

Self-operated Pressure Regulators



Type 2406 Excess Pressure Valve

ANSI version

Application

Excess pressure valve for set points from **0.075 to 150 psi (5 mbar to 10 bar)** · Valves in **NPS ½ to 2¹⁾ (DN 15 to 50)**
Pressure rating **Class 125 to 300 (PN 16 to 40)** · Suitable for gases at temperatures from **-5 to +140 °F/32 to +300 °F (-20 to +60 °C/0 to +150 °C)²⁾**



The regulators are used to control the pressure of flammable gases used as a source of energy, e.g. in boilers, driers, vaporizers, heat exchangers or industrial furnaces. Alternatively, they can control the compressed air supply in process engineering applications.

An additional application of the regulators is the pressure control of inert gas used for 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 drained.

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 diaphragm
- External control line connection
- Fulfills strict fugitive emission requirements (TA-Luft)
- Minimum leakage class IV
- Suitable as vacuum breaker

Versions

Valves NPS ½ to 2 (DN 15 to 50) · Flanged connections
Soft-seated plug · Body made of cast iron A126B, cast steel A216 WCC or stainless cast steel A351 CF8M

Special versions

- Version with FDA-compliant materials for the food processing and pharmaceutical industries
- Version to comply with NACE (sour gas)
- Actuator with seal and leakage line connection (also as vacuum breaker)



Fig. 1 · Type 2406 Excess Pressure Valve

- Version with connected control line. Pressure tapped directly at the valve body



¹⁾ NPS ½ and NPS ¾ not in Class 125

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

Principle of operation

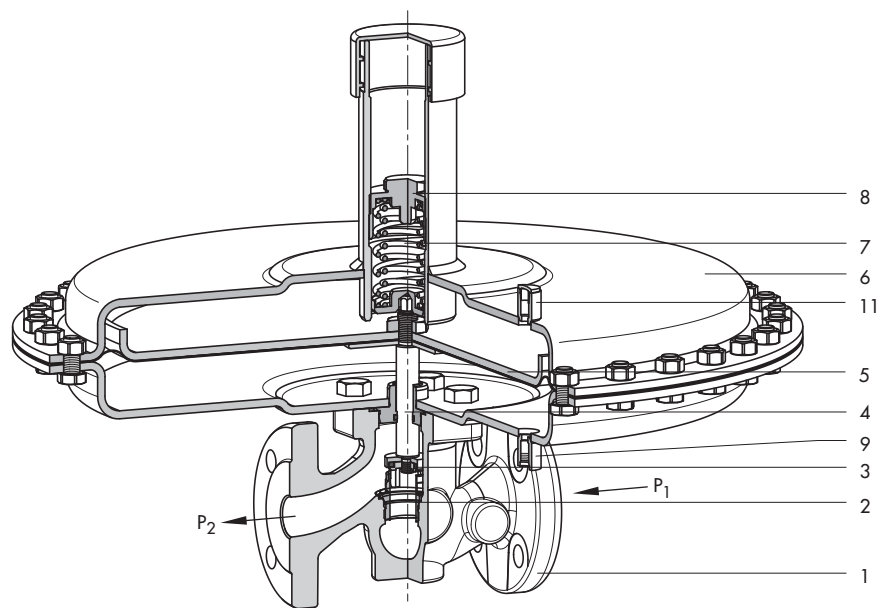
The medium flows through the valve as indicated by the arrow. The position of the valve plug (3) and the area released between plug and seat (2) determine the flow rate.

