

OPERATION MANUAL

Head sensors with exchangeable measuring insert



1. Introduction.

In this Operation Manual, the following series of sensors with exchangeable measuring inserts are described:

CT-7, CT-9, CT-11, CT G1, CT GB1, CT GN1, CTP1, CT T1, CT U1, CT U2, CT U3, CT U4, CT SW1, CT SW2.

Exchangeable measuring inserts: **W1, W2, W5.**

The sensors presented are equipped with a terminal block or a 4-20 mA transmitter instead of a terminal block.

All the sensors specified comply with the two followings standards:

PN-EN 60751

PN-EN 60584

2. Construction and principle of operation.

A resistance or thermoelectric measuring insert represents the basic element in each sensor. It is placed in an outer sheath; the clamps of the insert are shielded by a head made of aluminium alloy. The outer sheaths in this group of sensors are characterized by different types of process connections: there are threaded, slidable, clamps or flanged sheaths, etc. Inside the inserts, there is a thermometer resistor or a thermocouple connected with external clamps of the terminal block or of the 4-20 mA transmitter.

The measuring element of the insert responds to a change in temperature of a medium by changing its resistance /thermometric resistor/ or electromotive force EMF /thermocouple/. The changes correspond to their thermometric characteristics as defined in the following standards:

PN-EN 60751 – as for the thermometric resistors Pt100

PN-EN 60 584 – as for the thermocouples

Specification:

Resistor: 1 or 2x Pt 100, 500, 1000 class A or B

Connection Line : 2, 3, 4 - wire as for Pt100

Thermocouple: 1 or 2x Fe-CuNi /J/, NiCr-Ni /K/ class 1or 2

Max. temperature measurement range: Pt: -200 ... 550 °C
J: -40 ... 700 °C
K: -40 ... 900 °C

Measurement junction: isolated or earthed

Allowable working temperature of the head with a rubber seal: 100 °C
with a silicone seal...150 °C

Protection degree provided by the housing: IP 54 as for MA heads

IP 65 as for NA, DAN, and DANW heads

Cable gland: PG-9 as for MA head

M20x 1,5 as for NA ,DAN

Transmitters: AT, GI-22R, GI-22U, GI-22

Sensors

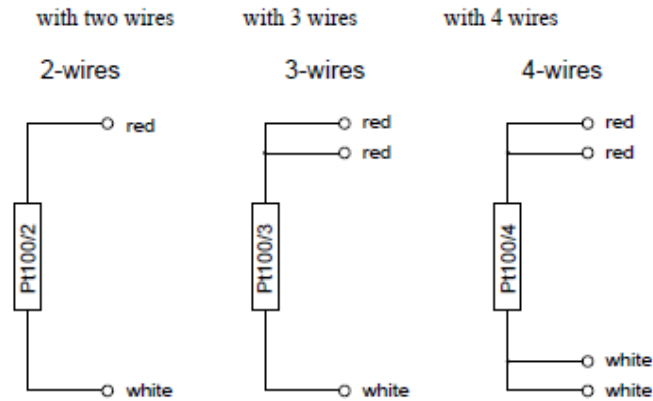
Sensor Type	Sheath Material	Measurement Range	Connection Type	Sheath Diameter	Type of measuring inserts
CT-7	1.4541	-200 ... 700 °C	Threaded Connector	Ø7	W2
CT-9	1.4541	-200 ... 700 °C	Threaded Connector	Ø9	W1
CT-11	1.4541	-200 ... 700 °C	Threaded Connector	Ø11	W1, W2
CT G1	1.4541	-200 ... 550 °C	Threaded Connector	Ø11	W1, W2
CT GB1	1.4541	-200 ... 150 °C	Threaded Connector	Ø9	W1
CT GN1	1.4541	-200 ... 550 °C	Threaded Connector	Ø9	W1
CT P1	1.7335	-200 ... 600 °C	UG15, UC1-15, UC2-15	Ø15	W1, W2
CT T1	1.4541	-200 ... 550 °C	Flange	Ø11	W1, W2
CT U1	1.4841	0 ..1000 °C	UC1-22, UC2-22	Ø22	W5
CT U2	1.4841+SIC	0 ..1000 °C	UC1-22, UC2-22	Ø22	W5
CT U3	1.4841	0 ..1000 °C	UC1-22, UC2-22	Ø22	W5
CT U4	1.4841	0 ..1000 °C	UC1-26, UC2-26	Ø26	W5
CT SW1	1.7335	0 ... 540 °C	to be welded	Ø18	SW1
	1.7380	0 ... 570 °C			
CT SW2	1.7335	0 ...540 °C	to be welded	Ø24	SW2
	1.7380	0 ... 570 °C			

