

92



Patent US9910447B2
 Patent IT1428884
 Patent EP3067772B1

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 within the operating limits of the valve. Beyond these working pressures the valve acts as a fixed orifice. Thanks to the new diaphragm technology, the valve can work also with very dirty water.

Making this orifice adjustable allows the valve to be pre-set and deliver a range of flow rates (unlike automatic balancing valves). The presetting gear can be easily adjusted. It works by varying the control valve stroke.

The EVOPICV valve also includes 2 port temperature control by means of an oblique pattern globe valve. The plug of the globe valve is machined to give a near linear 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

The 92 series PICV valve offers the following functions:

- Good valve authority to maintain temperature control and power output from the terminal unit.
- Maximum design flow limitation: once set, the 92 valve maintains design flow regardless of pressure changes in the system.
- It can easily be set up once installed, using the setting ring (with no actuator on).
- Measure by means of specific meter of the differential pressure across the valve: in this way user can verify if the start-up pressure has been reached and overpassed.
- DPCV dirt-resistant: the valve works during and after a Contaminated Water Test (proprietary test) with high concentration of iron oxide.
- Fast and easy maintenance: internal element (control valve and DPCV) can be easily removed, replaced or cleaned.

ΔP max.	Temperature	Working pressure max.	Stroke (max)			Rangeability	Leakage	Accuracy 0 ÷ 1 bar*	
600 kPa / 6 bar	-10 ÷ 120 °C	2500 kPa / 25 bar	DN15-20	DN25-32	DN40	50÷100 IEC 60534-2-3	Class IV IEC 60534-4	± 5%	
			3 mm	6 mm	7.5 mm				

	92VL ½"	92L ½"	92H ½"	92L ¾"	92H ¾"	92L 1"	92H 1"	92H 1 ¼"	92H 1 ½"
Flow rate max.	150 l/h 0,042 l/s	450 l/h 0,125 l/s	850 l/h 0,236 l/s	1000 l/h 0,277 l/s	1850 l/h 0,514 l/s	2500 l/h 0,694 l/s	3300 l/h 0,917 l/s	5200 l/h 1,44 l/s	9000 l/h 2,5 l/s
Start-up max.	25 kPa 0,25 bar	35 kPa 0,35 bar	25 kPa 0,25 bar	30 kPa 0,30 bar	35 kPa 0,35 bar	30 kPa 0,30 bar	30 kPa 0,30 bar	35 kPa 0,35 bar	40 kPa 0,40 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	Rp 1" UnionF EN 10226-1	Rp 1" UnionF EN 10226-1	Rc 1 ¼" UnionF EN 10226-1	Rp 1 ½" F EN 10226-1
Close off pressure**	600 kPa 6 bar	600 kPa 6 bar	600 kPa 6 bar	600 kPa 6 bar	600 kPa 6 bar^	600 kPa 6 bar	600 kPa 6 bar	600 kPa 6 bar	600 kPa 6 bar

* at pos. 9. For different presettings and delta P, please refer to the graph in Flow setting accuracy section.

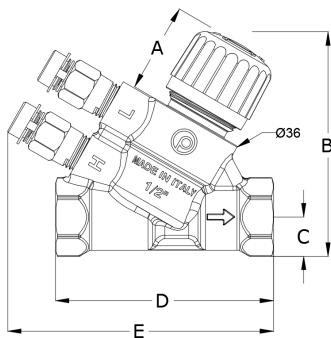
** Closed by electromechanical actuator

^ 300 kPa / 3 bar with thermoelectrical actuators series A5

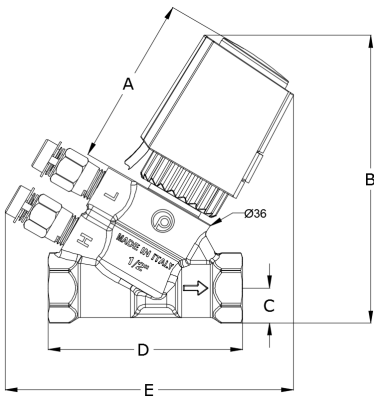


TECHNICAL SPECIFICATION

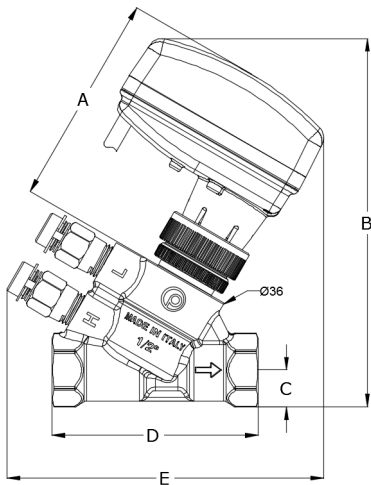
EN Dimensional data



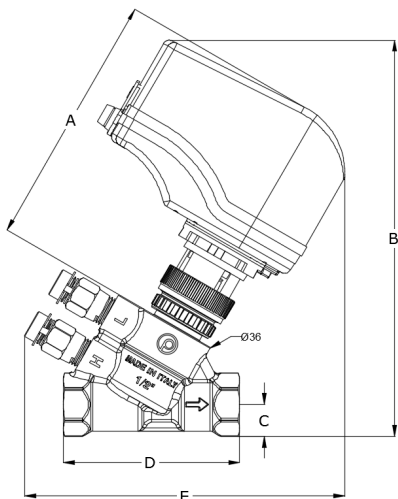
Manual valve						
Art.	Flow rate [l/h]	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)
92VL 1/2"	150	33	83	14.5	80.5	98
92L 1/2"	450	33	83	14.5	80.5	98



Valve with thermo-electric actuator						
Art.	Flow rate [l/h]	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)
92VL 1/2"	150	70	119	14.5	80.5	119
92L 1/2"	450	70	119	14.5	80.5	119

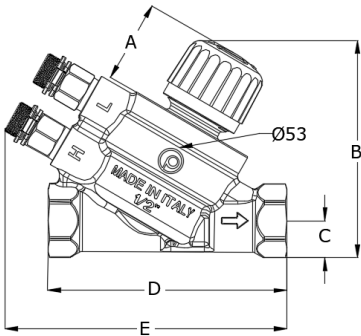


Valve with electromotive actuator						
Art.	Flow rate [l/h]	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)
92VL 1/2"	150	83	144.5	14.5	80.5	124
92L 1/2"	450	83	144.5	14.5	80.5	124

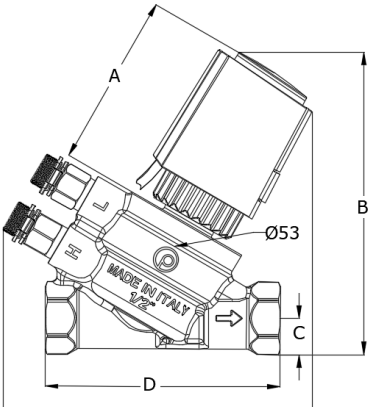


Valve with VM060						
Art.	Flow rate [l/h]	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)
92VL 1/2"	150	116.5	181	14.5	80.5	146
92L 1/2"	450	116.5	181	14.5	80.5	146

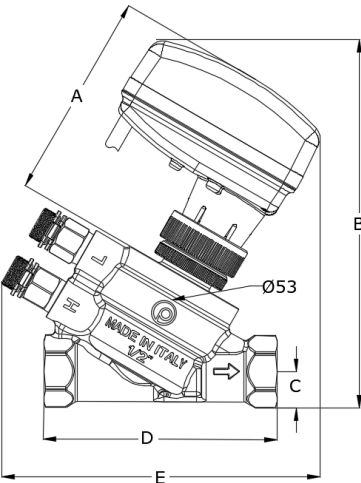




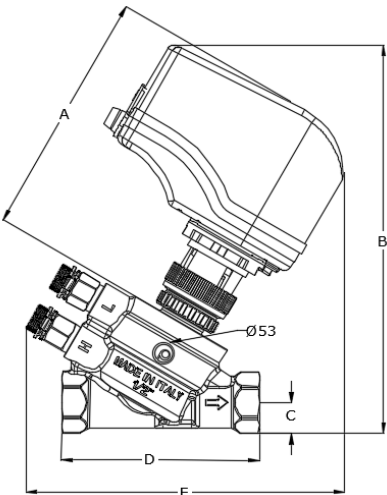
Manual valve						
Art.	Flow rate [l/h]	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)
92H ½"	850	33	84.5	14.5	93.5	110.5



Valve with thermo-electric actuator						
Art.	Flow rate [l/h]	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)
92H ½"	850	70	121	14.5	93.5	123

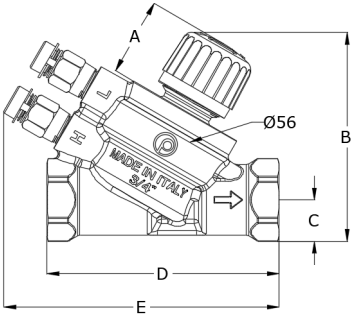


Valve with electromotive actuator						
Art.	Flow rate [l/h]	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)
92H ½"	850	83	147	14.5	93.5	127

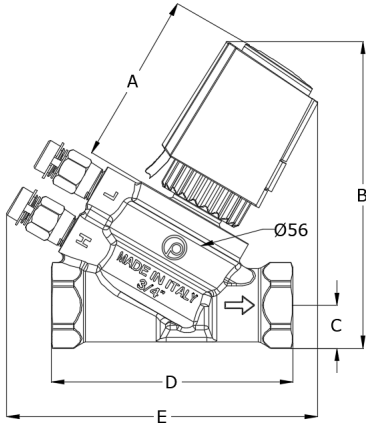


Valve with VM060						
Art.	Flow rate [l/h]	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)
92H ½"	850	116.5	184	14.5	93.5	150

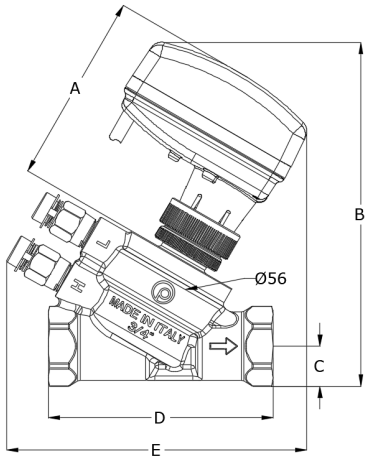




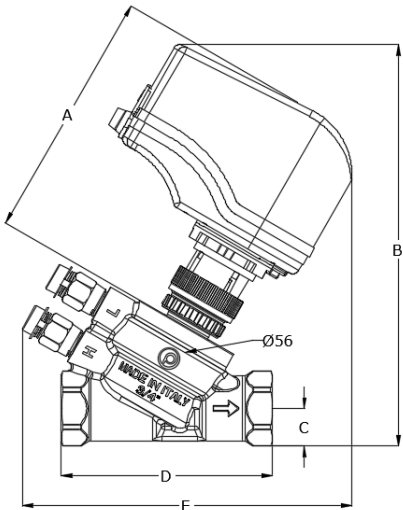
Manual valve						
Art.	Flow rate [l/h]	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)
92L 3/4"	1000	33	88	17.5	98	116
92H 3/4"	1850	33	88	17.5	98	116



