

Product Technical Information DS_TTH-11P_2109_EN

Series PROtemp, Model TTH 11P

RTD assembly with mineral insulated replaceable measuring insert Flanged process connection. With connection head



Application

The model TTH 11P is manufactured with replaceable insert, from thermocouple types J, K, N or T embedded in mineral insulated cable for high demanding applications.

As standard process connection, the TTH 11P can also be manufactured with ASME/ANSI or EN1092-1/DIN flanges.

Are available a wide range of sensor configuration and types, as well temperature connection heads, giving to TTH 11P a huge versatility for a wide industrial branches and environmental conditions.

If requested, can be supplied with temperature transmitter, HART programmable 4...20mA 2 wire technology or Profibus/FF, according to customer requested configuration.

Affordable and reliable, ideal for sensitive pipe and tank applications in the pulp and paper, chemical, oil & gas plants and auxiliary processes in steel and cement branches, as well as in other industries, at such low process temperatures as -196°C and up to 900°C.

16	Your Advantages
//	Class 1
//	Manufactured with M.I. cable
« //	Up to 900°C
//	Standard single or double junction
//	Full customization

Overview

Informa	Informative Signs					
0	Information	This symbol contains device-oriented information which does not result in personal injury.				
Ð	Checking	This symbol contains procedures and other facts to get the most of the device and which do not result in personal injury.				
A	Caution	This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in damaged device and which do not result in personal injury.				
A	Warning	This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in minor or medium injury.				
•	Danger	This symbol alerts you to a dangerous situation. Failure to avoid this situation will result in serious or fatal injury.				

Product Overview

The PROtemp TTH 11P is a modular thermocouple assembly that features a wide range replaceable measuring inserts sensor, output configurations and design, as well housings to withstand process, environmental and usage conditions.

The assembled replaceable insert is from our measuring inserts series Eltemp, model EIT 10 from mineral insulated cable up to 1250°C or EIT 40 from mineral insulated cable with ATEX Zone 2 approval.

The model TTH 11P features an extension neck with the same thermowell outer diameter and flanged process connection. The flange is welded on both sides and is available in different sizes and pressure ratings in accordance with ASME / ANSI or EN1092-1 / DIN2501.

A thermocouple consists of the junction of two different metals at one end called the hot junction, producing an electromotive force when the hot junction and the cold junction at the other end are placed at different temperatures. The hot junction is the part of the thermocouple to be subjected to the process temperature. The cold or reference junction is usually at a lower (ambient) temperature and will compensate for the hot junction. The electromotive force generated by the thermocouple varies with the junction metals. The thermocouple element usually ends at a connection head. However, it can be transferred by compensation cable to other measuring and control instruments. Thermocouples are used for temperature measurement in the range of -270°C to 2200°C.

The mineral insulated thermocouple was initially developed for applications in the nuclear sector, and was later extended to other sectors of the production process. The main reasons that generated its development were the need for a thermocouple with a shorter response time than that obtained with the conventional thermocouple mounted with a protection tube and that the thermo-elements do not come into direct contact with the environment in which they would be inserted.

The manufacture of a thermocouple with mineral insulation cable starts from a conventional thermocouple assembled with a protection tube or sheath. In this process, the thermo-elements are isolated from each other by a compacted powder of magnesium oxide and protected by a metal sheath (originally the protection tube). Thus, despite the fact that a given thermocouple has a permissible range of use for a given process, it must be taken into account whether the material selected for the protective sheath is sufficiently resistant to the type of medium to be immersed. A correct selection of the material for this component, allows establishing a longer period of life for the thermocouple, with greater reliability and lower operating costs.

Mineral-insulated thermocouples can be assembled with the isolated, grounded or exposed measurement junction. If not specified, they will be manufactured with isolated junction.

Consider a conventional thermocouple with a metal protection tube. Realizing that it is subjected to a temperature difference, as part of it is in contact with the process and the other end is in contact with the environment, each of them at its temperature. It is inevitable that through the sensor / protection tube assembly there is a heat flow from the highest temperature to the lowest temperature region. The balance occurs when the heat flow received by the sensor is equal to that lost by the sensor, and in this situation its temperature is not necessarily equal to the process temperature.

Since it is desired to measure the process temperature and the temperature value measured by the sensor is as close as possible to it, it is necessary that in the installation in the process some care is taken when choosing the sensor set and its accessories.

- The sensor / accessory set must have a mass that is as small as possible when compared to the process mass. There is a thermal resistance of the set that can cause a temperature difference between the sensor and the process and the greater the mass of this set, the greater the value of this resistance. Another undesirable phenomenon is when the process has fluctuations in the value of its temperature and by the inertia of the sensor, these fluctuations are attenuated or simply not detected, a fact directly related to the mass of the sensor.
- Another relevant factor is the depth of immersion of the sensor in the medium whose temperature is to be measured. The greater the immersion of the sensor, the lower the temperature gradient that, in the case of a thermocouple, the measurement junction will be subjected to. The consequence is that the temperature of the measuring junction approaches the temperature of the medium. A practical recommendation is that the immersion depth is at least 6 times the value of the external diameter of the set for measurement in liquids and 20 times for air, gases or steam.
- When the thermocouple / extension cable set is installed in the process close to electromagnetic fields, it is very likely that inductions will occur in the set, causing an erroneous reading of the measured temperature values. In this situation, insulated junction thermocouples must be used, with the sheath or protective tube to earth, as well as the extension / compensation cable, which must also be shielded and connected to earth.
- It should be considered that thermocouples in general deteriorate over time, occurring quite significantly when installed in processes at high temperature and in aggressive environments. Therefore, due to the peculiarities of each process, it is necessary to establish a useful life for the sensor and proceed to its preventive replacement or periodic calibration of the set.

