Technical information
TI 265T/02/en
60019744

Thermowell for temperature sensors omnigrad M TW 15

Bar-stock thermowell
Weld-in or flanged process connection










Omnigrad M TW 15 thermowells for temperature sensors are specially designed for the heavy chemicals industry and particularly suitable for applications with high pressures, temperatures and high flows (i.e. vessels or pipes with steam or gas).
These thermowells for temperature sensors are made from a bar.
Thanks to its modular configuration and the frame defined in standard DIN 43772 (form 4/4F), TW 15 is suitable to be used in all industrial processes with severe thermal and mechanical stresses.

Features and benefits

- SS 316Ti/1.4571 and 13CrMo4-5/1.7335 for "wetted" parts
- The common flanged process connections are supplied as standard; others are available on request.
- Customized immersion length
- Weld-in or flanged process connection
- Surface finishing Ra < 0.8 µm
- Separate extension pipe
- Material certification (3.1.B)
- Pressure test
- Test with penetrant liquids on welds

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Areas of application

Heavy industrial processes and in particular applications where steam and gases are processed at high pressures and temperatures; for example those carried out in the following sectors:
- chemical industry
- energy industry.

Function and system design

Equipment architecture

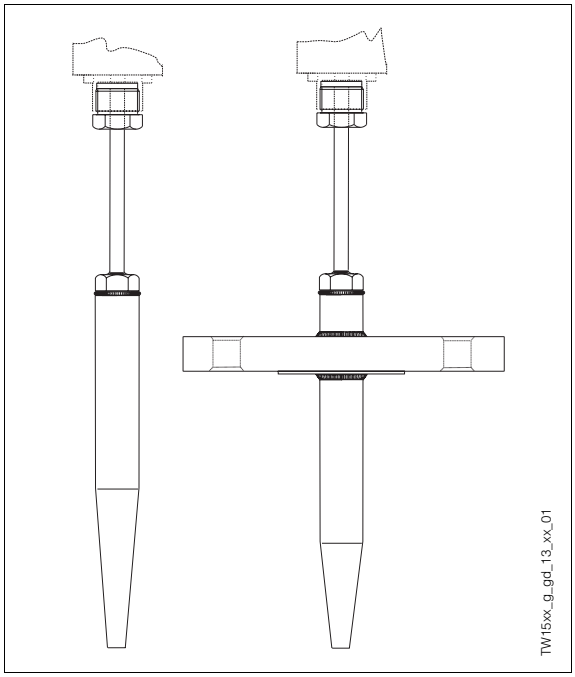


Fig. 1: TW 15 with different types of process connections

The design of the thermowell is based on standard DIN 43772 and can therefore guarantee a good level of resistance to the most typical and common industrial processes.
The thermowell is made form a metal bar with a diameter of 18 or 24 mm. The end of the thermowell is conical with a tip diameter of 9 or 12.5 mm respectively.
The TW 15 can be fitted onto the plant (tube or vessel) by means of a weld-in or flanged connection that can be chosen among different models (see section "Structure of components").

Material

Wetted parts in SS 316Ti/1.4571 or 13CrMo4-5/1.7335.

Weight

From 0.5 to 5 Kg for standard options.

Performance

Operating conditions

Process temperature

• 316Ti/1.4571	-200 ÷ 800°C
• 13CrMo4-5/1.7335	-50 ÷ 800°C

Maximum process pressure
The pressure values to which the thermowell can be subjected at the various temperatures are illustrated by the drawings in figures 2 and 3 and in table 1.

Maximum flow velocity
The highest flow velocity tolerated by the thermowell decreases as the length of the well/probe, exposed to the stream of the fluid, increases. Some information may be taken from the drawings in figures 2 and 3.