Valve with thermo-electric actuator						
Art.	Flow rate [l/h]	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)
92L 3/4"	1000	70	125	17.5	98	126
92H 3/4"	1850	70	125	17.5	98	126

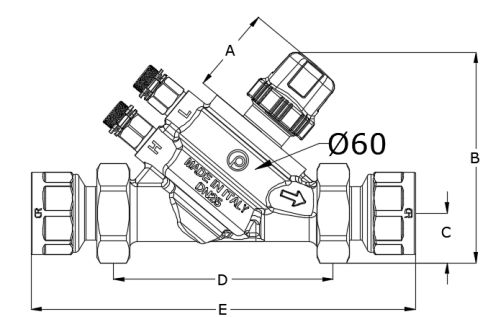


Valve with electromotive actuator						
Art.	Flow rate [l/h]	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)
92L 3/4"	1000	83	150	17.5	98	131
92H 3/4"	1850	83	150	17.5	98	131

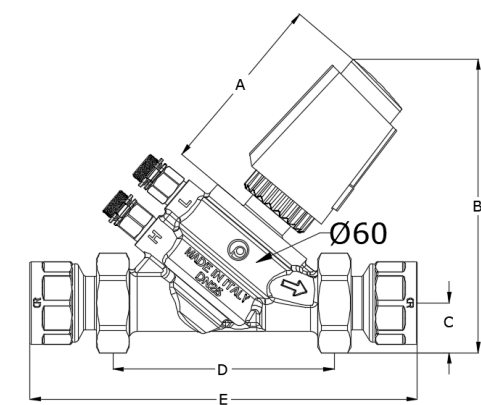


Valve with VM060						
Art.	Flow rate [l/h]	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)
92L 3/4"	1000	116.5	187	17.5	98	153
92H 3/4"	1850	116.5	187	17.5	98	153

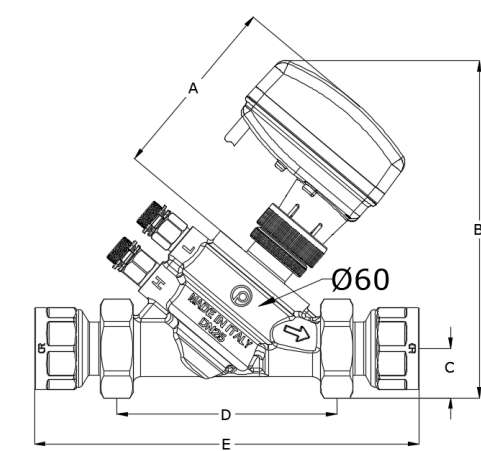




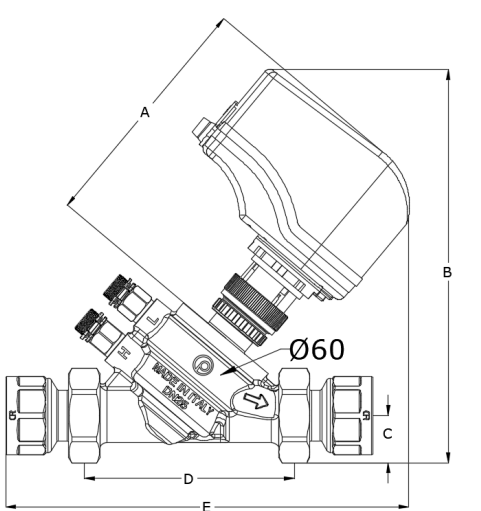
Manual valve						
Art.	Flow rate [l/h]	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)
92L 1"	2500	41	99	23.5	108	182
92H 1"	3300	41	99	23.5	108	182



Valve with thermo-electric actuator						
Art.	Flow rate [l/h]	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)
92L 1"	2500	86	138	23.5	108	182
92H 1"	3300	86	138	23.5	108	182

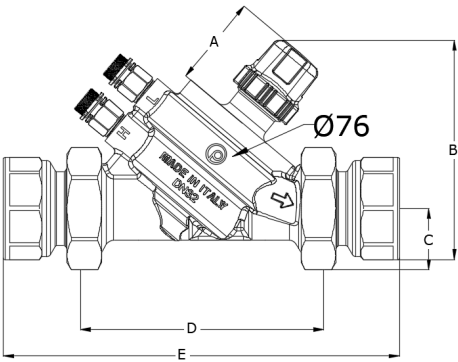


Valve with electromotive actuator						
Art.	Flow rate [l/h]	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)
92L 1"	2500	87.5	160	23.5	108	182
92H 1"	3300	87.5	160	23.5	108	182

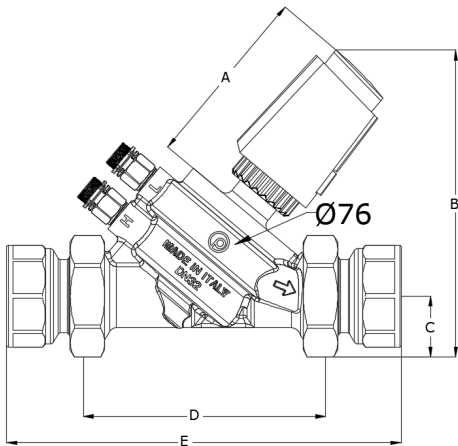


Valve with VM060						
Art.	Flow rate [l/h]	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)
92L 1"	2500	121	195	23.5	108	200
92H 1"	3300	121	195	23.5	108	200

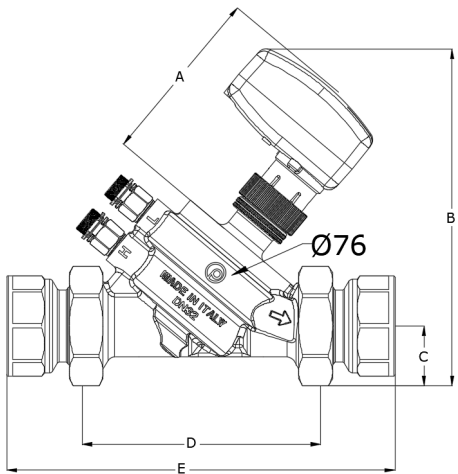




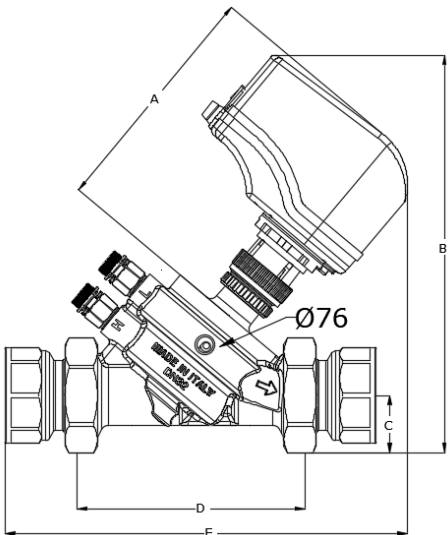
Manual valve						
Art.	Flow rate [l/h]	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)
92H 1 ¼"	5200	44.5	107.5	30	119	194



Valve with thermo-electric actuator						
Art.	Flow rate [l/h]	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)
92H 1 ¼"	5200	90	151	30	119	194

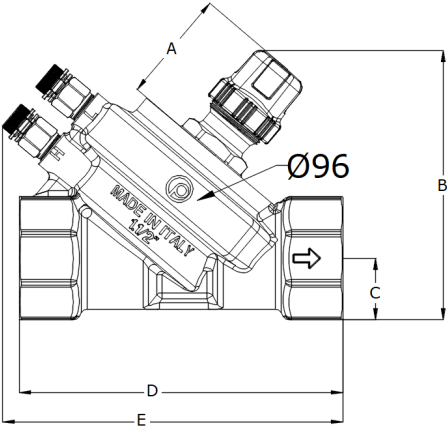


Valve with electromotive actuator						
Art.	Flow rate [l/h]	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)
92H 1 ¼"	5200	89	168.5	30	119	194

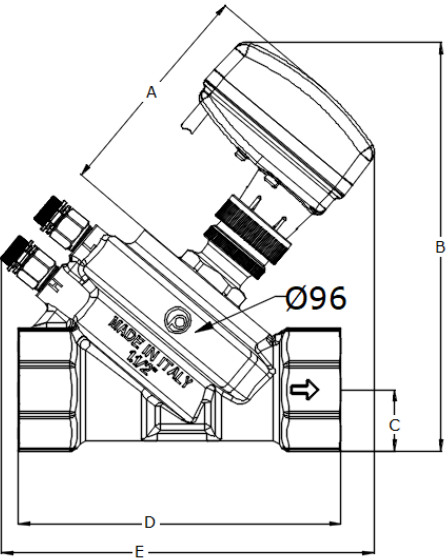


Valve with VM060						
Art.	Flow rate [l/h]	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)
92H 1 ¼"	5200	124.5	208	30	119	210

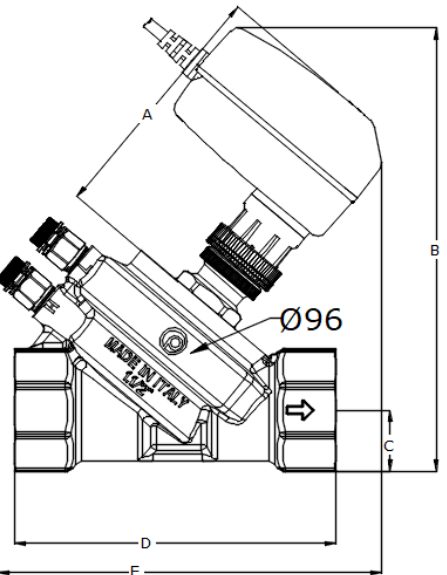




Manual valve						
Art.	Flow rate [l/h]	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)
92H 1 1/2"	9000	49.5	119	27	143	150.5



