81

EN Description

The pressure independent control valve (PICV) combines the functions of a differential pressure controller, regulation valve and 2 port control valve into a single body.
The EvoPICV incorporates a small diaphragm type DPCV in order to keep a constant differential pressure across an orifice and to provide a constant flow rate whilst the differential pressure is with the operating limits of the valve. Beyond these working pressures the valve acts as a fixed orifice.
Making this orifice adjustable allows the valve to be pre-set deliver a range of flow rates. In the case of the EvoPICV rotary valve this adjustment can be made just by means of specific function of the actuator, if present.
The EvoPICV valve also includes 2 port temperature control by means of an special pattern ball valve. The hole of the ball valve is machined to give a near equi-percentage flow control characteristic. Due to the fact that the differential pressure across the valve seat is constant it can be said that the authority of this control valve is very close to 1.
Due to the way the EvoPICV valve controls the flow rate, irrespective of differential pressure branch and sub mains, balancing valves are not required. The flow rate is maintained at the terminal unit regardless of system conditions making the valve ideal for systems with inverter driven pumps.

EN Valve features and benefits

The 81 series PICV valve offers the following functions:

- High precision equal percentage ball gives maximum flow control under all conditions.
- The EvoPICV-R shuts off fully leak tight due to the ball valve element finished.

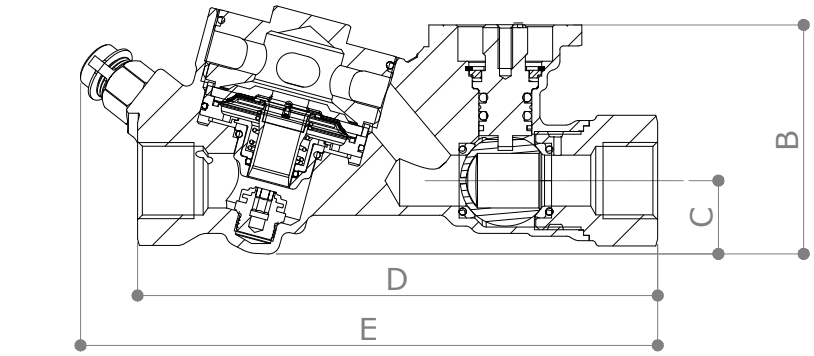
It provides these benefits:

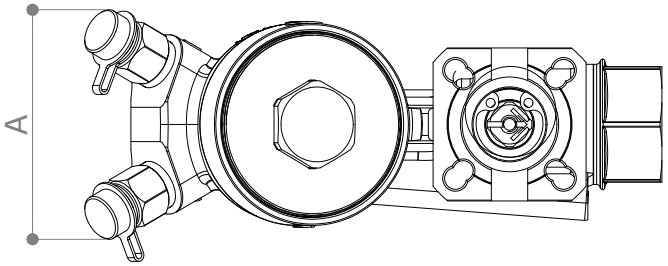
- Reduces capital outlay by eliminating the need for separate terminal balancing valves, temperature control valves, branch and mains balancing valves, and system differential pressure control valves.
- The valve has been designed to be easily close coupled to the terminal unit, even on 40mm centre to centre distance heating and cooling coils.
- Selection is simple as no authority calculations are needed.
- Commissioning is simplified as no costly proportional balance is required.
- Controllability is made easy due to the equal percentage characteristic (ball with special hole shape).
- User comfort maximised by ensuring every temperature control valve because it has full authority.

