

Pneumatic Transmitters



Type 812-1 Pneumatic Transmitter for Temperature



Type 812-1 with fixed sensor



Type 812-1 · Sensor with capillary tube

Mounting and Operating Instructions

EB 7575 EN

Edition August 2014

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 General safety instructions

- The device must be mounted, started up or serviced by fully trained and qualified personnel only; the accepted industry codes and practices are to be observed. Make sure employees or third persons are not exposed to any danger.
- According to these mounting and operating instructions, trained personnel refers to individuals who are able to judge the work they are assigned to and recognize possible dangers due to their specialized training, their knowledge and experience as well as their knowledge of the applicable standards.
- To ensure appropriate use, only use the device in applications where the operating pressure and temperatures do not exceed the specifications used for sizing the regulator at the ordering stage.
- The manufacturer does not assume any responsibility for damage caused by external forces or any other external factors.
- Any hazards that could be caused in the regulator by the process medium, operating pressure or by moving parts are to be prevented by taking appropriate precautions.
- Proper transport, storage, installation, operation and maintenance are assumed.
- SAMSON does not assume any liability for damage caused when the device is not used as intended.

2 Process medium and scope of application

Instrument for use in pneumatic control systems for measuring temperatures and converting the measured value into a standardized pneumatic signal from 0.2 to 1.0 bar or 3 to 15 psi
Suitable for liquids, gases or vapors at temperatures from -40 to $+300$ °C.

2.1 Transportation and storage

Transport and store within permissible ambient temperature range (-40 to $+90$ °C). Protect the transmitter against adverse influences, such as shocks, dirt or moisture.

3 Design and principle of operation

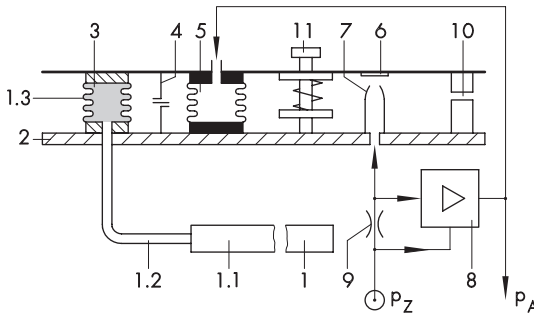
The sensor of the transmitter is either fixed to the transmitter or connected with the measuring system over a capillary tube, depending on the version.

The medium temperature creates a pressure proportional to the temperature in the gas-filled sensor (1.1). This pressure acts on the measuring bellows (1.3) creating a force, which is measured at the balance beam (3) and converted into a pneumatic signal (p_A).

The supply air p_Z flows through the booster (8), passes on to the restriction (9) and the nozzle (7) and finally hits the flapper (6).

An increase in temperature causes the flapper to come closer to the nozzle. As a result, the output pressure p_A applied to the feedback bellows (5) rises until a new equilibrium is reached, i.e. until the output signal reaches a value proportional to the temperature.

Zero is adjusted at the adjustment screw (11).



- | | | | | | |
|-----|------------------------------|----|-----------------------|-------|-----------------|
| 1 | Temperature measuring system | 5 | Feedback bellows | p_Z | Supply air |
| 1.1 | Sensor | 6 | Flapper | p_A | Output pressure |
| 1.2 | Capillary tube | 7 | Nozzle | | |
| 1.3 | Measuring bellows | 8 | Booster | | |
| 2 | Base plate | 9 | Restriction | | |
| 3 | Balance beam | 10 | Attenuation | | |
| 4 | Cross spring pivot | 11 | Zero adjustment screw | | |

Fig. 1: Functional diagram

4 Installation

See section 8 on page 11.

4.1 Version with fixed bulb sensor

Install the transmitters in such a way that the temperature sensor (1.1) is in the horizontal position and the pneumatic connections face downwards.

If a different mounting position is used, the lower measuring range value might be shifted.

Readjust zero using the zero adjustment screw (11) as described in section 5.1. The measuring span remains unaffected by a different mounting position.

Regardless of which mounting position is used, the bulb sensor with its effective length of 300 mm must be completely immersed in the process medium that is to be measured.

