Self-operated Pressure Regulators
Type 2405 Pressure Reducing Valve

SAMSON

Application

Pressure reducing valve for set points from **5 mbar** to **10 bar**
Nominal size **DN 15** to **50** · Nominal pressure **PN 16** to **40**
Suitable for gases at temperatures from **–20** to **+60 °C** (**0** to **+150 °C**) [1)]

CE

This regulator is used to control the pressure of flammable gases used as a source of energy, e.g. in boilers, driers, vaporizers, heat exchangers or industrial ovens. Alternatively, it can control the compressed air supply in process engineering applications.

An additional application of the regulator is the pressure control of inert gas used for inerting or blanketing reaction or storage tanks to protect the product in the tank from oxidation, explosion or escaping. To achieve an economical consumption of the inert gas, its pressure must be controlled to always remain slightly higher than atmospheric pressure while the tank is being filled or emptied.

Special features

- Low-maintenance proportional regulators
- Compact regulator design providing excellent control accuracy
- Internal set point springs with set point adjustment using a nut on the actuator
- Spring-loaded, single-seated valve balanced by a balancing diaphragm
- External connection of a control line
- Meets strict emission requirements (TA Luft)
- Minimum leakage class IV
- Suitable for vacuum

Version

Valve DN 15 to 50 · Flanged connections · Soft-seated plug · Body made of cast iron EN-JL1040, spheroidal graphite iron EN-JS1049, cast steel 1.0619, forged steel 1.4571 or CrNiMo steel 1.4408

Special versions

- Version with FDA-compliant materials for food processing and pharmaceutical industries
- NACE version for sour gas applications
- Version with force limiter (for higher pressures across the operating diaphragm)

1) For unbalanced versions with FPM diaphragm or FPM soft seal

Fig. 1: *Type 2405 Pressure Reducing Valve*

- Actuator with seal and leakage line connection (also for vacuum)
- Version with connected control line. Pressure tapped directly at the valve body

Ordering text

Type 2405 Pressure Reducing Valve

Nominal size DN ..., set point range … mbar (bar), K_{VS} …, Body material …, optionally, special version ...
Materials: plug sealing ..., balancing diaphragm ..., operating diaphragm …

Principle of operation

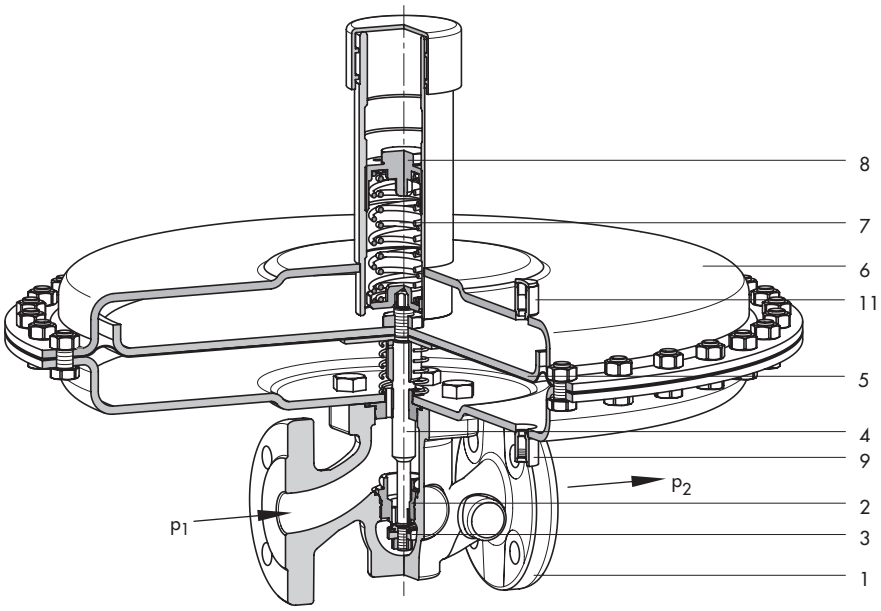
The medium flows through the valve in the direction indicated by the arrow. The position of the plug determines the flow rate across the area released between plug (3) and valve seat (2).

