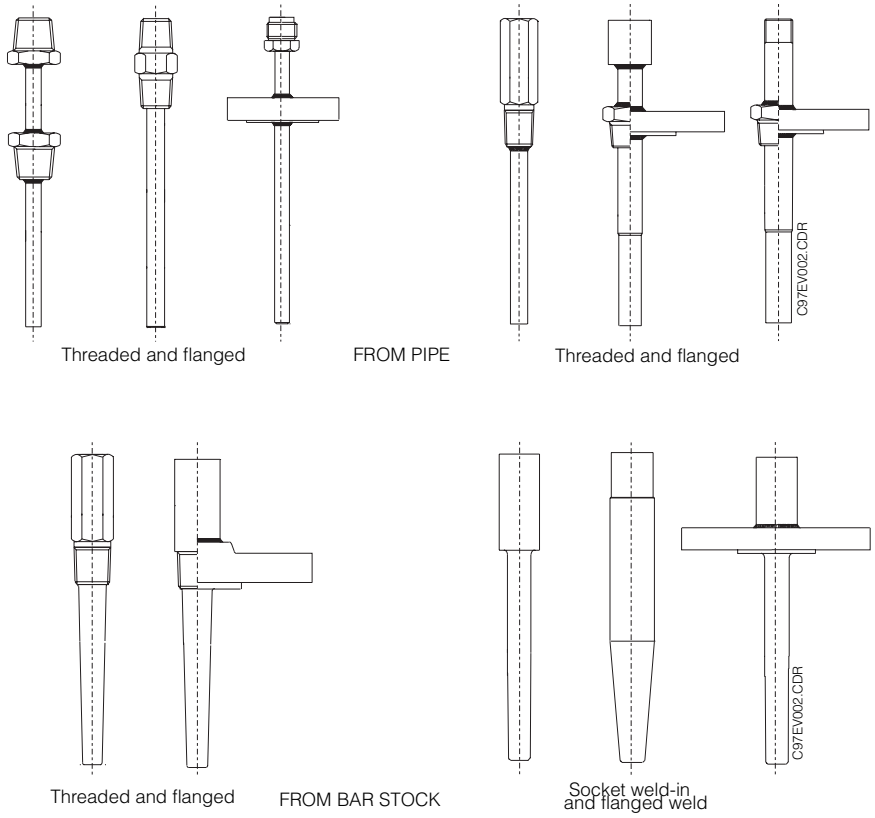
Technical
Information
TI138T/02/en

Industrial protecting tubes
omnigrad TA series

Heavy, medium and light duty
from round/hexagonal bar stock or pipe
threaded, flanged and socket weld-in versions



General
The Endress+Hauser thermowell lines cover a worldwide oriented measurement problem solving.
To meet customer necessities, including different technical standards according to international/country/corporate requirements, is our commitment.
The designs shown above are representative of the basic styles available.

Industrial thermowells are made from bar stock and from pipe of different diameters. The process connection can be threaded, flanged or socket weld-in. A variety of thermowell materials is available in order to cover a complete range of applications: heat treating, glass, paper, petroleum, power, chemical for example.

Quality made by
Endress+Hauser
ISO 9001

Endress+Hauser
Nothing beats know-how

General

Thermowell design has a great importance in obtaining accurate temperature measurements. Factors as length, thickness and mass velocity have to be carefully balanced to produce adeguate well strength as well as accuracy and response of temperature measurement.

Immersion length

The distance from the tip of the well to the underside of the thread/flange/socket weld-in is the immersion length. For optimum accuracy, this length should be long enough to allow the entire temperature sensitive part of the element to project into the medium being measured.
For a correct temperature measurement the thermowell immersion length must be 20 times its diameter.
When calculating the immersion length, the dead length to pass through walls, sockets etc. must also be taken into account.

Straight/Conical or Tapered Wells

Tapered shank wells provide greater strength for the same sensitivity. The higher strength-to-weight ratio gives these wells a higher natural frequency than equivalent length straight/conical shank wells, permitting operation at higher fluid velocity.

Loading capacity of wells

In many cases well failures are not due to the effect of pressure and temperature only. Inadequate strength of well can be due to improper choice of shape or material. Less familiar, and more dangerous, are the vibration effects to which wells are subjected. Fluid, flowing by the well, forms a turbulent wake (called the Von Karman trail) which has definite frequency based on the thermowell shape and process operating conditions.
The standard DIN43763 as well as ASME PTC 19.3 -1974 (ANSI PTC19.3 - 1974) gives the formulas to enable the user to determine if a selected well is strong to withstand specific application conditions of temperature, pressure, velocity and vibrations.

Identification

Upon request thermowell is supplied with punched on identification.

