

Self-operated Pressure Regulators

Back Pressure Valve Type 2114/2418 • Valve opens when upstream pressure rises



Application

Type 2114/2418 Back Pressure Valves regulate the fluid pressure upstream of the valve to a pre-adjusted set point value.

Set points from 0.75 psi to 35 psi (0.05 bar to 2.5 bar)

Nominal sizes 6" to 10"

Pressure ratings ANSI 125 to 300

For liquids, gases and steam up to **660 °F** (350 °C)

The regulators consist of a Type 2114 valve with a Type 2418 actuator complete with set point adjustment.

Features

- Low-maintenance, medium-controlled, self-operated proportional regulators requiring no auxiliary energy
- Easy set point adjustment at the actuator
- Field retrofit of actuator for simple change of set point range
- Spring-loaded, single-seated valve with upstream and downstream pressure balancing by means of a stainless steel bellows
- Plug with soft seal for high sealing requirements
- Low-noise standard plug – special version with a St I flow divider for further noise level reduction (see Data Sheet T 8081)

Standard version

Type 2114 Valve with Type 2418 Control Actuator

- Sizes 6" to 10"
- ANSI Class 125 to 300
- Body made of ASTM materials cast iron A 126 Cl. B, cast carbon steel A 216 WCB or cast stainless steel A 351 CF8M
- PTFE or EPDM soft-sealed plug
- Type 2418 Actuator with EPDM rolling diaphragm, with fitting

Options

- **Valve with St I flow divider** for particularly low-noise operation with gases and steam
- **FKM diaphragms** for oils (ASTM I, II, III)
- **Stainless steel seat and plug with PTFE soft seal** (max. 430 °F (220 °C)) · With EPDM soft seal (max. 300 °F (150 °C))
- **Free of oil and grease** for super-clean applications
- **Seat and plug armoured** for better wear
- **Metal to metal seal plug**
- **Version for oxygen service** on request



Fig. 1 · Type 2114/2418 Pressure Reducing Valve

For **DIN version** see Technical Data Sheet T 2549 EN

Principle of operation (Fig. 2)

The process medium flows through the valve in the direction indicated by the arrow. The position of the valve plug determines the cross-sectional area of flow between the plug (3) and the seat (2). The plug stem (5) and the plug are connected to the stem (11) of the actuator (10).

To control the pressure, the operating diaphragm (12) is tensioned by the positioning springs (7) and the set point adjustment nut (6) so that the valve is opened by the force of the positioning spring when both pressures are balanced ($p_1 = p_2$).

