

Thermowell for temperature sensors *omnigrad M TW 12*

Pipe thermowell Sliding process connection



Omnigrad M TW 12 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 12 thermowell for temperature sensors is suitable for almost all industrial processes.

Features and benefits

- SS 316L/1.4404 e SS 316Ti/1.4571 for "wetted" parts
- The most common compression fittings are supplied as standard; others are available on request.
- Customized immersion length
- Surface finishing $R_a < 0.8 \mu\text{m}$
- Tip of the thermowell with a reduced diameter or tapered for a faster response time
- Material certification (3.1.B)
- Pressure test

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).

The TW 12 can be fitted onto the plant (tube or tank) through the use of a compression fitting, which can be chosen from the most common models (see section "Structure of the components").

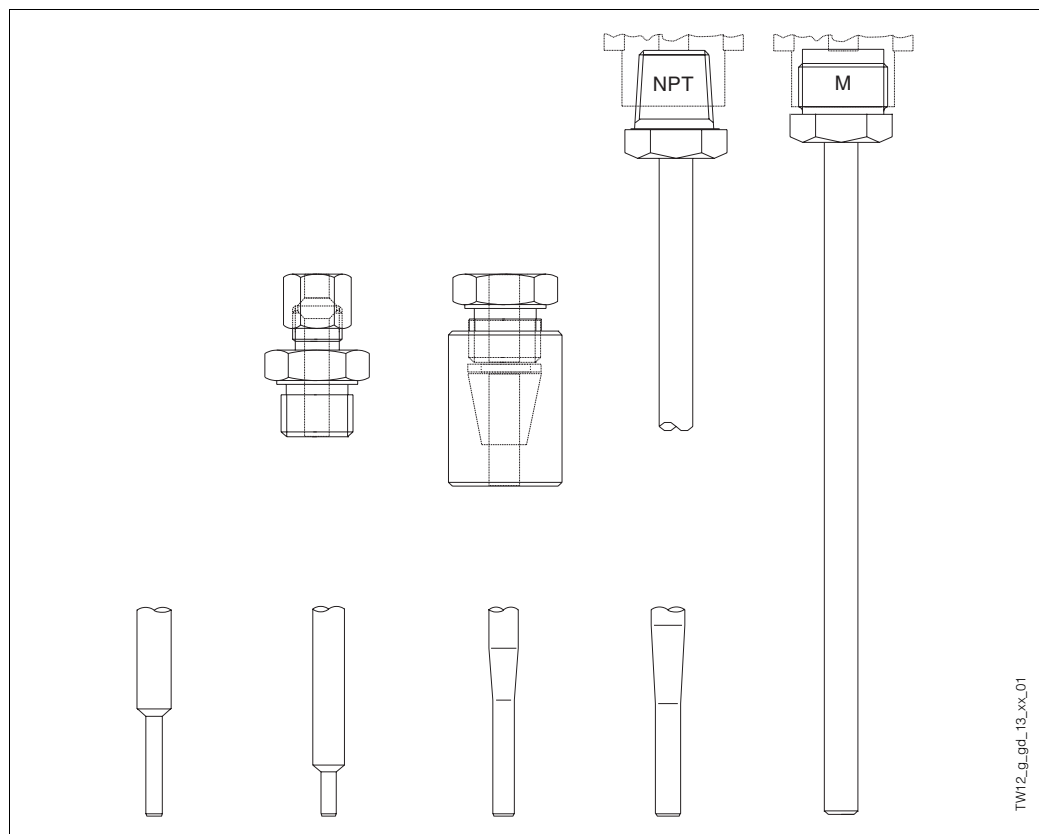


Fig. 1: TW 12 with several types of process connections and end parts of the thermowell.

Material

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

Weight

From 0.5 to 1.5 Kg for standard options.

Performance

Operating conditions

Process temperature

- Sleeve in SS (TA 50 compression fitting) max 500°C
- Sleeve in PTFE (TA 50 compression fitting) max 200°C
- Sleeve in Viton® (TA70 compression fitting) max 180°C

If the thermowell is welded to the plant, the acceptable temperature for the process is:

- 316L/1.4404 -200 ÷ 600°C
- 316Ti/1.4571 -200 ÷ 800°C.

