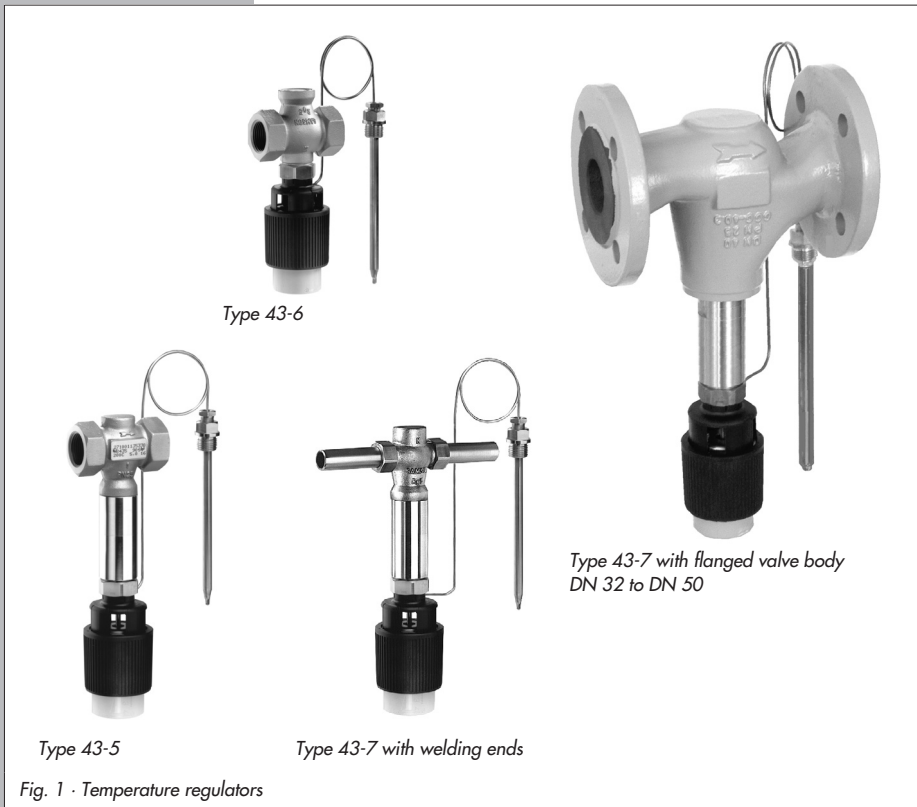


# Temperature Regulators Series 43 Type 43-5 and Type 43-7 Type 43-6



## Mounting and Operating Instructions

**EB 2172 EN**

Edition January 2008



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**Typetesting**

*The Types 43-5, 43-6 and 43-7 Temperature Regulators have been typetested by the German Technical Inspectorate (TÜV) according to DIN 3440. Register number is available on request.*



### General safety instructions

- ▶ *The regulators must be mounted, started up, and serviced by fully trained and qualified personnel only, observing the accepted industry codes and practices. Make sure employees or third persons are not exposed to any danger.  
All safety instructions and warnings in these instructions, particularly those concerning installation, start-up and maintenance, must be observed.*
- ▶ *The valves fulfill the requirements of the European Pressure Equipment Directive 97/23/EC. Valves with a CE marking have a declaration of conformity that includes information on the applied conformity assessment procedure. The declaration of conformity can be made available on request.*
- ▶ *For appropriate operation, make sure that the temperature regulator is only used in applications where the operating pressure and temperatures do not exceed the operating values based on the valve sizing data submitted in the order.  
Note that the manufacturer does not assume any responsibility for damage caused by external forces or any other external influences.  
Any hazards which could be caused in the temperature regulator by the process medium or operating pressure are to be prevented by means of appropriate measures.*
- ▶ *Proper shipping and appropriate storage are assumed.*

### Caution

- ▶ *Do not start up the temperature regulators until the valve and control thermostat have been installed.*
- ▶ *Prior to removing the regulator, make sure the relevant section of the plant has been depressurized and drained.*
- ▶ *Allow the plant to fill up slowly on start-up.*
- ▶ *Protect the regulator against frost when controlling freezing media.*
- ▶ *In cases where the sensor is used in combination with a thermowell, you must use a SAMSON thermowell.*

# 1 Design and principle of operation

## 1.1 Temperature regulator

The temperature regulator consists of a valve with the Type 2430 K Thermostat attached to it.