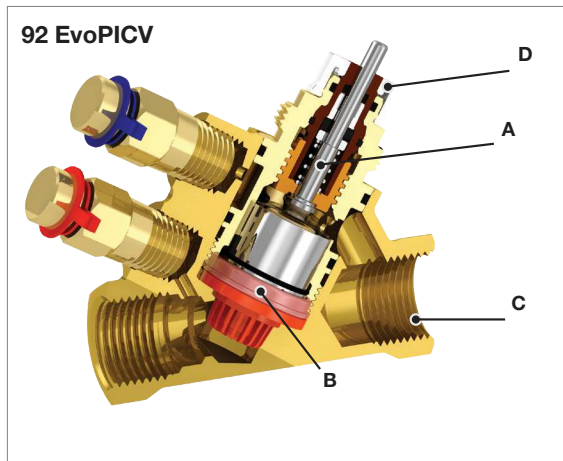
Valve with VA7493						
Art.	Flow rate [l/h]	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)
92H 1 1/2"	9000	98.5	181	27	143	165



Valve with RVAZ2						
Art.	Flow rate [l/h]	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)
92H 1 1/2"	9000	89	168.5	30	119	194



EN Materials and weight



	Material list
Regulating valve (A)	High resistance polymer Stainless steel 18/8
Diaphragm (B)	High resistance polymer, EPDMx, WMQ, Silicone Stainless steel AISI 303, HNBR
Presetting (D)	ABS, PC
Body (C)	Corrosion resistant brass CW602N
Gaskets	EPDM-x

Art.	Weight (kg)	Art.	Weight (kg)	Art.	Weight (kg)
92VL 1/2"	0,46	92L 3/4"	0,69	92H 1"	1,17
92L 1/2"	0,46	92H 3/4"	0,69	92H 1 1/4"	1,80
92H 1/2"	0,65	92L 1"	1,17	92H 1 1/2"	2,06

EN Installation and maintenance EvoPICV 92

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 are listed in the table below.

To achieve max nominal flow rate on 92H 1 1/2", remove the protective cap.

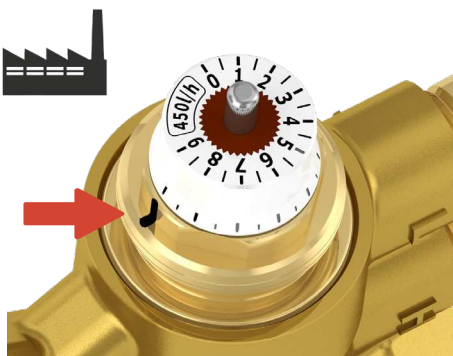


	92VL 1/2"	92L 1/2"	92H 1/2"	92L 3/4"	92H 3/4"	92L 1"	92H 1"	92H 1 1/4"	92H 1 1/2"
ΔP Start-up	25 kPa 0,25 bar	35 kPa 0,35 bar	25 kPa 0,25 bar	30 kPa 0,30 bar	35 kPa 0,35 bar	30 kPa 0,30 bar	30 kPa 0,30 bar	35 kPa 0,35 bar	40 kPa 0,40 bar

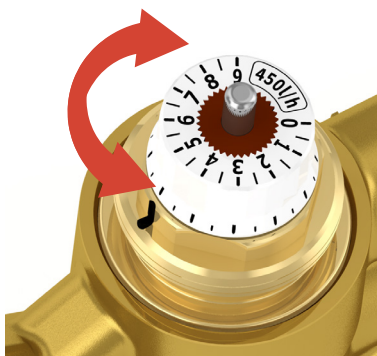
Medium
Water / Water+glycol 30%

2. Flow preset

To set the selected flow, follow these steps:



Remove the handwheel or the actuator. default setting: pos. 9



Turn the selector to the target position to set the flow rate



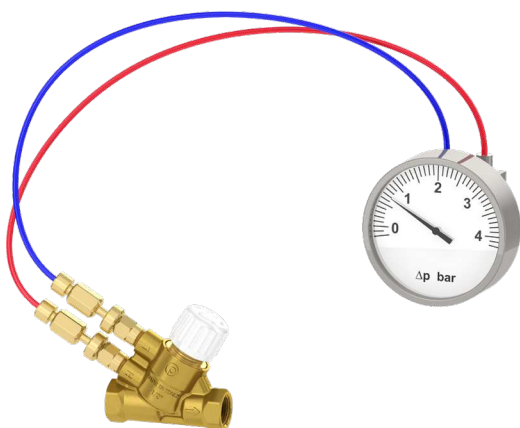
Re-assembly the handwheel or the actuator

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, 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.

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 differential pressure compared to the start-up differential pressure of the valve (proper valve has to be selected among all the Pettinaroli EvoPICV catalogue).



4. Actuator assembly

The valve can be equipped with a series of thermal-electric or electro-mechanical actuators, according to the requirements of the system. Actuators come along with an adaptor for proper mounting on the valve and for proper functioning of the whole device.

Thermal-electric actuator (not for 92H 1 1/2")



Electro-mechanical actuator



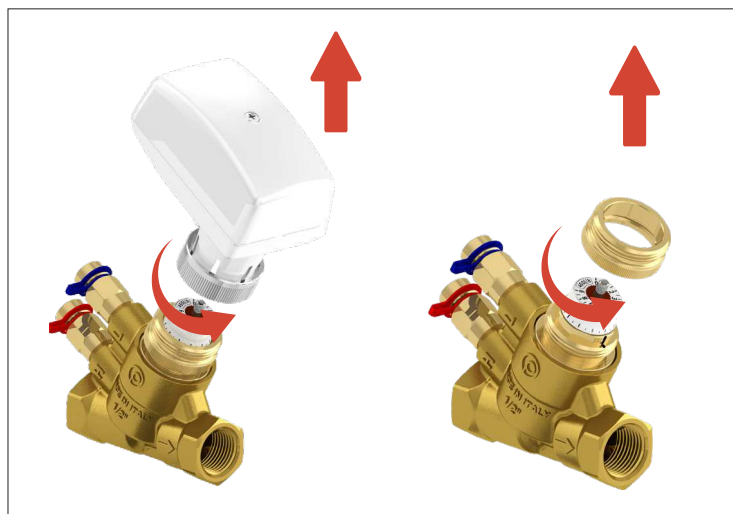
5. Maintenance, cleaning and replacement of the diaphragm of 92 EVOPICV valve

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. Maintenance and cleaning of the differential pressure regulator and the control valve must be carried out as per following instructions.

Step 1a: completely remove the knob



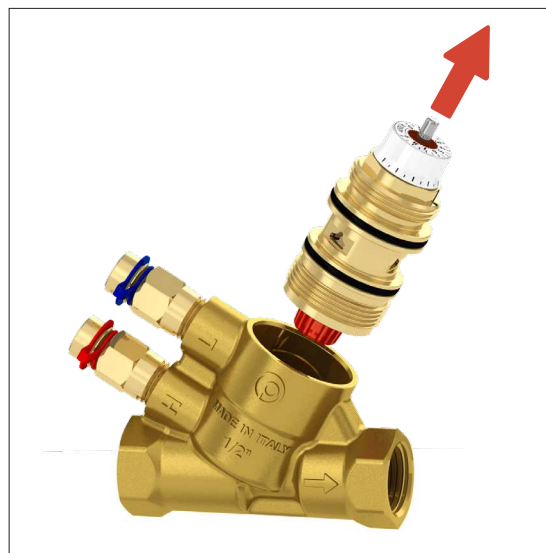
Step 1b: remove the actuator and the adapter.



Step 2: using a 21mm (DN15 to DN25) or 30mm (DN32-DN40) spanner unscrew the headwork.



Step 3: remove the headwork.



TECHNICAL SPECIFICATION

Step 4: push down the control valve stem and pull the diaphragm out



Step 6: put back the diaphragm. Push it in its seat



Step 8: Screw the headwork with 20 Nm torque



To replace the element control valve-DPCV, follow the instructions above except steps 4, 5 and 6. In step 7, put a new headwork (092DC).

Step 5: clean the diaphragm with water and a cloth



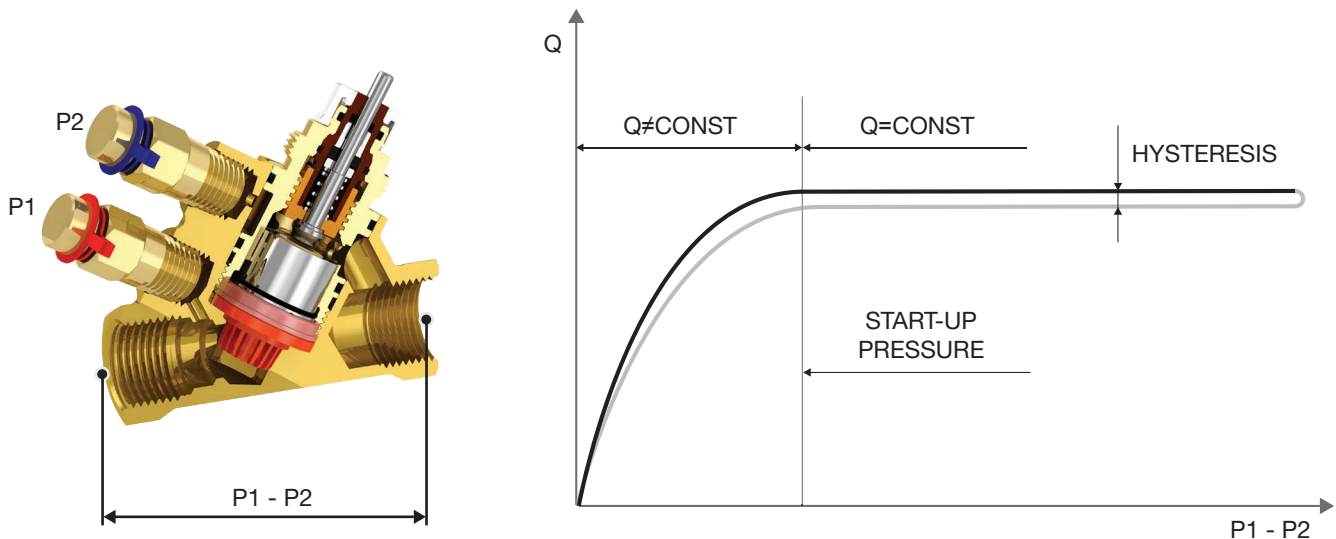
Step 7: replace the headwork



Step 9: replace the actuator adapter and the actuator or the handwheel.



