Temperature Regulators Series 43
Type 43-1
Type 43-2

Type 43-1 · Version with female thread

Type 43-2 · Version with welding ends

Type 43-2 · Version with flanged valve body DN 32 to 50

Fig. 1 · Temperature regulators

Mounting and Operating Instructions

EB 2171 EN

Edition August 2003

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Typetesting
The Types 43-1 and 43-2 Temperature Regulators have been typetested by the German Technical Inspectorate (TÜV) according to DIN EN 14597 using the type designation 2750-0.
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.*

NOTICE

- *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 a valve body, seat and a pressure-balanced plug. The thermostat contains an operating bellows, set point spring, capillary tube and temperature sensor.

NOTICE
Use a maximum torque of 20 Nm to attach the thermostat to the valve.

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 as a safety temperature monitor (STM).
Refer to the Mounting and Operating Instructions EB 2185 EN for more details.

1.3 Version with double adapter and/or manual adjustment

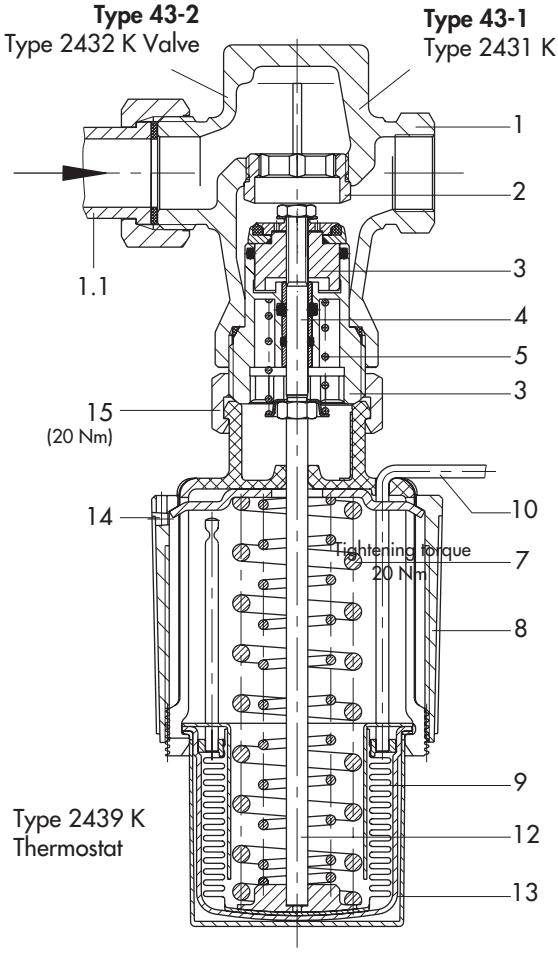
The temperature regulator can be equipped with a double adapter to connect an additional thermostat to control a further control variable and/or manual adjustment.

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

Principle of operation:
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 operating bellows (9) and the pin of the operating element (12) 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.

Note: *Thermostats working according to the vapor pressure principle are described in EB 2430-3 EN.*



1 Valve body
1.1 Connection nut with seal and welding end
2 Seat
3 Plug
4 Plug stem
5 Valve spring
7 Set point spring
8 Set point adjuster
9 Operating bellows
10 Capillary tube
12 Pin of operating element
13 Operating element
14 Lead-sealed bore
15 Coupling nut

Fig. 2 · Sectional drawing

2 Installation

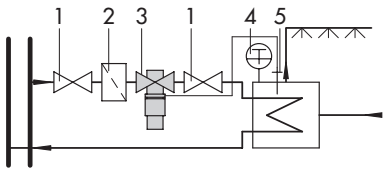
On installing the regulator, make sure that the permissible ambient temperature does not exceed 80 °C.

2.1 Installing the valve

The valve must be installed in horizontal pipes with the thermostat suspended downwards. Other installation positions are also possible for temperatures lower than 110 °C.
The direction of flow must correspond with the arrow on the valve body.

2.1.1 Strainer

Install a strainer (SAMSON Type 1 or Type 2, refer to Data Sheet T 1010 EN and 1015 EN) upstream of the valve to prevent any sealing parts, weld spatter or other impurities carried along by the process medium from impairing the proper functioning of the valve, particularly tight shut-off.
The filter element of the strainer must be suspended downwards.
Make sure sufficient space is left to allow the filter element to be removed.



1 Shut-off valve
2 Strainer
3 Temperature regulator
4 Thermometer
5 Temperature sensor

Fig. 3 · Typical installation in a water-heated boiler

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 temperature 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 ½ or G ¾ 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 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 °C	Set point change per turn	Sensor diameter
0 to 35	2.5 2	9.5 16
25 to 70	3 2	9.5 16
40 to 100	4 3	9.5 16
50 to 120	4 4.5	9.5 16
70 to 150	4.5 5	9.5 16

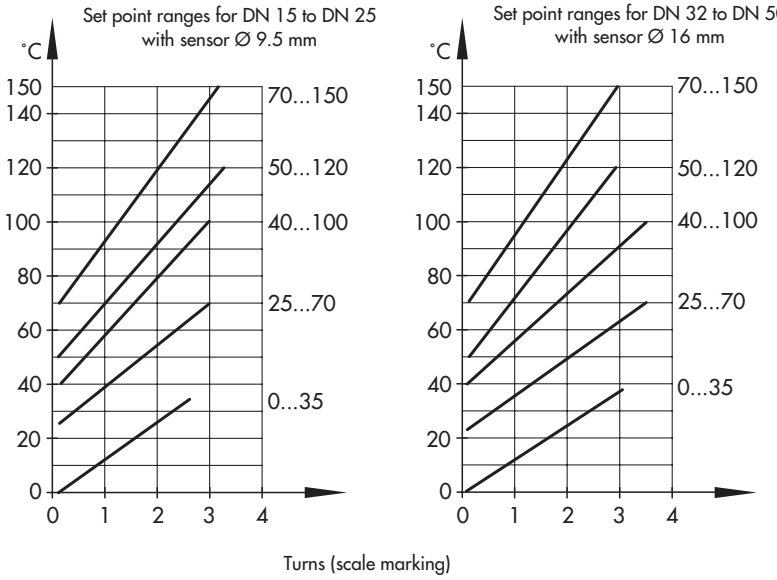


Fig. 4 · Adjustment diagrams

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.

