



OPERATIONS AND MAINTENANCE MANUALS O&MM-03

INSTRUCTION MANUAL

WIRED SENSORS



	OPERATIONS AND MAINTENANCE MANUALS INSTRUCTION MANUAL	O&MM-03
	WIRED SENSORS	PAGE 2 OF 9

Table of contents

OPERATIONS AND MAINTENANCE MANUALS O&MM-03.....	1
INSTRUCTION MANUAL	1
WIRED SENSORS	1
1. INTRODUCTION	3
2. TECHNICAL SPECIFICATIONS AND DESCRIPTION.....	3
3. OPERATING CONDITIONS	4
4. TRANSPORT AND STORAGE	5
5. USE (OPERATION, MAINTENANCE AND INSPECTIONS).....	6
6. FAILURES, FAULTS.....	6
7. SPARE PARTS	6
8. SAFETY	6
9. INSTALLATION	7
10. ELECTRICAL CONNECTION	7

	OPERATIONS AND MAINTENANCE MANUALS INSTRUCTION MANUAL	O&MM-03
	WIRED SENSORS	PAGE 3 OF 9

1. INTRODUCTION

This instruction manual applies to the following types of temperature sensors: **04, 07, 08, 12, 15, 16, 17, 18, 19, 20, 23, 24, 25.**

The sensors are manufactured in accordance with the EN 60584-1 and EN 60751+A2:1997 standards.

2. TECHNICAL SPECIFICATIONS AND DESCRIPTION

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

The measuring sensor is a thermocouple composed of two thermoelectrodes made of different metals, connected by a measuring junction.

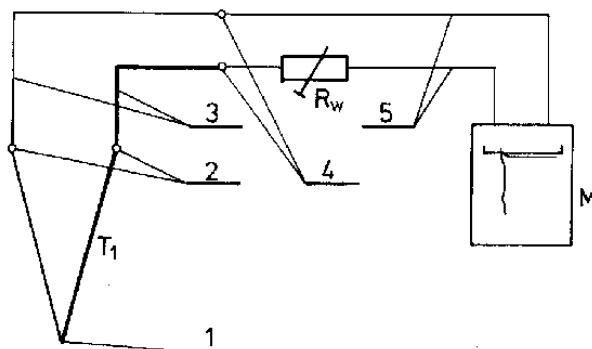


Fig. 1 Diagram of the measuring system with a thermoelectric sensor: T_1 – thermoelectric sensor; R_w – line equalization resistor; M – cooperating/indicating/recording and regulating device; 1 – measuring junction; 2 – free ends; 3 – compensation wires; 4 – reference junction; 5 – connecting wires.

If the measuring junction is located in the medium, the temperature of which is to be measured, and the free ends are at a temperature different than the temperature of the medium, then a thermoelectric power proportional to the temperature difference will occur between the free ends of the thermocouple.

When a constant temperature of the free ends is ensured, the thermoelectric power that occurs will depend on the changes in the temperature of the measuring junction.

	OPERATIONS AND MAINTENANCE MANUALS INSTRUCTION MANUAL	O&MM-03
	WIRED SENSORS	PAGE 4 OF 9

Since temperature fluctuations often occur around the free ends of the thermocouple, it is necessary to extend the free ends (using compensation wires) to a place with a constant temperature.

Wired sensors consist of:

- a cable ending with a measuring junction (thermocouple sensor) or a resistor (resistance temperature detector),
- various types of covers (optional) made of various materials (silicone, metal),
- sensor end (connector, terminal block, free ends).

3. 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.

Thermocouples:

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

	OPERATIONS AND MAINTENANCE MANUALS INSTRUCTION MANUAL	O&MM-03
	WIRED SENSORS	PAGE 5 OF 9

Resistance temperature detectors:

TOLERANCE CLASS	FOR WIRE-WOUND RESISTORS	FOR THIN-FILM RESISTORS
AA	-50 – 250	0 – 150
A	-100 – 450	-30 – 300
B	-196 – 660	-50 – 500
C	-196 – 660	-50 – 600

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.

The operating conditions of a sensor depend largely on its operating environment. The lifetime of sensors operating in a neutral environment is the greatest. The operation of the sensor in a different environment, e.g., an oxidizing or reducing atmosphere, significantly shortens the sensor's lifetime.

Many factors determine the longevity of a sensor. The operating environment of a thermocouple may cause the following unfavourable phenomena:

- change in the chemical composition of thermoelectrodes caused by diffusion through the thermocouple junction,
- change in the chemical composition of one or both thermoelectrodes caused by partial evaporation of one of the alloying components at higher temperatures,
- change in the chemical composition of one or both thermoelectrodes caused by the absorption of pollutants from the environment.

Of course, there are many more factors that can negatively affect sensors. It is possible, that the pollutants in the atmosphere, in which the sensor operates, are so aggressive, that the sensor's operating period may be as short as 6 months.

4. 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%.

	OPERATIONS AND MAINTENANCE MANUALS INSTRUCTION MANUAL	O&MM-03
	WIRED SENSORS	PAGE 6 OF 9

5. 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.