Types of Thermocouples

The most common thermocouples used in industrial applications are types, K, J, T, N, S and R. Below is shown the main features for those thermocouples. The types S and R are not featured in this model.

Thermocouple Type K (NICKEL CHROMIUM - NICKEL)								
Positive Element (KP)	Positive Element (KP) Ni90%Cr10% Measurement range -270°C to 1200°C							
Negative Element (KN) Ni95%Mn2%Si1%A12% Thermocouple emf -6,458 mV to 48,838 mV								

Can be used on oxidant and inertial atmospheres. Due to its oxidation resistance is used at high temperatures above 600°C and low temperatures below 0°C. Should not be used on reducer and sulphuric atmospheres. At high temperatures and with low oxygen content, chromium diffusion happens, leading to a thermocouple response curve gap.

Thermocouple Type J (IRON - CONSTANTAN)							
Positive Element (JP) Fe99,5% Measurement range -210°C to 760°C							
Negative Element (JN) Cu55%Ni45% Thermocouple emf -8,096 mV to 42,919 mV							

Can be used in neutral, oxidant or reducer atmospheres. Is not recommendable to be used at relative humidity (RH) atmospheres and at low temperatures (the thermo element JP becomes fragile). Above 540°C, iron suffers oxidation very quickly. Also, not recommendable to be used on sulphur atmospheres above 500°C.

Thermocouple Type T (COPPER - CONSTANTAN)								
Positive Element (TP) Cu100% Measurement range -270°C to 400°C								
Negative Element (TN) Cu55%Ni45% Thermocouple emf -6,258 mV to 20,872 mV								

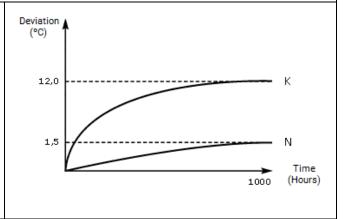
Can be used in neutral, oxidant or reducer atmospheres. It shows very good accuracy, due to copper properties. Above 300°C, the copper oxidation becomes very intense, reducing the thermocouple lifetime and causing deviation on the thermocouple original response curve.

Thermocouple Type N (NICROSIL - NISIL)							
Positive Element (NP)	Ni84,4%Cr14,2%Si1,4%	Measurement range	-270°C a 1300°C				
Negative Element (NN) Ni95,45%Si4,40%Mg0,15% Thermocouple emf -4,345 mV a 47,513 mV							

Newer thermocouple, which is a substitute for type K thermocouple, as it has a much higher resistance to oxidation and in many cases, it is also a substitute for platinum-based thermocouples due to their maximum temperature of use.

The normal operating temperature should not exceed 1100°C. It is recommended for oxidizing, inert or low oxygen atmospheres, as it does not suffer from the greenroot effect.

It must not be exposed to sulphurous atmospheres. The graph shows the temperature deviation suffered by the type N thermocouple compared to the type K in an oxidizing atmosphere at a temperature of 1000°C.



Thermocouple Type S (PLATINUM RHODIUM – PLATINUM)						
Positive Element (SP)	Pt90%Rh10%	Measurement range	-50°C to 1768°C			
Negative Element (SN) Pt100% Thermocouple emf -0,236 mV to 18,693 mV						

Can be used on oxidant and inertial atmospheres, with reliability and stability at high temperatures, much higher than other thermocouples limits without platinum thermo-elements. The thermo-elements should not be exposed to metallic vapours or reducer atmospheres. This type of thermo-elements shouldn't be assembled directly in metallic pipes, but using ceramic isolators and protection pipe, alumina based (Al203) with high purity level (99,7%), commercially known as 799 (old 710). Still is possible to manufacture the thermocouple using ceramic pipes with alumina content of 67%, known as 610, but is not recommendable for these platinum types thermocouples. For temperatures above 1500°C is used platinum pipes. Is not recommendable to use these types of thermocouples in temperatures below 0°C, due to response sensor instability.

Thermocouple Type R (PLATINUM RHODIUM – PLATINUM)								
Positive Element (RP)	Positive Element (RP) Pt87%Rh13% Measurement range -50°C to 1768°C							
Negative Element (RN) Pt100% Thermocouple emf -0,226 mV to 21,101 mV								
	, , ,							

Has the same thermocouple S features, with approximately 11% more thermoelectric power.



Tolerance Classes

Table 1 shows the tolerance classes (classes 1 and 2), according to the type of thermocouple, temperature of use and deviation, according to IEC 60584.

