

Self-operated Pressure Regulators Series 2371



Excess Pressure Valves for food processing and pharmaceutical industries

Type 2371-00 · With pneumatic set point adjustment

Type 2371-01 · With mechanical set point adjustment

Application

Excess pressure valves for set point ranges **0.3 to 6 bar** (5 to 90 psi) · K_{VS} **2.5 to 10** (C_V 3 to 12) · **DN 15 to DN 50** (NPS ½ to 2) · For liquids and gases from **-10 to +160 °C** (14 to 320 °F) · Max. operating pressure **10 bar** (150 psi)

The valve opens as the inlet pressure rises



Special features

- Proportional regulators for use in the food processing and pharmaceutical industries
- Wetted inside surfaces with a smooth or polished finish
- Stainless steel 1.4404 (316L)
- FDA-approved materials
- Angle-style valve body
- Body free of cavities
- Diaphragm leakage monitoring over a leak-off port

Versions

Excess pressure valve with a diaphragm for controlling the inlet pressure p_1 to the adjusted set point. The set point of Type 2371-00 is adjusted pneumatically. The set point of Type 2371-01 is adjusted mechanically by the set point spring.

Angle valve · Version in bar stock body · DN 15 to DN 50 (NPS ½ to 2) · Plug with metal sealing or optionally special plug with soft sealing.

Maximum pressure 10 bar (150 psi) · Clamp to attach actuator housing

Type 2371-00 with pneumatic set point adjustment · Additional version with pneumatic stem blocking

Type 2371-01 with mechanical set point adjustment · Additional version with mechanical stem blocking

This stem locking allows the plug to be lifted to keep the valve open during CIP (Cleaning in Place) or SIP (Sterilization in Place).

Connections

Standard: Welding ends acc. to DIN 11850 Series 2

Special version: Welding ends according to BS 4825, ISO 2037 (SMS) or DIN EN ISO 1127 · Flanges according to DIN EN 1092-1 · Threaded connections according to DIN 11887, SMS 1146, ISO 2853 (IDF) · Clamp connections according to ISO 2852, DIN 32676 or BS 4825

Special versions

Body made of 1.4435, other materials on request · Body with two inlet ports · Body with DN 65 end connections · Smaller K_{VS} coefficients available on request · Leak-off port for leakage monitoring with connection sleeve to connect it to a leakage line



Fig. 1 · Type 2371-00



Fig. 2 · Type 2371-01 with mechanical stem locking

Principle of operation

The process medium flows through the valve body (1) in the direction indicated by the arrow. The position of the valve plug (3) determines the flow rate across the cross-sectional area released between the plug and the valve seat (2).

The valve opens when the pressure p_1 upstream of the valve rises above the adjusted set point pressure. The resulting inlet pressure p_1 depends on the flow rate.

Any medium escaping from the leak-off port (11) in the housing indicates that the operating diaphragm (4/4.1) may be leaking or the diaphragm has ruptured.

Type 2371-01 - Version with mechanical set point adjustment (Fig. 3)

The valve is normally closed by the positioning springs (7). The valve starts to open when the inlet pressure p_1 applied to the diaphragm (4) and the resulting force exceed the force of the springs.

The set point is adjusted by an Allen key (8 mm), which is inserted through the adjustment opening (6.1) on top of the housing onto the set point screw (6). The blanking plug must first be removed. If necessary, the set point screw (6) can be secured by the locking screw (12) in the upper plug section (5) to prevent the set point screw from loosening due to vibrations which would change the set point.

Turning the set point screw clockwise causes the spring plate (7.1) to move upwards and increases the spring force and the set point. Turning the set point screw counterclockwise relieves the spring tension, reducing the set point.

Type 2371-00 - Version with pneumatic set point adjustment (Fig. 4)

The valve is normally closed by the set point pressure (p_c).

When the inlet pressure p_1 applied to the diaphragm (4.1) exceeds the set point pressure p_c , the force exerted on the diaphragm by the pressure of the medium makes the diaphragm move. As a result, the plug (3) moves out of the normally closed position and the valve opens.