6. FAILURES, FAULTS

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

7. 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.

8. 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 the external covers/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.

	OPERATIONS AND MAINTENANCE MANUALS INSTRUCTION MANUAL	O&MM-03
	WIRED SENSORS	PAGE 7 OF 9

9. 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.

During installation of the sensor, ensure that it is immersed at such a depth, that the measuring junction is located in the measured medium.

Provided that technical reasons allow that, it is recommended to use longer sensors in order to obtain a favourable ratio of the length of the sheath part, located at ambient temperature, to the total length of the sensor. For this reason, it is beneficial to install the sensor in pipeline elbows.

The protruding parts of the sensor sheaths should be thermally insulated.

If the sensor sheaths and head are exposed to thermal radiation, use sensor protective screens.

The sensor must be installed in accessible places to ensure easy inspection or replacement during operation.

10. ELECTRICAL CONNECTION

The sensors should be connected by qualified personnel.

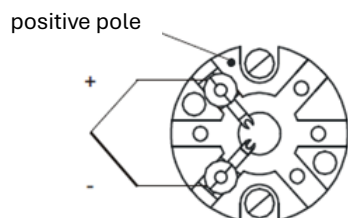
THERMOCOUPLES

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.

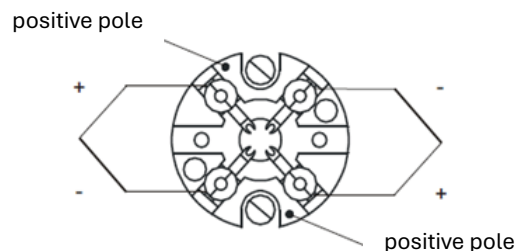
An example of a connection method is shown in the diagram of the connection of the sensor to the terminal block (**02-...WK1**):

	OPERATIONS AND MAINTENANCE MANUALS INSTRUCTION MANUAL	O&MM-03
	WIRED SENSORS	PAGE 8 OF 9

Single thermocouple



Double thermocouple

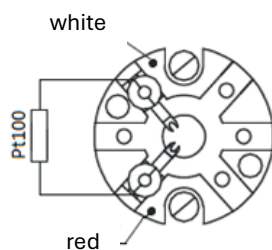


RESISTANCE TEMPERATURE DETECTORS

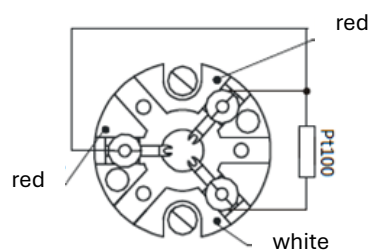
Resistance temperature detectors should be connected using the appropriate cable type (2-wire, 3-wire or 4-wire) depending on the sensor type, e.g., a 2-wire sensor should be connected using a 2-wire cable.

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

1 x 2-wire Pt100

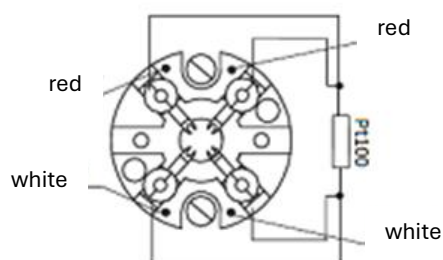


1 x 3-wire Pt100

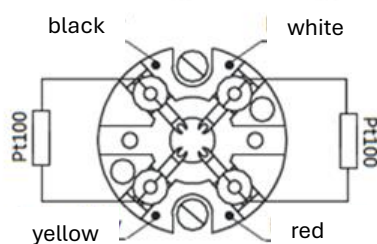


	OPERATIONS AND MAINTENANCE MANUALS INSTRUCTION MANUAL	O&MM-03
	WIRED SENSORS	PAGE 9 OF 9

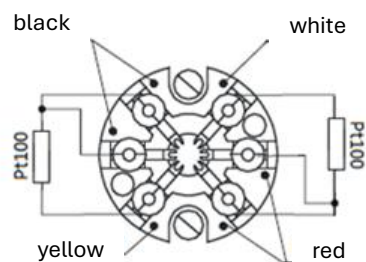
1 x 4-wire Pt100



2 x 2-wire Pt100

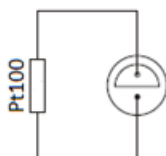


2 x 3-wire Pt100

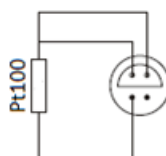


Sensors with a LEMO connector:

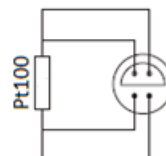
1 x 2-wire Pt100



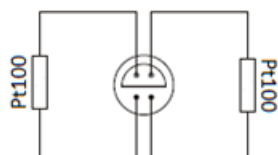
1 x 3-wire Pt100



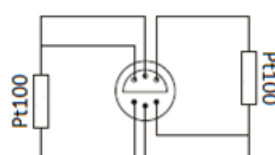
1 x 4-wire Pt100



2 x 2-wire Pt100



2 x 3-wire Pt100



PREPARED BY:	CHECKED BY:	APPROVED BY:
DATE: 07.05.2026		