PCMTV32-50

Pressure independent control valves, DN32-DN50 with integrated flow limiter and differential pressure regulator for thermal emitters

Valves intended for systems with multiple or large fan-coil units, chilled beams or air handling units etc., in which pressure independent control valves are preferred. They can be used as constant flow limiters in constant volume systems (without an actuator) or as true PICVs (pressure independent control valves) in variable volume systems (with an actuator).

- ✓ Precise hydronic balance gives increased comfort and reduced 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 offers a remarkable adjustment flexibility
- ✓ Easy selection as no authority or ratio calculations are needed

Application

The PCMTV DN32-50 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 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.

Water flow through a valve varies as a function of the area of passage and the pressure differential across that valve. To determine which pressure dependant valve size to use, the following formula is helpful, $Q = Kv\sqrt{\Delta P}$.

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 caracteristics. It is also possible to set any flow rate value and to maintain it 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 $Q = Kv$.

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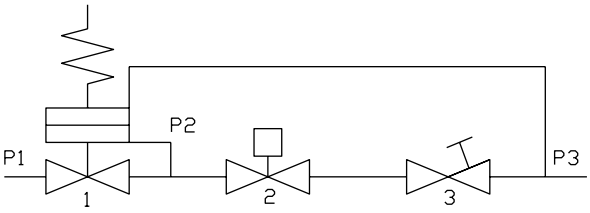
REGIN THE CHALLENGER

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 pre-setting plate (3) allows the maximum flow rate to be set. The percentage value, indicated on the scale, matches the maximum flow rate percentage.

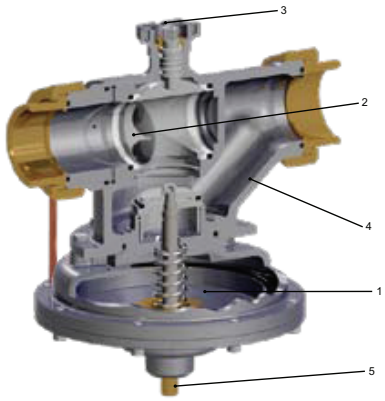
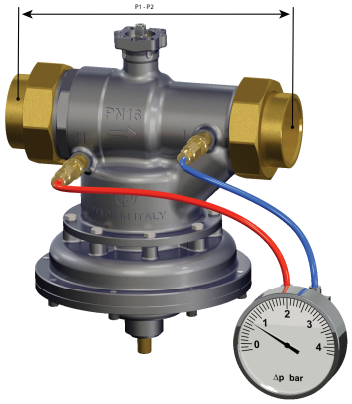


Fig. 1 1. differential pressure regulator, 2. control valve, 3. pre-setting plate, 4. body, 5. additional manual shut-off device

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 (pressure independent control valve). 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.

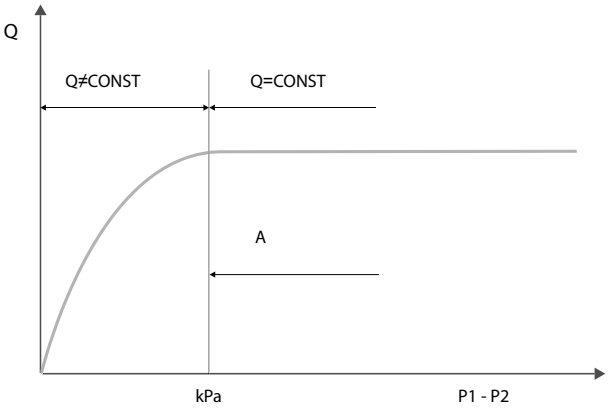


Fig. 2 If P1-P2 > Start up pressure (A), then the valve is within the working range.

