

**Differential Pressure  
and Temperature Regulators  
Type 2468/2430 K  
Type 2478/2430 K**



*Fig. 1 - Type 2478/2430 K*

**Mounting and  
Operating Instructions**

**EB 3132-1 EN**

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### General safety instructions

- ▶ The differential pressure and temperature regulator may only be mounted, started up or serviced by fully trained and qualified personnel, 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 mounting and operating instructions, particularly those concerning assembly, start-up, and maintenance, must be observed.
- ▶ The regulator fulfils the requirements of the European Pressure Equipment Directive 97/23/EC. Valves with a CE marking have a declaration of conformity, which includes information about the applied conformity assessment procedure. The declaration can be viewed and downloaded on the Internet at <http://www.samson.de>.
- ▶ For appropriate operation, make sure that the regulator is only used in areas where the operating pressure and temperatures do not exceed the operating values that are based on the valve sizing data submitted in the order.  
The manufacturer does not assume any responsibility for damage caused by external forces or any other external influence!  
Any hazards that could be caused in the regulator by the process medium, the operating pressure or by moving parts are to be prevented by means of the appropriate measures.
- ▶ Proper shipping and appropriate storage are assumed.

### Important!

- ▶ When removing the regulator from the pipeline, make sure the relevant section of the plant has been depressurized and, depending on the process medium, drained as well.  
If necessary, allow the regulator to cool down or heat up to reach ambient temperature prior to starting any work on it.
- ▶ Make sure the regulator is frost protected when it is used to control freezing process media.

**Note!** Non-electrical control valves, whose valve bodies are not lined with an **insulating material coating**, do not have their own potential ignition source according to the risk assessment stipulated in EN 13463-1: 2001, paragraph 5.2, even in the rare incident of an operating fault. Therefore, such valve versions do **not** fall within the scope of Directive 94/9/EC.

### 1 Design and principle of operation

The differential pressure regulator consists of a Type 2468 or Type 2478 Control Valve with seat and balanced plug, the closing actuator with operating diaphragm as well as the thermostat with set point adjuster, capillary tube, and temperature sensor.

The regulator is designed to maintain the differential pressure and temperature at the adjusted set point value. The valve closes as the controlled variable increases.

Regulator versions for safety devices as safety temperature monitors FR/TR/STM are additionally equipped with a Type 2403 Safety Thermostat; as safety temperature limiters FR/TR/STL, they are equipped with a Type 2439 K Safety Temperature Limiter.

For details, refer to the mounting and operating instructions

EB 2183 (2083) EN for Type 2403 and  
EB 2185 EN for Type 2439 K.

The medium flows through the area released between the seat and plug in the direction indicated by the arrow on the body; the differential pressure or temperature is determined by the position of the plug.

