

MANUAL

P5102 LT

Spatial Resistance Temperature Sensors with Two-wire Programmable Transmitter



- Measuring resistor Pt100
- Measuring range:
 - with cable sensor -40 to +180 °C,
 - with local sensor -40 to +70 °C (without display),
-10 to +55 °C (with display)
- Accuracy class A, B according to EN 60751
- Converts of Pt100 resistance signal to current output signal 4 to 20 mA of the temperature
- Built-in LCD display indicates the temperature in the whole input range with readability 0,1 °C
- Allows to directly change the analog output range using buttons
- Indicates break of temperature sensor or line using either high (>20 mA) or low (<4 mA) output current
- Version with local sensor or with movable sensor with cable line
- Mounting on the wall using the bracket
- Housing IP 55

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1. General instructions and information

1.1 Symbols used



Symbol of warning; for safe use it is necessary to proceed according to the instructions.



Symbol CE certifies compliance of the product with the respective government directives.



Symbol "Output"



Symbol "Power supply"



This product does not belong to public waste and it is subjected to separate collection.

1.2 Safety cautions and warnings



The transmitter shall be powered from a safe voltage source that meets all requirements of the standard EN 61010-1 and installed in compliance with national requirements and standards providing safety. The equipment may only be installed by a qualified personnel who are familiar with national and international laws, directives, standards and with the instructions manual. The instrument may not be used for other purposes than as specified in this instructions manual. For elimination of a risk of injury from electric shock or fire the maximum operational parameters of the instrument may not be exceeded, particularly range of operating temperature because of exposure to heat from connected or surrounding technological equipment must not be exceeded!

The transmitter should be installed in suitable environment without any direct sunlight, occurrence of dust, high temperatures, mechanical vibrations and shocks and protected against rain and excessive moisture.

1.3 Scope of delivery

With the product is delivered:

- Manual for installation, operation and maintenance
- Certificate of calibration (only with calibrated sensors)

1.4 Description of the delivery and packing

The product is packaged in a protective cover and provided with an identification label with a mark of the output control. The product must not be exposed to direct rain, vibrations and shocks during transport.

1.5 Storage

The products shall be stored at temperatures from +5 °C to +35 °C and maximum relative humidity 80 % in the rooms with elimination of condensation of water vapours on the products. The stored products shall not be exposed to any shocks, vibrations and effects of harmful vapours and gases.

1.6 Installation and commissioning

During installation, commissioning, operation and maintenance follow the instructions in chapter 4.

1.7 Spare parts

Any of the compact parts of the product can be also ordered as a spare part if there are not required special procedures or technological operations for the exchange.

1.8 Repairs

Products are repaired by the manufacturer. The products for repair should be sent with description of the fault or defect in a packing that guarantees damping of shocks and vibrations and protects against damage during transport.

1.9 Warranty

Products are covered by a warranty for a period of 3 years from the delivery date on the delivery note. The manufacturer guarantees technical and operational parameters of the products within scope of the applicable documentation. Warranty period is specified with individual items and begins from the day of takeover of the goods by the purchaser or delivery to the carrier. Any claims concerning to defects of the goods together can be filed in writing with the manufacturer within the warranty period and the claimed product shall be presented. The claiming party shall give identification of the product, number of the delivery note and description of the fault or defect.

The manufacturer is not responsible for any defects caused by improper storage, incorrect connection, damages caused by external effects, in particular by effects of factors with excessive values, unqualified installation, improper operation or common wearing.

2. End of service and disposal

2.1 End of service



Dismounting and disposal of the device is possible after disconnecting of power supply voltage.

2.2 Disposal



When disposing the packing and destroyed or irreparably damaged product proceed according to the local regulations.

3. Product description

P5102 LT Spatial Resistance Temperature Sensors with Two-wire Programmable Transmitter

- Measuring resistor Pt100
- Measuring range:
 - with cable sensor -40 to +180 °C,
 - with local sensor -40 to +70 °C (without display),
-10 to +55 °C (with display)
- Accuracy class A, B according to EN 60751
- Converts of Pt100 resistance signal to current output signal 4 to 20 mA of the temperature
- Built-in LCD display indicates the temperature in the whole input range with readability 0,1 °C
- Allows to directly change the analog output range using buttons
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3.1 Application