Table 1 PCMTV32-F6, start-up pressures at different pre-settings

Setting %	Flow (l/h)	Flow (l/s)	Start-up ΔP (kPa)
100	6000	1.667	30
90	5400	1.500	30
80	4800	1.333	30
70	4200	1.167	30
60	3600	1.000	25
50	3000	0.833	20
40	2400	0.667	20
30	1800	0.500	20
20	1200	0.333	N/A
10	600	0.167	N/A

Table 2 PCMTV40-F9, start-up pressures at different pre-settings

Setting %	Flow (l/h)	Flow (l/s)	Start-up ΔP (kPa)
100	9000	2.500	35
90	8100	2.250	33
80	7200	2.000	32
70	6300	1.750	30
60	5400	1.500	27
50	4500	1.250	25
40	3600	1.000	24
30	2700	0.750	22
20	1800	0.500	N/A
10	900	0.250	N/A

Table 3 PCMTV50-F12, start-up pressures at different pre-settings

Setting %	Flow (l/h)	Flow (l/s)	Start-up ΔP (kPa)
100	12000	3.333	35
90	10800	3.000	33
80	9600	2.667	32
70	8400	2.333	29
60	7200	2.000	24
50	6000	1.667	21
40	4800	1.333	20
30	3600	1.000	20
20	2400	0.667	N/A
10	1200	0.333	N/A

Table 4 PCMTV50-F18, start-up pressures at different pre-settings

Setting %	Flow (l/h)	Flow (l/s)	Start-up ΔP (kPa)
100	18000	5.000	35
90	16200	4.500	33
80	14400	4.000	30
70	12600	3.500	25
60	10800	3.000	23
50	9000	2.500	20
40	7200	2.000	18
30	5400	1.500	16
20	3600	1.000	N/A
10	1800	0.500	N/A

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).

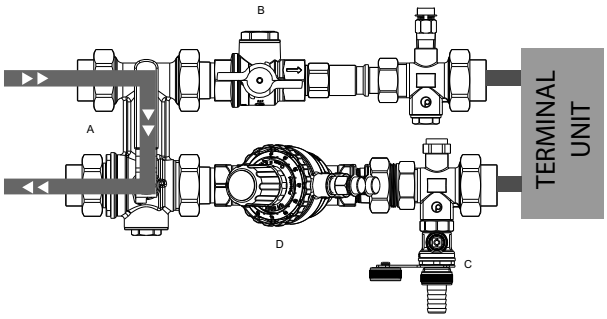


Fig. 3 Flushing of main pipe line: A: Bypass mode B: Closed C: Closed D: Open

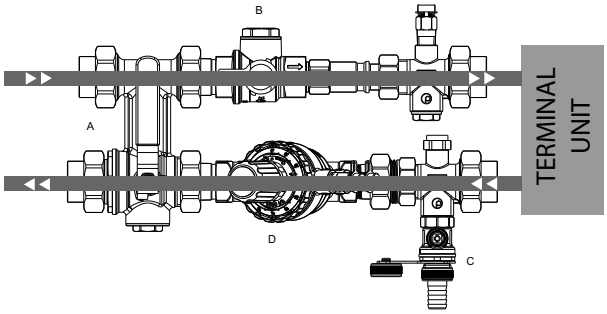


Fig. 4 Normal use: A: Normal mode B: Open C: Closed D: Open

Maintenance and cleaning

During valve cleaning operations, use a damp cloth. DO NOT use any detergent or chemical product that may seriously damage or compromise the proper functioning and the reliability of the valve.

Flushing and shut off

The valve can be flushed by turning it 180°. The differential pressure reducer is now inhibited and no flow limitation occurs.

Remember to restore the valve to its working position after flushing.

The valve can be closed through the cartrige, if needed, by using a 6 mm allen key.

In normal working conditions, this shut off device must be fully open.