Exchangeable measuring inserts

Type	Sheath Material	RTD/TC	Sheath Diameter
W1	1.4541	Pt	Ø6, Ø8
		J / K	
W2	1.4541	Pt	Ø3, Ø6, Ø8
	1.4541	J	
	Inconel 600	K	
W5	Ceramika	J / K	Ø14

3. Resistance sensors – designation of connection clamps

Terminal block – one measuring circuit



Terminal block – one measuring circuit

with two wires with three wires

4. Thermoelectric Sensors – designation of connection clamps

In the case of thermoelectric sensors, polarity must carefully be observed; thus, on a terminal block, the positive pole of thermocouple is marked as + in order to allow the end user to properly connect the thermoelectric sensor.

When the thermoelectric sensor is connected with external devices, then, the corresponding pole on the terminal block must be connected with the corresponding pole of the wire (which has a polarity-specific colour). In the Table below, there are shown: thermoelectric sensor types, the respective rule to connect a specific sensor type, and corresponding colour codes.

Thermoelectric sensor			Type of wire compensation/thermoelectric			Color code		
Type	Wire +	Wire -	Oznaczenie	Wire +	Wire -	Wire +	Wire -	Sheath
T	Cu	CuNi	TX	Cu	CuNi	brown	white	brown
E	NiCr	CuNi	EX	NiCr	CuNi	violet	white	violet
J	Fe	CuNi	JX	Fe	CuNi	black	white	black
K	NiCr	Ni	KX	NiCr	Ni	green	white	green
K	NiCr	Ni	KCA	Fe	CuNi	green	white	green
K	NiCr	Ni	KCB	Cu	CuNi	green	white	green
N	NiCrSi	NiSi	NX	NiCrSi	NiSi	pink	white	pink
N	NiCrSi	NiSi	NC	E-Cu	CuNiMn	pink	white	pink
R / S	Pt13 / Pt	Pt	RCA/SCA	E-Cu	CuNiMn	orange	white	pomarańcz.

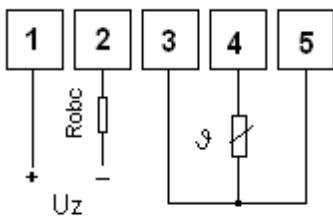
Thermoelectric sensor			Type of wire compensation/thermoelectric			Color code		
R / S	Pt13 / Pt	Pt	RCA/SCA	E-Cu	CuNiMn	orange	white	pomarańcz.

5. Transmitters.

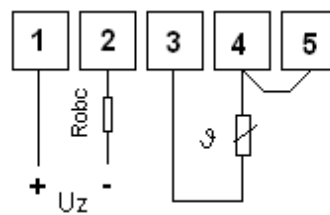
4 - 20 mA transmitters RTD - diagram of wiring.

Type: AT, GI-22R, GI-22

with 3 wires

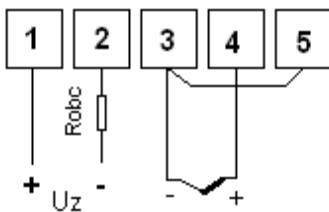


with two wires



TC/4 - 20 mA transmitters - diagram of wiring.

