2100	0.583	28
60	1800	0.500	27
50	1500	0.417	25
40	1200	0.333	22
30	900	0.250	18
20	600	0.167	18
10	300	0.083	18

Installation

Before installation

Before filling the terminal unit system with water, make sure the main pipeline has been flushed and most of the dirt and debris have been flushed away. Always comply with local or applicable flushing, however, in order to get the longest life and the best performance from a PICV, Regin does not accept any liability for improper or wrong use of this product.

Always protect the pressure regulator by using strainers upstream of the valve and making sure the water quality complies with UNI 8065 standards (Fe < 0.5 mg/kg and Cu < 0.1 mg/kg).

Furthermore, the iron oxide in the water passing through the control valve (PICV) should not exceed 25 mg/kg (25 ppm).

To ensure that the main pipework is cleaned appropriately, flushing bypasses should be used without flushing through the pressure regulator of the PICV, thereby preventing debris that might clog the valve (see figure below).

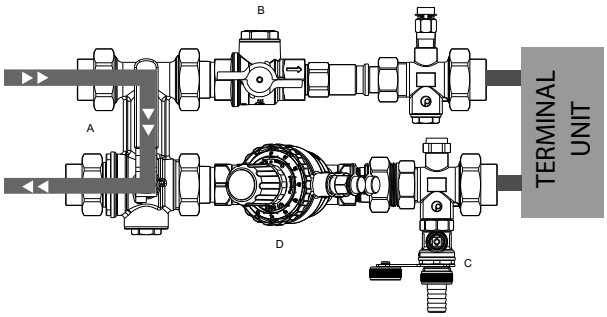


Fig. 3 Flushing of main pipe line: A: Bypass mode B: Closed C: Closed D: Open

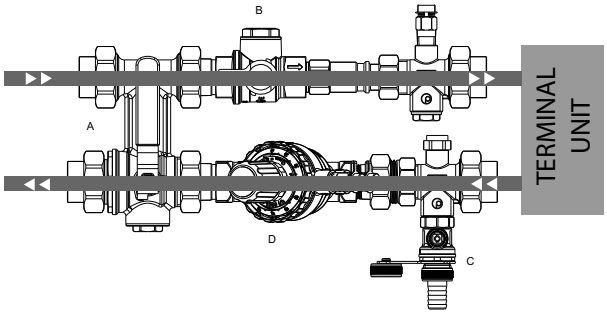


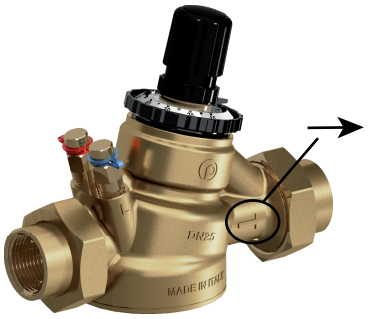
Fig. 4 Normal use: A: Normal mode B: Open C: Closed D: Open

Mounting

The valve has to be mounted with the arrow pointing in the direction of the flow.

Mounting it in the wrong direction may damage the system and the valve itself.

If flow reversal is possible, a non-return valve should be mounted.



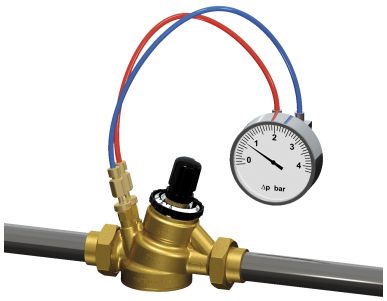
Commisioning

Commissioning is very easy to perform, design flow rates can be modified at any time and at low costs. Since it is not necessary to commission the valve after its installation, the valve can work immediately after it has been assembled, for example, on the floors where works are already finished.

It is however necessary to be sure that the valve is actually working in the operating range. In order to verify it, just measure the differential pressure across the valve, as shown in the picture.

If the measured differential pressure is higher than the start-up pressure, the valve is actually keeping the flow constant at the set value.

In order to adjust the flow rate, just set the selected value using the adjustment knob (see below).



