

MOUNTING AND OPERATING INSTRUCTIONS



EB 2549 EN

Translation of original instructions



Type 2422/2425 Excess Pressure Valve
Self-operated Pressure Regulators

Edition January 2016



Note on these mounting and operating instructions

These mounting and operating instructions assist you in mounting and operating the device safely. The instructions are binding for handling SAMSON devices.

- For the safe and proper use of these instructions, read them carefully and keep them for later reference.
- If you have any questions about these instructions, contact SAMSON's After-sales Service Department (aftersaleservice@samson.de).



The mounting and operating instructions for the devices are included in the scope of delivery. The latest documentation is available on our website at www.samson.de > **Service & Support** > **Downloads** > **Documentation**.

Definition of signal words

DANGER

Hazardous situations which, if not avoided, will result in death or serious injury

WARNING

Hazardous situations which, if not avoided, could result in death or serious injury

NOTICE

Property damage message or malfunction

Note

Additional information

Tip

Recommended action

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1 General safety instructions

- The device must be mounted, started up or serviced by fully trained and qualified personnel only; the accepted industry codes and practices are to be observed. Make sure employees or third persons are not exposed to any danger.
- All safety instructions and warnings given in these mounting and operating instructions, particularly those concerning installation, start-up, and maintenance, must be strictly observed.
- According to these mounting and operating instructions, trained personnel refers to individuals who are able to judge the work they are assigned to and recognize possible dangers due to their specialized training, their knowledge and experience as well as their knowledge of the applicable standards.
- The devices comply with the requirements of the European Pressure Equipment Directive 2014/68/EU. Devices with a CE marking have a declaration of conformity, which includes information about the applied conformity assessment procedure. This declaration of conformity can be provided on request. This declaration of conformity can be provided on request.
- To ensure appropriate use, only use the device in applications where the operating pressure and temperatures do not exceed the specifications used for sizing the device at the ordering stage.
- The manufacturer does not assume any responsibility for damage caused by external forces or any other external factors.
- Any hazards that could be caused in the regulator by the process medium, operating pressure or by moving parts are to be prevented by taking appropriate precautions.
- Proper transport, storage, installation, operation, and maintenance are assumed.

i Note

Non-electric actuators and control valve versions do not have their own potential ignition source according to the ignition risk assessment stipulated in EN 13463-1: 2009, section 5.2, even in the rare incident of an operating fault. Therefore, they do not fall within the scope of Directive 94/9/EC.

For connection to the equipotential bonding system, observe the requirements specified in section 6.3 of EN 60079-14 (VDE 0165 Part 1).

2 Process medium and scope of application

Pressure regulator for liquids, gases and vapors up to 350 °C

For controlling the upstream pressure p_1 to the adjusted set point. The valve opens when the upstream pressure rises. The upstream pressure is transmitted to the actuator over a control line that must be installed on site.

The pressure regulators are not shut-off devices guaranteeing tight shut-off. When closed, these regulators can have a leakage rate of $\leq 0.05\%$ of the K_{VS} coefficient.

Overpressure protection must be installed in the plant.

⚠ WARNING

Risk of injury and property damage due to high pressure in the plant.

A suitable overpressure protection must be installed on site in the plant section.

2.1 Transportation and storage

The regulator must be carefully handled, transported and stored. Protect the excess pressure valve against adverse influences, such as dirt, moisture or frost, during storage and transportation.

When regulators are too heavy to be lifted by hand, fasten the lifting sling to a suitable place on the valve body.

⚠ WARNING

Incorrectly attached lifting slings or supports. Risk of injury and property damage due to valve falling.

Securely fasten slings or supports to the valve body and secure against slipping.

3 Design and principle of operation

See Fig. 1 and Fig. 2.

The Type 2422/2425 Excess Pressure Valve consists of the Type 2422 Valve and the Type 2425 Actuator. The Type 2422 Valve is available either balanced by a bellows or a diaphragm.

The excess pressure valve is used to maintain the pressure upstream of the valve to an adjusted set point. The valve opens when the upstream pressure rises.

The medium flows through the valve in the direction indicated by the arrow. The position of the plug (3) determines the flow rate across the area released between plug (3) and valve seat (2). The plug stem (4) with the plug is connected to the top diaphragm stem (8) of the actuator (10).