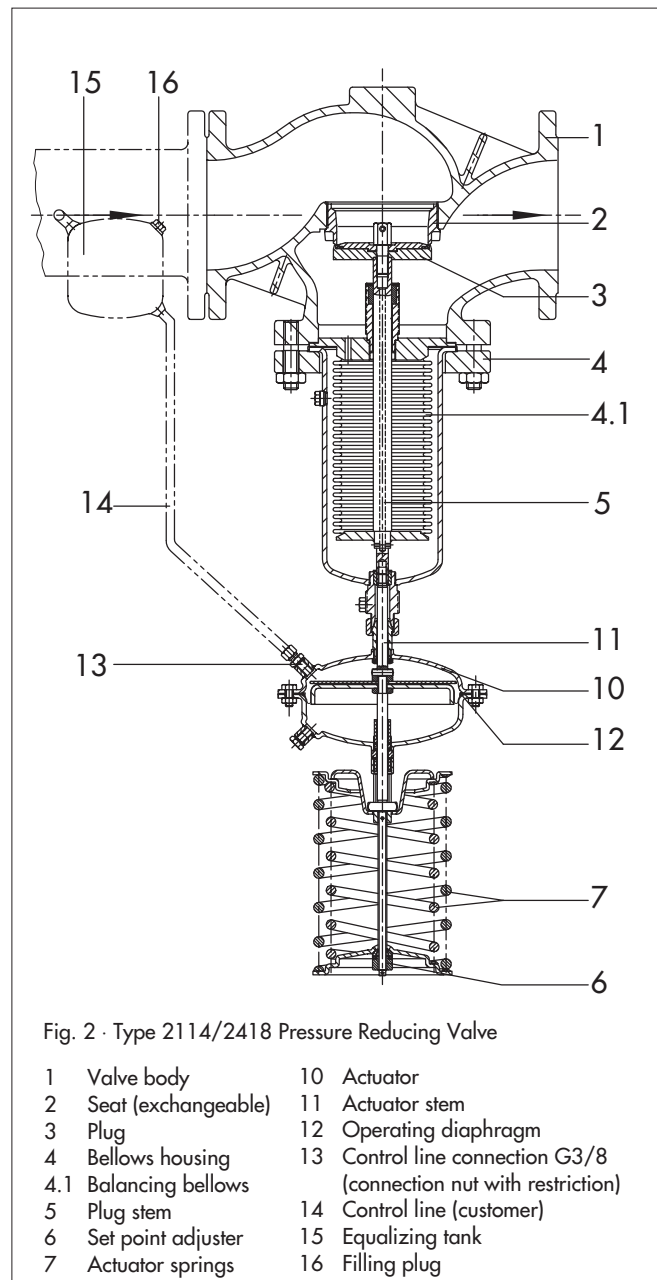
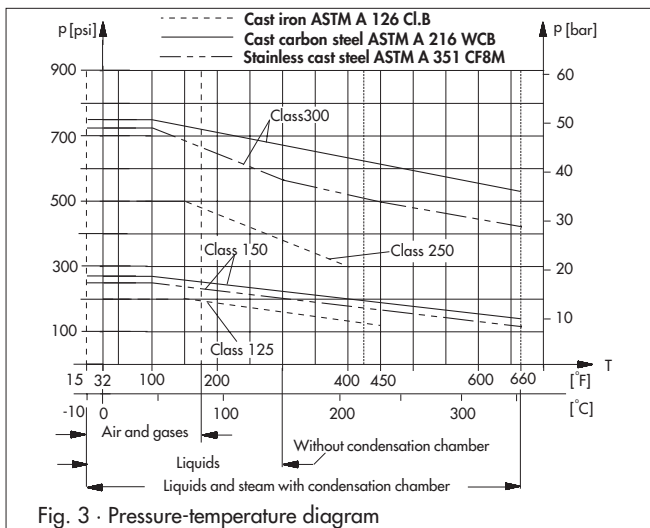
The upstream pressure p_1 to be controlled is tapped upstream of the valve and transmitted via the control line (14) to the operating diaphragm (12) where it is converted into a positioning force. This force is used to adjust the valve plug (3) according to the force of the positioning springs (7) which are adjusted at the set point adjustment nut (6). When the force resulting from the upstream pressure p_1 rises above the adjusted set point, the valve opens proportionally to the change in pressure.

The fully balanced valves are equipped with a balancing bellows (4). The downstream pressure p_2 acts on the inner bellows surface, whereas the upstream pressure p_1 act on the outer surface of the bellows. In this way, the forces produced by the upstream and downstream pressures acting on the plug are balanced.

The valves can be delivered with an St I flow divider. The valve seat must be exchanged if the flow divider is retro-fitted.

Installation

- The actuator must be suspended downwards as depicted
- Horizontal pipeline with a slight downward slope on either side (for condensate discharge)
- Direction of flow must coincide with the arrow on the valve body
- Pressure tap approx. 3.3 ft (1 m) downstream from the valve. The control line (pipe $\frac{3}{8}$ ") is to be provided by the customer
- A larger pipe cross-section (expansion piece) downstream of the valve may be installed to compensate for case with high steam expansion
- A strainer is recommended to be installed upstream of the valve to protect the valve internals from damage by foreign matter.
- Shutoff valves are recommended to isolate the regulator during maintenance



Pressure-Temperature Diagram

The range of application of the valves is limited by the pressure-temperature rating of the body material and ANSI class. The diagram in Fig. 4 is for reference only. For exact values, consult ANSI standards B16.1, B16.4 and B16.34.