	Types	R and S	В	J	T	E	K and N
ss 1	Temperature Range [°C]	0 to 1100 1100 to 1600	-	-40 to 375 375 to 750	-40 to 125 125 to 350	-40 to 375 375 to 800	-40 to 375 375 to 1000
Class	Deviation [°C]	± 1 ± (1 + 0,003(t - 1100)		± 1,5 ± 0,004 (t)	± 0,5 ± 0,004 (t)	± 1,5 ± 0,004 (t)	± 1,5 ± 0,004 (t)
ss 2	Temperature Range [°C]	0 to 600 600 to 1600	600 to 800 800 to 1700	-40 to 333 333 to 750	-40 to 133 133 to 350	-40 to 333 333 to 900	-40 to 333 333 to 1200
Class	Deviation [°C]	± 1,5 ± 0,0025 (t)	± 0,0025 (t) ± 0,005 (t)	± 2,5 ± 0,0075 (t)	± 1,0 ± 0,0075 (t)	± 2,5 ± 0,0075 (t)	± 2,5 ± 0,0075 (t)

Table 1 - Classes of thermocouples according to IEC 60584

P

Colour Codes

	Cond Combi		Standards					
TC Types	+ Leg	- Leg	IEC 60584-3	ANSI Mc96.1	DIN43714	BS 1843		
Т	Copper	Constantan	+	+ -	+ -	+ -		
J	Iron	Constantan	-	+	+	+ -		
E	Nickel - Chromium	Constantan	+ -	+	÷ -	+		
K	Nickel - Chromium	Nickel - Aluminum	+ -	+	+	+ -		
Vx	Copper	Constantan	+ -	+ -	+ -	+		
N	Nicrosil	Nisil	+	+	NOT DEFINED -	+		
S	Platinum - 10% Rhodium	Platinum	+	+	+	+		
R	Platinum - 13% Rhodium	Platinum	+	-	+	+		
U	Copper	Nickel	+	+	+	+		
В	Platinum - 30% Rhodium	Platinum - 6% Rhodium	+	+	+	NOT DEFINED -		
G	Tungsten	Tungsten – 26% Rhenium	NOT DEFINED -	+	NOT DEFINED -	NOT DEFINED -		
D	Tungsten – 3% Rhenium	Tungsten – 25% Rhenium	NOT DEFINED -	+	NOT DEFINED -	HOT DEFINED -		
С	Tungsten – 5% Rhenium	Tungsten – 26% Rhenium	NOT DEFINED -	+	NOT DEFINED.	HOT DEFINED -		

0

Vx is the compensating cable designation for thermocouple type K, also defined as KCA/KCB U is the compensating cable designation for thermocouple types S and R.

Materials Materials

Below are the characteristics of the materials, available for mineral insulated cable sheaths, process connection and extension neck. Please note there are severe restrictions for materials availability for extension neck.

SS 304 (1.4301 / X5CrNi18-10)

AISI 304 is a widely-used austenitic chromium-nickel stainless steel. Stainless steel 304 has excellent corrosion resistance in a wide variety of environments and when in contact with different corrosive media. Pitting and crevice corrosion can occur in environments containing chlorides. Stress corrosion cracking can occur at temperatures over 60°C. Stainless steel 304 has good resistance to oxidation in intermittent service up to 870°C and in continuous service to 900°C. However, continuous use at 425-860°C is not recommended if corrosion resistance in water is required. The steel is common throughout industry particularly in food processing as the material is not susceptible to corrosion from acids found in common foodstuffs. As a consequence, such steel is ideal for items such as sinks, work surfaces, preparation areas and refrigerators. It is also a perfect material for use in the pharmaceutical industry for environments such as clean rooms.

SS 316L (1.4404 / X2CrNiMo17-12-2)

SS 316 is the standard molybdenum-bearing grade, second in importance to 304 amongst the austenitic stainless steels. The molybdenum gives to SS 316 better overall corrosion resistant properties than Grade 304, particularly higher resistance to pitting and crevice corrosion in chloride environments. The SS 316L, the low carbon version of 316 and is immune from sensitization (grain boundary carbide precipitation). Thus, it is extensively used in heavy gauge welded components. The austenitic structure also gives these grades excellent toughness, even down to cryogenic temperatures. Compared to chromium-nickel austenitic stainless steels, 316L stainless steel offers higher creep, stress to rupture and tensile strength at elevated temperatures. SS 316L with excellent corrosion resistance properties in acids (low concentration and temperature phosphoric and sulfuric) in non-oxidizing atmospheres. Maximum temperature of 927°C.

SS 321 (1.4541 / X6CrNiTi18-10)

Stainless steel similar to SS 304 but with titanium compound, which gives it better properties when subjected to welding operations and increasing chemical resistance for use in the food and chemical industry. Characterised by high corrosion resistance in general atmospheric corrosive environments it exhibits excellent resistance to most oxidizing agents, general foodstuffs, sterilizing solutions, dyestuffs, most organic chemicals plus a wide variety of inorganic chemicals, also hot petroleum gases, steam combustion gases, nitric acid, and to a lesser extent sulphuric acid. It displays good oxidation resistance at elevated temperatures has excellent resistance to intergranular corrosion and has excellent weldability. Maximum temperature of 900°C.

Inconel 600 (2.4816 / NiCr15Fe)

Alloy 600 is a nonmagnetic, nickel-based high temperature alloy possessing an excellent combination of high strength, hot and cold workability, and resistance to ordinary form of corrosion. This alloy also displays good heat resistance and freedom from aging or stress corrosion throughout the annealed to heavily cold worked condition range. The high chromium content of alloy 600 raises its oxidation resistance considerably above that of pure nickel, while its high nickel content provides good corrosion resistance under reducing conditions. This alloy exhibits high levels of resistance to stress and salt water, exhaust gases, and most organic acids and compounds. Good resistance to oxidation at high temperatures. Maximum temperature of 1149°C.

