

Self-operated Pressure Regulators

Pressure Reducing Valve Type 2405



Application

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



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
- Fulfills stricter fugitive emission requirements (TA-Luft)
- Minimum leakage class IV
- Suitable for vacuum

Versions

Valve DN 15 to 50 · Flanged connections · Soft-sealed 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
- Version to comply with NACE (sour gas)
- Actuator with seal and leakage line connection (also for vacuum)
- 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

Ordering text

Pressure Reducing Valve Type 2405

Nominal size DN ..., set point range ... mbar (bar),
K_{V5} coefficient ...

Body material ..., optional special version

Materials:

Plug sealing ..., balancing diaphragm ...,
operating diaphragm ...

Principle of operation

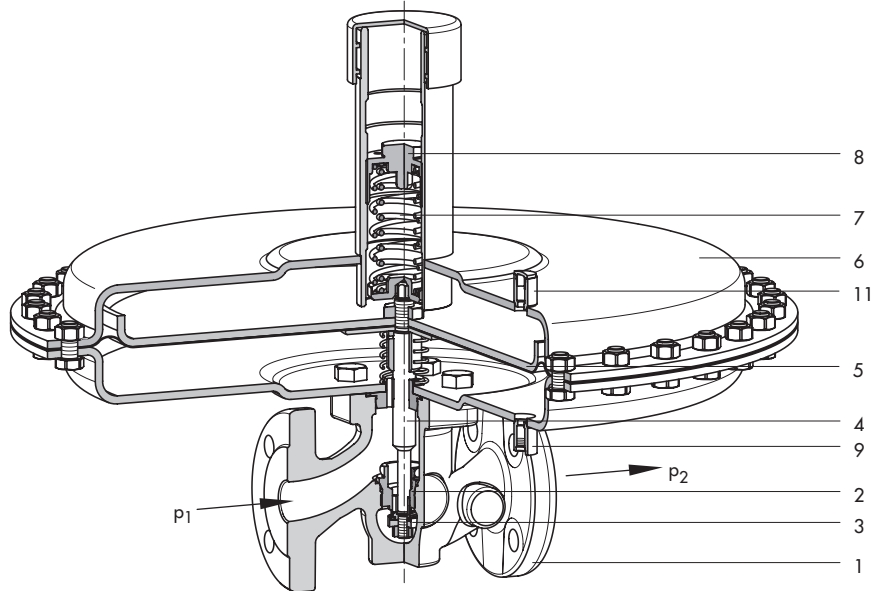
The medium flows through the valve as indicated by the arrow. The position of the valve plug and the area released between the plug (3) and seat (2) determine the flow rate.

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).

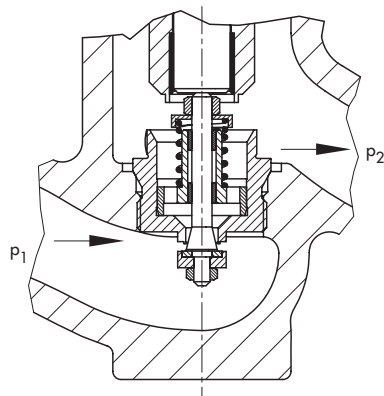
The downstream pressure p_2 to be controlled is tapped downstream of the valve and transmitted over the control line to the actuator where it is converted into a positioning force. This force is used to move the valve plug according to the force of the set point spring (7).

The spring force can be adjusted 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.

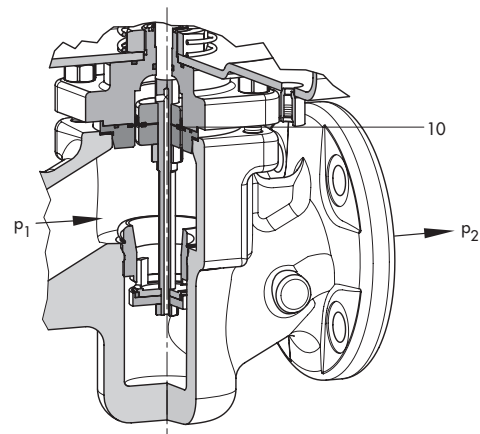
In the version with pressure balancing, the forces produced by the upstream and downstream pressures acting on the plug are eliminated by the balancing diaphragm (10). The plug is fully balanced.