ΔP max.	Temperature	Working pressure max.	Stroke	Rangeability	Leakage	Accuracy 0÷1 bar
400 kPa / 4 bar	-10 ÷ 120 °C	2500 kPa / 25 bar	90°	50÷100 IEC 60534-2-3	Class IV IEC 60534-4	± 5%

	81VL ½”	81L ½”	81H ½”	81L ¾”	81H ¾”
Flow rate max.	360 l/h 0,100 l/s	700 l/h 0,194 l/s	1000 l/h 0,278 l/s	780 l/h 0,217 l/s	1150 l/h 0,319 l/s
Start-up max.	20 kPa 0,20 bar	20 kPa 0,20 bar	20 kPa 0,20 bar	25 kPa 0,25 bar	25 kPa 0,25 bar
Connections	Rp ½" F EN 10226-1	Rp ½" F EN 10226-1	Rp ½" F EN 10226-1	Rp ¾" F EN 10226-1	Rp ¾" F EN 10226-1

EN Dimensional data

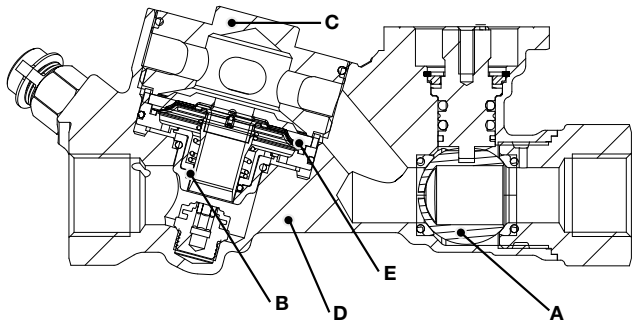




Manual valve						
Art.	**Flow rate [l/h]**	**A (mm)**	**B (mm)**	**C (mm)**	**D (mm)**	**E (mm)**
81VL ½"	360	62	68	20	142	158
81L ½"	700	62	68	20	142	158
81H ½"	1000	62	68	20	142	158
81L ¾"	780	62	68	20	142	158
81H ¾"	1150	62	68	20	142	158

EN Materials and weight

81 EvoPICV



	Material list
Ball (A)	Brass CW617N
Cartridge spring (B)	High resistance polymer - EPDM Stainless steel AISI 303
Cartridge body (C)	Brass CW614N
Body forging (D)	Brass CW602N
Diaphragm (E)	EPDM

Art.	**Weight (kg)**
81VL ½"	1,13
81L ½"	1,10
81H ½"	1,12
81L ¾"	1,06
81H ¾"	1,04

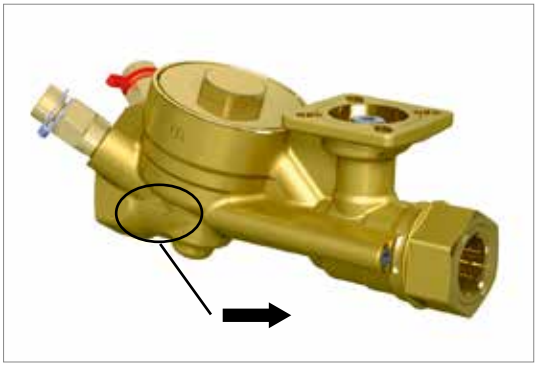
EN Installation and maintenance EvoPICV 81

1. Use conditions

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.
Minimum differential pressure above which the valve begins to exercise its regulating effect:

	81VL ½"	81L ½"	81H ½"	81L ¾"	81H ¾"
ΔP Start-up	20 kPa 0,20 bar	20 kPa 0,20 bar	20 kPa 0,20 bar	25 kPa 0,25 bar	25 kPa 0,25 bar

Medium
Water / Water+glycol 30%



2. Flow preset

To set the selected flow, the actuator must be used. Actuator has to be settable by means of electronics or should has at least a end stroke blocking device.

3. Operating control

It is 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.
If the measured differential pressure is higher than the start-up pressure, the valve is actually keeping the flow constant at the set value.
Pettinaroli **MDPS2** is the device which allows to do it: along with a smartphone and the dedicated app, it can directly give the user the differntial pressure compared to the start-up differential pressure of the valve (proper valve has to be selected among all the Pettinaroli EvoPICV catalogue).

