

## T 3019 EN

### Type 42-24 DoT and Type 42-28 DoT Differential Pressure and Temperature Regulators Type 42-34 DoT, Type 42-36 DoT, Type 42-37 DoT, Type 42-38 DoT, Type 42-39 DoT and Type 42-38 DoT E Differential Pressure, Flow and Temperature Regulators

Series 42 Self-operated Regulators



#### Application

Regulators for district heating systems, heat generators, heat exchangers and other HVAC and industrial applications  
Valve sizes **DN 15 to 150** · Pressure rating **PN 16 to 40** · Suitable for liquids and vapors from **5 to 150 °C**

The valves **close** when the differential pressure or temperature **rises**.

The regulators consist of a valve balanced either by a bellows or diaphragm<sup>1)</sup>, a double adapter, an actuator and a control thermostat. Depending on the version, they control the temperature, differential pressure and/or flow rate to the adjusted set point. The largest signal is always used to control the regulator.

#### Special features

- Differential pressure set points  $\Delta p = 0.05$  to 5 bar
- Temperature set points from  $-10$  to  $+250$  °C

#### Versions

The regulators can be equipped with a Type 2231 to Type 2235 Control Thermostat.

Details on control thermostats in ► T 2010.

**Type 2231** (Fig. 1) with set point adjustment directly at the bulb sensor · **Type 2232** (Fig. 2) with separate set point adjustment and bulb sensor · **Type 2233 and Type 2234** with air sensor · **Type 2235** with air duct sensor which can be installed as required.

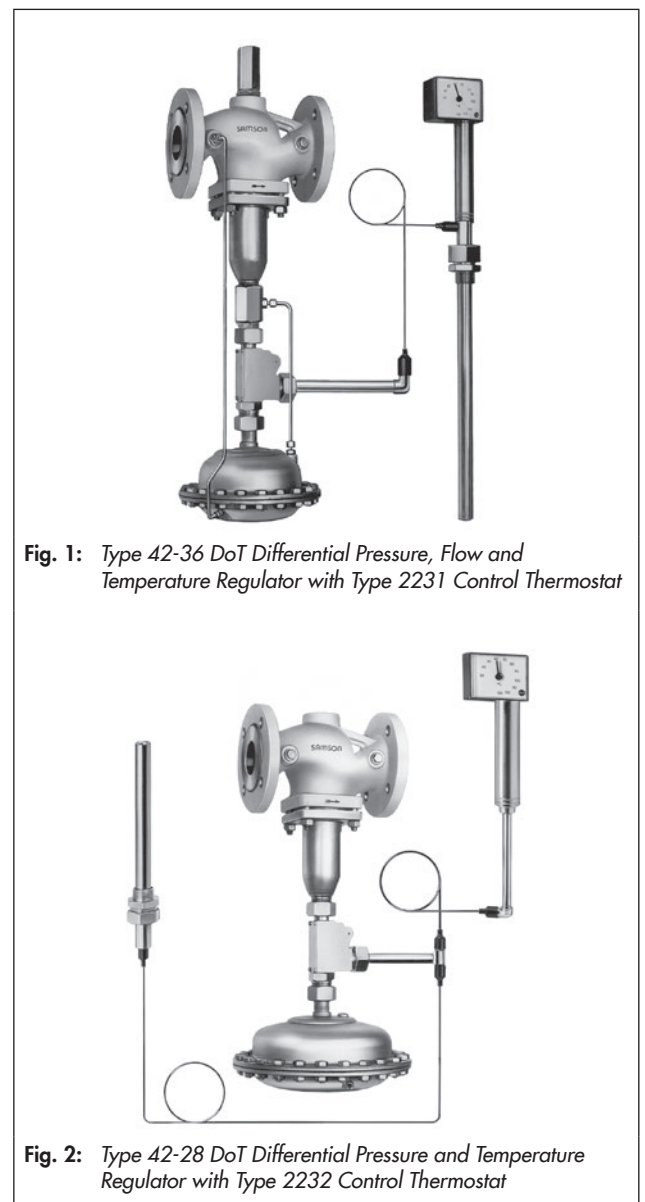
Details on regulators without control thermostats in Data Sheets ► T 3003, ► T 3007, ► T 3013, ► T 3015, ► T 3017 and ► T 3018.