SS 446-1 (1.4749 / X18CrN28)

SS 446-1 is a ferritic, heat resisting, stainless chromium steel, characterized by extremely good resistance to reducing sulphurous gases, very good resistance to oxidation in air, good resistance to oil-ash corrosion and good resistance to molten copper, lead and tin. SS 446-1 should be chosen mainly for service at temperatures above 700°C where the excellent resistance of the material to slag corrosion and sulphidizing gases is particularly advantageous. Typical applications for SS 446-1 are recuperators in the metallurgical and glass industries, thermocouple protection tubes, soot blower tubes, injection nozzles and muffle tubes in continuous wire annealing furnaces.

ALLOY C-276 (2.4819 / UNS N10276)

ALLOY C-276 is a Nickel-chromium-molybdenum wrought alloy that is considered the most versatile corrosion resistant alloy available. This alloy is resistant to the formation of grain boundary precipitates in the weld heat-affected zone, thus making it suitable for most chemical process applications in an as welded condition. Alloy C-276 also has excellent resistance to pitting, stress-corrosion cracking and oxidizing atmospheres up to 1030°C. Alloy C-276 has exceptional resistance to a wide variety of chemical environments. Some typical applications of ALLOY C-276 include equipment components in chemical and petrochemical organic chloride processes and processes utilizing halide or acid catalysts. Other industry applications are pulp and paper (digesters and bleach areas), scrubbers and ducting for flue gas desulfurization, pharmaceutical and food processing equipment.

MONEL 400 (2.4361 / UNS N04400)

Monel 400 is a nickel-copper alloy (about 67% Ni – 23% Cu) that is resistant to sea water and steam at high temperatures as well as to salt and caustic solutions. This nickel alloy is particularly resistant to hydrochloric and hydrofluoric acids when they are de-aerated. As would be expected from its high copper content, alloy 400 is rapidly attacked by nitric acid and ammonia systems. A low corrosion rate in rapidly flowing brackish or seawater combined with excellent resistance to stress-corrosion cracking in most freshwaters, and its resistance to a variety of corrosive conditions led to its wide use in marine applications and other non-oxidizing chloride solutions. Monel 400 can be used in temperatures up to 535°C.

SS 310 (1.4845 / X8CrNi25-21)

AISI 310 stainless steel is a high chromium nickel austenitic stainless steel with a high carbon content. It has excellent mechanical properties, high temperature oxidation resistance and heat resistance in continuous service up to 1150°C. AISI 310 is used in various industrial furnaces, steam boilers and petroleum system parts and thermocouple protection tubes. Examples include fire box sheets, furnace linings, boiler baffles, thermocouple wells, aircraft cabin heaters, and jet engine burner liners.

SS 904L (1.4539 / X1NiCrMoCu25-20-5)

Grade 904L stainless steel is a non-stabilized austenitic stainless steel with low carbon content. This high alloy stainless steel is added with copper to improve its resistance to strong reducing acids, such as sulphuric acid. The steel is also resistant to stress corrosion cracking and crevice corrosion. Grade 904L stainless steels have excellent resistance to warm seawater and chloride attack. Grade 904L stainless steels offer good oxidation resistance. However, the structural stability of this grade collapses at high temperatures, particularly above 400°C. major applications of grade 904L stainless steels include pulp and paper processing industries and acetic, phosphoric and sulphuric acid processing plants.

Materials	Maximum Temperature (°C)
Carbon Steel	550
Aisi 446-1	1093
Aisi 304	899
Aisi 310	1147
Hasteloy B	815
Hasteloy C	1038
Monel	893
Nicrobell	1250
Molybdenum	1870
HR-160	1200
Titanium: Oxidant Atmosphere	538
Titanium: Reducer Atmosphere	1260
Tantalum	2349
Thermo-alloy APM	1425
Metal Ceramic LT-1	1375
Recrystalized Silicone Carbide	1600
Platinum	1699

Table 2 - Maximum material service temperature: Indicative temperatures, subject to change according to atmosphere / medium

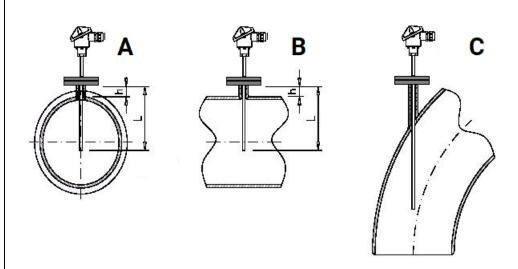


Installation

The temperature assemblies of type PROtemp TTH 11P are intended to be applied in pipelines and storage tanks in processes that require high robustness and reliability.

The immersion length has big influence in the instrument accuracy. If the immersion length is small, an additional error may occur and might not be negligible, if there is a big difference between process temperature and ambient temperature. The temperature dissipation happens between process connection and immersed length.

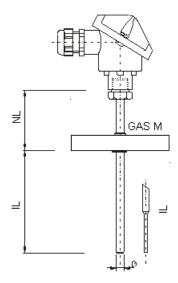
If possible, the immersion length must be slightly greater than pipe radius (see fig. A and B). In the other side, an appropriate thermal insulation can compensate a reduced immersion length or simply mount the assembly on a pipe curve (see fig. C). Other possibility to grant a correct measurement is the assembly mounting with appropriate angle (see fig. D). Be advised if the assembly is to be mounted according fig. C or fig. D, the assembly should be installed against fluid flow.