4. Maintenance and cleaning

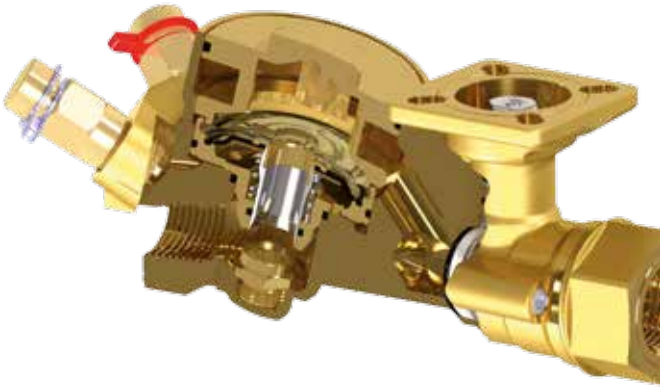
During valve cleaning operations, use a damp cloth. DO NOT use any detergent or chemical product that may seriously damage or compromise the proper functioning and the reliability of the valve.

5. Actuator assembly

The valve can be equipped with a series of actuators, according to the requirements of the system. The actuator connection plate complies the ISO 5221 F03 and F04.

6. Flow Rate Limitation and Temperature Control

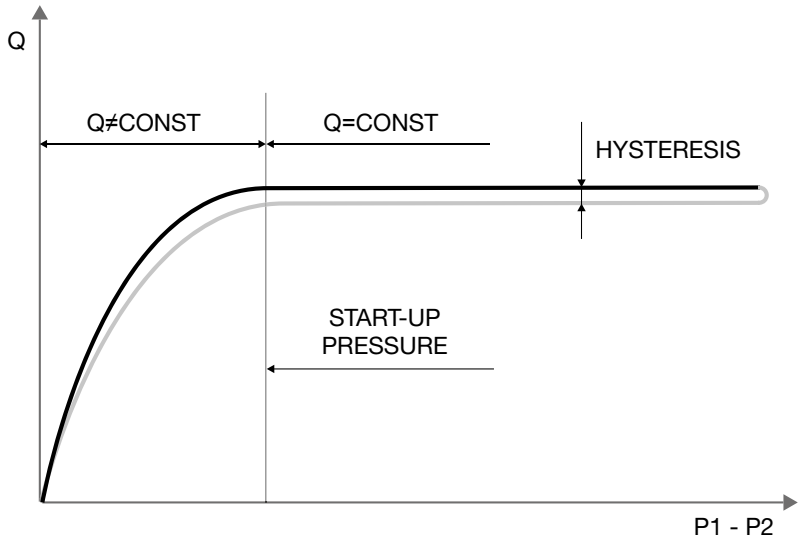
The temperature control element of the valve consists of an specific pattern ball valve; the differential pressure (P2-P3) across is held constant by the differential pressure regulator.
Flow rate limitation and modulating flow control are both achieved using a single characterised port in the ball element of the valve. As the differential pressure across this characterised port is held constant by the pressure regulator, flow rate is now only a function of the cross sectional area of this port.
As the ball closes against the PTFE seat a portion of the port is occluded, the characterised port has been designed such that the rate of change of area as the ball closes produces an equal percentage characteristic.
Maximum flow rate limitation is achieved by limiting the position to which the ball may open. This can be achieved in two ways, firstly by means of a mechanical adaptor or more commonly by limiting the maximum opening position of the attached