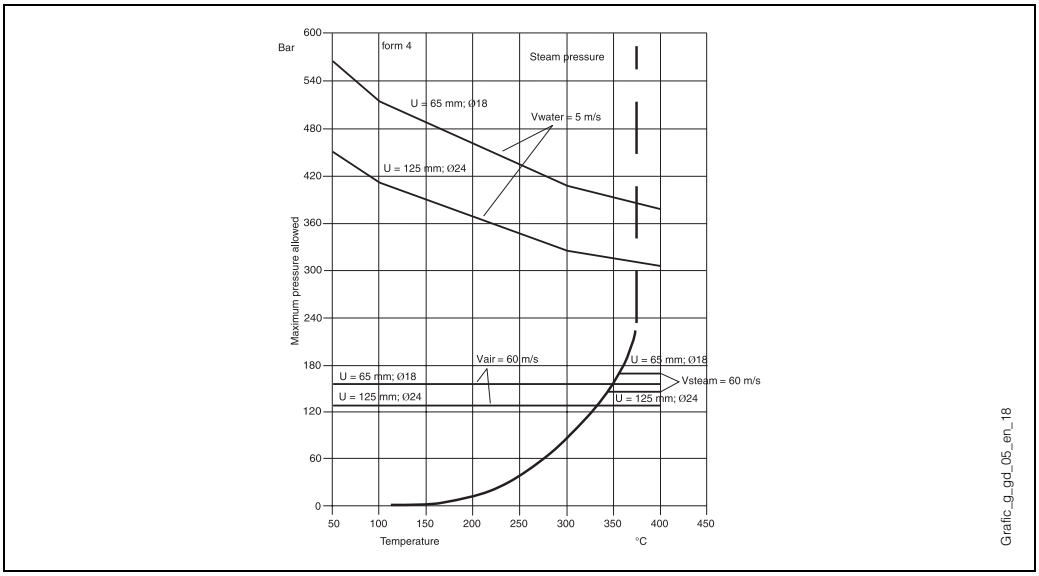


Fig. 2: Pressure/temperature drawing for the weld-in thermowell in SS 316Ti/1.4571

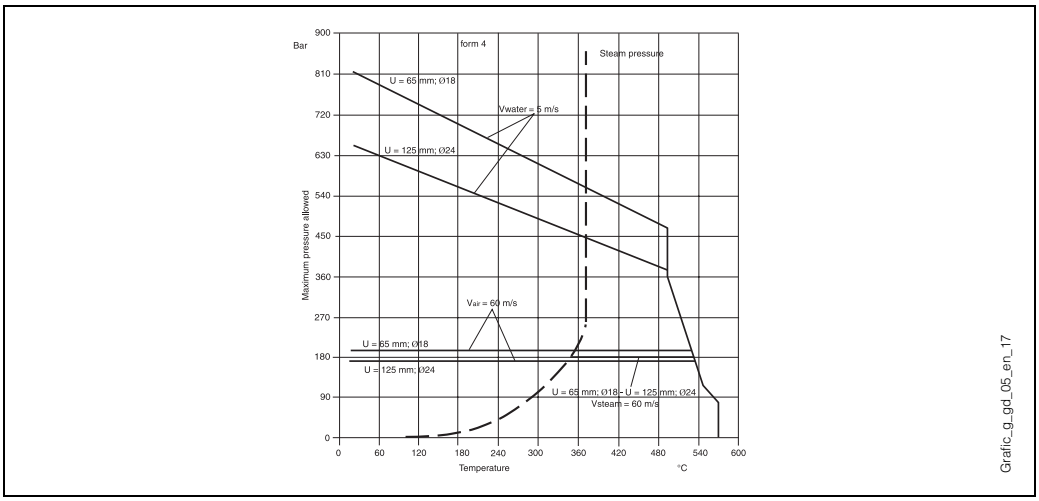


Fig. 3: Pressure/temperature drawing for weld-in thermowell in 13CrMo4-5/1.7335

Temperature	Maximum acceptable pressure (barg); values based on "1% proof stress"		
	SS 316Ti/1.4571		
	PN20 / cl.150 (ISO 7005)	PN40 (EN 1092)	PN50 / cl.300 (EN 1092)
-10...50°C	16	40* (37.3)	40
100°C	15.6	39.1 (33.8)	39.1
200°C	13.7	34.1 (29.3)	34.1
300°C	12.4	31.1 (25.8)	31.1
400°C	11.7	29.2 (24.0)	29.2
500°C	11.2	28.1 (23.1)	28.1
600°C	8.7	21.7 (21.3)	21.7