EN Start-up curves and presetting

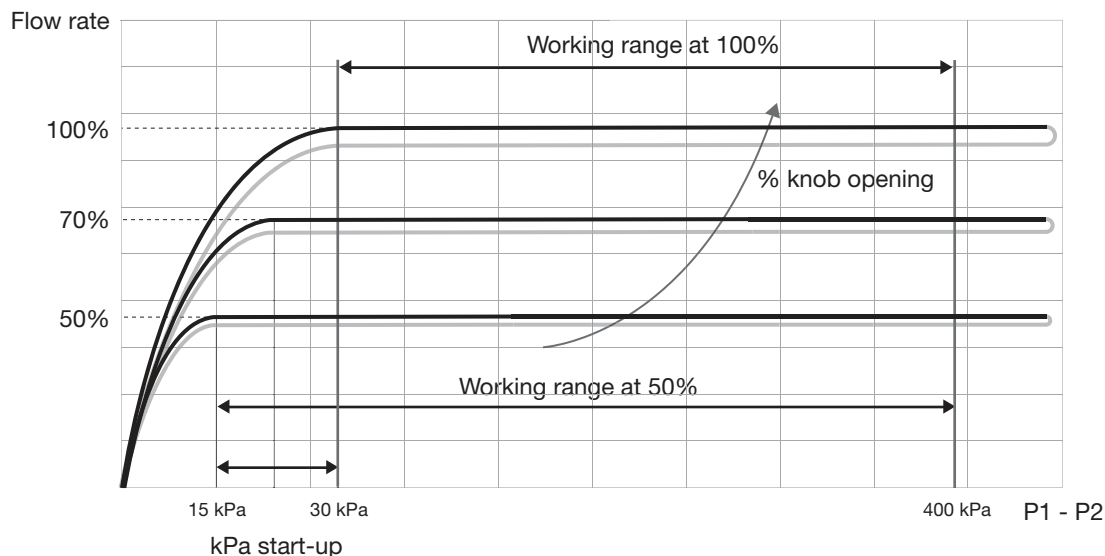


The example above shows a characteristic curve where start-up pressure, hysteresis and accuracy can be evaluated.

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:



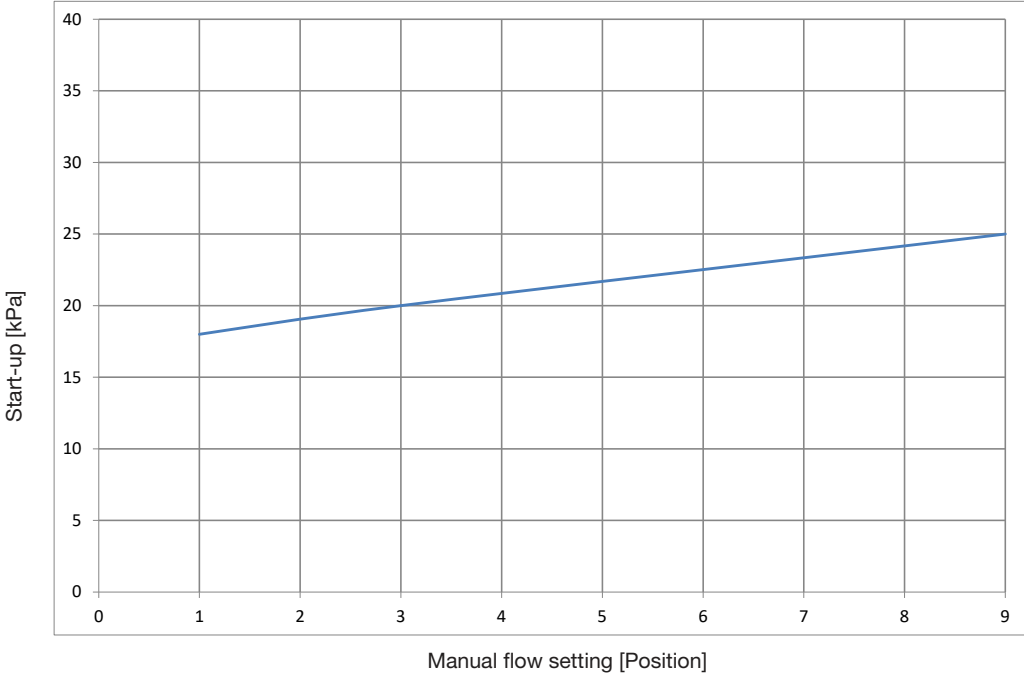
When the valve is set at 100% of nominal (maximum) flow, the curve begins to remain constant at 30 kPa, therefore the suggested working range of the valve is $30 \div 400$ kPa;

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 $15 \div 400$ kPa.

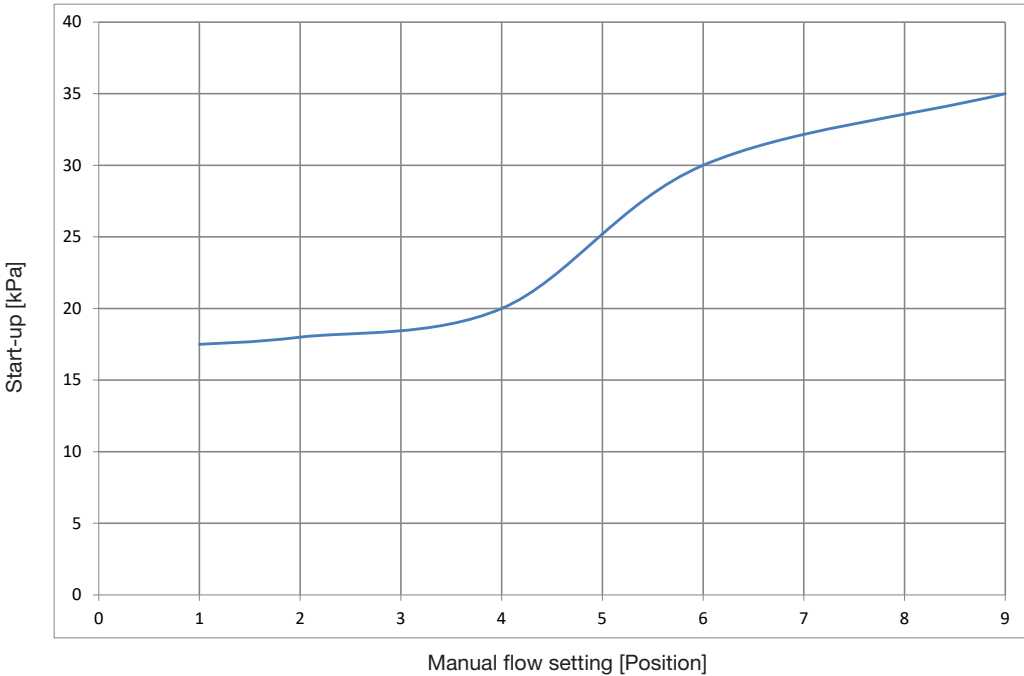
Over 400 kPa the fluid velocity through the valve is extremely high and cavitation may happen due to extreme turbulence of the flow.

Because of these phenomena the valve can get damaged. For energy saving reasons, we suggest to continuously work the valve under 400 kPa.

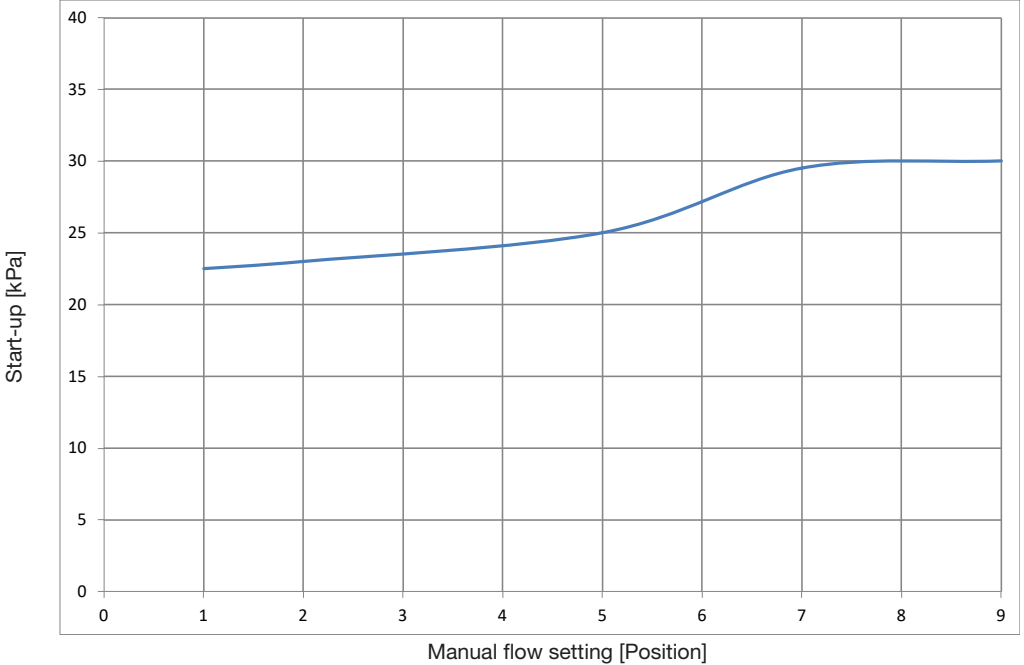
The following diagrams show the start-up pressure at different presetting.



