

Head sensors with replaceable ceramic measuring inserts



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Head sensors with replaceable wire measuring inserts in ceramic insulators.

These operating instructions apply to sensors with replaceable measuring inserts in ceramic insulators: TT..U-1, TT..U-11, TT..UO-11, TT..K-1, and replacement inserts for the above sensors, WD... type. The sensors are made with a terminal block or a terminal block and a 4-20 mA signal transmitter (AP... version).

The sensors are made in accordance with the PN-EN 60584 standard.

1. Construction and principle of operation.

The basic element of the sensors is a thermoelectric measuring insert made of thermocouple wires with a diameter of 3 mm placed in ceramic insulators and terminated with a terminal block. The ceramic block is covered with a head made of aluminum alloy. The head can have a raised cover, which will allow you to mount an analog signal converter from a ceramic block to a current or voltage signal.

An additional straight or angular process shield made of heat-resistant steel is mounted in the head, protecting the measuring insert against direct contact with the medium. Since the shield is in the shape of a smooth pipe, special fittings are used to mount the sensors, enabling the sensor to be inserted into the measurement zone to a certain depth.

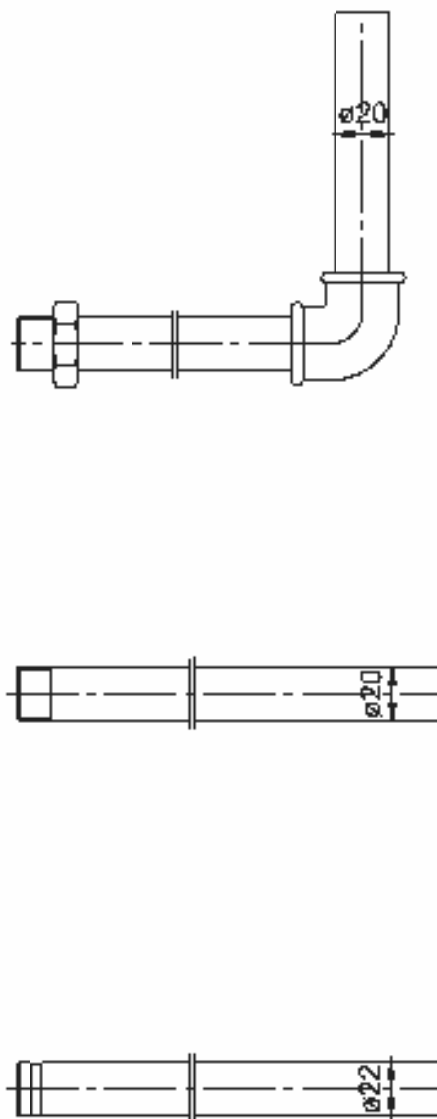
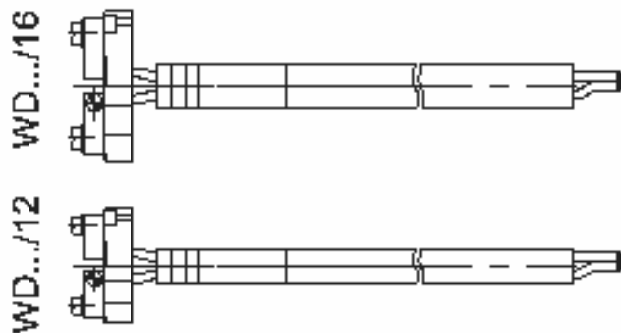
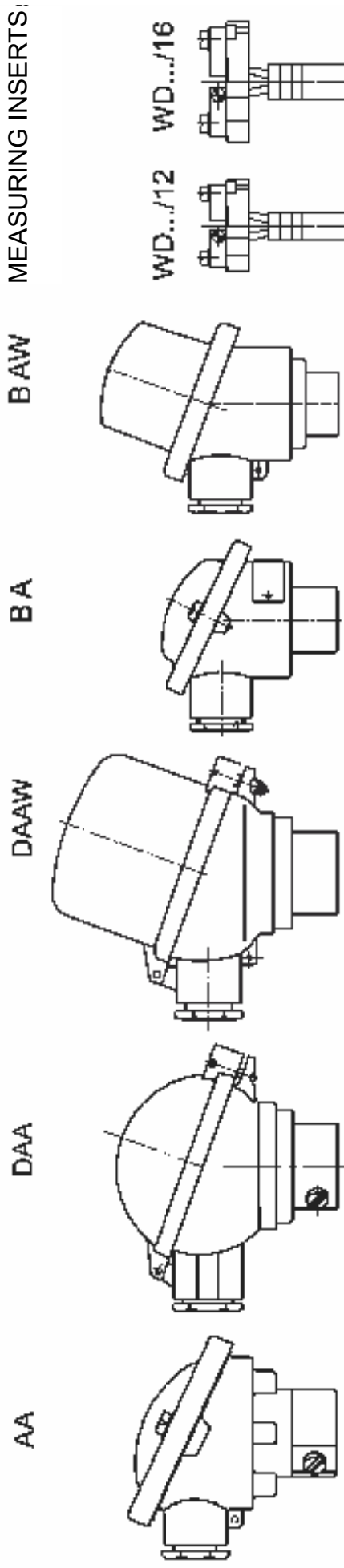
The thermocouple of the measuring insert reacts to a change in the medium temperature by changing the electromotive force (EMF) in accordance with the thermometric characteristics specified in the PN-EN 60584 standard.

