



Two-Way Cast Iron Flanged PICV Control Valve
Adjustable Flow Limiter and Automatic Pressure Regulator
2-1/2 to 6" ANSI Class 125 or 250

Description

Pressure Independent Control Valves integrate three functions into a single device: control valve, adjustable flow limiter and automatic differential pressure regulator. They are available in both ANSI Class 125 and 250.



Features

- Control valve with integrated differential pressure regulator and adjustable flow limiter
- ANSI 125 and ANSI 250 bodies and flanges
- 2-1/2-, 3-, 4-, 5-, and 6-inch (65, 80, 100, 125, and 150 mm)
- Field adjustable presetting
- ANSI Class IV leakage (0.01%)
- Pressure test (P/T) points
- Can be equipped with EN180, EN360, or ES247 electro-motoric actuators

Valve Body Flow Maximums

Table 1

Size	Maximum Flow Range GPM	ANSI Class 125	ANSI Class 250	ΔP Regulator Operating Range psi (kPa)
2-1/2"	19 to 110	PICV2-250(110)-125		3.6 to 90 (25 to 600)
	26 to 154	PICV2-250(154)-125		8 to 90 (55 to 600)
	19 to 110		PICV2-250(110)-250	3.6 to 90 (25 to 600)
	26 to 154		PICV2-250(154)-250	8 to 90 (55 to 600)
3"	24 to 150	PICV2-300(150)-125		3.6 to 90 (25 to 600)
	31 to 190	PICV2-300(190)-125		8 to 90 (55 to 600)
	24 to 150		PICV2-300(150)-250	3.6 to 90 (25 to 600)
	31 to 190		PICV2-300(190)-250	8 to 90 (55 to 600)
4"	55 to 300	PICV2-400(300)-125		5 to 90 (35 to 600)
	65 to 395	PICV2-400(395)-125		10 to 90 (70 to 600)
	55 to 300		PICV2-400(300)-250	5 to 90 (35 to 600)
	65 to 395		PICV2-400(395)-250	10 to 90 (70 to 600)
5"	85 to 485	PICV2-500(485)-125		5 to 90 (35 to 600)
	105 to 595	PICV2-500(595)-125		8 to 90 (55 to 600)
	85 to 485		PICV2-500(485)-250	5 to 90 (35 to 600)
	105 to 595		PICV2-500(595)-250	8 to 90 (55 to 600)
6"	115 to 650	PICV2-600(650)-125		5 to 90 (35 to 600)
	140 to 860	PICV2-600(860)-125		9 to 90 (62 to 600)
	115 to 650		PICV2-600(650)-250	5 to 90 (35 to 600)
	140 to 860		PICV2-600(860)-250	9 to 90 (62 to 600)



Application	- For use in heating, ventilating and air conditioning systems as a control valve - For closed loop hot or chilled water applications
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Caution Notations

CAUTION:		Equipment damage may occur if you do not perform a procedure as specified.
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Specifications Functional Data	Line size	2-1/2-inch (65 mm) to 6-inch (150 mm)	
	Body style	Flanged	
	Pressure class	ANSI 125 and ANSI 250	
	Pressure regulation flow accuracy	± 5% from 10 to 90 psi (4- and 6-inch high flow from 15 to 90 psi) ±10% from Δp_{min} to 10 psi or 15 psi, as noted above.	
	Valve characteristic	Linear	
	Close-off	100 psi (700 kPa)	
	Leakage rate	< Class IV (0 to 0.01% of nominal maximum flow)	
	Operating direction	Normally open (push to close)	
	Permissible media	Hot water, chilled water, water/glycol solution	
	Medium temperature range	34°F to 248°F (1°C to 120°C)	
Materials	Nominal stroke	2-1/2-inch and 3-inch 4 to 6-inch	3/4-inch (20 mm) 1-1/2-inch (40 mm)
	Valve body	Cast iron	
	Stem, spring, seat	Stainless steel	
	Plug	Brass (DZR)	
	Regulator	Stainless steel	
General ambient conditions	Seals	EPDM (peroxide cured)	
	Temperature		
	Operation	5°F to 131°F (-15°C to 55°C)	
	Transport	-22°F to 149°F (-30°C to 65°C)	
	Storage	5°F to 122°F (-15°C to 50°C)	
	Humidity		
	Operation	5 to 95% rh	
Miscellaneous	Transport	<95% rh	
	Storage	5 to 95% rh	
	Canadian Registration Number	OH7645.5R1 (for 2-1/2-inch and 3-inch only)	

Table 2. Cast Iron Valve Body Ratings.