The valve consists of the valve body, seat and balanced plug. Type 43-5 (female thread) and Type 43-7 (male thread or with flanged valve body) close when the temperature rises. The plug in Type 43-6 is arranged in the reverse order and opens when the temperature rises.

The thermostat consists of the operating bellows, set point spring, capillary tube and temperature sensor.

## 1.2 Version with safety thermostat

When a Type 2439 K/2403 K Safety Thermostat is attached to the valve or the regulator, this combination functions as a safety temperature limiter (STL) or a temperature regulator with safety temperature limiter (TR/STL).

Refer to the Mounting and Operating Instructions EB 2185 EN for more details.

## 1.3 Version with double adapter

The temperature regulator can be equipped with a double adapter to connect an additional thermostat to control a further control variable.

Refer to the Mounting and Operating Instructions EB 2176 EN for more details.

The temperature regulator works according to the adsorption principle. The temperature of the medium to be controlled produces a pressure in the sensor which is proportional to the actual temperature measured. This pressure is transmitted over the capillary tube (10) to the operating element (13) where it is converted into a positioning force. This force acts on the positioning bellows (9) and the pin of the operating element (10) which moves the plug stem and plug (3).

By turning the set point adjuster (8), the spring (7) changes the regulator's point of response. Consequently, the valve plug moves through its full travel range within a higher or lower temperature range measured by the sensor.

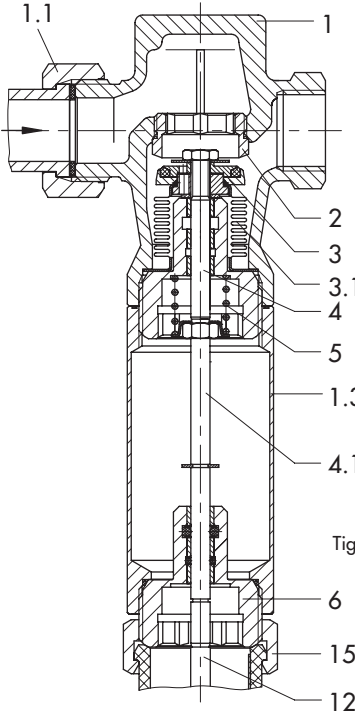
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**Note:** Thermostats such as Type 2430 K that function according to the vapor pressure principle are described in EB 2430-3 EN.

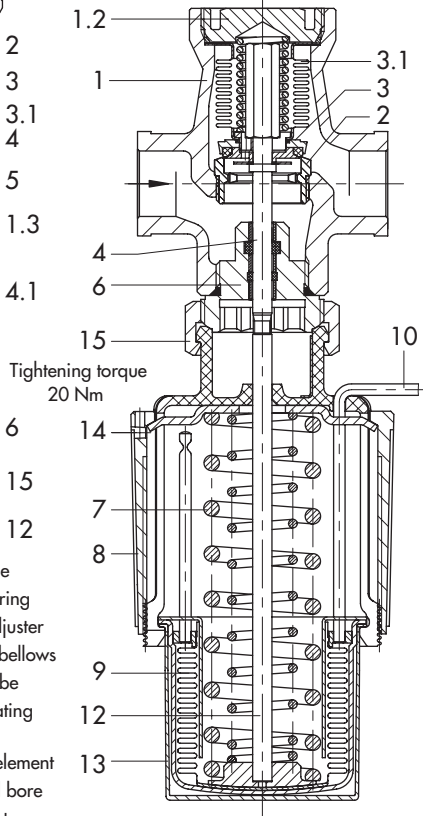
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**Type 43-7**  
Type 2437 K Valve

**Type 43-5**  
Type 2435 K Valve (female thread)



**Type 43-6**  
Type 2436 K



Tightening torque  
20 Nm

- |                              |                             |
|------------------------------|-----------------------------|
| 1 Valve body                 | 6 Guide nipple              |
| 1.1 Connection nut with seal | 7 Set point spring          |
| 1.2 Stopper                  | 8 Set point adjuster        |
| 1.3 Insulating pipe          | 9 Positioning bellows       |
| 2 Seat                       | 10 Capillary tube           |
| 3 Plug                       | 12 Pin of operating element |
| 3.1 Balancing bellows        | 13 Operating element        |
| 4 Plug stem                  | 14 Lead-sealed bore         |
| 4.1 Pin                      | 15 Coupling nut             |
| 5 Valve spring               |                             |

Fig. 2 · Sectional drawing

## 2 Installation

On installing the regulator, make sure that the permissible ambient temperature does not exceed 80 °C.

