

Application

- Measuring range: 0 .. +1000°C
- Furnace with liquid metals:
- Zinc
- Tin
- Lead

Features

- Very long time working in liquid aluminum
- Thermal shock resistance
- Very high wear resistance
- Low coefficient of thermal expansion (no need for preheating)
- Modular construction

The sensor consists of a replaceable insert, a protective tube (thermowell), terminal block and an aluminium connection head.

The measuring insert is a replaceable element of the complete sensor, which means that only the insert, instead of the entire sensor, needs to be dismantled for regular inspection or in case of damage.

Immersion length, thermowell diameter, process connection flange (optional) connection head can be selected depending on the requirements of the application.

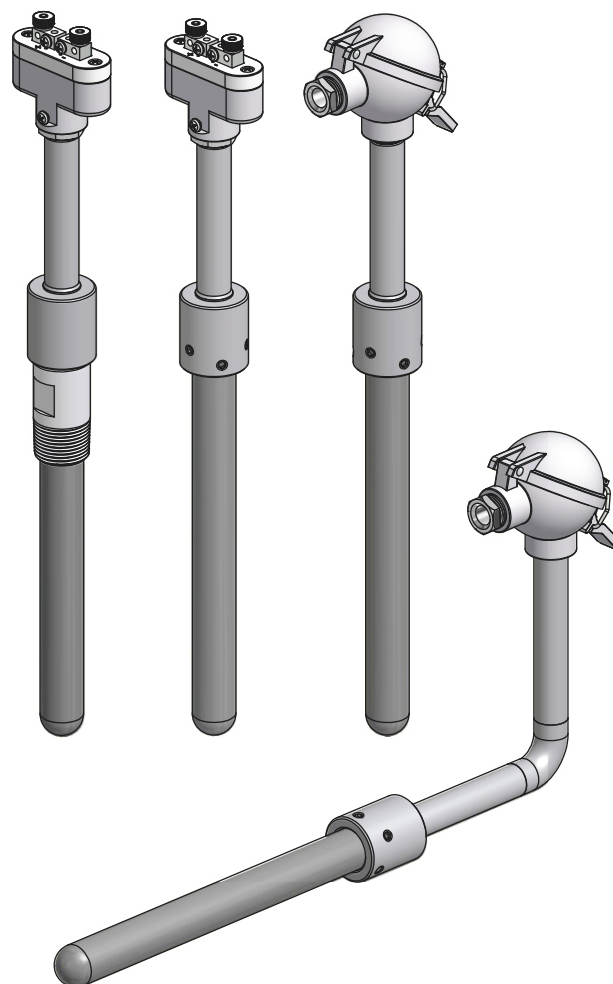
Other versions

This data sheet contains only a small portion of our program of supplying thermoelectric thermometers with a replaceable measuring insert for measurement of liquid metals.

Other versions:

- with metal thermowell covered coated with a special oxide

Other versions can be supplied upon customer's request.



Thermowell material

Syalon 101 is silicon nitride alloy with unique properties such as high strength, low weight, excellent thermal shock resistance. It is also corrosion and erosion resistant.

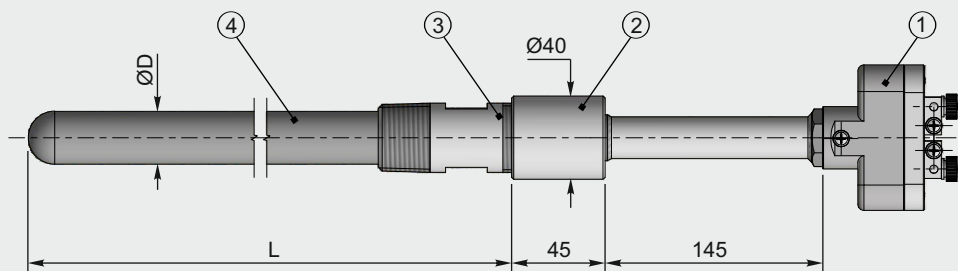
Moreover, Syalon 101 thermowell is vacuum tight and it has high electrical resistance. It exhibits high mechanical strength at extreme high temperatures (above 1000°C in air). These properties combined with very high wear resistance makes Syalon 101 thermowell an excellent application choice for molten aluminum, zinc, tin and lead.

Preheating is not necessary because of Syalon 101 low coefficient of thermal expansion.

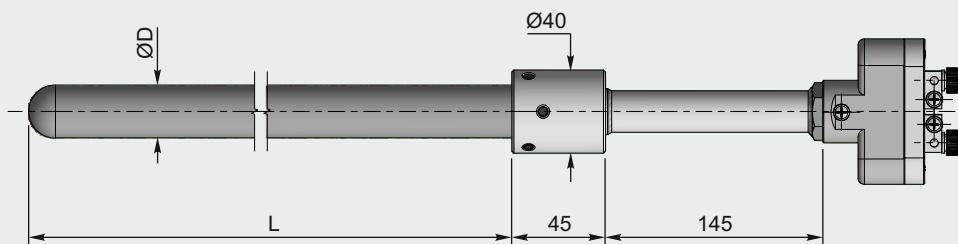
More details on Syalon are available at separate data sheet.

