

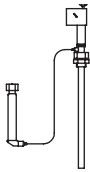
# Self-operated Regulators

## Thermostats

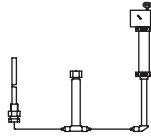
**Type 2231 and Type 2232** Bulb Sensors

**Type 2233, Type 2234, and Type 2235**

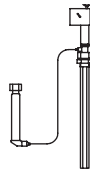
Air Sensors



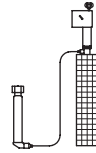
Type 2231 with  
bulb sensor



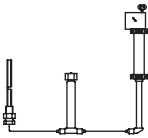
Type 2232 with bulb  
sensor (separate)



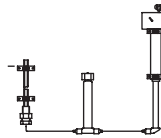
Type 2233 with air  
sensor



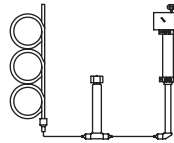
Type 2233 with  
perforated cover



Type 2234 with  
bulb sensor  
(separate) and  
clamp (on the set  
point adjuster)



Type 2234 with air sensor  
and clamp



Type 2235 with freely  
installable air sensor  
and clamp (on the set  
point adjuster)

## Mounting and Operating Instructions

**EB 2231 EN**

Edition May 2016

## Note on these mounting and operating instructions

These mounting and operating instructions assist you in mounting and operating the device safely. The instructions are binding for handling SAMSON devices.

- For the safe and proper use of these instructions, read them carefully and keep them for later reference.
- If you have any questions about these instructions, contact SAMSON's After-sales Service Department (aftersaleservice@samson.de).



The mounting and operating instructions for the devices are included in the scope of delivery. The latest documentation is available on our website ([www.samson.de](http://www.samson.de)) > Product documentation. You can enter the document number or type number in the [Find:] field to look for a document.

## Definition of signal words

### DANGER

*Hazardous situations which, if not avoided, will result in death or serious injury*

### WARNING

*Hazardous situations which, if not avoided, could result in death or serious injury*

### NOTICE

*Property damage message or malfunction*

### Note

*Additional information*

### Tip

*Recommended action*

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## 1 Design and principle of operation

The thermostat is used in combination with a control valve to regulate the temperature.

The thermostat can be fastened directly to the control valve or using a double adapter. A double adapter with or without locking facility allows a further thermostat to be connected to achieve additional temperature regulation or limitation.

The thermostat comprises the temperature sensor, set point adjuster, capillary tube, and operating element.

Depending on the field of application, the versions shown on the front cover can be selected.

The thermostats operate according to the liquid expansion principle. When, for example, the temperature at the temperature sensor (19) increases, the liquid contained in the sensor expands, causing the pin (9) of the operating element to be pushed upward by the bellows (10). This travel motion acts on

the plug stem of the connected valve and moves the valve plug until the temperature reaches the adjusted set point.

The temperature set point can be adjusted using a key (12). By turning the key, a spindle moves the piston (18) up or down, causing the volume of the liquid contained in the sensor (19) to change. As a result, the valve plug travels according to the adjusted set point within a higher or lower temperature range measured by the sensor.

### Typetesting

The Types 2231 to 2235 Control Thermostats have been tested together with control valves by the German Technical Inspectorate (TÜV) in accordance with DIN EN 3440. The register number is available on request.

### EAC compliance

The thermostats bear the EAC mark of conformity.

## 2 Installation

### 2.1 Types 2231 and 2232 (bulb sensor)

Bulb sensors are used to measure the temperature of liquids. They are designed for installation in pipelines, heat exchangers, boilers, baths, tanks, etc.

