92X/2



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 PICV 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. Thanks to the new diaphgram 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 varying the control valve stroke.
The PICV 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 PICV 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 92X/2 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 92X/2 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).
- Threaded connections M x M flat end for placing the seals.
- DPCV dirt-resistant: the valve works during and after a Contaminated Water Test (proprietary test) with high concentration of iron oxide.
- Fast and easy maintenace: 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	3 mm	50÷100 IEC 60534-2-3	Classe IV IEC 60534-4	± 5%

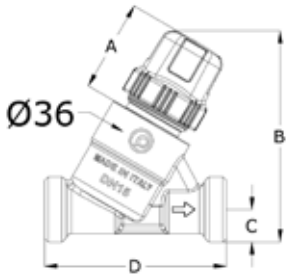
	92XVL/2 ½"	92XL/2 ½"	92XL/2 ½"x ¾"	92XVL/2 ¾"	92XL/2 ¾"	92XVL/2 ¾"	92XL/2 1"	92XL/2 1"	92XH/2 1"
Flow rate max.	150 l/h 0,042 l/s	450 l/h 0,125 l/s	450 l/h 0,125 l/s	150 l/h 0,042 l/s	450 l/h 0,125 l/s	850 l/h 0,236 l/s	850 l/h 0,236 l/s	1000 l/h 0,278 l/s	1850 l/h 0,514 l/s
Start-up max.	25 kPa 0,25 bar	35 kPa 0,35 bar	35 kPa 0,35 bar	25 kPa 0,25 bar	35 kPa 0,35 bar	30 kPa 0,30 bar	30 kPa 0,30 bar	30 kPa 0,30 bar	35 kPa 0,35 bar
Connections	G ½" M ISO 228-1	G ½" M ISO 228-1	G½"Mx ¾"BS3600 ISO 228-1	G ¾" M ISO 228-1	G ¾" M ISO 228-1	G ¾" M ISO 228-1	G 1" M ISO 228-1	G 1" M ISO 228-1	G 1" M ISO 228-1
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 refers to the graph in Flow setting accuracy section.

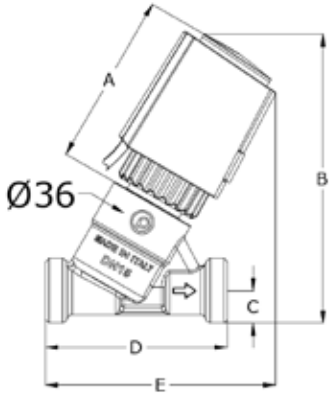
** Closed by electromechanical actuator

^ 300 kPa / 3 bar with thermoelectrical actuators series A5

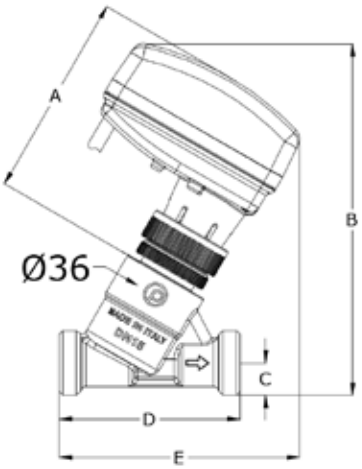
EN Dimensional data



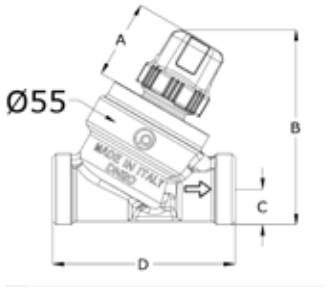
Manual valve						
Art.	**Flow rate [l/h]**	**A (mm)**	**B (mm)**	**C (mm)**	**D (mm)**	**E(mm)**
92XVL/2 ½"	150	37.5	82.5	10.5	73.5	-
92XL/2 ½"	450	37.5	82.5	10.5	73.5	-
92XVL/2 ¾"	150	37.5	85.5	13	73.5	-
92XL/2 ¾"	450	37.5	85.5	13	73.5	-
92XL/2 ½" ¾"	450	37.5	85.5	13	73.5	-



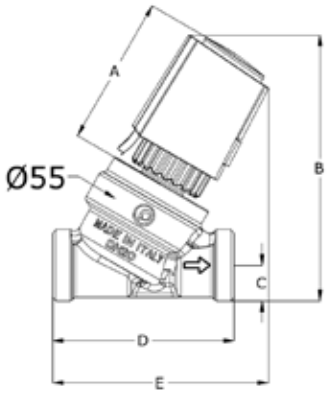
Valve with thermo-electric actuator						
Art.	**Flow rate [l/h]**	**A (mm)**	**B (mm)**	**C (mm)**	**D (mm)**	**E (mm)**
92XVL/2 ½"	150	70	114	10.5	73.5	94
92XL/2 ½"	450	70	114	10.5	73.5	94
92XVL/2 ¾"	150	70	116.5	13	73.5	93
92XL/2 ¾"	450	70	116.5	13	73.5	93
92XL/2 ½" ¾"	450	70	116.5	13	73.5	93



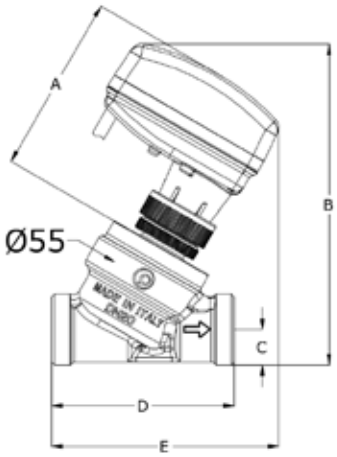
Valve with electromotive actuator						
Art.	**Flow rate [l/h]**	**A (mm)**	**B (mm)**	**C (mm)**	**D (mm)**	**E (mm)**
92XVL/2 ½"	150	83	140.5	10.5	73.5	98.5
92XL/2 ½"	450	83	140.5	10.5	73.5	98.5
92XVL/2 ¾"	150	83	143	13	73.5	97.5
92XL/2 ¾"	450	83	143	13	73.5	97.5
92XL/2 ½" ¾"	450	83	143	13	73.5	97.5



Manual valve						
Art.	**Flow rate [l/h]**	**A (mm)**	**B (mm)**	**C (mm)**	**D (mm)**	**E (mm)**
92XVL/2 ¾″	850	36.5	87	16.5	85.5	-
92XVL/2 1″	850	36.5	91	16.5	85.5	-
92XL/2 1″	1000	36.5	91	16.5	85.5	-
92XH/2 1″	1850	36.5	91	16.5	85.5	-