Maximum process pressure

- Sleeve in SS (TA 50 compression fitting) 4 MPa (40 bar) at 20°C
- Sleeve in PTFE (TA 50 compression fitting) 1 MPa (10 bar) at 20°C
- Sleeve in Viton® (TA 70 compression fitting) 2 MPa (20 bar) at 20°C

If the thermowell is welded to the plant, the pressure values to which the thermowell can be subjected at various temperatures are illustrated by the drawings in figures 2 and 3.

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 drawing in figures 2 and 3.

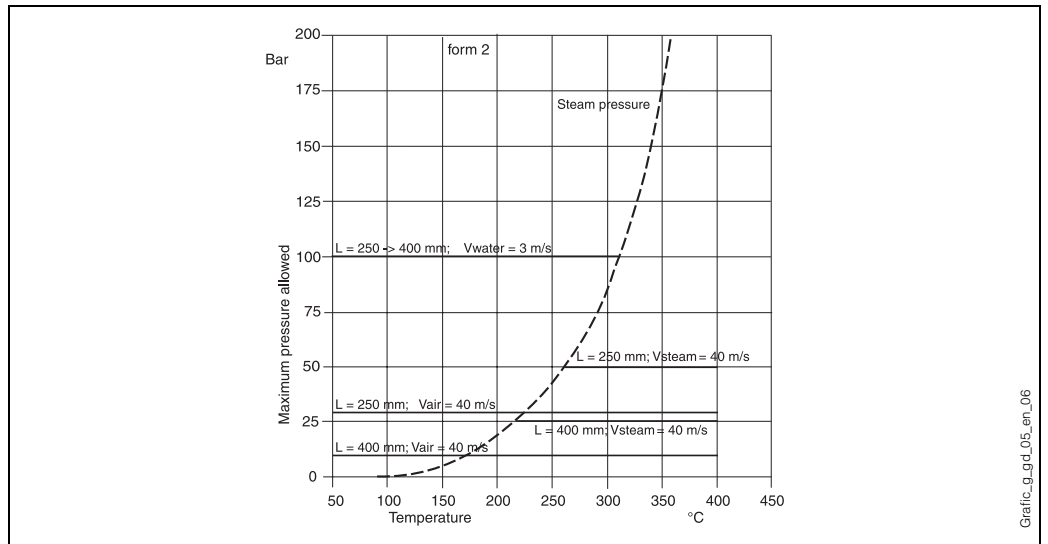


Fig. 2: Pressure/temperature drawing for thermowell with a straight pipe Ø11 in SS 316Ti/1.4571

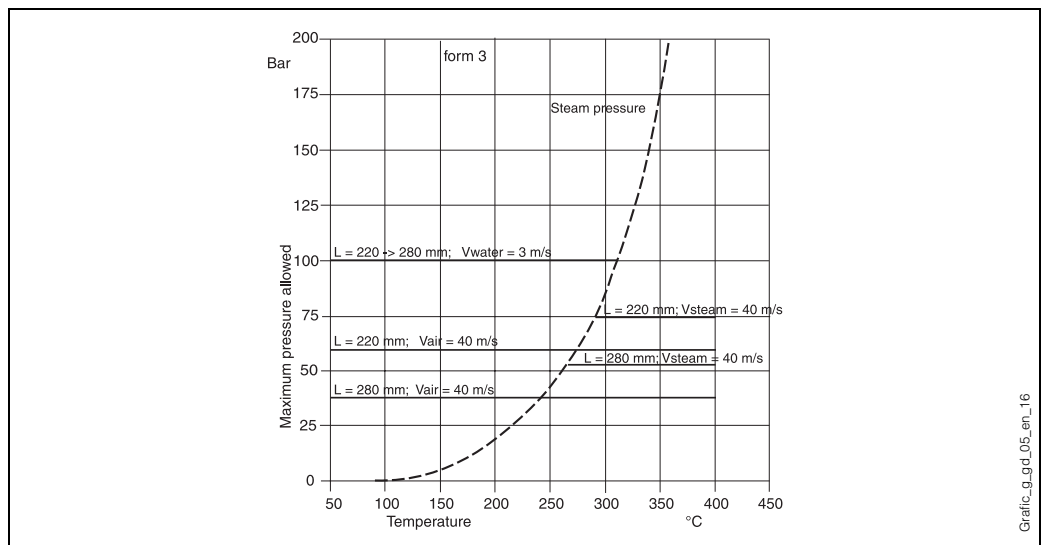


Fig. 3: Pressure/temperature drawing for thermowell with stepped pipe Ø12 mm in SS 316Ti/1.4571

