

Combined Self-operated Regulators

Regulators for Differential Pressure, Flow Rate and Temperature



Application

Regulators for district heating supply networks, heat generators, heat exchangers, building service plants and industrial plants. For safety monitoring and safety limitation of the energy supply in heat generators and heat exchangers.

Temperature set point from 0 to 120 °C · Limit signals up to 120 °C · Valves in DN 15 to DN 50 · Nominal pressure PN 25 · Suitable for liquids up to 150 °C and gases up to 80 °C

The valve closes when the differential pressure, flow rate or temperature increases.



Special features

- Low-maintenance P-regulators requiring no auxiliary energy
- Suitable for water and non-flammable liquids and gases, provided they do not cause the materials used to corrode
- Special version with oil-resistant internal parts
- Temperature sensor for operating pressures up to 40 bar
- Suitable for district heating plants conforming to DIN 4747 (requirements stipulated by AGFW (German District Heating Association) concerning components in house substations).

Combinations with Type 2403 K Safety Thermostat have the same function as a safety temperature monitor (STM) · With Type 2439 K Safety Thermostat, the same function as a safety temperature limiter (STL) · Regulators have "Extended Safety" specified in DIN 14597.

Versions (Figs. 1 and 2)

Differential pressure or flow regulators with temperature regulators in valve sizes DN 15 to DN 50 made of red brass with connection nuts and welding ends (special versions with threaded ends or flanges) · DN 32, 40 and 50 also available with flanged valve body made of spheroidal graphite iron · Type 2430 K Control Thermostat

Type 2468/2430 K · Differential pressure and temperature regulator with a fixed differential pressure set point adjusted to $\Delta p = 0.1$ or 0.2 bar · With internal overload protection (excess pressure limiter) in the actuator · Installation in return flow pipes

Type 2469/2430 K (Fig. 1) · Flow and temperature regulator with continuously adjustable flow set point at the integrated restriction (upper differential pressure of 0.2 bar) · Installation in either flow or return flow pipes

Type 2478/2430 K (Fig. 2) · Differential pressure and temperature regulator, same as Type 2468/2430 K, but for installation in flow pipes

Type 2479/2430 K · Differential pressure and temperature regulator with flow limitation · Fixed differential pressure set point adjusted to $\Delta p = 0.2$ bar · Continuously adjustable flow limitation · With internal overload protection (excess pressure limiter) in the actuator · Installation in return flow pipes

Type 2469/2430 K/2403 K Flow and Temperature Regulator and Safety Temperature Monitor (FR/TR/STM) · With Type 2469 Valve, Type 2430 K Control Thermostat and Type 2403 K Safety Thermostat