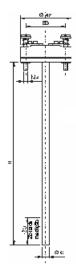


- This product is not intended to be used in oxygen service or in classified zones under ATEX directive.
- With temperature transmitter assembled, make sure power supply is switched off during wiring procedures.
- With temperature transmitter assembled, make sure power supply is according to specification on device label.
- Please note ambient temperature cannot be greater than measuring insert sealing.
- If the measuring fluid has a low temperature and the environment contains high relative humidity, please consider the use of a polypropylene or polyamide connection head.
- Please pay attention to measuring point if you are measuring a two phased fluid.

Mechanical Construction

Generic Configuration





Left: Standard device with customized immersion and extension/cooling neck, optional swagged tip Right: Replaceable measuring insert, see details page 15



The temperature heads are not orientable. Do not attempt to remove from process the temperature assembly by turning the temperature head.



The swagged versions are available as standard for thermowell OD of 12mm, Aisi 316.

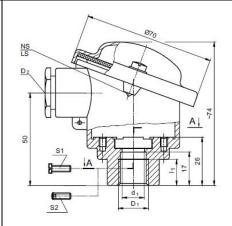
Connection Heads/Housings

These housings allow accommodate and connect up to two temperature transmitters or ceramic blocks, or one of each type. Are available in different materials and are standard with one cable entry M20x1.5. If you require a different cable entry an/cable gland, please contact us.



A temperature transmitter is required if the housing has a display, because it is powered by current loop.

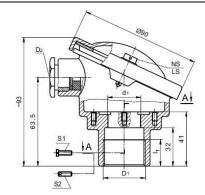




Material: Aluminium, Epoxy coated
Approval: Non-hazardous area Form: DIN B
Ingress Protection: IP65
Process Entry: ½" G
Process Entry: Bore 15.3 mm
Cable Entry: M20x1.5
Local Display: No
Type: AB1

Order Code Option B1 (½" G) F0 (Bore 15.3 mm)

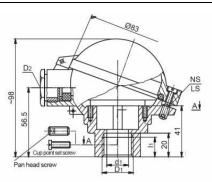




Material: Aluminium, Epoxy coated Approval: Non-hazardous area Form: DIN A Ingress Protection: IP65 Process Entry: ½" G Cable Entry: M20x1.5 Local Display: No Type: AA1

Order Code Option A1

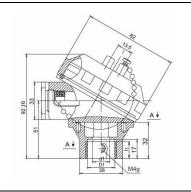




Material: Aluminium, Epoxy coated
Approval: Non-hazardous area Form: DIN B
Ingress Protection: IP65
Process Entry: ½" G
Cable Entry: M20x1.5
Local Display: No
Type: AL2

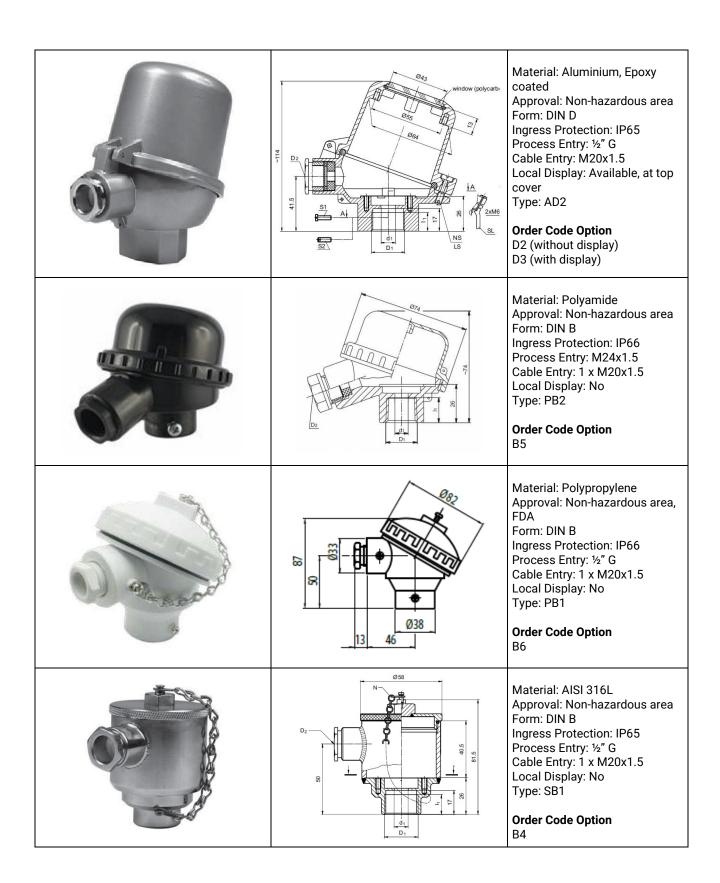
Order Code Option



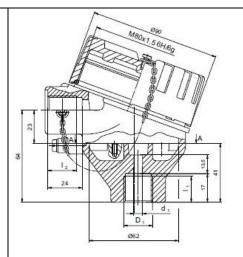


Material: Aluminium, Epoxy coated Approval: Non-hazardous area Form: DIN B Ingress Protection: IP65 Process Entry: ½" G Cable Entry: M20x1.5 Local Display: No Type: AT1

Order Code Option







Material: Aluminium, Epoxy coated

Approval: ATEX II 2GD EEx d

IIC

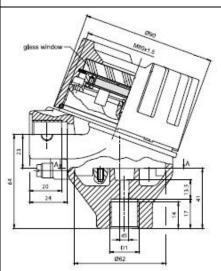
Ingress Protection: IP66/68 Process Entry: ½" G, ½" NPT Number of Cable Entries: up 2 Cable Entry: M20x1.5, ½" NPT Local Display: No

