








Series BPTemp, Model TWA15

Fabricated Thermowell






With probe adjustable fitting. Threaded process connection



 Application
<p>Model TWA15 is a fabricated thermowell designed for general purpose applications with threaded process and thermometer connection by compression fitting.</p> <p>Manufactured from stainless steel tubes with straight design, withstands most common process conditions, guarantees longer life time cycle for resistance and thermocouple assemblies.</p> <p>Totally customized, is key system component for the AMBtemp TXH 5xA and TXH 5xB, and TXC 10P series of process temperature assemblies.</p> <p>Applications across all industrial branches, for moderate requirements and service conditions.</p>

 Your Advantages
 Cost effective
 Aisi 316L corrosion resistant
 Up to 600°C
 ASME/ANSI or ISO threads
 Customization

Informative Signs		
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	Information	This symbol contains device-oriented information which does not result in personal injury.
	Checking	This symbol contains procedures and other facts to get the most of the device and which do not result in personal injury.
	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.
	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		
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A thermowell is a system component designed to increase physical and corrosion resistance to RTD and thermocouple assemblies. It also allows the removal of the measuring element for maintenance or for recalibration without the process being interrupted. Can be installed regardless the orientation in pipes and tanks.




The Delta Sensor fabricated thermowells are manufactured from a metal tubing bar and designed to support moderate process conditions, fluid velocity, corrosion, pressure and temperature. Two lines of thermowells are available according to the connection: female threaded for thermometer connection and male connection to suit thermometer housing.

The thermowell material is generally choose to attend the corrosion properties and process temperature. Are available as thermowell material for this model the most common stainless stell AISI 304/316/316L.

These threaded thermowells are available with ASME/ANSI and ISO standards. Other standards are available on request.

The TWA15 is a fabricated thermowell with straight design with integrated compression fitting, to withstand common process conditions of fluid velocity, corrosion resistance and temperature mediums. Main advantages are the presence of less metallic mass, temperature probe head/cable gland orientable and ensuring the temperature probe is completely inserted to the thermowell bottom for perfect heat conduction. Ensuring proper compliance with standards, can be customized:

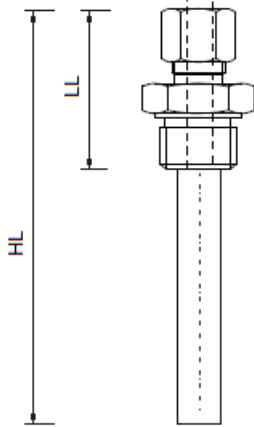
- Immersion and total length, regardless to lagging length.
- Wall thickness (bore)
- Threaded process connection
- Olive material
- Thermowell material

	All material corrosion and resistance properties stated in this document should be followed as guidelines only.
	Temperature rattooing of materials can be severe reduced due to presence of corrosive agents.
	Please note maximum temperature will also be dependent of thermometer sensor temperature limits.



Mechanical Construction

Generic Configuration



	Seals or other mounting components and accessories are not included in the standard scope of supply.
	The lagging length (LL) is the length of process connection and thermometer connection and depends on choose configuration. For instance, a 1/2" G process connection will have a 45 mm lagging length.
	Recommended immersion length is about 20x thermowell diameter, at least 10x thermowell diameter, depending on flow velocity. Non-compliance with this, may lead to significant measurement errors.



Below are the characteristics of the main materials, available as standard for protection tubes, process connection and protection sheaths of thermocouple elements. The information below provided should not be strictly followed, but only as guidelines for applications. Please note most of these materials are not available for BPtemp series of fabricated thermowells.

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.

KANTHAL A-1

Kanthal A-1 is a ferritic iron-chromium-aluminium alloy (FeCrAl alloy) for use at temperatures up to 1400°C. The alloy is characterized by high resistivity and very good oxidation resistance. Typical applications for Kanthal A-1 are electrical heating elements in industrial furnaces and thermocouple protection tubes.

KANTHAL AF

Kanthal AF is a ferritic iron-chromium-aluminium alloy (FeCrAl alloy) for use at temperatures up to 1300°C. The alloy is characterized by excellent oxidation resistance and very good form stability resulting in long element life. Typical applications for Kanthal AF are as electrical heating elements in industrial furnaces and thermocouple protection tubes.

KANTHAL APM

Kanthal APM is an advanced powder metallurgical, dispersion strengthened, ferritic iron-chromium-aluminium alloy (FeCrAl alloy) for use at tube temperatures up to 1250°C. Kanthal APM tubes have good form stability at high temperature. Kanthal APM forms an excellent, non-scaling surface oxide, which gives good protection in most furnace environments, i.e., oxidizing, sulphurous and carburizing, as well as against deposits of carbon, ash, etc. The combination of excellent oxidation properties and form stability makes the alloy unique. Typical applications for Kanthal APM are thermocouple protection tubes and as radiant tubes in electrically or gas fired furnaces such as continuous galvanizing furnaces, seal quench furnaces, holding furnaces and dosing furnaces in the aluminium and zinc.

