

Application

- Measuring range: -40 .. +800°C
- Suitable for additional thermowell
- Technological process installations in all branches of industry

Features

- Exchangeable measuring insert made of mineral insulated cable (vibration proof)
- Spring-loaded measuring insert provides ideal contact with the thermowell
- Temperature transmitter can be installed in the sensor head
- Connection head with local LCD or LED display as an option (see models TWR01H, DANWdie-LED)

The sensor consists of a replaceable insert, neck and an aluminium connection head where a programmable temperature transmitter with a 4-20 mA output signal can be installed.

The measuring insert represents the replaceable element of the complete sensor which reduces time and costs of maintenance of the measuring apparatus installed in the object. Spring fixation of the measuring insert provides perfect pressure to the bottom of the protecting tube, reduces time of reaction to changes of temperature and increases accuracy of measurement as well as reduces natural vibration thus mechanical and electrical defects can be avoided.

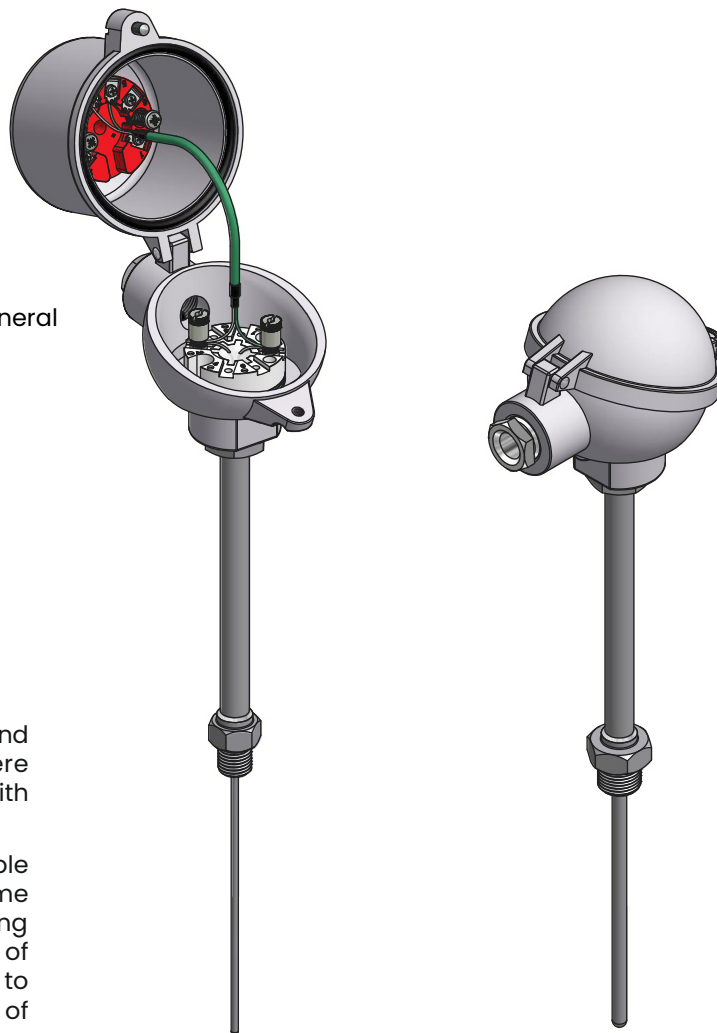
Insertion length, thermometer thread, connection head as well as type and number of sensors, accuracy and method of connection can be selected individually for the respective application.

Temperature Transmitter (Option)

Transmitter is mounted inside the connection head of the sensor. There are two ways of installation: directly on the measuring insert or in the higher cap of the head.

The advantage of the second solution is that replacing the standard insert with a terminal block is easy without having to dismantle the transmitter, which significantly shortens the time and lowers the cost of sensor maintenance and protects the connection cables.

Mounting two transmitters is possible upon customer's request.



Sensor with connection head DANW

Sensor with connection head NA

ATEX, EAC Ex versions

Intrinsically safe and Flameproof designs are available for applications in hazardous areas. These models are provided with certificate for „intrinsically safe“ and „flameproof“ type of protection according to Directive 2014/34/UE (ATEX) and EAC Ex TR-CU 012/2011 (Eurasian Economic Union).