Valve model
92VL 1/2" - 150 l/h

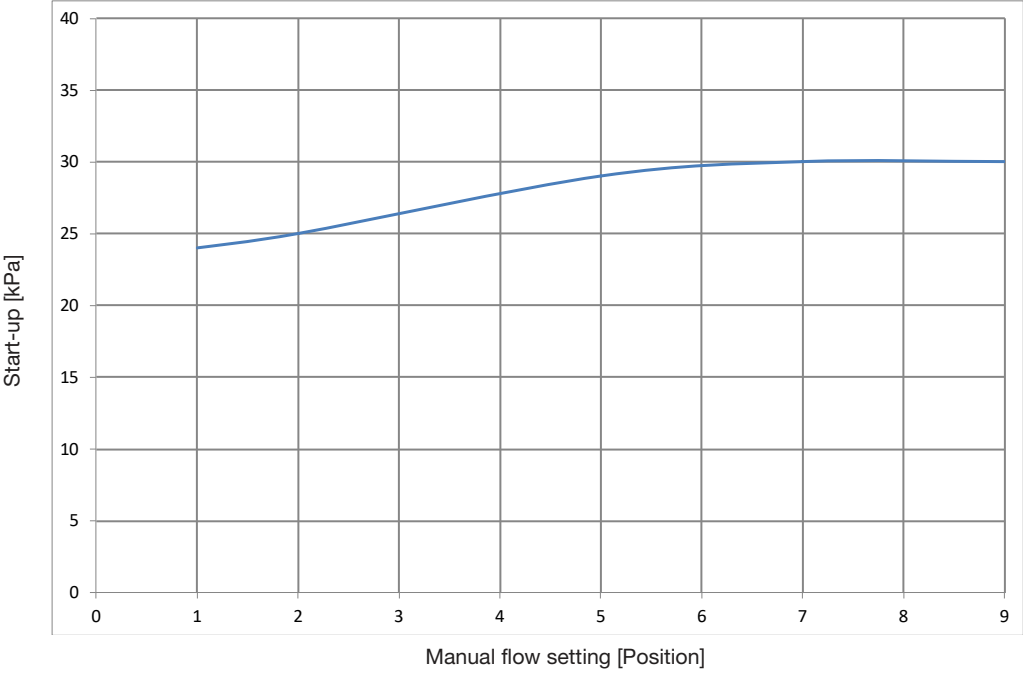


Valve model
92L 1/2" - 450 l/h

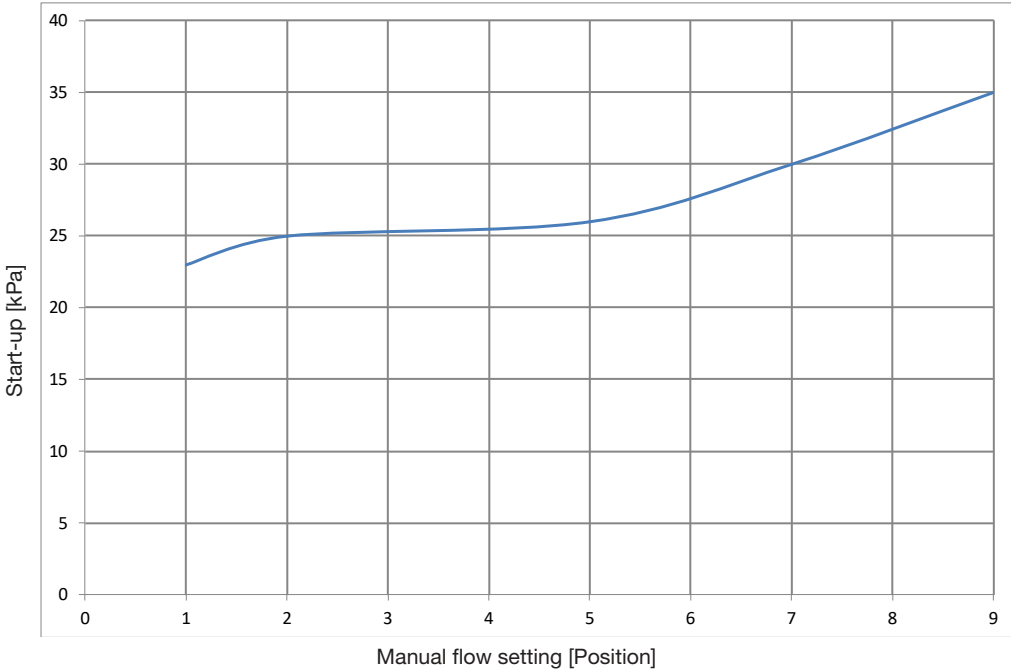


Valve model
92H 1/2" - 850 l/h

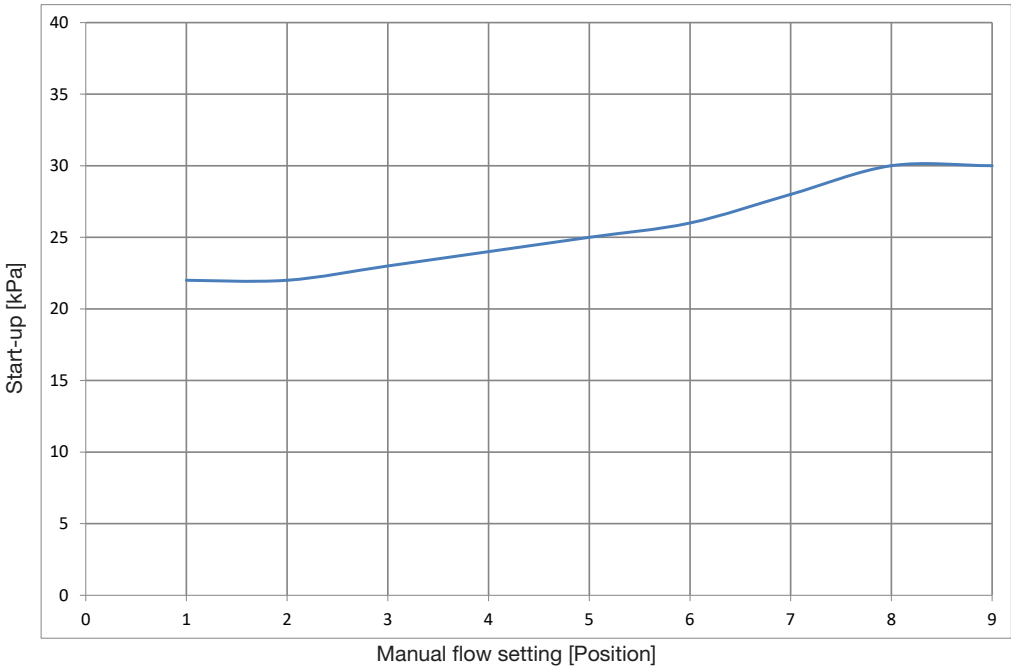




Valve model
92L 3/4" - 1000 l/h

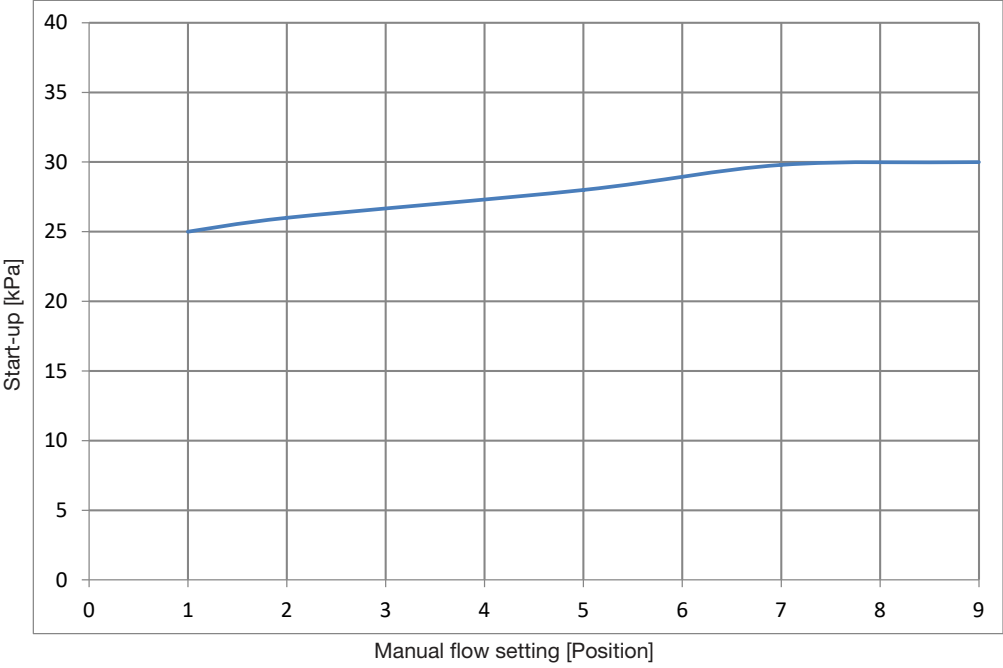


Valve model
92H 3/4" - 1850 l/h



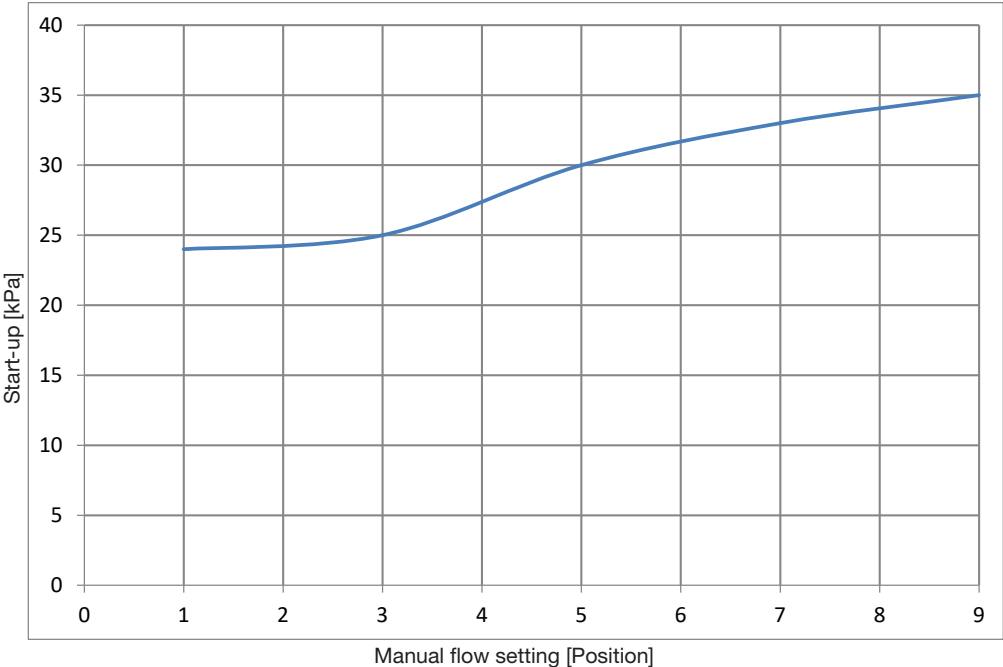
Valve model
92L 1" - 2500 l/h





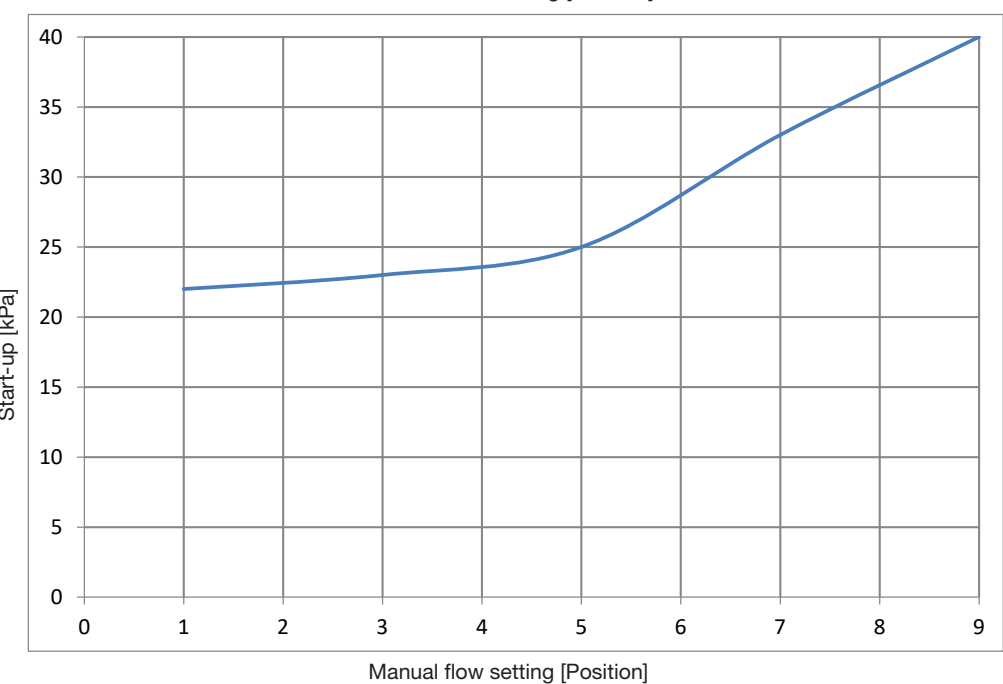
Valve model

92H 1" - 3300 l/h



Valve model

92H 1 1/4" - 5200 l/h



Valve model

92H 1 1/2" - 9000 l/h



Flow pre-setting 92 EvoPICV

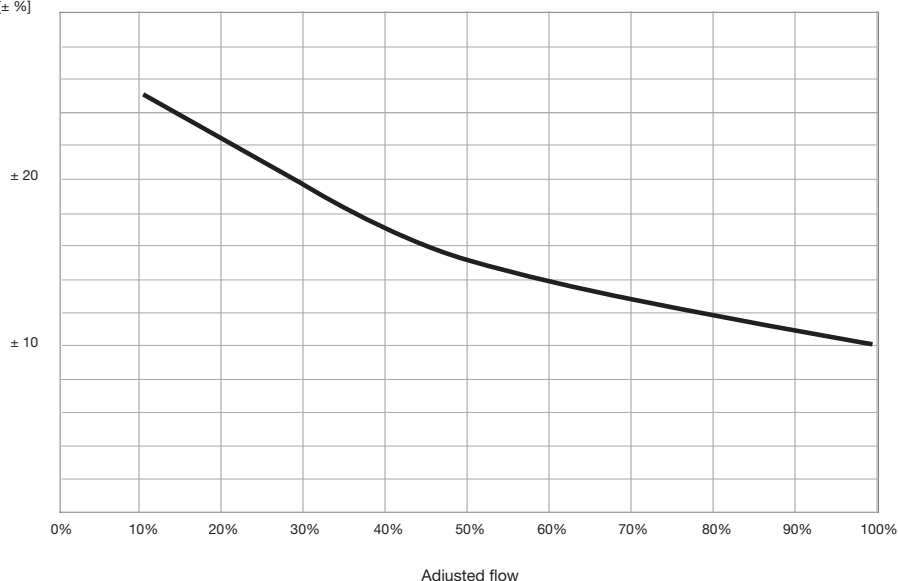
Presetting %	92VL 1/2"		92L 1/2"		92H 1/2"		92L 3/4"		92H 3/4"		92L 1"	
	Flow rate		Flow rate		Flow rate		Flow rate		Flow rate		Flow rate	
	l/h	l/s	l/h	l/s	l/h	l/s	l/h	l/s	l/h	l/s	l/h	l/s
9	150	0,043	450	0,125	850	0,236	1000	0,277	1850	0,514	2500	0,684
8	133,2	0,037	387	0,108	774	0,215	911	0,253	1734	0,484	2202	0,612
7	114	0,032	328,8	0,091	689	0,191	804	0,223	1548	0,430	1875	0,521
6	99,6	0,028	261	0,073	606	0,168	722	0,201	1320	0,367	1577	0,438
5	85,2	0,024	207	0,058	496	0,138	573	0,159	1080	0,300	1304	0,362