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



Type 2405 **without** pressure balancing (K_{VS} 0.1 to 1)
Flow-to-close



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

- | | |
|-----------------------|------------------------------------------------|
| 1 Valve body | 7 Set point spring |
| 2 Valve seat | 8 Set point adjuster |
| 3 Plug | 9 Control line connection G 1/4 |
| 4 Plug stem | 10 Balancing diaphragm |
| 5 Operating diaphragm | 11 Vent plug |
| 6 Actuator housing | (only with actuator A = 1200 cm ²) |

Fig. 2 · Functional diagram of Type 2405 Pressure Reducing Valve

Table 1 · Technical data

Nominal size		DN 15 to 25	DN 32 to 50
Nominal pressure (body)		PN 16 · PN 25 · PN 40	
K _{VS} coefficients		0.1 · 0.25 · 0.4 1 · 1.6 · 2.5 · 4 · 6.3 · 8	6.3 · 8 · 16 · 20 · 32
Max. perm. upstream pressure		10 bar · 12 bar ¹⁾	
Max. perm. temperature range (medium temperature)		-20 to +60 °C (+150 °C) ²⁾	
Leakage class acc. to DIN EN 60534-4		Soft sealing, min. 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. perm. pressure across operating diaphragm	1200 cm ² · 5 to 15 mbar · 10 to 30 mbar	1 bar	
	640 cm ² · 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 cm ² · 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 cm ² · 0.1 to 0.6 bar	1.5 bar · 10 bar ³⁾	
	160 cm ² · 0.2 to 1 bar	2.5 bar · 16 bar ³⁾	
	80 cm ² · 0.8 to 2.5 bar	5 bar · 16 bar ³⁾	
	40 cm ² · 2 to 5 bar	10 bar · 16 bar ³⁾	
Pressure balancing	K _{VS} = 0.1 to 4	Without balancing diaphragm	
	K _{VS} = 6.3 to 32	With balancing diaphragm	
Pressure tapping		External control line · Optional internal pressure tapping ⁴⁾	
Control line connection		G ¼	

1) Version with set points from 0.1 to 5 bar

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

3) Version with force limiter

4) Only for set point ranges 0.8 to 2.5 bar, 2 to 5 bar and 4.5 to 10 bar

Table 2 · Materials

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

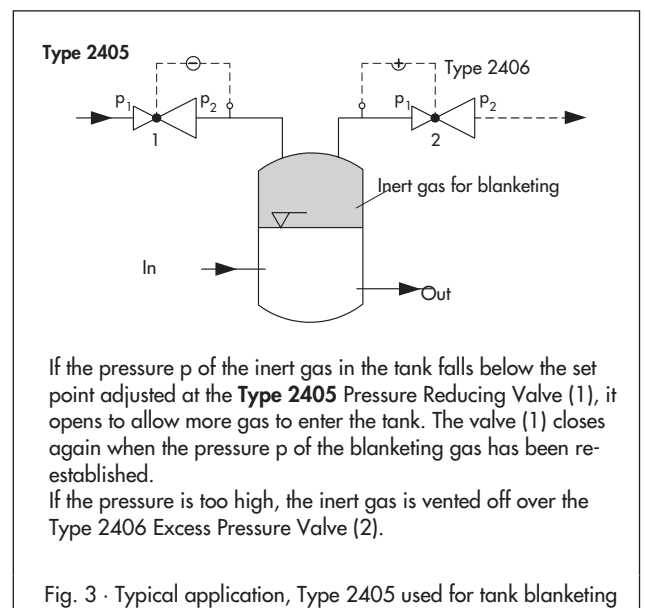
2) Only with K_{VS} 0.1 to 1

Installation

Preferably the regulator is to be installed in horizontal pipelines

- Actuator housing on top, facing upwards
- The direction of medium flow must correspond with the arrow on the valve 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.