**Type 43-5 and 43-7:** If the valve is to be insulated, two thirds of the insulating pipe (1.3) must remain uninsulated.

### 2.1 Installing the valve

**Type 43-5 and 43-7:** The valve must be installed in horizontal pipes with the thermostat suspended downwards.

**Type 43-6:** The thermostat must be installed pointing upwards for temperatures lower than 110 °C.

The direction of flow must correspond with the arrow on the valve body.

### 2.1.1 Strainer

A strainer (SAMSON Type 1 or Type 2) must be installed upstream of the relevant valve, since sealing particles, globules, or other impurities carried along by the process medium could impair the proper functioning of the valve, especially tight shut-off.

The filter element must be vertically suspended. Ensure that ample space is available to remove the filter.

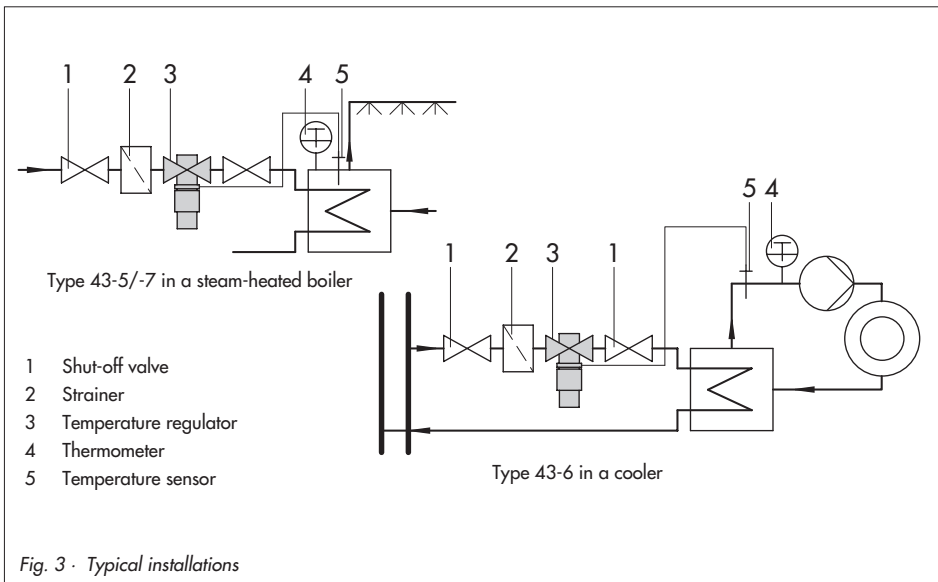


Fig. 3 · Typical installations

### 2.1.2 Additional installation instructions

We recommend to install hand-operated shut-off valves both upstream of the strainer and downstream of the regulator. This allows the plant to be shut down for cleaning or maintenance routines, or when the plant is not operated for extended periods.

To check the adjusted set point, we recommend that a thermometer be installed near the sensor so that it is immersed in the medium to be controlled.

## 2.2 Installing the sensor

The temperature sensor of Type 2430 K may be installed in any desired position. The instructions of the corresponding mounting and operating instructions must be observed for the Type 2430 K-3 Vapor Pressure Sensor.

The entire length of the sensor must be immersed in the medium to be controlled.

When choosing the position of installation, make sure that the sensor is installed in a location where overheating and considerable idling times do not occur.

Weld a welding socket with a G 1/2 or G 3/4 female thread connection at the point where the sensor is to be installed.

Seal the screw gland or thermowell into the welding socket. Insert the sensor and tighten it with the clamping screw.

---

### NOTICE

*To avoid damage caused by corrosion, it is important to make sure on installing the sensor or thermowell that only the same kind of materials are used together.*

*For example, do not use a sensor or thermowell made of non-ferrous metal in a stainless steel heat exchanger.*

*In this case, the sensor should be used together with a stainless steel thermowell.*

---

### 2.2.1 Capillary tube

The capillary tube should be routed without bends or twists. The smallest bending radius is 50 mm.

Roll up extra length to form a ring. Do not bend or shorten.

The ambient temperature around the capillary tube should be kept as even as possible.