The upstream pressure p_1 is regulated by the positioning springs (11) and the set point adjuster (13). When relieved of pressure, the valve is closed by the force of the set point springs.

The upstream pressure p_1 to be controlled is tapped upstream of the valve and transmitted over the control line to the operating diaphragm (9) where it is converted into a positioning force. This force is used to move the valve plug according to the force of the positioning springs. 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 principle of operation of the Type 2422/2425 Excess Pressure Valve balanced by a bellows or diaphragm only differs concerning the pressure balancing. The valves balanced by a diaphragm have a balancing diaphragm (5.1) instead of a bellows (5). In both cases, the forces created by the upstream and downstream pressures that act on the valve plug are balanced out.

The valves can be supplied with flow divider ST 1 or ST 3. The valve seat must be replaced on retrofitting the flow divider.

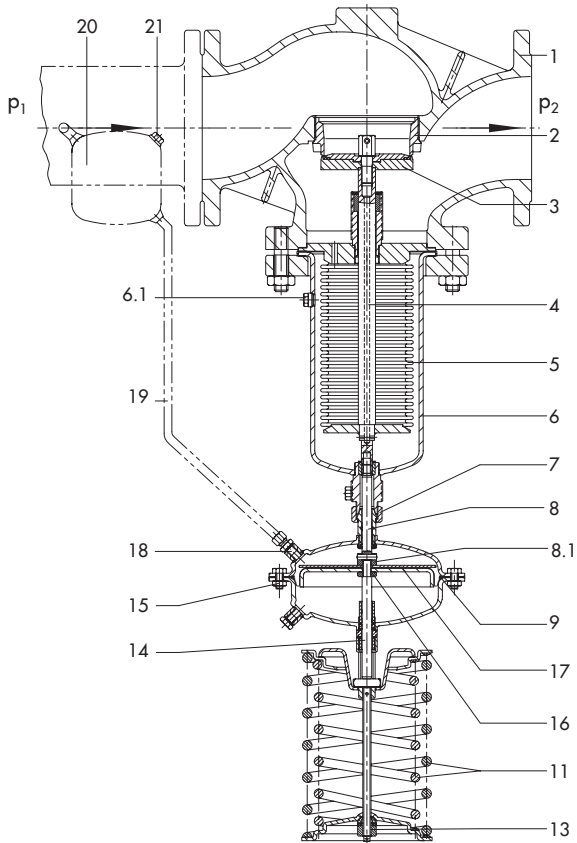
The control of **vapors** and **liquids above 150 °C** is only possible with a Type 2422 Valve balanced by a bellows. In this case, compensation chamber (20) is already installed in the control line¹⁾. The needle valve (18) in the control line is open and lead-sealed.

Before start-up, fill the compensation chamber with the process medium at the filling opening (21) until it overflows.

¹⁾ Only in combination with a control line kit. Otherwise, the compensation chamber must be ordered separately (► T 2595).