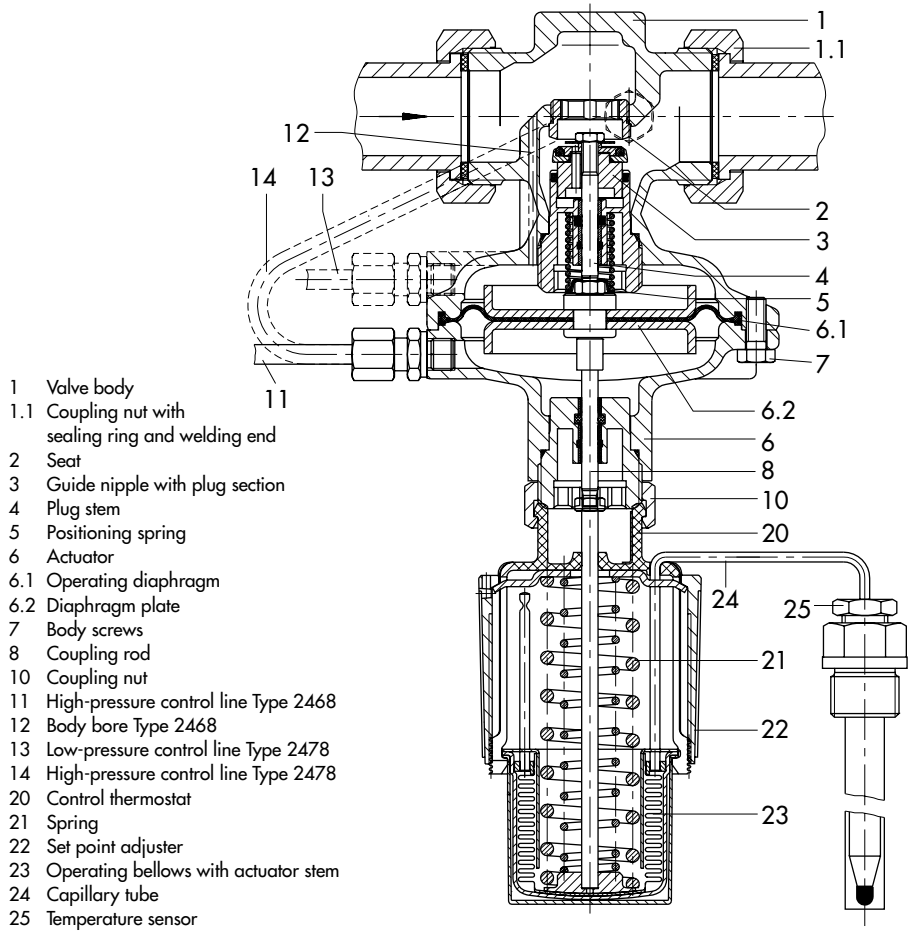
For differential pressure regulation with the Type 2468, the high pressure is transferred to the outer diaphragm chamber through the control line (11) to be provided by the customer; the low pressure is applied to the low-pressure side of the operating diaphragm (6.1) through a bore (12) in the valve body.

In Type 2478, the high pressure is applied to the operating diaphragm over the attached control line (14); the low pressure acts on the diaphragm through the control line (13) to be provided by the customer. The positioning force resulting from the differential pressure moves the valve plug against the force of the positioning spring (5).

The temperature of the process medium creates a pressure in the temperature sensor. This pressure is transmitted to the operating bellows (23) over the capillary tube (24) and converted into a positioning force. This force is used to move the valve plug (3) via the coupling rod (8) depending on the force of the spring (21) pretensioned by the set point adjuster (22).

The larger signal is used to actuate the valve.

Tightening torques		DN	Nm
Item 10	Coupling nut		20
Item 3	Plug	15...25	70
		32...50	110
Item 7	Screw	15...32	8
		40...50	18



- 1 Valve body
- 1.1 Coupling nut with sealing ring and welding end
- 2 Seat
- 3 Guide nipple with plug section
- 4 Plug stem
- 5 Positioning spring
- 6 Actuator
- 6.1 Operating diaphragm
- 6.2 Diaphragm plate
- 7 Body screws
- 8 Coupling rod
- 10 Coupling nut
- 11 High-pressure control line Type 2468
- 12 Body bore Type 2468
- 13 Low-pressure control line Type 2478
- 14 High-pressure control line Type 2478
- 20 Control thermostat
- 21 Spring
- 22 Set point adjuster
- 23 Operating bellows with actuator stem
- 24 Capillary tube
- 25 Temperature sensor

Fig. 2 · Sectional drawing

## 2 Installation

Install the regulator as illustrated in the schematics in Fig. 3 in the low-pressure line (return pipe) or high-pressure line (flow pipe). Upon installation, make sure the permissible ambient temperature of 80 °C is not exceeded.

### 2.1 Mounting position

Install the regulator in a horizontal pipeline with the actuator including thermostat vertically suspended. In sizes DN 15 to 25, the regulator can also be installed in a vertical pipeline.

Make sure the medium flows through the regulator in the direction indicated by the arrow on the body.

