

Thermowell for temperature sensors omnigrad M TW 13

Pipe thermowell Flanged process connection



Omnigrad M TW 13 thermowells are designed for the use in the fine chemicals industry but can also be used for generic applications.

Thanks to its modular configuration, defined in standard DIN 43772 (form 2/3), the TW 13 thermowell is suitable for almost all industrial processes.

Features and benefits

- SS 316L/1.4404, SS 316Ti/1.4571 and Hastelloy C for the "wetted" parts
- The common flanged process connections are supplied as standard; others are available on request
- Customized immersion length
- Surface finishing Ra < 1.6 µm
- Tip of the thermowell with a reduced diameter or tapered for a faster response time
- Material certification (3.1.B)
- Pressure test
- Test with penetrant liquids on welds

Areas of application

- Fine chemicals industry
- Light energy industry
- Food industry
- General industrial services

Function and system design

Equipment architecture

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 from a pipe with a diameter of 9, 11 or 12 mm. The final part can be straight, tapered (i.e. with a gradual reduction of the stem achieved thanks to a swaging procedure), or reduced (stepped). An oversheath in plastic can be supplied for thermowells with straight tip.

The Omnigrad M TW 13 thermowell can be fitted on the plant (pipe or vessel) using a flanged connection, which can be chosen from the most common models (see section "Structure of components").

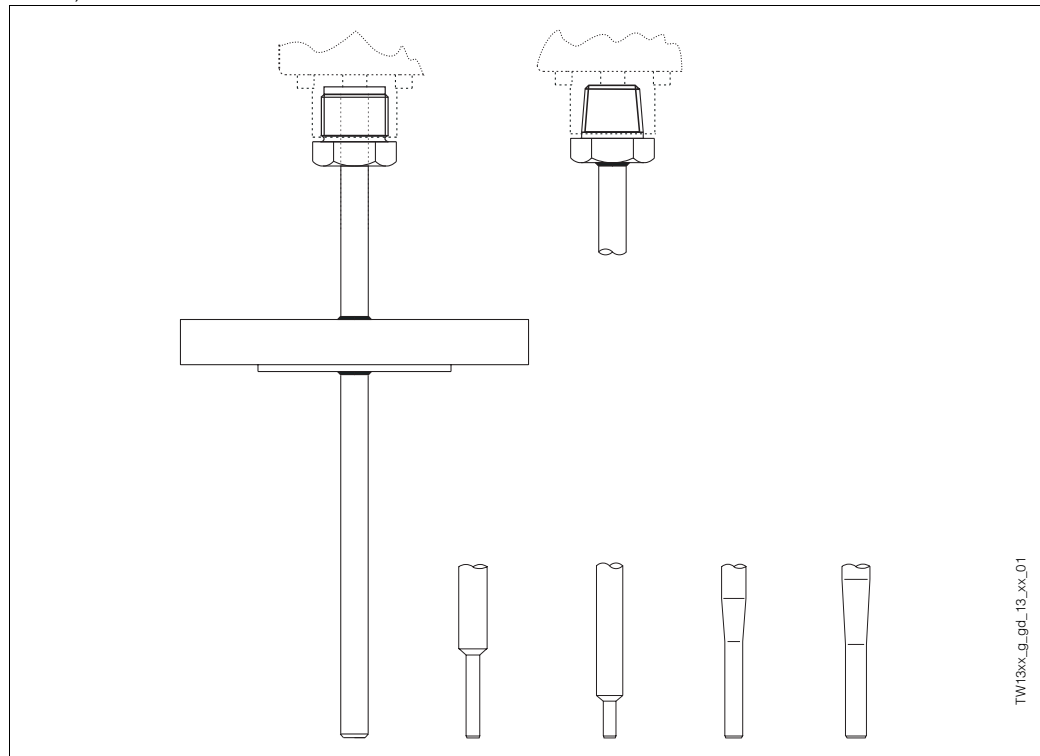


Fig. 1: TW 13 with several types of process connections and end parts of the thermowell

Material

Wetted parts in SS 316L/1.4404, SS 316Ti/1.4571 or Hastelloy C.

Weight

From 1.5 to 4 Kg for standard options.

Performance

Operating conditions

Process temperature

- 316L/1.4404
- 316Ti/1.4571
- Hastelloy C

-200 ÷ 600°C
 -200 ÷ 800°C
 -200 ÷ 1000°C

Maximum process pressure

The pressure values to which the thermowell pipe can be subjected at varying temperatures are illustrated in the drawings of figures 2 and 3. For pipes with a diameter of 9 mm, with a limited flow rate, the thermowell can tolerate the following maximum pressures:

- 50 bar at 20°C
- 33 bar at 250°C
- 24 bar at 400°C

A limitation can often originate from the process connection: the pressure/temperature “ratings” for flanges supplied as standard are shown 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 is provided in the drawing of figures 2 and 3.