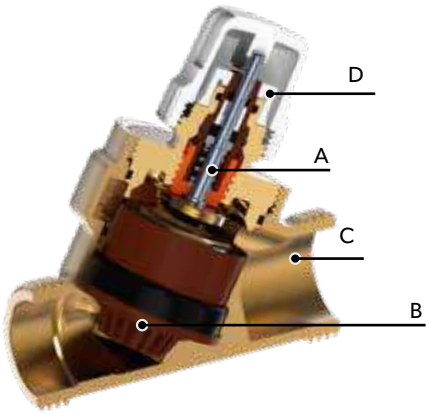
Valve with thermo-electric actuator						
Art.	**Flow rate [l/h]**	**A (mm)**	**B (mm)**	**C (mm)**	**D (mm)**	**E (mm)**
92XVL/2 ¾″	850	69.5	119.5	16.5	85.5	100.5
92XVL/2 1″	850	69.5	123.5	16.5	85.5	100.5
92XL/2 1″	1000	69.5	123.5	16.5	85.5	100.5
92XH/2 1″	1850	69.5	123.5	16.5	85.5	100.5



Valve with electromotive actuator						
Art.	**Flow rate [l/h]**	**A (mm)**	**B (mm)**	**C (mm)**	**D (mm)**	**E (mm)**
92XVL/2 ¾″	850	83	144.5	16.5	85.5	105
92XVL/2 1″	850	83	148.5	16.5	85.5	105
92XL/2 1″	1000	83	148.5	16.5	85.5	105
92XH/2 1″	1850	83	148.5	16.5	85.5	105

EN Materials and weight

PICV 92X/2



	Material list
Regulating valve (A)	High resistance polymer Stainless steel 18/88
Diaphragm (B)	High resistance polymer - EPDM, WMQ, Silicone Stainless steel AISI 303, HNBR
Presetting (D)	ABS, PC
Body (C)	Corrosion resistant brass CW602N
Gaskets	EPDM-x

Art.	Weight (kg)
92XVL/2 ½"	0,32
92XL/2 ½"	0,32
92XVL/2 ¾"	0,33
92XL/2 ¾"	0,33

Art.	Weight (kg)
92XL/2½"x¾"	0,57
92XH/2 1"	0,56
92XL/2 1"	0,57
92XH/2 1"	0,56

Art.	Weight (kg)
92XH/2 1"	0,56

EN Installation and maintenance PICV 92X/2



1. Use conditions

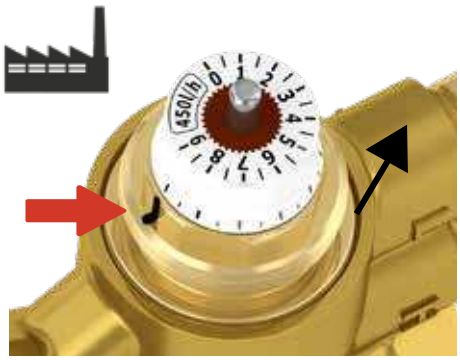
The valve has to be mounted with the arrow in the direction of the flow. Mounting it in the wrong direction may damage the system and the valve itself.
If flow reversal is possible, a non-return valve should be mounted.
Minimum differential pressure above which the valve begins to exercise its regulating effect:

	92XVL/2 ½"	92XL/2 ½"	92XL/2 ½"x ¾"	92XVL/2 ¾"	92XL/2 ¾"	92XVL/2 ¾"	92XL/2 1"	92XL/2 1"	92XH/2 1"
ΔP Start-up	25 kPa 0,25 bar	35 kPa 0,35 bar	35 kPa 0,35 bar	25 kPa 0,25 bar	35 kPa 0,35 bar	30 kPa 0,30 bar	30 kPa 0,30 bar	30 kPa 0,30 bar	35 kPa 0,35 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

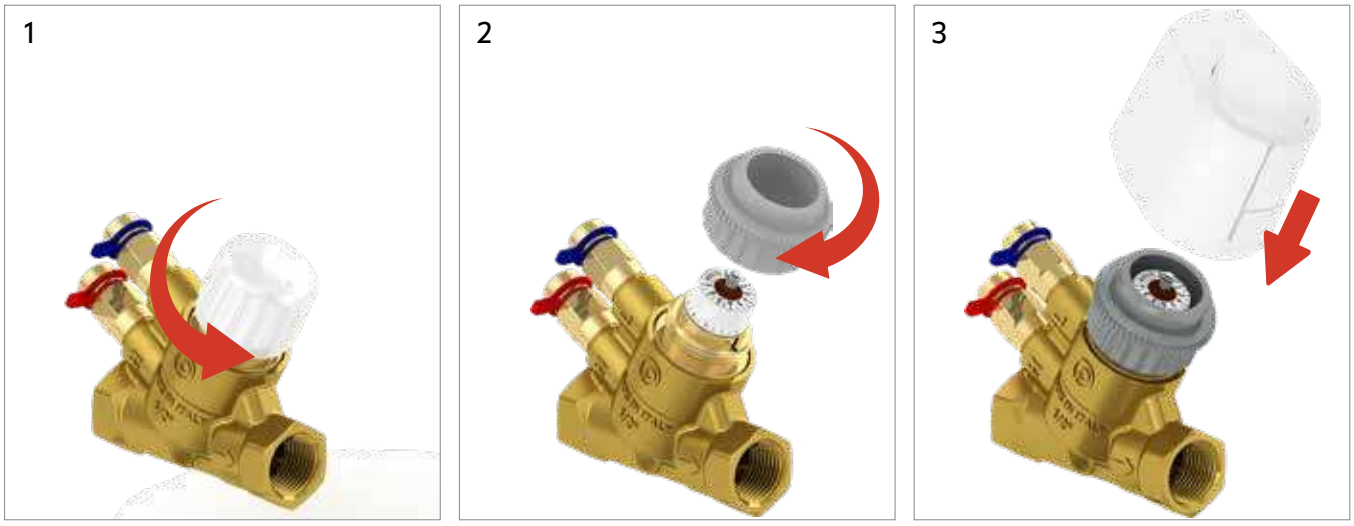


Re-assembly the handwheel or the actuator

3. 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



Electro-mechanical actuator



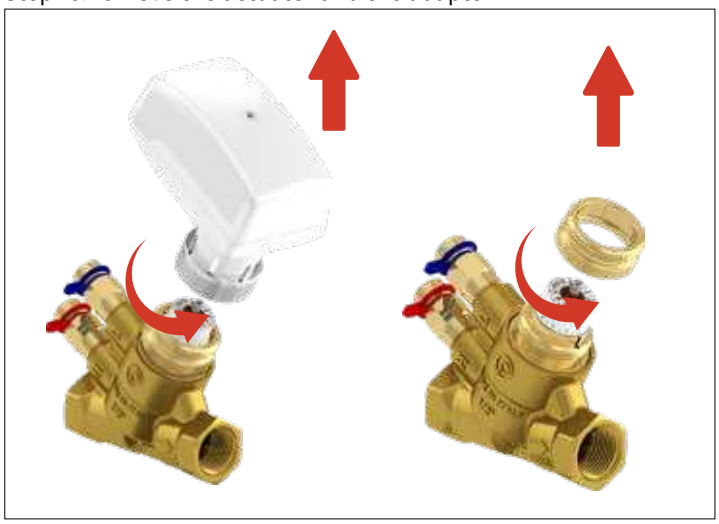
4. Maintenance, cleaning and replacement of the diaphragm of PICV 92X/2 valve

