

# 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 **150 °C** · Limit signals up to **120 °C** · Valves in **DN 15** to **50** · Nominal pressure **PN 25**  
Suitable for liquids up to **150 °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 other liquids and gases, provided they do not cause the materials used to corrode
- Temperature sensor for operating pressures up to 40 bar
- Suitable for district heating plants conforming to DIN 4747-1 (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 EN 14597.

### Versions

**Differential pressure or flow regulators with temperature regulators** in valve sizes DN 15 to 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 2469/2430 K** (Fig. 1) · Flow and temperature regulator with continuously adjustable flow set point at the integrated restriction (differential pressure at the restriction of 0.2 bar) · Installation in either flow or return flow pipes

**Type 2479/2430 K** · Differential pressure limiter 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 <sup>1)</sup> (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

**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

<sup>1)</sup> Type 2479/2430 K only for DN 15 to 25



Fig. 1 · Type 2469/2430 K

**Principle of operation** (see Figs. 2 to 4)

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

**Type 2469/2430 K Flow and Temperature Regulator**

The high pressure upstream of the restriction (orifice) (1.2) is transmitted to the high-pressure side of the actuator (6) over the attached control line (1.1). 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 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.

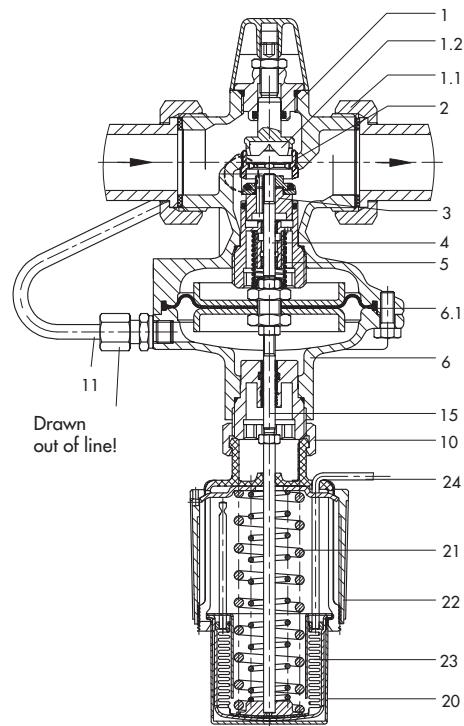
The largest signal is always used to actuate the valve.

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

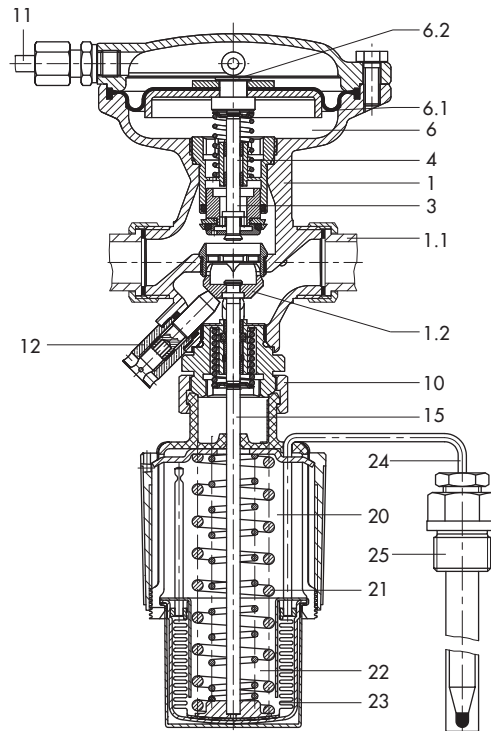
This regulator is the same as Type 2469/2430 K, except it does not have the fixed control line (1.1). Instead, the high pressure of the plant is transmitted over a control line to be attached on installing the regulator in the pipeline. The flow limitation is adjusted at the restriction (1.2).

An overload protection (excess pressure limiter) (6.2) in the actuator of Type 2479/2430 K (DN 15 to 25 only) protects seat and plug from overload during exceptional operating conditions that could lead to valve or plant damage.

