

# Self-operated Pressure Regulators

## Pressure Reducing Valve Type 2422/2424



### Application

Pressure regulators for set points from **0.05 bar** to **2.5 bar** · Valves in **DN 125** to **250** · Nominal pressures **PN 16** to **40** · Suitable for liquids, gases and vapors up to **350 °C**

The valve **closes** when the downstream pressure **rises**.



The pressure reducing valves consisting of a valve and an actuator control the downstream pressure to an adjustable set point. The medium pressure to be kept constant is transmitted through a control line to the diaphragm of the actuator.

### Special features

- Low-maintenance proportional regulators requiring no auxiliary energy
- Wide set point range and easy set point adjustment using a nut
- Exchangeable actuator and positioning springs
- Spring-loaded, single-seated valve with upstream and downstream pressures balanced by a stainless steel bellows or by a balancing diaphragm
- Low-noise standard plug · Special version with a flow divider St I or St III for further noise level reduction (see Data Sheet T 8081 EN)
- Reduced  $K_{VS}$  coefficients for adaption to the operating conditions

### Versions

**Type 2422/2424 Pressure Reducing Valve** in sizes DN 125 to 250 consisting of:

Type 2422 Valve with soft-seated plug, balanced by a bellows or a diaphragm · Body of cast iron, spheroidal graphite iron, cast steel or cast stainless steel · Type 2424 Actuator with EPDM rolling diaphragm and screw fitting · Set point adjustable

### Special versions

- Valve with flow divider St I or St III for particularly low-noise operation
- With metal-seated plug
- FPM rolling diaphragm for oils
- Version completely in stainless steel for nominal pressure PN 16 to 40 · Details on request
- Versions for oxygen service
- Actuator with two diaphragms