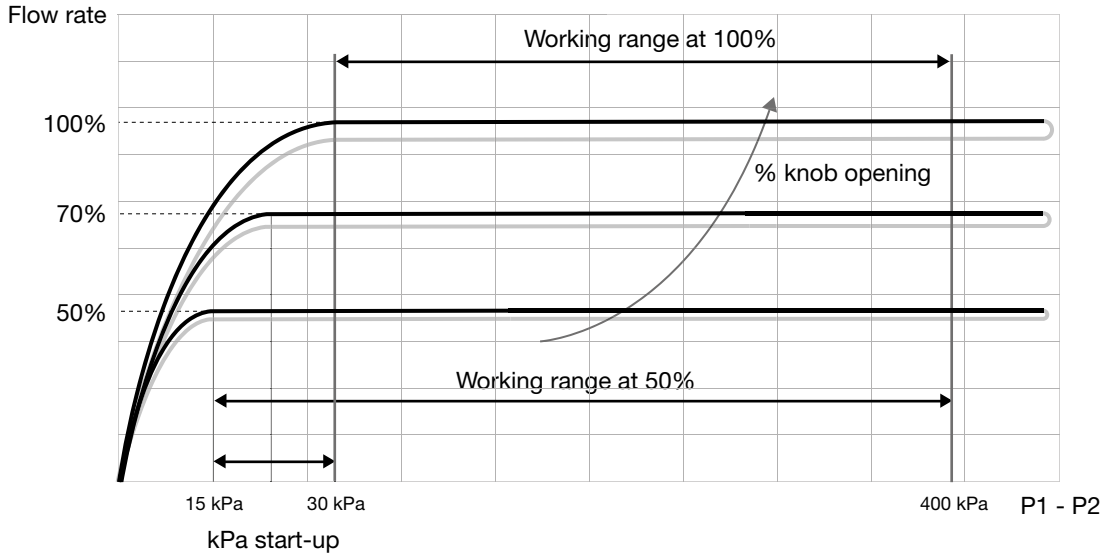
Drawing showing how characterised ball is occluded by PTFE seat

actuator.
Modulating flow rate control is achieved by positioning the ball between the fully closed position and the point at which the design flow rate is achieved, in other the words the point at which the maximum opening position of the actuator is reached.

EN Characteristic curves



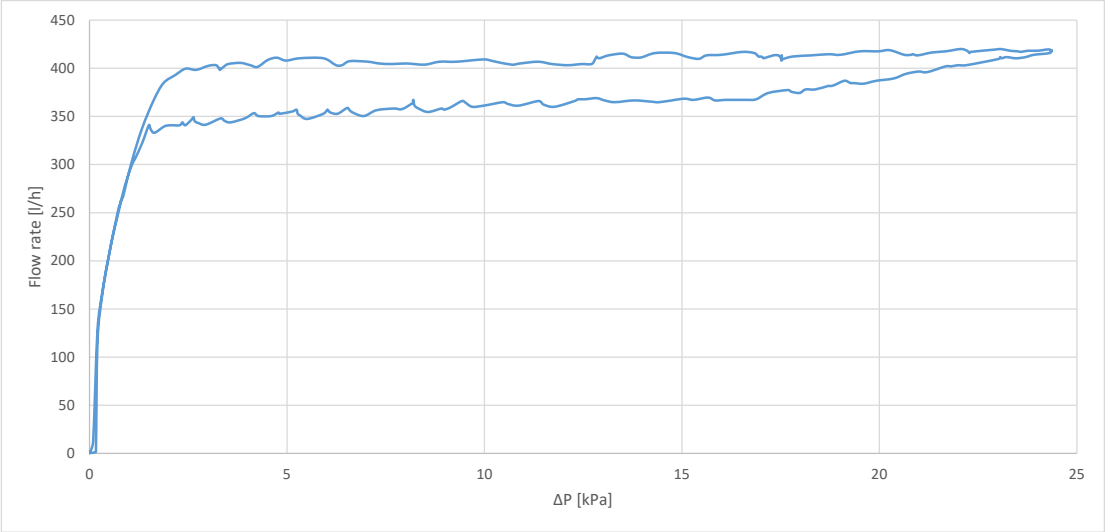
The example above shows a characterisitc curve where start-up pressure, hysteresis and accuracy can be evaluated.
Using a differential pressure gauge to measure the pressure drop the valve absorbs, allows to check whether the valve is in the operating range (and, therefore, whether the flow is constant) 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.
Start-up value varies with flow setting of the valve, as shown by the example below:



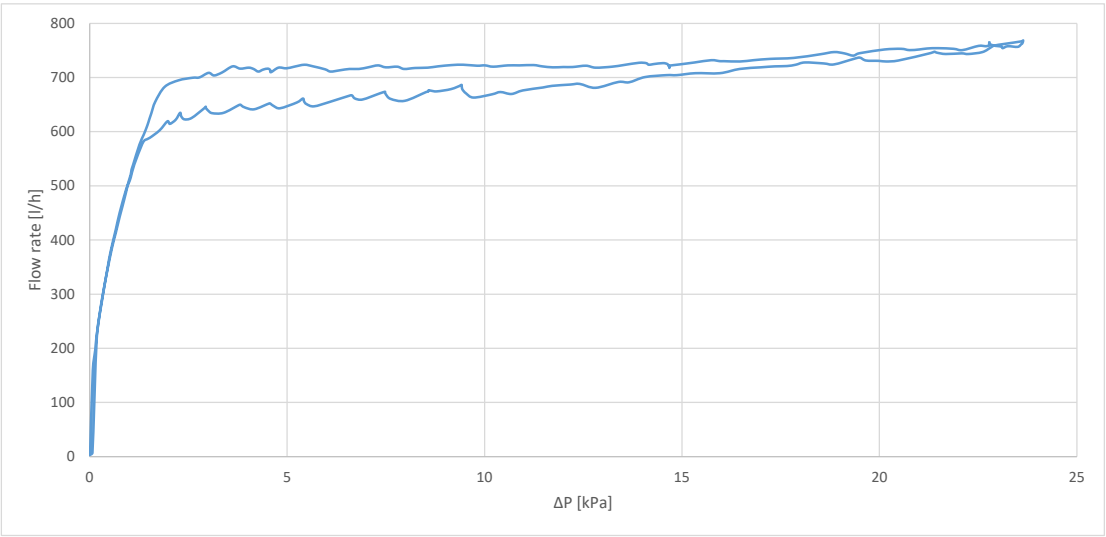
When the valve is set at 100% of nominal (maximum) flow, the curve begins to remain constant at 30 kPa, therefore the working range of the valve is 30 ÷ 400 kPa;

When the valve is set at 50% of nominal flow, the curve begins to remain constant at 15 kPa, therefore the working range of the valve is 15 ÷ 400 kPa.

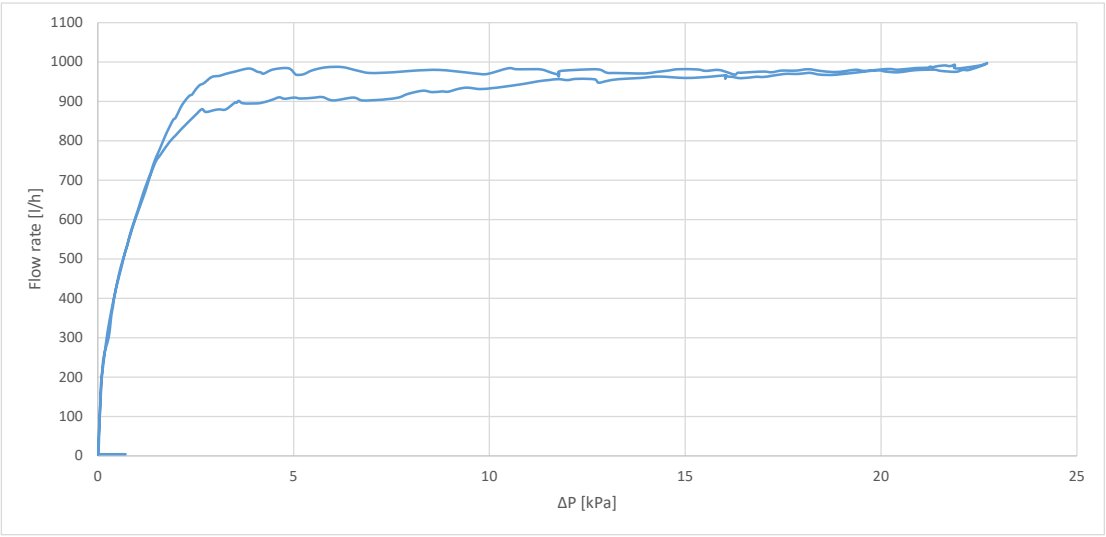
The following diagrams show the start-up pressure at different presetting.