- |   |                        |
|---|------------------------|
| 1 Valve body  | 10 Coupling nut        |
| 1.1 Connection nut with seal and welding end                | 11 Control line        |
| 1.2 Restriction (orifice) for adjusting flow rate set point | 12 Set point screw     |
| 2 Seat  | 15 Coupling rod        |
| 3 Plug (balanced)   | 20 Control thermostat  |
| 4 Plug stem   | 21 Springs             |
| 5 Positioning springs                                       | 22 Set point adjuster  |
| 6 Actuator  | 23 Positioning bellows |
| 6.1 Operating diaphragm                                     | 24 Capillary tube      |
| 6.2 Overload protection (excess pressure limiter)           | 25 Temperature sensor  |



Type 2479/2430 K, DN 32 to 50



Type 2479/2430 K, DN 15 to 25

Fig. 2 · Regulators for differential pressure, flow rate and temperature

### 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.

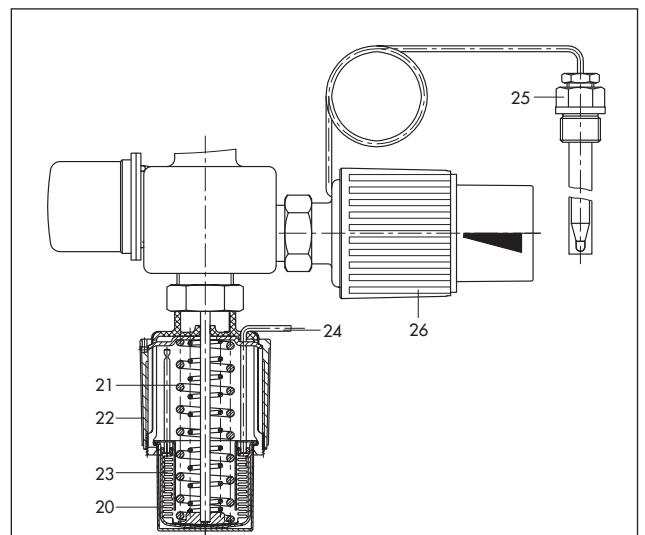


Fig. 3 · Type 2469/2430 K/2403 K  
Flow and Temperature Regulator and  
Safety Temperature Monitor

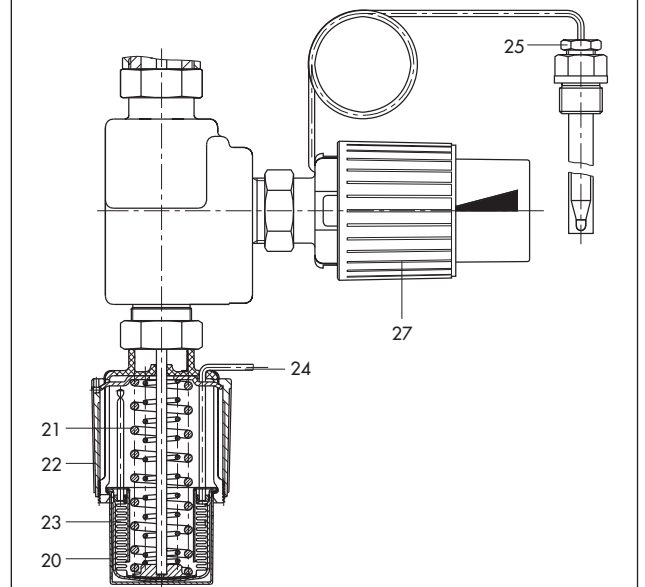


Fig. 4 · Type 2469/2430 K/2439 K  
Flow and Temperature Regulator and  
Safety Temperature Limiter

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 <sup>1)</sup>	40 <sup>1)</sup>	50 <sup>1)</sup>
K <sub>Vs</sub>	Screwed ends		0.4 <sup>2)</sup>	1.0 <sup>2)</sup>	2.5	4 <sup>2)</sup>	6.3	8	12.5	16	20
	Flanged body		–	–	–	–	–	–	12.5	20	25
x <sub>FZ</sub> 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								
<b>Differential pressure set point</b>											
Type 2479/...			Adjusted to 0.2 bar								
<b>Flow rate set point range in m<sup>3</sup>/h</b>											
Type 2469/... with diff. press. at restriction <sup>4)</sup>	0.2 bar		0.01 to 0.2	0.002 to 0.64	0.2 to 1.2	0.1 to 1.3 <sup>3)</sup> 0.1 to 2.5	0.1 to 2.3 <sup>3)</sup> 0.1 to 3.6	0.1 to 3.5 <sup>3)</sup> 0.1 to 5	0.3 to 5.8 <sup>3)</sup> 0.3 to 10	0.4 to 9.1 <sup>3)</sup> 0.4 to 12.5	0.4 to 14.1 <sup>3)</sup> 0.4 to 15