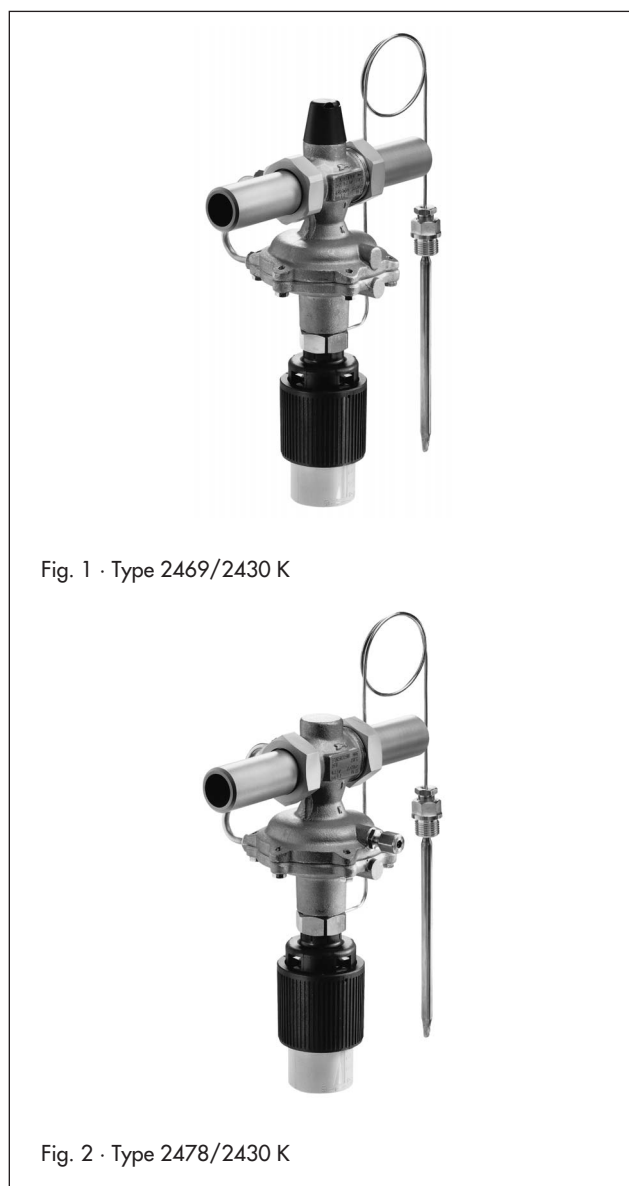


Fig. 1 · Type 2469/2430 K

Fig. 2 · Type 2478/2430 K

Type 2469/2430 K/2439 K Flow and Temperature Regulator and Safety Temperature Limiter (FR/TR/STL) · With Type 2469 Valve, Type 2430 K Control Thermostat and Type 2439 K Safety Thermostat

Principle of operation (see Figs. 3 to 6)

The regulators consist of a valve, actuator and a control thermostat (20) and, in some cases, also a safety thermostat (26/27).

Type 2468/2430 K Differential Pressure and Temperature Regulator

To control the differential pressure, the high pressure is transmitted to the lower diaphragm chamber of the actuator (6). The low pressure is applied over a hole in the valve body (1) to the low pressure side of the diaphragm (6.1). The resulting differential pressure is converted into a positioning force at the operating diaphragm and is used to move the plug stem (4) and the valve plug (3) according to the force of the springs (5). The temperature of the medium produces a pressure in the sensor proportional to the temperature measured. This pressure is transmitted to the positioning bellows (23) where it is converted into a positioning force. It is used to move the valve plug (3) according to the force of the springs (21) and the temperature set point adjusted. The largest signal is always used to actuate the valve.

An overload protection (excess pressure limiter) (16) in the actuator of Type 2468/2430 K protects seat and plug from overload during exceptional operating conditions that could lead to valve or plant damage.

Type 2469/2430 K Flow and Temperature Regulator

The high pressure upstream of the restriction (1.2) is transmitted to the high pressure side of the actuator (6) over the attached control line (11). The low pressure downstream of the restriction is applied to the low pressure side of the diaphragm (6.1) through a hole in the valve plug (3). The resulting differential pressure is converted into a positioning force at the operating diaphragm. This force is used to move the valve plug according to the force of the springs (5). The operation principle of the control thermostat (20) is the same as described for Type 2468/2430 K. The largest signal is always used to actuate the valve.

Type 2478/2430 K Differential Pressure and Temperature Regulator

The regulator is the same as Type 2468/2430 K. However, the valve body (1) has no hole to transmit the low pressure. Instead, the high pressure and low pressure are transmitted over control lines.

Type 2479/2430 K Differential Pressure and Temperature Regulator with Flow Limitation

This regulator is the same as Type 2469/2430 K, except it does not have the control line (11). Instead, the high pressure of the plant is transmitted over a control line to be attached on installing the regulator in the pipeline. The flow limitation is adjusted at the restriction (1.2).

An overload protection (excess pressure limiter) (16) in the actuator of Type 2479/2430 K protects seat and plug from overload during exceptional operating conditions that could lead to valve or plant damage.

- | | |
|---|---|
| 1 Valve body | 15 Coupling rod |
| 1.1 Connection nut with seal and welding end | 16 Internal excess pressure limiter (overload protection) |
| 1.2 Restriction for adjusting flow rate set point | 20 Control thermostat |
| 2 Seat | 21 Springs |
| 3 Plug (balanced) | 22 Set point adjuster |
| 4 Plug stem | 23 Positioning bellows with actuator stem |
| 5 Positioning springs | 24 Capillary tube |
| 6 Actuator | 25 Temperature sensor |
| 6.1 Operating diaphragm | 26 Type 2403 K |
| 11 Control line | 27 Type 2439 K |