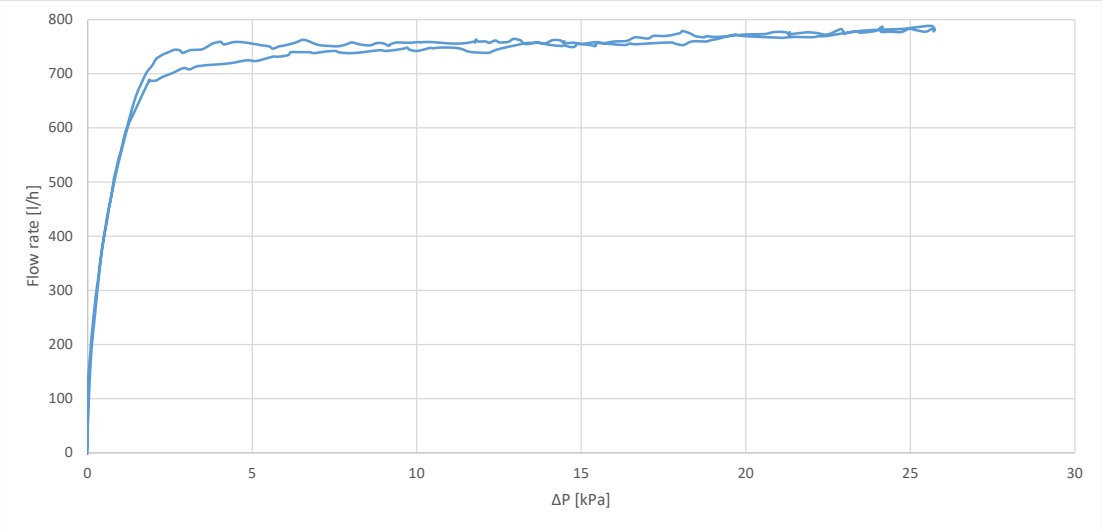
Valve model
81VL 1/2" - 360 l/h



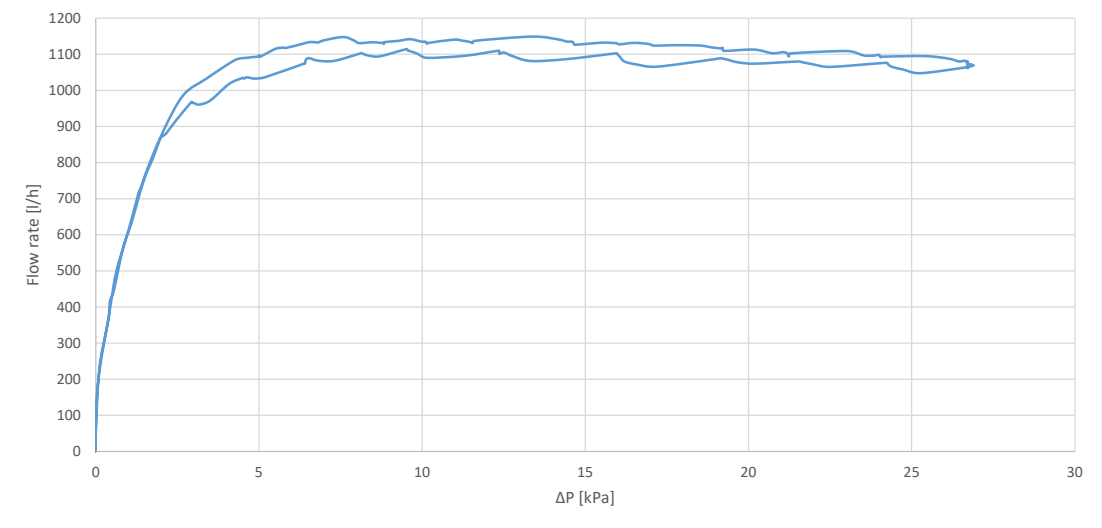
Valve model
81L 1/2" - 700 l/h



Valve model
81H 1/2" - 1000 l/h



Valve model
81L 3/4" - 780 l/h

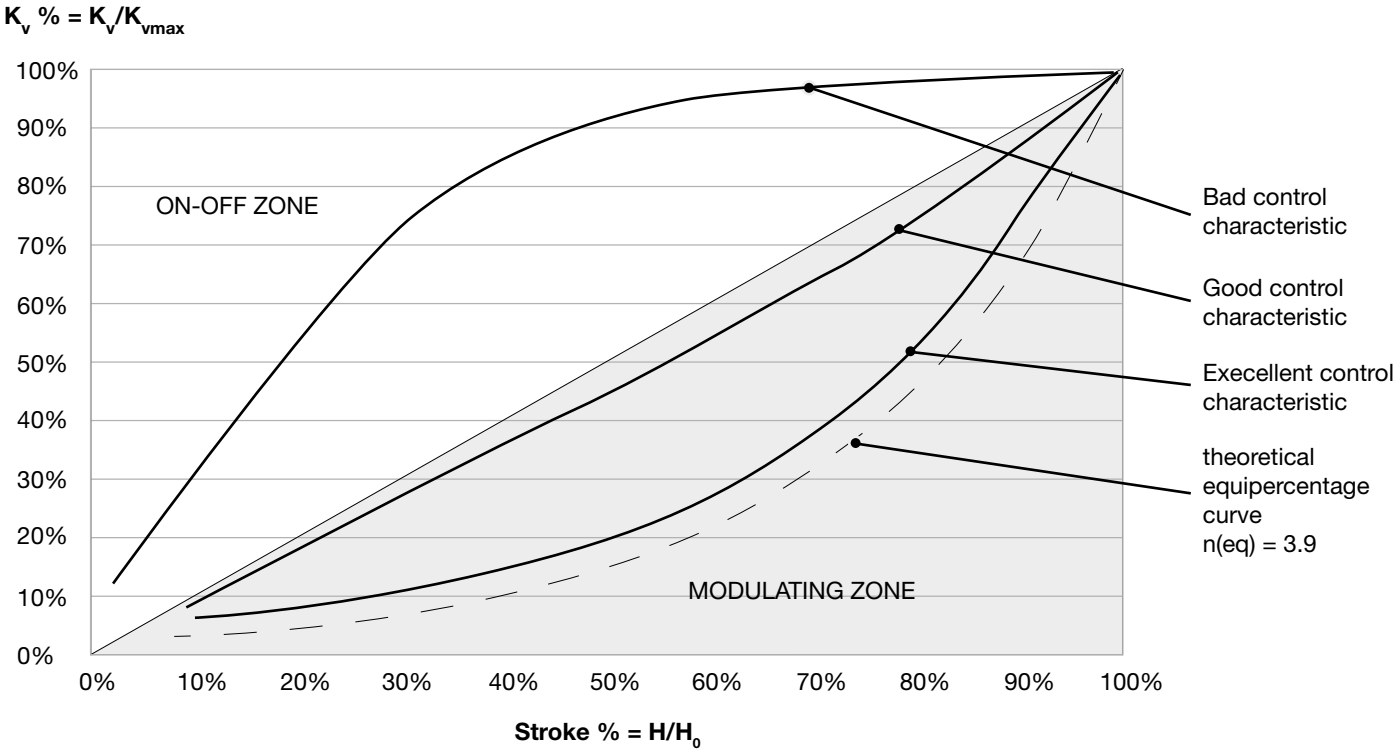


Valve model
81H 3/4" - 1150 l/h

EN Control curves

Operating on the position of the regulating valve control stem will modify the valve Kv, hence the flow rate. The relation between Kv and stroke is shown in the graph below.