Technical description:

Thermocouple type.....	single or double Fe-CuNi /J/, NiCr-Ni/K/ kl.1,2 PN-EN 60584
Max. measuring range.....	-40÷700 °C for J-type -40÷900 °C for K-type
Hot junction type.....	exposed (SE)
Permissible operating temperature of the head.....	100 °C - rubber seal on request..... 150 °C - silicone gasket
Protection degree of housing.....	IP-54 for BA-type IP-53 for DAA, DAAW-type
Gland dimension.....	M20x1,5
Transmitters.....	TxBLOCK, APAQ, LTT, FLEX TOP, 248HA

2. Scheme of associating sensor assemblies.

CONNECTION HEADS



Heat-resistant covers of sensors

Sensor type	Material of thermowell	Measuring range	Assembling method	Thermowell diameter	Protection degree
TTJU-1	1.4841 H25T	-40÷700°C	UG-1-20	ø20	IP 54
TTJK-1					
TTKU-1	1.4841	-40÷1150°C			
TTKK-1					
TTKU-1	H25T	-40÷1000°C			
TTKK-1					
TTJU-11 TTJUO-11	H25T 1.4841 1.4762	-40÷700°C	UZ-11, UZ-21	ø22	IP 53
TTKU-11 TTKUO-11	1.4841	-40÷1150°C			
TTKU-11 TTKUO-11	H25T	-40÷1000°C			
TTKU-11 TTKUO-11	1.4762	-40÷1200°C			
WDJ		-40÷750°C		8x12, ø14 ø16	
WDK		-40÷1200°C			

3. Assembly.

Sensors should be installed in measuring places in accordance with the structurally assumed method of assembly, if possible, in places facilitating inspection during operation and replacement in the event of damage. The accuracy of the temperature measurement depends to a large extent on how the sensor is installed. Please note that the sensor transmits signals depending on the temperature in which the measuring element is located. Since part of the sensor is located outside the measurement site, at ambient temperature, and the sheath is a good heat conductor, it changes the temperature distribution at the measurement site by continuously dissipating heat to the environment. These changes, which increase the inaccuracy of the measurement, are the greater the greater the ratio of the length of the sensor at ambient temperature to the length of the entire sensor, and the greater the difference between the ambient temperature and the temperature at the measurement site.

If accurate temperature measurement is required, the following recommendations should be followed when installing the sensors:

- thermally insulate the parts of the sensor sheath protruding beyond the measuring area,
- lead the connecting line, especially in the case of long lengths, so that it is not exposed to large temperature fluctuations,
- use longer sensors (deep immersion) in order to obtain a favorable ratio of the length of the sheath at ambient temperature to the total length.

4. Connecting and running a connecting line.

The line connecting the sensors with the measuring device should be made with compensating wires with a cross-section of not less than 1 mm², in accordance with the regulations on low-voltage electrical installations. When routing lines, avoid connecting wires. If necessary, solder connections are recommended. When making the connection line, all recommendations of the operating instructions of the device with which the sensor will work must be observed.

Sensors should be combined with plus-plus, minus-minus devices. For ease of installation, the national standards of each country specify the color of the insulation of the wires and the outer sheath.

5. Designation of connection terminals.

• TERMINAL BLOCK

Since thermocouple sensors must be connected with proper polarity, for proper connection, a „+” sign is marked on the terminal block - the positive pole of the thermocouple.

In the case of connecting the thermocouple sensor with external devices, the appropriate pole of the terminal block should be connected to the wire of the same polarity (in the appropriate color). The marking, colors and scope of use of the cables are given in the table below.

TC type	Type of wire		Metal composition		Wire color „+”		Tolerances		Temp. range
	Compens.	Ext.	Wire +	Wire -	IEC 584 „-” white	ANSI „-” red	Class 1	Class 2	
J	-	JX	Fe	CuNi	black	white	±1.5	±2.5	-25÷200°C
K	-	KX	NiCr	NiAl	green	yellow	±1.5	±2.5	-25÷200°C
K	KCA	-	Fe	410 Alloy	green	-	-	±2.5	0÷150°C
K	KCB	-	Cu	CuNi	green	-	-	±2.5	0÷100°C
T	-	TX	Cu	CuNi	khaki	blue	±0.5	±1.0	-25÷200°C
E	-	EX	NiCr	CuNi	violet	violet	±1.5	±2.5	-25÷200°C
N	-	NX	Nicrosil	Nisil	pink	orange	±1.5	±2.5	-25÷200°C
N	NC	-	Cu	278 Alloy	pink	-	-	±2.5	0÷150°C