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

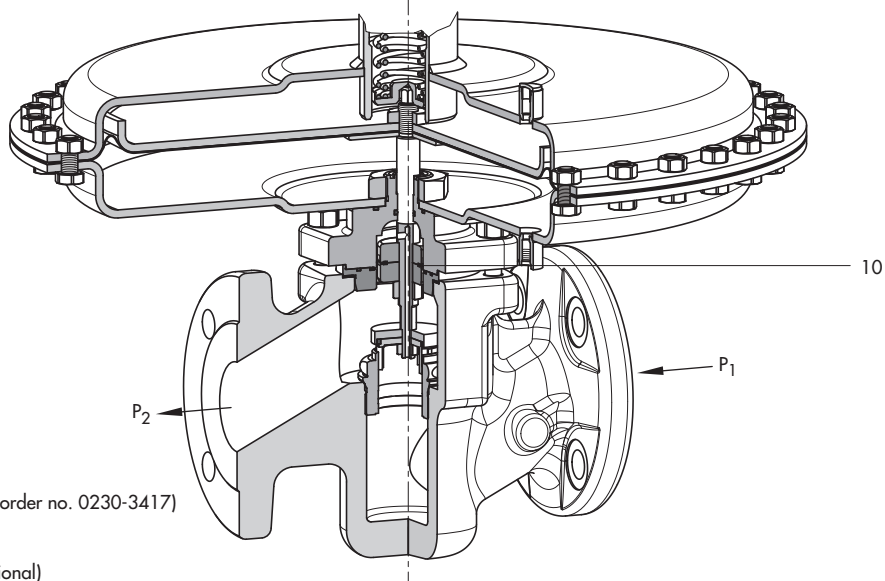
The upstream pressure p_1 to be controlled is tapped at the valve inlet, transmitted to the control line connection (9) on the actuator housing (6) through an external control line¹⁾ and converted into a positioning force. This force is used to move the plug depending on the force of the set point spring. The spring force can be adjusted on the set point adjuster (8). When the force resulting from the upstream pressure p_1 rises above the adjusted pressure set point, the valve is opened proportionally to the change in pressure.

In the version with pressure balancing, the forces depending on the upstream and downstream pressures are eliminated at the plug by the balancing diaphragm (10). As a result, the plug is fully balanced.

¹⁾ Optional internal pressure tapping



Type 2406 Excess Pressure Valve · **Without** pressure balancing



Type 2406 Excess Pressure Valve · **With** pressure balancing

- 1 Valve body
- 2 Valve seat
- 3 Valve plug
- 4 Plug stem
- 4.1 Plug stem with hole
- 5 Operating diaphragm
- 6 Actuator housing
- 7 Set point spring
- 8 Set point adjuster
- 9 Control line connection G ¼
(G ¼ to ¼-18 NPT adapter (order no. 0230-3417)
must be ordered separately)
- 10 Balancing diaphragm
- 11 Leakage line connection (optional)