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



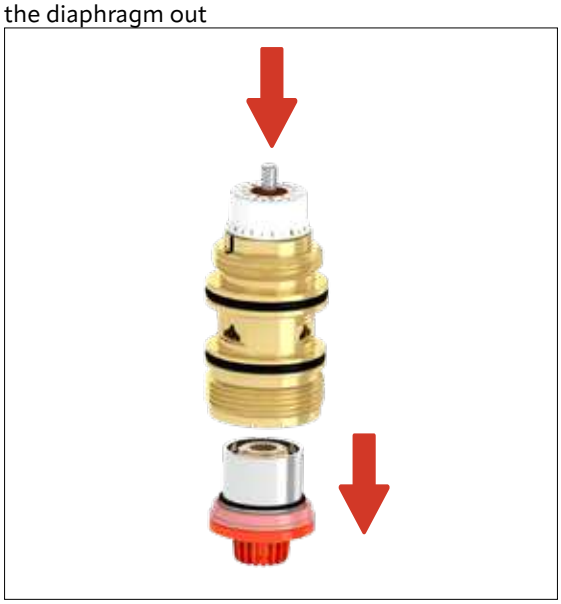
Step 2: using a 21mm spanner unscrew the headwork



Step 3: remove the headwork



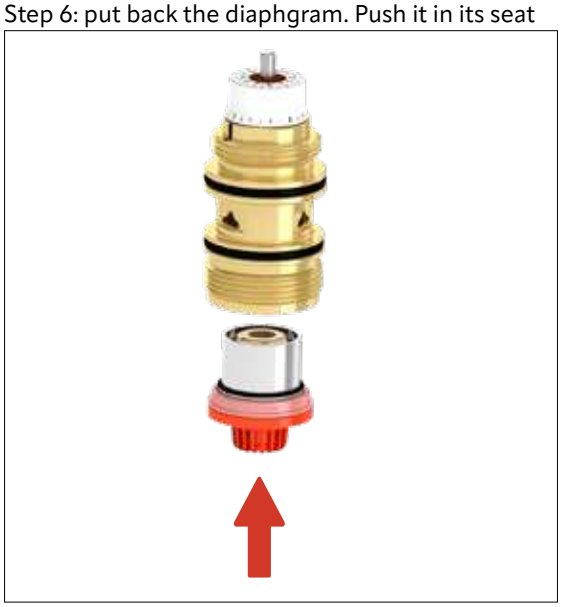
Step 4: push down the control valve stem and pull the diaphragm out



Step 5: clean the diaphragm with water and a cloth



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



Step 7: replace the headwork



Step 8: Screw the headwork with 20 Nm torque

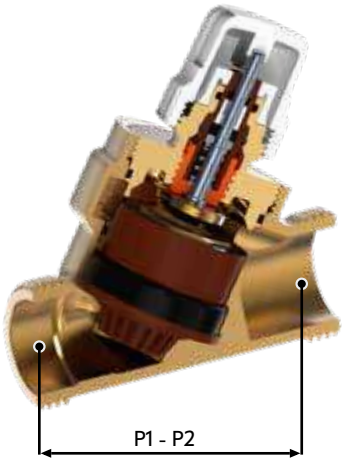


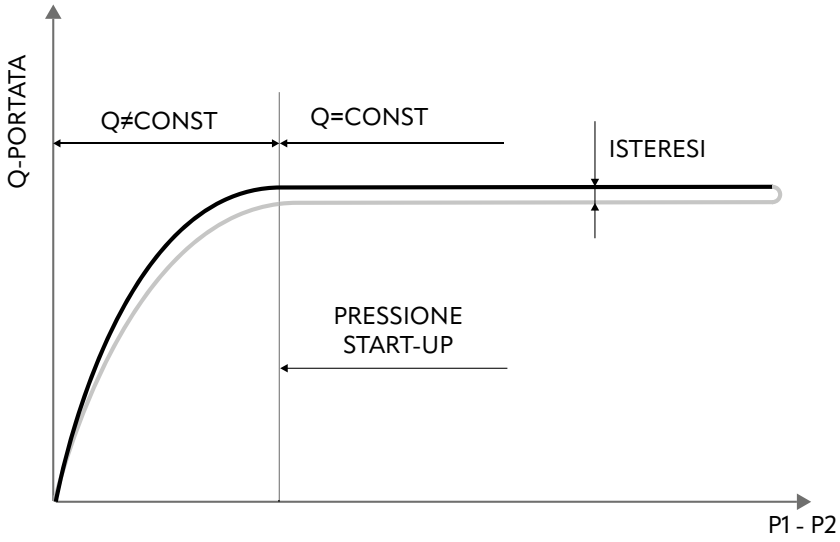
Step 9: replace the actuator adapter and the actuator or the handwheel



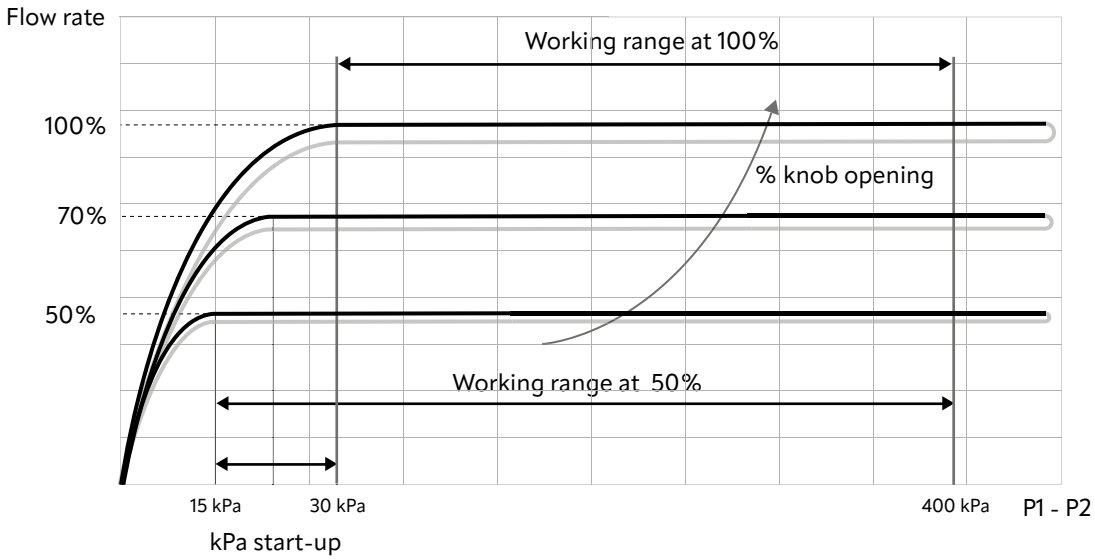
To replace the element control valve-DPCV, follow the instructions above except steps 4, 5 and 6. In step 7, put a new headwork (092D).