Flow preset

To set the selected flow, follow these steps:

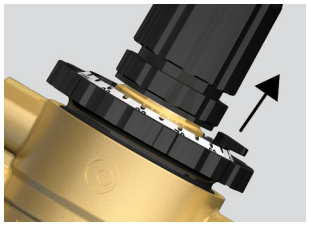


Fig. 5 Lift the lock pin to unlock the selector

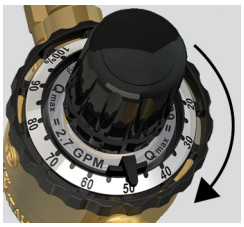


Fig. 6 Turn the selector to the target position

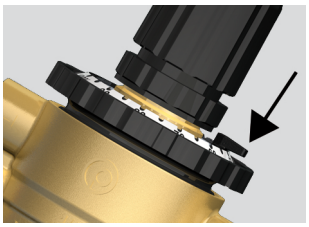


Fig. 7 Press the lock pin to the lock selector in the final position

Flow pre-setting table for PCMTV DN20-32

Pre-setting %	Flow rate (l/h)		
	F2200	F2700	F3000
100	2200	2700	3000
90	1980	2430	2700
80	1760	2160	2400
70	1540	1890	2100
60	1320	1620	1800
50	1100	1350	1500
40	880	1080	1200
30	660	810	902
20	440	540	600
10	220	270	300

Technical data

Pressure class	PN25 (25 bar)
Flow characteristics	Equal percentage
Rangeability	100 ~150 : 1
Stroke	6 mm
Connection	Internal tapered pipe thread on union fittings according to EN 10226-1
Media	Hot or cold water, cooling systems (max. 50% glycol)
Leakage	0.01 % of maximum flow, Class IV IEC 60534-4.
Temperature range	-10…120°C
Valve position	Normally open. Valve position is closed when used with a normally closed on/off thermal actuator

CE

This product carries the CE-mark. More information is available at www.regincontrols.com.

Material

Body	Brass CW602N (CZ121)
Plug parabol	Brass CW614N (CZ132)
Stem	Stainless steel
Packing box	O-ring EPDM
Pressure regulator	EPDM, stainless steel and high resistance polymer

Models

Article	Connection	Nominal diameter	Max. start-up pressure*	Max. flow rate	ΔP max
PCMTV20-F2200	Rc ¾"	DN20	25 kPa	2200 l/h	600 kPa
PCMTV20-F2700	Rc ¾"	DN20	30 kPa	2700 l/h	600 kPa
PCMTV25-F2200	Rc 1"	DN25	25 kPa	2200 l/h	600 kPa
PCMTV25-F2700	Rc 1"	DN25	30 kPa	2700 l/h	600 kPa
PCMTV32-F2700	Rc 1¼"	DN32	30 kPa	2700 l/h	600 kPa
PCMTV32-F3000	Rc 1¼"	DN32	35 kPa	3000 l/h	600 kPa

* See *Start-up pressure*for more information on start-up pressures at different pre-settings.

Suitable actuators and adapters

Actuators for 6 mm stroke - Thermal actuators

Article	Control signal	Supply voltage	Adapter[1]
RTAM125-24A	0…10 V DC, NC	24 V AC	VA64
RTAM125-24	On/Off, NC	24 V AC/DC	VA64
RTAM125-230	On/Off, NC	230 V AC	VA64

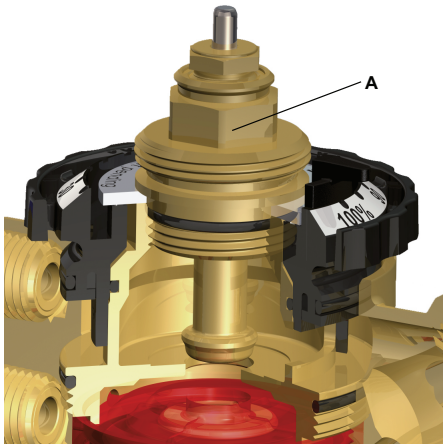
Actuators for 6 mm stroke - Electromechanical actuators

Article	Control signal	Supply voltage	Adapter[1]
RVAZ2-24A	0(2)…10 V / (0)4…20 mA	24 V AC/DC +/- 15%	VA748X
RVAZ2-24	2– point/3-point, 3-wire	24 V AC/DC +/- 15%	VA748X
RVAZ2-230	2– point/3-point, 3-wire	230 V AC/DC +/- 15%	VA748X

Control characteristics curve

Operating on the position of the control valve's stem A will modify the valve Kv, hence the flow rate.