As the inlet pressure p_1 drops, the resulting force reduces again. The valve is closed when the pressure falls below the set point pressure p_c .

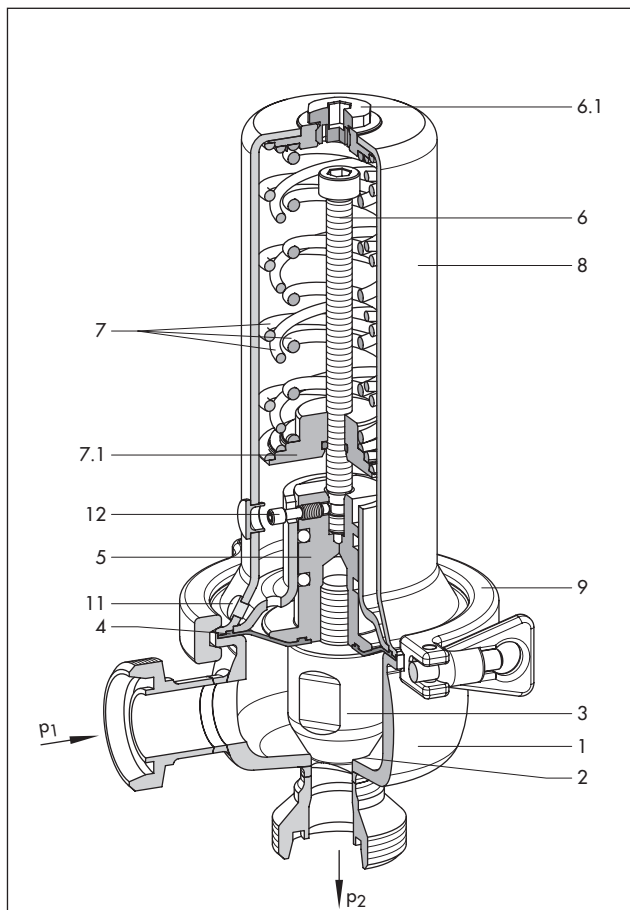


Fig. 3 · Type 2371-01 with mechanical set point adjustment

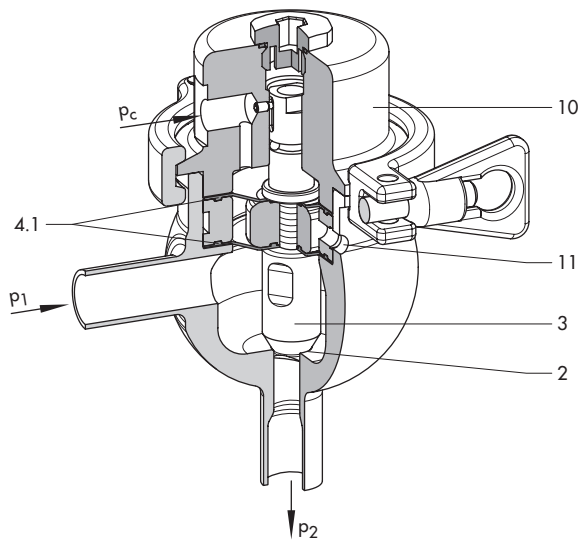


Fig. 4 · Typ 2371-00 with pneumatic set point adjustment

- 1 Valve body
- 2 Seat
- 3 Plug
- 4 Diaphragm (Type 2371-01)
- 4.1 Double diaphragm (Type 2371-00)
- 5 Upper plug section
- 6 Set point screw
- 6.1 Adjustment opening with blanking plug
- 7 Positioning spring(s)
- 7.1 Spring plate
- 8 Actuator housing (mechanical set point adjustment)
- 9 Clamp fitting
- 10 Actuator housing (pneumatic set point adjustment)
- 11 Leak-off port (leakage monitoring)
- 12 Locking screw
- p_c Set point pressure
- p_1 Inlet pressure (upstream pressure)
- p_2 Outlet pressure (downstream pressure)

Stem locking (Fig. 5)

The stem locking is designed to keep the plug in the open position. This allows safe and effective cleaning (CIP or SIP) while the valve is open.