#### Installation recommendations

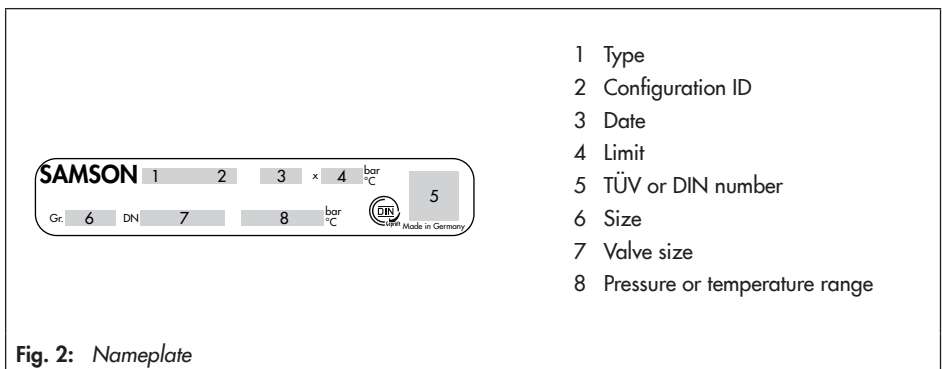
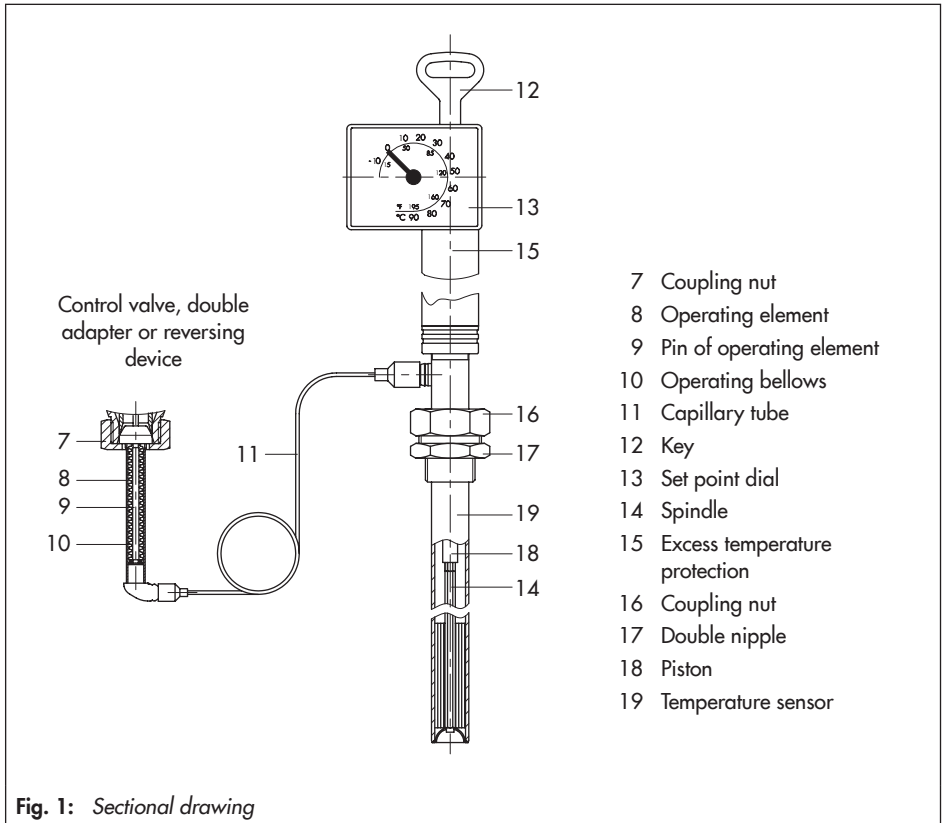
- Select the place of installation ensuring that the sensor is installed as close as

possible to the heat source, but avoid exposing it to overheating.

- When mounted in a boiler, we recommend installing the sensor in the top third of the boiler.
- When mounted in a counterflow heat exchanger, we recommend installing the sensor in a pipe elbow, directly behind the pipe end socket piece.
- In plants with only temporary heat consumption, a circulation pipe must be provided when the regulator is mounted on a counterflow heat exchanger to ensure that the sensor can respond to temperature changes in the counterflow heat exchanger even when no water is tapped.