St I Flow Divider

When a flow divider St I is installed, the rated C_v value is reduced to C_{v1} . Flow characteristic differences between valves with and without flow dividers do not occur until the valve has passed through approx. 80 % of its travel range.

Valve specific correction terms

For valve correction terms for calculating noise levels, please refer to Associated Information Sheet number T 2500.

Table 1 · Technical Data · All pressures in psi and bar (gauge)

Valve		Type 2114	
Pressure rating		ANSI 125	ANSI 150 and 300
Nominal size		6"	6" to 10"
End Connection		Flat face flanges	Raised face flanges
Temperature range		See Fig. 4 Pressure-Temperature Diagram (according to ANSI B16 series)	
	Valve plug	Metal sealing, max. 660 °F (350 °C) Soft sealing, PTFE, max. 430 °F (220 °C) Soft sealing, EPDM, max. 300 °F (150 °C) Soft sealing, NBR, max. 140 °F (60 °C)	
Maximum permissible differential pressure	6"	175 psi (12 bar)	
	8" to 10"	145 psi (10 bar)	
Leakage rate		≤ 0.05% of Cv value	
Terms for control valve sizing according to ISA S75.01 and S75.02		F _L = 0.95	X _T = 0.75
Actuator		Type 2418	
Set point ranges		0.75 to 3.5 psi	0.05 to 0.25 bar
		1.5 to 9 psi	0.1 to 0.6 bar
		3 to 15 psi	0.2 to 1 bar
		7 to 21 psi	0.5 to 1.5 bar
		15 to 35 psi ¹⁾	1 to 2.5 bar ¹⁾
Maximum permissible pressure at the actuator	Diaphragm area	49.6 in ² (320 cm ²)	99.2 in ² (640 cm ²)
	Pressure	45 psi (3 bar)	23 psi (1.5 bar)
Maximum permissible temperature		Non-combustible gases: 175 °F (80 °C) Liquids: 300 °F (150 °C), with expansion tank: 660 °F (350 °C) Steam with expansion tank: 660 °F (350 °C)	

1) for set point range exceeding 35 psi (2.5 bar) see T 2552: Type 2335 Back Pressure Valve

Table 2 · Materials

Valve		Type 2114		
Pressure rating		ANSI 125	ANSI 150 or 300	
Max. Permissible temperature		450 °F (230 °C)	660 °F (350 °C)	
Body		Cast iron ASTM A 126 Cl.B	Cast carbon steel ASTM A 216 WCB	Cast stainless steel ASTM A 351 CF8M
Seat		Stainless steel		Stainless steel
Plug		AISI 410	WN 1.4006	AISI 316Ti WN 1.4571
Seal ring for soft seal		PTFE with 15% glass fiber · EPDM		
Balancing bellows and stem		Stainless steel AISI 316Ti WN 1.4571		
Gasket		Graphite with stainless steel core		
Actuator		Type 2418		
Diaphragm cases		Sheet steel A283 Gr.C	Sheet steel St 34-2	AISI 304 WN 1.4301
Diaphragm ¹⁾		EPDM with fabric reinforcement · FKM for oils		
Guide bushing		DU-bushing		
Gaskets		EPDM/PTFE ¹⁾		

¹⁾ FKM when used with oils

Table 3 · Cv and Kvs values

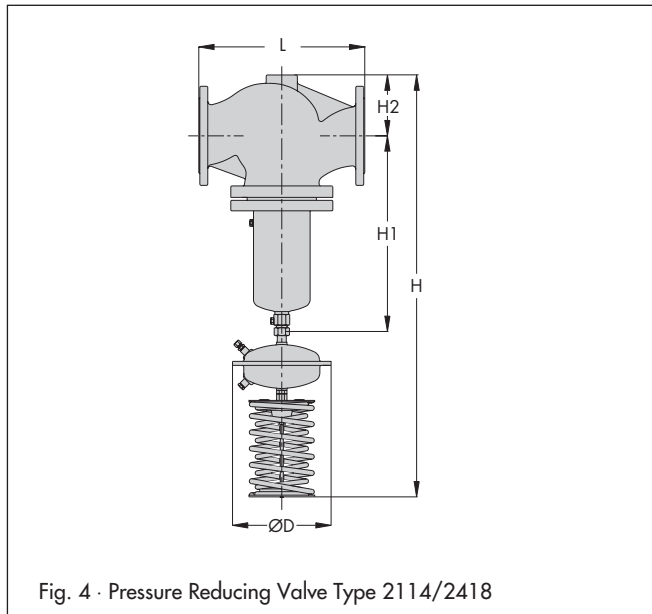
Size	Seat bore	Cv	Cv I	Seat bore	Kvs	Kvs I
	inches	Standard version	With flow divider	mm	Standard version	With flow divider
6"	4.92	328	245	125	280	210
8"	8.15	490	370	207	420	315
10"	8.15	585	340	207	500	375

