PICCV Rotary Actuator

V̇ Default [l/s]	Flow range* [l/s]	DN [mm]	DN [inches]	Type	Rotary Actuator Open/Close	Rotary Actuator Multifunction	Frequency [Hz]
0.06	0.04...0.10	15	1/2"	PICCV-15-006		LR24A-MF (AC/DC 24V)	50/60
0.09	0.04...0.10	15	1/2"	PICCV-15-009			
0.13	0.10...0.40	15	1/2"	PICCV-15-013			
0.19	0.10...0.40	15	1/2"	PICCV-15-019			
0.32	0.10...0.40	15	1/2"	PICCV-15-032			
0.36	0.10...0.40	15	1/2"	PICCV-15-036	LR24A(-S)/LR230A(-S)		
0.37	0.27...0.60	20	3/4"	PICCV-20-037			
0.44	0.27...0.60	20	3/4"	PICCV-20-044			
0.57	0.27...0.60	20	3/4"	PICCV-20-057			
0.60	0.27...0.60	20	3/4"	PICCV-20-066	LR24A(-S)/LR230A(-S)		
0.80	0.27...0.80	20	3/4"	PICCV-20-080**			
0.69	0.50...1.10	25	1"	PICCV-25-069			
0.88	0.50...1.10	25	1"	PICCV-25-088			
0.98	0.50...1.10	25	1"	PICCV-25-098			
1.02	0.50...1.10	25	1"	PICCV-25-102	LR24A(-S)/LR230A(-S)		
0.99	0.72...1.60	32	1 1/4"	PICCV-32-099		NR24A-MF (AC/DC 24V)	
1.12	0.72...1.60	32	1 1/4"	PICCV-32-112			
1.27	0.72...1.60	32	1 1/4"	PICCV-32-127			
1.51	0.72...1.60	32	1 1/4"	PICCV-32-151			
1.56	0.72...1.60	32	1 1/4"	PICCV-32-156			
1.90	0.99...2.20	40	1 1/2"	PICCV-40-190			
2.08	0.99...2.20	40	1 1/2"	PICCV-40-208			
2.35	1.22...2.70	50	2"	PICCV-50-235			
2.55	1.22...2.70	50	2"	PICCV-50-255	NR24A(-S)/NR230A(-S)		
3.00	2.48...5.50	50	2"	PICCV-50-300		SR24A-MF (AC/DC 24V)	
3.50	2.48...5.50	50	2"	PICCV-50-350			
4.20	2.48...5.50	50	2"	PICCV-50-420			
5.06	2.48...5.50	50	2"	PICCV-50-506	SR24A(-S)/SR230A(-S)		

Remark:

* Flow setting is depending on combination of actuators (Angle). For detail, please refer to PICCV Flow Limitation at our website www.belimo.ch.
** For PICCV-20-080, On/Off Pressure Independent (PI) application is recommended.

Note:

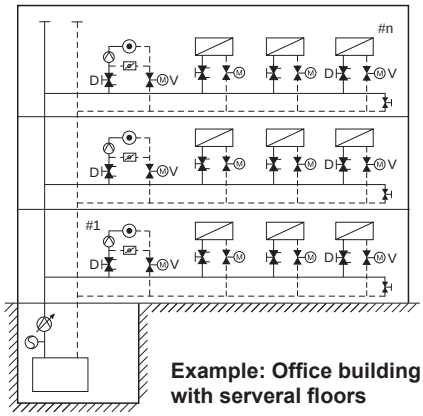
• Emergency control function (Mechanical Fail-Safe Actuators) is available on request for PICCV valve.

Content

UL marked actuators is optional, please contact your local Sales Representative for details.

V3.2 11.2015•Subject to modification

The challenge



Example: Office building with serveral floors

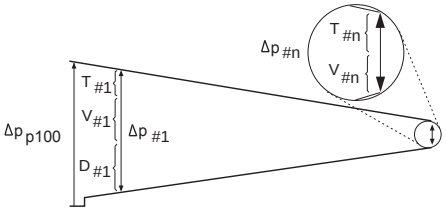
Energy savings with maximum convenience and low installation cost are requirements for the construction of new buildings and renovations. Selecting the correct valves for the entire pipe line system and a professional hydraulic balancing cost money.