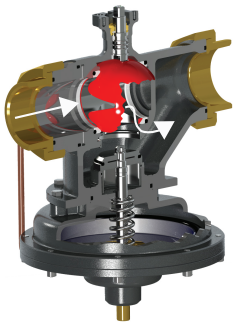


Fig. 5 Equal percentage control valve

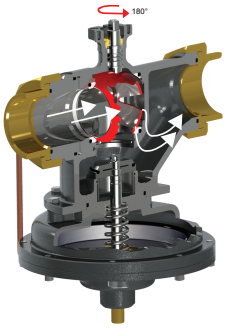


Fig. 6 Flushing mode

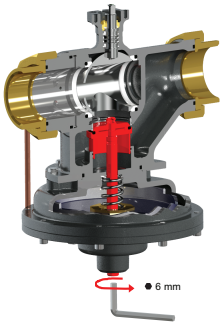


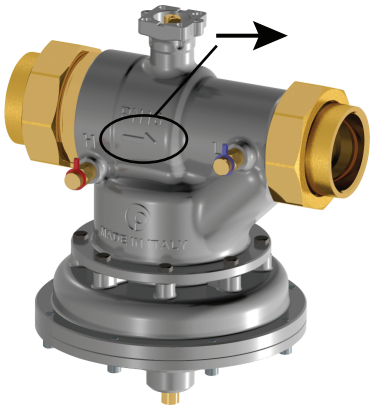
Fig. 7 Manual shut-off valve

Mounting

The valve has to be mounted with the arrow 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.



Commissioning

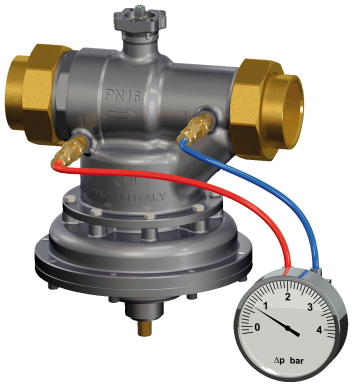
Commissioning is very easy to perform, preset flow rates can be modified at any time and at low costs.

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 this, just measure the differential pressure across the valve, as shown in the picture.

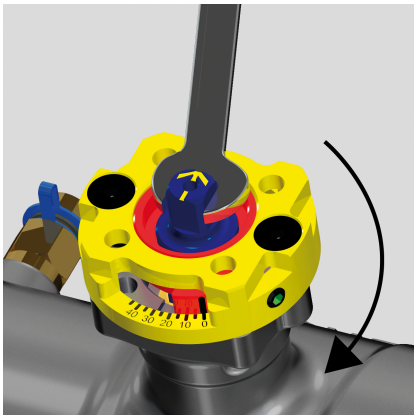
If the measured differential pressure is higher than the start-up pressure, the valve is keeping the flow constant at the set value.

In order to adjust the flow rate, just set the selected value by using the pre-setting plate (see below).

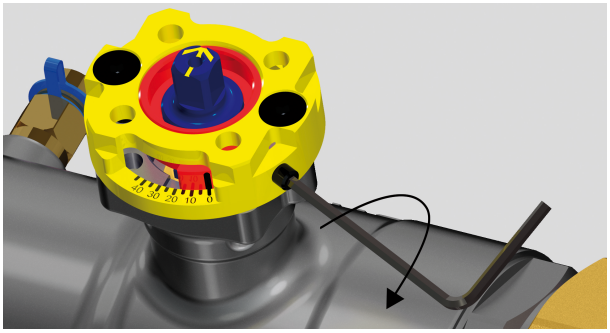


Flow preset

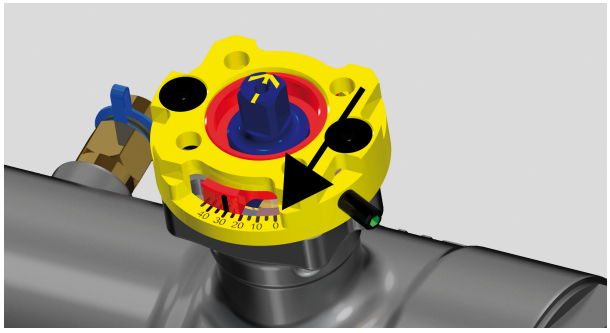
To set the selected flow, follow these steps:



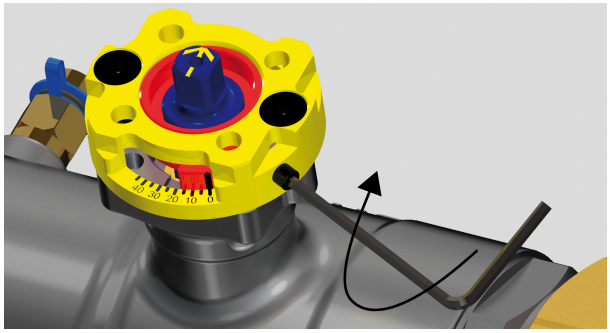
1. Close the valve.