Fig. 2 · Functional diagram of Type 2406

Table 1 · Technical data · All pressures as gauge pressures

| Valve size ¹⁾ | NPS ½ DN 15 | NPS ¾ DN 20 | NPS 1 DN 25 | NPS 1½ and 2 DN 40 and 50 |
|---|---|--|--|------------------------------|
| Pressure rating (body) | Class 125 · Class 150 · Class 300 PN 16 · PN 25 · PN 40 | | | |
| C _V coefficients | 0.12 · 0.3 0.5 · 1.2 · 2 · 3 · 5 | 0.12 · 0.3 0.5 · 1.2 · 2 · 3 5 · 7.5 | 0.12 · 0.3 0.5 · 1.2 · 2 · 3 5 · 7.5 · 9.4 | 7.5 · 9.4 · 20 23 · 37 |
| K _{VS} coefficients | 0.1 · 0.25 0.4 · 1 · 1.6 · 2.5 | 0.1 · 0.25 0.4 · 1 · 1.6 2.5 · 4 · 6.3 | 0.1 · 0.25 0.4 · 1 · 1.6 · 2.5 4 · 6.3 · 8 | 6.3 · 8 · 16 20 · 32 |
| Max. permissible temperature range ²⁾ (medium temperature) | -5 to +140 °F/32 to 300 °F · -20 to +60 °C/0 to +150 °C ²⁾ | | | |
| Leakage class according to ANSI/FCI 70-2 | Soft-seated plug, minimum class IV | | | |
| Set point ranges | 0.075 to 0.25 psi · 0.15 to 0.42 psi · 0.35 to 0.87 psi · 0.75 to 3 psi 1.5 to 8 psi · 3 to 15 psi · 10 to 35 psi · 30 to 75 psi · 65 to 150 psi 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 | | | |
| Pressure balancing | C _V = 0.12 to 5 · K _{VS} = 0.1 to 4 | | Without balancing diaphragm | |
| | C _V = 7.5 to 37 · K _{VS} = 6.3 to 32 | | With balancing diaphragm | |
| Pressure tapping over connected control line | External control line · Direct at the valve body (special version) | | | |
| Control line connection | G ¼ (with ¼ NPT adapter) | | | |
| Max. permissible pressure across the operating diaphragm | 186 in ² · 0.075 to 0.25 psi 1200 cm ² · 5 to 15 mbar | 30 psi 2 bar | | |
| | 186 or 100 in ² · 0.15 to 0.42 psi 1200 or 640 cm ² · 10 to 30 mbar | | | |
| | 100 in ² · 0.35 to 0.87 psi 640 cm ² · 25 to 60 mbar | | | |
| | 50 in ² · 0.75 to 3 psi 320 cm ² · 50 to 200 mbar | | | |
| | 50 in ² · 1.5 to 8 psi 320 cm ² · 0.1 to 0.6 bar | 75 psi 5 bar | | |
| | 25 in ² · 3 to 15 psi 160 cm ² · 0.2 to 1 bar | 150 psi 10 bar | | |
| | 12.5 in ² · 10 to 35 psi 80 cm ² · 0.8 to 2.5 bar | 240 psi 16 bar | | |
| | 6 in ² · 30 to 75 psi 40 cm ² · 2 to 5 bar | 240 psi 16 bar | | |
| | 6 in ² · 65 to 150 psi 40 cm ² · 4.5 to 10 bar | 240 psi 16 bar | | |

¹⁾ Larger valve sizes on request

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

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

| Body | A126B, A216 WCC | A351 CF8M |
|---------------------|----------------------|-----------|
| Seat | 1.4112 ¹⁾ | 316L |
| Plug | 1.4305 ¹⁾ | 316L |
| Plug stem | 316L | |
| Seal | EPDM · FPM · NBR | |
| Balancing diaphragm | EPDM · FPM · NBR | |
| Actuator housing | 1.0332 | 1.4301 |
| Operating diaphragm | EPDM · FPM · NBR | |

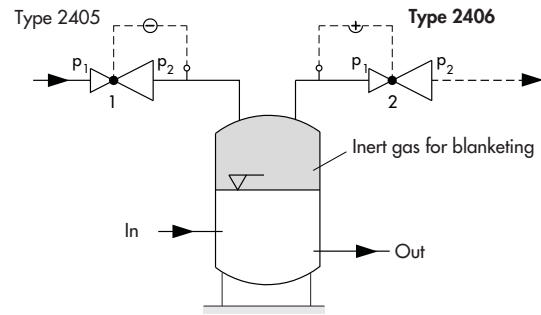
¹⁾ Optionally 316L (1.4404)

Installation

Preferably, the regulator is to be installed in horizontal pipelines.

- Actuator housing above the valve, facing up
- Direction of medium flow to correspond with the arrow on the valve body
- In applications with humid gas, condensate may form in the control line in which the gas flows, which may damage the regulator. To allow the condensate to run back into the tank, install the control line with an approximate 10 % slope to the pressure-tapping point at the tank.
- Minimum distance between pressure-tapping point and regulator $2 \times \text{NPS}$ ($2 \times \text{DN}$)

In special cases, the regulator can also be installed in vertical pipelines with direction of flow from the top (for further details refer to EB 2522 EN).



When the pressure p of the blanketing gas in the tank falls below the set point adjusted on the Type 2405 Pressure Reducing Valve (1), the valve opens to allow more gas to enter the tank. The valve (1) closes again when the pressure p of the blanketing gas increases.

If the pressure is too high, the blanketing gas is vented through the Type 2406 Excess Pressure Valve (2).