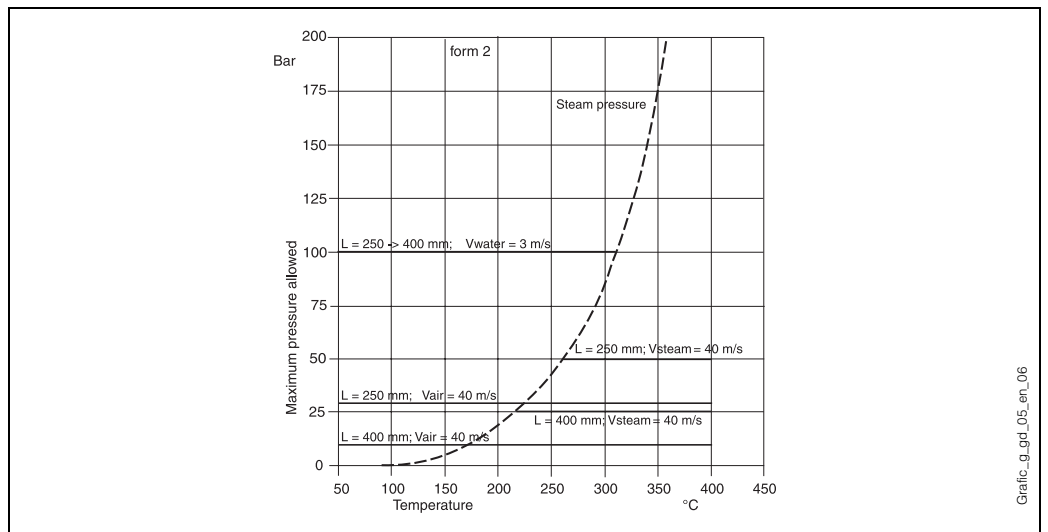


Fig. 2: Pressure/temperature drawing for thermowell with a straight pipe Ø 11 mm in SS 316Ti/1.4571

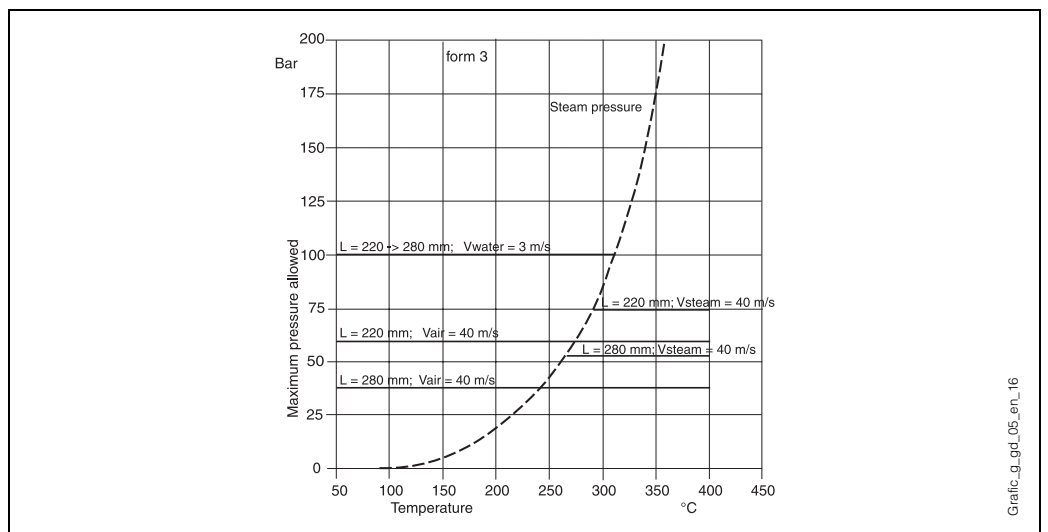


Fig. 3: Pressure/temperature drawing for thermowell with a tapered pipe Ø 12 mm in SS 316Ti/1.4571