In the pressureless state (control line not connected and no pressure applied) the valve is opened by the force of the set point spring (7).

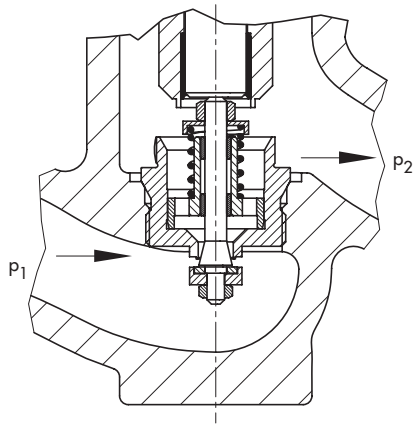
The downstream pressure p_2 to be controlled is tapped downstream of the valve and transmitted over the control line to the actuator where it is converted into a positioning force. This force is used to move the valve plug according to the force of the set point spring (7).

The spring force is adjustable at the set point adjuster (8). When the force resulting from the downstream pressure p_2 rises above the adjusted set point, the valve closes proportionally to the change in pressure.

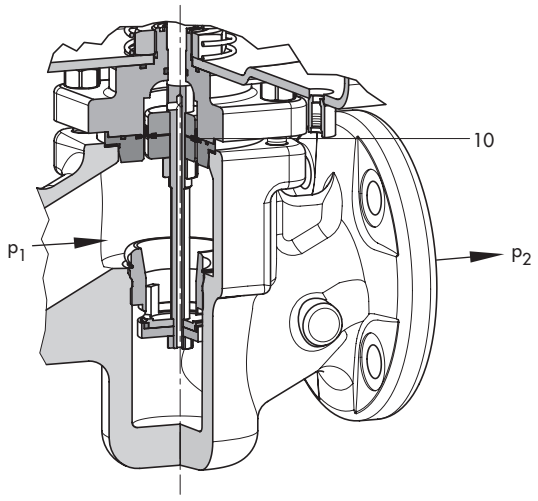
In the version with pressure balancing, the forces produced by the upstream and downstream pressures acting on the plug are eliminated by the balancing diaphragm (10). The plug is fully balanced.



Type 2405 **without** pressure balancing (K_{VS} 1.6 to 4) · Flow-to-open



Type 2405 **without** pressure balancing (K_{VS} 0.016 to 1)
Flow-to-close



Type 2405 **with** pressure balancing (K_{VS} 6.3 to 32)

1	Valve body	5	Operating diaphragm	9	Control line connection G ¼
2	Valve seat	6	Actuator housing	10	Balancing diaphragm
3	Plug	7	Set point spring	11	Leakage line connection (optional)
4	Plug stem	8	Set point adjuster		