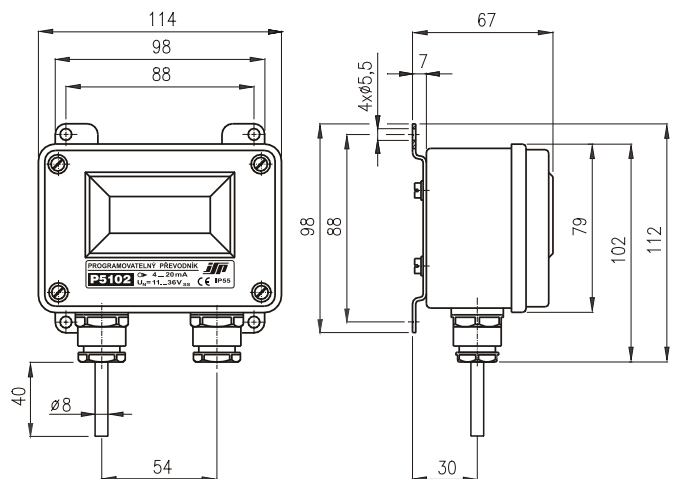
Spatial resistance temperature sensors with programmable transmitter are designed for remote temperature measurement of space (ambient air) in non-hazardous locations without potentially explosive atmosphere of gases or dusts, where the local indication of measured temperature is needed.

3.2 Description

A sensor of the thermometer is one measuring resistor Pt100 which is placed in the measuring insert stem and connected through 3-wire to programmable transmitter P5102. For temperature measurement is used resistance-temperature dependence of Pt sensor. Resistance signal from a sensor is converted in the transmitter to a linearized current signal 4 to 20 mA. Built-in LCD display indicates actual ambient temperature. Sensors with transmitter are mounted using mounting brackets on the wall in production or sports halls etc.

Communication with the transmitter through the RS232C interface requires a KA-01 communication cable with a galvanic isolation. For the interface description see the separate data sheet. The configuration can be done by a PC and by NPT-02 set-up program. Changing of range and calibration can be also done by a easy set-up unit NJ-14 or with optional display by push-buttons on the transmitter directly in the field. Changing of parameters can be disabled by the set-up unit.

3.3 Dimensional drawings



4. Installation, operation and maintenance

4.1 Installation and commissioning

4.1.1 General

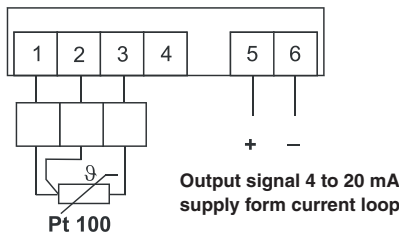
After mounting and correct connection, switch on the power supply.

Screw terminals are used to connect wires with cross-section of 0.5 to 1.5 mm². Transmitters are designed for continuous operation and have to be supplied from safe power supply with limited current output. If more transmitters are supplied from one power supply with high output current, then it is recommended to connect each transmitter (or groups of transmitters) over fuse F 50 mA or suitable resistor. The device is protected against inversion polarity of supply voltage, against short-term output overvoltage 600 W / 1 ms and against long-term input overvoltage max. 7 VDC or long-term current max. 18 mA between any inputs.

Transmitters must be powered by safe power supplies. They are protected against reversing of polarity and peak voltage overload. Their input and output circuits are not galvanically isolated, therefore with powering of more transmitters from a common power supply it is necessary that connected sensors and cables have a high insulation resistance. However, with this type of connection it is recommended to insert a galvanic isolation into supply circuits. If the power supply is designed for a higher load current (>100 mA) it is recommended to insert F 50 mA fuse or a current-limiting resistor into supply circuits.

4.1.2 Electrical connection

Three-wire connection of resistance sensor



4.2 Setup of the transmitter

4.2.1 Setup of the transmitter

There are three buttons on the transmitter with display or on the set-up unit. Their function is as follows:

- Button ← - setting mode menu entry
- value setting entry
- Button → - next menu item
- scrolls to the next menu item
- Button ↑ - previous menu item
- increases number by 1

First press and hold the button ← for 2 s. On display will appear flashing SEP. After the button is released, first menu item appears. It is possible to scroll through the menu by other two buttons →, ↑. During the setup is not possible to use serial communication.

Menu items are as follows:

- 'LO' lower range value
- 'HI' upper range value
(attention! different span than PT-010 to PT-042)
- 'LO-E' correction of lower range value
- 'HI-E' correction of upper range value
- 'dP' damping time constant and selection of error reporting by means of error output current
- 'End', 'E' end and exit from setup menu

Choose the item to be changed, and then press the button ←. A numerical value appears, and first digit flashes. The value is possible to change by digits using the buttons →, ↑. The sign of number changes when you shift the flashing digit to the first place on the left using the button →. In this manner, the number changes for negative number; repeating the whole procedure changes the number for positive number. It is important to pay attention to the number sign as it often causes wrong setting of the transmitter.

On the older versions of the display or on older versions of set-up unit NJ-12 and NJ-13, the sign is displayed in such manner that the minus sign (for negative number) or the space (for positive number) flashes alternately with the digit. Some menu symbols look different on the older versions of display; they are listed in the table in second column.