Temperature	Maximum acceptable pressure (barg); values based on "1% proof stress"		
	SS 316L/1.4404		SS 316Ti/1.4571
	PN20 / cl.150 (ISO 7005)	PN40 (EN 1092)	PN40 (EN 1092)
-10...50°C	(15.9)*	40 (33.8)*	40 (37.3)*
100°C	(13.2)	35.6 (29.3)	39.1 (33.8)
200°C	(11)	29.3 (24.4)	34.1 (29.3)
300°C	(9.7)	25.8 (21.2)	31.1 (25.8)
400°C	(6.5)	24.0 (19.2)	29.2 (24.0)
500°C	(4.7) [at 450°C]	22.8 (17.8)	28.1 (23.1)
600°C	-	-	21.7 (21.3)

* The values in brackets refer to values based on "0.2% proof stress" (EN 1092 and ISO 7005)
 Table 1: Pressure/temperature table for thermowell (1 bar = 100 kPa)

Installation

Omnigrad M TW 13 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 temperature recorded due to the lower temperature of the process fluid near to the walls and heat transfer, which takes place through the sensor stem. 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 80÷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 sensor reduces the effect produced by a low immersion length. Another solution may be a tilted installation (see fig. 4C-4D).

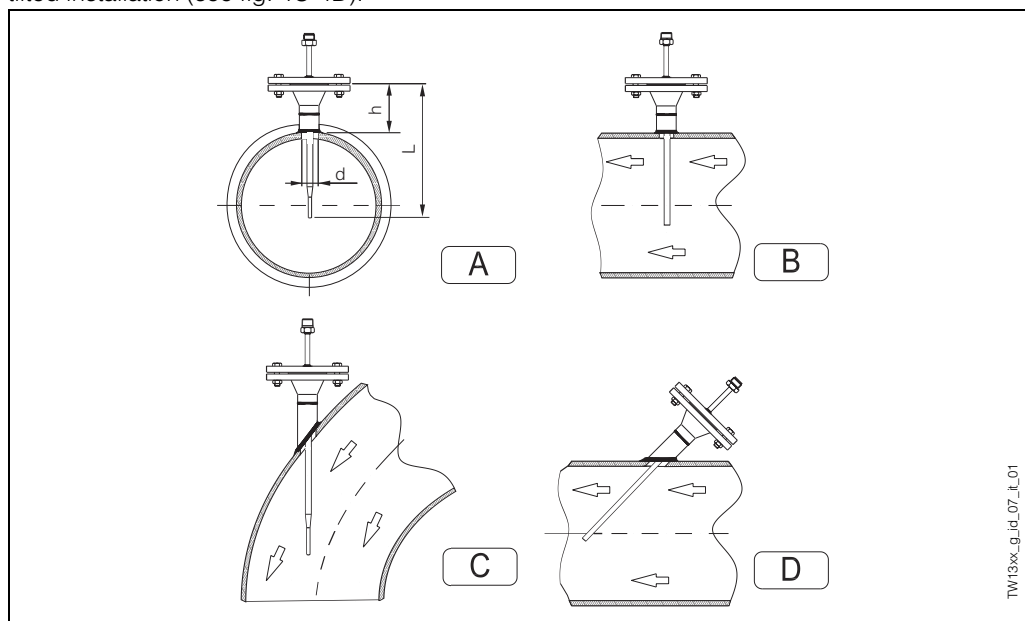


Fig. 4: Installation examples

With regard to corrosion, the base material of the wetted parts (SS 316L/1.4404, SS 316Ti/1.4571, Hastelloy C) can tolerate the common corrosive media right up to even the highest temperatures. In some cases, it may be useful to insert the oversheath in plastic on the thermowell (see section "Structure of components"). For further information on specific applications, please contact the E+H Customer Service.

System components

Extension neck

The extension neck is the part between the process connection and the housing. It is normally made of a tube with the same dimensional and physical characteristics (diameter and material) of the tube under the process connection.



Attention!

The standard lengths of the neck are 80 or 145 mm, according to the selected option. In accordance with standard DIN 43772, in the case of a thermowell with a diameter of 12 mm and a tapered tip (form 3F), the extension neck will be respectively 82 or 147 mm.

The M24x1.5 connection, situated in the upper part of the neck, enables to orient the head of the sensor. This option is not available with 1/2" NPT fittings.

Process connection

Standard connections are available in the following types:

- 1" ANSI cl. 150 RF (DN25 PN20 B ISO 7005)
- DN25 PN40 B1 EN 1092 (DIN 2526/7 form C)
- DN40 PN40 B1 EN 1092 (DIN 2526/7 form C)
- DN50 PN40 B1 EN 1092 (DIN 2526/7 form C).