<sup>1)</sup> Valves above DN 250 on request

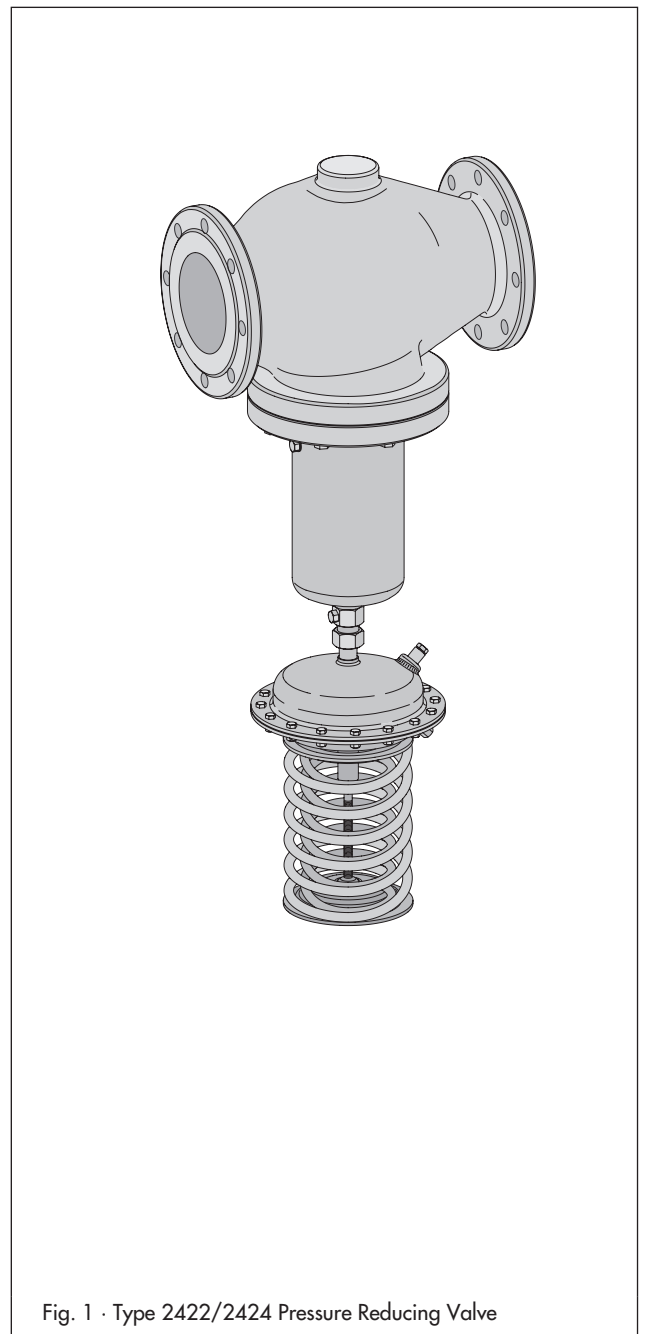


Fig. 1 · Type 2422/2424 Pressure Reducing Valve

**Principle of operation** (see Fig. 2)

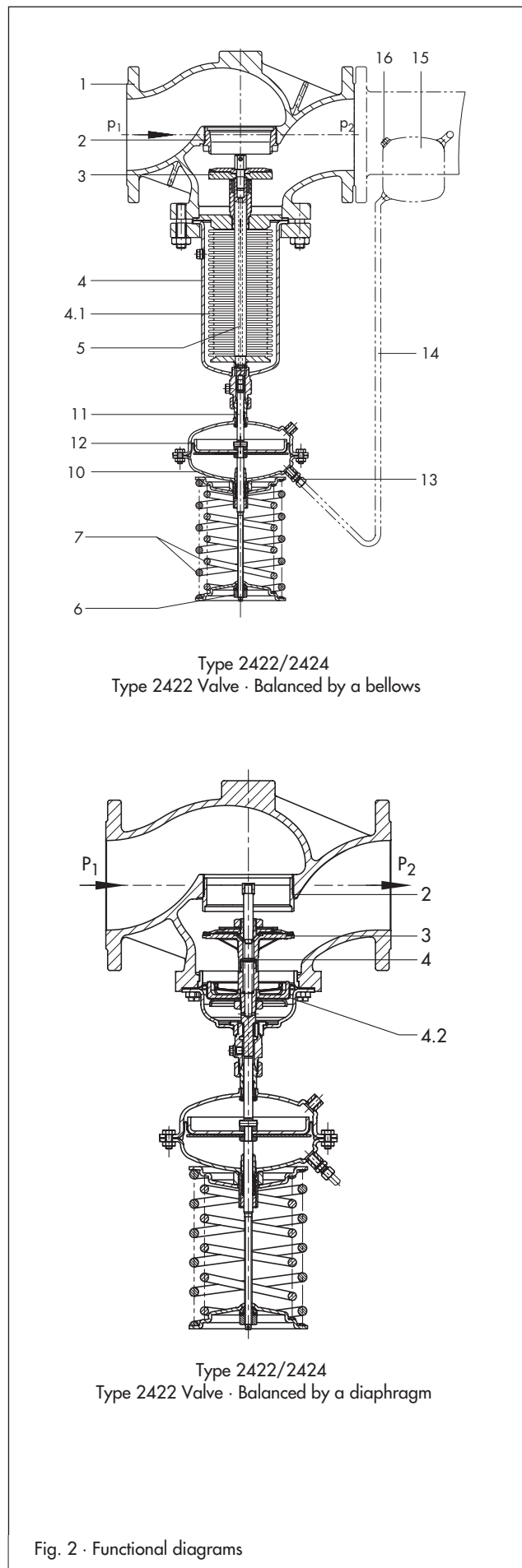
The medium flows through the valve as indicated by the arrow. The position of the valve plug (3) and the area released between the plug and seat (2) determine the flow rate. The plug stem (5) with the plug is connected to the stem (11) of the actuator (10).

To control the pressure, the downstream pressure  $p_2$  to be controlled is adjusted using the positioning springs (7) and the set point adjuster (6). The valve is opened by the force of the positioning springs when it is relieved of pressure ( $p_1 = p_2$ ).