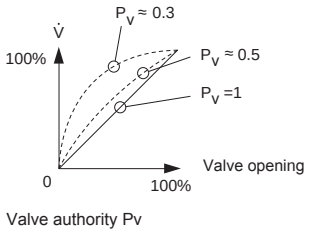
Valves are conventionally designed with a valve authority of 0.5 and installed after each consumer (e.g. air heater, heat exchanger, supply controls).

However, pressure conditions vary depending on the installation site of the consumer and the load. In the case of consumers (#1) that are placed near the main pump, the differential pressure between the supply/return pipes is much higher than at the end of the pipes (#n). With nominal volumetric flow, the necessary delivery height rp_{p100} of the main pump depends on the selected pipe network (DN and pipe lengths) and on the minimum differential pressure at the last consumer (pressure drop at the consumer and valve).

Pressure diagram at full load

The pressure difference △p #1 consists of the pressure drop at consumer T#1, valve V#1 and the balancing valve D#1. The valve V#1 is fully opened. If valve #1 closes, the differential pressure across valve V#1 can increase up to △p #1, the valve authority sinks markedly, and the flow quantity increases disproportionately.





Valve authority Pv

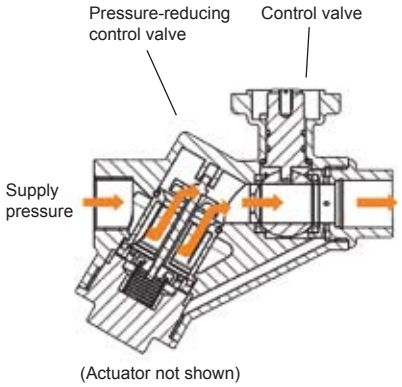
The solution

As a result of the consistent further development of the tried-and-tested Belimo Characterised Control Valve, the valve design has been simplified with the new Pressure Independent Characterised Control Valve (PICCV). The flow rate is constant, even when the valve closes and the differential pressure increases. The valve authority is 1, even with over-sized valves.

The advantages

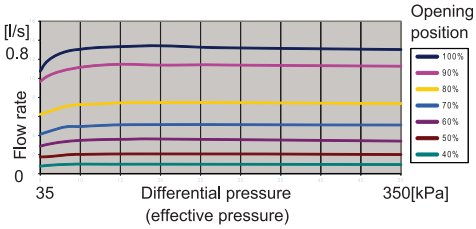
Hydraulic balancing is no longer necessary. Equipping a building becomes simpler, and only one valve per consumer is needed. Since no more balancing valves are needed and the hydraulic balancing is eliminated, it is possible to minimise cost while - at the same time - increase convenience.

PICCV: The simplest way to control the flow rate

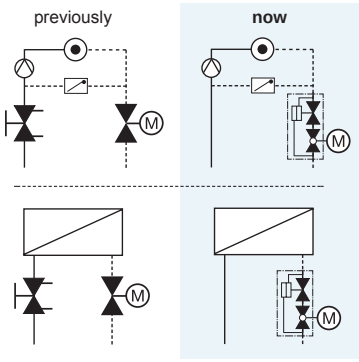


(Actuator not shown)

Typical flow diagram PICCV-20-066



Only one valve is needed per consumer:



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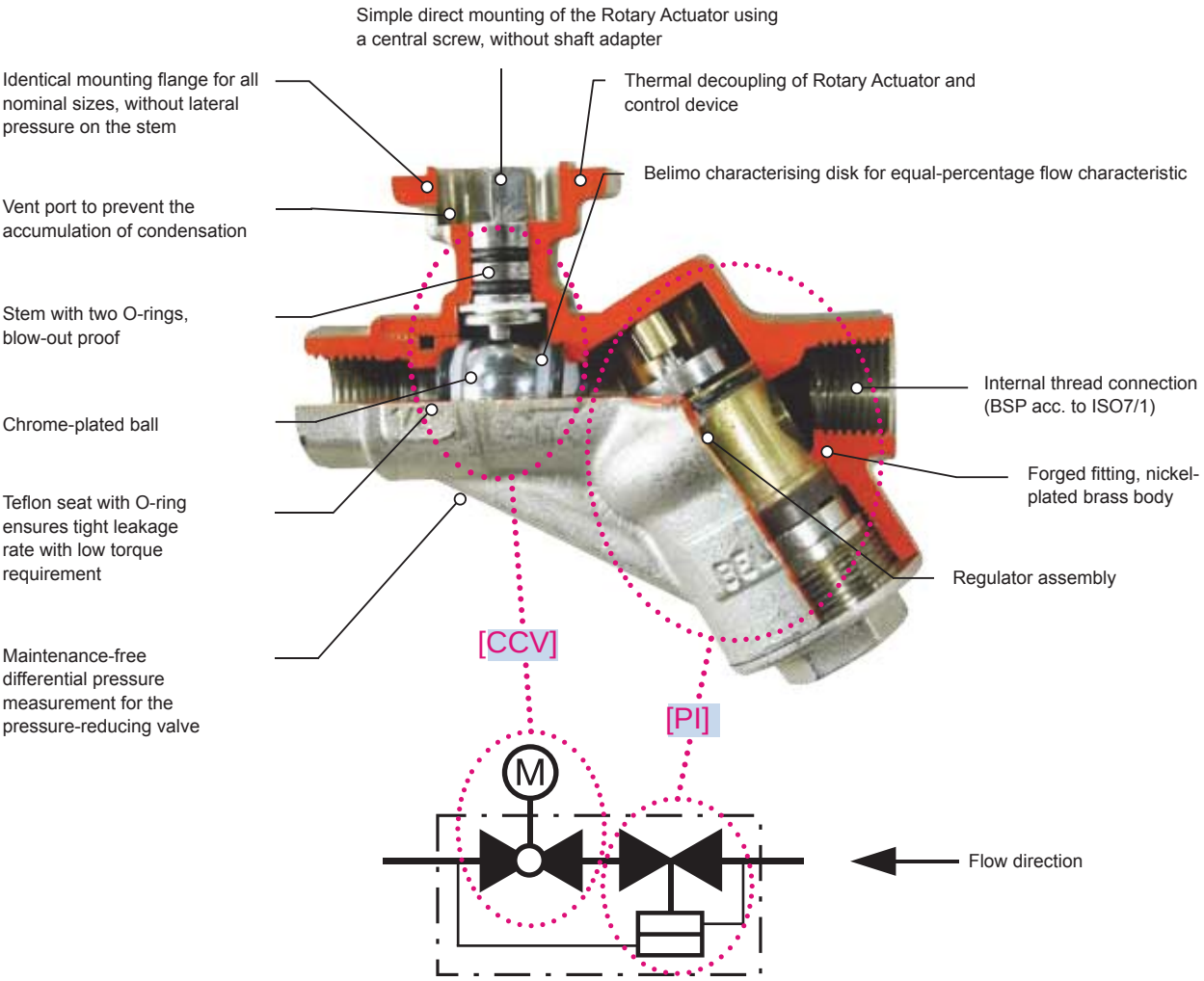
Cross-section of the Pressure Independent Characterised Control Valve PICCV



The characteristics

The Pressure Independent Characterised Control Valve PICCV contains two valves: The pressure self-regulating valve **[PI]** and the Characterised Control Valve **[CCV]** that works with equal-percentage. When the differential pressure increases, the pressure-regulating valve closes and ensures a constant pressure over the control valve.

The selection

The range of motorised Pressure Independent Characterised Control Valves comprises a practical spectrum. All valves are:

- 2-way valves in the most common nominal sizes (DN15...50)
- Designed for a flow rate of 0.04l/s to 5.5l/s

The corresponding drives

Optimum function ability of the Belimo Pressure Independent Characterised Control Valve is ensured by the corresponding motorisation. Depending on the application, the Pressure Independent Characterised Control Valves are supplied with different Rotary Actuators. You can choose from the LR..A.., NR..A.. and SR..A.. Rotary Actuators. Depending on the type, they can be controlled by a modulating, Open/Close or 3-point control system.

UL marked actuators is optional, please contact your local Sales Representative for details.