4	70,8	0,020	165	0,046	393	0,109	451	0,125	846	0,235	1048	0,291
3	55,2	0,015	121,2	0,034	331	0,092	376	0,104	624	0,173	798	0,222
2	39,6	0,011	81,6	0,023	265	0,074	291	0,081	492	0,137	560	0,155
1	19,2	0,005	42	0,012	157	0,044	169	0,047	276	0,077	339	0,094
0	0	0	0	0	0	0	0	0	0	0	0	0

Presetting %	92H 1"		92H 1 1/4"		92H 1 1/2"	
	Flow rate		Flow rate		Flow rate	
	l/h	l/s	l/h	l/s	l/h	l/s
9	3300	0,917	5200	1,444	9000	2,500
8	3046	0,846	4680	1,300	8040	2,233
7	2682	0,745	4164	1,157	7200	2,000
6	2265	0,629	3582	0,995	6240	1,733
5	1849	0,514	2880	0,800	5070	1,408
4	1387	0,385	2220	0,617	3954	1,098
3	884	0,246	1578	0,438	2814	0,782
2	543	0,151	1026	0,285	2064	0,573
1	173	0,048	540	0,150	1110	0,308
0	0	0	0	0	0	0

Flow setting accuracy

Max flow deviation over 1 bar differential pressure and max flow deviation for settings below pos. 9.

ε [± %]

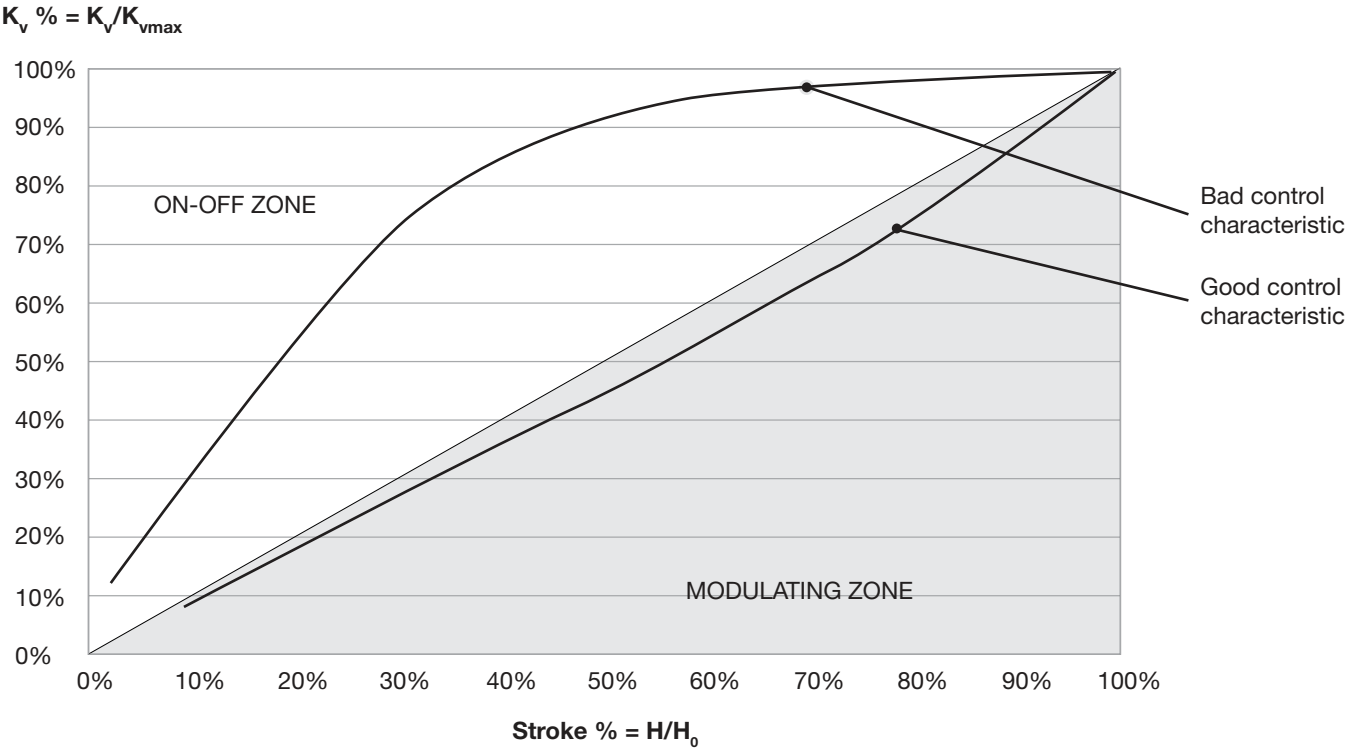


Please contact technical department for further information.

EN Control curves

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

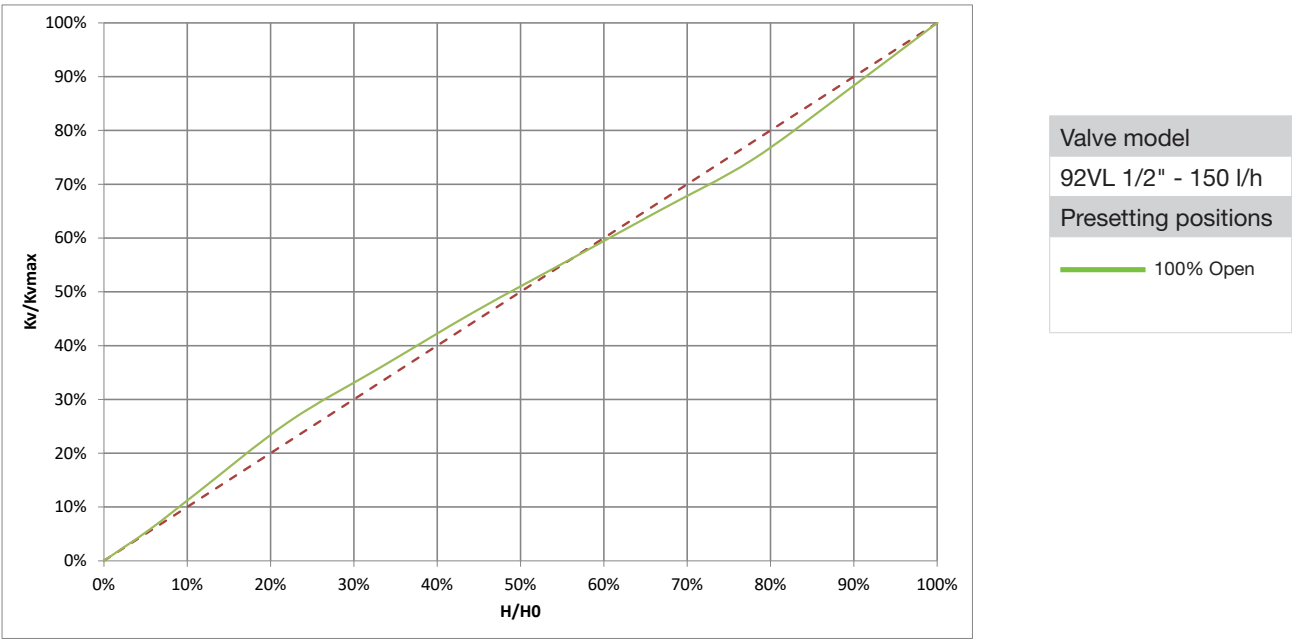
Typical control valve characteristic curves.*