The downstream pressure  $p_2$  to be controlled is tapped downstream of the valve and transmitted through the control line to the operating diaphragm (12) where it is converted into a positioning force. This force is used to move the valve plug (3) according to the force of the positioning springs (7), which is adjustable at the set point adjuster (6). 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.

The principle of operation of the regulator with a valve balanced by a bellows or by a diaphragm only differ concerning their pressure balancing. The valves balanced by a diaphragm have a balancing diaphragm (4.2) instead of a balancing bellows (4.1). In both cases, the forces created by the upstream and downstream pressures acting on the valve plug are equally balanced out.

The valves can be equipped with a flow divider St I or St III. When retrofitting the valve with a flow divider, the seat must be exchanged.



- 1 Valve body
- 2 Seat (exchangeable)
- 3 Plug
- 4 Bellows housing
- 4.1 Balancing bellows
- 4.2 Balancing diaphragm
- 5 Plug stem
- 6 Set point adjuster
- 7 Positioning springs
- 10 Actuator
- 11 Actuator stem
- 12 Operating diaphragm
- 13 Control line connection G 3/8  
(screw joint with restriction)
- 14 Control line (attached on site)
- 15 Condensation chamber
- 16 Filler plug

Upstream pressure  $p_1$   
Downstream pressure  $p_2$

Fig. 2 · Functional diagrams

## Installation

- Install the valve with the actuator suspended downwards.
- Install pipelines horizontally with a slight downward slope on both sides of the valve for drainage of the condensate.
- The direction of medium flow must correspond with the arrow on the valve body.
- Connect a control line to the actuator from the point of pressure tapping in the pipeline located approximately one meter downstream of the valve or at the point of measurement of the connected plant (with condensation chamber, if necessary).

## Pressure-temperature diagram (acc. to DIN EN 12516-1)

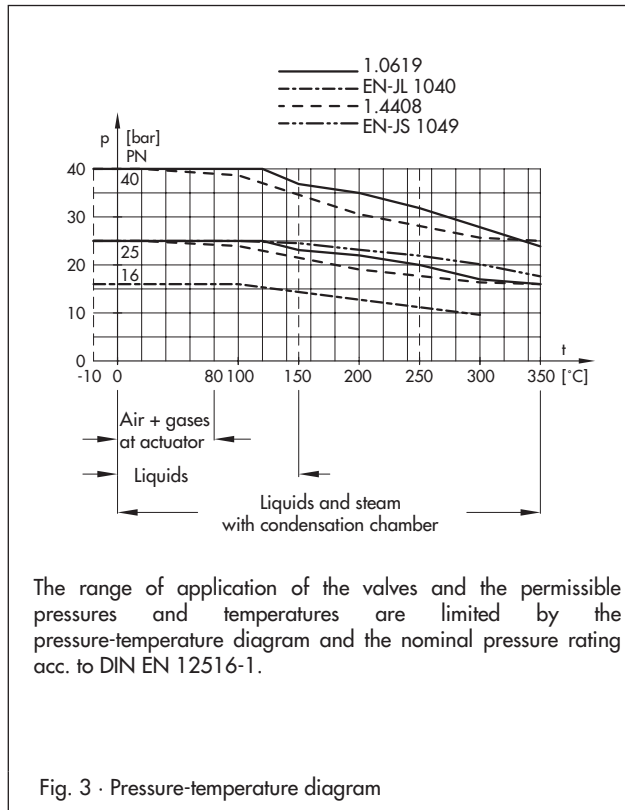


Fig. 3 · Pressure-temperature diagram

## Accessories

- Screw joints for connection of the control line  $\frac{3}{8}$ " to the filler neck. Other screw joints are available on request.
- Condensation chamber for steam condensation and protection of the operating diaphragm against extreme temperatures. This chamber is necessary for steam and liquids above 150 °C.
- Extension and condensation chamber for temperatures above 220 °C
- Conical expansion piece to double the nominal outlet diameters, available in sizes DN 125/250 and DN 150/300, nominal pressures PN 16 or PN 40.
- The control line (pipe  $\frac{3}{8}$ " ) is to be attached on site.