EN Start-up curves and presetting





The example above shows a characterisitc curve where start-up pressure, hysteresis and accuracy can be evaluated. Start-up value varies with flow setting of the valve, as shown by the example below:

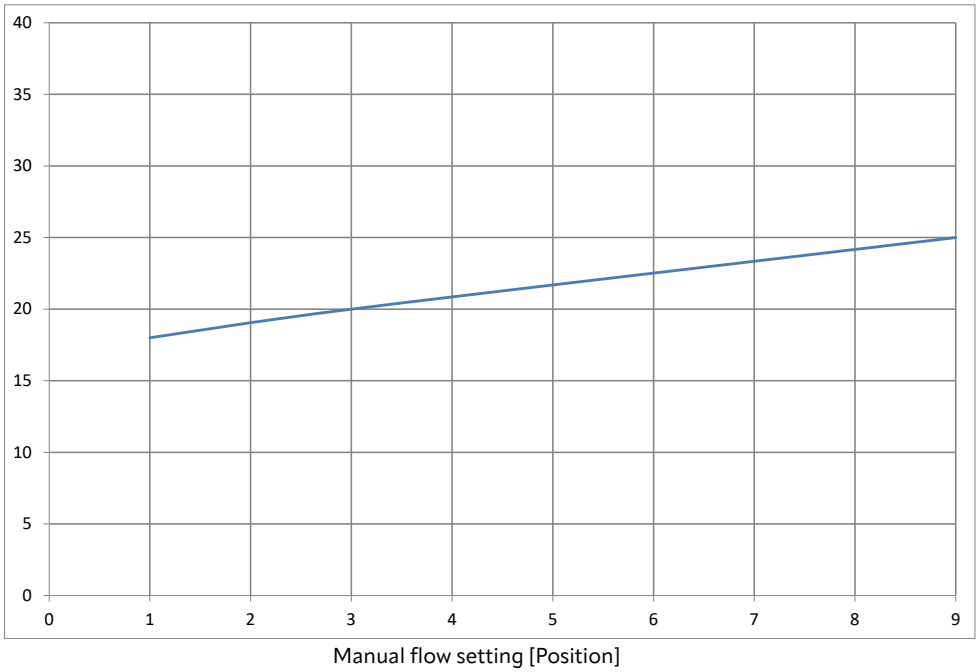


When the valve is set at 100% of nominal (maximum) flow, the curve begins to remain constant at 30 kPa, therefore the suggested working range of the valve is 30 ÷ 400 kPa;

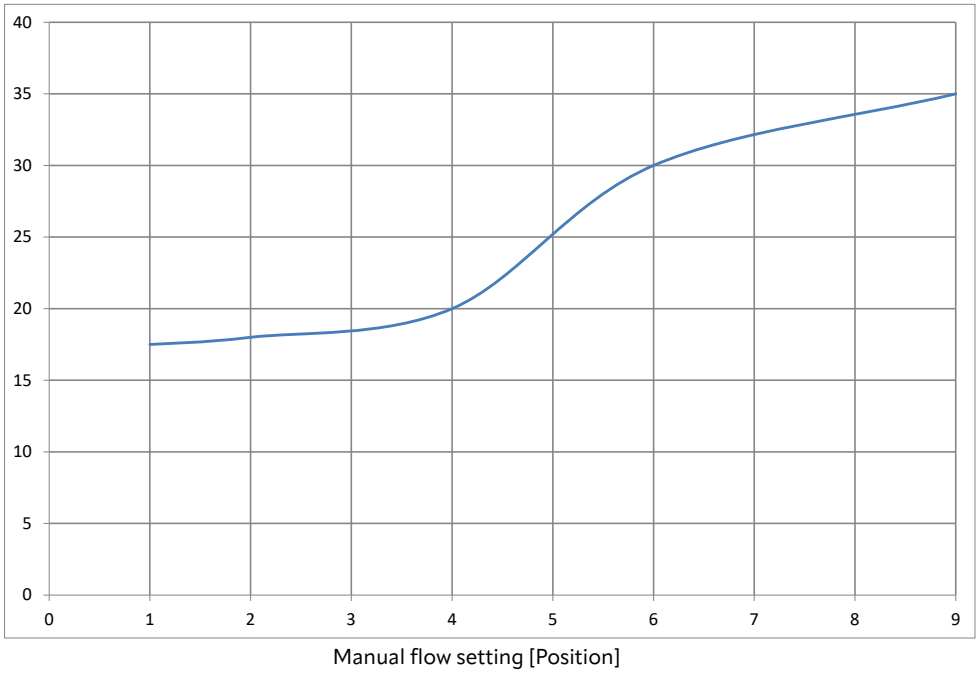
When the valve is set at 50% of nominal flow, the curve begins to remain constant at 15 kPa, therefore the working range of the valve is 15 ÷ 400 kPa.

Over 400 kPa the fluid velocity through the valve is extremely high and cavitation may happen due to extreme turbolence of the flow.
Because of these phenomena the valve can get demaged. For energy saving reasons, we suggest to continuosly work the valve under 400 kPa.