Temperature		Pressure psig (kPa)			
°F	°C	ANSI Class 125		ANSI Class 250	
-20 to 150	-30 to 66	200	(1387)	500	(3447)
200	93	190	(1310)	460	(3171)
250	121	175	(1206)	415	(2861)
300	149	165	(1137)	375	(2585)
400	204	140	(965)	290	(1999)
450	232	125	(861)	250	(1723)



Table 3. Close-off Pressures for Electronic Actuators.

Valve Size In. (mm)	EN180 Non-Spring Return		EN360 Non-Spring Return		ES247 Spring Return	
	psi	kPa	psi	kPa	psi	kPa
2-1/2 (65)	100	700	—	—	100	700
3 (80)	100	700	—	—	100	700
4 (100)	—	—	100	700	100	700
5 (125)	—	—	100	700	100	700
6 (150)	—	—	100	700	100	700

Mechanical Design

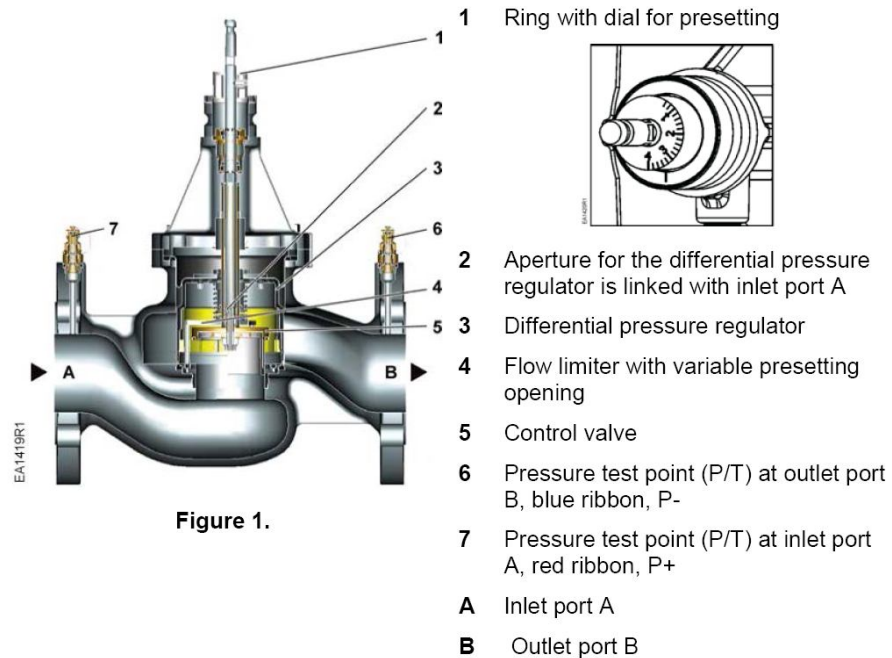


Figure 1.

Operation

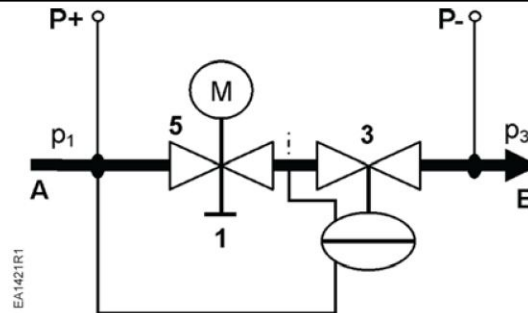
The Pressure Independent Control Valves combine three functions (see Figure 2):

- a control valve (5) for controlling the volumetric flow,
- a field-adjustable flow limiter (4) with a dial (1) for a pre-settable maximum volumetric flow,
- a differential pressure regulator (3) that automatically adjusts to pressure fluctuations in the hydraulic system respectively across the control valve to maintain a constant flow.

The mechanical series-connected differential pressure regulator keeps the differential pressure constant across the control valve, thus maintaining constant flow. The desired maximum volumetric flow can be preset with the field adjustable flow limiter. The building automation system controller (not shown) and the actuator regulate the volumetric flow and consequently the desired temperature in buildings, rooms or zones.



Operation,
continued



- A Inlet medium (inlet port A)
- B Outlet medium (outlet port B)
- 1 Flow limiter with dial for presetting
- 3 Differential pressure regulator
- 5 Control valve with mounted actuator
- P- P/T port, pressure test point with blue ribbon (6)
- P+ P/T port, pressure test point with red ribbon (7)
- p₁ Pressure at inlet port A of PIC Valve
- p₃ Pressure at outlet port B of PIC Valve

Figure 2. Pressure Independent Control Valve Operation.