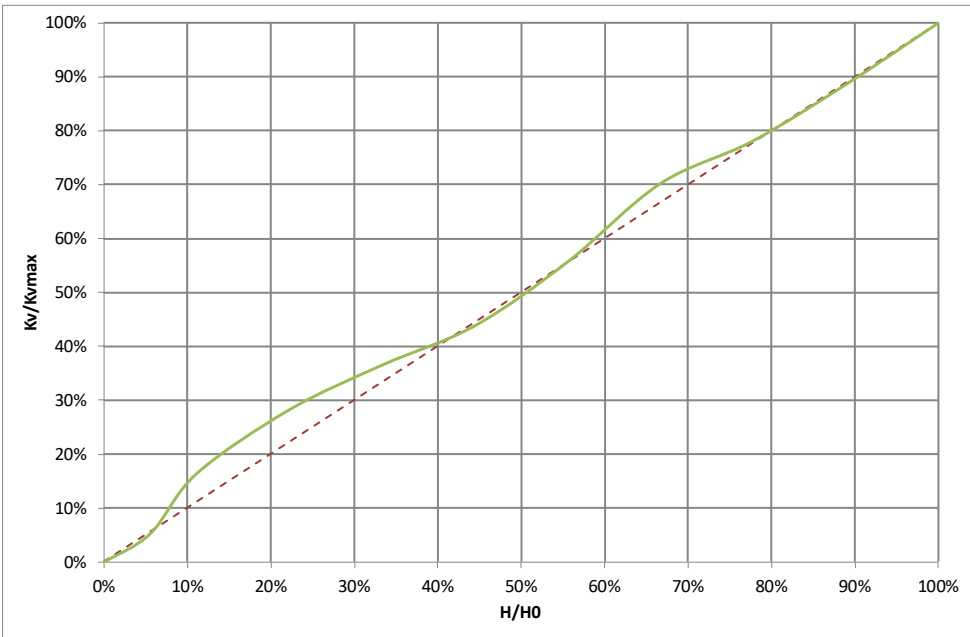
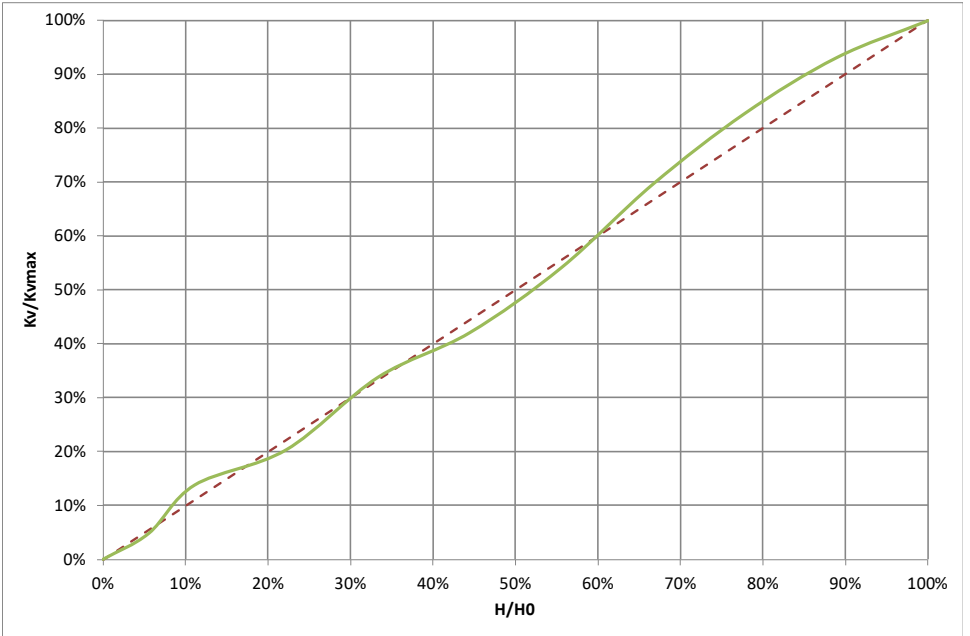
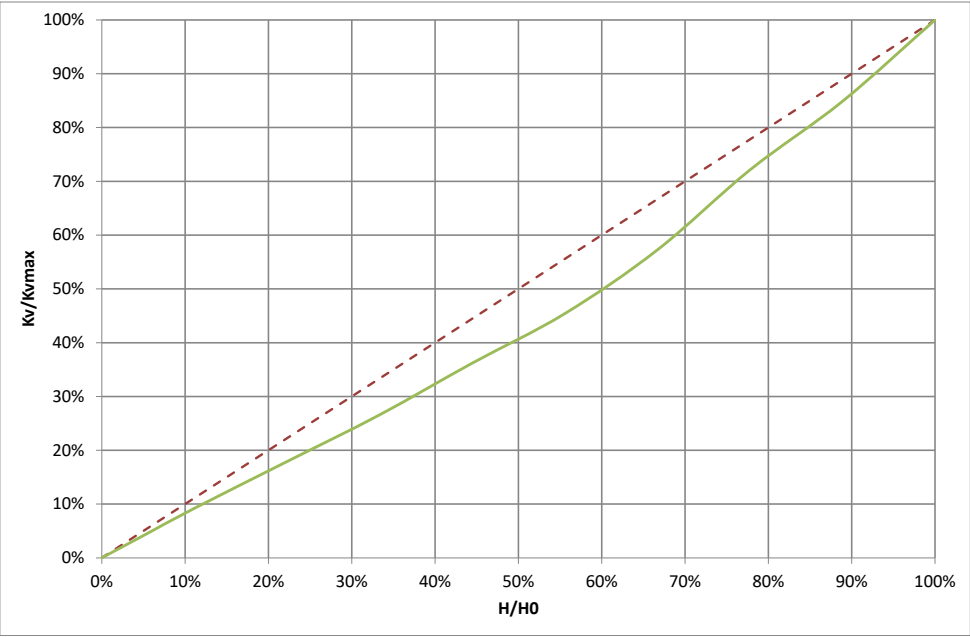


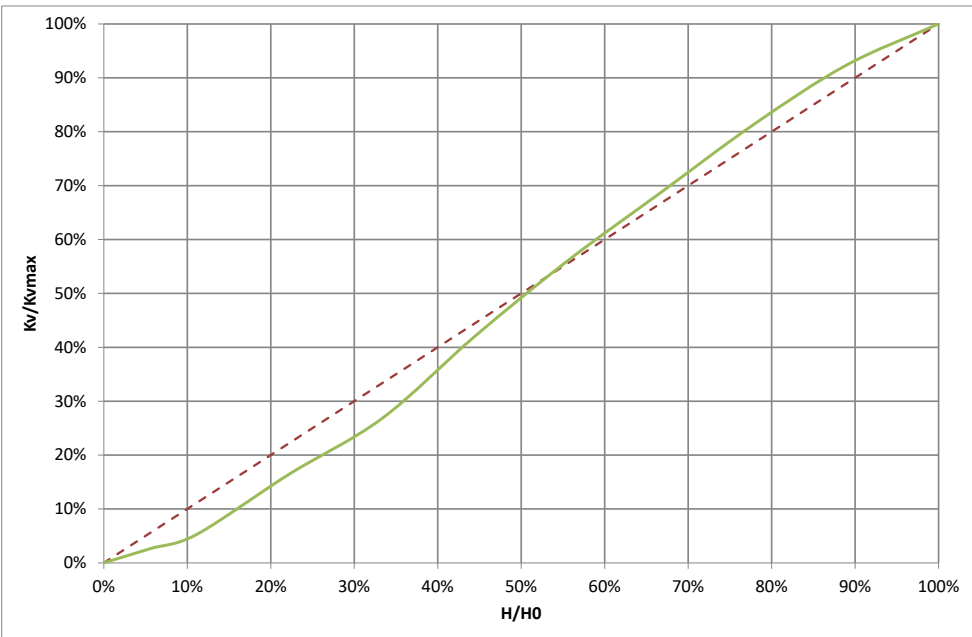
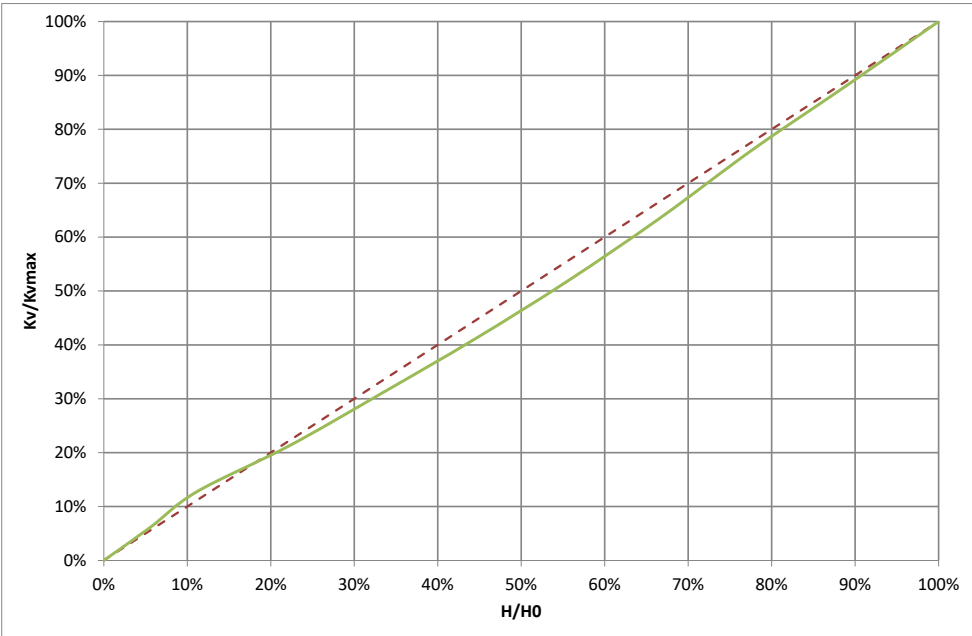
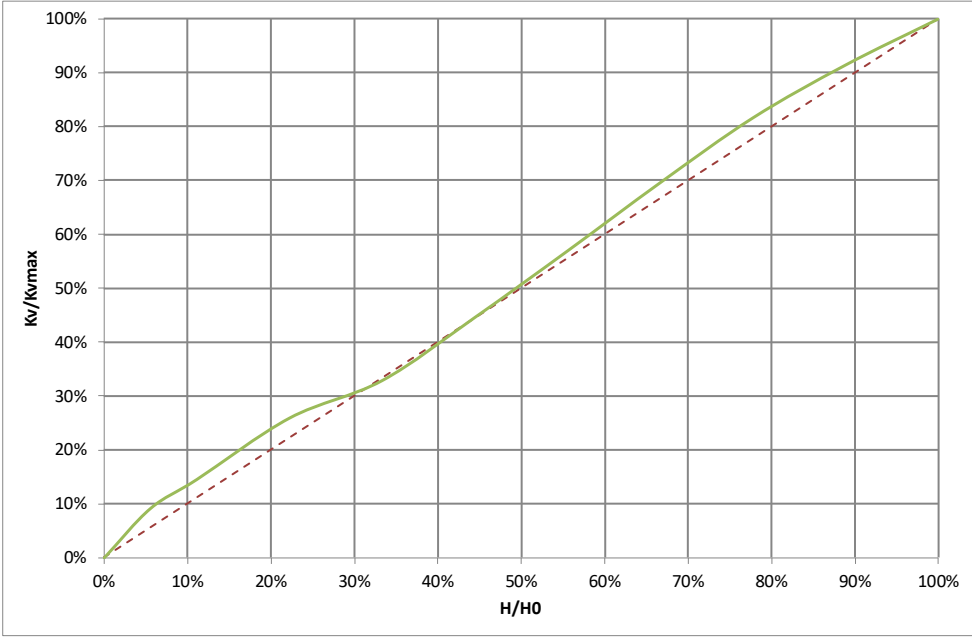
The **EvoPICV 92 Dynasty** valve has an inherent linear characteristic.