The stem can be locked pneumatically (Type 2371-00) or mechanically (Type 2371-01).

The control properties of the excess pressure valve are not affected when the stem locking is inactive (disengaged).

Pneumatic stem locking (for Type 2371-00)

The housing of the stem locking (10.1) is connected to the excess pressure valve (Type 2371-00) over the adjustment opening in the actuator housing (10). The connecting pin (14) links the internal piston (13) to the upper plug section (5) of the excess pressure valve.



To lock the stem, the set point control must not be active, i.e. no set point pressure p_c applied. A displacement pressure p_v equal to 3 bar ¹⁾ must be applied to lift the piston (13) to open the valve. The piston returns to its original position when the pressure p_v is removed and when the set point pressure p_c ²⁾ is applied again, causing the valve to take on its control function again.

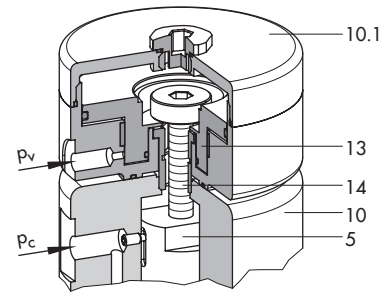


Fig. 5 · Functional diagram of the stem locking

- 5 Upper plug section
- 10 Actuator housing (with pneumatic set point adjustment)
- 10.1 Housing of the stem locking
- 13 Piston
- 14 Connecting pin
- p_v Displacement pressure (G $\frac{1}{8}$ connection)
- p_c Set point pressure (G $\frac{1}{4}$ connection)

Mechanical stem locking (for Type 2371-01)

The regulator with mechanical set point adjustment can also be fitted with a manually operated stem locking.

In this case, the lever on top of the actuator housing must be actuated manually to open the valve and locked it in position.



Installation

The regulator has an angle-style valve body.

- Install the valve into the pipeline without any tension.

Observe the following points:

- The valve must be installed with actuator housing facing upwards and the inlet port in the horizontal position.
- The medium must flow through the valve in the direction indicated by the arrow on the valve body (inlet port at the side and outlet port at the bottom).



¹⁾ The following generally applies: The displacement pressure p_v must be 3 bar higher than the applied set point pressure p_c ($p_v \geq p_c + 3 \text{ bar}$).

²⁾ When a set point pressure below 3 bar exists, the piston must be brought back into its resting position by briefly raising the set point pressure p_c above 3 bar. Afterwards, the required set point can be adjusted as usual.

Ordering text

Excess Pressure Valve Type 2371-00/Type 2371-01

Type 2371-00 · Pneumatic set point adjustment
Set point range 0.3 to 6 bar (5 to 90 psi)

Type 2371-01 · Mechanical set point adjustment
Set point range 0.3 to 1.2 bar (5 to 18 psi)/1.0 to 3.0 bar (15 to 45 psi)/2.5 to 4.5 bar (35 to 65 psi)/4.0 to 6.0 bar (60 to 90 psi)

Nominal size DN (NPS) ...

Plug with metal sealing/soft sealing

Type of connections: Threaded connection acc. to .../clamp connection acc. to .../flange connection acc. to .../Welding ends acc. to ...

Stem locking: Pneumatic/mechanical

Table 1 · Technical data · All pressures specified as gauge pressures

Type 2371-... Excess Pressure Valve		DN					NPS					
Nominal size		15	20	25	32	40	50	½	¾	1	1½	2
K_{VS} in m ³ /h C_V in US gal/min		2.5	2.5	2.5	4	6.3	10	3	3	3	7.5	12
K_V or C_V for CIP stem locking ¹⁾		4	4	4	10	16	25	5	5	5	20	30
Set point ranges	Pneumatic SP adjustment	0.3 to 6 bar					5 to 90 psi					
	Mechanical SP adjustment	0.3 to 1.2 bar · 1 to 3 bar · 2.5 to 4.5 bar 4 to 6 bar					5 to 18 psi · 15 to 45 psi · 35 to 65 psi 60 to 90 psi					
Maximum pressure		10 bar					150 psi					
Max. perm. temperatures	Operating temp. range	-10 to +160 °C					14 °F to 320 °F					
	Sterilizing temperature	180 °C up to 30 minutes					356 °F up to 30 minutes					
Leakage rate, in relation to K_{VS} or C_V		Metal sealing: ≤0.05 % · Soft sealing: ≤0.02 %										
Peak-to-valley height and surface	External	Ra ≤ 1.6 µm, glass bead blasted ²⁾ · Ra ≤ 0.6 µm, polished										
	Internal	Ra ≤ 0.8 µm, smooth finish ²⁾ · Ra ≤ 0.6 µm, polished Ra ≤ 0.4 µm, satin finish · Ra ≤ 0.4 µm, mirror finish										