Local Display: N Type: AE1

Order Code Option

B2 (Process ½" G 1x cable entry)





Material: Aluminium, Epoxy

coated

Approval: ATEX II 2D Ex tD

A21

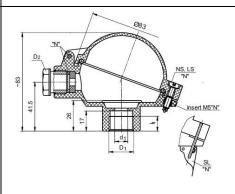
Ingress Protection: IP66/68 Process Entry: ½" G, ½" NPT Number of Cable Entries: up 2 Cable Entry: M20x1.5, ½" NPT Local Display: Available, at top cover

Type: AE2

Order Code Option

B3 (Process ½" G 1x cable entry)





Material: Black polyamide PA12

anti-static

Approval: ATEX II 2G EEx ia II

Fom: DIN B

Ingress Protection: IP65

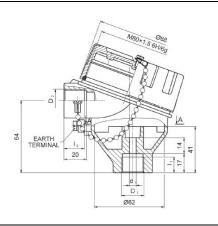
Process Entry: 1/2" G, 1/2" NPT,

M20x1.5, M24x1.5 Cable Entry: M20x1.5 Local Display: No Type: PE1

Order Code Option

P1





Material: AISI 316L

Approval: ATEX IM2 Ex d I Mb/II2G Ex d IIC Gb/II 2D Ex t IIIC

Db

Ingress Protection: IP66/68 Process Entry: ½" G, ½" NPT Number of Cable Entries: up 2 Cable Entry: M20x1.5, ½" NPT

Local Display: No

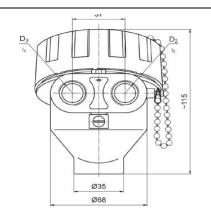
Type: SE1

Order Code Option

S2 (Process ½" G, 1x cable

entry)





Material: AISI 316L Approval: ATEX IM2 Ex d I Mb/ II2G Ex d IIC Gb/II 2D Ex t IIIC

Ingress Protection: IP66/68 Process Entry: ½" G, ½" NPT Number of Cable Entries: up 2 Cable Entry: M20x1.5, ½" NPT

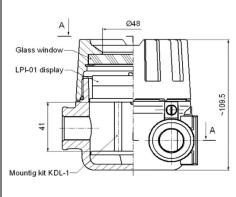
Local Display: Yes, at top cover

Type: SE2

Order Code Option

S3 (Process ½" G 1x cable entry)





Material: Aluminium, Epoxy

coated

Approval: ATEX II 2GD EEx d

IIC

Ingress Protection: IP66/67 Process Entry: ½" NPT Number of Cable Entries: up 2 Cable Entry: M20x1.5, ½" NPT Local Display: Yes, at side

Type: Al2

Order Code Option

H1 (1x cable entry, 1x plug)



Depending on the type of housing and the number of cable entries, you may include in the supply, cable glands and plugs for non-hazardous or hazardous areas, polyamide and nickel-plated brass, for armoured and no-armoured cables.

Replaceable Measuring Insert

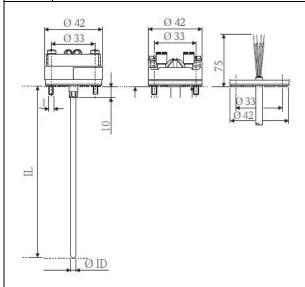
The length of the measuring element (IL) as it depends on the immersion length, the extension neck and even the type of connection head, will be given on the product ID and it's not necessary to specify in the order code.



The product can be ordered with measuring insert with 3 possible configurations: temperature transmitter, terminal block or free end wires (bellow image – left to right).

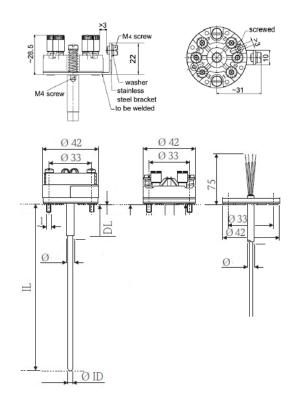


A swagged version is only available for wired versions and of insert nominal diameter of 6mm and above.



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Are available a terminal block or plate with ground post on stainless steel bracket. These options are not available with connection heads form B.





The above ATEX version of this measuring element is manufactured with support tube (DL) with 8mm diameter and 40mm long.