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

<sup>2)</sup> Special version

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

<sup>4)</sup> The minimum required differential pressure Δp<sub>min</sub> 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 <sup>3</sup> /h for Type 2479/...												
Δp <sub>set point</sub> Δp <sub>plant</sub> + Δp <sub>restriction</sub>	Δp <sub>plant</sub> Calculation for plant	Δp <sub>restriction</sub> Diff. pressure	DN	15				20	25	32	40	50
			K <sub>Vs</sub>	0.4 <sup>1)</sup>	1.0 <sup>1)</sup>	2.5	4 <sup>1)</sup>	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	$\dot{V}$ max.	0.2	0.64	1.2	2.5	3.6	4.2	10	12.5	15
				–	–	–	1.3 <sup>2)</sup>	2.3 <sup>2)</sup>	3.5 <sup>2)</sup>	5.8 <sup>2)</sup>	9.1 <sup>2)</sup>	14.1 <sup>2)</sup>

<sup>1)</sup> Special version

<sup>2)</sup> 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<sub>min</sub> 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	
Max. permissible ambient temperature	–20 to 80 °C <sup>1)</sup>	
Max. permissible temperature at the sensor	50 K above the adjusted set point	
Max. permissible pressure at the sensor	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	10 to 95 or 20 to 120 °C
Max. permissible ambient temperature	50 °C	80 °C (60 °C elec. signal transmitter)
Max. permissible temperature at the sensor	25 K above the adjusted set point	20 K above the adjusted limit value
Max. permissible pressure at the sensor with thermowell	40 bar	40 bar
Capillary tube	5 m	2 m (special version 5 m)

<sup>1)</sup> NOTICE For temperatures below freezing point: Ice may form and damage the plant and, in particular, the valve.

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

Valves		
Body	Red brass CC491K/CC449K (Rg 5) · Spheroidal graphite iron EN-JS 1049 <sup>1)</sup>	
Seat	Stainless steel 1.4305	
Plug	Brass <sup>3)</sup> , free of dezincification, with EPDM soft seal <sup>2)</sup>	
Valve spring	Stainless steel 1.4310	
Operating diaphragm	EPDM with fabric reinforcement <sup>2)</sup>	
Seals	EPDM <sup>2)</sup>	
Thermostat		
Sensor	Capillary tube	Copper
	Thermowell	Nickel-plated copper or stainless steel 1.4571

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

<sup>2)</sup> Special version, e.g. for mineral oils: FPM (FKM)

<sup>3)</sup> 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!

#### Flow and Temperature Regulator Type 2469/2430 K

or

#### Differential Pressure Limiter and Temperature Regulator with Flow Limitation Type 2479/2430 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/differential pressure at restriction ... 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

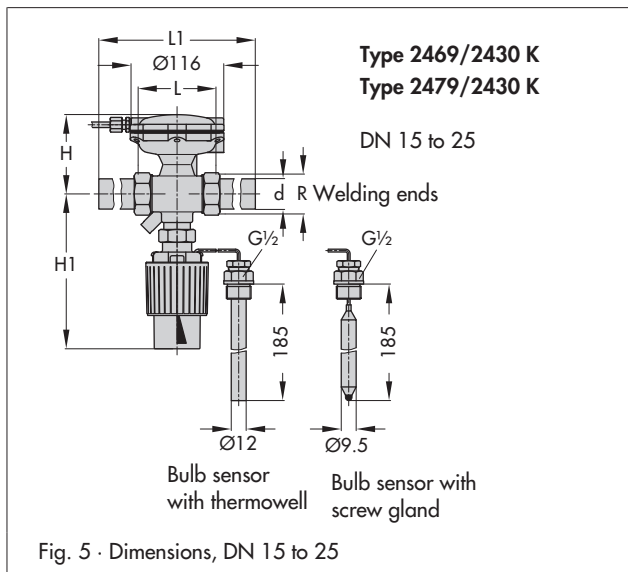
Red brass body/flanged valve body (spheroidal graphite iron)

On option, special version/accessories ...

**Dimensions in mm and weights**

Nominal size DN	15	20	25	32 <sup>1)</sup>	40 <sup>1)</sup>	50 <sup>1)</sup>	
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 2469/2430 K Type 2479/2430 K	85						
H1 Type 2469/2430 K Type 2479/2430 K	280		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 <sup>2)</sup>	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
<b>Special versions</b>							
<b>Version with threaded ends (with male thread)</b>							
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						
<b>Version with flanges PN 16/25<sup>3)</sup></b>							
Length L3	130	150	160	180	200	230	
Weight, approx. kg <sup>2)</sup>	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



Specifications subject to change without notice