4.2 Version with capillary sensor

A bracket is supplied to mount the transmitter to mount to a wall. Mount the device as horizontal as possible with the pneumatic connections at the side.

Pipe mounting requires a special mounting bracket (order no. 1089-0101).

The temperature sensor can be installed in any position as required. The bulb sensor with its effective length of 300 mm must be completely immersed in the process medium that is to be measured.

4.3 Capillary tube

Route the capillary tube ensuring that it does not get damaged. The smallest bending radius must not be smaller than 50 mm.

Any capillary tube that is not used must be rolled up. Do not bend or shorten it.

The capillary tube must not be exposed to any large temperature fluctuations.

4.4 Installing the sensor

To install the sensor, a coupling sleeve with R 1/2 or R 3/4 female thread must be used at the point of measurement depending on the sensor version. Screw or seal one of the mounting parts shown in Fig. 3 into this sleeve.

The mounting parts for the sensor must be ordered separately. They are not included in the scope of the transmitter delivery.

4.5 Pneumatic connections

The pneumatic connections are designed with 1/8 NPT (G 1/8) thread.

Conventional screw fittings for pipes or plastic hoses may be used.



Note:

Make sure the supply air is dry as well as free of oil and dust. Read the maintenance instructions for upstream pressure reducing stations! Blow through all air pipes and hoses thoroughly before connecting them.

5 Operation

The measuring range specified in the order (see nameplate) is already set at the factory and cannot be changed.

Depending on the mounting position though, zero (lower range value) can be recalibrated.

5.1 Zero point calibration

1. Remove the cover from the transmitter.
2. Connect a pressure gauge at the pneumatic output and apply a supply air of 1.4 ± 0.1 bar to the supply air input.
3. Produce a temperature at the temperature sensor that corresponds with the lower range value of the transmitter, e.g. $50\text{ }^{\circ}\text{C}$ at a measuring range of $+50$ to $+150\text{ }^{\circ}\text{C}$.
4. Set the supply air. The pressure gauge must indicate a pressure of 0.2 bar. If this value is incorrect, readjust the zero adjustment screw (11) accordingly.

6 Versions - Ordering number -

| Version | Order no.: 3812- | ... | ... | ... | ... | ... | ... | ... | 0 | 0 | 0 | ... |
|---|------------------|-----|-----|-----|-----|-----|-----|-----|---|---|---|-----------------|
| Sensor type | | | | | | | | | | | | |
| Bulb sensor | 1 | | | | | | | | | | | |
| Air sensor | 2 | | | | | | | | | | | |
| Sensor for food processing (T-union) | 3 | | | | | | | | | | | |
| Sensor version | | | | | | | | | | | | |
| Capillary tube, 3 m | 1 | | | | | | | | | | | |
| Protected capillary tube, 3 m | 2 | | | | | | | | | | | |
| Capillary tube, 6 m | 3 | | | | | | | | | | | |
| Protected capillary tube, 6 m | 4 | | | | | | | | | | | |
| Bulb sensor, fixed | 5 | | | | | | | | | | | |
| Span | | | | | | | | | | | | |
| 50 °C | | | | 0 | 0 | | | | | | | |
| 100 °C | | | | 1 | 0 | | | | | | | |
| 200 °C | | | | 1 | 1 | | | | | | | |
| Output signal | | | | | | | | | | | | |
| 0.2 to 1 bar | | | | | | 0 | 1 | | | | | |
| 3 to 15 psi | | | | | | 0 | 2 | | | | | |
| Connection | | | | | | | | | | | | |
| G 1/8 | | | | | | | | 0 | 1 | | | |
| 1/8 NPT | | | | | | | | 0 | 2 | | | |
| Measuring range | | | | | | | | | | | | |
| -20 to +30 °C | | | | | | | | | | | | 1 |
| 0 to +50 °C | | | | | | | | | | | | 2 |
| 0 to +100 °C | | | | | | | | | | | | 3 |
| +50 to +150 °C | | | | | | | | | | | | 4 |
| 0 to +200 °C | | | | | | | | | | | | 5 |
| Span 50 °C, lower range value between -40 and +150 °C | | | | | | | | | | | | 6 ¹⁾ |
| Span 50 °C, lower range value between -+150 and +250 °C | | | | | | | | | | | | 7 ¹⁾ |
| Span 100 °C, lower range value between -40 and +200 °C | | | | | | | | | | | | 8 ¹⁾ |
| Span 200 °C, lower range value between -40 and +100 °C | | | | | | | | | | | | 9 ¹⁾ |

¹⁾ Specify the measuring range that you require on ordering. The transmitter will then delivered with this measuring range.