All set points are displayed in the same form and with the same units as the measured physical variable, except for damping value. This value is displayed in the form xxx.x.

The set value is stored in EPROM memory in the transmitter after pressing the button ←.

If the desired value is not in admissible range then error message Er-12 flashes for 2 s and the value is not stored. If the setting by the set-up unit is disallowed then message Er-13 flashes.

Selection of output current during reporting error of sensor connection or internal error of the transmitter should be done together with damping value setting. Positive value of damping means that error current is higher than or equals 21 mA, negative value of damping means that error current is less than or equals 3.6 mA. When no error is reported, the value of output current ranges from 3.8 to 20.5 mA.

4.2.2 Error messages

Following error messages can appear on display during operation:

Errors reported at the same time by error output current:

- 'Er-1', 'Er--1' incorrectly connected sensor or faulty sensor
- 'Er-2' 'Er--2' primary variable out of the input range
- 'Er-3' 'Er--3' EEPROM error (write error)
- 'Er-4' 'Er--4' EEPROM error (CRC error)
- 'Er-5' 'Er--5' misconfiguration (incorrect connection code)
- 'Er-6' 'Er--6' internal error (divide by zero)

Errors reported only on display at configuration by the setup:

- 'Er11' 'Er-11' EEPROM error (write error during editing)
- 'Er12' 'Er-12' value out of range
- 'Er13' 'Er-13' disallow changing transmitter configuration by the set-up unit (set by means of NPT-02, or when ordering the product)

4.3 Operation and maintenance

The products do not need any maintenance.

5. Product specification

5.1 Technical specifications

Measuring resistor: 1x Pt100, 3-wire

Measuring range:
 with cable sensor -40 to +180 °C,
 with local sensor -40 to +70 °C (without display)
 10 to +55 °C (with display)

Measuring current: < 0.15 mA

Output signal:
 2-wire current 4 to 20 mA or 20 to 4 mA

D/A conversion error:
 $\leq \pm 0,05$ % span of set range

Current output total error:
 $\leq \pm \left(\frac{\text{digital accuracy}}{\text{span of set range}} \times 100 + 0.05 \right)$ [%]

Transfer function: linear with temperature

Supply voltage: 11 to 36 VDC

Recommended power supply:
 ZS-010, ZS-011, ZS-020

Load resistance: $R_L [\Omega] \leq (U_N [V] - 11) / 0.022$

Sensor break or other fault indication:
 display indication of error code
 output > 20 mA or > 4 mA

5.2 Supplementary parameters

Output current limit:
 signal approx. 3.8 až 20.5 mA
 error current limit approx. 23 mA

Display:
 4-digit LCD with sign

Effect of supply voltage:
 $\leq \pm 0.002$ % of span / V

Effect of ambient temperature:
 $\leq \pm 0.05$ % span of set range/ 10 °C

Effect of sensor inner resistance for voltage input:
 ≤ 0.004 mA / 1 k Ω

Long-term stability:
 $\leq \pm 0.1$ % span of set range / 2 years

EMC (Electromagnetic compatibility):
 according to EN 61326-1

5.3 Operating conditions

Ambient temperature of electronic box: see ordering table

Humidity:
 S2x 0 to 100 % RH with condensation

Elevation:
 up to 2000 m above the sea level

5.4 Other specifications

Sensor measuring stem:
 length 60 mm
 diameter 8 mm
 material nickeled brass

Sensor cable:
 length 2 m and 4 m
 isolation silicone

Housing: IP 55

Weight: 275 g (without sensor)

Box material: PVC

6. Ordering

6.1 Ordering table

Type	Description
◦ P5102 LT	Spatial resistance temperature sensor with two-wire programmable transmitter P5102
Code	Version Ambient temperature of electronic box
◦ S11	Without display -40 to +70 °C
◦ S21	With display -10 to +55 °C
Code	Temperature sensor Measuring range
◦ 0	Local -40 to +70 °C without display, -10 to +55 °C with display
◦ 1	With cable 2 m -40 to +180 °C
◦ 2	With cable 4 m -40 to +180 °C
Code	Setting range of transmitter
◦ RL	Start of range (4 mA) (fill in value and units)
◦ RH	End of range (20 mA) (fill in value and units)
Code	Measuring resistance
A	Measuring resistance with accuracy A according to EN 60751
Code	Calibration in customer defined points, including certificate of calibration
◦ KTE31A	Sensor calibration in three points in range -40 to +60 °C
KTE9	Other
Code	Optional accessories
◦ NJ-14	Set-up unit (to set range, damping time constant and hysteresis)
◦ V	Mounting bracket for temperature sensor with cable
Example of order: P5102 LT S21 0 RL 0 °C RH 50 °C KTE31A (-10, 30, 50)	

◦ ... Marked version can be dispatched up to 5 working days



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