Detailed information on accessories can be found in Data Sheet T 2595 EN.

**Table 1 · Technical data** · All pressures in bar (gauge)

Type 2422 Valve				
Nominal pressure	PN 16, 25 or 40			
Nominal size	DN 125	DN 150	DN 200	DN 250
Max. perm. temperature	See Fig. 3 · Pressure-temperature diagram			
Valve plug	Metal sealing: 350 °C · PTFE soft sealing: 220 °C · Valve balanced by a diaphragm: 150 °C			
Leakage rate	≤ 0.05 % of K <sub>vs</sub> coefficient			
Type 2424 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 <sup>1)</sup>			
Max. perm. pressure at actuator	Effective area	320 cm <sup>2</sup>		640 cm <sup>2</sup>
	Pressure	3 bar		1.5 bar
Max. perm. temperature	Gases 80 °C at the actuator · Liquids 150 °C, with condensation chamber max. 350 °C · Steam with condensation chamber max. 350 °C			

<sup>1)</sup> Set point ranges above 2.5 bar, refer to T 2552 EN for Type 2333 Pressure Reducing Valve

**Table 2 · Materials** · Material number according to DIN EN

Type 2422 Valve · Balanced by a bellows				
Nominal pressure	PN 16	PN 25	PN 16/25/40	
Valve body	Cast iron EN-JL1040	Spheroidal graphite iron EN JS-1049	Cast steel 1.0619	Stainless steel 1.4408
Seat	1.4006			1.4571
Plug	1.4571			
Seal for soft sealing	PTFE with 15 % glass fiber up to 220 °C			
Plug stem	1.4301			
Balancing bellows	1.4571			
Bottom section	1.0305			1.4571
Body gasket	Graphite with metal core			
Type 2422 Valve · Balanced by a diaphragm				
Nominal pressure	PN 16	PN 16/25	PN 16/25/40	–
Valve body	Cast iron EN-JL1040	Spheroidal graphite iron EN JS-1049	Cast steel 1.0619	–
Seat	Red brass			
Plug	Standard version Red brass · Max. 150 °C with EPDM soft sealing or max. 150 °C with PTFE soft sealing			
Pressure balancing	Balancing cases made of sheet steel DD11 · EPDM diaphragm, max. 150 °C with liquids or max. 80 °C with non-flammable gases or NBR diaphragm, max. 60 °C			
Type 2424 Actuator				
Diaphragm cases	Sheet steel DD11			1.4301
Diaphragm	EPDM <sup>1)</sup> with fabric insert			
Guide bushing	DU bushing			PTFE
Seals	EPDM/PTFE <sup>1)</sup>			

<sup>1)</sup> Special version for oils: FPM (FKM)

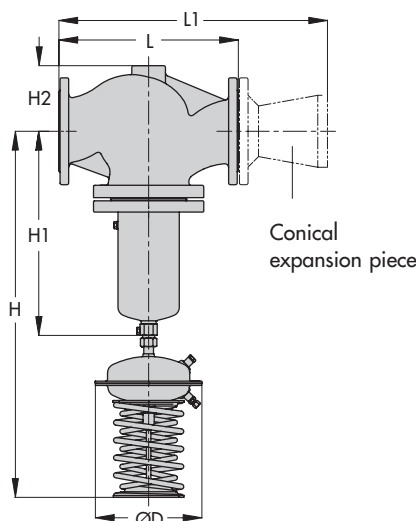
**Table 3 · Standard K<sub>vs</sub> coefficients and max. permissible differential pressures Δp** · Valve balanced by a bellows