Intrinsically safe (Exi)

data sheet XI-TT..WS

Flameproof (Exd)

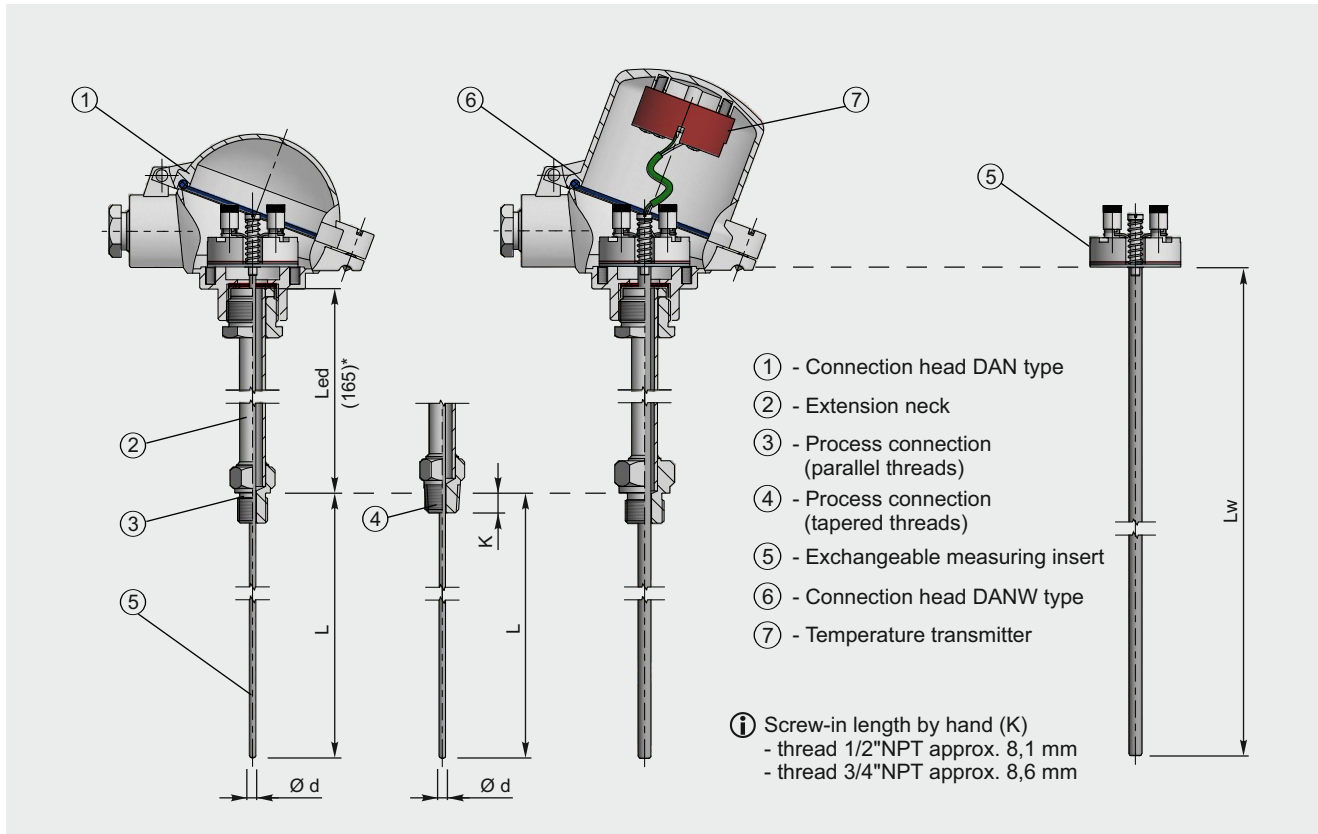
data sheet XD-TT..WS

Other versions

This data sheet contains only a small portion of our program of supplying thermocouple thermometer with a replaceable measuring insert.

Other versions can be supplied upon customer's request.

Designs



Basic values of thermocouples type J, K, N according to PN-EN 60584 / IEC 584

Temperature		°C	100	200	300	400	500	600	700
Nominal value	Type J	mV	5.27	10.78	16.33	21.85	27.39	33.10	39.13
	Type K	mV	4.10	8.14	12.21	16.40	20.64	24.91	29.13
	Type N	mV	2.77	5.91	9.34	12.97	16.75	20.61	24.53
Tolerance	Class 1	°C	±1.5	±1.5	±1.5	±1.6	±2.0	±2.4	±2.8
	Class 2	°C	±2.5	±2.5	±2.5	±3.0	±3.7	±4.5	±5.2

Tolerance

The PN-EN 60584 Standard defines the formulas for calculating acceptable measure tolerance. More information available in the general thermocouple thermometer sheet.