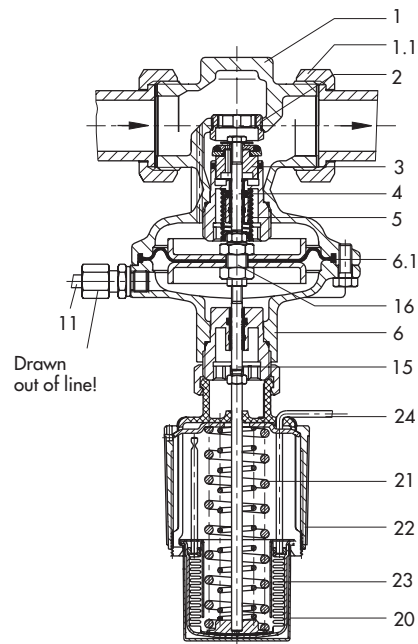


Fig. 3 · Type 2468/2430 K

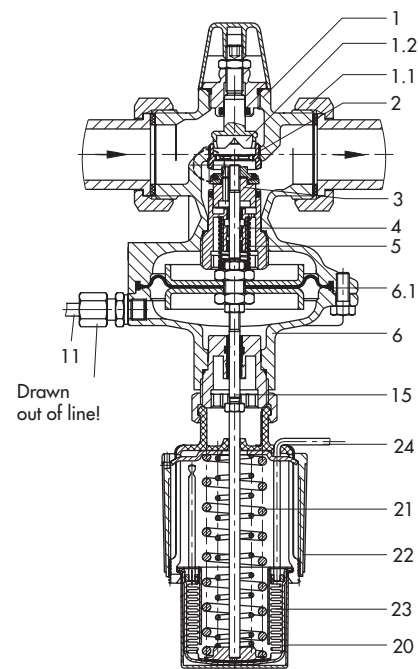


Fig. 4 · Type 2469/2430 K

Type 2469/2430 K/2403 K Flow and Temperature Regulator and Safety Temperature Monitor

This regulator is the same as Type 2469/2430 K, but additionally has a Type 2403 K Safety Thermostat (26). When the temperature reaches the limit value adjusted, when the capillary tube ruptures or there is a leak in the sensor, a spring mechanism closes the valve. The valve automatically resets itself when the fault has been remedied and the temperature has fallen below the limit. The Type 2403 K Safety Thermostat is available in two versions which differ in their sensor installation position. Refer to Data Sheet T 2183 EN for more details.

Type 2469/2430 K/2439 K Flow and Temperature Regulator and Safety Temperature Limiter

This regulator is the same as Type 2469/2430 K, but additionally has a Type 2439 K Safety Thermostat (27). A spring mechanism closes and locks the valve when the temperature reaches the limit value adjusted, when the capillary tube ruptures or there is a leak in the sensor. The valve can only be reset and put back into operation with a tool.

Installation

The regulators are only suitable for installation in horizontal pipes

Valve

- The medium must flow through the valve in the direction indicated by the arrow on the valve body.
- The valve must be mounted suspended downwards.



Control thermostat

- The temperature sensor of Type 2430 K Control Thermostat and Type 2439 K Safety Thermostat may be installed in any position.
- The installation position of the temperature sensor of Type 2403 K Safety Thermostat must be carefully observed as it depends on the sensor version.

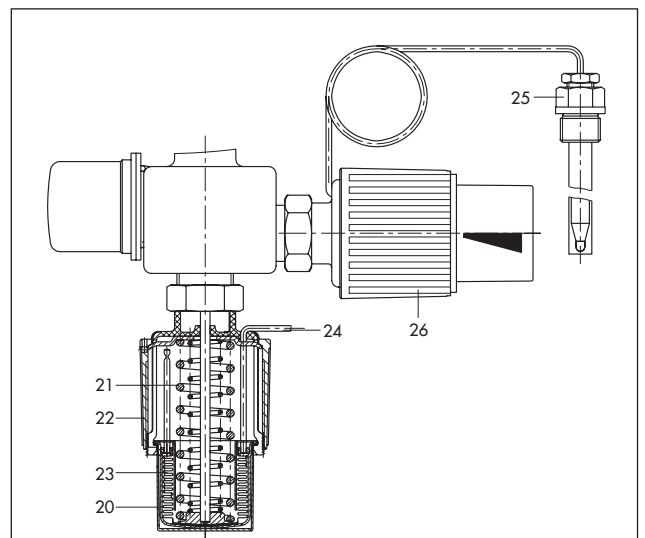


Fig. 5 · Type 2469/2430 K/2403 K Flow and Temperature Regulator and Safety Temperature Monitor