Installation

Measurement range

The Omnigrad M TW 12 thermowells can be mounted on pipes or vessels or other plant parts that may require them.

The interface components for the connection to the process 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 $80 \div 100$ 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). For use in the food industry, it is best to follow the rule $h \leq d/2$.

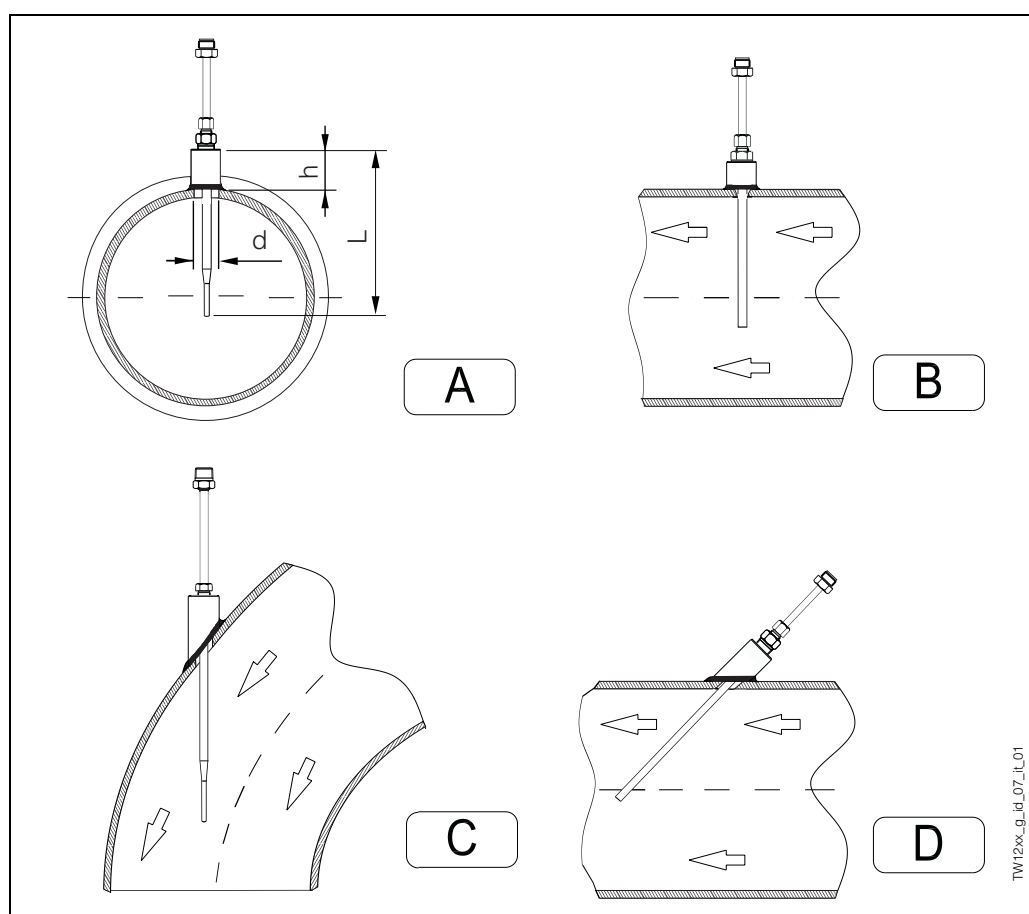


Fig. 4: Installation examples

As far as corrosion is concerned, the base materials for "wetted" parts (SS 316L/1.4404, SS 316Ti/1.4571 for the pipe, SS 316/1.4401 for the compression fittings and for several types of sleeves) are able to tolerate the most common corrosive agents up to the highest temperatures. For further information on specific applications, please contact the E+H Customer Service.