1) Pneumatic or mechanical · 2) Standard version

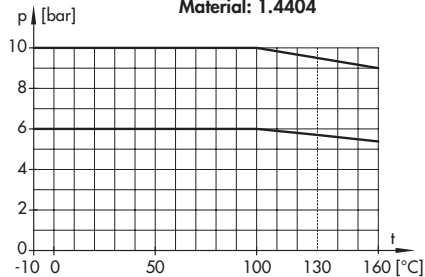
Table 2 · Materials · Material number acc. to DIN EN

Version	DIN	ANSI
Body	1.4404	316L
Plug	With metal sealing	1.4404
	Seat ring for soft sealing	PEEK
Diaphragm	EPDM and PTFE	
Cap	1.4404	316L
Springs	1.4310	301

Table 3 · Connections, max. operating pressure (inlet press.) and temperature ranges · See pressure-temperature diagram 1 2

Connections	Standard	Nominal size mm · inch	Pressure-temperature values	
			Max. inlet pressure	Medium temperature range
Welding ends	DIN 11850 Series 2	DN 15 to 50	10 bar	-10 to 100 °C 1
	DIN EN ISO 1127 (Series 1)	1.6 mm	DN 15, 20	10 bar
		2.0 mm	DN 25 to 40	
		2.6 mm	DN 50	
	BS 4825	NPS 1, 1½, 2	150 psi	14 to 212 °F 2
SMS 3008/ISO 2037	DN 25 to 50	10 bar	-10 to 100 °C 1	
Threaded connections	DIN 11887 Type A	DN 15 to 50	10 bar	-10 to 100 °C 1
	SMS 1146	DN 25 to 50	6 bar	-10 to 100 °C 1
	ISO 2853 (IDF)	NPS 1 to 2	150 psi	14 to 212 °F 2
Clamp connections	DIN 32676	DN 15 to 50	10 bar	-10 to 100 °C 1
	ISO 2852	DN 25 to 50	10 bar	-10 to 100 °C 1
	BS 4825	NPS 1, 1½, 2	150 psi	14 to 212 °F 2
Flanges with smooth raised face $R_a \leq 0.8 \mu\text{m}$	DIN EN 1092-1	PN 10	DN 15 to 50	10 bar
	Form B2	PN 6	DN 15 to 50	6 bar
	ASME B 16.5 Form RF (Cl 150)		NPS 1 to 2	150 psi

1 Pressure-temperature diagram for materials according to DIN EN · Temperature range extended
Material: 1.4404



2 Pressure-temperature diagram for ANSI materials
Temperature range extended
Material: 316L

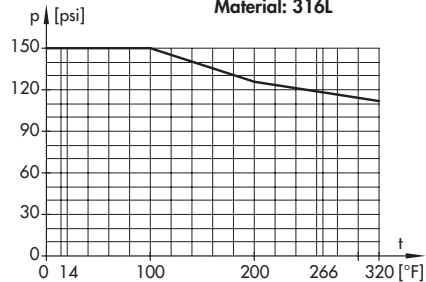


Fig. 6 · Pressure-temperature diagrams

Dimensions

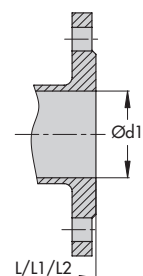
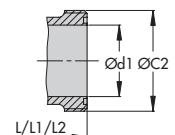
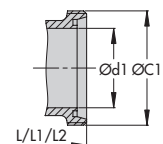
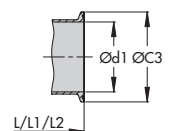
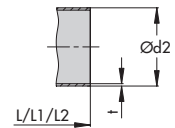
Dimensions in mm and weights in kg