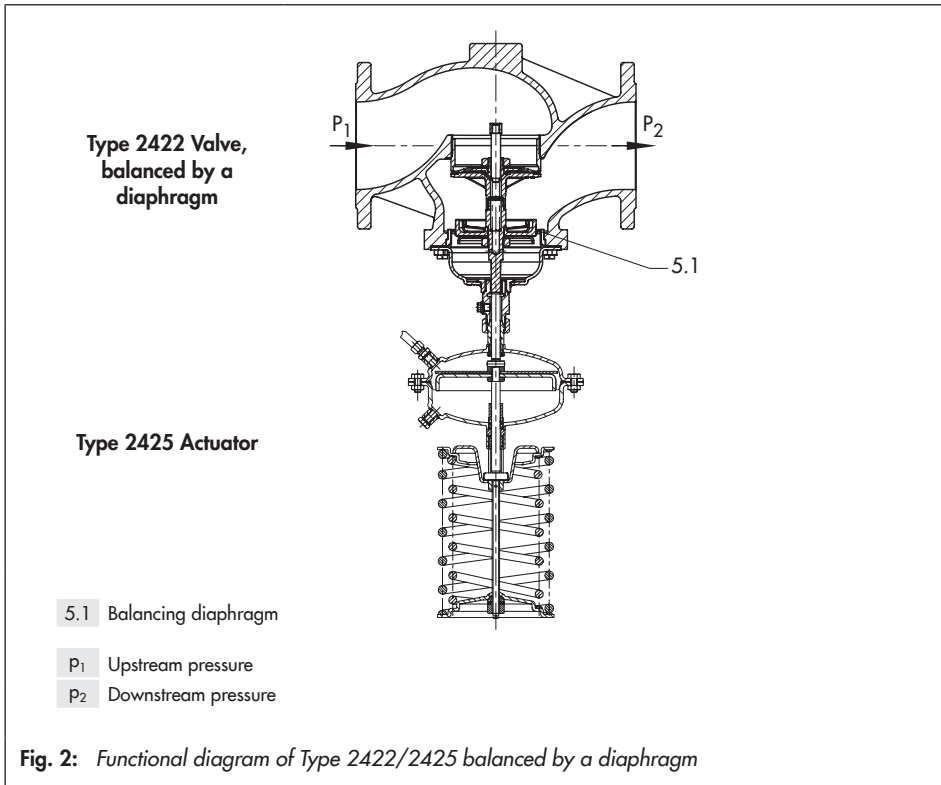
Type 2422 Valve,
balanced by a
bellows

Type 2425 Actuator



- | | | | | | |
|-----|------------------------------|-----|-----------------------|----------------|---|
| 1 | Type 2422 Valve | 8.1 | Nut | 18 | Control line connection (for steam including screw joint with restriction and needle valve) |
| 2 | Seat (exchangeable) | 9 | Operating diaphragm | 19 | Control line |
| 3 | Plug | 10 | Type 2425 Actuator | 20 | Compensation chamber (for temperatures above 150 °C and for steam) |
| 4 | Plug stem | 11 | Positioning springs | 21 | Filler plug |
| 4.1 | Actuator stem | 13 | Set point adjuster | P ₁ | Upstream pressure |
| 5 | Balancing bellows | 14 | Bottom diaphragm stem | P ₂ | Downstream pressure |
| 6 | Bellows housing | 15 | Nuts and bolts | | |
| 6.1 | Vent screw (bellows housing) | 16 | Nut | | |
| 7 | Coupling nut | 17 | Diaphragm plate | | |
| 8 | Top diaphragm stem | | | | |

Fig. 1: Functional diagram of Type 2422/2425 balanced by a bellows



4 Installation

See Fig. 1 and Fig. 2.

4.1 Assembly

Valve and actuator can be assembled before or after the valve has been installed in the pipeline.

→ Relieve the positioning springs of tension by turning the set point adjuster (13).

→ Place the actuator on the bellows housing and carefully screw it in as far as it will go. Make sure the control line connection points toward the upstream pressure side.

→ Hold the actuator and fasten it to the bellows housing using the coupling nut (7).

4.2 Mounting position

Select the installation location making sure that the regulator is installed at a distance of at least six times the nominal size (DN) away from pipe fittings or instruments that cause flow turbulence (e.g. pipe bends, manifolds, pressure measuring points or other valves). They can change the flow conditions which may lead to an instable control process especially in applications with gases, air or steam.

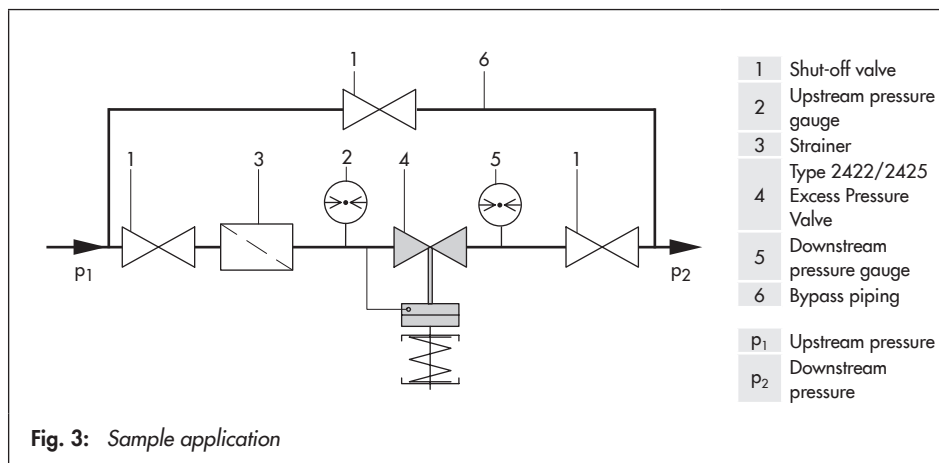
Contact SAMSON to obtain the TV-SK 17041 documentation which contains more details on installation requirements.