NOTICE
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.*

1. Unscrew the coupling nut (15) and take the control thermostat off the valve.
2. Use the socket wrench to remove the entire plug section.
3. Clean the plug and seat thoroughly.
   If the seat is damaged, it must be removed using the seat tool specified in EB 029 EN and replaced with a new one.
   If the plug is damaged, the entire plug section as well as the gasket in the body must be replaced with new ones.
4. Proceed in the reverse order to reassemble the valve.
   Insert a new gasket for the plug section in the body. Apply a drop of 'Omnifit 222' before screwing on the plug section (tightening torque 80 Nm).
   Tighten the coupling nut of the thermostat on the valve with 20 Nm.

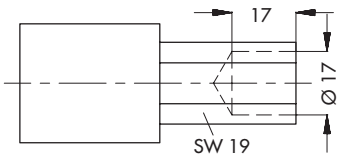


Fig. 5 · Socket wrench

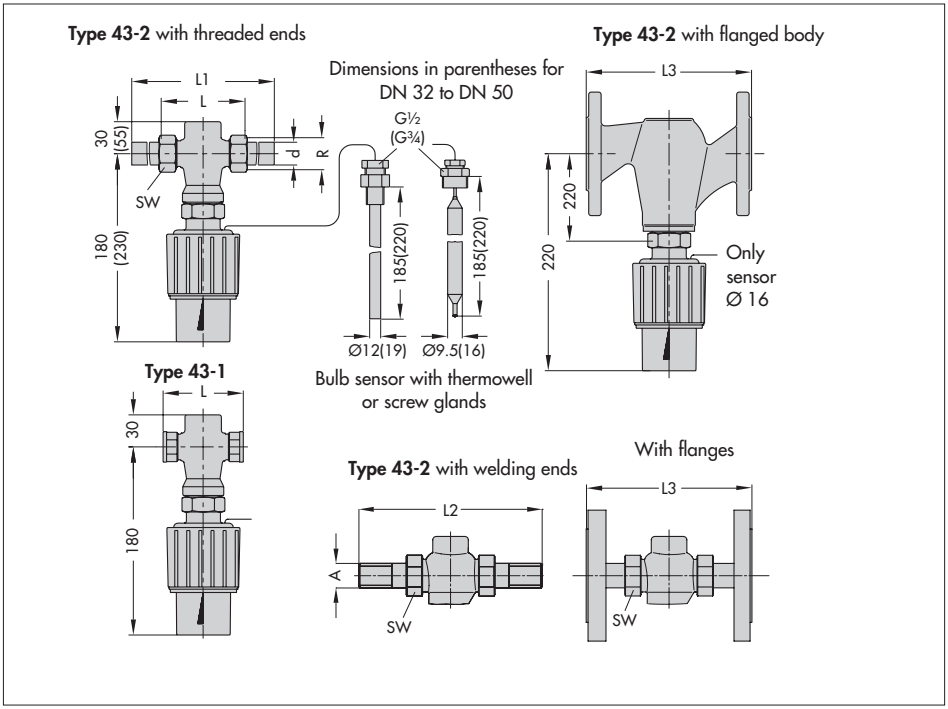
5 Troubleshooting

Malfunction	Possible causes	Recommended action
Temperature at the sensor exceeds the adjusted set point	Seat and plug untight	Remove valve. Clean seat and plug. Otherwise, contact SAMSON.
	Valve too large or too small for control task	Recalculate K_{VS} and contact SAMSON.
	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.
	Not enough heating or cooling energy available	Draw up an energy balance.
Temperature set point at the sensor is not reached	Thermostat defective	Send thermostat to SAMSON for repair.
	Strainer blocked	Drain and clean filter of the strainer.
	Valve installed in the wrong way	Remove valve and re-install in the direction indicated by the arrow.
Control loop hunts	Valve too large for control task	Recalculate K_{VS} and contact SAMSON.
	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.

6 Dimensions in mm and weights

Type 43-1 **G**	½	¾	1			
Length L	65	75	90			
Weight approx. in kg[1)]	1.4	1.5	1.6			
Type 43-2 **DN**	**15**	**20**	**25**	**32**	**40**	**50**
Pipe Ød	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[1)]	1.7	2.0	2.3	4.4	5.1	5.9
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[1)]	1.7	2.0	2.3	4.4	5.1	5.9
Special version with flanges (PN 16/25)						
Length L3	130	150	160	180	200	230
Weight approx. in kg[1)]	3.1	4.0	4.8	7.6	9.1	11.0
Version with flanged valve body						
Length L3	–				200	230
Weight approx. in kg[1)]					9.8	14.1

[1)] 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

SAMSON AG · MESS- UND REGELTECHNIK
Weismüllerstraße 3 · 60314 Frankfurt am Main · Germany
Phone: +49 69 4009-0 · Fax: +49 69 4009-1507
Internet: http://www.samson.de

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