The relation between Kv and stroke is shown in the graph below.



Typical control valve characteristics curve

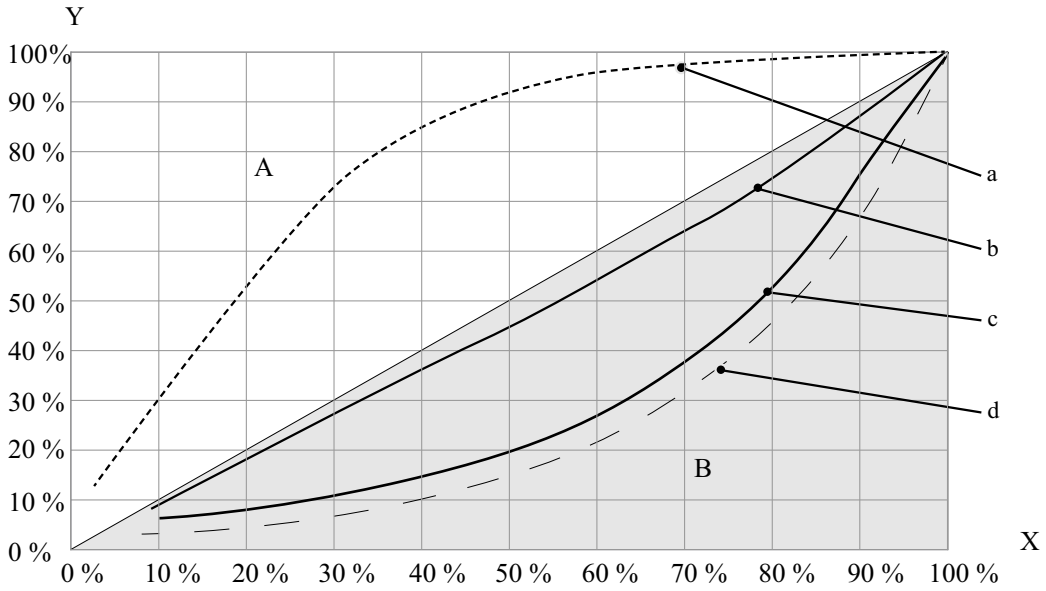


Fig. 8 Y = K_v % = K_v/K_{vmax}; X = Stroke %=H/H_0; A = On-off zone; B = Modulating zone; a = Bad control characteristics; b = Good control characteristics; c = Excellent control characteristics; d = Theoretical equipercentage curve n(ep) = 3.9

Combining the PCMTV valve characteristics with heat exchanger results in a linear control system.

1. *Adapters must be ordered separatly.*

H = current opening angle of the control valve; H varies from 0 to H_0

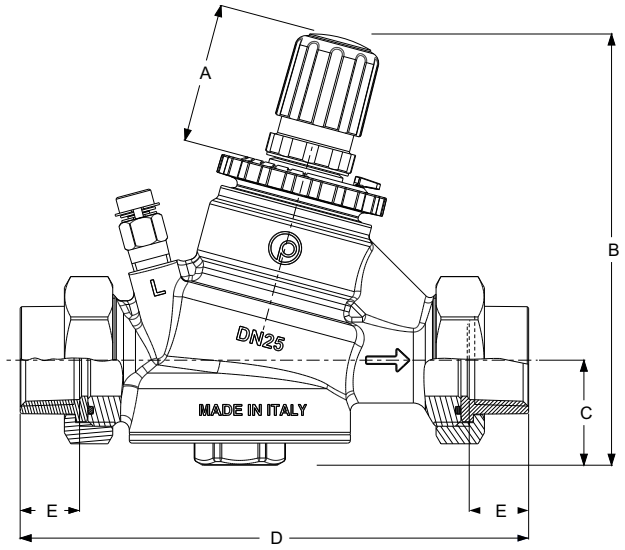
H_0 = maximum opening angle of the control valve;

Kv = valve flow factor at opening angle = H

Kvmax = valve flow factor at opening angle = H_0

Note: Control curve characteristics may change depending on the valve version.