Test capabilities

Hydrostatic test

E+H and customer reference standards hydrostatic tests are available "on request" (i.e. Dow Chemical, Du Pont, ENI, Esso, Montedison, Shell, etc.).
Two main testing methods, at ambient temperature, are available with issuing of certificates: internal and external pressure test.

Liquid penetrant test and others

Additional tests such as liquid penetrant examination, ultrasonic tests, radiographic inspection are available with issuing of inspection test report certificate.

Materials

In general, the thermowell material used is governed mainly by the corrosion conditions. Occasionally the material strength rather than the corrosion resistance determines the thermowell material selection. For this reason wells are also available in several grades of stainless steel and carbon steel, Monel, Hastelloy C and Inconel 600.
The high polish option for all stainless steel thermowells provides maximum corrosion resistance.
Since the various materials specified for thermowells cannot meet the requirements of all possible service conditions, the material that is best suited to the application shall be selected by the user. The thermowell material can be specified according to others installed plant units.
In the case of corrosive media it is advisable to establish the suitability of a material by testing it under service conditions, since often only slight impurities are sufficient to alter the effect which such media may have on the material.
For reference guide herein you find a table with the metallurgic characteristics and the application of the most commonly used materials.

DIN description or brand	DIN W. Nr.	ANSI	Metallurgic characteristics	Application
x5CrNiMo17122	1.4401	AISI316	- corrosion resistance - good resistance at very low temperatures	acetone asphalt fatty acids food & beverage hydrogen peroxide paper petroleum processing petrochemical industries soaps and detergents steam sulphur
x2CrNiMo17132	1.4404	AISI316L	- corrosion resistance - good resistance at very low temperatures - less sensitization in welded plate fabrication in the range 450÷850°C for short time periods	
x6CrNiMoTi17122	1.4571	AISI316Ti	- corrosion resistance - good resistance at very low temperatures -less sensitization in welded plate fabrication in the range 450÷850°C for long time periods	
x10CrAl24 (DIN) x19CrN28 (Euro)	1.4749 1.4762	AISI446	- corrosion resistance - good resistance at very high temperatures - better scaling resistance	flue smoke gas temperature petroleum processing petrochemical industries sulphur
10CrMo910	1.7380	-	DIN 43763	
13CrMo44	1.7335	-		
Inconel 600 NiCr15Fe	2.4816	UNS N 06600	- good resistance in oxidizing and reducing atmospheres -high corrosion resistance at very high temperatures	exit flues glass heat treatment high corrosive environment high temperature environment oxidation and reducing atmospheres superheaters waste heat boilers
Hastelloy C	2.4819	UNS N 10276	- excellent corrosion resistance in oxidizing and reducing atmospheres - corrosion resistance in welded junctions - excellent resistance to pitting and to stress corrosion cracking	chemical industries aggressive fluids as Alum (Potassium or Sodium), Calcium Bisulphate, Calcium Chloride, Chromic Acid, Citric Acid, Copper Chloride, Ferric Chloride, Hydrobromic Acid

Table 1

Heavy duty

Endress+Hauser offers a complete range of standardized thermowells. Heavy duty thermowell line covers a very large amount of industrial standards as DIN, Dow Chemical, Du Pont, ENI, ME U, etc.
Two different types of thermowell construction are available: from drilled bar stock and from pipe.
The process connection can be threaded, flanged or socket weld-in.

Herein you can find a summary technical description of heavy duty thermowells (see Technical Information references for more details).

Bar stock thermowells-Female thermometer connection

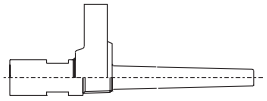
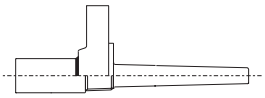
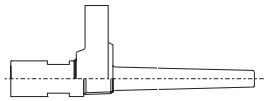
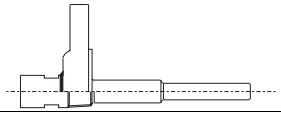
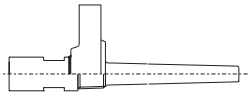
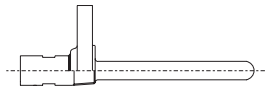
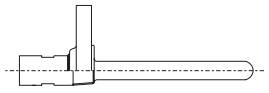
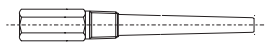
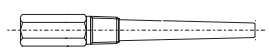
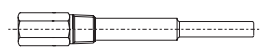
Thermowell model		Hex bar wrench	Round bar ∅	Thermometer connection	Process connection	Bottom shape	Standard reference
TA550		-	30 mm	1/2" NPT	3/4" NPT or flanged		ME U819.02 - type 2
TA551		-	42 mm	1/2" NPT 1/2" NPSC	1 1/4" NPT or flanged		Du Pont TCM-1T; TCM-2T; TCM-6T; TCM-7T; TCM-8T
TA555		-	34 mm	1/2" NPT	1" NPT or flanged		ME U819.04 - type 6
TA556		-	35 mm	3/4" NPT	1" NPT or flanged		ENI BAR 3 ENI BAR 4
TA557		-	35 mm	1/2" NPT	1" NPT or flanged		ENI BAR 1
TA558		-	48 mm	3/4" NPT	1 1/2" NPT or flanged		ENI MAS 1
TA559		-	48 mm	1/2" NPT	1 1/2" NPT or flanged		ENI MAS 1 special
TA560		27 mm	-	1/2" NPT	3/4" NPT		-
TA561		27 mm	-	1/2" NPT 1/2" NPSC	1/2" NPT or 3/4" NPT		Du Pont SR1T Du Pont SR2T
TA565		36 mm	-	1/2" NPT	1" NPT		-
TA566		36 mm	-	1/2" NPT	1" NPT		-

