

Thermowell with flange Model TW10

WIKA data sheet TW 95.10

Applications

- Petrochemical industry, on-/offshore, plant construction
- For high process loads
- For high chemical demands

Special features

- Heavy-duty design
- Coating for corrosive or abrasive process loads
- Possible thermowell forms: tapered, straight, stepped
- Design TW10-F: Full penetration weld version
- Design TW10-P, TW10-R: With double weld seam
- Design TW10-S, TW10-B: Screw-welded design
- Design TW10-W: Forged version without welded joint



Thermowell with flange, model TW10

Description

Each thermowell/protection tube is an important component of any temperature measuring point. It is used to separate the process from the surrounding area, thus protecting the environment and operating personnel and keeps aggressive media, high pressures and flow rates from the temperature sensor itself and thereby enables the thermometer to be exchanged during operation.

Based on the almost limitless application possibilities, there are a large number of variants, such as thermowell/protection tube designs or materials. The type of process connection and the basic method of manufacture are important design differentiation criteria. A basic differentiation can be made between threaded and weld-in thermowells/protection tubes, and those with flange connections.

Furthermore, one can differentiate between protection tubes and thermowells. Protection tubes are constructed from a tube, that is closed at the tip by a welded solid tip. Thermowells are manufactured from bar stock or forgings.

The TW10 series of thermowells with flange connection are suitable for use with numerous electrical and mechanical thermometers from WIKA.

Due to the heavy-duty design, these international design thermowells are the first choice for use in the chemical and petrochemical industries and in plant construction.

Specifications

Basic information	
Thermowell form	<ul style="list-style-type: none"> ■ Tapered ■ Straight ■ Stepped ■ ScrutonWell design per SP 05.16 (selectable)
Versions	
Design TW10-F	Full penetration weld version
Design TW10-P	With double weld seam (weld seam strength 3 mm)
Design TW10-R	With double weld seam (weld seam strength 6 mm)
Design TW10-S	Screw-welded design, weld seam does not come into direct contact with the medium
Design TW10-B	Screw-welded design, additional weld seam on the process side (sealing joint)
Design TW10-W	Forged version without welded joint
Material (wetted)	<ul style="list-style-type: none"> ■ Stainless steel 304/304L ■ Stainless steel 316/316L ■ Stainless steel 1.4571 ■ Stainless steel 1.4404 ■ A105 ■ Alloy C4 ■ Alloy C276 ■ Alloy 400 ■ Titanium grade 2 ¹⁾ ■ Tantalum sheet for wetted parts ■ Restricted choice of materials with TW10-W
	→ Other materials on request
Coating	
Hardfacing for abrasive process loads with Stellite® 6	<ul style="list-style-type: none"> ■ Laser cladding Layer thickness 1.6 mm [0.062 in] (standard) Higher layer thickness on request ■ Plasma Transfer Arc (PTA) Layer thickness 1.6 mm [0.062 in] (standard) up to 3.2 mm [0.125 in] ■ Air Plasma Spraying (APS) Layer thickness max. 1.6 mm [0.062 in] ■ High Velocity Oxide Fuel (HVOF) Layer thickness 0.5 mm [0.02 in]
Corrosion protection for high chemical loads	<ul style="list-style-type: none"> ■ PFA Layer thickness min. 0.4 mm [0.015 in] (standard) or min. 0.6 mm [0.024 in] (special design) ■ ECTFE (Halar®) Layer thickness min. 0.6 mm [0.024 in]
	→ Other resistant coatings on request

¹⁾ For titanium grade 2 material in a washer disc construction, the blind flange is designed to be removable.

²⁾ Post weld heat treatment: Depending on the selected material of the thermowell and flange as well as the design of the thermowell, heat treatment of the welded joint may be a technical requirement. Any annealing colour that occurs during this treatment on the thermowell are process-related with carbon steel and do not affect the function of the thermowell.

Examples for coatings



Process connection

Type of process connection	
Flange	<ul style="list-style-type: none"> ■ Per ASME B16.5 ■ Per EN 1092-1 ■ Per DIN 2527
	→ Other flanges on request
TW10-W	<ul style="list-style-type: none"> ■ Dimensions in accordance with ASME B16.5 ■ Dimensions in accordance with EN 1092-1 ■ Dimensions in accordance with DIN 2527
Connection to thermometer N	<ul style="list-style-type: none"> ■ ½ NPT female thread ■ G ½ female thread ■ M20 x 1.5
	→ Other dimensions on request
Bore size B	<ul style="list-style-type: none"> ■ 6.2 mm [0.244 in] ■ 6.6 mm [0.260 in] ■ 7.0 mm [0.276 in] ■ 8.2 mm [0.323 in] ■ 8.5 mm [0.355 in] ■ 9.0 mm [0.354 in] ■ 9.8 mm [0.385 in] ■ 10.2 mm [0.402 in] ■ 12.2 mm [0.480 in]
Insertion length U	<ul style="list-style-type: none"> ■ 150 mm [5.9 in] ■ 200 mm [7.87 in] ■ 250 mm [9.84 in] ■ 300 mm [11.81 in] ■ 350 mm [13.78 in] ■ 400 mm [15.75 in] ■ 6 in [152 mm] ■ 7 in [178 mm] ■ 10 in [254 mm] ■ 13 in [330 mm] ■ 16 in [406 mm]
	→ Other insertion lengths on request
Min. insertion length	Depending on the selected version
Max. insertion length ¹⁾	800 mm [31.5 in]
Connection length H	<ul style="list-style-type: none"> ■ 45 mm [1.77 in] ■ 57 mm [2.25 in] ■ 60 mm [2.36 in] ■ 83 mm [3.25 in] ■ 108 mm [4.25 in] ■ 133 mm [5.25 in]
	→ Other connection lengths on request
Min. Connection length	Depending on the selected version
Max. Connection length	250 mm [10 in]