Fig. 3 · Sample application, Type 2406 used in tank blanketing

Dimensions

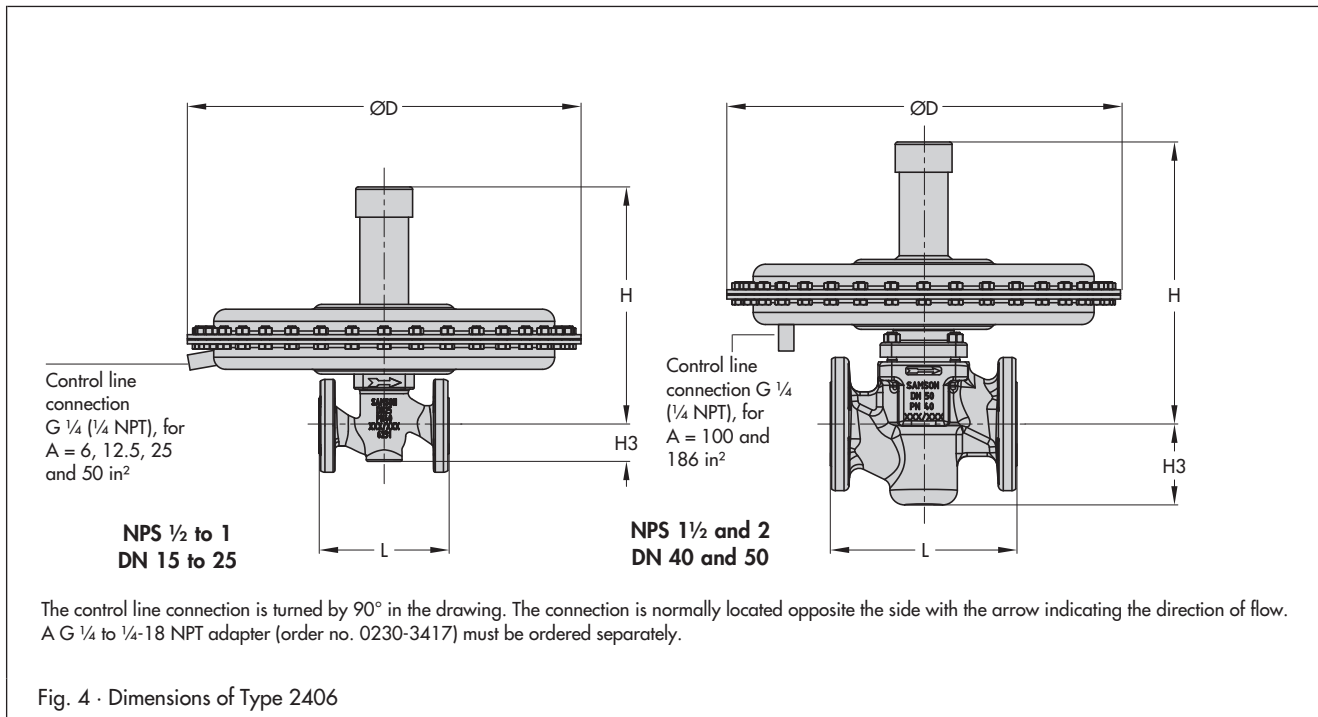


Table 3 · Dimensions and weights

| Valve size | | NPS ½ (DN 15) | NPS ¾ (DN 20) | NPS 1 (DN 25) | NPS 1½ (DN 40) | NPS 2 (DN 50) | |
|------------|-----------|---------------|---------------|---------------|----------------|---------------|------|
| Valve | Class 125 | inch | – | – | 7.3 | 8.8 | 10 |
| | | mm | – | – | 184 | 222 | 254 |
| | Class 150 | inch | 7.3 | 7.3 | 7.3 | 8.8 | 10 |
| | | mm | 184 | 184 | 184 | 222 | 254 |
| | Class 300 | inch | 7.5 | 7.6 | 7.8 | 9.3 | 10.5 |
| | | mm | 191 | 194 | 197 | 235 | 267 |
| | Height H3 | inch | | 2.2 | | | 2.8 |
| | | mm | | 55 | | | 72 |