Table 4 · Dimensions and weights · Values in brackets apply to temperatures from 430 to 660 °F (220 to 350 °C)

Back pressure valve Type 2114/2418		Units	inches			mm		
Nominal size			6"	8"	10"	6"	8"	10"
Set point range in psi (bar)	Length L	ANSI 125 and 150	17.75	21.38	26.30	451	543	668
		ANSI 300	18.62	22.38	27.88	473	568	708
	Height H1	23.2 (28.7)	28.7 (34.2)		590 (730)	730 (870)		
	Height H2	6.89	10.6		175	270		
0.75 to 3.5 psi (0.05 to 0.25 bar)	Height H	42.1 (47.6)	52.0 (57.5)		1070 (1210)	1320 (1460)		
	Actuator	∅ D = 15.0 inches, A = 99.2 in ²			∅ D = 380 mm, A = 640 cm ²			
	Spring force F	485 lbf			2150 N			
1.5 to 8.5 psi (0.1 to 0.6 bar)	Height H	43.7 (49.2)	52.0 (57.5)		1110 (1250)	1320 (1460)		
	Actuator	∅ D = 15.0 inch, A = 99.2 in ²			∅ D = 380 mm, A = 640 cm ²			
	Spring force F	810 lbf			3600 N			
3 to 15 psi (0.2 to 1.0 bar)	Height H	43.7 (49.2)	52.0 (57.5)		1110 (1250)	1320 (1460)		
	Actuator	∅ D = 15.0 inches, A = 99.2 in ²			∅ D = 380 mm, A = 640 cm ²			
	Spring force F	1845 lbf			8200 N			
7 to 21 psi (0.5 to 1.5 bar)	Height H	41.7 (47.2)	47.6 (53.1)		1060 (1200)	1210 (1350)		
	Actuator	∅ D = 11.2 inches, A = 49.6 in ²			∅ D = 285 mm, A = 320 cm ²			
	Spring force F	1035 lbf			4600 N			
15 to 35 psi (1 to 2.5 bar)	Height H	41.7 (47.2)	47.6 (53.1)		1060 (1200)	1210 (1350)		
	Actuator	∅ D = 11.2 inches, A = 49.6 in ²			∅ D = 285 mm, A = 320 cm ²			
	Spring force F	1845 lbf			8200 N			
Weight for carbon steel ANSI 150 ¹⁾	Units		lbs			kg		
	0.75 to 15 psi (0.05 to 1.0 bar)	449	1,031	1,176	204	469	535	
	7 to 35 psi (0.5 to 2.5 bar)	415	997	1,142	189	453	519	

¹⁾ +10% for cast steel ANSI 300

Dimensions



Accessories

- Fitting for connection of the control line $\frac{3}{8}$ " to the filler plug.
- Condensation chamber for steam condensation and expansion tank for protection of the operating diaphragm against extreme temperatures. This chamber is necessary for steam and liquids above 300 °F (150 °C).
- Extension piece and expansion tank for temperatures above 430 °F (220 °C).

Additional data for accessories see T 2595.

Ordering information

Back Pressure Valve Type 2114/2418
 Nominal size ... Body material ...
 ANSI Class ... End connection ...
 Set point range ... psi (bar)
 Optionally, accessories ... /special version ...

Specifications subject to change without notice.



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