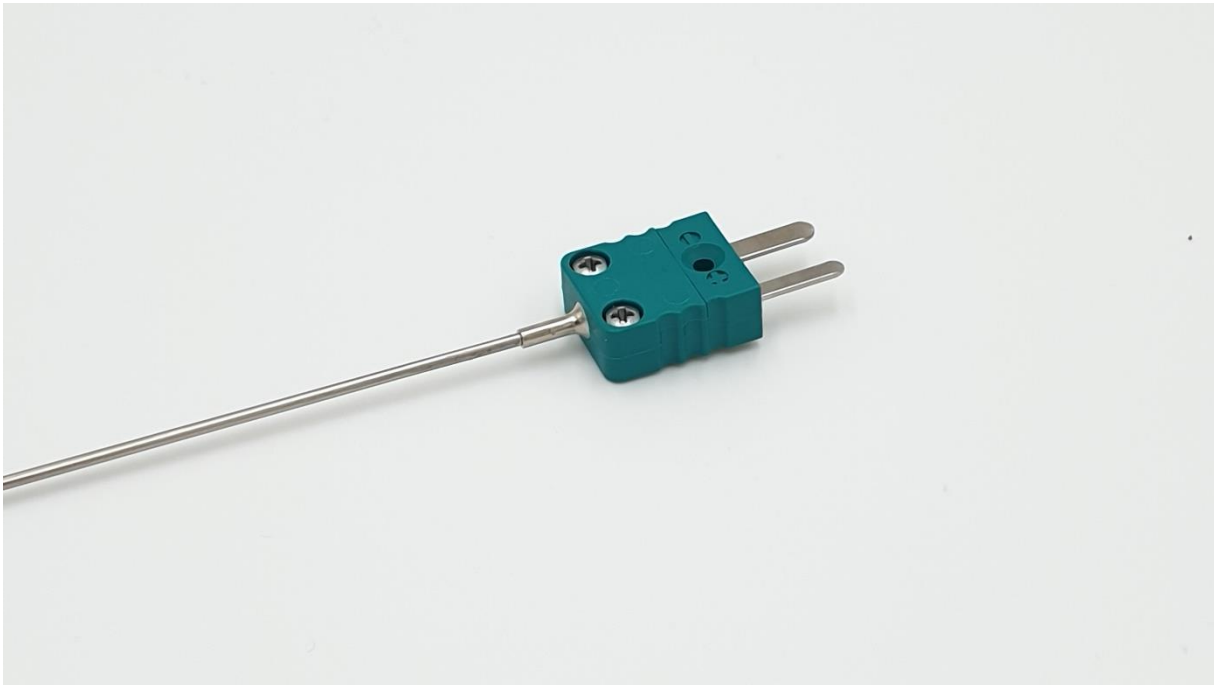
OPERATIONS AND MAINTENANCE MANUALS O&MM-01

INSTRUCTION MANUAL

INSULATED THERMOCOUPLES AND RESISTANCE TEMPERATURE DETECTORS



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1. INTRODUCTION

This instruction manual applies to the following types of temperature sensors: **02, 03, 05, 06, 07, 11, 17, 18, 26.**

2. GENERAL INFORMATION

Insulated sensors are particularly resistant to vibrations and shocks, and can be bent without concern of causing a short circuit. Due to that, they are widely used in hard-to-reach places, for installation in small components, and in any place where the user wishes to use flexible measuring components with small diameters and low thermal inertia. In combination with appropriately calibrated instruments, they enable the measurement and regulation of temperature in industrial processes. The sensors are manufactured in accordance with the following standards: EN 60584-1 and EN 60751+A2:1997.

3. TECHNICAL SPECIFICATIONS AND DESCRIPTION

Insulated thermocouples are used to convert the temperature of the measured medium into thermoelectric power.

Insulated resistance temperature detectors respond to temperature changes by changing the resistance of a resistor.