C610 (Pytagoras)

Ceramic material non porous. Very resistant to hydrofluoric acid, thermal mechanical shocks is used not only as external protection tubes (thermowells), but also as internal tubes and insulators. Maximum temperature: 1400°C

C799 (Alsint 99.7)

Is the most resistant material used as internal and external protection. Excellent resistance to hydrofluoric acid, alkalis vapours and atmospheres from reducer to oxidizing. It has the highest purity and lower porosity compared with other types of ceramics. Maximum temperature: 1600°C

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
Ceramic C610 (Pytagoras)	1400
Ceramic C710/799 (Alsint)	1600
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

☰	Technical Data
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Equipment						
Application	Temperature measurement					
Function	Thermowell					
Design	Straight, with integrated compression fitting					
Operating temperature	Min	-200°C				
	Max	600°C				
Mechanical Characteristics						
Process connection thread	ANSI/ASME	1/4" NPT to 3/4" NPT				
	ISO 228-1	G 1/4" to G 3/4"				
	Metric	On demand				
Protective tube materials	Aisi 316L	Outer diameter	3.0 mm to 12.0 mm			
Thermometer connection	Type	Compression fitting, single or double ferrule				
	Bore	To suit sensors with 3 mm, 4 mm and 6 mm				
	Olive	Single ferrule	Material	Aisi 316, PTFE		
Double ferrule		Aisi 316				
Dimensions	Total length	Min.	50 mm	Max.	1000 mm	
	Lagging length	Min.	20 mm	Max.	45 mm	
	Tubing OD	3.0 mm, 4.0 mm		Wall thickness	Min	0.25 mm
		6.0 mm, 8.0 mm, 9.0 mm, 10.0 mm, 12 mm			Min	1.0 mm
Environmental Conditions						
Storage temperature	-60 to 80°C					
Relative humidity	0 to 95 %RH, non-condensing					
Weight	50 g to 500 g with standard options					
Approvals, Certifications	EN10204-2.1/2.2/3.1/3.2 (Compliance/Test Report/Inspection Certificate)					



How to Order

Sign		Instruction
Tick	✓	Single option selection field necessary
Double tick	✓✓	Multiple option selection field available
Added extra	⊕	Not mandatory selection field

Order Code		Description
TWA15-		Fabricated Thermowell BPtemp Model TWA15
010	✓	Total Length HL
2		100 mm
3		150 mm
4		200 mm
5		250 mm
6		300 mm
7		350 mm
8		400 mm
X		Customized length
Y		Special version on request
020	✓	Protective Tube, Diameter and Material
F3		3x0.25 mm, Aisi 316L
F4		4x0.35 mm, Aisi 316L
F6		6x1.0 mm, Aisi 316L
F8		8x1.0 mm, Aisi 316L
F0		9x1.0 mm, Aisi 316L
FA		10x1.0 mm, Aisi 316L
FC		12x1.0 mm, Aisi 316L
FM		12x1.5 mm, Aisi 316L
FQ		12x2.0 mm, Aisi 316L
Y9		Special version on request
Not all options are listed here. Please contact us know current production plan for this device		
030	✓	Process Connection; Lagging Length
B1		Compression fitting G 1/2" SS316
B2		Compression fitting NPT 1/2" in SS316
B3		Compression fitting G 1/4" SS316
B4		Compression fitting NPT 1/4" in SS316
B7		Compression fitting G 3/4" SS316
B8		Compression fitting NPT 3/4" in SS316
Y9		Special version on request



How to Order (continuation)

040	✓	Bore; Olive material
3S		3 mm; SS316
3T		3 mm; PTFE
4S		4 mm; SS316
6S		6 mm; SS316
6T		6 mm; PTFE
8S		8 mm; SS316
Y9		Special version on request
Not all options are listed here. Please contact us know current production plan for this device		
050	✓	Olive Design
1		Single ferrule
2		Double ferrule (unavailable in PTFE)
⊕ 060	✓	Additional Specifications
9		Special version on request
⊕ 070	✓✓	Quality Assurance Documentation
M2		Materials certificate according to EN10204-3.1
Y9		Other on request, according to specification

Selection Example







Fabricated thermowell SS316L straight design with stem length of 300 mm. Process connection ISO 228-1 G ½" M to suit a 6mm temperature probe. Double ferrule in SS316.

Order code	TWA15-XF0B16S2/345 mm
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My Notes

	Contact
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