

Application

- Measuring range: -40 .. +600°C
- Particularly suitable for steam and gas applications with high process pressures and temperatures
- Universal range of application

Features

- Spring-loaded measuring insert provides ideal contact with the thermowell
- Temperature transmitter can be installed in the sensor head
- High flexibility due to modular assembly with standard terminal heads and customized immersion length
- High compatibility with a design according to DIN 43772
- Connection head with local LED display as an option (see model DANWdie-LED)

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

The measuring insert is a replaceable element of the complete sensor, which significantly reduces the time and cost of maintenance of measuring instruments on site.

Thanks to the spring-loaded fastening of the measuring insert it is perfectly pressed against the bottom of the protective tube, which reduces the time of reaction to temperature changes, increases accuracy of measurement and reduces natural vibrations, thus mechanical and electrical damages can be avoided.

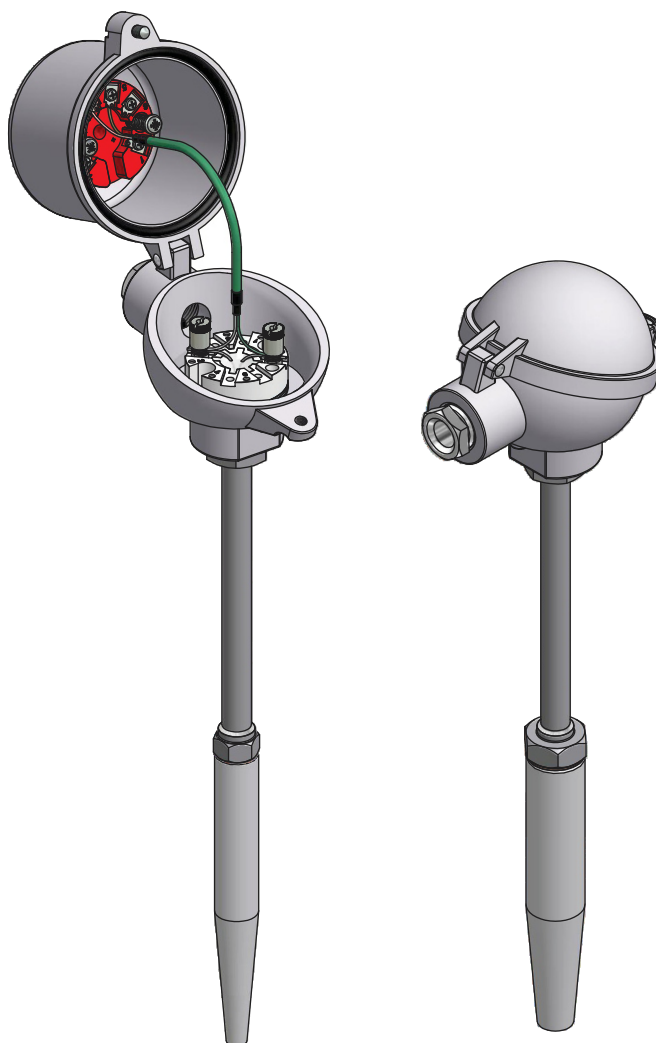
Immersion length, design of thermowell, connection head as well as type and number of sensors and accuracy can be selected individually for the respective application.

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..SW

Flameproof (Exd)