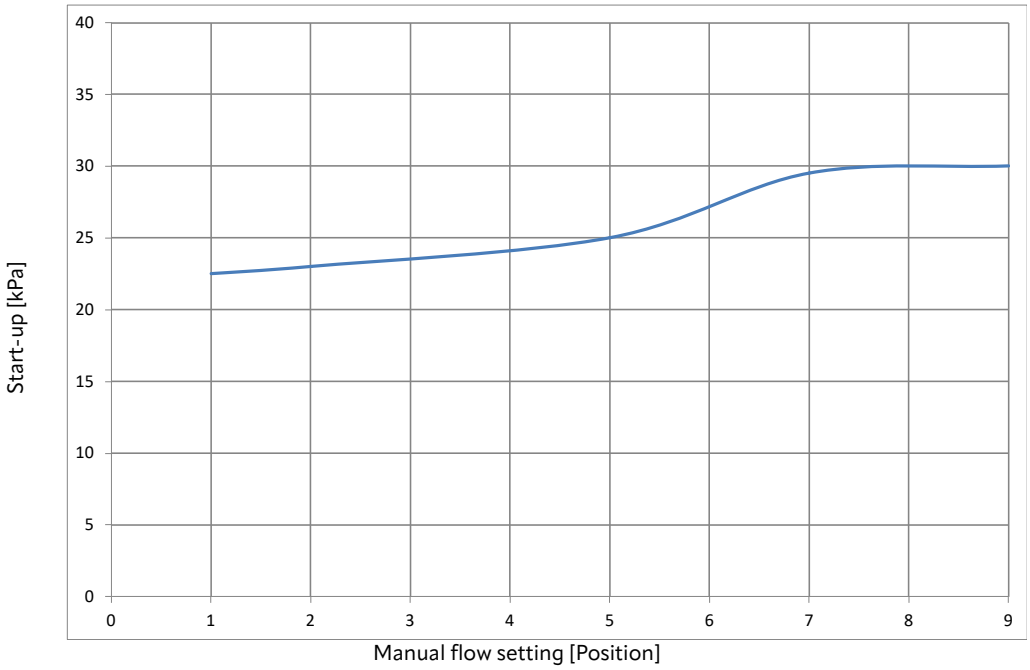
The following diagrams show the start-up pressure at different presetting.



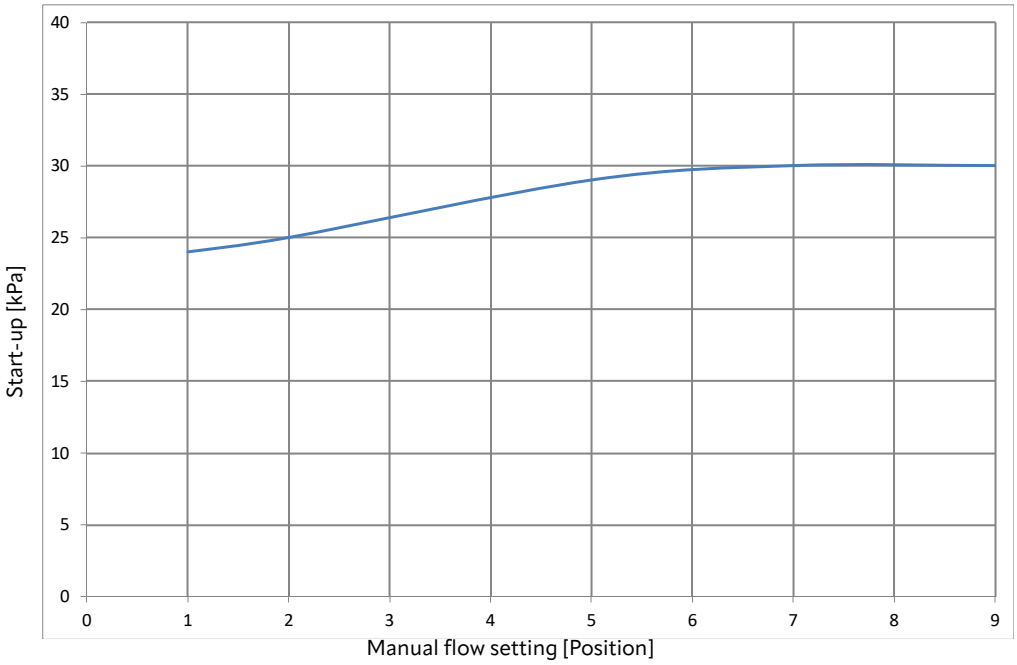
Valve model
92XVL/2 1/2″ - 150 l/h
92XVL/2 3/4″ - 150 l/h



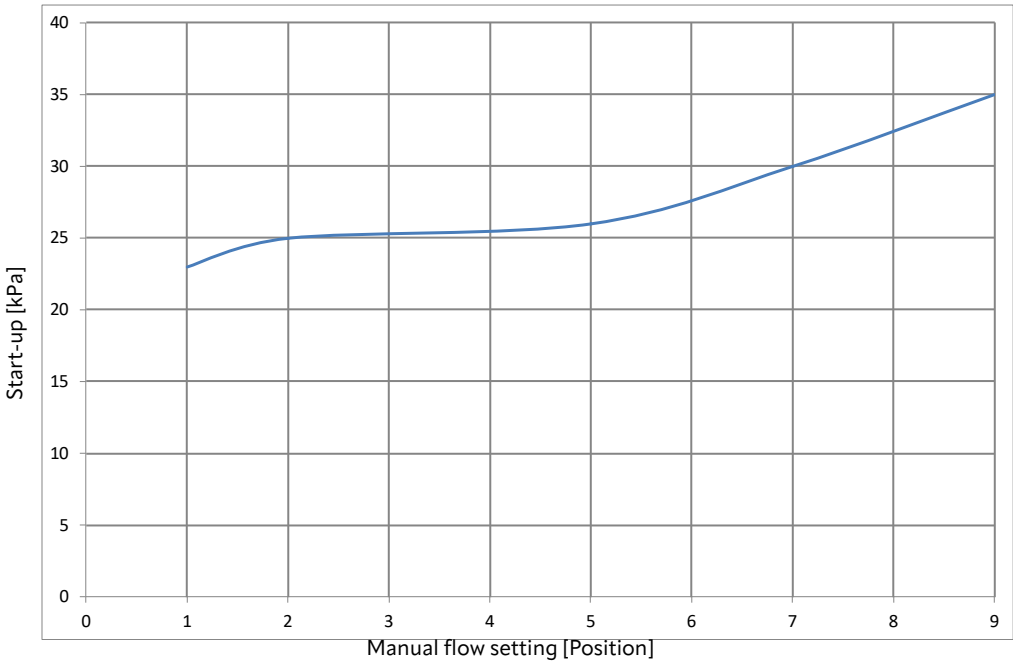
Valve model
92XL/2 1/2″ - 450 l/h
92XL/2 3/4″ - 450 l/h
92XL/2 ½″x ¾″ - 450 l/h