**Differential pressure and temperature regulators** for installation in the flow or return flow pipe · Details in Data Sheet ► T 3003.

**Type 42-24 DoT** with Type 2422 Valve, double adapter, Type 2424 Actuator with adjustable set point and a control thermostat

**Type 42-28 DoT** (Fig. 2) with Type 2422 Valve, double adapter, Type 2428 Actuator with fixed set point and a control thermostat

<sup>1)</sup> Valves balanced by a diaphragm, DN 125 to 150 only



**Fig. 1:** Type 42-36 DoT Differential Pressure, Flow and Temperature Regulator with Type 2231 Control Thermostat

**Fig. 2:** Type 42-28 DoT Differential Pressure and Temperature Regulator with Type 2232 Control Thermostat

**Differential pressure regulators with safety temperature limiters** · Details in Data Sheets ▶ T 3003 and ▶ T 2046.

**Type 42-24/2212** with Type 2422 Valve, Type 2424 Actuator with adjustable set point and a Type 2212 Safety Thermostat

**Type 42-28/2212** with Type 2422 Valve, Type 2428 Actuator with fixed set point and a Type 2212 Safety Thermostat

**Differential pressure regulators with safety temperature monitors** · Details in Data Sheets ▶ T 3003 and ▶ T 2043.

**Type 42-24/2213** with Type 2422 Valve, Type 2424 Actuator with adjustable set point and a Type 2213 Safety Thermostat

**Type 42-28/2213** with Type 2422 Valve, Type 2428 Actuator with fixed set point and a Type 2213 Safety Thermostat

**Differential pressure regulators with pressure limiters**  
Details in Data Sheets ▶ T 3003 and ▶ T 2519.

**Type 42-24/2401** with Type 2422 Valve, Type 2424 Actuator with adjustable set point and a Type 2401 Pressure Limiter

**Flow and temperature regulators** for installation in the flow or return flow pipe · Details in Data Sheets ▶ T 3015 and ▶ T 3018.

**Type 42-36 DoT** (Fig. 1) with Type 2423 Valve, double adapter, Type 2426 Actuator and a control thermostat

**Type 42-36 DoT E** · With Type 2423 Valve, double adapter, Type 2426 Actuator · With restriction to adjust the flow set point · With electric or electrohydraulic actuator

**Flow regulators with safety temperature limiters** · Details in Data Sheets ▶ T 3015, ▶ T 3018 and ▶ T 2046.

**Type 42-36/2212** with Type 2423 Valve, Type 2426 Actuator and a Type 2212 Safety Thermostat

**Type 42-36 E/2212**<sup>1)</sup> with Type 2423 Valve, Type 2426 Actuator and Type 2212 Safety Thermostat · With electric or electrohydraulic actuator.

**Flow regulators with safety temperature monitors** · Details in Data Sheets ▶ T 3015, ▶ T 3018 and ▶ T 2043.

**Type 42-36/2213** with Type 2423 Valve, Type 2426 Actuator and a Type 2213 Safety Thermostat

**Type 42-36 E/2213**<sup>1)</sup> with Type 2423 Valve, Type 2426 Actuator and Type 2213 Safety Thermostat · With electric or electrohydraulic actuator.

**Flow regulators with pressure limiters** · Details in Data Sheets ▶ T 3015, ▶ T 3018 and ▶ T 2519.

**Type 42-36/2401** with Type 2423 Valve, Type 2426 Actuator and a Type 2401 Pressure Limiter

**Type 42-36 E/2401**<sup>1)</sup> with Type 2423 Valve, Type 2426 Actuator and Type 2401 Pressure Limiter · With electric or electrohydraulic actuator.