- The direction of flow must match the direction indicated by the arrow on the body.
- Install the regulator free of stress. If necessary, support the pipeline near to the connecting flanges. Do not attach supports directly to the valve or actuator.
- Install a strainer upstream of the regulator.
- Protect the regulator from icing up when controlling media that can freeze. If necessary, depressurize and drain the regulator and remove it from the pipeline while the plant is shut down.

4.3 Notes on installation

Install the excess pressure valve in horizontal pipelines.

- Flush the pipeline thoroughly before installing the regulator to ensure that no impurities impair the proper functioning of the valve, above all the tight shut-off.



Installation

Mounting position

Valve balanced by a bellows/diaphragm

- Actuator facing downward



Pressure testing of the plant · The pressure must not exceed the maximum permissible pressure of the regulator and plant on testing the pressure of the plant when the regulator is already installed. An excessive test pressure can damage the operating diaphragm in the actuator.

NOTICE

Uncontrolled excess pressure in the plant may damage the operating diaphragm. The maximum permissible pressure at the actuator must not exceed the pressure specified in Table 1.

Table 1: Max. perm. pressure at actuator

Actuator area	Max. perm. pressure
640 cm ²	1.5 bar
320 cm ²	3 bar

To prevent damage to the diaphragm, take one of following precautions:

- Remove the regulator from the pipeline or isolate the regulator in the pipeline and install a bypass (see Fig. 3) or
- Detach the control line and seal the openings with end plugs or
- Install a shut-off valve in the control line.

4.4 Control line, compensation chamber and needle valve

Control line · A control line must be provided at the site of installation, e.g. a 3/8" pipe for steam or an Ø8 x 1 or Ø6 x 1 mm copper pipe for air/water.

Connect the control line to the upstream line (p_1) at least one meter away from the valve inlet. If a manifold is located upstream of the excess pressure valve, connect the valve to the manifold, even if it is several meters away. If the upstream line is extended by a conical expansion piece, connect the control line in the expanded section of the line. Weld the control line at the side in the middle of the pipe, inclining at a ratio of approximately 1:10 up to the compensation chamber.

Weld the line coming from the pressure tapping point to the 3/8" pipe socket on the chamber. Install the compensation chamber at the highest point of the pipeline. Consequently, the control line between compensation chamber and actuator must also be installed with a downward slope. In this case, use a 3/8" pipe with screw fittings.

If the control line connection is located below the middle of the valve inlet flange, arrange the compensation chamber at the same level as the inlet flange. In this case, use a pipe which is at least 1/2" in size for the control line from the tapping point to the compensation chamber.

If the control line is connected above the middle of the valve inlet flange, install the compensation chamber at the same level as the upstream pressure tapping point. The additional pressure of the condensate head must be compensated for by adjusting the set point to a higher value.

Control line kit · A control line kit for tapping pressure directly at the valve body is available as an accessories part from SAMSON (for set points ≥ 0.8 bar). See ► T 2595.

Compensation chamber · A compensation chamber is required for liquids **above 150 °C** as well as for **steam**. The mounting position of the compensation chamber is indicated by an adhesive label on the chamber itself as well as by an arrow and the word "top" stamped on the top of the chamber.

This mounting position must be adhered to; otherwise the safe functioning of the excess pressure valve cannot be guaranteed.

Needle valve · If the regulator tends to hunt, install a needle valve at the control line connection (18) in addition to the standard SAMSON screw joint with restriction.

4.5 Strainers

Install the strainer upstream of the excess pressure valve (see Fig. 3).