Fig. 2: *Functional diagram of Type 2405 Pressure Reducing Valve*

Table 1: *Technical data*

Nominal size		**DN 15**	**DN 20**	**DN 25**	**DN 32 to 50**
Nominal pressure (valve)		PN 16 · PN 25 · PN 40			
K_{VS} coefficients		0.016 · 0.04 · 0.1 0.25 · 0.4 · 1 · 1.6 2.5 · 4	0.016 · 0.04 · 0.1 0.25 · 0.4 · 1 · 1.6 2.5 · 4 · 6.3	0.016 · 0.04 · 0.1 0.25 · 0.4 · 1 · 1.6 2.5 · 4 · 6.3 · 8	1.6 · 2.5 · 4 · 6.3 8 · 16 · 20 · 32
Max. permissible upstream pressure		10 bar · 12 bar [1]			
Max. permissible temperature range (medium temperature)		–20 to +60 °C (0 to +150 °C) [2]			
Leakage class according to IEC 60534-4		Soft-seated, minimum Class IV			
Set point ranges		5 to 15 mbar · 10 to 30 mbar · 25 to 60 mbar · 50 to 200 mbar · 0.1 to 0.6 bar · 0.2 to 1 bar · 0.8 to 2.5 bar · 2 to 5 bar · 4.5 to 10 bar			
Max. permissible pressure at operating diaphragm	1200 cm² · 5 to 15 mbar · 10 to 30 mbar	1 bar			
	640 cm² · 10 to 30 mbar · 25 to 60 mbar	4 bar (K_{VS} = 0.1 to 1) · 2 bar (K_{VS} = 1.6 to 32)			
	320 cm² · 25 to 60 mbar · 50 to 200 mbar	8 bar (K_{VS} = 0.1 to 1) · 4 bar (K_{VS} = 1.6 to 32)			
	320 cm² · 0.1 to 0.6 bar	1.5 bar · 10 bar [3]			
	160 cm² · 0.2 to 1 bar	2.5 bar · 16 bar [3]			
	80 cm² · 0.8 to 2.5 bar	5 bar · 16 bar [3]			
	40 cm² · 2 to 5 bar	10 bar · 16 bar [3]			
	40 cm² · 4.5 to 10 bar	10 bar · 16 bar [3]			
Pressure balancing	K_{VS} = 0.016 to 4	Without balancing diaphragm			
	K_{VS} = 6.3 to 32	With balancing diaphragm			
Pressure tapping		External [4]			
Control line connection		G ¼			

[1] Version with set points from 0.1 to 10 bar · [2] For unbalanced versions with FPM diaphgram or FPM soft seal · [3] Version with force limiter
[4] Special version for set point ranges 0.8 to 2.5 bar, 2 to 5 bar and 4.5 to 10 bar: pressure tapping directly at the valve body (see photo in section on special versions on page 1)

Table 2: *Materials*

Valve body	**EN-JL1040, EN-JS1049, 1.0619**	**1.4408, 1.4571**
Seat	1.4112 [1]	1.4404
Plug	1.4305 [1]	1.4404
Plug spring	1.4310 [2]	
Plug stem	1.4404	
Seal	EPDM · FPM · NBR	
Balancing diaphragm	EPDM · FPM · NBR	
Actuator housing	**1.0332**	**1.4301**
Operating diaphragm	EPDM · FPM · NBR	

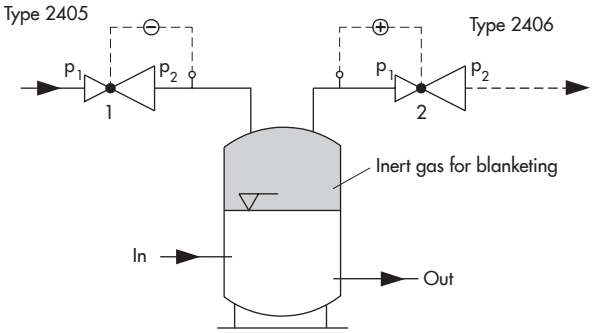
[1] Optionally 1.4404 · [2] Only with K_{VS} = 0.1 to 1

Installation

The regulator is preferably to be installed in horizontal pipelines

- Actuator housing on top, actuator facing upwards
- Direction of flow must match the direction indicated by the arrow on the body
- In applications in which the blanketing gas can liquefy, condensate may form in the control line, causing damage to the regulator. To allow condensate to run back into the tank, install the control line with an approximate 10 % slope to the pressure tapping point at the tank.
- Distance between the pressure tapping point and regulator min. 6 x DN

In exceptional cases, the regulator can also be installed in vertical pipelines with the direction of flow from the top (see ▶ EB 2520 EN for more details).