Type: GI-22U, GI-22



6. Packing and storing instructions, transportation.

The sensors to be transported must always be properly packed in order to avoid any damage during the transportation. It is recommended to place the sensors to be transported either in one general, shared package or in individual unit packages. The sensors should be stored in their packages in indoor storage spaces: the indoor air must contain no traces of vapours and/or aggressive substances, the indoor air temperatures must range from +5 °C to 50 °C, and the relative humidity must not exceed 85%. Whilst being transported, the sensors must be protected against shifting inside the packagings. The sensors manufactured by 'Limatherm Sensor' can be transported using maritime, rail, road, or air modes of transport, in all cases provided that the direct impact of atmospheric factors on the sensors during the transportation is totally eliminated. The detailed transportation conditions are specified in the Polish Standard PN-81/M-42009.

7. Warranty.

- The Manufacturer provides the original purchaser of the sensor (sensors) with a twelve (12) month warranty and necessary service; for this period, the Manufacturer guarantees the uninterrupted and error free functioning of sensors;
- The twelve (12) month warranty begins on the day of purchase;
- Also, the Manufacturer provides the original purchaser of the sensors with a post-warranty service;
- The warranty voids in the case of any changes in and repairs of the instrument performed by the user;
- This warranty does not cover damages resulting from improper transportation, nor defects and errors caused by bad handling or misuse which does not comply with the provisions as set forth in this Operation Manual.

8. Recommended examples of assembling the sensors.

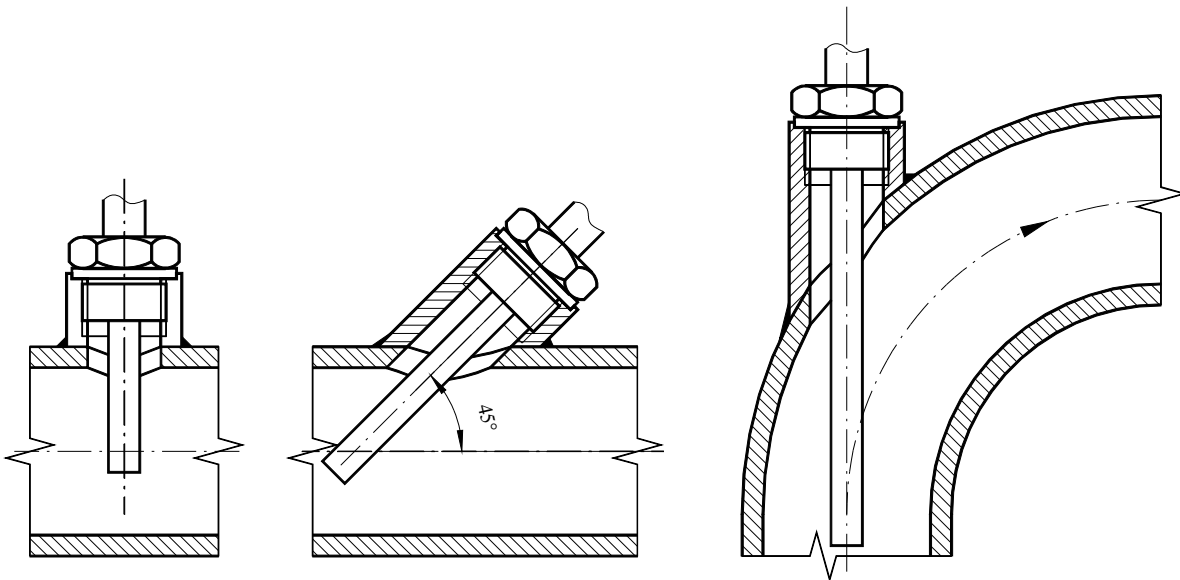


Fig. 1: Examples of assembling sensors with a threaded connector