Cp = Version with pneumatic set point adjustment · **Cr** = Version with mechanical set point adjustment

Valve		DN 15 NPS ½	DN 20 NPS ¾	DN 25 NPS1	DN 32 -	DN 40 NPS 1½	DN 50 NPS 2
Welding ends for pipes acc. to DIN 11850	L (Cp)/L1 (Cr)	70	70	70	105	105	105
	L2 (Cr)	90	90	90	105	105	105
	Ød2	19	23	29	35	41	53
	t	1.5	1.5	1.5	1.5	1.5	1.5
Welding ends for pipes acc. to DIN EN ISO 1127 (Series 1)	L (Cp)/L1 (Cr)	70	70	70	105	105	105
	L2 (Cr)	90	90	90	105	105	105
	Ø d2	21.3	26.9	33.7	42.4	48.3	60.3
	t	1.6	1.6	2	2	2	2.6
Welding ends for pipes acc. to BS 4825	L (Cp)/L1 (Cr)	-	-	70	-	105	105
	L2 (Cr)			90		105	105
	Ød2			25.4		38.1	50.8
	t			1.6		1.6	1.6
Welding ends for pipes acc. to SMS 3008/ISO 2037	L (Cp)/L1 (Cr)	-	-	70	105	105	105
	L2 (Cr)			90	105	105	105
	Ød2			25	33.7	38	51
	t			1.2	1.2	1.2	1.2
Clamp connections acc. to DIN 32676	L (Cp)/L1 (Cr)	60.3/60	60.3/60	60.3/60	88.9	88.9	88.9
	L2 (Cr)	90	90	90	88.9	88.9	88.9
	Ød1	16	20	26	32	38	50
	ØC3	34	34	50.5	50.5	50.5	64
Clamp connections acc. to BS 4825	L (Cp)/L1 (Cr)	-	-	60.3/60	-	88.9	88.9
	L2 (Cr)			90		88.9	88.9
	Ød1			22.2		34.9	47.6
	ØC3			50.5		50.5	64
Clamp connections acc. to ISO 2852	L (Cp)/L1 (Cr)	-	-	60.3/60	88.9	88.9	88.9
	L2 (Cr)			90	88.9	88.9	88.9
	Ød1			22.6	31.3	35.6	48.6
	ØC3			50.5	50.5	50.5	64
Threaded connections acc. to DIN 11887	L (Cp)/L1 (Cr)	64/60	64/60	64/60	100	100	100
	L2 (Cr)	90	90	90	100	100	100
	Ød1	16	20	26	32	38	50
	ØC1	34 x 1/8"	44 x 1/6"	52 x 1/6"	58 x 1/6"	65 x 1/6"	78 x 1/6"
Threaded connections acc. to SMS 1146	L (Cp)/L1 (Cr)	-	-	55/60	105	105	105
	L2 (Cr)			90	105	105	105
	Ød1			22.6	29.6 ¹⁾	35.6	48.6
	acc. to ISO 2853 (IDF)			ØC2	40 x 1/6"	48 x 1/6"	60 x 1/6"
37 x 1/8"		45.9 x 1/8"	50.6 x 1/8"	64.1 x 1/8"			
Flanges acc. to DIN EN 1092-1	L (Cp)/L1 (Cr)/L2 (Cr) ¹⁾	90	95	100	105	115	125
Common dimensions	A (Cp)	80	80	80	110	110	110
	A (Cr)	95	95	95	110	110	110
	H	65					
	H1 (Cp)	75	75	75	130	130	130
	H1 (Cr)	250	250	250	280	280	280
	H3	≥ 200					
	ØD	100					
Valve · Weight with welding ends	Cp	Approx. 3 kg			Approx. 11 kg		
	Cr	Approx. 6 kg					
Stem locking · Weight		Approx. 2.5 kg					