Valve model
92XVL/2 3/4″ - 850 l/h
92XVL/2 1″ - 850 l/h



Valve model
92XL/2 1″ - 1000 l/h



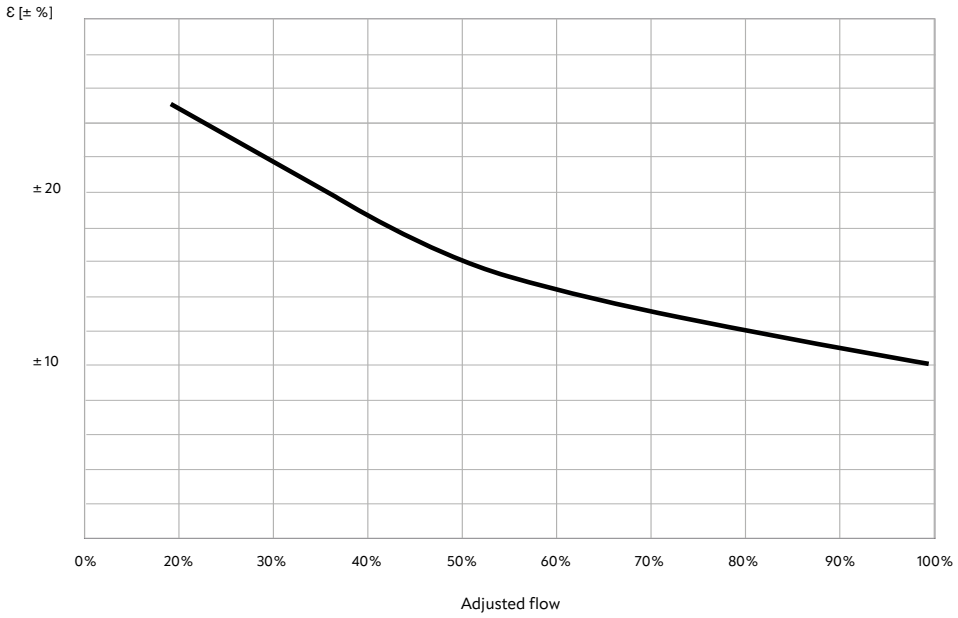
Valve model
92XH/2 1″ - 1850 l/h

Flow pre-setting PICV 92X/2

Presetting %	92XVL/2 ½″ 92XVL/2 ¾″		92XL/2 ½″ 92XL/2 ¾″ 92XL/2 ½″ x¾″		92XVL/2 ¾″ 92XVL/2 1″		92XL/2 1″		92XH/2 1"	
	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
9	150	0,043	450	0,125	150	0,043	1000	0,277	1850	0,514
8	133,2	0,037	387	0,108	133,2	0,037	911	0,253	1734	0,484
7	114	0,032	328,8	0,091	114	0,032	804	0,223	1548	0,430
6	99,6	0,028	261	0,073	99,6	0,028	722	0,201	1320	0,367
5	85,2	0,024	207	0,058	85,2	0,024	573	0,159	1080	0,300
4	70,8	0,020	165	0,046	70,8	0,020	451	0,125	846	0,235
3	55,2	0,015	121,2	0,034	55,2	0,015	376	0,104	624	0,173
2	39,6	0,011	81,6	0,023	39,6	0,011	291	0,081	492	0,137
1	19,2	0,005	42	0,012	19,2	0,005	169	0,047	276	0,077
0	0	0	0	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.

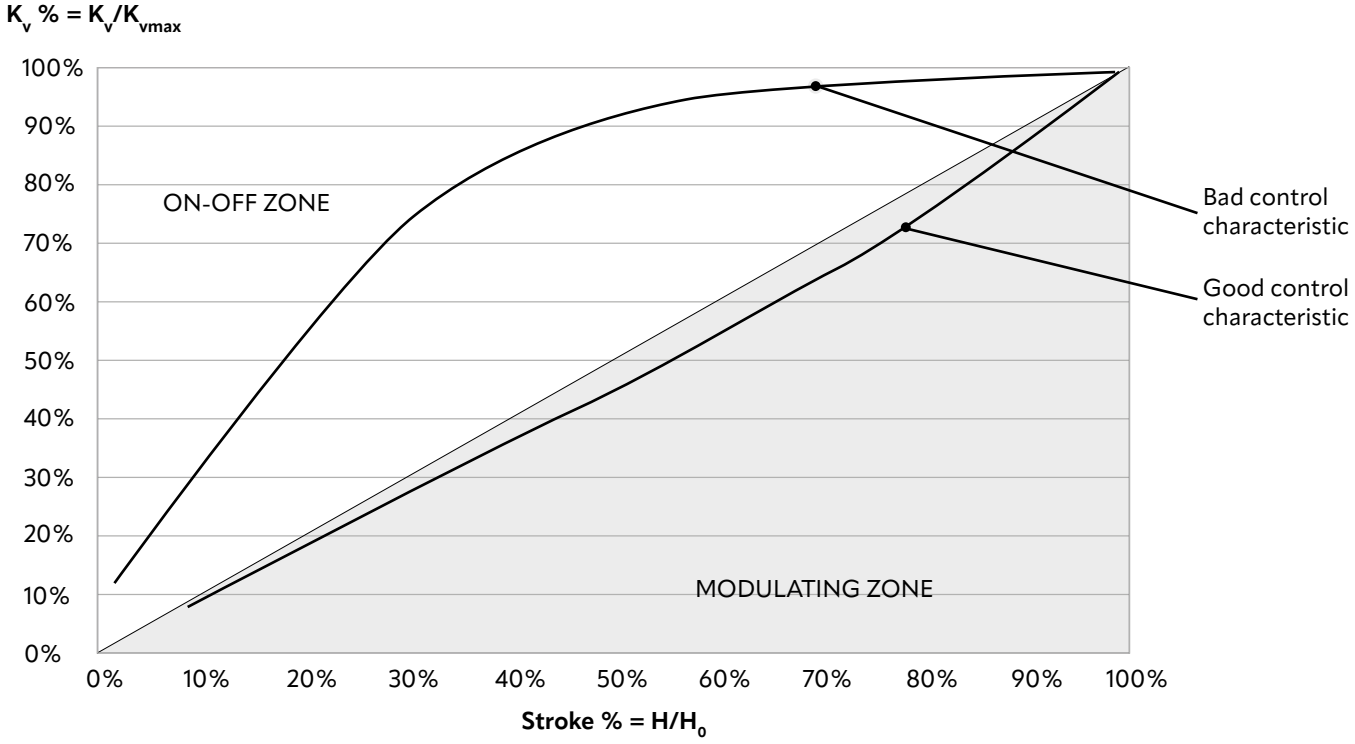


Please contact technical department for further infomation.

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.