#### Installation

- Weld on a pipe socket with female thread (socket-weld design) of approx. 40 mm in length at the place of installation (this also applies when a thermowell is used).
- Remove the double nipple (17) or thermowell (if used) from the sensor (19) and seal it into the welded socket.
- Adjust the highest possible set point on the set point dial (13) using the key (12). Insert the sensor with the associated seal into the double nipple or thermowell. Secure it with the coupling nut (16). The entire length of the temperature sensor (19) or thermowell must be immersed in the process medium.



**Thermowell:** When a thermowell is used, we recommend filling the free space between sensor and thermowell with oil or, when installed horizontally, with grease or any other heat transfer medium to avoid delays during heat transmission. Observe the thermal expansion of the filling medium. Do not fill the entire free space or slightly loosen sensor nut for pressure compensation.

### NOTICE

*Galvanic corrosion due to incorrectly selected materials of the mounting parts. On installing the sensor or thermowell, only combine the same kind of materials (e.g. stainless steel with stainless steel or copper together with other copper materials).*

## 2.2 Types 2233, 2234, and 2235 (air sensor)

**Types 2233 and 2234** are designed for installation in air heaters, air ducts, drying cabinets, etc. Install the sensor from the outside into the room and secure it with a special clamp (accessories). The entire length of the sensor must be immersed in the air flow to be regulated.

For Type 2234, install the set point adjustment in an easily accessible location.

Avoid locations with considerable ambient temperature fluctuations.

**Type 2233 with perforated cover** is generally used for installation in manufacturing facilities, living spaces, baths, etc.

### Installation recommendations

- Mount the sensor protected by a perforated cover to a suitable location, if possible in the middle of the wall.
- **Type 2234 with clamps** (or perforated cover) is suitable for installation in drying chambers, dryers, air heaters, incubators, etc. In case of forced air circulation, install the sensor near the supply air inlet. Mount the set point adjustment outside the room to be controlled in an easily accessible location. The set point adjustment must be exposed to a temperature that is as constant as possible.
- **Type 2235** is equipped with a temperature sensor to be calibrated on site. This allows the measurement of almost all temperature layers. Make sure the set point adjustment for this sensor is installed outside the room to be controlled in an easily accessible location. Avoid locations with considerable ambient temperature fluctuations.
- When regulating the temperature in greenhouses, make sure that the thermostat and set point adjuster are not exposed to direct sunlight. When the temperature regulating system is shut down during the summer, adjust a high set point to protect the thermostat.

## 2.3 Capillary tube

- ➔ Carefully run the capillary tube (11) without bending or twisting it and do not expose to any temperature fluctuations, if possible.

**NOTICE**

*Risk of malfunction due to capillary tube damage.*

- Do not damage or shorten the capillary tube.
- Roll up excess tube to form a ring (smallest bending radius = 50 mm).

## 2.4 Operating element

- Attach the operating element (8) to the valve body or double adapter using the coupling nut (7).

## 3 Operation

### 3.1 Adjusting the set point

Only use the key (12) to adjust the required temperature set point at the set point dial (13).

- Slowly turn the key clockwise to increase the temperature and counterclockwise to reduce it.
- Read off the temperature at the reference thermometer of the plant and readjust with key, if necessary.

**Note**

*Higher set point temperatures can be adjusted in increments as required. However, to lower the set point temperature, proceed in steps of 10 to 20 °C. When doing so, wait for the process medium to cool down before continuing (watch the thermometer).*

### 3.2 Correcting the set point dial

Due to special conditions on site, the temperature adjusted at the set point dial might not be the same as the reading at the reference thermometer. If this is the case, proceed as follows:

- Undo the screw labeled "Korrektur" on the back of the dial housing.
- Turn the entire dial housing until the dial shows the same temperature as the reference thermometer.
- Turn clockwise to increase the set point and counterclockwise to reduce it (viewed from the front with the dial housing on top).
- A 360° turn corresponds to a set point change of approx. 1.5 °C.



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