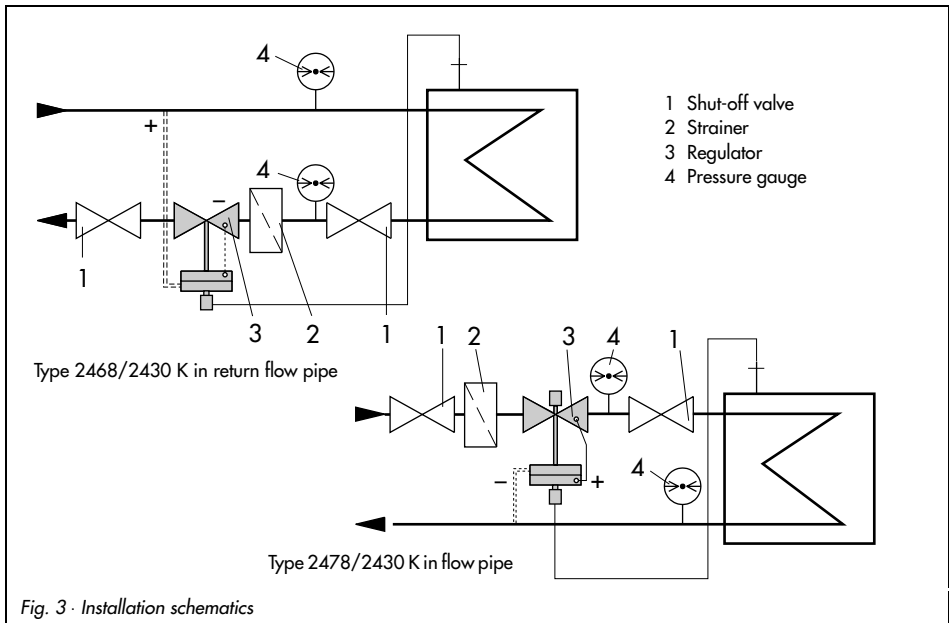
### 2.2 Control line

The high-pressure line must be adapted and attached on site. Make absolutely sure that the line is free of dirt.

The piping arrangement depends on the applicable installation schematics (Fig. 3).

### 2.3 Strainer

Install a strainer (SAMSON Type 1NI) upstream of the regulator to prevent that any sealing parts, weld spatter, and other impurities carried along by the process medium impair the proper functioning of the valve, above all the tight shut-off.



Make sure the direction of flow through the strainer corresponds to the arrow on the strainer body.

The filter element must be vertically suspended. Remember to leave enough space to remove it.

## 2.4 Additional mounting instructions

We recommend to install a hand-operated shut-off valve both upstream of the strainer and downstream of the regulator to be able to shut down the plant for cleaning and maintenance.

To monitor the pressures in the plant, install a pressure gauge both in the flow and return flow pipes.

To check the adjusted set point, we recommended to install a thermometer near the sensor that extends into the process medium.

## 2.5 Installing the temperature sensor

*For details on the Type 2430 K Thermostat, refer to Mounting and Operating Instructions EB 2430 EN.*

*Details on the Type 2430 Thermostat (vapor pressure) can be found in EB 2430-3 EN.*

The Type 2430 K Temperature Sensor can be installed in any desired mounting position. Its entire length must be immersed in the process medium.

Choose a place of installation where neither overheating nor considerable idle times occur.

Weld in a socket with a G 1/2 or G 3/4 female thread at the place of installation.

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



### **Caution!**

*To prevent corrosion damage, make sure that only the same kind of materials are used together when installing the sensor or thermowell.*

*For example, do not use temperature sensors or thermowells of non-ferrous metal in a stainless steel heat exchanger. In this case, install a stainless steel sensor or thermowell.*

## 2.5.1 Capillary tube

Install the capillary tube such that no mechanical damage can occur.

The smallest permissible bending radius is 50 mm. Roll up the excess tube to form a ring; never bend or shorten the tube.

Make sure the capillary tube is not exposed to large temperature fluctuations.

## 2.6 Installing the valve and thermostat

Place the thermostat on the connection of the actuator and fasten it with the coupling nut (10) using a tightening torque of 20 Nm.

## 3 Operation

### 3.1 Start-up

Allow the plant to fill up slowly on start-up. When pressure-testing the pipelines with the regulator installed, the test pressure must not exceed 1.5 times the nominal pressure.

### 3.2 Set point adjustment

Adjust the set point with the black plastic ring (set point adjuster 22), observing the reference thermometer.

- ▶ Turning the adjuster clockwise causes the temperature to decrease; turning counter-clockwise increases the temperature.