Designs

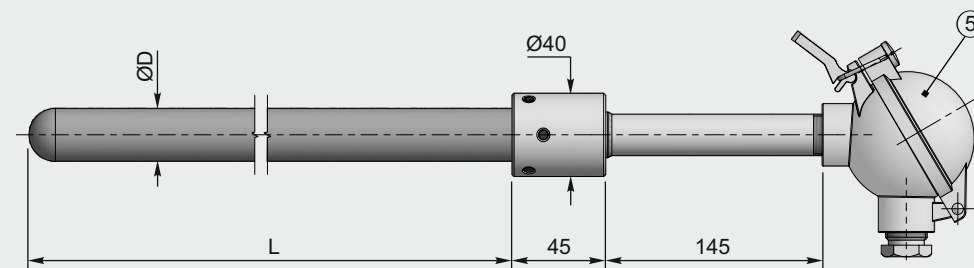
Type TT446
with threaded connection



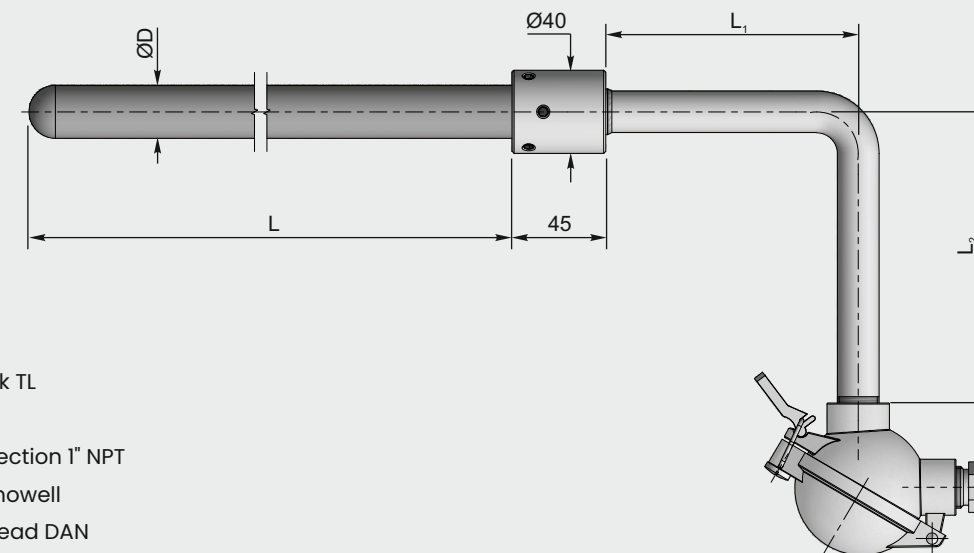
Type TT447
with TL terminal block



Type TT448
with DAN connection head



Type TT449
angled version



- ① - Terminal block TL
- ② - Sleeve
- ③ - Process connection 1" NPT
- ④ - Process thermowell
- ⑤ - Connection head DAN

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

Temperature		°C	100	200	300	400	500	600	700	800	900	1000
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	33.28	37.33	41.28
	Type N	mV	2.77	5.91	9.34	12.97	16.75	20.61	24.53	28.46	32.37	36.26
Tolerance	Class 1	°C	±1.5	±1.5	±1.5	±1.6	±2.0	±2.4	±2.8	±3.2	±3.6	±4.0
	Class 2	°C	±2.5	±2.5	±2.5	±3.0	±3.7	±4.5	±5.2	±6.0	±6.7	±7.5