Medium Flow

The medium entering the Pressure Independent Control Valve (inlet port A) first passes through the variable presetting opening (4) which is connected to the ring with a dial (1) for presetting the desired maximum volumetric flow. The actuator (not shown here) opens and accurately positions the control valve. Then, the medium flows through control valve (5) with a linear characteristic.

Before leaving the Pressure Independent Control Valve (outlet port B), the medium passes through a built-in mechanical differential pressure regulator (3). This differential pressure regulator is the heart of the Pressure Independent Control Valve and ensures that the selected volumetric flow is maintained across the whole working range and independent of the inlet pressure p₁.

Pressure Test Points

The Pressure Independent Control Valve is equipped with two pressure test points (P+, P-) for measuring and monitoring the differential pressure across the valve during commissioning.

Manual Control

Manual control is only possible with a mounted actuator.

Advantages

The advantages of Pressure Independent Control Valves are:

- Once the flow limiter is set to design flow, the hydronic circuit self balances, even when changes to the system are made, such as additions.
- For any heat demand the Pressure Independent Control Valve with mounted actuator can be set to the desired volumetric flow and will remain constant regardless of pressure fluctuations in the system.

Constant flow regardless of pressure changes in the system leads to a more stable control, less wasted energy and greater comfort.



**Volumetric Flow/
Dial Presetting**

Tables to determine the dial setting for a desired volumetric flow.

Table 4. 2-1/2-Inch Valves Flow Rates.

Low Flow Valves PICV2-250(110)		
Setting	Max. GPM	Max. m ³ /h
4.0	110.0	25.0
3.8	102.1	23.2
3.6	94.7	21.5
3.4	87.7	19.9
3.2	81.3	18.5
3.0	75.3	17.1
2.8	69.7	15.8
2.6	64.5	14.6
2.4	59.6	13.5
2.2	55.0	12.5
2.0	50.6	11.5
1.8	46.4	10.5
1.6	42.2	9.6
1.4	38.0	8.6
1.2	33.7	7.7
1.0	29.2	6.6
0.8	24.5	5.6
0.6	19.3	4.4

High Flow Valves PICV2-250(154)		
Setting	Max. GPM	Max. m ³ /h
4.0	154.0	35.0
3.8	143.2	32.5
3.6	133.0	30.2
3.4	123.4	28.0
3.2	114.4	26.0
3.0	105.9	24.1
2.8	98.0	22.3
2.6	90.6	20.6
2.4	83.6	19.0
2.2	77.0	17.5
2.0	70.6	16.0
1.8	64.5	14.6
1.6	58.5	13.3
1.4	52.5	11.9
1.2	46.4	10.5
1.0	40.1	9.1
0.8	33.4	7.6
0.6	26.2	6.0

Table 5. 3-Inch Valves Flow Rates.

Low Flow Valves PICV2-300(150)		
Setting	Max. GPM	Max. m ³ /h
4.0	149.8	34.0
3.8	137.6	31.3
3.6	126.5	28.7
3.4	116.4	26.4
3.2	107.1	24.3
3.0	98.7	22.4
2.8	91.0	20.7
2.6	83.9	19.1
2.4	77.3	17.6
2.2	71.1	16.1
2.0	65.2	14.8
1.8	59.5	13.5
1.6	53.8	12.2
1.4	48.2	10.9
1.2	42.4	9.6
1.0	36.5	8.3
0.8	30.2	6.9
0.6	23.5	5.3

High Flow Valves PICV2-300(190)		
Setting	Max. GPM	Max. m ³ /h
4.0	189.5	43.0
3.8	175.2	39.8
3.6	162.2	36.8
3.4	150.1	34.1
3.2	139.1	31.6
3.0	128.9	29.3
2.8	119.4	27.1
2.6	110.5	25.1
2.4	102.2	23.2
2.2	94.2	21.4
2.0	86.5	19.6
1.8	79.0	17.9
1.6	71.5	16.2
1.4	63.9	14.5
1.2	56.2	12.8
1.0	48.2	10.9
0.8	39.8	9.0
0.6	30.9	7.0

Table 6. 4-Inch Valves Flow Rates.