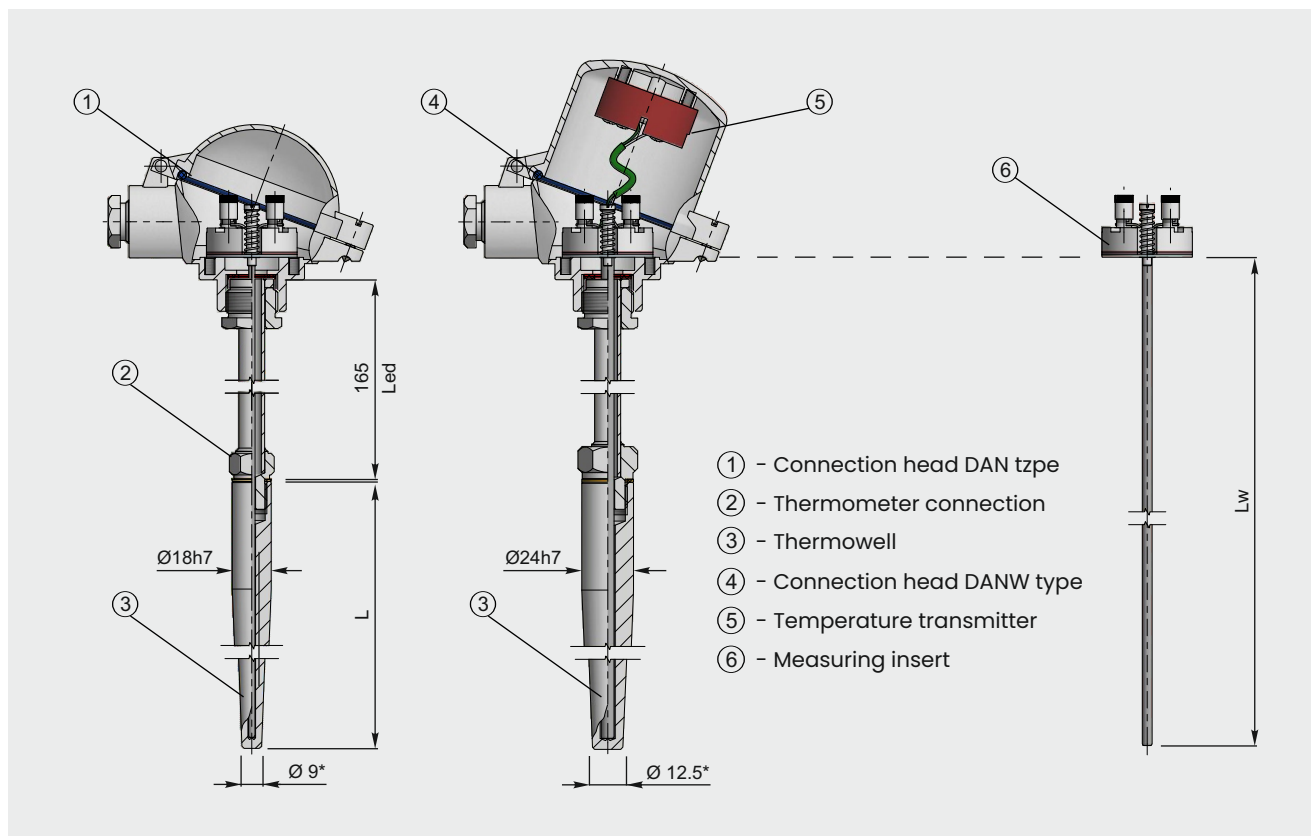
data sheet XD-TT..SW

Other versions

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

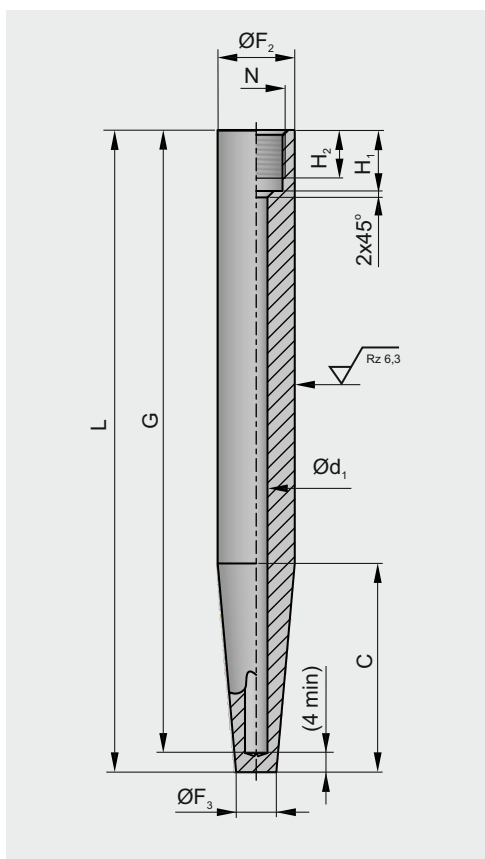
Other versions can be supplied upon customer's request.