The insulated cable is made in the form of a seamless tube with an insulating material and thermoelectrodes or copper or nickel wires (in the case of resistance detectors) inside. The number of thermoelectrodes and wires inside the insulated cable can vary and depends on the type of sensor. Thermoelectric wires at one end of the insulated cable are joined to form a measuring junction of a thermocouple, and in the case of resistance detectors, a resistor is welded to the internal wires.

Measuring junctions can be made as follows:

a) for single thermocouples:

- isolated from the sheath,
- connected to the sheath (grounded),

b) for double thermocouples:

- isolated from each other and from the sheath,
- connected to each other and isolated from the sheath,
- connected to each other and to the sheath housing (grounded).

Temperature sensors measure the temperature at the location of the resistor or measuring junction.

4. OPERATING CONDITIONS

Do not exceed the measuring range of the sensors during operation.

Temperature range:

The temperature range is a complex characteristic, influenced by both the sensor type and the insulated cable sheath material.

The measuring range of a thermocouple is the range of temperatures that can be measured with a given thermocouple due to the measuring range of the meter and the scope of application of the sensor cooperating with the meter.

The long-term use scope is the temperature range, at which a given thermocouple, under specific physicochemical conditions, can be used for measurement without concern of changing its thermoelectric characteristics.

The short-term use scope is the temperature range, at which a given thermocouple, under specific physicochemical conditions, can be used for measurement without concern of changing the thermoelectric characteristics of the thermocouple in a limited time.

MEASURING COMPONENT SYMBOL	CONTINUOUS OPERATION TEMPERATURE RANGE [°C]	SHORT-TERM OPERATION TEMPERATURE RANGE [°C]
J	+20 – 700	-180 – 750
T	-185 – 300	-250 – 400
K	0 – 1100	-180 – 1350
N	0 – 1100	-270 – 1300
E	0 – 800	-40 – 900
S	0 – 1550	-50 – 1750
R	0 – 1600	-50 – 1700

The influence of some chemical substances on the medium, for which the temperature is measured, with the sheath materials is known to the manufacturer of the device. In case of any doubts, it is recommended to contact the device manufacturer.

5. TRANSPORT AND STORAGE

During transport and storage, sensors should be protected from the influence of external weather conditions, such as precipitation. Sensors should be stored indoors. Long sensors must be transported after appropriate bracing. Sensors with ceramic components must be appropriately protected during transport.

Sensors must be protected from accidental movement during transport. Sensors must be stored at a temperature of 5–50°C, with relative humidity not exceeding 80%.

6. USE (OPERATION, MAINTENANCE AND INSPECTIONS)

Sensors are maintenance-free devices.

Maintenance and inspections should be performed by qualified personnel. The inspection should include the condition of the outer sheath and the cable. Periodic calibration is recommended, in order to ensure that the sensor is measuring temperature correctly.

7. FAILURES, FAULTS

After a failure occurs, it is recommended to contact the device manufacturer.

8. SPARE PARTS

For some sensor versions, it is possible to purchase, for example, a replaceable insert or connectors as spare parts.

In case of a need to purchase any spare parts, it is recommended to contact the device manufacturer.

9. SAFETY

In order to ensure safe operation of the device, please follow the information contained in this manual.

Do not twist the cable during sensor installation.

Do not pull the cable.

Do not allow the cable to bend excessively.

Do not bend the measuring tip of the resistance detector.

Do not damage external ceramic covers or special sheaths.

Do not use for purposes other than intended.

Do not use outside the temperature ranges specified in this manual.

For minimum and maximum application temperatures, it is recommended to contact the device manufacturer.

10. INSTALLATION

The sensors should be installed by qualified personnel.

Sensors should be installed in a way, so that the measuring component (junction/resistor) is as close as possible to the measured surface.

Sensors equipped with a mounting stub should be installed by screwing the mounting stub in clockwise.

11. ELECTRICAL CONNECTION

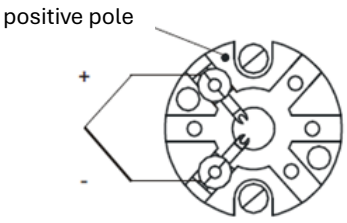
The sensors should be connected by qualified personnel.