Type J (Fe-CuNi)

Class	Temperature range	Tolerance
1	-40 °C .. +375 °C	± 1.5 °C
	+375 °C .. +750 °C	± 0.0040 x t
2	-40 °C .. +333 °C	± 2.5 °C
	+333 °C .. +750 °C	± 0.0075 x t

Type K (NiCr-Ni), Typ N (NiCrSi-NiSi)

Class	Temperature range	Tolerance
1	-40 °C .. +375 °C	± 1.5 °C
	+375 °C .. +1000 °C	± 0.0040 x t
2	-40 °C .. +333 °C	± 2.5 °C
	+333 °C .. +1200 °C	± 0.0075 x t

Standard lengths

Immersion length L	Measuring insert length Lw
100 mm	275 mm
140 mm	315 mm
200 mm	375 mm
260 mm	435 mm

In case of non-standard lengths, below formula should be used to calculate length of measuring insert:

$$Lw = L \text{ (thermowell length)} + 165 \text{ (neck length)} + 10$$

Example:

$$Lw = 200 + 165 + 10$$

For thermowell L=200 mm long, length of measuring insert is 375mm.

Response time

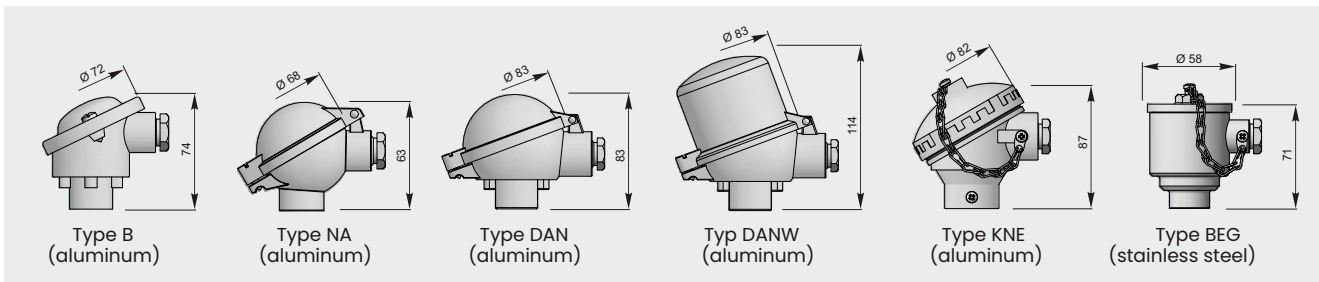
Average response time at mixed water 0.4 m/s (acc. to DIN EN 60584), at temperature change from 23 to 33°C.

Tests refers to thermocouples with isolated measuring junction (SO,SOB).

Measuring insert diameter	Response time
Ø 3 mm	t ₅₀ = 2.5 s
	t ₉₀ = 3 s
Ø 6 mm	t ₅₀ = 7 s
	t ₉₀ = 9.5 s

Connection heads

This sensor can be fitted with one of the following connection heads. For more information about the connection heads see section "Accessories".