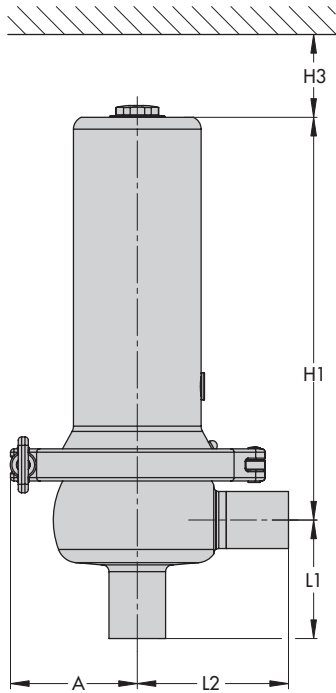
¹⁾ Inside Ø d1 depending on pipe standard · ²⁾ Acc. to ISO 2853 (IDF): 31.3 mm

Fig. 7 · Dimensions

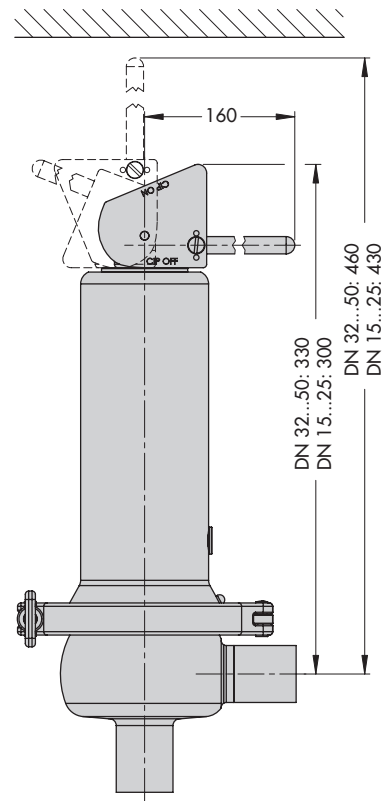


Dimensions

Type 2371-01 · Regulator with mechanical set point adjustment (Cr), without/with stem locking

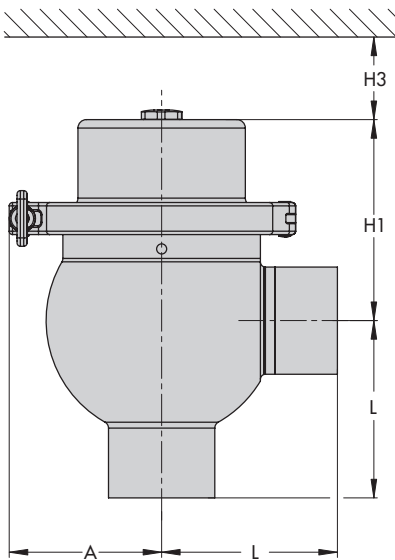


Without stem locking

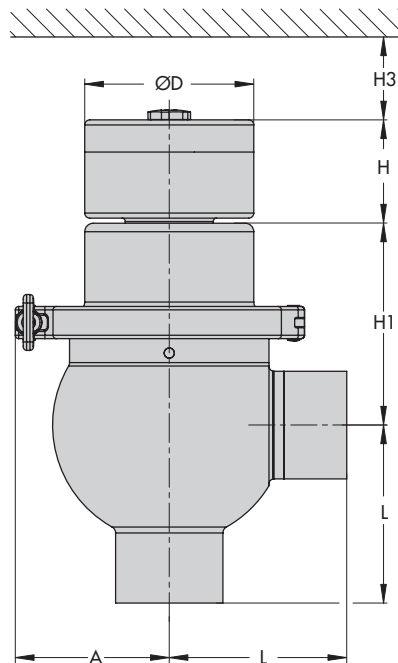


With mechanical stem locking

Typ 2371-00 · Regulator with pneumatic set point adjustment (Cp), without/with stem locking



Without stem locking



With pneumatic stem locking

The Type 2371-00/01 Regulators in the drawings have welding ends

Specifications subject to change without notice.



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