Type 2422 Valve · Balanced by a bellows					
Standard K <sub>vs</sub> coefficients and max. permissible differential pressures Δp					
DN	Seat Ø	Standard K <sub>vs</sub>	Flow divider St I K <sub>vs I</sub>	Flow divider St III K <sub>vs III</sub>	Max. perm. differential pressure Δp
125	103 mm	190	150	95	16 bar
150	125 mm	280	210	140	12 bar
200	207 mm	420	315	200	10 bar
250	207 mm	500	375	220	10 bar
Reduced K <sub>vs</sub> coefficients and max. permissible differential pressures Δp					
125	65 mm	80	60	40	20 bar
150	89 mm	125	95	60	16 bar
200	125 mm	280	210	140	12 bar
250	125 mm	280	210	140	12 bar

**Table 4 ·  $K_{VS}$  coefficients and max. permissible differential pressures  $\Delta p$  · Valve balanced by a diaphragm**

Type 2422 Valve · Balanced by a diaphragm					
Standard $K_{VS}$ coefficients and max. permissible differential pressures $\Delta p$					
Nominal size		DN 125	DN 150	DN 200	DN 250
$K_{VS}$ coefficient	22 mm travel	190	290	550	600
	35 mm travel	250	380	650	800
Max. permissible differential pressures $\Delta p$		12 bar		10 bar	

**Dimensions · Valve balanced by a bellows**



Type 2422 Valve · Balanced by a bellows

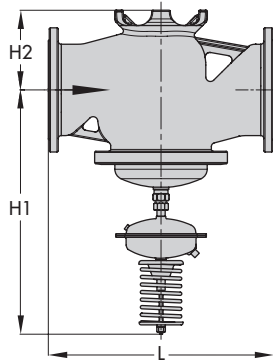
**Dimensions in mm and weights · Dimensions in parentheses apply to temperatures between 220 °C to 350 °C**

Type 2422/2424 Pressure Reducing Valve · Valve balanced by a bellows						
Nominal size	DN	125	150	200	250	
Set point range in bar	Length L	400	480	600	730	
	Length L1	PN 16	635	740	-	
		PN 40	640	760	-	
	Height H1		460 (600)	590 (730)	730 (870)	
	Height H2		145	175	235	260
0.05 to 0.25	Height H		990 (1130)	1120 (1260)	1260 (1400)	
	Actuator		Ø D = 380 mm, A = 640 cm <sup>2</sup>			
0.1 to 0.6	Height H		990 (1130)	1120 (1260)	1260 (1400)	
	Actuator		Ø D = 380 mm, A = 640 cm <sup>2</sup>			
0.2 to 1.0	Height H		990 (1130)	1120 (1260)	1260 (1400)	
	Actuator		Ø D = 380 mm, A = 640 cm <sup>2</sup>			
0.5 to 1.5	Height H		910 (1050)	1040 (1180)	1180 (1320)	
	Actuator		Ø D = 285 mm, A = 320 cm <sup>2</sup>			
1 to 2.5	Height H		940 (1080)	1070 (1210)	1210 (1350)	
	Actuator		Ø D = 285 mm, A = 320 cm <sup>2</sup>			
0.05 to 1.0	Weight for cast iron PN 16 <sup>1)</sup> in kg, approx.		135	185	425	485
0.5 to 1.5/ 1 to 2.5			125	175	415	475

<sup>1)</sup> +10 % for cast steel PN 40 and spheroidal graphite iron PN 25

Fig. 4 · Dimensional diagram, Type 2422 Valve balanced by a bellows with Type 2424 Actuator

## Dimensions · Valve balanced by a diaphragm



Type 2422 Valve · Balanced by a diaphragm

### Dimensions in mm and weights in kg

Type 2422/2424 · Balanced by a diaphragm				
Nominal size	DN 125	DN 150	DN 200	DN 250
Length L	400	480	600	730
Height H1	720	745	960	
Height H2	145	175	260	
Weight in kg, approx	75	95	250	

Fig. 5 · Dimensional diagram, Type 2422 Valve balanced by a diaphragm with Type 2424 Actuator

### Ordering text

Pressure Reducing Valve **Type 2422/2424**

DN ..., body material ..., PN ...

$K_{VS}$  ..., set point range ... bar

Balanced by a bellows/diaphragm

Optionally, accessories ..., optionally, special version ...

Specifications subject to change without notice.





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