<sup>1)</sup> When the Type 42-36 E is combined with a safety device (Type 2212, Type 2213 or Type 2401), the closing of the restriction may generate additional forces at the Type 2426 Diaphragm Actuator. Such forces can be prevented by using a Type 2428 Actuator. In this case, the type designation changes to Type 42-38 E/2xxx.

**Differential pressure, flow and temperature regulators**  
Details in Data Sheet ▶ T 3017.

**Type 42-37 DoT** with Type 2423 Valve, double adapter, Type 2427 Actuator with adjustable set point and a control thermostat

**Type 42-39 DoT** same as Type 42-37 DoT, but with Type 2429 Actuator.

**Differential pressure and flow regulators with safety temperature limiters** · Details in Data Sheets ▶ T 3017 and ▶ T 2046.

**Type 42-37/2212** with Type 2423 Valve, Type 2427 Actuator with adjustable set point and a Type 2212 Safety Thermostat

**Type 42-39/2212** same as Type 42-37/2212, but with Type 2429 Actuator.

**Differential pressure and flow regulators with safety temperature monitors** · Details in Data Sheets ▶ T 3017 and ▶ T 2043.

**Type 42-37/2213** with Type 2423 Valve, Type 2427 Actuator with adjustable set point and a Type 2213 Safety Thermostat

**Type 42-39/2213** same as Type 42-37/2212, but with Type 2429 Actuator.

**Differential pressure and flow regulators with pressure limiters** · Details in Data Sheets ▶ T 3017 and ▶ T 2519.

**Type 42-37/2401** with Type 2423 Valve, Type 2427 Actuator with adjustable set point and a Type 2401 Pressure Limiter

**Type 42-39/2401** same as Type 42-37/2401, but with Type 2429 Actuator.

**Pressure regulators with pressure limiters** · Details in Data Sheets ▶ T 2547, ▶ T 2549 and ▶ T 2519.

**Type 2422/2424/2401** with Type 2422 Valve, Type 2424 Actuator with adjustable set point and a Type 2401 Pressure Limiter

**Type 2422/2425/2401** with Type 2422 Valve, Type 2425 Actuator with adjustable set point and a Type 2401 Pressure Limiter

**Temperature regulator and differential pressure regulator with flow limitation** for installation in the return flow pipe · Details in Data Sheet ▶ T 3013.

**Type 42-34 DoT** with Type 2423 Valve, double adapter, Type 2424 Actuator with adjustable set point and a control thermostat

**Type 42-38 DoT** with Type 2423 Valve, double adapter, Type 2428 Actuator with fixed set point

## Principle of operation

The principle of operation for regulators without control thermostat is described in the aforementioned data sheets. The principle of operation of **control thermostats** is described in Data Sheet ► T 2010.

The double adapter Do2 is mounted between the valve and actuator. The control thermostat is attached to connection c. The travel is directly transferred (connection b) or over the lever (3.6) to the coupling pin (3.5) and plug stem of the valve. The unit with the largest stroke is always linked to the plug stem.

An **intermediate piece** (see Fig. 3) is mounted between the double adapter and the bellows housing (to connect the low-pressure control line) in regulators that control the flow rate, e.g. Type 42-36 DoT, Type 42-37 DoT and Type 42-39 DoT. As a result, the installation dimensions increase by 65 mm (see Dimensions for DN 15 to 100).

The intermediate piece in Type 42-34 and Type 42-38 is already installed.

The principle of operation for regulators without safety thermostat is described in the aforementioned data sheets. The principle of operation of the **Type 2212 Safety Thermostat** is described in Data Sheet ► T 2046.

The Type 2212 Safety Temperature Limiter (STL) is equipped with a temperature sensor which operates according to the adsorption principle. The temperature of the measured medium creates a pressure in the sensor which is proportional to the measured temperature. This pressure is transferred to an operating bellows through a capillary tube where it is converted into a positioning force and compared to the force of the set point spring.