Table 2

Bottom shape		
 Straight	Tapered	 Conical

Bar stock thermowells - Female thermometer connection

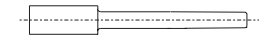
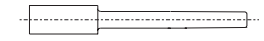
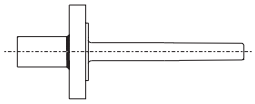
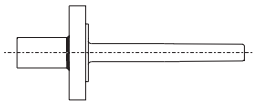
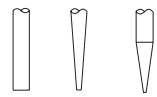
Thermowell model		Round bar ∅	Thermometer connection	Process connection	Bottom shape	Standard reference
TA570		49 ÷ 35 mm	1/2" NPT 1/2" NPSM 1/2" BSP 1/2" BSPF	Socket weld-in		Dow Chemical standard G6D-7001-00 (1995)
TA571		34 ÷ 30 mm	1/2" NPT 1/2" NPSM 1/2" BSP 1/2" BSPF	Socket weld-in		-
TA572		29 ÷ 25 mm	1/2" NPT 1/2" NPSC	Socket weld-in		Du Pont SR21T Du Pont SR22T
TA573		24 ÷ 20 mm	G 3/8" M14 (x1.5) M18 (x1.5)	Socket weld-in		DIN 43763-Form D
TA574		18 mm	M14 (x1.5)	Socket weld-in		DIN 43763-D1S type DIN 43763-D2S type DIN 43763-D4S type DIN 43763-D5S type
TA575		34 ÷ 30 mm	1/2" NPT 1/2" NPSM	Flanged weld		Dow Chemical standard G6D-7002-00 (1995)
TA576		29 ÷ 25 mm	1/2" NPT 1/2" NPSC	Flanged weld		Du Pont SR6T Du Pont SR7T

Table 3

Welded extension pipe thermowells

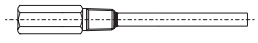
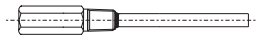
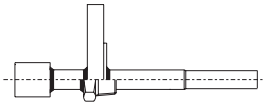
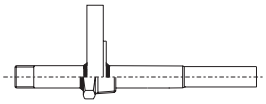
Thermowell model		Pipe ∅	Thermometer connection		Extension	Process connection	Bottom shape	Standard reference
TA530		9÷12 mm	Female	G 1/2" 1/2" NPT	Hexagonal 27 mm wrench	1/2" NPT		-
TA531		9÷15 mm 1/4"-3/8"		G 1/2" 1/2" NPT	Hexagonal 27 mm wrench	3/4" NPT		-
TA532		1/4"-3/8"-1/2"		G 1/2" 1/2" NPT	Hexagonal 36 mm wrench	1" NPT		-
TA533		1/4"-3/8"-1/2" 3/4"-1"		G 1/2" 1/2" NPT	Hexagonal 53 mm wrench	1 1/2" NPT		-
TA540		1/4"-1/2"-3/4"		1/2" NPT 3/4" NPT	Round ∅ 35 mm	flanged or welded mounting bushing		ENI TUB 1 ENI TUB 2 ENI TUB 3 ENI TUB 4
TA541		1/2"-3/4"	Male	1/2" NPT 3/4" NPT G 1/2" G 3/4"	Round pipe size	flanged or welded mounting bushing		ME U819.05 9 type

Table 4

Bottom shape			
			
Straight	Tapered	Conical	Conical Tapered

Medium duty

Medium duty thermowell line covers DIN standards and complete market requirements.
Thermowells available are made from pipe.
The process connection can be threaded, flanged or sanitary fittings.
Herein you can find a summary technical description of medium and light duty thermowells (see Technical Information references for more details).