### 3 Operation

#### 3.1 Adjusting the set point

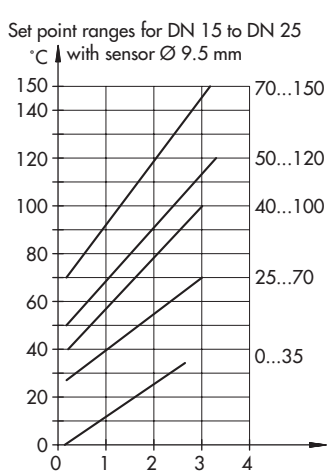
To adjust the set point, use the black plastic set point adjuster (8) while watching the reference thermometer.

The adjustment diagrams on page 9 can be used as a guide to find the first approximate value.

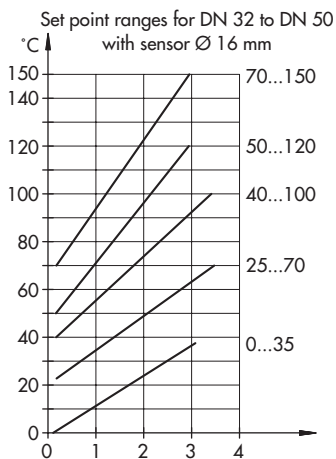
- ▶ Turning the adjuster clockwise will reduce the temperature and turning it counterclockwise will raise it.

The adjusted value can be fixed by lead-sealing the bore (14) in the set point adjuster.

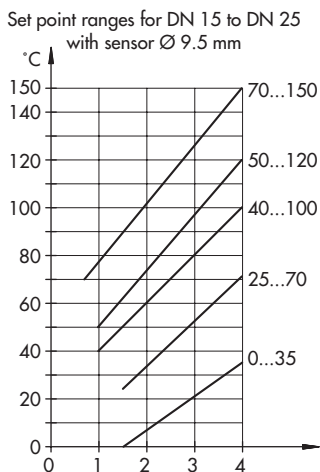
| Set point range<br>°C | Set point change<br>per turn | Sensor<br>diameter |
|-----------------------|------------------------------|--------------------|
| 0 to 35               | 2.5<br>2                     | 9.5<br>16          |
| 25 to 70              | 3<br>2                       | 9.5<br>16          |
| 40 to 100             | 4<br>3                       | 9.5<br>16          |
| 50 to 120             | 4<br>4.5                     | 9.5<br>16          |
| 70 to 150             | 4.5<br>5                     | 9.5<br>16          |



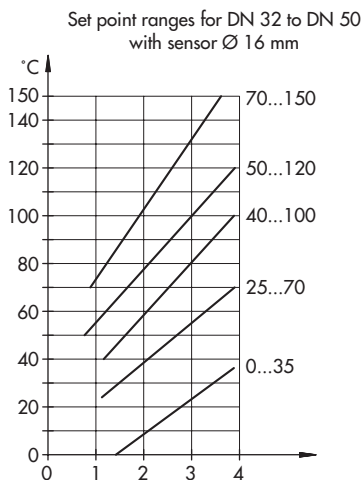
Type 43-5/-7



Turns (scale marking)



Type 43-6



Turns (scale marking)

Fig. 4 - Adjustment diagrams

## 4 Maintenance—Replacing parts

The temperature regulator is free of maintenance. Nevertheless, it is subject to natural wear, particularly at the seat and plug. Depending on the operating conditions, the regulator needs to be checked at regular intervals to avoid possible malfunctions.

If the valve does not shut off tightly, this may be due to dirt on the seat and plug or due to natural wear. The valve can be removed from the pipeline to repair it.



### CAUTION!

*Before carrying out maintenance work on the temperature regulator, first relieve the corresponding plant section of pressure and, depending on the process medium, drain it as well.*

*Let the plant section cool down to reach ambient temperature, if necessary.*

*We recommend removing the regulator from the pipeline.*

### 4.1 Cleaning or replacing the plug

To change the plug section (3), a special socket wrench is needed:

For DN 15 to 25 Order no. 1280-3001

For DN 32 to 50 Order no. 1280-3007.

For nominal sizes DN 15 to DN 25, this wrench can be made, for example, from a GEDORE screwdriver bit (IN 19-19) by drilling a hole into the 19 mm hexagon bit as shown in Fig. 5.

**Note:** To replace the seat, a special tool is required. Refer to the EB 029 EN for the product numbers 2710 to 2730.

### Type 43-5 and 43-7

1. Unscrew the coupling nut (1.5) and take the control thermostat off the valve.
2. Unscrew the guide nipple (6) and insulating pipe (1.3) from the valve body.
3. Use the socket wrench to remove the entire plug section.