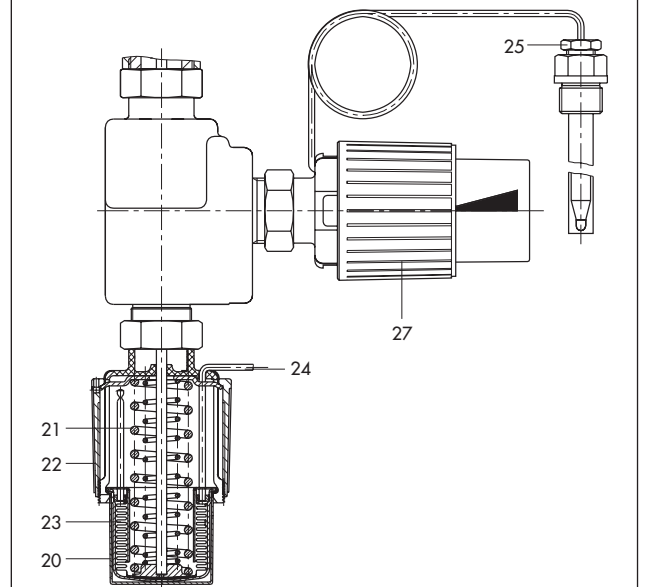


Fig. 6 · Type 2469/2430 K/2439 K Flow and Temperature Regulator and Safety Temperature Limiter

The following points must be observed:

- The whole length of the sensor must be immersed in the medium to be controlled.
- The sensor should be installed in a location where overheating or considerable idle times cannot occur.
- The capillary tube should be routed in such a way that the permissible temperature range is not exceeded, temperature fluctuations do not occur and the tube cannot be damaged.
- The smallest bending radius is 50 mm.

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

Nominal size		DN		15				20	25	32 ¹⁾	40 ¹⁾	50 ¹⁾
K _{Vs}	Screwed ends	0.4 ²⁾	1.0 ²⁾	2.5	4 ²⁾	6.3	8	12.5	16	20		
	Flanged body	–	–	–	–	–	–	12.5	20	25		
z value	Screwed ends	0.6					0.55	0.5		0.45		
	Flanged body	–						0.45		0.40		
Nominal pressure		PN		25								
Max. perm. differential pressure Δp across the valve		20 bar								16 bar		
Max. perm. temperature at the valve		Liquids: 150 °C Non-flammable gases: 80 °C										
Differential pressure set point												
Type 2468/..., 2478/...		Adjusted to 0.1 or 0.2 bar										
Type 2479/...		Adjusted to 0.2 bar										
Flow rate set point range in m³/h												
Type 2469/... with upper diff. press. 4)	0.2 bar	0.01 to 0.2	0.002 to 0.64	0.2 to 1.2	0.1 to 1.3 ³⁾ 0.1 to 2.5	0.1 to 2.3 ³⁾ 0.1 to 3.6	0.1 to 3.5 ³⁾ 0.1 to 5	0.3 to 5.8 ³⁾ 0.3 to 10	0.4 to 9.1 ³⁾ 0.4 to 12.5	0.4 to 14.1 ³⁾ 0.4 to 15		

1) Additional version: Valve with flanged body made of spheroidal graphite iron (EN-JS 1049)

2) Special version

3) An increase in noise level can be expected when the specified flow rates are exceeded, even if cavitation does not occur.

4) The minimum required differential pressure ΔP_{min} across the valve is calculated as follows:

$$\Delta P_{\min} = \Delta P_{\text{restriction}} + \left(\frac{\dot{V}}{K_{Vs}} \right)^2$$

Table 2 · Flow rate set point ranges for Type 2479/...

Flow rate set point ranges \dot{V} for water in m ³ /h for Type 2479/...												
ΔP _{set point} ΔP _{plant} + ΔP _{restriction}	ΔP _{plant} Calculation for plant	ΔP _{restriction} Diff. pressure	DN	15				20	25	32	40	50
			K _{Vs}	0.4 ¹⁾	1.0 ¹⁾	2.5	4 ¹⁾	6.3	8	12.5	16	20
0.2 bar	0.1 bar	0.1 bar	\dot{V} min.	0.01	0.12	0.2	0.5	0.8	0.8	2	3	4
			\dot{V} max.	0.14	0.45	0.85	1.8	2.6	3.6	7.1	8.5	10.7
0.3 bar	0.1 bar	0.2 bar	\dot{V} min.	0.2	0.64	1.2	2.5	3.6	5	10	12.5	15
			\dot{V} max.	–	–	–	1.3 ²⁾	2.3 ²⁾	3.5 ²⁾	5.8 ²⁾	9.1 ²⁾	14.1 ²⁾

1) Special version

2) An increase in noise level can be expected when the specified flow rates are exceeded, even if cavitation does not occur.