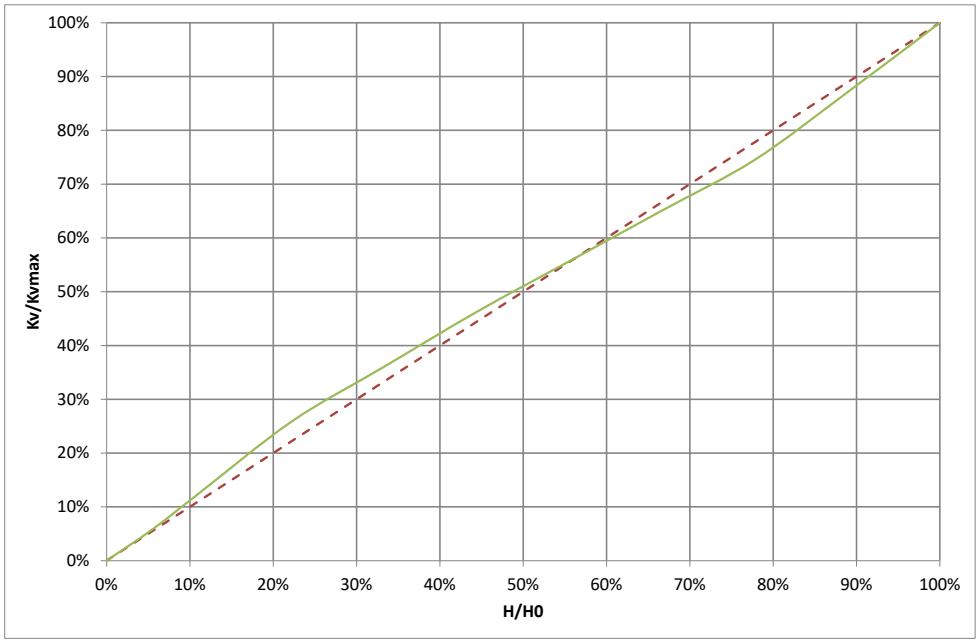
Tipical control valve characteristic curves.*



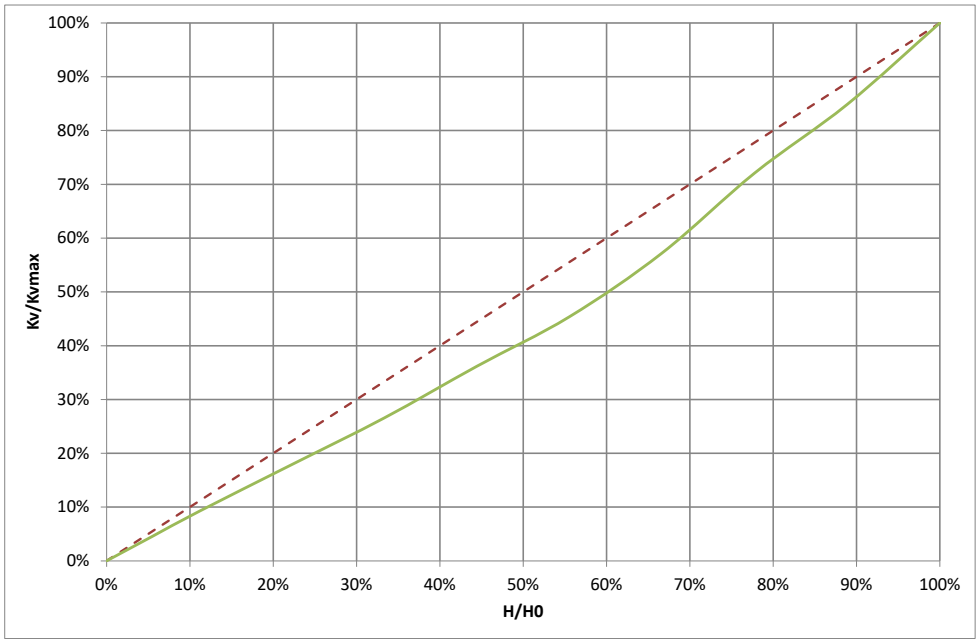
Combining the **PICV** valve characteristic with heat exchanger results in a linear control system.

In the next page control curves of **92X/2** are shown.

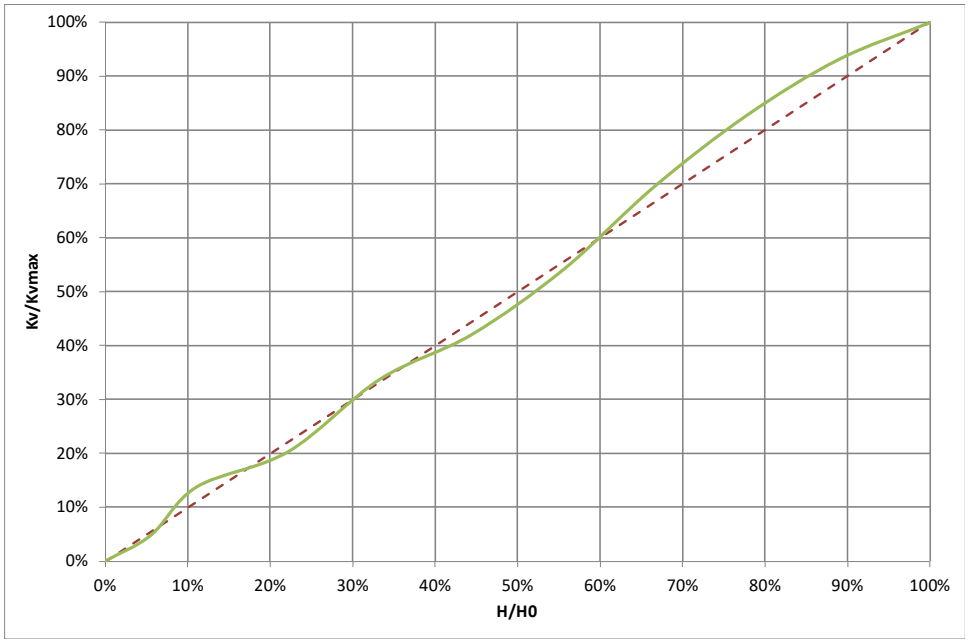
* Control curve characteristic may change according to valve version.



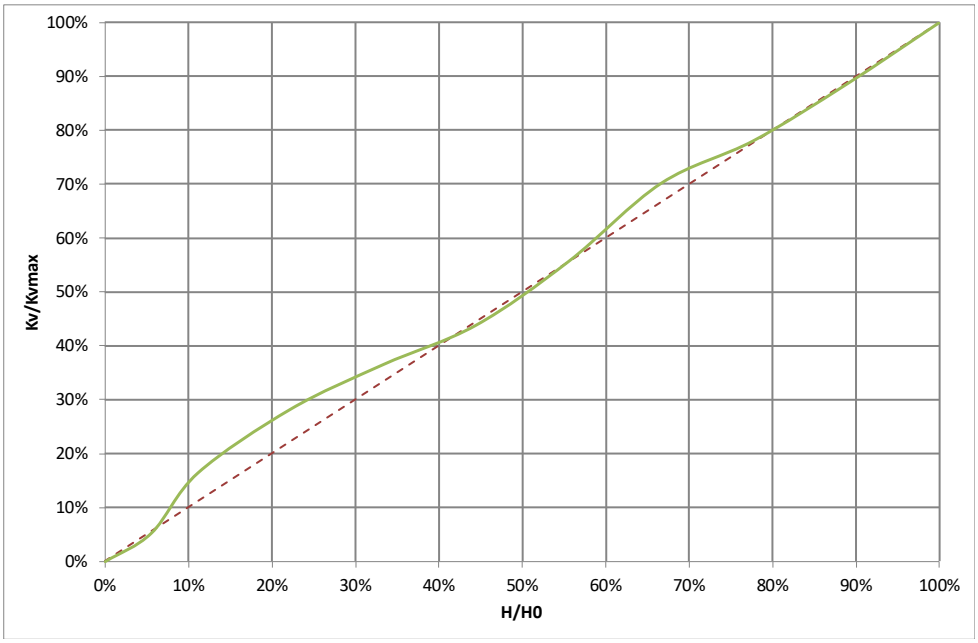
Valve model
92XVL/2 1/2″ - 150 l/h
92XVL/2 3/4″ - 150 l/h
Presetting positions
100% Open