### Type 43-6

1. Unscrew stopper (1.2) and pull out the entire plug section. Continue to step 4 for all versions.
4. Thoroughly clean the seat and plug. If the seat is damaged, use the seat wrench (EB 029 EN) to replace the seat. If the plug is damaged, the entire plug section as well as the seal ring in the body must be replaced with new ones.
5. Proceed in the reverse order to reassemble the valve. Insert a new seal ring for the plug section in the body. Apply a drop of "Omnifit 222" before screwing on the plug section (80 Nm). Tighten the coupling nut of the thermostat (20 Nm).

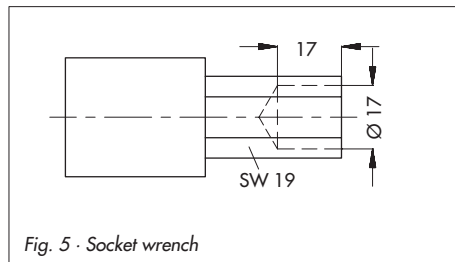


Fig. 5 · Socket wrench

## 5 Troubleshooting

### 5.1 Type 43-5 and Type 43-7

| Malfunction   | Possible causes                            | Recommended action  |
|---|--|---|
| Temperature exceeds adjusted set point                            | Seat and plug untight                      | Remove valve. Clean seat and plug. Otherwise, contact SAMSON.   |
|   | Valve too large for control task           | Recalculate $K_{VS}$ and select smaller valve.  |
|   | Sensor installed at wrong place            | Install sensor, ensuring its entire length is immersed in the medium. Do not install sensor where idle times can occur or heat accumulates. |
|   | Safety equipment e.g. STL or STM triggered | Check plant and unlock safety equipment.  |
|   | Thermostat defective                       | Replace thermostat (read specifications on nameplate).  |
| Temperature set point not reached                                 | Not enough heating energy available        | Draw up an energy balance.  |
|   | Valve too small for control task           | Recalculate $K_{VS}$ and select larger valve.   |
|   | Strainer blocked                           | Drain and clean filter of the strainer.   |
| Control loop hunts or very long idle times occur/control sluggish | Valve installed against direction of flow  | Re-install valve such that direction of flow corresponds to arrow on the body.  |
|   | Valve too large for control task           | Recalculate $K_{VS}$ and select smaller valve.  |
|   | Time constant too large for control loop   | Fill the thermowell with conductive paste, or remove thermowell or use a sensor with a smaller time constant.                               |
|   | Sensor installed at wrong place            | Sensor may be installed too far from the area where the temperature to be controlled arises. Locate sensor closer to heat exchanger.        |

## 5.2 Type 43-6

| <b>Malfunction</b>  | <b>Possible causes</b>                     | <b>Recommended action</b>   |
|---|--|---|
| Temperature set point not reached                                 | Seat and plug untight                      | Remove valve. Clean seat and plug. Otherwise, contact SAMSON.   |
|   | Valve too large for control task           | Recalculate $K_{VS}$ and select smaller valve.  |
|   | Safety equipment e.g. STL or STM triggered | Check plant and unlock safety equipment.  |
| Temperature exceeds adjusted set point                            | Valve too small for control task           | Recalculate $K_{VS}$ and select larger valve.   |
|   | Thermostat defective                       | Replace thermostat (read specifications on nameplate).  |
|   | Not enough cooling energy available        | Draw up an energy balance.  |
|   | Strainer blocked                           | Drain and clean filter of the strainer.   |
|   | Sensor installed at wrong place            | Install sensor, ensuring its entire length is immersed in the medium. Do not install sensor where idle times can occur or heat accumulates. |
| Control loop hunts or very long idle times occur/control sluggish | Valve installed against direction of flow  | Re-install valve such that direction of flow corresponds to arrow on the body.  |
|   | Valve too large for control task           | Recalculate $K_{VS}$ and select smaller valve.  |
|   | Time constant too large for control loop   | Fill the thermowell with conductive paste, or remove thermowell or use a sensor with a smaller time constant.                               |
|   | Sensor installed at wrong place            | Sensor may be installed too far from the area where the temperature to be controlled arises. Locate sensor closer to heat exchanger.        |