System components

Process connection

Standard compression fittings (in SS 316/1.4401) are available with the following connections:

- threaded, G 1/2" and G 1", with stainless steel or PTFE sleeve (TA 50)
- welded, with sleeve in Viton® (TA 70)

Other versions may be supplied on request.

Figure 5 shows the base dimensions.

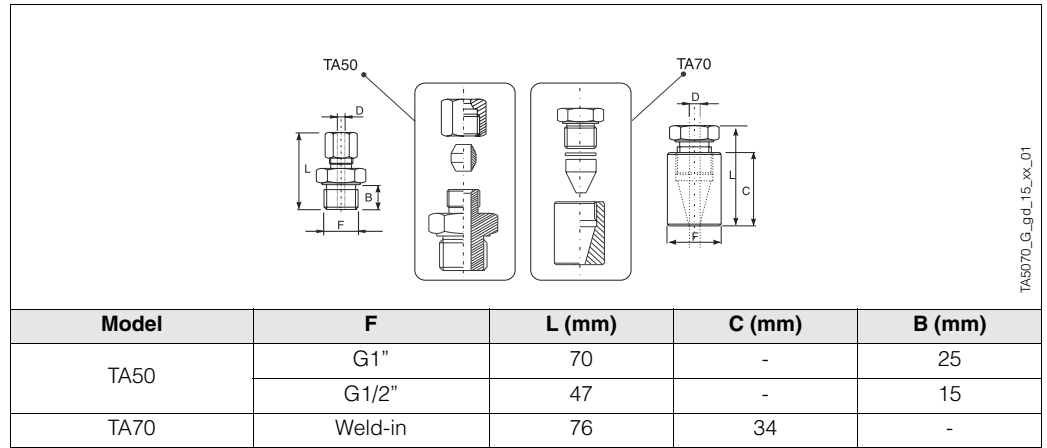


Fig. 5: Base dimensions of process connections

The immersion length of the part of pipe in contact with the process fluid is available in the standard dimensions indicated in standard DIN 43772 and in the most commonly used ones. Immersion length can also be customised within a range of values (see "Sales structure" at the end of this document).

The surface finishing (Ra) is 0.8 µm. The different types of tips (reduced or tapered) are described in figure 6.

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.