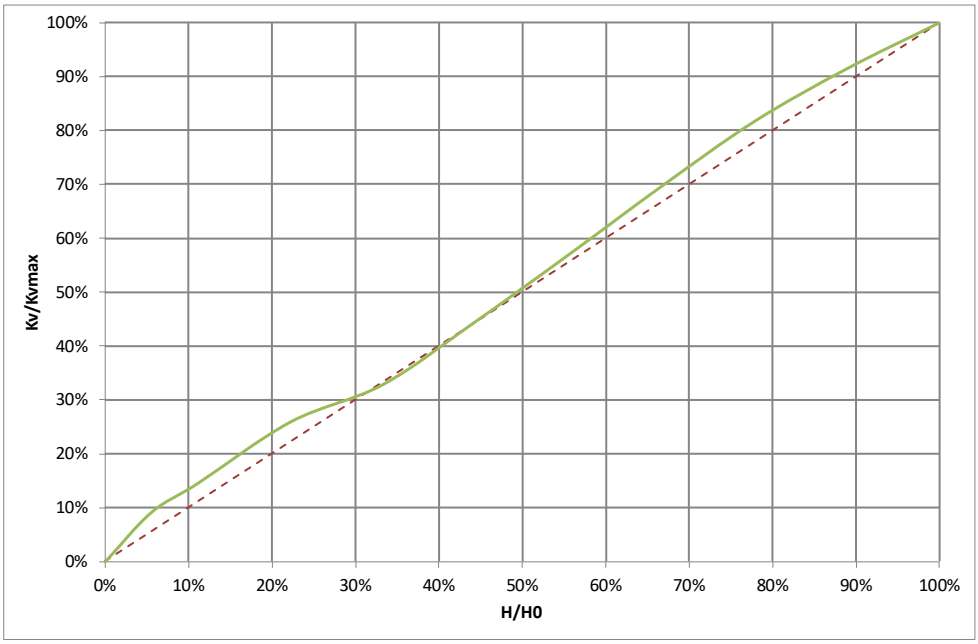
Valve model
92XL/2 1/2″ - 450 l/h
92XL/2 3/4″ - 450 l/h
92XL/2 ½″x ¾″ - 450 l/h
Presetting positions
100% Open



Valve model
92XVL/2 3/4″ - 850 l/h
92XVL/2 1″ - 850 l/h
Presetting positions
100% Open



Valve model
92XL/2 1″ - 1000 l/h
Presetting positions
100% Open



Valve model
92XH/2 1″ - 1850 l/h
Presetting positions
100% Open

- 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_{00}

EN Actuators

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

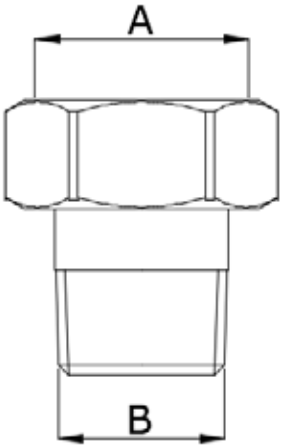
Type	Art. n.	Stroke	Adaptor
24v, 0-10v Proportional, Feedback	VA7483	6,3 mm^	0A7010*
24v, 0-10v Prop, Feedback, Fail safe	VA7484	6,3 mm^	0A7010*
24v, 3 Point Floating	VA7481	6.3 mm	0A7010*
230v, 3 Point Floating	VA7481	6.3 mm	0A7010*
24v, 0-10v Proportional Thermic	A544P3	4 mm	VA64**
24v, ON-OFF Thermic, 2 wires	A544O2	4 mm	VA64**
24v, ON-OFF Thermic, 4 wires	A544O4	4 mm	VA64**
230v, ON-OFF Thermic, 2 wires	A542O2	4 mm	VA64**
230v, ON-OFF Thermic, 4 wires	A542O4	4 mm	VA64**
24v, 0-10v Proportional, Feedback	VT194P4	9 mm^	0A7010*

* Adaptor not included ** Adaptor included ^ stroke detection system or programmable

Fratelli Pettinaroli is not liable for unauthorized use of actuator not shown in the table above. However, actuating force must not exceed 160 N.

EN Fittings

If necessary it is possible to match the PICV **92X/2** valves with union fittings as shown below:



A x B	Art. n.	Code
1/2″ F x 3/8″ M	1007T	9601010050C
3/4″ F x 1/2″ M	1007T	9601210050C
1″ F x 3/4″ M	1007Z	9602010210C

Other models available: if interested please contatc Pettinaroli technical department.

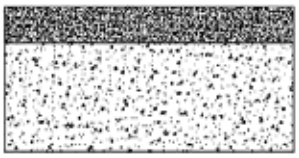
EN Insulating cases



UL94 fire rated insulating case for PICV. For heating and cooling installations.
092XIHV: case for heating, closure by Velcro®. Size has to be specified.
092XICV: case for cooling, closure by Velcro®. Size has to be specified.

Cases for heating let the headwork and the actuator uncover wheras those for cooling cover the actuator too (all those in the range). Insulation sheel has a thin external layer made of 80 kg/m^3 density polyetylene cross linked foam and a thicker internal layer made of 29 kg/m^3 density polyetylene 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.
* The images shown are for demonstration purposes only.
* The data and photo should not be used without permission of the copyright holder.

FRATELLI PETTINAROLI S.p.A. CLIMATE SYSTEMS TECHNOLOGY

Fratelli Pettinaroli Spa
Via Pianelli, 38 - 28017 San Maurizio d'Opaglio (NO) - Italy
Tel. +39 0322 96217 - +39 0322 96545 - Fax +39 0322 96546
info@pettinaroli.com - www.pettinaroli.com