## 6 Dimensions in mm and weights

| Nominal size DN |          | G ½   | G ¾ | G 1 |
|-----------------|----------|---|-----|-----|
| Length L        |          | 65  | 75  | 90  |
| Type            | Height H | Weight (approx. kg) for version with bulb sensor and thermowell, version without thermowell: – 0.2 kg |     |     |
| 43-5            | 260      | 1.8   | 1.9 | 2   |
| 43-6            | 190      | 1.8   | 1.9 | 2   |

| Type 43-6/-7   | DN | 15   | 20   | 25   | 32   | 40   | 50   |
|--|----|------|------|------|------|------|------|
| Pipe Ø d   |    | 21.3 | 26.8 | 33.7 | 42   | 48   | 60   |
| Connection R   |    | G ¾  | G 1  | G 1¼ | G 1¾ | G 2  | G 2½ |
| 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  |
| Weight approx. in kg <sup>1)</sup>                                 |    | 2    | 2.3  | 2.8  | 4.7  | 5.1  | 7.5  |
| Special version with threaded ends (male thread)                   |    |      |      |      |      |      |      |
| Length L2  |    | 129  | 144  | 159  | 180  | 196  | 228  |
| Male thread A  |    | G ½  | G ¾  | G 1  | G 1¼ | G 1½ | G 2  |
| Weight approx. in kg <sup>1)</sup>                                 |    | 2.0  | 2.3  | 2.8  | 4.7  | 5.1  | 7.5  |
| Special version with flanges (PN 16/25) or with flanged valve body |    |      |      |      |      |      |      |
| Length L3  |    | 130  | 150  | 160  | 180  | 200  | 230  |
| Weight approx. in kg <sup>1)</sup>                                 |    | 3.1  | 3.9  | 4.6  | 7.6  | 8.4  | 11.4 |

<sup>1)</sup> Weight for versions with bulb sensor and thermowell; version without thermowell: subtract 0.2 kg

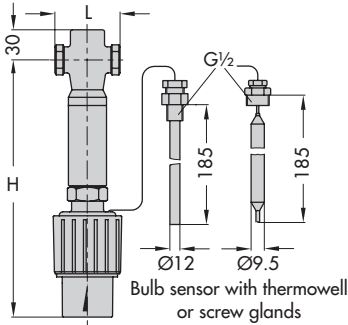
## 7 Customer inquiries

Should you have any inquiries regarding temperature regulators, please submit the following details:

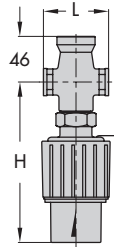
- ▶ Type and nominal size
- ▶ Order and model numbers
- ▶ Upstream and downstream pressures
- ▶ Temperature and medium
- ▶ Min. and max. flow rates

- ▶ Has a strainer been installed?
- ▶ Installation drawing

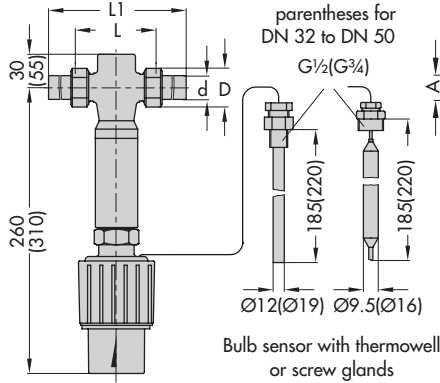
Type 43-5



Type 43-6

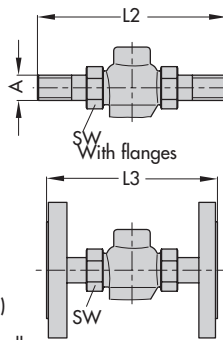


Type 43-7 with welding ends

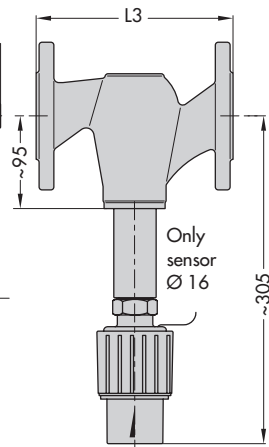


Dimensions in parentheses for DN 32 to DN 50

With threaded ends



With flanged valve body



Type 43-6 with intermediate insulating piece

Temperature range extended from 0 to -15 °C

The total height without intermediate insulating piece is reduced from ~305 mm to ~255 mm.





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**EB 2172 EN**

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