- Do not use the strainer to permanently filter the process medium.
- The direction of flow must correspond to the arrow on the body.
- The filter element must be installed to hang downwards or sideways for applications with steam.



Tip

Remember to leave enough space to remove the filter element.

4.6 Shut-off valve

Install a hand-operated shut-off valve both upstream of the strainer and downstream of the regulator. This allows the plant to be shut down for cleaning and maintenance and when the plant is not used for longer periods of time (see Fig. 3).

4.7 Pressure gauge

Install a pressure gauge both upstream and downstream of the regulator to monitor the pressures prevailing in the plant (see Fig. 3).

Install the pressure gauge on the upstream side in front of the pressure tapping point.

5 Operation

See Fig. 1 and Fig. 2.

5.1 Start-up

Do not start up the regulator until all parts have been mounted. Make sure the control line is open and correctly connected.

Fill the plant **slowly** with the process medium. Avoid pressure surges. Open the shut-off valves first on the upstream pressure side. Afterwards, open all the valves on the consumer side (downstream of the regulator).

Regulation of steam

Observe the following points for applications with steam:

- Before start-up, all pipes conveying the process medium must be completely drained and dry (to prevent steam hammering).
- Before start-up, fill the compensation chamber with water at the filling opening (21) until it overflows. Screw the plug back in.
- Slowly start up the plant and allow time for the pipes and valves to heat up.

Air and condensate must be allowed to escape from the plant. Install steam trap or air vent for steam-operated systems at a suitable location.

Regulation of liquids

To start up the excess pressure valve, open shut-off valves slowly. To vent the bellows space, unscrew the vent screw (6.1). After

the air has escaped from the bellows space, retighten the vent screw (6.1).

For temperatures above 150 °C, first fill the compensation chamber with the process medium.

5.2 Adjusting the set point

Adjust the required upstream pressure by turning the set point adjuster (13).

Turn clockwise ↻

- The upstream pressure is increased (higher pressure set point)

Turn counterclockwise ↻

- The upstream pressure is reduced (lower pressure set point)

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.



Tip

Monitor the adjusted set point pressure at the pressure gauge on the upstream pressure side.

Changing the set point range

The set point range is determined by the size of the actuator and its positioning springs. The set point range can only be changed by exchanging the entire actuator assembly. Therefore, we recommend contacting us if you want to change the set point range.

5.3 Decommissioning

Close first the shut-off valve on the upstream side of the valve and then on the downstream side of the valve.

6 Maintenance and troubleshooting

If the upstream pressure deviates considerably from the set point, check the control line for blockage and check the diaphragm for leakage.

In case of other causes, such as a damaged seat or plug, we recommend contacting SAMSON's After-sales Service (see section 8).

If the diaphragm is damaged, proceed as described in section 2.1.

▲ WARNING

Risk of scalding due to hot process medium escaping uncontrolled.

Allow the regulator to cool down before depressurizing and draining it and remove it from the pipeline.

6.1 Replacing the operating diaphragm

See Fig. 1 and Fig. 2.

Shut down the plant by slowly closing the shut-off valves. Depressurize the relevant

section of the pipeline and, if necessary, drain it as well.

