

Analogue Temperature Transmitters Model T91.10 / T91.20



Model T91.10

Model T91.20

1 Safety instructions

When mounting, commissioning and operating these transmitters, it is important to observe the respective national safety precautions and regulations in effect (e.g. VDE 100). Nonobservance of the applicable

regulations may cause severe injury to persons or damage to equipment. Only staff with suitable qualifications should work with these transmitters. Before commissioning, check the instrument's suitability for the intended application. In particular, it is important to observe the ambient and operating limits as specified in the WIKAI data sheet, TE 91.01.

2. Mounting

Model T91.10 head mounting transmitters are designed to be mounted on a measuring insert in a DIN Form B connection head. Model T91.20 head mounting transmitters are designed to be mounted on a measuring insert in a Form J connection head. The connecting wires of the measuring insert must be approx. 50 mm long and insulated.

3. Maintenance

The temperature transmitters described here are maintenance free! The electronics do not incorporate any components which could be repaired or replaced. Depending upon operating conditions, it may be advisable to check the calibration of the transmitter yearly.

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4. Electrical connections

These transmitters have an internal galvanic connection between the sensor input and analogue output. No external connection should be made (for example, by earthing) between the connected temperature sensor and analogue output! For this reason it is best to use isolated thermocouples. For flying leads we recommend using crimped connector sleeves. To connect a thermocouple: Make sure that the thermocouple is connected with the correct polarity. If the cable between the thermocouple and the transmitter must be extended, only use the appropriate thermal or compensating cable for the connected thermocouple type.

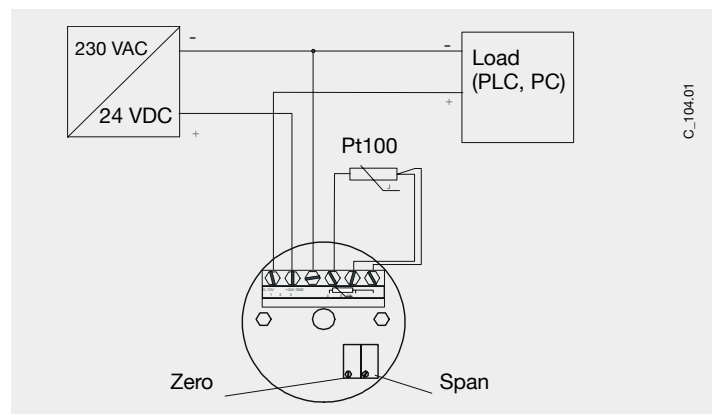
4.1 Pt100 input

Model T91.10.104

Pt100 in 2- or 3-wire connection.

For a 2-wire connection the resistance of the wires affects the measurement results. Therefore this circuit should only be selected if the wires are short, or accuracy requirements are low. If using a 2-wire connection, always connect a jumper between input terminals 5 and 6.