* The values in brackets refer to values based on “0.2% proof stress” (EN 1092 and ISO 7005)
Table 1: Pressure/temperature table for flanged thermowell in SS 316Ti/1.4571

Installation

Omnigrad M TW 15 thermowells can be mounted on pipes or vessels or other plant parts that may require them.
The interface components for the process connections and the related gaskets are not normally provided with the sensors and must be purchased by the customer.
Immersion length may influence the accuracy of the measurement. If the immersion length is too low, an error may be generated in the measured temperature due to the lower temperature of the process fluid near the walls and to heat transferred through the thermowell body. The incidence of such an error can be relevant if there is a large difference between the process temperature and ambient temperature. In order to avoid this source of inaccuracy, the thermowell should have a small diameter and the immersion length (L) should be, if possible, at least 100 mm.
For pipes with a small section, it is necessary to make sure that the tip of the probe reaches or slightly exceeds, if possible, the axis line of the duct (see fig. 4A-4B). Insulation of the outer part of the thermowell reduces the effect produced by a low immersion. Another solution may be a tilted installation (see fig. 4C-4D).

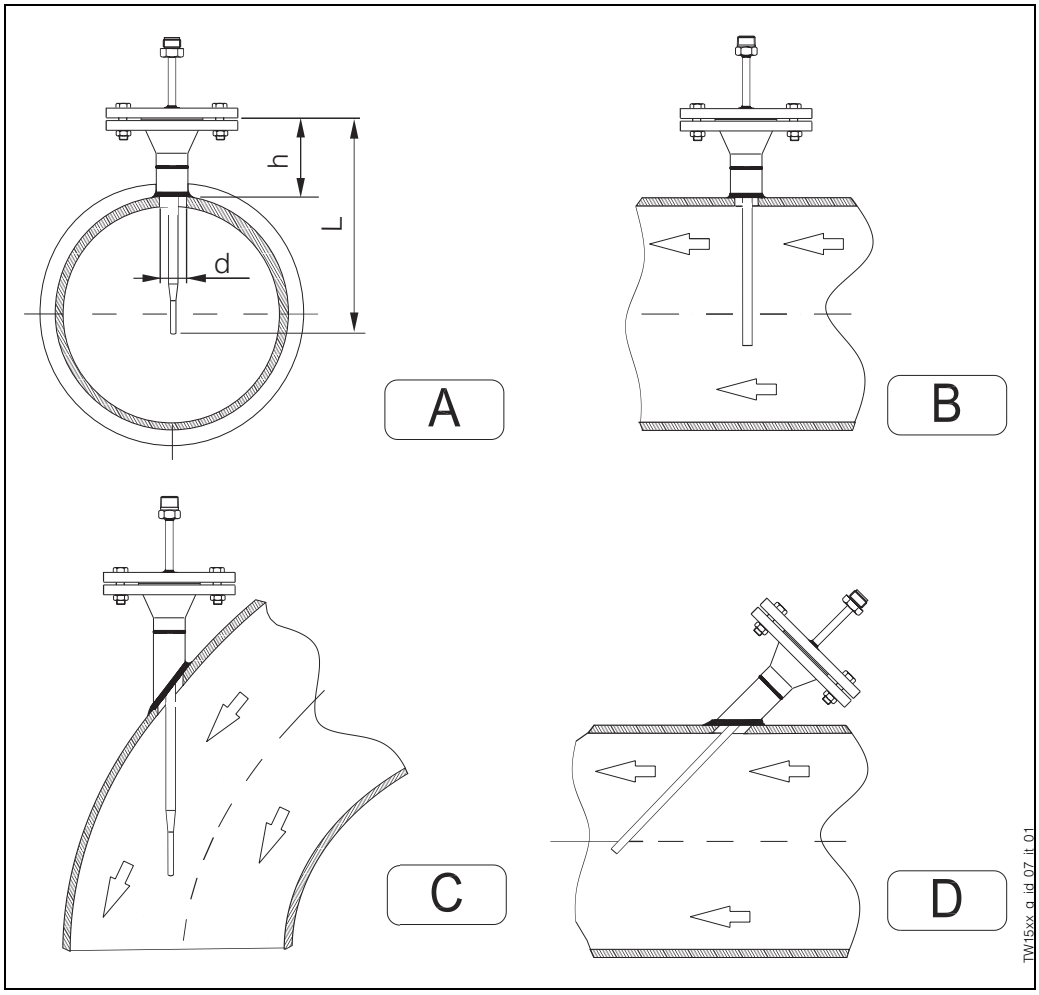
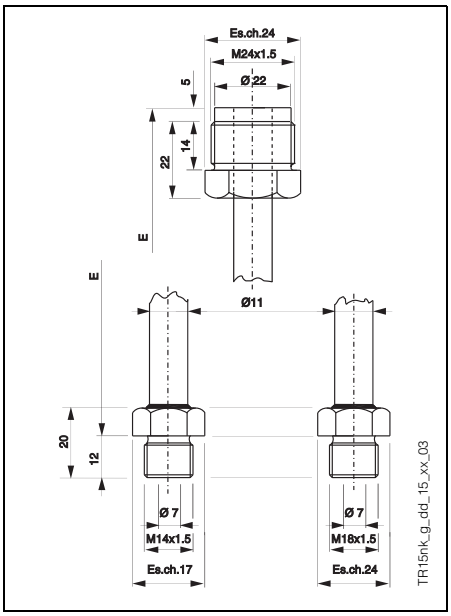