The minimum required differential pressure ΔP_{min} between the flow pipe and the return flow pipe is calculated as follows:

$$\Delta P_{\min} = \Delta P_{\text{set point}} + \left(\frac{\dot{V}}{K_{Vs}} \right)^2$$

Table 3 · Thermostats

Type 2430 K Control Thermostat		
Set point range	Continuously adjustable: 0 to 35, 25 to 70, 40 to 100, 50 to 120 or 70 to 150 °C	
Ambient temperature	–20 to 80 °C	
Temperature at the sensor	Max. 50 K above the adjusted set point	
Pressure at the sensor	Max. 40 bar	
Capillary tube	2 m (special version: 5 m)	
Safety Thermostat		
	Type 2403 K for STM	Type 2439 K for STL
Adjustment range of limit value	60 to 75, 75 to 100 or 100 to 120 °C	40 to 95 or 70 to 120 °C
Ambient temperature	Max. 50 °C	Max. 80 °C (60 °C elec. signal transmitter)
Temperature at the sensor	Max. 25 K above the adjusted set point	Max. 20 K above the adjusted limit value
Pressure at the sensor with thermowell	Max. 40 bar	Max. 40 bar
Capillary tube	5 m	2 m (special version 5 m)

Table 4 · Material · Material number acc. to DIN EN

Valves		
Body	Red brass CC491K (Rg 5, G-CuSn5ZnPb) · Spheroidal graphite iron EN-JS 1049 ¹⁾	
Seat	Stainless steel 1.4305	
Plug	Brass, free of dezincification, with EPDM soft sealing ^{2) 3)}	
Valve spring	Stainless steel 1.4310	
Operating diaphragm	EPDM with fabric reinforcement	
Seals	EPDM ²⁾	
Thermostat		
Sensor	Capillary tube	Copper
	Thermowell	Nickel-plated copper or stainless steel 1.4571

¹⁾ Additional version for DN 32, 40 and 50: Valve with flanged body made of spheroidal graphite iron

²⁾ Special version for oils (ASTM I, II, III): FPM (FKM)

³⁾ For K_{VS} 0.4 and 1: 1.4305

Ordering text

Typetested Temperature Regulators (TR), Safety Temperature Monitors (STM) and Safety Temperature Limiters (STL) are available!

Differential Pressure and Temperature Regulators
Type 2468/2430 K, 2478/2430 K, 2479/2430 K

or

Flow and Temperature Regulator Type 2469/2430 K

or

Differential Pressure and Temperature Regulator with Flow Limitation Type/2430 K

or

Flow and Temperature Regulator and Safety Temperature Monitor Type 2469/2430 K/2403 K

or

Flow and Temperature Regulator and Safety Temperature Limiter Type 2469/2430 K/2439 K

Valve Type ..., DN ..., PN ..., K_{VS} ...,

Connection nuts with welding ends/threaded ends/flanges

Differential pressure set point ... bar / Upper differential pressure value ... bar

Temperature set point range ...°C, limit value range ...°C

With Safety Thermostat Type ... for Type 2403 K optionally:

Version 1: Sensor horizontal or sensor tip facing upwards

Version 2: Sensor vertical or sensor tip facing downwards

Limit value set to/lead-sealed to ...°C

Red brass body/flanged valve body (spheroidal graphite iron)

On option, special version/accessories ...