Sizing diagram for Pressure Independent Characterised Control Valves PICCV

Legend

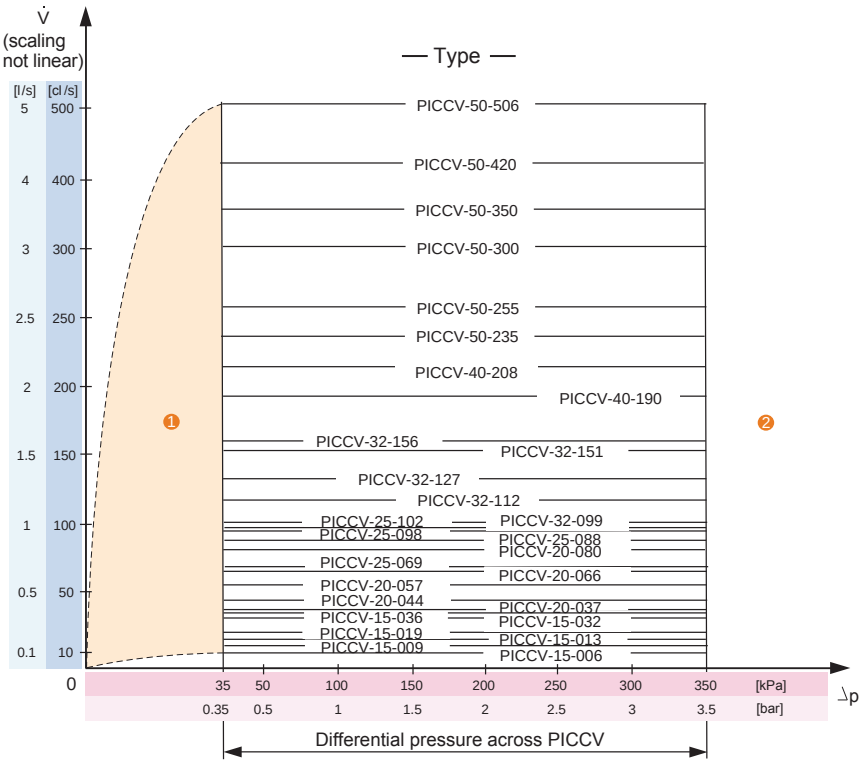
❶
The differential pressure across the PICCV should be within the range of 35...350kPa. If the differential pressure is lower than 35kPa, the PICCV behaves like a conventional control valve, where the flow decreases with the differential pressure.

❷
The PICCV is not recommended if △p over the PICCV is greater than the differential pressure of 350kPa.

△ps defintion

Closing pressure at which the Rotary Actuator is still able to close the valve in relation to the corresponding leakage rate.

△ps = 350kPa



Ordering sample

PICCV-32-151

- Nominal flow rate in l/s, e.g 1.51l/s
- DN in mm
- Pressure Independent Characterised Control Valve

Design

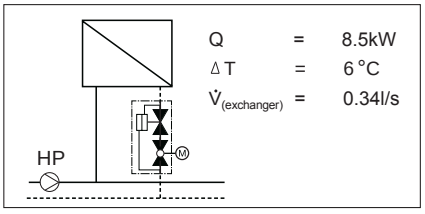
In the case of conventional control valves, the valves are selected k vs $= \frac{\dot{V}_{100}}{\sqrt{\triangle p_{v100}}}$.

The decisive factor for the design of the Pressure Independent Characterised Control Valve is the flow rate through the consumer or the heat exchanger.
In the case of a maximum flow rate of <2m/s, the diameter of the pipe connector at the heat exchanger can be set equal to the diameter of PICCV (max. flow rate).

Examples

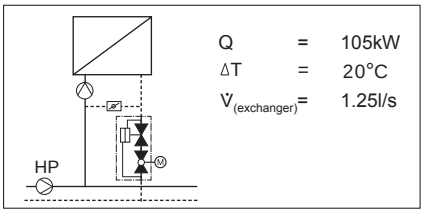
The flow rate through the Pressure Independent Characterised Control Valve should be higher than that through the consumer or heat exchanger:

Example of an air cooler (throttling circuit)



$\dot{V}_{(valve)} = \dot{V}_{(exchanger)}$
0.36l/s > 0.34l/s
→ PICCV-015-036 (Type)

Example of an air preheater (injection circuit with 2-way valve)



$\dot{V}_{(valve)} = \dot{V}_{(exchanger)}$
1.27l/s > 1.25l/s
→ PICCV-32-127 (Type)

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Technical Data

Pressure Independent Characterised Control Valve: DN15...50
For modulating, Open/Close or 3-point control of cold and warm water

Applications

- **Water-side control of air handling unit in ventilations and air-conditioning plants**
- **Water side control in heating plants**
- **Fancoil control**
- **VAV reheat**