The spring force depends on the limit adjustment. If the measured temperature exceeds the adjusted limit, the spring mechanism in the connecting element is triggered, moving the pin and the plug stem connected to it. The valve closes and the position is automatically locked. The limiters can only be unlocked and put back into operation with a special tool after the temperature has fallen below the limit and the fault has been remedied.

### Special installation regulations according to VdTÜV:

Install the regulator only in combination with an upstream strainer (e.g. Type 2 NI in Data Sheet ► T 1015).

Only use the thermowells delivered by the manufacturer.

The principle of operation for regulators without safety thermostat is described in the aforementioned data sheets. The principle of operation of the **Type 2213 Safety Thermostat** is described in Data Sheet ► T 2043.

The Type 2213 Safety Temperature Monitor (STM) operates according to the liquid expansion principle. The temperature sensor, capillary tube and operating element are filled with an expansion liquid.

The temperature-dependent change in volume of the liquid in the bulb sensor causes the piston in the operating element to move. As a result, the pin of the operating element moves the plug stem with the plug. The temperature limit can be adjusted by a key. This limit value is indicated on the scale.

The thermostat closes the valve when the temperature reaches the adjusted temperature limit. The thermostat resets itself automatically when the temperature has fallen to a value of approx. 5 K below the adjusted limit.

The spring mechanism in the operating element is released when the capillary tube breaks or when there is a leak in the sensor. It moves the plug stem with the plug over the pin and closes and locks the valve.

### Special installation regulations according to VdTÜV:

Install the regulator only in combination with an upstream strainer (e.g. Type 2 NI in Data Sheet ► T 1015).

Only use the thermowells delivered by the manufacturer.

The principle of operation for regulators without pressure elements is described in the aforementioned data sheets. The principle of operation of the **Type 2401 Pressure Element** is described in Data Sheet ► T 2519.

The medium passes through the strainer and the capillary tube to an operating bellows. It is converted into a positioning force which is compared to the force of the set point spring.

The spring force depends on the limit adjustment.

When the pressure exceeds the adjusted limit value, the spring mechanism in the connecting element is released. It moves the pin and the plug stem attached to it, closing and locking the valve. Additionally, the pressure limiter closes the valve when the pressure falls below 0.8 bar (gauge pressure).

The limiters can only be unlocked and put back into operation with a special tool (lever with order no. 1490-7399) after the temperature has fallen below the limit by 0.5 bar and the fault has been remedied.

### Version with Type 2401 Safety Pressure Element

The safety pressure element has increased safety according to DIN EN 14597. The valve is locked when the pressure exceeds the adjusted limit and when the pressure fails. The valve can only be unlocked when the pressure is higher than 1 bar and approx. 0.5 bar below the adjusted limit value.

### Accessories

- Compression-type fitting for 8, 10 and 12 mm pipe diameters
- Needle valve G 1/4, steel

### Special versions

- Higher flow ranges
- With internal parts resistant to mineral oils
- Valve entirely of stainless steel
- ANSI/JIS version
- Liquids and vapors up to max. 150 °C
- Other control thermostat versions or special versions
- Side mounting of an electric actuator to apply an electric signal (fail-safe position)

## Ordering text

Type 42-... DoT Regulator

DN ...

Valve balanced by a bellows/diaphragm

Body material ...