Transmitter output signal: 0 ... 10 V / 3-wire design

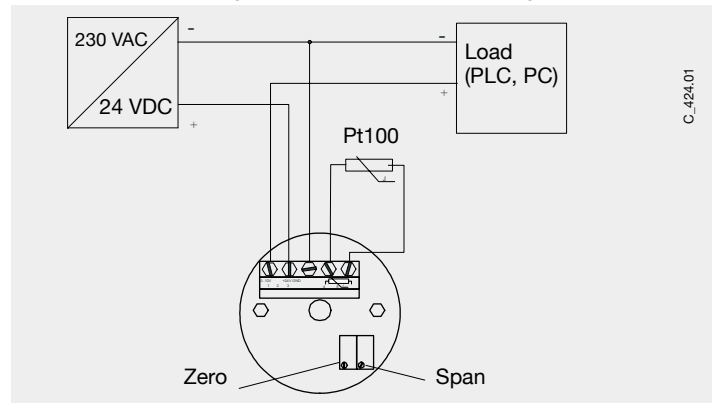


C_104.01

Model T91.10.424

Pt100 in 2-wire connection

Transmitter output signal: 0 ... 10 V / 3-wire design

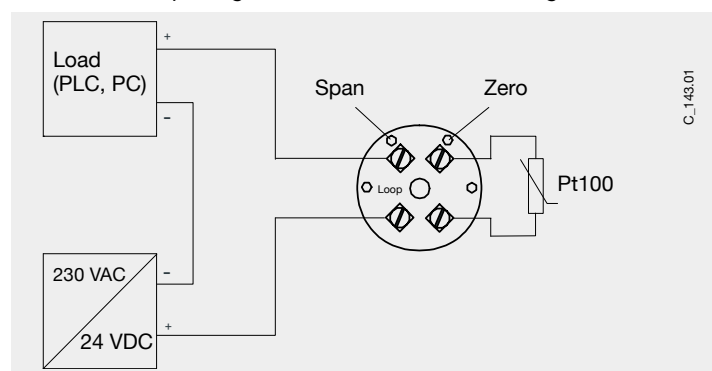


C_142.01

Model T91.20.143

Pt100 in 2-wire connection

Transmitter output signal: 4 ... 20 mA / 2-wire design

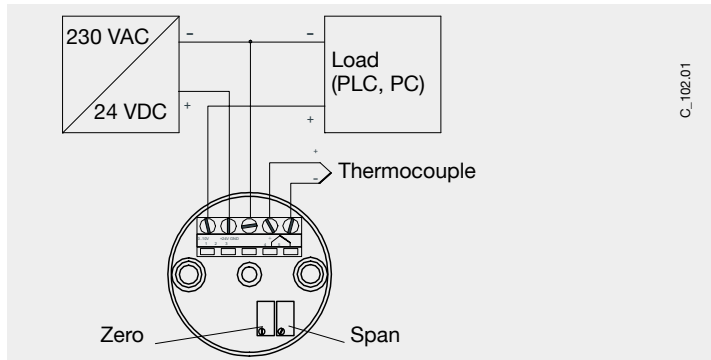


C_143.01

4.2 Thermocouple input

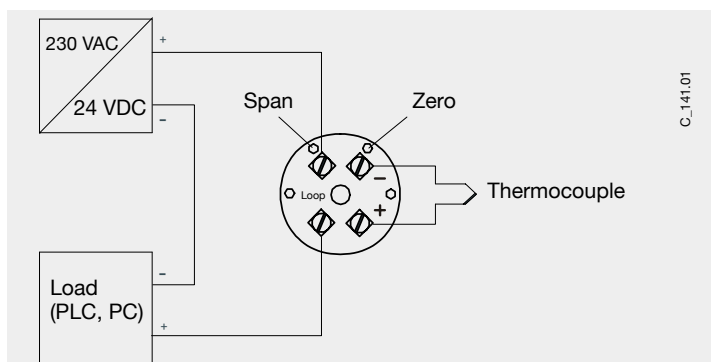
Model T91.10.102

The positive lead of the thermocouple is connected to terminal TC+ on the transmitter and the negative lead to terminal TC-. Transmitter output signal: 0 ... 10 V / 3-wire design



Model T91.20.141

The positive lead of the thermocouple is connected to terminal TC+ on the transmitter and the negative lead to terminal TC-. Transmitter output signal: 4 ... 20 mA / 2-wire design



4.3 Electrical connection 0 ... 10 V output signal

Model	Terminals
T91.10	1 (+signal), 2 (+24 V), 3 (-GND)

Maximum power supply: 15 ...35 VDC (reverse-polarity protected)
The output voltage follows the applied input signal linearly. Please note that the output can only be regulated to within approx. 0.002 V at the lower supply voltage. (model T91.10.424 approx. 0.02 V).

4.4 Electrical connection 4 ... 20 mA-loop

Model	Terminals
T91.20	loop + / -

Maximum power supply: 10 ...35 VDC (reverse-polarity protected)
In the current loop the transmitter and the indicator/processor are connected in series. The transmitter regulates the current in proportion to the input signal. The load can be connected either to the positive or negative terminals of the transmitter. With the load connected to the positive terminal, the power supply and load may not have a common earth.