Fig. 4: Installation examples

With regard to corrosion, the base material of the wetted parts (SS 316Ti/1.4571) can tolerate the common corrosive media right up to even the highest temperatures. For further information on specific applications, please contact the E+H Customer Service.
On request, the E+H Customer Service can verify (by elevation) the resistance of thermowells at specific operating conditions (pressure, temperature, fluid speed) taking into account also the forces and vibrations generated by the flow.

System components

Extension neck



The extension neck is the part between the thermowell and the head.
It is made up of a tube of 11 mm in SS 316L/1.4404 (fig.7), with lower connection:
•M14x1.5 for thermowells with a diameter of 18 mm
•M18x1.5 for thermowells with a diameter of 24 mm.

The neck length (E) is:
•155 mm for a thermowell length (L) of 110 mm
•165 mm for other lengths (L).

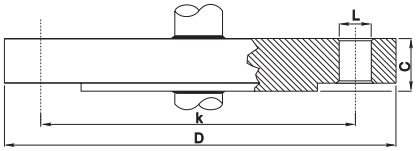
The connection situated in the upper part of the neck enables to position the head of the sensor as shown in figure 5. The length of the extension neck may influence the temperature of the head. It is necessary that this temperature is kept within the limit values.

Fig. 5:Extension neck

Process connection

Standard connections are available in the following types:
- weld-in
- with flanges ANSI B16.5 cl. 150 and 300 RF (also ISO 7005)
- with EN 1092 flange (compatible with DIN 2526/7 form C).

Other versions may be supplied on request.
Figure 6 shows the base dimensions of the flanges available in the Sales structure (see paragraph "Ordering information" at the end of the document).



Flange type	D (mm)	K (mm)	L (mm)	C (mm)
1" ANSI 150 RF	110	79.5	16	14.5
1" ANSI 300 RF	125	89	18	19.5
DN25 PN40 B1 EN 1092	115	85	14	16
DN40 PN40 B1 EN 1092	150	110	18	18
DN50 PN40 B1 EN 1092	165	125	18	20

Fig. 6: Base dimensions of flanged connections

The thermowell is marked near the process connection, in compliance with standard DIN 43772.
The thermowell is made form a metal bar with a diameter of 18 or 24 mm.
The insert length is available in the standard dimensions DIN 43772 and in the most commonly used ones, or it can be personalized by the customer within a range of values (refer to "Sales structure" at the end of the document).

⚠ Warning! Thermowells with a diameter of 18 mm can be supplied with a maximum length (L) of 200 mm.