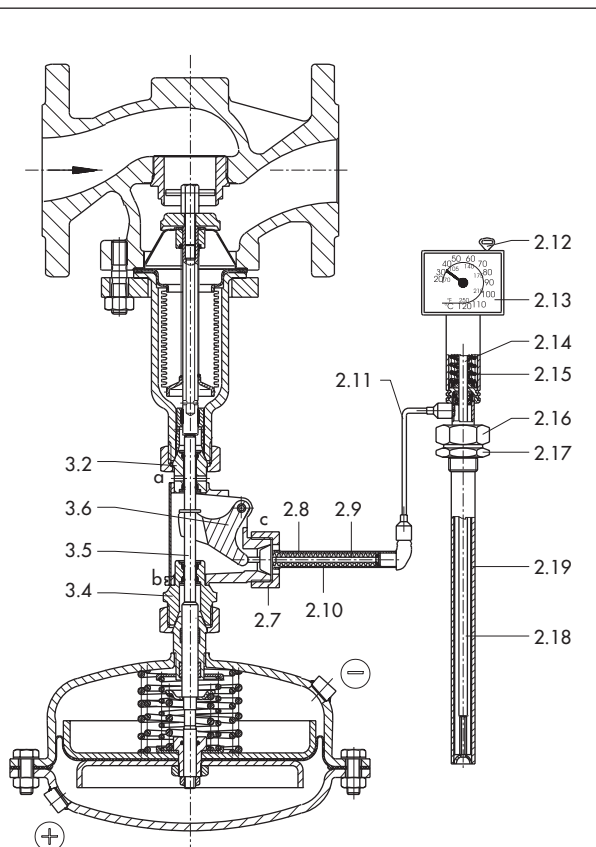
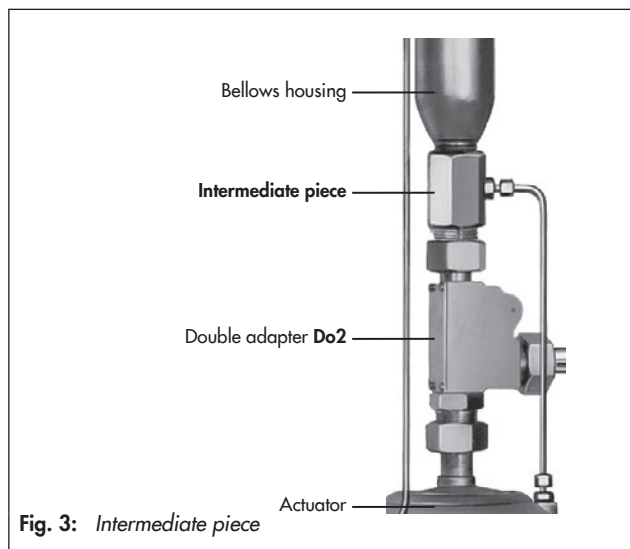
PN ...

Set point range or set point ... bar

With Type 2231/2232/2233/2234/2235 Control Thermostat and set point range in °C

Optionally, special version ...

Optionally, accessories ... (▶ T 3095)



### Control thermostat

2.7 Coupling nut	2.12 Set point adjustment
2.8 Operating element	2.13 Set point dial
2.9 Pin of operating element	2.14 Threaded spindle
2.10 Operating bellows	2.15 Excess temperature protection
2.11 Capillary tube	2.16 Coupling nut
	2.17 Double nipple
	2.18 Piston
	2.19 Temperature sensor

### Double adapter

a, b, c Connections
3.2 Connections with seals
3.4 Stopper with seal
3.5 Coupling pin
3.6 Lever

Fig. 4: Type 42-36 DoT Flow and Differential Pressure or Pressure Regulator

Table 1: Technical data

Type 2231 to 2235 Thermostat		Size 150					
Set point range (set point span 100 K)		-10 to 90 °C · 20 to 120 °C · 50 to 150 °C For Types 2232, 2234, 2235 also 100 to 200 °C and 150 to 250 °C					
Perm. ambient temperature at the set point adjustment		-40 to +80 °C					
Perm. temperature at the sensor		100 K above the adjusted set point					
Perm. pressure at sensor	Type 2231/2232	Without thermowell: PN 40 · With thermowell or thermowell with flange: PN 40/PN 100					
	Type 2233/2234	Without thermowell: PN 40 · With flange: PN 6/PN 40					
Capillary tube length		5 m (10 or 15 m as special version)					
Type		2231	2232	2233	2234	2235	Double adapter
Weight, approx. kg		3.2	4.0	3.4	3.7	3.6	1.5