THERMOCOUPLES

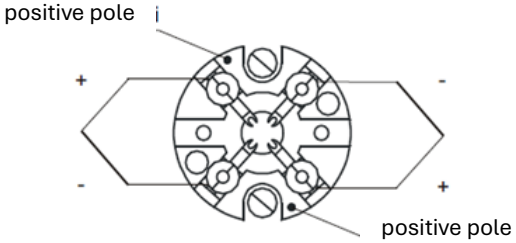
Thermocouples should be connected according to their polarity: „+”; „–”. Sensors should be connected using the appropriate type of cable, depending on the sensor type, e.g., K, J, N.

An example of a connection method is shown in the diagram of the connection of the sensor to the terminal block (**02-...WK1**):

Single thermocouple

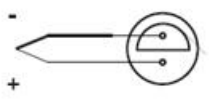


Double thermocouple

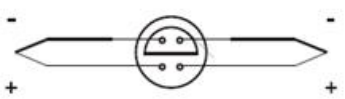


Thermocouples with a LEMO connector:

Single thermocouple



Double thermocouple

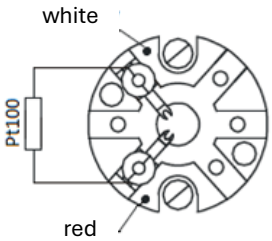


RESISTANCE TEMPERATURE DETECTORS

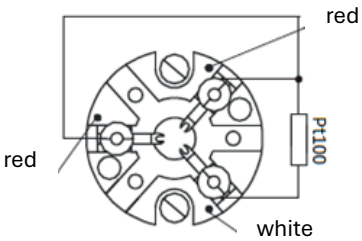
Resistance temperature detectors should be connected using the appropriate cable type (2-wire, 3-wire or 4-wire) depending on the sensor type, e.g., a 2-wire sensor should be connected using a 2-wire cable.

An example of a connection method of the resistance temperature detector is shown in the diagram below:

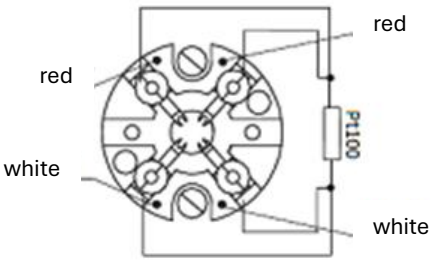
1 x 2-wire Pt100



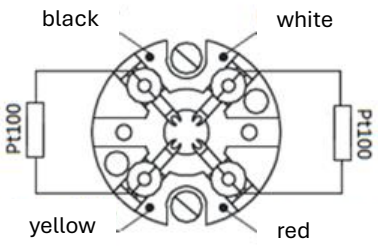
1 x 3-wire Pt100



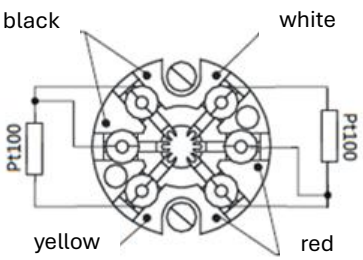
1 x 4-wire Pt100



2 x 2-wire Pt100

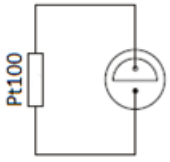


2 x 3-wire Pt100

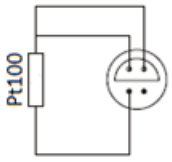


Sensors with a LEMO connector:

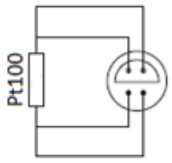
1 x 2-wire Pt100



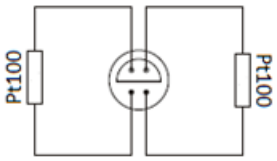
1 x 3-wire Pt100



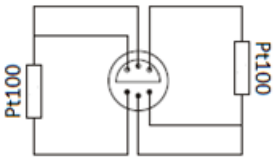
1 x 4-wire Pt100



2 x 2-wire Pt100



2 x 3-wire Pt100



PREPARED BY:	CHECKED BY:	APPROVED BY:
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