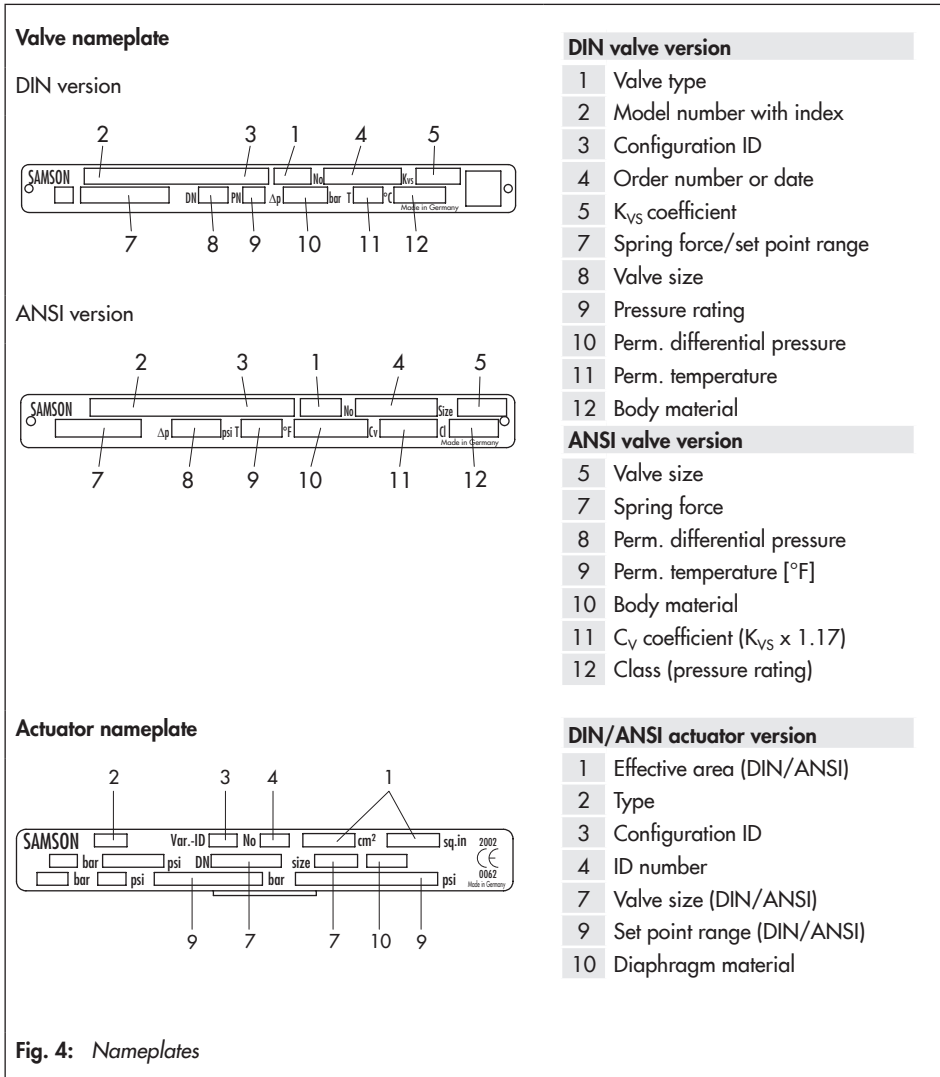
The actuator can be removed from the valve without having to remove the valve from the pipeline. However, in this case, do not forget that the actuator cone seals off the bellows housing. Consequently, the process medium will drain out of the valve on removing the actuator.

1. Relieve the spring assembly of tension by turning the set point adjuster (13) counterclockwise.
2. Unscrew the control line and clean it.
3. Undo the coupling nut (7) and remove the actuator.
4. Unscrew the set point adjuster (13). Remove bearing, bushing, spring(s) and spring plate.
5. Remove nuts and bolts (15). Lift the top cover plate off the actuator stem.
6. Pull the diaphragm stems together with the diaphragm plates and the diaphragm out of the lower diaphragm case.
7. Hold the bottom nut (16) stationary using a socket wrench and unscrew the top diaphragm stem by loosening the nut (8.1) (the nut is sealed with paint!).
8. Take off the top diaphragm plate (17). Replace the operating diaphragm (9) with a new one.

Proceed in the reverse order to reassemble the regulator. For start-up, proceed as described in section 5.1.

7 Nameplate

Nameplates are attached to the valve and the actuator.



8 After-sales service

If malfunctions or defects occur, contact the SAMSON's After-sales Service department for support.

The addresses of SAMSON AG, its subsidiaries, representatives and service facilities worldwide can be found on our website (www.samsongroup.net), in all SAMSON product catalogs or on the back of these Mounting and Operating Instructions.