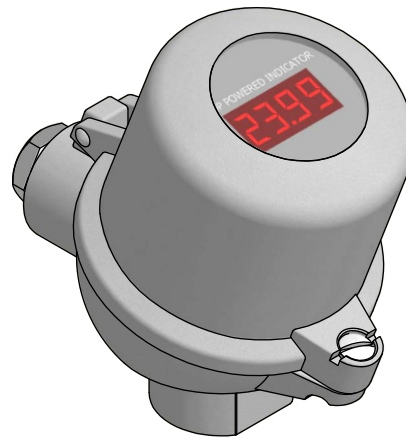


Connection head DANWdie with local LED display

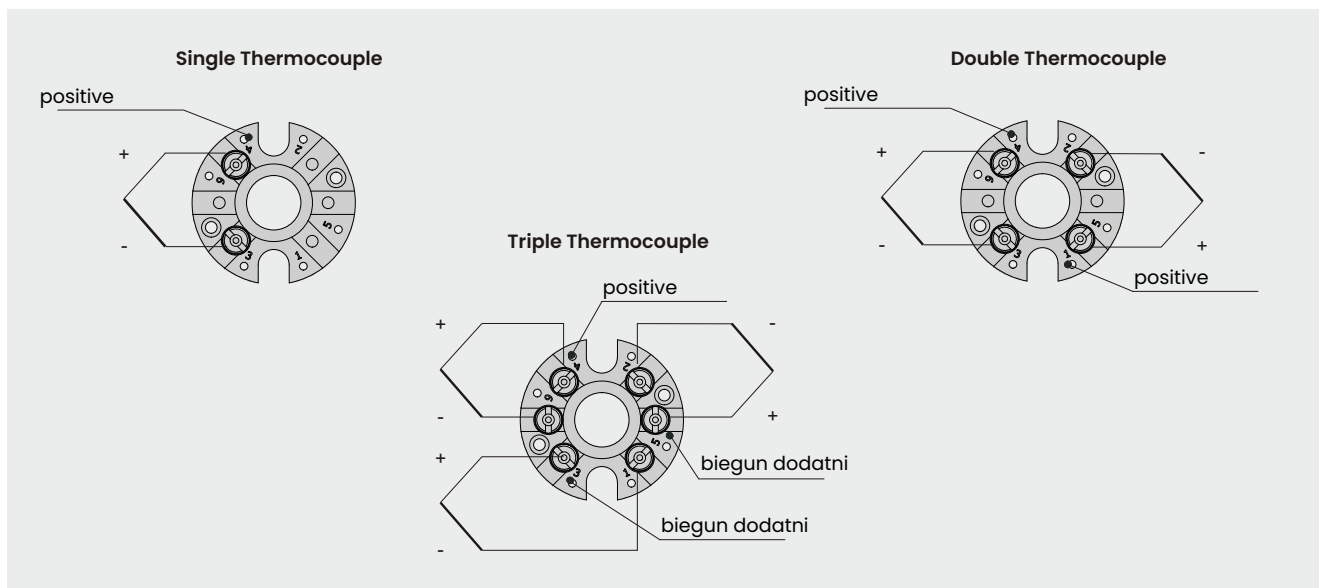
The display is mounted in connection head cover with glass window which allows preview of measuring temperature. 4 digits with a height of 9.5 millimeter ensure clear reading of values.

Programming of measure range can be performed via three buttons placed on the back of display panel.

Mounted temperature transmitter 4..20mA on measuring insert is necessary for proper use. It also works with temperature transmitters with HART® protocol.



Electrical connection on ceramic block



Ordering code

1 2 3 4 5 6 7 8 9 10 11 12
 TT WS - - - - - - - - - - -

1	<input type="text"/>	Version		Single thermocouple
		AP		Single thermocouple, with 4..20 mA temperature transmitter
		APW		Single thermocouple, 4..20 mA temperature transmitter and local LED display*
		2		Double thermocouple
		3		Triple thermocouple
2	<input type="text"/>	Thermocouple type		
		J		Type J (Fe-CuNi)
		K		Type K (NiCr-Ni)
		xxx		other, please specify
3	<input type="text"/>	Measuring insert diameter d		
		1		Ø3.0 mm
		2		Ø6.0 mm
		3		Ø4.5 mm
		4		Ø4.8 mm
		5		Ø6.4 mm
4	<input type="text"/>	Closing method of connection head		
		1		closing by screw
		3		closing by clamp
5	<input type="text"/>	Connection head		
		NA	Type NA	Aluminum Cable gland: M20x1.5 IP65
		DAN	Type DAN	Aluminum Cable gland: M20x1.5 IP65
		DANW	Type DANW	Aluminum Cable gland: M20x1.5 IP65
		B	Type B	Aluminum Cable gland: M20x1.5 IP65
		BEG	Type BEG	Stainless Steel Cable gland: M20x1.5 IP65
		xxx		other, please specify
6	<input type="text"/>	Length L [mm]		
		100		100 mm
		160		160 mm
		200		200 mm
		250		250 mm
		400		400 mm
		xxx		other, please specify
7	<input type="text"/>	Neck length Led [mm]		
				165 mm (standard)
		250		250 mm
		xxx		other, please specify
8	<input type="text"/>	Thermometer connection		
		M12x1.5		M12x1.5
		M14x1.5		M14x1.5
		M18x1.5		M18x1.5
		xxx		other, please specify
9	<input type="text"/>	Measuring junction		
		SO		Junction isolated
		SP		Junction grounded
		SOB		Junctions isolated (double and triple thermocouples)
10	<input type="text"/>	Tolerance		
		1		Class 1 according to PN-EN 60584-2
		2		Class 2 according to PN-EN 60584-2
11	<input type="text"/>	Measuring range of temperature transmitter		
		0..100		input signal for 4..20mA: 0..100°C
		xxx		other, please specify
12	<input type="text"/>	Type of temperature transmitter		
		PR5334A3B		Output signal 4..20 mA
		PR5335A		Output signal 4..20 mA, with HART® protocol
		PR5350A		Output signal Profibus® PA / Foundation Fieldbus
		xxx		other, please specify

* only with connection head DANWdie

Example

Temperature sensor TTKWS11-DAN-200-M12x1.5-SO-1

(sensor 1xK, connection head type DAN closed by screw, length L=200mm, measuring insert diameter Ø3 mm, thermometer thread M12x1.5, junction isolated, class 1).