Low Flow Valves PICV2-400(300)		
Setting	Max. GPM	Max m ³ /h
4.0	300	68
3.8	273	62
3.6	250	57
3.4	229	52
3.2	210	48
3.0	194	44
2.8	179	41
2.6	166	38
2.4	154	35
2.2	143	32
2.0	132	30
1.8	122	28
1.6	112	26
1.4	102	23
1.2	91	21
1.0	80	18
0.8	67	15
0.6	55	12

High Flow Valves PICV2-400(395)		
Setting	Max. GPM	Max m ³ /h
4.0	395	90
3.8	360	82
3.6	327	74
3.4	298	68
3.2	272	62
3.0	250	57
2.8	230	52
2.6	212	48
2.4	196	45
2.2	181	41
2.0	168	38
1.8	154	35
1.6	141	32
1.4	128	29
1.2	114	26
1.0	99	23
0.8	83	19
0.6	65	15

Table 7. 5-Inch Valves Flow Rates.

Low Flow Valves PICV2-500(485)		
Setting	Max. GPM	Max m ³ /h
4.0	485	110
3.8	446	101
3.6	412	94
3.4	382	87
3.2	355	81
3.0	330	75
2.8	308	70
2.6	286	65
2.4	266	60
2.2	246	56
2.0	227	52
1.8	207	47
1.6	188	43
1.4	167	38
1.2	147	33
1.0	125	29
0.8	104	24
0.6	85	18

High Flow Valves PICV2-500(595)		
Setting	Max. GPM	Max m ³ /h
4.0	595	135
3.8	550	125
3.6	511	116
3.4	475	108
3.2	443	101
3.0	414	94
2.8	387	88
2.6	361	82
2.4	336	76
2.2	312	71
2.0	288	66
1.8	264	60
1.6	240	55
1.4	215	49
1.2	188	43
1.0	161	37
0.8	132	30
0.6	105	23

**Table 8. 6-Inch Valves Flow Rates.**

Low Flow Valves PICV2-600(650)			High Flow Valves PICV2-600(860)		
Setting	Max. GPM	Max m ³ /h	Setting	Max. GPM	Max m ³ /h
4.0	650	148	4.0	860	195
3.8	610	139	3.8	796	181
3.6	571	130	3.6	737	167
3.4	533	121	3.4	683	155
3.2	497	113	3.2	632	144
3.0	462	105	3.0	586	133
2.8	429	98	2.8	542	123
2.6	398	90	2.6	501	114
2.4	367	83	2.4	463	105
2.2	338	77	2.2	427	97
2.0	310	70	2.0	392	89
1.8	282	64	1.8	358	81
1.6	255	58	1.6	324	74
1.4	228	52	1.4	291	66
1.2	201	46	1.2	256	58
1.0	173	39	1.0	220	50
0.8	143	33	0.8	182	41
0.6	115	26	0.6	140	32

Engineering Notes**CAUTION:**

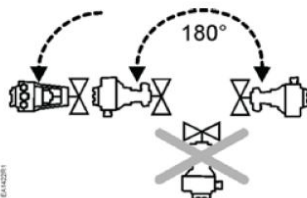
Install the valve so that the flow of the medium matches the direction of the arrow on the valve body. Failure to do so may damage the differential pressure regulator.

Recommendations

- A strainer or dirt trap should be fitted upstream of the valve to enhance reliability and service life.
- Remove dirt, welding beads, and so on from valves and pipes.
- Do not insulate the actuator bracket; air circulation must be ensured.

Mounting Notes

Pressure Independent Control Valves and actuators can be easily assembled on site. Neither special tools nor adjustments, besides the presetting, are required. Prior to mounting the actuator, the required volumetric flow must be set. Each valve is supplied with a bib tag indicating the maximum GPM flow for each setting of the flow limiter.