The adjusted value can be sealed using the bore in the set point adjuster.

## 4 Maintenance – replacing parts

The regulator is maintenance free. Nevertheless, it is subject to natural wear, particularly at the seat, plug, and operating diaphragm.

Depending on the operating conditions, the regulator needs to be checked at regular intervals to avoid possible malfunctions.

Details on faults and how to correct them can be found in section 5. If a problem cannot be solved with the help of the information specified in the table, contact SAMSON.

To replace the plug and operating diaphragm, proceed as described in sections 4.1 and 4.2.



#### **Caution!**

*Remove the regulator from the pipeline when working on it. To do so, make sure the relevant section of the plant has been depressurized and drained.*

*For high medium temperatures, allow the section of the plant to cool down to reach ambient temperature before you start.*

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## 4.1 Cleaning or replacing the plug

1. Unscrew coupling nut (10) and remove thermostat from the regulator.
2. Unscrew control lines and remove regulator from the pipeline.
3. Unscrew body screws (7). Remove lower diaphragm case including diaphragm (6.1) and diaphragm plate (6.2).
4. In sizes DN 15 to 25, unscrew guide nipple (3) using a socket wrench (order no. 1280-3001) and remove it.

The required socket wrench can also be made from, for example, a GEDORE screwdriver bit (IN 19-19) by boring a 17 mm hole ( $\varnothing 17$ ) into the 19 mm hexagon bit (Fig. 4).

In sizes DN 32 to 50, unscrew stopper before removing the plug section.

5. Thoroughly clean seat and plug section.
6. Remove any blockages from the control line. If the plug is damaged, remove entire plug section.
7. Reassemble regulator in reverse order, observing the tightening torques specified in the table in Fig. 2.

## 4.2 Replacing the diaphragm

1. Unscrew coupling nut (10) and remove thermostat from the regulator.
2. Unscrew control lines and remove regulator from the pipeline.
3. Unscrew body screws (7). Remove lower diaphragm case including diaphragm and diaphragm plate.
4. Replace complete diaphragm including diaphragm plates.
5. Reassemble regulator in reverse order, observing the tightening torques specified in the table in Fig. 2.

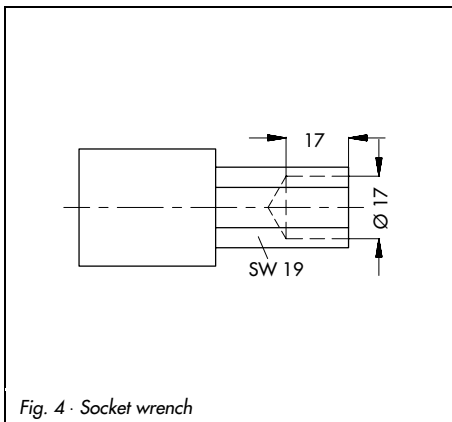


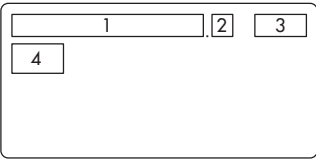
Fig. 4 · Socket wrench

## 5 Troubleshooting

Fault	Possible causes	Solution
Differential pressure	Leakage at seat and plug	Remove valve, clean seat and plug. If necessary, replace plug (section 4.1). Otherwise, return device to SAMSON for repair.
Differential pressure set point exceeded	Defective operating diaphragm	Replace diaphragm (section 4.2) or return device to SAMSON for repair.
	Blocked control line	Remove and clean control line.
	Valve too large for control task	Recalculate $K_{VS}$ and contact SAMSON.
Differential pressure set point not reached	Safety device was triggered	Check plant, unlock safety device (e.g. pressure limiter).
	Insufficient differential pressure across plant	Compare existing differential pressure across plant with plant drag. Min. diff. pressure = Diff. pressure at restriction + $(\dot{V}/K_{VS})^2$
	Blocked strainer	Empty and clean strainer filter.
	Incorrectly installed valve	Install regulator such that flow direction corresponds to arrow on body.
Control loop hunts	Valve too large for control task	Recalculate $K_{VS}$ and contact SAMSON.
Temperature set point at sensor exceeded or not reached	Leakage at seat and plug	Remove valve, clean seat and plug. If necessary, replace plug (section 4.1). Otherwise, return device to SAMSON for repair.
	Sensor installed in wrong location	Make sure sensor's entire immersion length is immersed in medium. Check that sensor is not installed in dead spot or area where heat accumulates.
	Safety device (e.g. STL or STM) was triggered	Check plant, unlock safety device.