The material of the flange must be the same of the thermowell stem. For this reason, connections are available both in SS 316L/1.4404 and in SS 316Ti/1.4571. For Hastelloy C versions, the base material of the flange is SS 316L. An Hastelloy C disk is welded on the surface in contact with the process fluid.

The standard surface finish for the flange coupling side ranges between 3.2 and 6.4 µm (Ra).

Other types of flanges are available on request.

Figure 5 shows the base dimensions of the flanges available for the sales structure (see paragraph "Ordering information" at the end of the document).

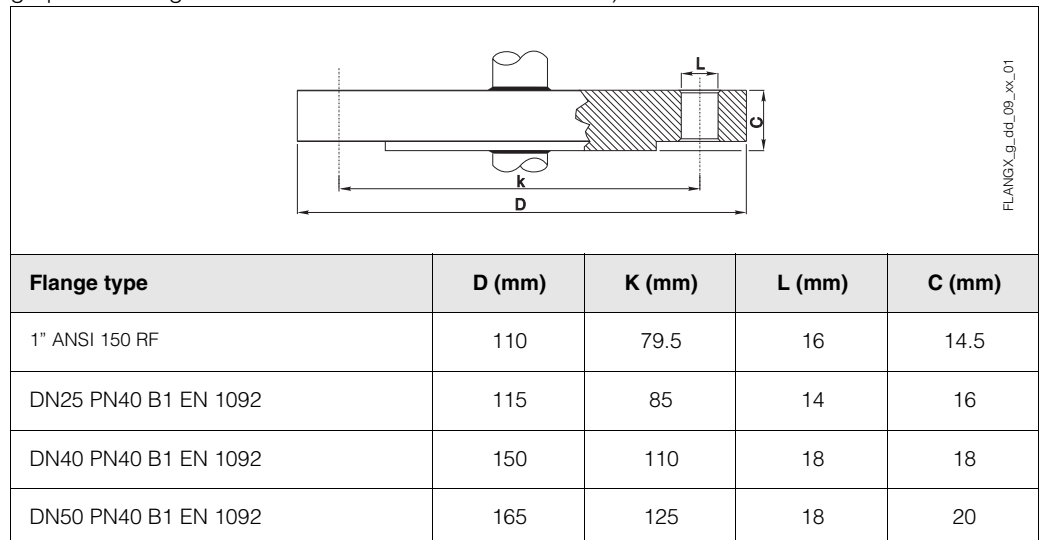


Fig. 5: Base dimensions of flanged connections

The immersion length of TW 13 thermowells complies with the standard dimensions given in DIN 43772 and with the most commonly used ones, but it can also be customised according to the customer's requirements within a range of values (refer to "Sales structure" at the end of the document). The surface finish (Ra) of the wetted parts of the thermowell is 1.6 µm. The different types of tips (reduced or tapered) are described in figure 6.