**Table 2: Materials · Material numbers according to DIN EN**

Type 2231 to 2235 Thermostat		Standard version		Special version		
Operating element		Nickel-plated brass				
Sensor	Type 2231 and Type 2232	Bronze		CrNiMoTi steel		
	Type 2233 and Type 2234	Copper				
	Type 2235	Copper		-		
Capillary tube		Nickel-plated copper				
<b>Thermowell with threaded connection</b>						
Immersion tube		Bronze, steel, copper <sup>7)</sup>		CrNiMoTi steel		
Threaded nipple		Brass · Steel				
<b>Thermowell with threaded connection</b>						
Immersion tube		Steel		CrNiMoTi steel		
Flange						
<b>Double adapter Do2</b>						
Body		CW508L (brass)				
Coupling pin		1.4301				
Seal		EPDM seal between PTFE disks				
<b>Type 2422 and 2423 Valves · Balanced by a bellows</b>						
Pressure rating		PN 16	PN 25	PN 16, 25 and 40		
Valve body		Cast iron EN-GJL-250	Spheroidal graphite iron EN-GJS-400-18-LT	Cast steel 1.0619	Cast stainless steel 1.4408	Forged stainless steel 1.4571 <sup>1)</sup>
Seat		1.4104, 1.4006			1.4404	
Plug	Up to DN 100	1.4104, 1.4006 <sup>2)</sup>			1.4404	
	DN 125 to 250	1.4301, 1.4404 with PTFE seal				
Plug stem		1.4301				
Metal bellows		1.4571 · DN 125 and larger: 1.4404				
Bottom section		P265GH			1.4571	
Body gasket		Graphite on metal core				
<b>Types 2422 and 2423 Valves · Balanced by a diaphragm</b>						
Pressure rating		PN 16	PN 25	PN 16, 25 and 40		
Valve body		Cast iron EN-GJL-250	Spheroidal graphite iron EN-GJS-400-18-LT	Cast steel 1.0619	Cast stainless steel 1.4408	-
Valve seat		Red brass <sup>3) 4)</sup>				
Plug (standard version)		Red brass <sup>3) 5)</sup> · With EPDM soft seal, max. 150 °C or with PTFE soft seal, max. 150 °C				
Pressure balancing		Balancing cases made of sheet steel DD11 · EPDM balancing diaphragm, max. 150 °C or NBR diaphragm, max. 80 °C				
<b>Type 2427 and Type 2429 Actuators</b>						
Diaphragm cases		Sheet steel DD11			1.4301	
Diaphragm		EPDM <sup>6)</sup> with fabric reinforcement · Special version for mineral oils: FKM				
Guide bushing		DU bushing			PTFE	
Seals		EPDM/PTFE <sup>6)</sup>				