7 Technical data

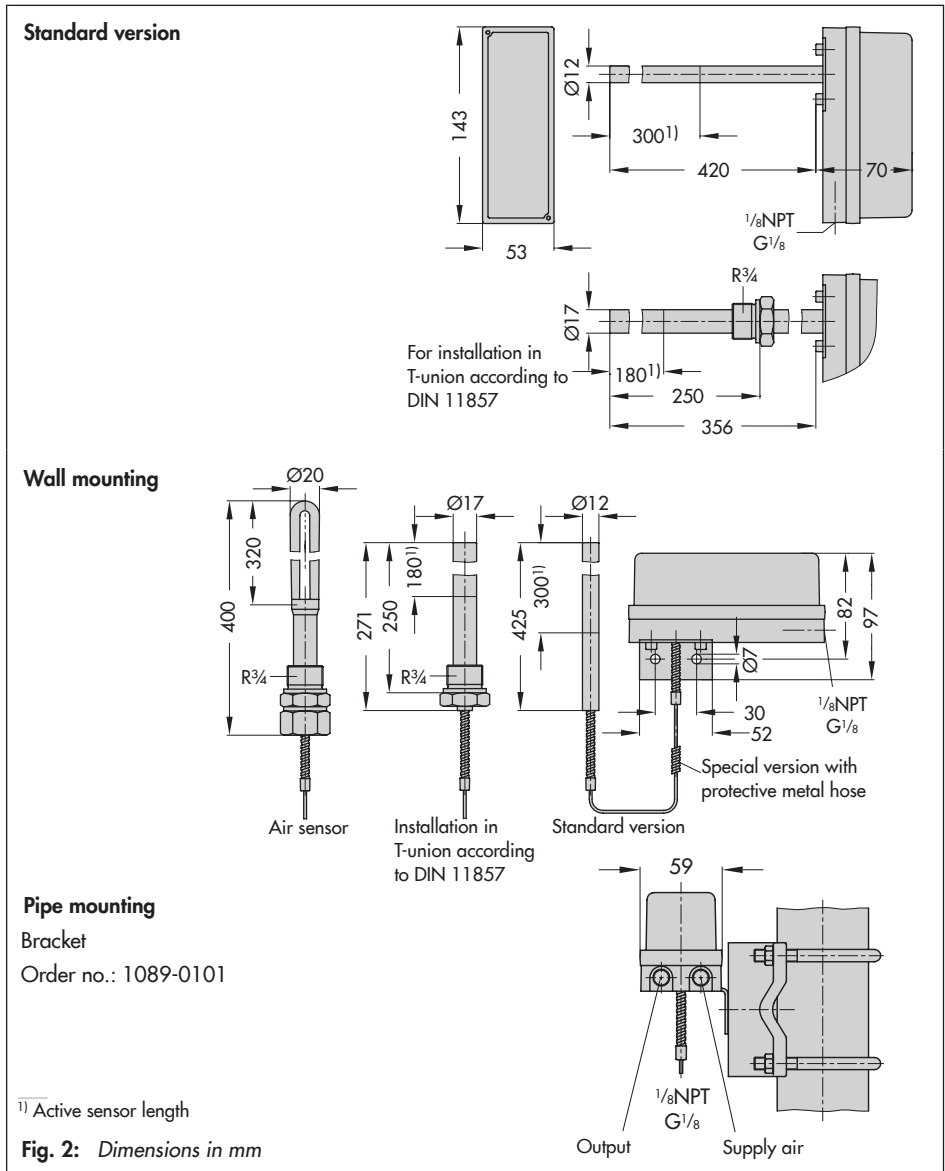
Table 1: Technical data

| Span | 50 °C | 100 °C | 200 °C |
|---|--|---------------|---------------|
| Measuring range limits | -40 °C/+300 °C | | |
| Overload limits | 350 °C | 350 °C | 500 °C |
| Supply air | Supply air 1.4 ±0.1 bar (20 ±1.5 psi) | | |
| Output | 0.2 to 1.0 bar (3 to 15 psi) | | |
| Air output capacity | Max. 2 m _n ³ /h | | |
| Consumption | 0.1 m _n ³ /h in steady-state condition | | |
| Load characteristic | 0.8 m _n ³ /h, reversing error <0.3 % | | |
| Deviation from terminal-based linearity | 0.6 % with terminal-based conformity | | |
| Hysteresis | <0.2 % | | |
| Influence | Supply air: < 0.12 %/0.1 bar | | |
| Pressure at the sensor | <0.4 %/10 bar | <0.2 %/10 bar | <0.1 %/10 bar |
| Ambient temperature | <0.06 %/K | <0.03 %/K | |
| Permissible ambient temperature | -40 to +90 °C | | |
| Capillary tube length | 3 m or 6 m | | |

Table 2: Materials- Material numbers according to DIN EN

| Type 3812-1 | |
|---|-------------------------------|
| Enclosure and cover | Die-cast aluminum AlSi12 |
| Bellows | Bronze |
| Bellows fixture | Brass |
| Diaphragms | ECO (epichlorohydrine) |
| Seals and O-rings | Silicone |
| Sensor | Stainless steel 1.4571/1.4404 |