5. Transmitter adjustment

Zero point and Span adjustment is carried out via potentiometers. These are on the upper face of the transmitter. The potentiometers are protected against accidental alteration. The zero-point potentiometer can be adjusted to make small corrections. After any adjustment of the span potentiometer, a complete adjustment of the transmitter is necessary.

5.1 Preparation

Connect a suitable simulation source to the input of the T91 (Pt100 or thermocouple simulator). When simulating a Pt100, connect the simulator in a 2- or 3-wire configuration. We re-

commend the use of passive resistances. When simulating a thermocouple, the actual terminal temperature of the transmitter must be pre-set on the simulator (Cold Junction Compensation).

- Connect a mA meter in the 4 ... 20 mA-loop or a multimeter to the 0 ... 10 V output signal
- Connect a suitable power supply to the transmitter

5.2 Adjustment of the 0 ... 10 V output signal

- 1) Set the simulator with approx. 1 V offset from the lower limit of the measuring range (e.g. $-20\text{ }^{\circ}\text{C} = 1\text{ V}$ for measurement range $-30\text{ }^{\circ}\text{C} \dots +70\text{ }^{\circ}\text{C}$)
- 2) Turn the zero potentiometer Z, until the output signal (in our example $-20\text{ }^{\circ}\text{C} = 1\text{ V}$ output signal) matches the desired value
- 3) Set the end value of the measurement range with the simulator, e.g. $+70\text{ }^{\circ}\text{C}$ for measurement range $-30\text{ }^{\circ}\text{C} \dots +70\text{ }^{\circ}\text{C}$
- 4) Turn the span potentiometer S, until the output signal (in our example $70\text{ }^{\circ}\text{C} = 10\text{ V}$) matches the desired value.
- 5) Repeat step 1 and check signal (1 V)
- 6) Repeat step 3 and check signal (10 V)

5.3 Adjustment of the 4 ... 20 mA output signal

- 1) Set the lower value of the measurement range with the simulator, e.g. $-30\text{ }^{\circ}\text{C}$ for measurement range $-30\text{ }^{\circ}\text{C} \dots +50\text{ }^{\circ}\text{C}$
- 2) Turn the zero potentiometer Z, until the output signal shows the desired value
- 3) Set the end value of the measurement range with the simulator, e.g. $+50\text{ }^{\circ}\text{C}$ for measurement range $-30\text{ }^{\circ}\text{C} \dots +50\text{ }^{\circ}\text{C}$
- 4) Turn the span potentiometer S, until the output signal shows the desired value
- 5) Repeat step 1 and check output signal of zero point
- 6) Repeat step 3 and check output signal of span

5.4 Closing steps

Disconnect the simulator, the multimeter and the power supply

6. Fault diagnostics

When measuring with resistance thermometers or thermocouples, factors arising from the design and measuring technology used can falsify the results measured. The most important effects that can lead to faults are listed below:

Error	Possible cause
No voltage output	- No supply voltage - Display unit not working - Circuit interruption in the supply line - 4-20 mA output: polarity in the loop is not correct
Output signal 1) $0\text{ V} / < 4\text{ mA}$ 2) corresponds to room temperature	- Short circuit in the Pt100 - Short circuit in the thermocouple
Output signal $> 10\text{ V} / > 20\text{ mA}$	- Sensor break
Temperature read out too low/fluctuates	- Poor lead insulation resistance
Read out obviously too high or too low	- Moisture in the sensor or in the sensor wire - Not correct compensation wire or incorrect thermocouple
If the measuring point is heated up the output signal reduces	- Thermocouple polarity incorrect
When only one pole of the thermocouple is connected, a value is still displayed	- Electromagnetic disturbances are coupled to the input lead - Through poor galvanic isolation, and poor insulation, parasitic voltages are present, e.g. through the thermal insulation
Displayed value obviously incorrect	- Electromagnetic disturbances are coupled to the input lead - Parasitic galvanic voltages, e.g. as a result of moisture in the compensation cable insulation