| Valve with actuator · Dimensions and weights | | | | | |
|--|----------------------------------|---|---|----------------|-----------------|
| 0.075 to 0.25 psi · 5 to 15 mbar | Height H | 13" (330 mm) | | 14.4" (365 mm) | |
| | Actuator | ∅ D = 19.3" (490 mm), A = 186 in ² (1200 cm ²) | | | |
| 0.15 to 0.42 psi · 10 to 30 mbar | Height H | 12.8" (325 mm) | | 14.4" (365 mm) | |
| | Actuator | ∅ D = 15" (380 mm), A = 100 in ² (640 cm ²) | ∅ D = 19.3" (490 mm), A = 186 in ² (1200 cm ²) | | |
| 0.35 to 0.87 psi · 25 to 60 mbar | Height H | 12.8" (325 mm) | | | |
| | Actuator | ∅ D = 15" (380 mm), A = 100 in ² (640 cm ²) | | | |
| 0.75 to 3 psi · 50 to 200 mbar | Height H | 12.8" (325 mm) | | 14.2" (360 mm) | |
| | Actuator | ∅ D = 11.2" (285 mm), A = 50 in ² (320 cm ²) | | | |
| 1.5 to 8 psi · 0.1 to 0.6 bar | Height H | 12.8" (325 mm) | | 14.2" (360 mm) | |
| | Actuator | ∅ D = 11.2" (285 mm), A = 50 in ² (320 cm ²) | | | |
| 3 to 15 psi · 0.2 to 1 bar | Height H | 12.8" (325 mm) | | 14.2" (360 mm) | |
| | Actuator | ∅ D = 8.9" (225 mm), A = 25 in ² (160 cm ²) | | | |
| 10 to 35 psi · 0.8 to 2.5 bar | Height H | 12.6" (320 mm) | | 14" (355 mm) | |
| | Actuator | ∅ D = 6.7" (170 mm), A = 12 in ² (80 cm ²) | | | |
| 30 to 75 psi · 2 to 5 bar | Height H | 12.6" (320 mm) | | 14" (355 mm) | |
| | Actuator | ∅ D = 6.7" (170 mm), A = 6 in ² (40 cm ²) | | | |
| 65 to 150 psi · 4.5 to 10 bar | Height H | 16.5" (420 mm) | | 18.9" (480 mm) | |
| | Actuator | ∅ D = 6.7" (170 mm), A = 6 in ² (40 cm ²) | | | |
| Set point ranges | 0.075 to 0.25 psi · 5 to 15 mbar | Approx. weight ¹⁾ in lb and kg | 61.7 lb · 28 kg | | 88.2 lb · 40 kg |
| | 0.15 to 0.42 psi · 10 to 30 mbar | | 39.7 lb · 18 kg | | |
| | 0.35 to 0.87 psi · 25 to 60 mbar | | 30.9 lb · 14 kg | | 66.1 lb · 30 kg |
| | 0.75 to 3 psi · 50 to 200 mbar | | 22 lb · 10 kg | | 57.3 lb · 26 kg |
| | 1.5 to 8 psi · 0.1 to 0.6 bar | | 17.6 lb · 8 kg | | 48.5 lb · 22 kg |
| | 3 to 15 psi · 0.2 to 1 bar | | 17.6 lb · 8 kg | | 44.1 lb · 20 kg |
| | 10 to 35 psi · 0.8 to 2.5 bar | | 17.6 lb · 8 kg | | 44.1 lb · 20 kg |
| | 30 to 75 psi · 2 to 5 bar | | 19.8 lb · 9 kg | | 46.3 lb · 21 kg |
| | 65 to 150 psi · 4.5 to 10 bar | | | | |

¹⁾ Body of cast steel A216 WCC: +10 %

Ordering text

Type 2406 Excess Pressure Valve

Valve size NPS (DN) ..., set point range ... psi (bar),

C_V coefficient (K_{VS} coefficient) ...

Body material ...

Materials:

Plug seal ..., balancing diaphragm ..., operating diaphragm ...

Optionally, special version

Specifications subject to change without notice



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