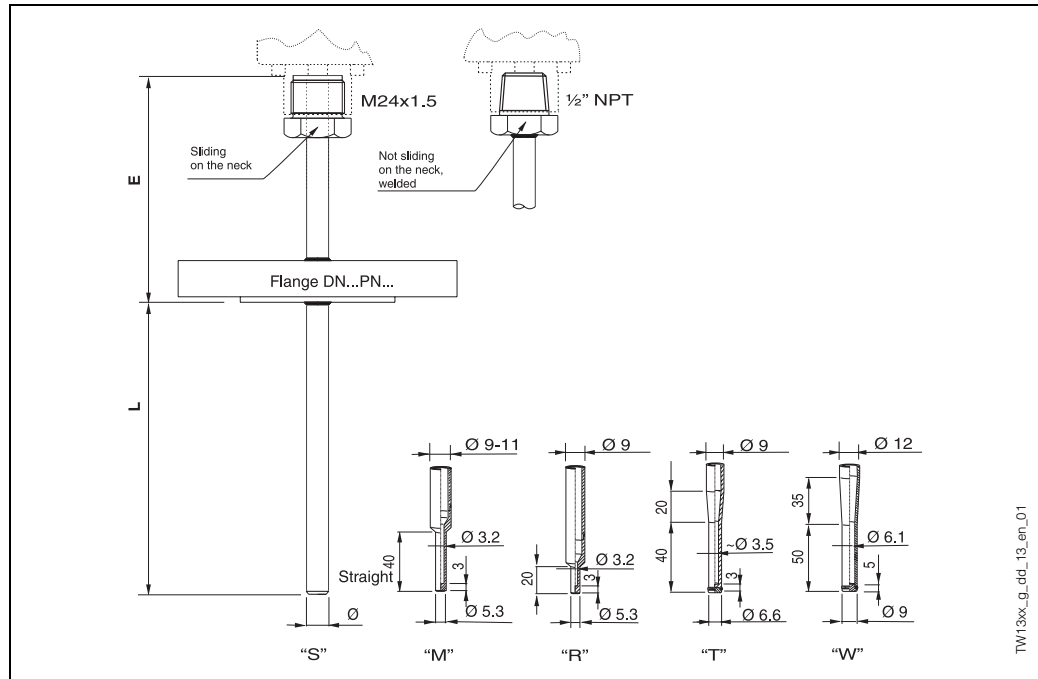


Fig. 6: Functional components

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 13 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 thermometer. 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. For thermowells that do not comply with this standard (with a reduced tip, a tapered tip on a 9 mm pipe, special dimensions ...), the pressure of the corresponding straight pipe with similar dimensions is verified. Tests at different pressures can be carried out on request. The liquid (dye) penetrant test verifies the absence of crevices on the weldings of the thermowell.

Further details

Maintenance

Omnigrad M TW 13 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

TW13	Head connection				
	1	M24x1.5 head connection			
	2	1/2" NPT head connection			
	Pipe diameter, type of material and finishing				
	A	Pipe diameter: 9 mm, material: SS 316L/1.4404, Ra<1.6 µm			
	D	Pipe diameter: 9 mm, material: SS 316Ti/1.4571, Ra<1.6 µm			
	G	Pipe diameter: 9 mm, material: Hastelloy C, Ra<1.6 µm			
	B	Pipe diameter: 11 mm, material: SS 316L/1.4404, Ra<1.6 µm			
	E	Pipe diameter: 11 mm, material: SS 316Ti/1.4571, Ra<1.6 µm			
	H	Pipe diameter: 11 mm, material: Hastelloy C, Ra<1.6 µm			
	F	Pipe diameter: 12 mm, material: SS 316Ti/1.4571, Ra<1.6 µm			
	Y	Special version			
	Neck length E (60 - 250 mm)				
	1	80 mm, extension neck E (82 mm with tip model "W")			
	3	145 mm, extension neck E (147 mm with tip model "W")			
	8	... mm, extension neck E to specify			
	9	... mm, special extension neck E			
	Flange type, standard finishing Ra 3.2-6.4 µm <i>(the material must be the same as the material of the pipe)</i>				
	AB	1" ANSI 150 RF, material SS 316L			(DN25 PN20 B ISO7005)
	EA	DN25 PN40 B1 EN 1092, material SS 316L			(DIN 2526/7 form C)
	EB	DN40 PN40 B1 EN 1092, material SS 316L			(DIN 2526/7 form C)
	EC	DN50 PN40 B1 EN 1092, material SS 316L			(DIN 2526/7 form C)
	FA	DN25 PN40 B1 EN 1092, material SS 316Ti			(DIN 2526/7 form C)
	FB	DN40 PN40 B1 EN 1092, material SS 316Ti			(DIN 2526/7 form C)
	FC	DN50 PN40 B1 EN 1092, material SS 316Ti			(DIN 2526/7 form C)
	HA	DN25 PN40 B1 EN 1092, material SS 316L + Hastelloy disk			(DIN 2526/7 form C)
	HC	DN50 PN40 B1 EN 1092, material SS 316L + Hastelloy disk			(DIN 2526/7 form C)
	YY	Special version			
	Tip design				
	S	Straight tip without reduction			
	R	Reduced tip, L >= 30 mm (SS 9 mm pipe)			
	M	Reduced tip, L >= 80 mm (SS 9 and 11 mm pipe)			
	T	Tapered tip, L >= 100 mm (SS 9 mm pipe)			
	W	Tapered tip, L >= 120 mm in compliance with DIN 43772 form 3F (from 12 mm pipe in SS, with length E from 82 to 147 mm)			
	Y	Special version			
	Immersion length (50 - 3700 mm)				
	C	120 mm, immersion length L			
	D	160 mm, immersion length L			
	E	225 mm, immersion length L			
	F	250 mm, immersion length L			
	G	285 mm, immersion length L			
	H	315 mm, immersion length L			
	J	345 mm, immersion length L			
	K	400 mm, immersion length L			
	L	465 mm, immersion length L			
	M	580 mm, immersion length L			
	X	... immersion length L to specify			
	Y	... special immersion length L			
	Material certification				
	0	Material certification not required			
	1	3.1.B EN10204, standard			
	2	3.1.B EN10204, "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			
TW13-					Complete order code

Supplementary documentation

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

Subject to modifications

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