**Figure 3. Accepted Mounting Positions.**



Dimensions

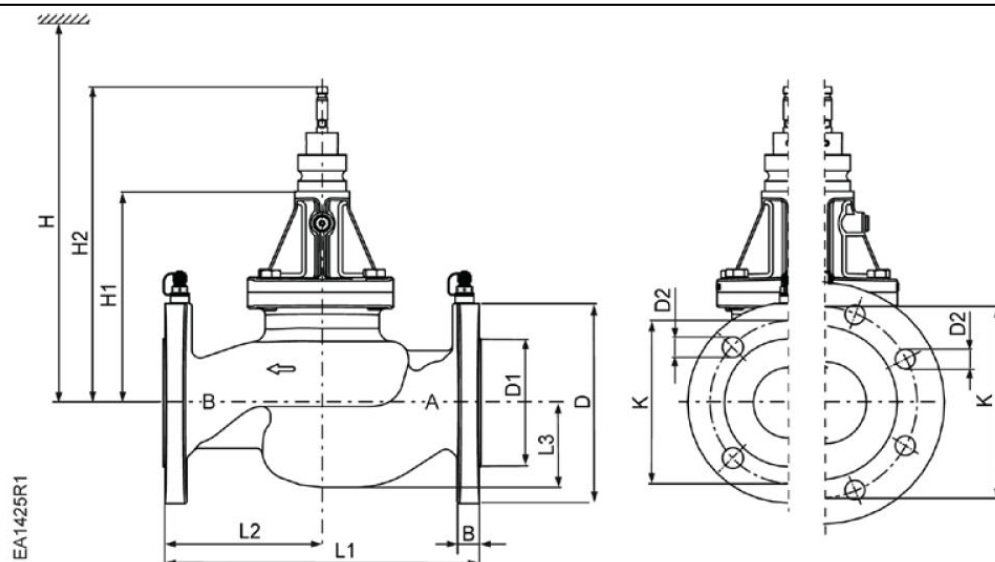


Table 9. Dimensions and Weights.

ANSI Class	Valve Size Inches (mm)	B	Ø D	Ø D1	Ø D2	L1	L2	L3	Ø K	H1	H2	H			Weight Pounds (kg)
												EN180	EN360	ES247	
125	2.5 (65)	0.69 (17.5)	7.01 (178)	N/A	0.75 (19)	10.87 (276)	5.43 (138)	3.11 (79)	5.50 (140)	7.68 (195)	11.42 (290)	25.08 (637)	—	26.93 (684)	42 (19)
250		1.00 (25.4)	7.48 (190)	4.96 (126)	0.88 (22.4)	11.50 (292)	5.75 (146)	3.31 (84)	5.88 (149.4)	7.68 (195)	11.42 (290)	25.08 (637)	—	26.93 (684)	56 (25.4)
125	3 (80)	0.75 (19)	7.50 (191)	N/A	0.75 (19)	11.75 (298)	5.87 (149)	3.75 (95.3)	6.00 (152)	8.52 (216.5)	12.32 (313)	25.95 (659)	—	23.86 (606)	62 (28.1)
250		1.12 (28.5)	8.25 (210)	5.69 (145)	0.88 (22.4)	12.5 (318)	6.26 (159)	3.88 (98.4)	6.62 (168)	8.52 (216.5)	12.32 (313)	25.95 (659)	—	23.86 (606)	82 (37.2)
125	4 (100)	0.98 (25)	9.00 (228.6)	N/A	0.75 (19)	13.86 (352)	7.40 (188)	4.49 (114)	7.5 (190.5)	13.07 (332)	19.23 (488.5)	—	31.38 (797)	32.32 (821)	123 (55.6)
250		1.14 (29)	10 (254)	6.94 (176.3)	0.88 (22.4)	14.40 (365.8)	7.63 (193.8)	4.61 (117)	7.88 (200.2)	13.07 (332)	19.23 (488.5)	—	31.38 (797)	32.32 (821)	156 (70.8)
125	5 (125)	0.98 (25)	10 (254)	N/A	0.88 (22.4)	15.75 (400)	8.07 (205)	5.30 (134.7)	8.50 (215.9)	14.06 (357)	15.63 (397)	—	34.06 (865)	35.00 (889)	170 (77.2)
250		1.52 (38.6)	10.9 (276.9)	8.31 (211.1)	0.88 (22.4)	16.62 (422.2)	8.51 (216.1)	5.50 (139.6)	9.25 (235)	14.06 (357)	15.63 (397)	—	34.92 (887)	35.87 (911)	221 (100)
125	6 (150)	1.05 (26.70)	11 (279.4)	N/A	0.88 (22.4)	17.76 (451)	9.17 (233)	6.15 (156.3)	9.50 (241.3)	15.79 (401)	17.48 (444)	—	36.06 (916)	37.01 (940)	235 (106)
250		1.58 (40.1)	12.5 (317.5)	9.69 (246.1)	0.88 (22.4)	18.62 (473)	9.61 (244)	6.34 (161.1)	10.63 (270)	15.79 (401)	17.48 (444)	—	36.93 (938)	37.87 (962)	303 (138)

ØD1 = Raised area of flange

H = Total actuator height plus minimum distance to the wall or the ceiling for mounting, connection, operation, maintenance, etc.

H1 = Dimension from the pipe center to install the actuator (upper edge)

H2 = Valve in the «Open» position means that the valve stem is fully extended

Warranty

Application-related technical data are guaranteed only when the valves are used in connection with our recommended actuators.

Warranty is void, if used with non-recommended actuators.