Temperature set point exceeded	Insufficient heating or cooling energy available	Generate energy balance.
	Defective thermostat	Return thermostat to SAMSON for repair.
Control loop hunts	Valve too large for control task	Recalculate $K_{VS}$ and contact SAMSON.
	Time constant too high for control loop	Fill thermowell with conductive paste, remove thermowell, or use sensor with smaller time constant.

## 6 Description of the nameplate



1 Model number  
2 Modification index  
3 Date of manufacture  
4 Type designation

In the other fields:  
 $K_{VS}$  or  $c_v$   
 Diff. pressure set point range bar or psi  
 Max. perm. temperatur °C or °F  
 Max. perm. differential pressure  $\Delta p$   
 Nominal pressure PN or ANSI Class

*Fig. 5 · Inscription*

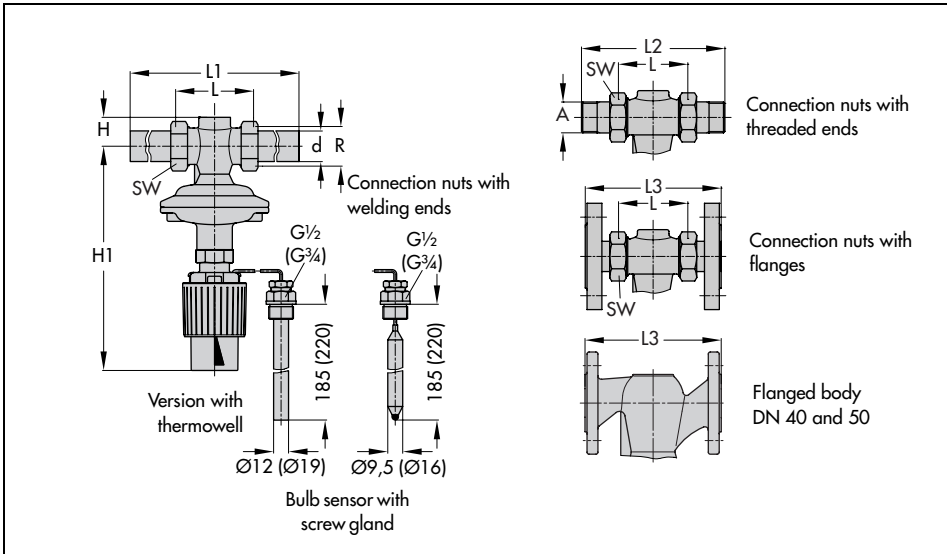
## 7 Customer inquiries

If you have any inquiries, submit the following details:

- ▶ Regulator type and size
- ▶ Threaded or flange connection
- ▶ Model number
- ▶ Pressures upstream and downstream of the regulator
- ▶ Process medium and temperature
- ▶ Max. and min. flow rate
- ▶ Has a strainer been installed?
- ▶ Installation drawing

## 8 Dimensions in mm and weights

Nominal size DN	15	20	25	32	40	50
Inside pipe diameter $\varnothing d$	21.3	26.8	32.7	42	48	60
Connection 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
Height H	32			45		
Height H1	245			265	295	
Standard version						
Welding ends L1	210	234	244	268	294	330
Weight, approx. kg	2.4	2.5	2.7	4.0	6.2	7.0
Special version with threaded ends (male thread)						
Length L2	129	144	159	180	196	228
Male thread A	G1/2	G3/4	G1	G1 1/4	G1 1/2	G2
Weight, approx. kg	2.2	2.3	2.4	5.9	6.4	6.9
Special version with flanges PN 16/25 or version with flanged body (DN 40/50)						
Length L3	130	150	160	180	200	230
Weight, approx. kg	3.6	4.3	4.9	9.1	10.4	11.9







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