Dimensions in mm and weights

Nominal size DN	15	20	25	32 ¹⁾	40 ¹⁾	50 ¹⁾	
Pipe diameter d	21.3	26.8	32.7	42	48	60	
Connecting size R	G 3/4	G 1	G 1 1/4	G 1 3/4	G 2	G 2 1/2	
Width across flats SW	30	36	46	59	65	82	
Length L	65	70	75	100	110	130	
L1 with welding ends	210	234	244	268	294	330	
H	Type 2468/2430 K Type 2478/2430 K	32		45		45	
	Type 2469/2430 K Type 2479/2430 K	65		85		85	
H1	Type 2468/2430 K Type 2478/2430 K	245		265		295	
	Type 2469/2430 K Type 2479/2430 K	245		265		295	
H2	Type 2469/2430 K /2439 K	340		360		390	
H3	Type 2469/2430 K /2439 K	360		380		410	
Weight, approx. kg ²⁾	Type 2468/2430 K Type 2478/2430 K	2.4	2.5	2.7	4.0	6.2	7.0
	Type 2469/2430 K Type 2479/2430 K	2.5	2.6	2.7	3.8	6.5	7.0
	Type 2469/2430 K /2403 K	3.8	3.9	4.0	5.1	7.8	8.3
	Type 2469/2430 K /2439 K	3.9	4.0	4.1	5.2	7.9	8.4
Special versions							
Version with threaded ends (with male thread)							
Length L2	129	144	159	180	196	228	
Male thread A	G 1/2	G 3/4	G 1	G 1 1/4	G 1 1/2	G 2	
Weight	See version with welding ends						
Version with flanges PN 16/25³⁾							
Length L3	130	150	160	180	200	230	
Weight, approx. kg ²⁾	Type 2468/2430 K Type 2478/2430 K	3.8	4.5	5.2	7.2	10.2	12.0
	Type 2469/2430 K Type 2479/2430 K	3.9	4.6	5.2	7.0	10.5	12.0
	Type 2469/2430 K Type 2403 K	5.2	5.9	6.5	8.3	11.8	13.3
	Type 2469/2430 K Type 2439 K	5.3	6.0	6.6	8.4	11.9	13.4

- 1) Additional version: Valve with flanged body of spheroidal graphite iron
- 2) Weights for version with bulb sensor and thermowell: minus 0.2 kg for version with thermowell
- 3) Valves in DN 40 and DN 50 already have flanges mounted

The dimensions and weights of valves with flanged bodies (DN 32, 40 and 50) are identical to those valves with screwed-on flanges!

Specifications subject to change without notice.

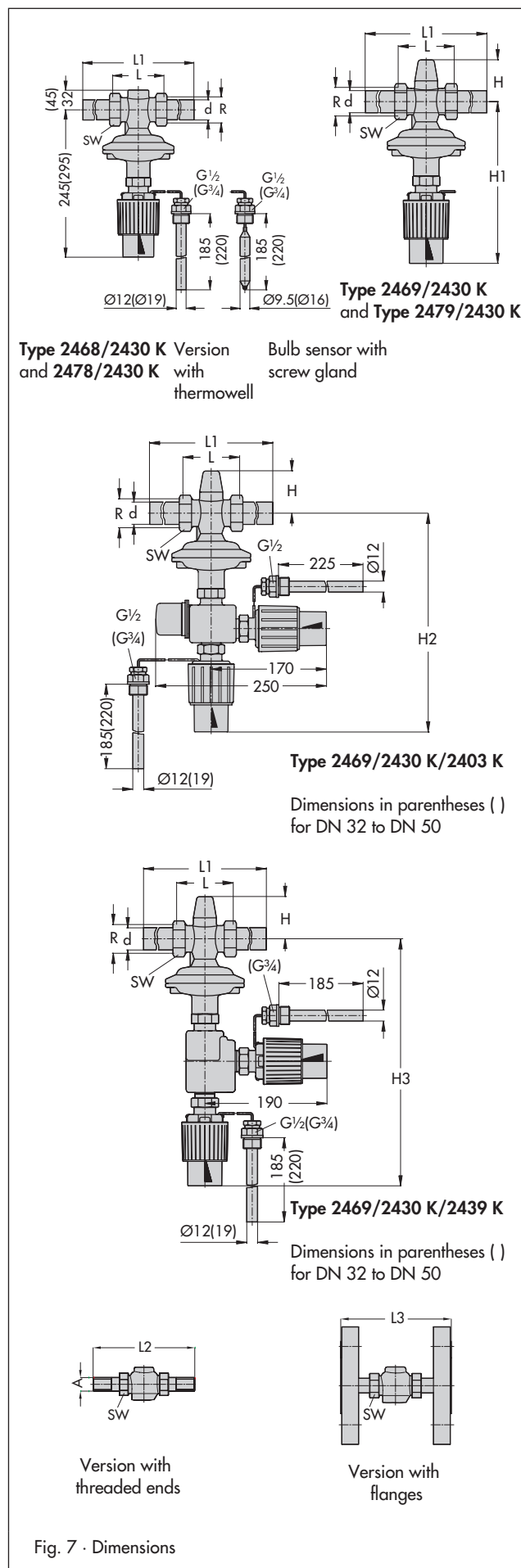


Fig. 7 · Dimensions