Device							
			<u> </u>	· · · · · · · · · · · · · · · · · · ·			
Application	Temperature measuremen						
Principle	Thermocouple						
Types	Thermocouple types J, K, N						
Accuracy	Class 1 IEC60584; Special						
Configuration	Standard simplex and dupl	ex; Triplex config	guration on	request	T		
	Mineral insulated type J		196°C		760°C		
Operating temperature	Mineral insulated type K	Min		Abs. max	900°C		
a paraming remiperature	Mineral insulated type N	1			900°C		
	Mineral insulated type T				400°C		
=1 .: 10 ::: ::							
Electrical Specifications							
		1 1/					
	Thermocouple emf	mV					
Output signal	4-20 mA	Loop power 2		l v · -			
. 3	4-20mA HART	Loop power 2	wires	Version 7			
	Digital communication	Profibus PA	1 12 114	Version 3.02			
		Fieldbus Foun		Profiles 31P			
	Mounting	Housings with	33mm t				
	Power supply	Analogue		11 to 35 Vdc			
T	11.	HART/PA/FF		9 to 32 Vdc			
Temperature Transmitter	Input	Pt100/Pt1000 Universal					
	Minimum span	25 K					
	Load [RL]	RL ≤ (UB − 8V) / 0.025 A					
	Galvanic insulation	Min 500 VAC		0754 1:1	 		
Insulation resistance	>100 MΩ/250 Vdc @room		ng to IEC 6	0/51, whichev	er is greater		
	(Not for grounded hot-junc	11011)					
Mechanical Characteristics	Wetted parts	Aisi 316(L)					
	Extension Neck	Aisi 316(L)					
	Connection	Aluminium, po		e, polyamide, a	nti-static		
	head/Housing	polyamide, Ais	si 316L	T			
Materials	Terminal block	Type B		45% Al2O3			
Materials	Terrimar block	Type B ATEX (Steatite C 22			
	Cable entry washer /	Zinc-plated press steel seal oil resistant rubber					
	Cable gland (optional)	(-40100°C)/					
		Polyamide; nickel plated brass HT up to 200°C					
	Aisi 316	Type T, simple					
	Aisi 321	Types J and K					
	Inconel 600	Types K and N					
T	Length	50 to 1000 mm, customized;					
Thermocouple Sheath Materials	MI bl br tb - OD	over 1000 mm on request 4.5 mm, 6.0 mm; 8.0 mm on request					
	MI cable sheath OD		im; 8.0 mm				
	Ob a a th II this I	OD 4.5 mm		Min 0.5 mm			
	Sheath wall thickness	OD 6.0 mm		Min 0.7 mm			
	9.0 mm	OD 8.0 mm		Min 0.9 mm			
	8.0 mm	-		4.5 mm			
Drotactive Tube/Theres II CD	9.0 mm	To suit Insert	diameter	6.0 mm			
Protective Tube/Thermowell OD	10.0 mm	TO Suit misert diameter		6.0 mm			
	12.0 mm Minimum wall thickness	6.0 mm, 8.0 mm					
	i Winimiim wall thicknose	1.0 mm					
		0	Ceramic, posts nickel plated brass, bush SS 316 Ceramic, posts nickel plated brass, bush SS 316, SS				
	Up to 6 poles, non-Ex						
Terminal Block, Spring Loaded			s nickel pla	ted brass, bus			

Environmental Conditions				
Storage temperature	-30 to 80°C			
Relative humidity	0 to 95 %RH, non-condensing			
Calibration units	°C, °F, K			
Weight	Depending on material, diameter and length + block/transmitter			
Protection class	Refer to assembly housing			
(complying with EN 60529)	Refer to assembly flousing			
Approvals, Certifications	RoHS 2, CE, ATEX Zone 2			



Additional Information

Maintenance

The thermocouple assemblies of PROtemp series do not require a specific maintenance. The only recommendation is to check periodically the sensor integrity and perform an annual recalibration.

Factory Calibration Protocol

This factory quality protocol is supplied with every unit. This acts as an inspection report that shows compliance with DIN/EN 60584 essential points. One measurement point is issued for the effect.

Factory Calibration Certificate

The factory calibration certificate must be ordered with the device. The measurement points according to customer specifications and inside device operating temperature range.

Accessories

As accessories or spare parts, we have available measuring inserts, cable glands and PC programming temperature transmitters and interface kit with software. You can also order a stainless-steel TAG plate.

Delivery Time

For small quantities, less than 10 pieces with basic options, the delivery times are likely 8 to 10 working days or express manufacturing (48h) with feasibility according configuration and required quantities.



How to Order

Sign		Instruction
Tick	<	Single option selection field necessary
Double tick	%	Multiple option selection field available
Added extra	\oplus	Not mandatory selection field

Order Code		Description
Order Code		Description
TTH 11P-		Tomporatura Accombly Sorios DDOtoma Model TTU 11D
IIII IIP-		Temperature Assembly Series PROtemp Model TTH 11P
010	,	The management of the control of the
010	~	Thermocouple Type and Configuration; Class; Hot-junction
F		Thermocouple type K simplex; Cl 1 IEC60584; hot-junction grounded
G		Thermocouple type J simplex; Cl 1 IEC60584; hot-junction grounded
Н		Thermocouple type J duplex; Cl 1 IEC60584; Isolated hot-junction
J		Thermocouple type J simplex; Cl 1 IEC60584; Isolated hot-junction
K		Thermocouple type K simplex; Cl 1 IEC60584; Isolated hot-junction
L		Thermocouple type K duplex; Cl 1 IEC60584; Isolated hot-junction
M		Thermocouple type N duplex; Cl 1 IEC60584; Isolated hot-junction
N		Thermocouple type N simplex; Cl 1 IEC60584; Isolated hot-junction
T		Thermocouple type T simplex; Cl 1 IEC60584; Isolated hot-junction
U		Thermocouple type T duplex; Cl 1 IEC60584; Isolated hot-junction
Υ		Special version on request
020	~	Shape of the Tip
S		Straight, standard response
D		Swagged tip, length with 50 mm
R		Swagged tip, length with 30 mm
Υ		Special version on request
030	>	Process Immersion Length IL
1		50 mm
2		100 mm
3		150 mm
4		200 mm
5		250 mm
6		300 mm
7		350 mm
8		400 mm
X		Customized length
9		Special version on request
040	/	Neck Length NL
1		75 mm
2		100 mm
3		120 mm
4		150 mm
X		Customized length
9		Special version on request