Technical data

Medium	Cold and warm water, with 60% volume of glycol
Temperature of medium	-5...+100°C (DN 15...20), lower temperture on request -5...+80°C (DN 25...50), lower temperture on request
Rated pressure	4140kPa (DN15...25), 2760kPa (DN32...50)
Flow characteristic	equal percentage (following VDE2173) (PICCV-20-080: On/Off PI application)
Rangeability	DN15 Sv>50 DN20...50 Sv>100
Pipe connector	Internal thread to ISO 7/1
Differential pressure	35...350kPa
Closing Pressure △ps	1400kPa (actuator still capable of closing valve, leakage rate exceeds 0.01% maximum flow) 350kPa (leakage 0.01% maximum flow)
Angle of rotation	90°
Installation position	Vertical to horizontal (referred to the valve stem)
Maintenance	Maintenance-free
Valve material	
Valve body	Forged nickel-plated brass
Ball	Chrome-plated brass
Seal	PTFE
Shaft	Chrome-plated brass
O-ring	EPDM
Characterising disk	TEFZEL
Regulator	Stainless steel
Cage	Brass/Delrin 500 AF(DN25)
Diaphragm	Polyester-reinforced silicone
Spring for valve cone	Stainless steel

Mode of operation

The Pressure Independent Characterised Control Valve is motor-operated by a type of LR.. A.., NR..A.. or SR..A.. General Rotary Actuator. The actuator is controlled by a modulating, Open/Close or 3-point control system and move the ball of the PICCV, the throttling element, to the opening position dictated by the control signal.

Product features

Equal-percentage characteristic Equal-percentage characteristic of the flow ensured by the integrated characterising disk.

Constant flow volume V̇ Constant flow volume V̇ with various differential pressure of 35...350kPa, thanks to the integrated pressure regulator. A valve authority of 1 is attained, regardless of differential pressure variations across the valve.

Even in the part-load range, the flow rate remains constant with each opening position (angle of rotation) and ensures a steady control.

Manual operation by level Manual operation by lever after disengaging the gearing latch on the type of LR..A.., NR..A.. or SR..A.. Rotary Actuator (manual operation is not possible with LF..).

Accuracy ±5% variance due to differential pressure fluctuation or ±10% total assembly error incroporating differential pressure fluctuation, manufacturing toleances and is valve hysteresis.

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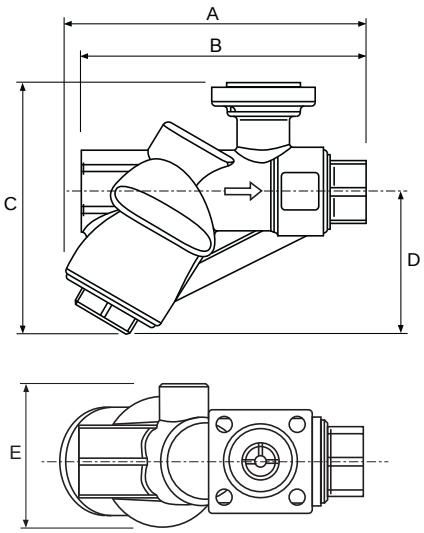
PICCV-.. dimension and weight



DN		Dimension [mm]					G	Thread	Max. Thread screwing depth
[mm]	[inches]	A	B	C	D	E	[kg]	Rp[inches]	[mm]
15	1/2"	118	114	94	58	51	0.86	1/2"	13
20	3/4“	124	126	94	58	51	0.87	3/4”	14
25	1”	174	179	121	75	82	2.72	1”	16
32	1 1/4”	199	221	140	89	87	3.74	1 1/4”	19
40	1 1/2”	202	204	140	89	87	3.54	1 1/2”	19
50	2”	214	225	146	89	87	4.31	2”	23
50	2”	426	396	224	148	132	12.25	2”	22

Ordering

The Pressure Independent Characterised Control Valve (PICCV) should be ordered together with the corresponding LR..A.., NR..A.. or SR..A.. Rotary Actuator.

Ordering examples (with NR24A-MF):
a) PICCV-40-215 with NR24A-MF Rotary Actuator fitted:
- order code: PICCV-40-215+NR24A-MF

b) PICCV-40-215 with NR24A-MF Rotary Actuator supplied separately or not fitted:
- order code: PICCV-40-215/NR24A-MF

UL marked actuators is optional, please contact your local Sales Representative for details.