2. Release the locking device.



3. Set the maximum flow rate.



4. Lock again and re-open the valve. Overtighting could seriously damage the device. Max. torque used 2-3 Nm.

Flow pre-setting table for PCMTV DN32 - DN50

Pre-setting %	Flow rate (l/h)			
	F6	F9	F12	F18
100	6000	9000	12000	18000
90	5400	8100	10800	16200
80	4800	7200	9600	14400
70	4200	6300	8400	12600
60	3600	5400	7200	10800
50	3000	4500	6000	9000
40	2400	3600	4800	7200
30	1800	2700	3600	5400
20	-	-	-	-
10	-	-	-	-

Technical data

Pressure class	PN16 (16 bar)
Flow characteristics	Equal precentage
Rangeability	> 100 : 1
Stroke	90°
Media	Hot or cold water and cooling systems (max. 50 % glycol)
Leakage	0.01 % of maximum flow, Class IV IEC 60534-4
Temperature range	-10…120°C
Connection	Internal tapered pipe thread on union fittings according to EN 10226-1

CE

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

Material

Body	Ductile iron EN-JS1030
Regulating valve	Brass CW614N
Pressure controller	EPDM, stainless steel 1.4305
Pre-setting	Brass CW617N
Stem	Stainless steel 1.4305
Gaskets	EPDM

Models

Article	Connection	Nominal diameter	Max. start-up pressure*	Max. flow rate	ΔP max.
PCMTV32-F6	Rc 1 1/4"	DN32	30 kPa	6000 l/h	600 kPa
PCMTV40-F9	Rc 1 1/2"	DN40	35 kPa	9000 l/h	600 kPa
PCMTV50-F12	Rc 2"	DN50	35 kPa	12 000 l/h	600 kPa
PCMTV50-F18	Rc 2"	DN50	35 kPa	18 000 l/h	600 kPa

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

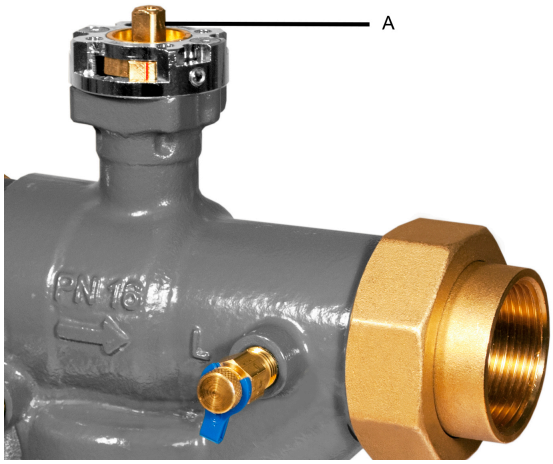
Suitable actuators

Article	Supply voltage	Control signal
RVASN08-24	24 V AC, 50/60 Hz alt. 24 V DC ±20 %	On/Off (2-position) and 3-position
RVASN08-24A	24 V AC, 50/60 Hz alt. 24 V DC ±20 %	0…10 V
RVASN08-230	230 V AC, 50/60 Hz	On/Off (2-position) and 3-position

Control characteristics curve

Rotating the stem of the control valve (A) will modify the Kv of the valve, thereby altering the flow rate.