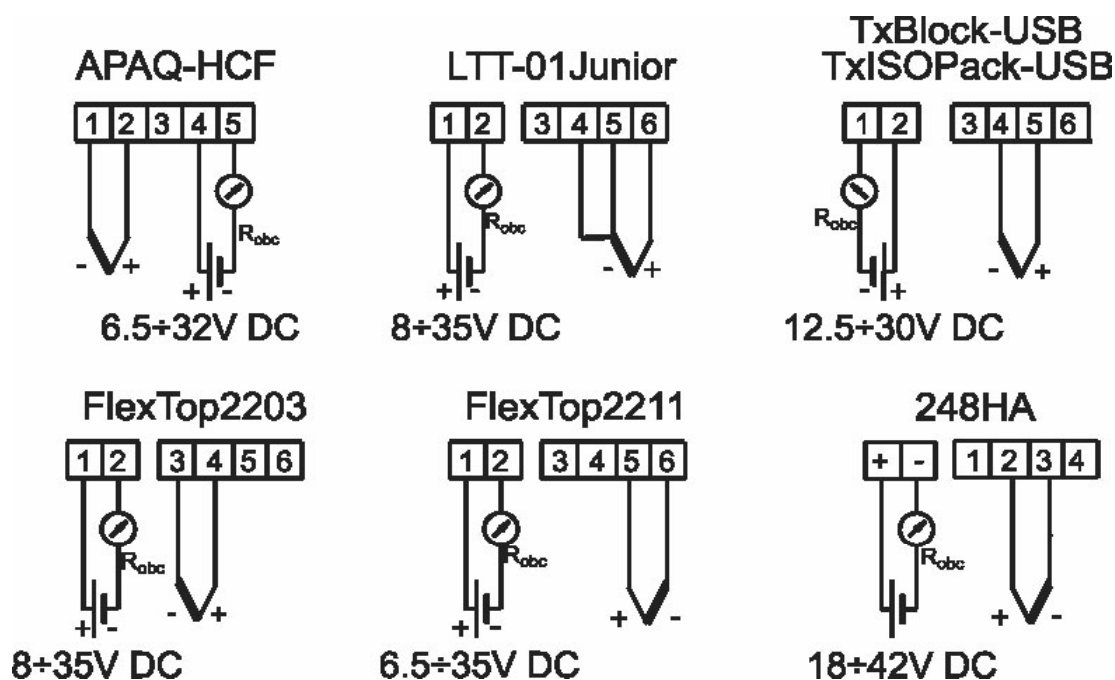
• CROSS-SECTIONS OF COMPENSATING CONDUCTORS

0,22 mm²; 0,5 mm²; 0,75 mm²; 1,0 mm²; 1,5 mm² - recommended cross-sections of compensating cables for connecting sensors with external devices are: 1,0 mm² or 1,5 mm² acc. to the PN-89/M-53859.

General rules for marking/coloring/compensating cables:

- acc. to the DIN IEC 584 - the color of the cover, outer insulation and positive wire assigned to the positive thermoelectrode of the sensor is the same, the color of the negative wire - white
- wg PN-89/M-53859 - the color of the cover, external insulation - different, the color of the insulation of the wire assigned to the positive thermoelectrode is red, while the insulation of the wire assigned to the negative thermoelectrode is any color except for red, purple and pink.

• TRANSMITTER TC/4-20 mA - WIRE DIAGRAM



The line connecting the sensor transducer with the measuring instrument should be made with copper wires with a cross-section of not less than 1 mm², in accordance with the regulations on low-voltage electrical installations. When routing lines, avoid connecting wires. If necessary, solder connections are recommended. When making the connection line, all recommendations of the operating instructions of the device with which the sensor will work must be observed.

Recommended external diameters of wires for cable glands in the heads of temperature sensors manufactured by Limatherm Sensor:

- FOR A-TYPE GASKET (WITHOUT CUTS):
Gland M20x1.5; cable diameter \varnothing : 5.5-7.5 mm.
- FOR B-TYPE GASKET (WITH CUTS):
Gland M20x1.5; cable diameter \varnothing : 4-12,5 mm.

6. Packing, storage and transport.

The sensors should be packed in a way that protects them against damage during transport in bulk and/or unit packages. The sensors should be stored in packages, in covered rooms, free of vapors and aggressive substances, where the air temperature is between +5 °C and 50 °C and the relative humidity does not exceed 85%. Transportation should take place in packaging with protection against movement of the sensors during transport. Means of transport may be land, sea or air, provided that they ensure the elimination of the direct impact of weather conditions. Transport conditions according to PN-81/M-42009.

7. Terms of warranty.

- the manufacturer guarantees the correct operation of the sensors for a period of 12 months from the date of purchase, as well as warranty and post-warranty service,
- any modifications made on your own will void the warranty,
- the warranty does not cover damage resulting from transport and use inconsistent with the requirements of this manual,
- covers operating in an environment other than water, if not specified in the inquiry or order, are not covered by the warranty.

8. Recommended ways of mounting sensors.