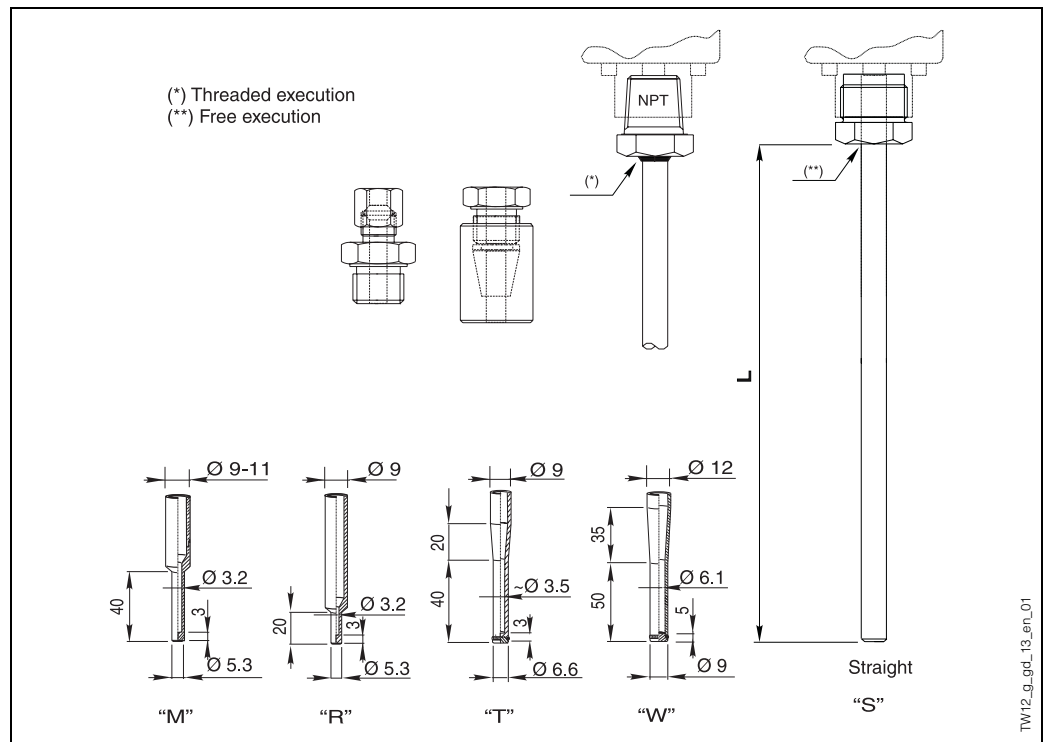


Fig. 6: Functional components

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 is not mandatory for TW 12 models used for generic applications.
Material certification	The material certificate 3.1.B (compliant standard EN 10204) can be directly selected from the sale 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 required 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. 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.

Further details

Maintenance	Omnigrad M TW 12 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

Sale structure

TW12		Head connection	
	1	M24x1.5 head connection	
	2	1/2" NPT head connection	
Pipe diameter, type of material			
	A	Pipe diameter: 9 mm, material: SS 316L/1.4404	
	D	Pipe diameter: 9 mm, material: SS 316Ti/1.4571	
	B	Pipe diameter: 11 mm, material: SS 316L/1.4404	
	E	Pipe diameter: 11 mm, material: SS 316Ti/1.4571	
	F	Pipe diameter: 12 mm, material: SS 316Ti/1.4571	
	Y	Special version	
Process connection			
(TA50 body material: SS 316/1.4401)			
	0	Without process connection	
	1	TA50 compression fitting, G1/2", sleeve in SS	
	2	TA50 compression fitting, G1/2", sleeve in PTFE	
	3	TA50 compression fitting, G1", sleeve in SS	
	4	TA50 compression fitting, G1", sleeve in PTFE	
	5	TA70 weld-in fitting, d.30x34, sleeve in Viton®	
	9	Special version	
Tip design			
	S	Straight tip	
	R	Reduced tip, L >= 30 mm (SS 9 mm pipe)	
	M	Reduced tip, L >= 50 mm (9 and 11 mm pipes)	
	T	Tapered tip, L >= 70 mm (SS 9 mm pipe)	
	W	Tapered tip, L >= 90 mm in compliance with DIN 43772 form 3 (SS 316Ti 12 mm pipe)	
	Y	Special version	
Immersion length L (50 - 3700 mm)			
	A	125 mm, immersion length L (TL=150 mm)	
	B	180 mm, immersion length L (TL=205 mm)	
	C	240 mm, immersion length L (TL=265 mm)	
	D	280 mm, immersion length L (TL=305 mm)	
	E	340 mm, immersion length L (TL=365 mm)	
	F	370 mm, immersion length L (TL=395 mm)	
	G	400 mm, immersion length L (TL=425 mm)	
	K	520 mm, immersion length L (TL=545 mm)	
	M	700 mm, immersion length L (TL=725 mm)	
	X	... immersion length L to specify	
	Y	... special immersion length L	
Material certification			
	0	Material certification not required	
	1	3.1.B EN10204 certificate for wetted part	
	2	3.1.B EN10204 "short form" for wetted parts	
	9	Special version	
Test on thermowell			
	0	Tests on thermowell not required	
	A	Hydrostatic internal pressure test on the thermowell	
	Y	Special version	
TW12-			Complete order code

Supplementary documentation

- | | |
|--|---------------|
| <input type="checkbox"/> TA series - general information | TI 138T/02/en |
| <input type="checkbox"/> Hydrostatic test for thermowells | TI 169T/02/en |
| <input type="checkbox"/> TA Fittings & Sockets omnigrad TA50, TA55, TA60, TA70, TA75 | TI 091T/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

Endress+Hauser
GmbH+Co.
Instruments International
P.O. Box 2222
D-79574 Weil am Rhein
Germany

Tel. (07621) 975-02
Tx 773926
Fax (07621) 975 345
<http://www.endress.com>
info@ii.endress.com

Endress + Hauser
People for Process Automation