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



Typical control valve characteristics curve

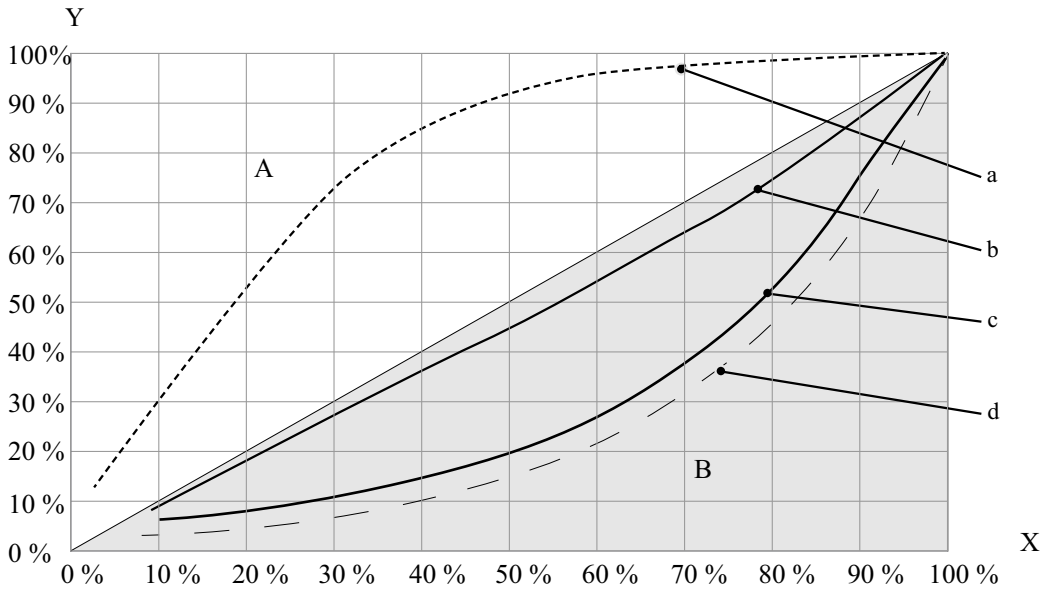


Fig. 8 Y = K_v % = K_v/K_{vmax}; X = Stroke %=H/H_0; A = On-off zone; B = Modulating zone; a = Bad control characteristics; b = Good control characteristics; c = Excellent control characteristics; d = Theoretical equipercentage curve n(ep) = 3.9

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

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

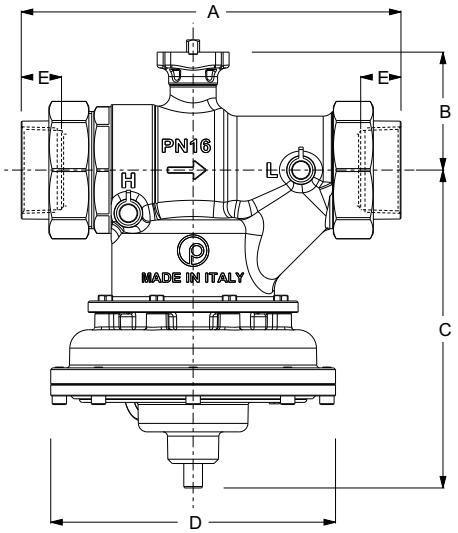
H_0 = maximum opening angle of the control valve;

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.

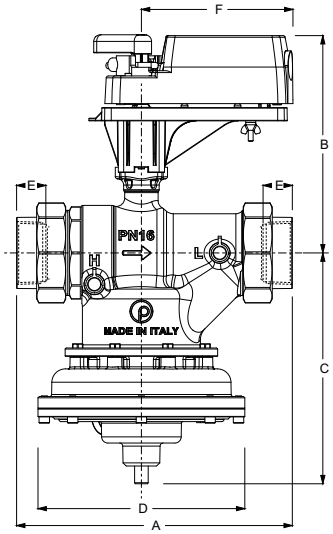
Dimensions, manual valve PCMTV



[mm]

Model	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)
PCMTV32-F6	230	89	180	156	23.6
PCMTV40-F9	230	89	180	156	23.6
PCMTV50-F12	264	97	221	198	28
PCMTV50-F18	264	97	221	198	28

Estimated dimensions with actuator (rotary actuator series)



[mm]

Model	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)
PCMTV32-F6	230	221	180	156	23.6	145.5
PCMTV40-F9	230	221	180	156	23.6	145.5
PCMTV50-F12	264	229	221	198	28	145.5
PCMTV50-F18	264	229	221	198	28	145.5

Documentation

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