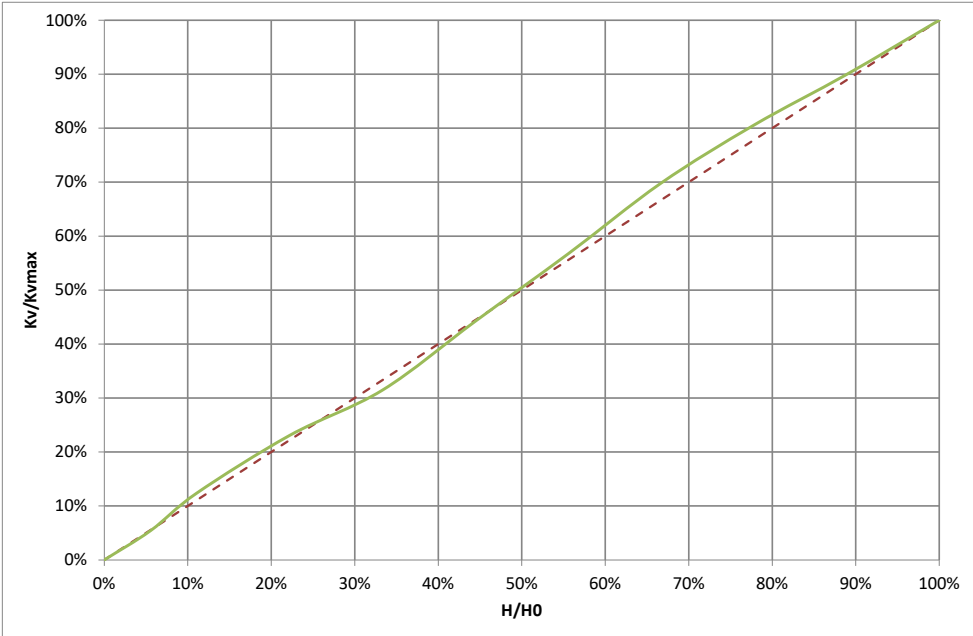
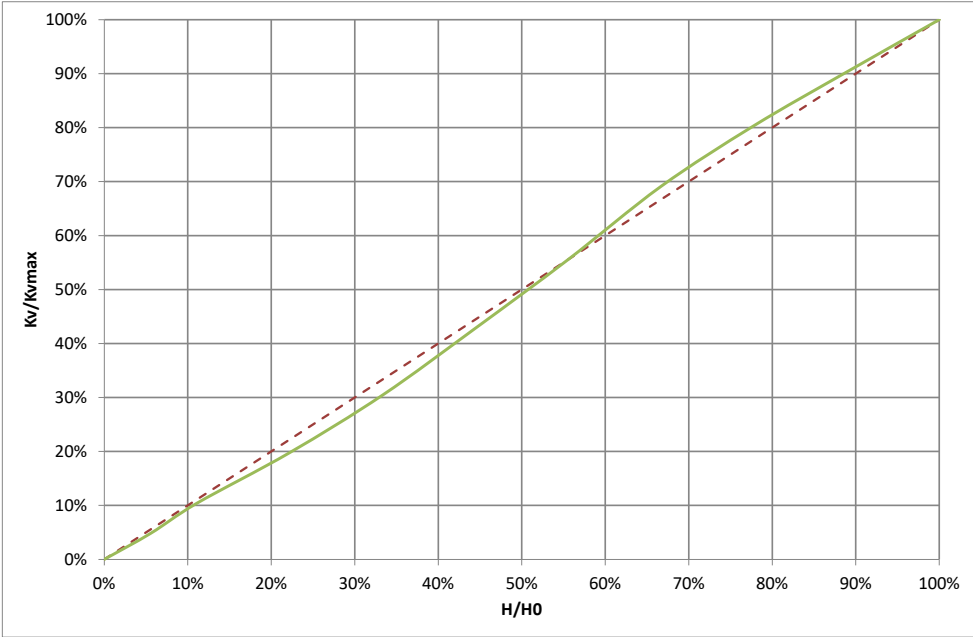
In the next page control curves of **92** are shown.

* Control curve characteristic may change according to valve version.









- H: current lift (opening) of the control valve; H varies from 0 to H_0
- H_0 : maximum lift of the control valve;
- K_v : valve flow factor at lift = H
- K_{vmax} : valve flow factor at lift = H_0



EN Actuators

The table below shows actuator part numbers for different control types.

Type - Electromechanic	Art. n.	Stroke	Suitable size	Adaptor	
24v, 0-10v Proportional, Feedback	VA7483	6,3 mm^	DN15 to DN32	0A7010*	0A748X*
				DN15-20	DN25-32
24v, 0-10v Prop, Feedback, Fail safe	VA7484	6,3 mm^	DN15 to DN32	0A7010*	0A748X*
				DN15-20	DN25-32
24v, 3 Point Floating	VA7481	6,3 mm	DN15 to DN32	0A7010*	0A748X*
				DN15-20	DN25-32
230v, 3 Point Floating	VA7481	6,3 mm	DN15 to DN32	0A7010*	0A748X*
				DN15-20	DN25-32
24v, 0-10v Proportional, Feedback	VA7493	8,7 mm^	DN40	0A7493**	
24v, 0-10v Proportional, Feedback	RVAZ2C	8,5 mm^	DN40	0A748X*	
24v, 3 Point Floating	RVAZ2	8,5 mm^	DN40	0A748X*	
120v - 230v, 3 Point Floating	RVAZ2	8,5 mm^	DN40	0A748X*	
24v, 0-10v Proportional Fail Safe	VM060	6.5 mm^	DN15 to DN32	76TE**	

Type - Thermoelectric	Art. n.	Stroke	Suitable size	Adaptor
24v, 0-10v Proportional Thermic	A544P3	4 mm	DN15, DN20	VA64**
24v, 0-10v Proportional Thermic	A564P3	6.5 mm	DN25, DN32	VA64**
24v, ON-OFF Thermic, 2 wires	A544O2	4 mm	DN15, DN20	VA64**
24v, ON-OFF Thermic, 4 wires	A544O4	4 mm	DN15, DN20	VA64**
230v, ON-OFF Thermic, 2 wires	A542O2	4 mm	DN15, DN20	VA64**
230v, ON-OFF Thermic, 4 wires	A542O4	4 mm	DN15, DN20	VA64**
24v, ON-OFF Thermic, 2 wires	A564O2	6.5 mm	DN25, DN32	VA64**
230v, ON-OFF Thermic, 2 wires	A562O2	6.5 mm	DN25, DN32	VA64**

* Adaptor NOT included

** Adaptor included

^ stroke detection system

Fratelli Pettinaroli is not liable for unauthorized use of actuator not shown in the table above.

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.



INSULATING CASES

UL94 fire rated insulating case for PICV. For heating and cooling installations.

092IHV: case for heating, closure by Velcro®. Size has to be specified.

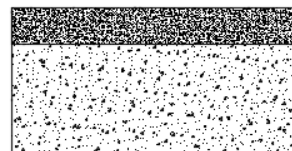
092IHB: case for heating, closure by double-sided tape. Size has to be specified.

092ICV: case for cooling, closure by Velcro®. Size has to be specified.

092ICB: case for cooling, closure by double-sided tape. Size has to be specified.

Cases for heating let the headwork and the actuator uncover whereas those for cooling cover the actuator too (all those in the range). Insulation sheel has a thin external layer made of 80 kg/m³ density polyethylene cross linked foam and a thicker internal layer made of 29 kg/m³ density polyethylene cross linked foam. Total thickness: 20 mm.

Feature	Insulation case	
Density [kg/m ³]	29	80
Operating temperature range [°C]	-60 / +90	-60 / +90
Thermal conductivity [W/mK]	0.040	0.049
Thickness [mm]	18	2



Cross section insulation sheel

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. Fratelli Pettinaroli suggests to follow recommendations of VDI 2035/1 too. Maximum suggested content (total) of Iron and Copper should be: Fe < 0.5 mg/kg and Cu < 0.1 mg/kg.

Although the valve operation has been verified with iron oxide, contaminated water, maximum suggested iron oxide (good practice) 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.

*The product color may be different with the actual product color due to printing procedure. *The appearance and specifications may change with no prior notice for improvement.
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