Designs



* other parameters upon request

Solid machined thermowell acc. to DIN 43772 - form 4



Standard diameters and threads type

d_1	F_2	N	F_3	H_1	H_2
3,5	18h7	M14x1,5	9	16	13
7	24h7	M18x1,5	12,5	19	15
	26h7	G1/2" (M20x1,5)			
9	32h11	G3/4" (M27x2)	15	22	17
11			17		
13			19		
14			20		

Standard lengths

L_o^{*2}	G_o^{*1}	C_o^{*2}
110	105	65
110	105	73
140	135	65
170	165	133
200	195	65
200	195	125
260	255	125
410	405	275

Maximal process pressure

Thermowell length L [mm]	Maximal pressure [MPa]			
	Thermowell SW1		Thermowell SW2	
	air	water	air	water
100	15.7	44	-	-
140	13.4		22	44
200				
260	-	-	-	-

values calculated for air velocity of 60 m/s and for water velocity of 5 m/s.

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), Type 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

Response time

Thermowell diameter	Response time	Length C=65 mm	Length C=125 mm
Ø 18h7	t ₅₀	7.5 s	7.5 s
	t ₉₀	19 s	19 s
Ø 24h7	t ₅₀	18 s	16 s
	t ₉₀	50 s	46 s

Non-standard neck lengths

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

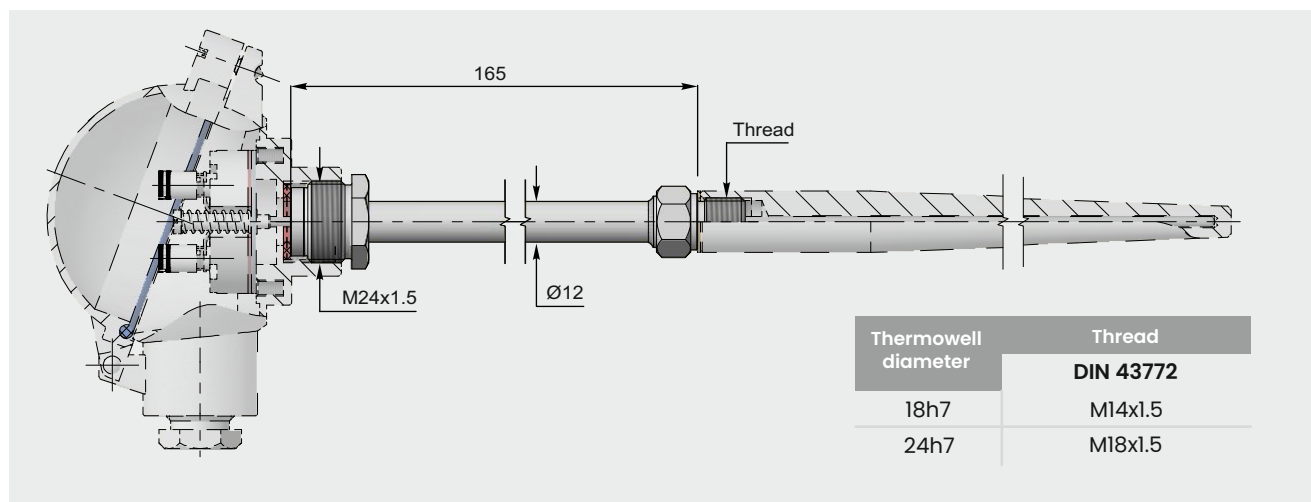
$$L_w = L_{\text{(thermowell length)}} + 165_{\text{(neck length)}} + 10$$

Example:

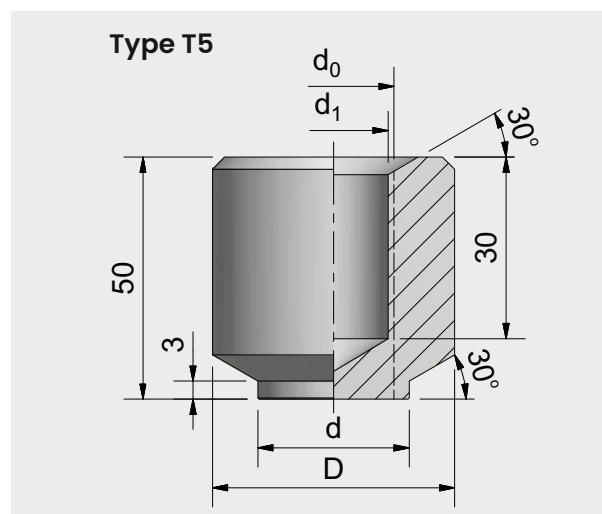
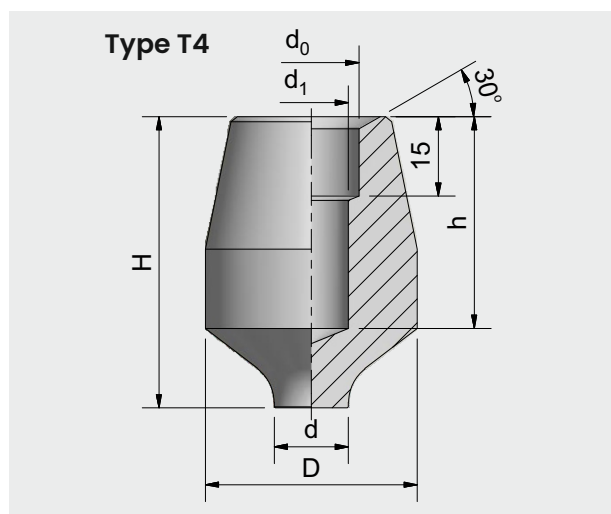
$$L_w = 200 + 165 + 10$$

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

Cooling neck



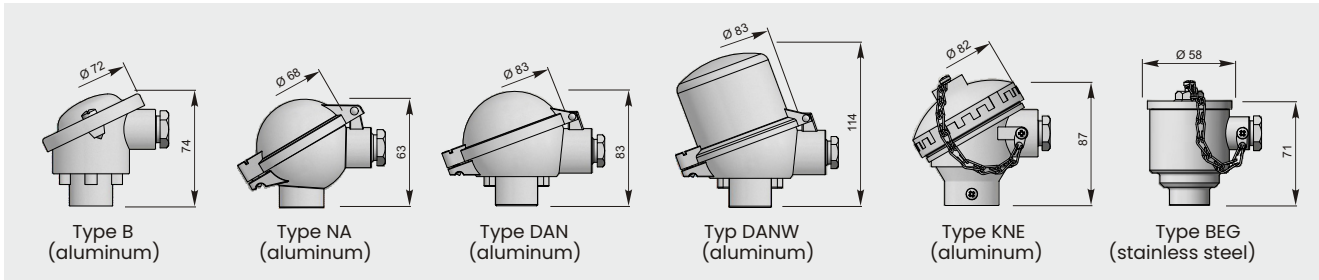
Adaptors for weld-in



More detailed information are available in the „Adaptors for weld-in” data sheet.