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

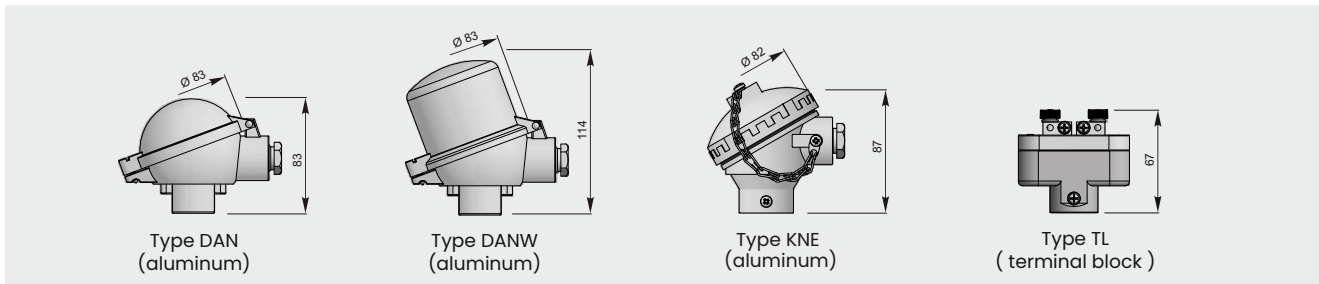
Standardowe dimensions

Thermowell diameter ØD [mm]	Length L [mm]
Ø28, Ø22, Ø16, Ø12.5	400, 700, 1000

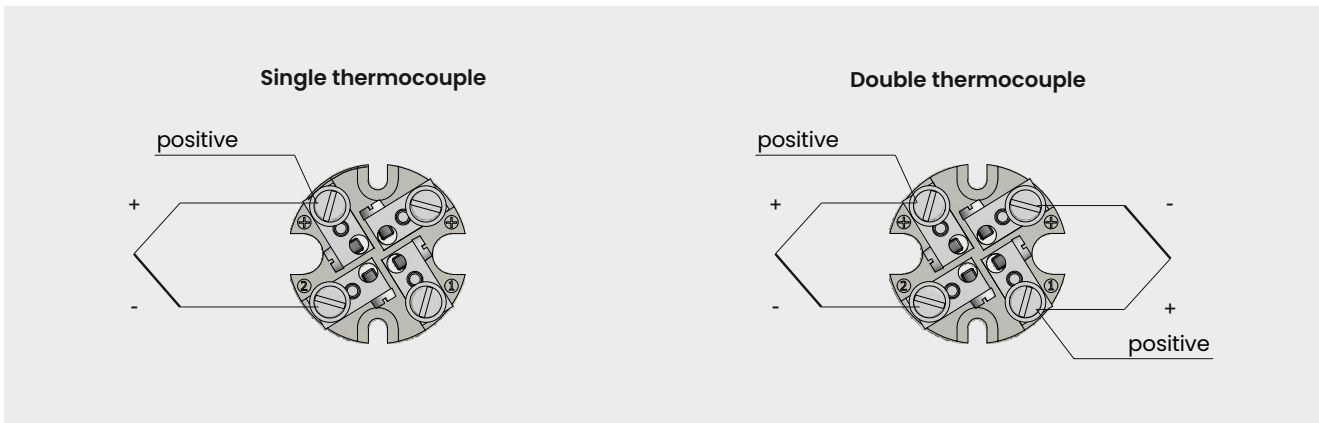
Resistance table

Material	Temp. °C	Working time in hours	Score
Aluminum	950	1000	no changes
Bismuth	800	10	no changes
Brass	950	50	no changes
Cast iron	1450	2	small changes
Lead	400	200	no changes
Copper	1150	7	noticeable changes

Types of connection heads



Electrical connection on ceramic block



Ordering code

TT44 - - - - - - -

	1	2	3	4	5	6	7	8	9
	Version								
1	<input type="text"/>	6	with threaded connection 1" NPT, terminal block TL						
		7	with terminal block TL						
		8	with connection head						
		9	angled version, with connection head or terminal block TL						
	Thermocouple type								
2	<input type="text"/>	J	Type J (Fe-CuNi)						
		K	Type K (NiCr-Ni)						
		N	Type N (NiCrSi-NiSi)						
		xxx	other, please specify						
	Connection head / Terminal block								
3	<input type="text"/>	TL	Terminal block TL						
		NA	Type NA	Aluminum	Cable gland: M20x1.5				IP 65
		DAN	Type DAN	Aluminum	Cable gland: M20x1.5				IP 65
		KNE	Type KNE	Aluminum	Cable gland: M20x1.5				IP 65
		xxx	other, please specify						
	Protection tube diameter [mm]								
4	<input type="text"/>	28	Ø 28 mm						
		22	Ø 22 mm						
		16	Ø 16 mm						
		12.5	Ø 12.5 mm						
	Length L [mm]								
5	<input type="text"/>	400	400 mm						
		700	700 mm						
		1000	1000 mm						
		xxx	other, please specify						
	Length L [mm] (only for Tt449)								
6	<input type="text"/>	200	200 mm						
		xxx	other, please specify						
	Length L [mm] (only for TT449) 2								
7	<input type="text"/>	200	200 mm						
		xxx	other, please specify						
	Tolerance								
8	<input type="text"/>	1	Class 2 according to PN-EN 60584-2						
		2	Class 2 according to PN-EN 60584-2						
	Measuring range of temperature transmitter*								
9	<input type="text"/>	0..100	input signal for 4..20mA: 0..100°C						
		xxx	other, please specify						
	Type of temperature transmitter*								
10	<input type="text"/>	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

Example

Temperature sensor TT447-K-TL-22-650-1 (sensor 1xK, terminal block TL, protection tube dia. Ø22 mm, length L=650 mm, class 1).

Temperature sensor TT449-K-DAN-16-950-300-500-1 (sensor 1xK, angled version with connection head DAN, protection tube dia. Ø16 mm, length L=950 mm, length L =300 mm, length L =500 mm, class 1). 1 2