Dimensions

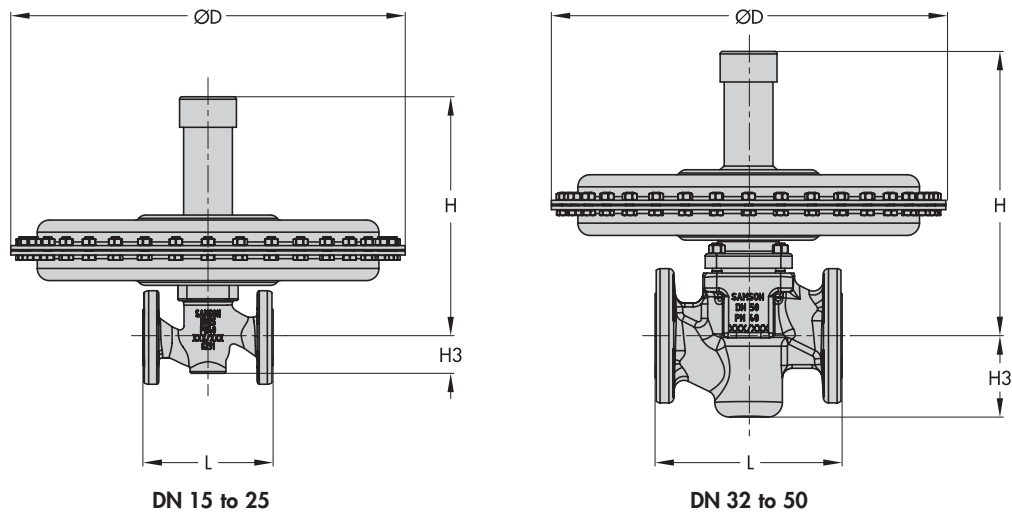


Table 3 · Dimensions in mm and weights in kg

Nominal size	DN	15	20	25	32	40	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	Ø D = 490, A = 1200 cm ²					
10 to 30 mbar	Height H	–			365		
	Actuator	–			Ø D = 490, A = 1200 cm ²		
10 to 30 mbar	Height H	325			–		
	Actuator	Ø D = 380, A = 640 cm ²			–		
25 to 60 mbar	Height H	–			360		
	Actuator	–			Ø D = 380, A = 640 cm ²		
25 to 60 mbar	Height H	325			–		
	Actuator	Ø D = 285, A = 320 cm ²			–		
50 to 200 mbar	Height H	325			360		
	Actuator	Ø D = 285, A = 320 cm ²					
0.1 to 0.6 bar	Height H	325			360		
	Actuator	Ø D = 285, A = 320 cm ²					
0.2 to 1 bar	Height H	325			360		
	Actuator	Ø D = 225, A = 160 cm ²					
0.8 to 2.5 bar	Height H	320			355		
	Actuator	Ø D = 170, A = 80 cm ²					
2 to 5 bar	Height H	320			355		
	Actuator	Ø D = 170, A = 40 cm ²					
4.5 to 10 bar	Height H	420			455		
	Actuator	Ø D = 170, A = 40 cm ²					
5 to 15 mbar	Weight ¹⁾ in kg, approx.	28			40		
10 to 30 mbar		18			30		
25 to 60 mbar		14			26		
50 to 200 mbar		10			22		
0.1 to 0.6 bar		8			20		
0.2 to 1 bar		8			20		
0.8 to 2.5 bar		9			21		
2 to 5 bar							
4.5 to 10 bar							

¹⁾ Body made of cast steel 1.0619: +10 %

Fig. 4 · Dimensions of Type 2405

Specifications subject to change without notice.



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