<sup>1)</sup> DN 15, 25, 40 and 50 only

<sup>2)</sup> Optionally with soft seal with standard  $K_{VS}$  coefficients

<sup>3)</sup> Special version 1.4409

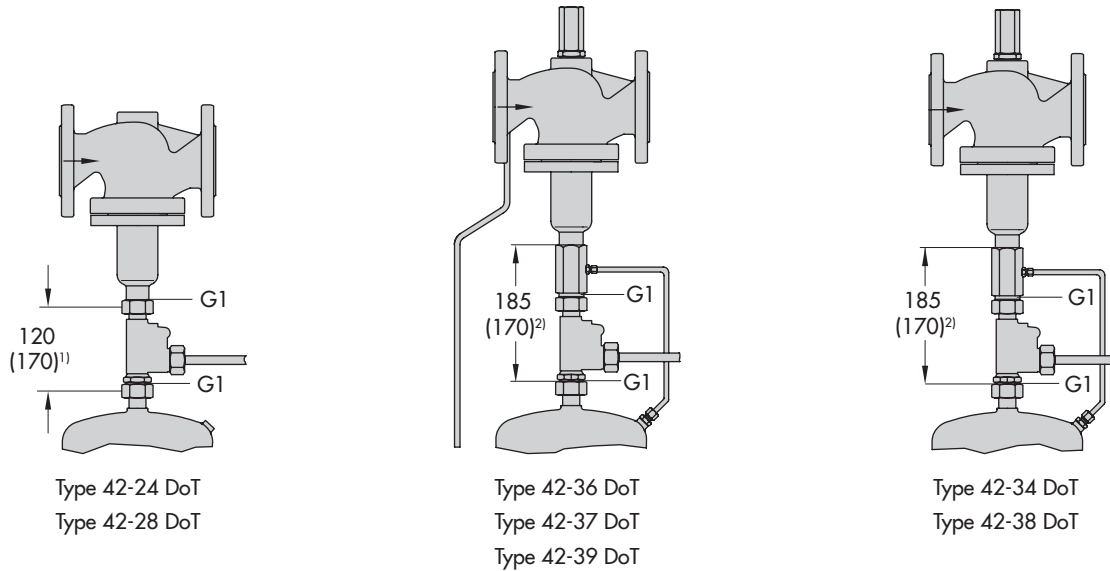
<sup>4)</sup> DN 65 to 100: 1.4006

<sup>5)</sup> DN 65 to 80: 1.4104, DN 100: 1.4006, with metal seal

<sup>6)</sup> Special version for mineral oils: FKM

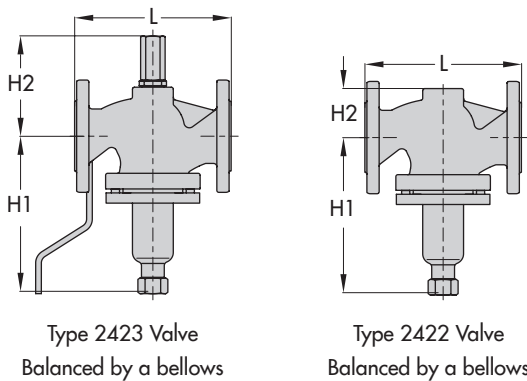
<sup>7)</sup> PN 16 only

## Dimensions

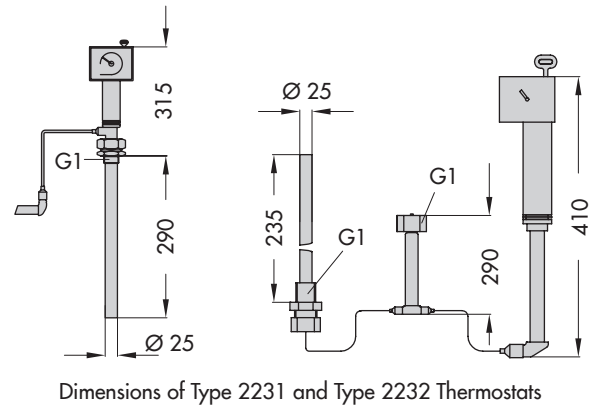


The external connection of the low-pressure control line is integrated into the bottom section of the valve in the Type 2422/2423 with balancing bellows (DN 125 to 150). The external connection must be mounted onto valves with a balancing diaphragm.

### Valves



### Thermostats



### Type 2423/2422 Valve - Dimensions in mm

Valve size	DN	15	20	25	32	40	50	65	80	100	125	150	
Length L		130	150	160	180	200	230	290	310	350	400	480	
Height H1	Balanced by a bellows	225						300	355	460	590		
	Balanced by a diaphragm									285	310		
<b>Type 2422 Valve</b>													
Height H2	Other materials	55			72			100	120	145	175		
	1.4571	53	-	70	-	92	98						
	Balanced by a diaphragm									145	175		
<b>Type 2423 Valve</b>													
Height H2	Other materials	115			135			195	220	265	295		
	1.4571	113	-	130	-	155	161						
	Balanced by a diaphragm									295	325		

Dimensions of regulators (valve body with actuator etc.) on request.

**Fig. 5:** Dimensions of intermediate piece/double adapter  
Dimensions in mm

1) DN 15 to 100: 120 mm · DN 125 to 250: 170 mm  
2) DN 15 to 100: 185 mm · DN 125 to 250: 170 mm