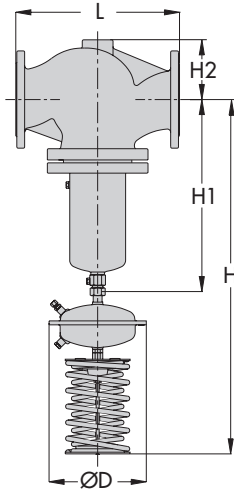
Please send your inquiries to: service@samsongroup.com

To assist diagnosis, specify the following details (see section 7):

- Type and nominal size of the valve
- Model number and configuration ID
- Order number or date
- Upstream and downstream pressure
- Temperature and process medium
- Min. and max. flow rate in m³/h
- Is a strainer installed?
- Installation drawing showing the exact location of the regulator and all the additionally installed components (shut-off valves, pressure gauge etc.)

9 Dimensions

Type 2422/2425 · Balanced by a bellows

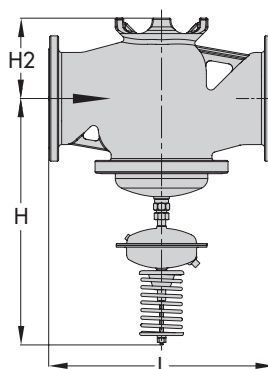


Dimensions in mm and weights in kg · The values in parentheses apply to temperatures from 220 to 350 °C

Valve size		DN 125	DN 150	DN 200	DN 250	
Length L		400	480	600	730	
Height H1		460 (600)	590 (730)	730 (870)		
Height H2		145	175	235	260	
Set point ranges in bar	0.05 to 0.25	Height H	990 (1130)	1120 (1260)	1260 (1400)	
		Actuator	ØD = 380, A = 640 cm ²			
	0.1 to 0.6	Height H	990 (1130)	1120 (1260)	1260 (1400)	
		Actuator	ØD = 380, A = 640 cm ²			
	0.2 to 1.0	Height H	990 (1130)	1120 (1260)	1260 (1400)	
		Actuator	ØD = 380, A = 640 cm ²			
	0.5 to 1.5	Height H	940 (1050)	1040 (1180)	1210 (1350)	
		Actuator	ØD = 285, A = 320 cm ²			
	1 to 2.5	Height H	940 (1080)	1070 (1210)	1210 (1350)	
		Actuator	ØD = 285, A = 320 cm ²			
Weight ¹⁾ based on cast iron, PN 16, approx. kg						
0.05 to 1.0		135	116	286	296	
0.5 to 1.5/1 to 2.5		125	110	280	290	

¹⁾ +10 % for cast steel, spheroidal graphite iron and forged steel

Fig. 5: Dimensions · Type 2422/2425 · **Balanced by a bellows**

Type 2422/2425 · **Balanced by a diaphragm**

Dimensions in mm and weights in kg

Valve size	DN 125	DN 150	DN 200	DN 250
Length L	400	480	600	730
Height H	720	745	960	960
Height H2	145	175	260	260
Weight (actuator with valve), approx. kg				
0.05 to 1 bar	80	94	239	249
0.5 to 2.5 bar	75	88	233	243

Fig. 6: Dimensions · Type 2422/2425 · **Balanced by a diaphragm**

10 Technical data

Table 2: *Technical data of Type 2422 Valve and Type 2425 Actuator*

Type 2422 Valve					
Valve size		DN 125	DN 150	DN 200	DN 250
Pressure rating		PN 16, 25 or 40			
Max. permissible temperature	Balanced by a bellows	Metal seal: max. 350 °C · PTFE soft seal: max. 220 °C EPDM or FKM soft seal: max. 150 °C NBR soft seal: max. 80 °C ¹⁾			
	Balanced by a diaphragm	150 °C			
Leakage class according to IEC 60534-4		≤0.05 % of K _{VS} coefficient			
Type 2425 Actuator					
Set point ranges		0.05 to 0.25 bar · 0.1 to 0.6 bar · 0.2 to 1 bar 0.5 to 1.5 bar · 1 to 2.5 bar ²⁾			
Max. permissible pressure at actuator	Effective diaphragm area	320 cm ²		640 cm ²	
	Pressure	3 bar		1.5 bar	
Max. permissible temperature		Gases 80 °C at the actuator ¹⁾ · Liquids 150 °C, with compensation chamber max. 350 °C · Steam with compensation chamber max. 350 °C			

¹⁾ For oxygen max. 60 °C

²⁾ Set point ranges above 2.5 bar ► T 2552 (Type 2335 Excess Pressure Valve)

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