Pipe thermowells-Male thermometer connection

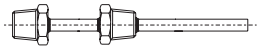
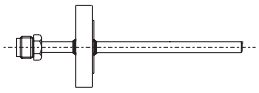
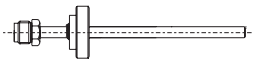
Thermowell model		Pipe ∅ (mm)	Thermometer connection	Neck	Process connection	Bottom shape	Standard reference
TA10		9÷13	M24 (x1.5) 1/2" NPT	√	G1/2"-G1" std DIN G1/2"-G3/4"-G1" 1/2"-3/4"-1"NPT M20 (x1.5)-M27 (x2)		DIN 43763-Form B DIN 43763-Form C
TA11		9÷12	M24 (x1.5) 1/2" NPT G 1/2"	no	M20 (x1.5)- G1/2" std DIN G1/4"-G3/8"-G1/2"-G3/4"-G1" 1/4"-3/8"-1/2" NPT 3/4"-1"NPT		-
TA12		9÷13	M24 (x1.5) 1/2" NPT G 1/2"	no	TA50 threaded compression fitting		-
TA13		9÷13	M24 (x1.5) 1/2" NPT G 1/2"	√	flanged		DIN 43763 - Form F
TA14		9÷13	M24 (x1.5)	√	wide range of food and sanitary connections		DIN 43763 - Form D

Table 5

Bottom shape	
	
Straight	Tapered

TA series selection table

TA series is particularly designed to complete E+H line of temperature sensors which includes EEx-d and heavy duty thermometers (requiring a separate thermowell).
To easy select the right coupling you can use the following selection table.

Model	Thermowell to thermometer connection								
	Type	TST262 EE x d	TST264 EE x d	TST280	TST281	TST285	TST286	TST288	TST289
TA10	Male	1/2" NPT	-	-	-	1/2" NPT	-	-	-
TA11							G 1/2"		
TA12									
TA13									
TA530	Female	1/2" NPT	-	1/2" NPT	G 1/2"	-	-	1/2" NPT G 1/2"	1/2" NPT G 1/2"
TA531									
TA532									
TA533									
TA540	Female	1/2" NPT	-	1/2" NPT	-	-	-	1/2" NPT	1/2" NPT 3/4" NPT
TA541	Male	1/2" NPT		-			G 1/2"	-	-
TA550	Female	-	1/2" NPT	1/2" NPT	-	-	-	1/2" NPT	1/2" NPT
TA551									
TA555									
TA556			-	-				-	3/4" NPT
TA557			1/2" NPT	1/2" NPT				1/2" NPT	1/2" NPT
TA558			-	-				-	3/4" NPT
TA559			1/2" NPT	1/2" NPT				1/2" NPT	1/2" NPT
TA560	Female	-	1/2" NPT	1/2" NPT	1/2" NPT	-	-	1/2" NPT	1/2" NPT
TA561									
TA565									
TA566									
TA570	Female	-	1/2" NPT	1/2" NPT	-	-	-	1/2" NPT	1/2" NPT
TA571									
TA572									
TA573			-	-				G 3/8" M14 M18	G 3/8"
TA575			1/2" NPT	1/2" NPT				1/2" NPT	1/2" NPT
TA576									

Table 6

Supplementary documentation

- ☐ TA10 thermowell
  Technical Information TI151T/02/en
- ☐ TA11 thermowell
  Technical Information TI195T/02/en
- ☐ TA12 thermowell
  Technical Information TI196T/02/en
- ☐ TA13 thermowell
  Technical Information TI238T/02/en
- ☐ TA14 thermowell
  Technical Information TI234T/02/en
- ☐ TA530 thermowell
  Technical Information TI189T/02/en
- ☐ TA531 thermowell
  Technical Information TI192T/02/en
- ☐ TA532 thermowell
  Technical Information TI193T/02/en
- ☐ TA533 thermowell
  Technical Information TI194T/02/en
- ☐ TA540 thermowell
  Technical Information TI166T/02/en
- ☐ TA541 thermowell
  Technical Information TI188T/02/en
- ☐ TA550 thermowell
  Technical Information TI153T/02/en
- ☐ TA551 thermowell
  Technical Information TI237T/02/en
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- ☐ TA572 thermowell
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- ☐ TA573 thermowell
  Technical Information TI187T/02/en
- ☐ TA574 thermowell
  Technical Information TI207T/02/en
- ☐ TA575 thermowell
  Technical Information TI162T/02/en
- ☐ TA576 thermowell
  Technical Information TI163T/02/en
- ☐ Welding capabilities
  Technical Information TI167T/02/en
- ☐ Liquid penetrant test
  Technical Information TI168T/02/en
- ☐ Hydrostatic test
  Technical Information TI169T/02/en

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