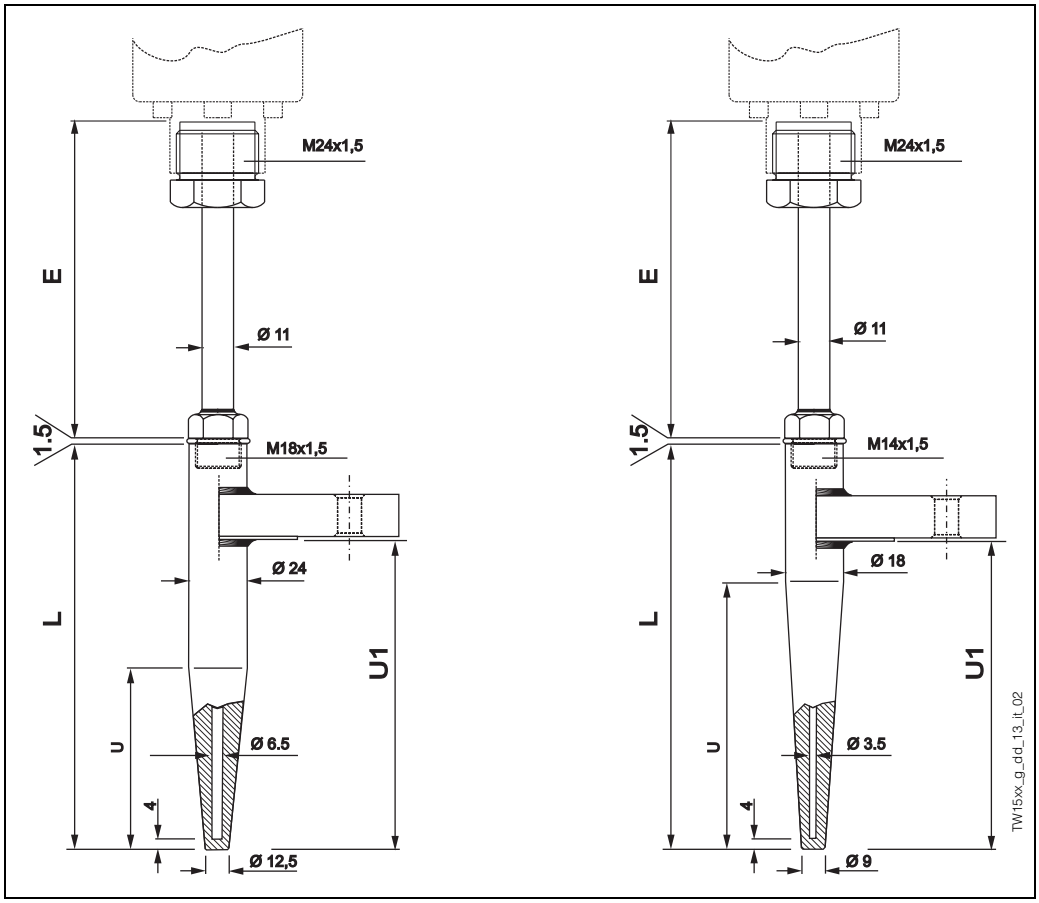


Fig. 7: Functional components

Certificates & approvals

PED approval

The Pressure Equipment Directive (97/23/CE) is respected. As paragraph 2.1 of article 1 is not applicable to this kind of instruments, the marking CE is not mandatory for TW 15 models used for generic applications.

Material certification

The material certificate 3.1.B (compliant standard EN 10204) can be directly selected from the sales structure of the product and refers to the parts of the thermowell in contact with the process fluid. Other types of certificates related to materials can be requested separately.
The "short form" certificate includes a simplified declaration, with no enclosures of documents, related to the materials used in the construction of the thermowell and guarantees the traceability of the materials through the identification number of the product. The data related to the origin of the materials can subsequently be requested by the customer if necessary.