Connection heads

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

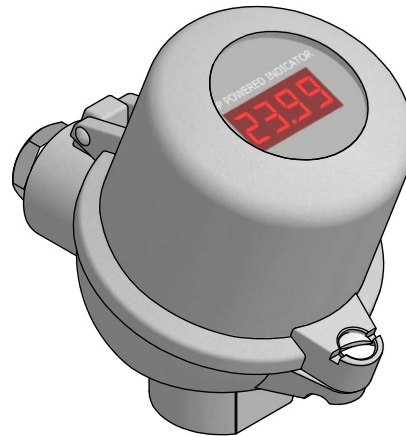


Connection head DANWdie with local LED display

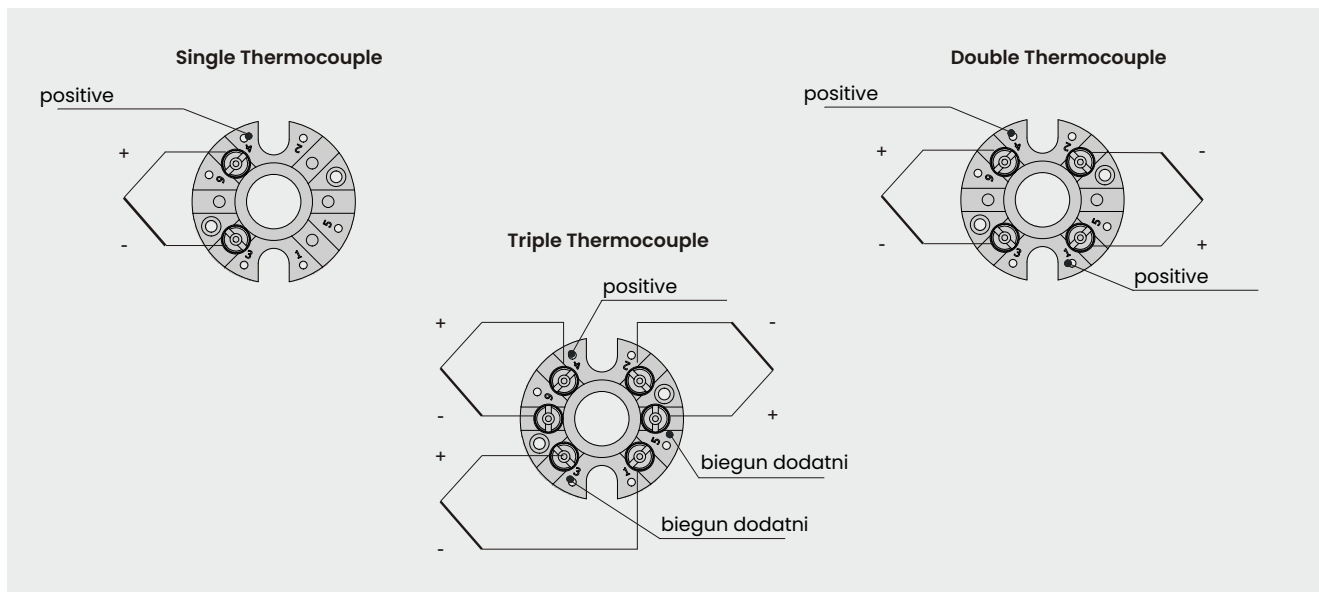
The display is mounted in connection head cover with glass window which allows preview of measuring temperature. 4 digits with a height of 9.5 millimeter ensure clear reading of values.

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

Mounted temperature transmitter 4..20mAon 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 SW - - - - - - - - - - -

1	<input type="checkbox"/>	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	
				* only with connection head DANWdie
2	<input type="checkbox"/>	Thermocouple type		
		J	Type J (Fe-CuNi)	
		K	Type K (NiCr-Ni)	
		xxx	other, please specify	
3	<input type="checkbox"/>	Thermowell diameter		
		1	Ø 18h7 mm	
		2	Ø 24h7 mm	
4	<input type="checkbox"/>	Closing method of connection head		
		1	closing by screw	
		3	closing by clamp	
5	<input type="checkbox"/>	Connection head		
		NA	Type NA	Aluminium Cable gland: M20x1.5 IP65
		DAN	Type DAN	Aluminium Cable gland: M20x1.5 IP65
		DANW	Type DANW	Aluminium Cable gland: M20x1.5 IP65
		B	Type B	Aluminium Cable gland: M20x1.5 IP65
		BEG	Type BEG	Stainless steel Cable gland: M20x1.5 IP65
		xxx	other, please specify	
6	<input type="checkbox"/>	Thermowell material		
		1.4541	Stainless steel AISI321 (1.4541)	
		1.4571	Stainless steel AISI316Ti (1.4571)	
		1.7335	Steel 1.7335 (A182 Grade F11)	
		1.7380	Steel 1.7380 (A182 Grade F22)	
		xxx	other, please specify	
7	<input type="checkbox"/>	Length L [mm]		
		110	110 mm	
		140	140 mm	
		200	200 mm	
		260	250 mm	
		xxx	other, please specify	
8	<input type="checkbox"/>	Neck length Led [mm]		
			165 mm (standard)	
		250	250 mm	
		xxx	other, please specify	
9	<input type="checkbox"/>	Measuring junction		
		SO	Junction isolated	
		SP	Junction grounded	
		SOB	Junctions isolated (double and triple thermocouples)	
10	<input type="checkbox"/>	Tolerance		
		1	Class 1 according to PN-EN 60584-2	
		2	Class 2 according to PN-EN 60584-2	
11	<input type="checkbox"/>	Measuring range of temperature transmitter		
		0..100	input signal for 4..20mA: 0..100°C	
		xxx	other, please specify	
12	<input type="checkbox"/>	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	

Example

Temperature sensor TTKSW11-DAN-1.4541-200-SO-1
 (sensor IxK, connection head type DAN closed by screw, thermowell Ø18h7, length L=200mm, neck length Led=165mm, thermowell material 1.4541, class 1).