How to Order (continuation)

050	/	Thermowell Diameter and Material; Measuring Element Diameter and Material		
K2		Tube OD 12x2 mm Aisi 316Ti; MgO cable 6.0 mm, Aisi 321		
K5		Tube OD 9 mm Aisi 316L; MgO cable 6.0 mm, Inconel 600		
L0		Tube OD 10 mm Aisi 316L; MgO cable 6.0 mm, Aisi 321		
M0		Tube OD 10 mm Aisi 316L; MgO cable 6.0 mm, Inconel 600		
T5		Tube OD 9 mm Aisi 316L; MgO cable 6.0 mm, Aisi 321		
Y9	· · ·			
Not all options	are	listed here. Please contact us know current production plan for this device		
'				
060	✓	Flanged Process Connection		
A01		1/2" ANSI Cl. 150# RF B16.5, A182-316		
A03		1/2" ANSI Cl. 300# RF B16.5, A182-316		
A11		1" ANSI Cl. 150# RF B16.5, A182-316		
A13		1" ANSI Cl. 300# RF B16.5, A182-316		
A21		2" ANSI Cl. 150# RF B16.5, A182-316		
A23		2" ANSI Cl. 300# RF B16.5, A182-316		
A51		1 1/2" ANSI CI. 150# RF B16.5, A182-316		
A53		1 1/2" ANSI CI. 300# RF B16.5, A182-316		
D24		EN 1092-1-05, DN 25, PN40, Aisi 316L		
D40		EN 1092-1-05, DN 40, PN40-10, Aisi 316L		
D50		EN 1092-1-05, DN 50, PN16-10, Aisi 316L		
Y99		Special version on request		
Not all options	are	listed here. Please contact us know current production plan for this device		
'				
070	/	Terminal Block		
В		Spring loaded block 45% Al2O3 type B		
Е		Spring loaded block Steatite C 220 type B ATEX Ex e IIG with bushing + ground post		
0		Spring loaded disk with bushing prepared for temperature transmitter (33 mm) +		
G		ground post		
Р		Spring loaded disk with bushing prepared for temperature transmitter (33 mm)		
S		Without terminal block; free end wires		
Υ		Special version on request		
080	/	Connection Head; Cable Entry		
A1		Aluminium head DIN form A, IP65, cable entry M20x1.5		
B1		Aluminium head form DIN B, IP65, cable entry M20x1.5		
B2		Aluminium head ATEX II 2GD EEx d IIC IP66, cable entry M20x1.5		
B3		Aluminium head ATEX II 2GD EEx d IIC IP66, with LED display, cable entry M20x1.5		
B4		SS316L head form DIN B, IP66, cable entry M20x1.5		
B5		Polyamide head form DIN B, IP66, cable entry M20x1.5		
B6		Polypropylene, FDA approval, head form DIN B, IP66, cable entry M20x1.5		
		Aluminium head form DIN B high lid, to fit both terminal block and temperature		
D2		transmitter, IP65, cable entry M20x1.5		
D3		Aluminium head form DIN B high lid, with LED display, cable entry M20x1.5		
	Aluminium head form DIN R hore 15 3/12 mm through secured with screws IP6			
FU	F0 cable entry M20x1.5			
T1		Aluminium head form DIN B threaded cover and chain, max. IP68, cable entry M20x1.5		
Y9		Special version on request		
Not all options	are	isted here. Please contact us know current production plan for this device		



How to Order (continuation)

~	Temperature Transmitter		
	Not selected		
	Universal input, output 4-20mA		
	2x Universal input, output 2x 4-20mA		
	Universal input, output 4-20mA HART		
	Universal input, output 4-20mA HART, Ex-zones		
	Special version on request		
/	Electrical Accessory Mounted		
	Cable gland skintop M20x1.5, blue polyamide IP68		
	Cable gland M20x1.5, polyamide; ATEX Exe IP66		
	Cable gland skintop M20x1.5, polyamide IP67		
	Cable gland M20S16 M20x1.5 HT (200°C), nickel plated brass, IP66		
	M12 Connector 4 poles, Steel, IP67		
	Special version on request		
~	Label and Product Documentation Language		
	English		
	French		
	Portuguese		
\	Approval		
	Zone 2 ATEX II 3G Ex dc ec IIC Gc		
	Zone 2 ATEX II 3G Ex dc IIC Gc		
	Zone 2 ATEX II 3G/D Ex ec mc IIC Gc		
	Zone 2 ATEX II 3G/D Ex ic IIC Gc IIIC Dc		
	Other on request, according to specification		
//	Quality Assurance Documentation		
	Factory calibration certificate, 2-point customer specification		
	Factory calibration certificate, 3-point customer specification		
	Materials certificate according to EN10204-3.1		
	Other on request, according to specification		
	✓		

Selection Example

Temperature assembly with class A sensor, 3-wire configuration, process connection by flange EN 1092-1-05, DN50-PN16, immersion length with 500mm, thermowell with OD of 12.0 mm. Wetted parts in Aisi 316L, aluminium head with threaded cover, with temperature transmitter configured for range 0...100°C/4-20mA.

Order code	TTH 11P-A3SX4T2D50ST1W5+20NEN/500 mm/0100°C/4-20mA
Order code	11H 11F-A35X41ZD30311W3+Z0NEN/300 Hilli/0100°C/4-Z0HA

Contact

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