Dimensions for PCMTV valves, DN20-DN32

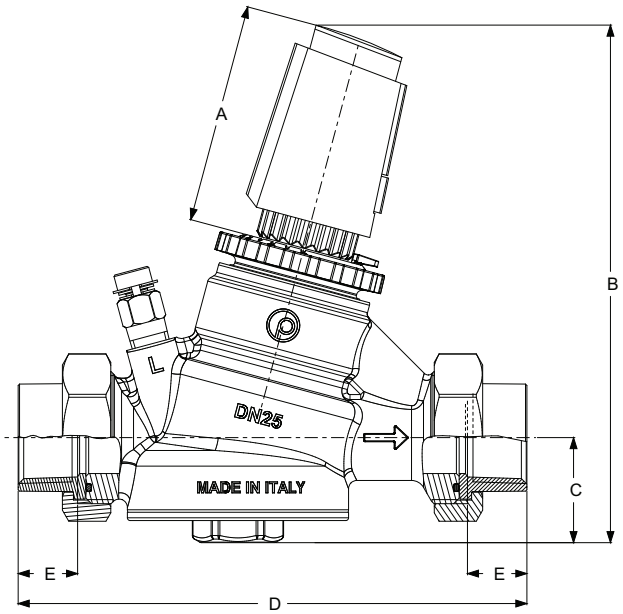


PCMTV

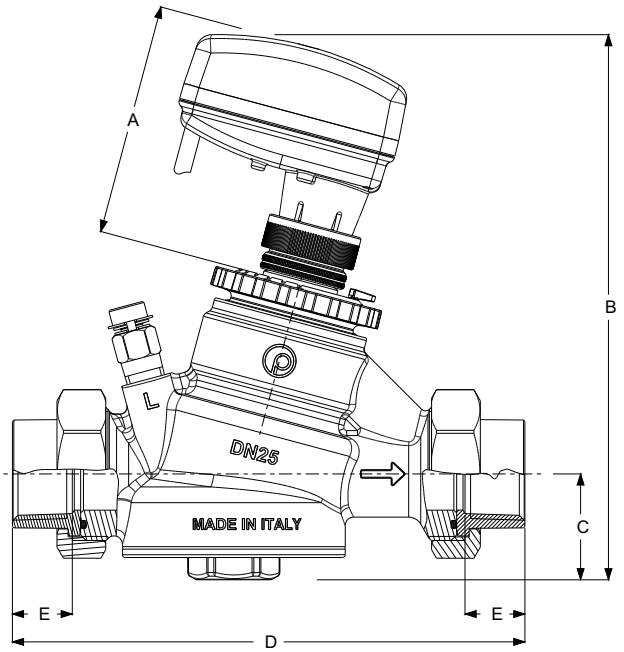
Table 4 Manual valve

Model	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)
PCMTV20-F2200	50.5	156	38	177	18
PCMTV20-F2700	50.5	156	38	177	18
PCMTV25-F2200	50.5	156	38	184	21.5
PCMTV25-F2700	50.5	156	38	184	21.5
PCMTV32-F2700	50.5	156	38	209	22
PCMTV32-F3000	50.5	156	38	209	22

Dimensions with actuators



PCMTV with thermal actuators



PCMTV with electromechanical actuators

Table 5 Valve with thermal actuator

Model	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)
PCMTV20-F2200	79.5	187	38	177	18
PCMTV20-F2700	79.5	187	38	177	18
PCMTV25-F2200	79.5	187	38	184	21.5
PCMTV25-F2700	79.5	187	38	184	21.5
PCMTV32-F2700	79.5	187	38	209	22
PCMTV32-F3000	79.5	187	38	209	22

Table 6 Valve with electromechanical actuator

Model	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)
PCMTV20-F2200	90	221	38	177	18
PCMTV20-F2700	90	221	38	177	18
PCMTV25-F2200	90	221	38	184	21.5
PCMTV25-F2700	90	221	38	184	21.5
PCMTV32-F2700	90	221	38	209	22
PCMTV32-F3000	90	221	38	209	22

Documentation

All documentation can be downloaded from www.regincontrols.com.