| Sensor filling | Inert gas |
| Capillary tube | Stainless steel 1.4571/1.4404 |
| Clamping flange, screw gland, thermowells | Stainless steel 1.4571/1.4404 |

8 Dimensions

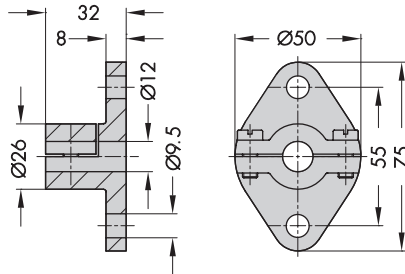


8.1 Accessories

Clamping flange

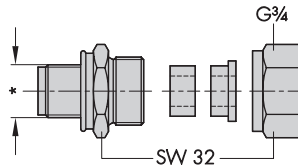
Clamping flange for wall mounting, e.g. on pressureless vessels, ducts, etc.

Order no.: 1090-9547 (PN 40)



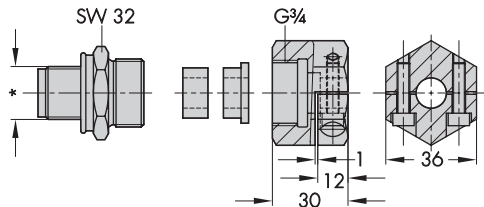
Screw gland (PN 10) for pressures up to 10 bar

- *) G ½: order no. 1080-4881
- G ¾: order no. 1080-4882



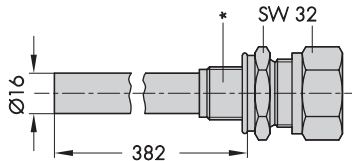
Screw gland (PN 40) for pressures up to 40 bar

- *) G ½: order no. 1080-4884
- G ¾: order no. 1080-4885



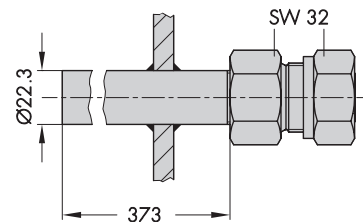
Thermowell (CrNiMo steel) with thread (PN 63) for pressures up to 63 bar

- *) G ½: order no. 1080-4888
- G ¾: order no. 1080-4889



Thermowell (CrNiMo steel) for welding (PN 63) for pressures up to 63 bar

Order no.: 1080-4890



Thermowell (CrNiMo steel) with flange
DN 25 (not shown) for PN 40 or PN 100
Details on request

Order no.: 1080-4891 (PN 40)

Order no.: 1080-4892 (PN 100)

Fig. 3: Accessories



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

EB 7575 EN

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