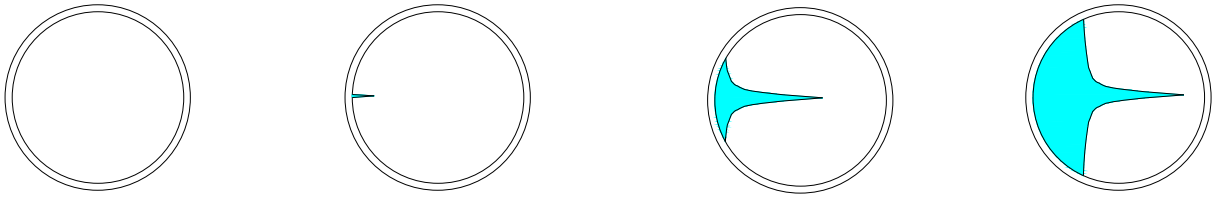
Typical control valve characteristic curves.



Combining the **EvoPICV-R** valve characteristic with heat exchanger results in a linear control system.

Below the characteristic hole shape of 81 PICV valve is shown. This special shape allows the valve to have an equalpercentage control characteristic.
The diagram below shows the free area of passage at various opening positions, it can be seen that as the ball opens up to 50% open only a very small area of passage is presented. As the ball opens to 75% a much greater area of passage is formed until at 100% open the full area of passage is presented. This rate of change of area of passage is the factor which governs the valve characteristic.

The characterised slot is laser cut directly into the ball, this allows the characterisation profile to be very precise and repeatable.



Flow pre-setting 81 EvoPICV

Presetting %	81VL ½"		81L ½"		81H ½"		81L ¾"		81H ¾"	
	Flow rate		Flow rate		Flow rate		Flow rate		Flow rate	
	l/h	l/s	l/h	l/s	l/h	l/s	l/h	l/s	l/h	l/s
100	360	0,100	700	0,194	1000	0,278	780	0,217	1150	0,319
90	210	0,060	563	0,156	960	0,267	626	0,174	1122	0,312
80	114	0,032	341	0,095	845	0,235	386	0,107	1032	0,287
70	75	0,020	207	0,058	737	0,205	215	0,060	805	0,224
60	53	0,014	153	0,043	570	0,158	153	0,042	561	0,156
50	36	0,010	98	0,027	380	0,106	129	0,036	323	0,090
40	15	0,004	74	0,021	232	0,064	93	0,026	141	0,039
30	4	0,001	39	0,011	132	0,037	53	0,015	9	0,003
20	-	-	-	-	23	0,006	-	-	-	-
10	-	-	-	-	-	-	-	-	-	-

EN Accessories

MDPS2
Digital differential manometer Bluetooth® for start-up test of PICV valves and flow rate measurement of Terminator balancing valves and Venturi devices. To be used with specific app installed on a smartphone.

MDP
Digital differential manometer differential pressure measurement.

EN Generals

Pettinaroli 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, in any case, make sure water quality complies with UNI 8065 standards (Fe < 0.5 mg/kg and Cu < 0.1 mg/kg).
Furthermore, maximum iron oxide in the water passing through control valve (PICV) should not exceed 25 mg/kg (25 ppm). To ensure the main pipework is cleaned appropriately, flushing by-passes should be used without flushing through the pressure regulator of the PICV thereby preventing dirt that might clog the valve.

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