Test on the thermowell

The pressure tests are carried out at ambient temperature in order to verify the resistance of the thermowell to the specifications indicated by standard DIN 43772.
Tests at different pressures can be carried out on request.
The liquid (dye) penetrant test verifies the absence of crevices on the weldings between the thermowell and flange.

Further details

Maintenance

Omnigrad M TW 15 thermowells do not require specific maintenance.

Delivery time

For small quantities (10 ÷ 20 units) and standard options, between 5 and 15 days depending on the configuration required.

Ordering information

Sales structure

TW15	Head connection									
	1	Without head and neck connection								
	2	M24x1.5 head connection								
	Y	Special version								
		Length of extension neck E (60 - 250 mm)								
		0	Extension length not required							
		1	155 mm, extension length E (only with L=110 mm)							
		2	165 mm, extension length E							
		8	... mm, extension length E to specify							
		9	... mm, special extension length E							
			Thermowell diameter, type of material and finishing							
			A	D=24, material: SS 316Ti/1.4571, Ra<1.6 µm						
			B	D=24, material: 13 CrMo 4-5/1.7335, Ra<1.6 µm						
			C	D=18, material: SS 316Ti/1.4571, Ra<1.6 µm						
			D	D=18, material: 13 CrMo 4-5/1.7335, Ra<1.6 µm						
			1	D=24, material: SS 316Ti/1.4571, Ra<0.8 µm						
			2	D=18, material: SS 316Ti/1.4571, Ra<0,8 µm						
			Y	Special version						
				Tip diameter D1, bore diameter d						
				1	D1=12.5 mm, d=6.5 mm, (insert diameter 6 mm)					
				2	D1=9 mm, d=3.5 mm, (insert diameter 3 mm)					
					Lengths L (100 - 1000 mm), U and U1					
				A	110 mm= L, U=65 mm, U1=0 mm; form 4					
				B	110 mm= L, U=73 mm, U1=0 mm; form 4					
				C	140 mm= L, U=65 mm, U1=0 mm; form 4					
				D	170 mm= L, U=133 mm, U1=0 mm; form 4					
				E	200 mm= L, U=125 mm, U1=0 mm; form 4					
				F	200 mm= L, U=65 mm, U1=130 mm; form 4F					
				G	260 mm= L, U=125 mm, U1=190 mm; form 4F					
				H	410 mm= L, U=275 mm, U1=340 mm; form 4F					
				J	200 mm= L, U=65 mm, U1=0 mm; form 4					
				K	260 mm= L, U=125 mm, U1=0 mm; form 4					
				Y	... special length L= ..., U= ..., U1= ..., on request					
						Flange type, standard finishing Ra 3.2-6.4 µm				
						(the material must be the same of the thermowell)				
						0	Flange not selected (weld-in connection)			
						1	Flange 1" ANSI 150 RF SS 316Ti (DN25 PN20 B ISO 7005)			
						2	Flange 1" ANSI 300 RF SS 316Ti (DN25 PN50 B ISO 7005)			
						A	Flange DN25 PN40 B1 EN 1092 SS 316Ti (DIN 2526/7 form C)			
						B	Flange DN40 PN40 B1 EN 1092 SS 316Ti (DIN 2526/7 form C)			
						C	Flange DN50 PN40 B1 EN 1092 SS 316Ti (DIN 2526/7 form C)			
						Y	Special version			
							Material certification			
							0	Material certification not required		
							1	3.1.B EN 10204, standard		
							2	3.1.B EN 10204, "short form"		
							9	Special version		
								Test on thermowell		
								0	Tests on thermowell not required	
								A	Hydrostatic internal pressure test on the thermowell	
								B	Hydrostatic external pressure test on the thermowell	
								C	Dye penetrant test on thermowell weldings	
								Y	Special version	
TW15-										Complete order code

Supplementary documentation

❑ TA series - general information	TI 138T/02/en
❑ Liquid penetrant test for thermowells	TI 168T/02/en
❑ Hydrostatic test for thermowells	TI 169T/02/en
❑ Terminal housings - Omnigrad TA 20	TI 072T/02/en
❑ RTD insert for temperature sensors - Omniset TPR 100	TI 268T/02/en

Subject to modifications

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