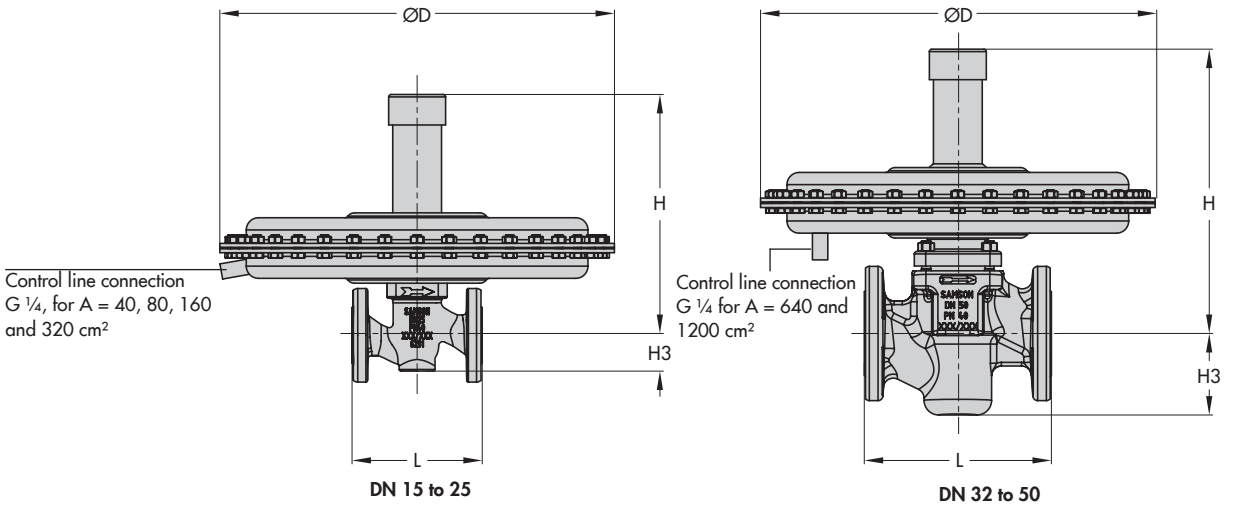


If the pressure p of the inert gas in the tank falls below the set point adjusted at the **Type 2405** Pressure Reducing Valve (1), it opens to allow more gas to enter the tank. The valve (1) closes again when the pressure p of the blanketing gas has been reestablished.

If the pressure is too high, the inert gas is vented off over the Type 2406 Excess Pressure Valve (2).

Fig. 3: *Typical application, Type 2405 used for tank blanketing*

Dimensions



The control line connection is turned by 90° in the drawing. The connection is normally located opposite the side with the arrow indicating the direction of flow.

Fig. 4: *Dimensions of Type 2405*

Table 3: *Dimensions in mm and weights in kg*

Nominal size			DN 15	DN 20	DN 25	DN 32	DN 40	DN 50
Set point range	Length L		130	150	160	180	200	230
	Height H3	Other materials	55			72		
		Forged steel	53	–	70	–	92	98
5 to 15 mbar	Height H		330			365		
	Actuator		ØD = 490, A = 1200 cm²					
10 to 30 mbar	Height H		325			365		
	Actuator		ØD = 380, A = 640 cm²			ØD = 490, A = 1200 cm²		
25 to 60 mbar	Height H		325			360		
	Actuator		ØD = 285, A = 320 cm²			ØD = 380, A = 640 cm²		
50 to 200 mbar	Height H		325			360		
	Actuator		ØD = 285, A = 320 cm²					
0.1 to 0.6 bar	Height H		325			360		
	Actuator		ØD = 285, A = 320 cm²					
0.2 to 1 bar	Height H		325			360		
	Actuator		ØD = 225, A = 160 cm²					
0.8 to 2.5 bar	Height H		320			355		
	Actuator		ØD = 170, A = 80 cm²					
2 to 5 bar	Height H		320			355		
	Actuator		ØD = 170, A = 40 cm²					
4.5 to 10 bar	Height H		420			455		
	Actuator		ØD = 170, A = 40 cm²					
5 to 15 mbar	**Weight** [1] in kg (approx.)		28			40		
10 to 30 mbar			18			40		
25 to 60 mbar			14			30		
50 to 200 mbar			14			26		
0.1 to 0.6 bar			14			26		
0.2 to 1 bar			10			22		
0.8 to 2.5 bar			8			20		
2 to 5 bar			8			20		
4.5 to 10 bar			9			21		

[1] Body made of cast steel 1.0619: +10 %

Specifications subject to change without notice

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