Process connection		
Tip thickness	6.4 mm [0.25 in]	
	→ Other tip thicknesses on request	
Suitable stem lengths l_1 (dial thermometer) with tip thickness 6.4 mm [0.25 in]		
Connection design S, 4 or 5	Parallel thread	$l_1 = U + H - 10 \text{ mm [0.4 in]}$
	Tapered thread	$l_1 = U + H - 2 \text{ mm [0.08 in]}$
Connection design 2	$l_1 = U + H - 30 \text{ mm [1.2 in]}$	

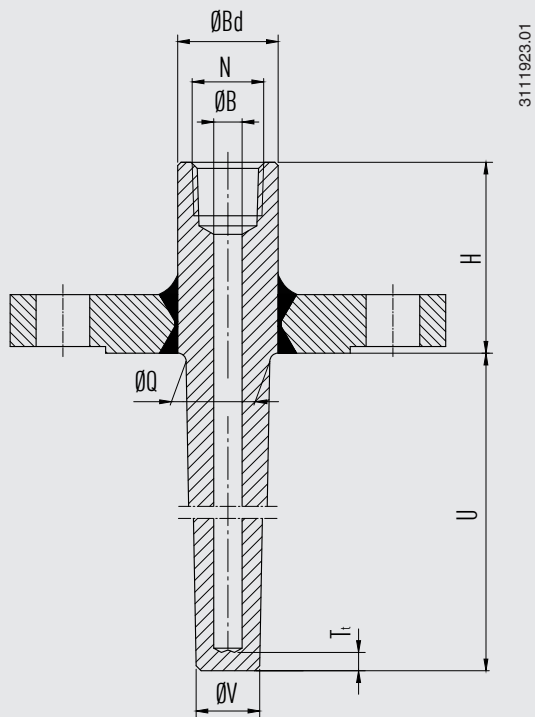
- 1) Longer insertion lengths in one-piece design are dependent on the geometry and material, and are possible up to 1575 mm (62 in) on request.
Basically, from an insertion length of 800 mm (31.5 in), a multi-part assembly in accordance with IN 00.16 is carried out, unless otherwise requested.
A wake frequency calculation in accordance with ASME PTC 19.3 TW-2016 requires compliance with the requirements of the above-mentioned standard.

Further details on: Process connection				
	Version	AARH in µinch	Ra in µm	Rz in µm
Sealing face roughness				
ASME B16.5	Stock finish	125 ... 250	3.2 ... 6.3	-
	Smooth finish	< 125	< 3.2	-
	RTJ	< 63	< 1.6	-
	Tongue/groove	< 125	< 3.2	-
EN 1092-1	Form B1	-	3.2 ... 12.5	12.5 ... 50
	Form B2	-	0.8 ... 3.2	3.2 ... 12.5
DIN 2527	Form C	-	-	40 ... 160
	Form E	-	-	< 16

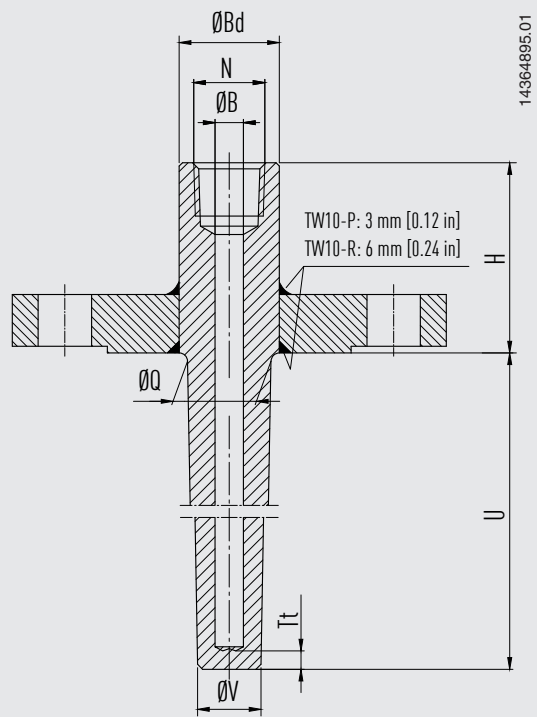
Operating conditions	
Max. process temperature, process pressure	Depending on: <ul style="list-style-type: none"> ■ Thermowell design <ul style="list-style-type: none"> - Dimensions - Material - Coating - Flange pressure rating ■ Process conditions <ul style="list-style-type: none"> - Flow rate - Density of medium
Wake frequency calculation (option)	<p>The calculation in accordance with ASME PTC 19.3 TW-2016 of individual thermowells minimises the risk of dynamic damage that can be caused by the vortex shedding of a Kármán vortex street (Vortex Induced Vibration; VIV).</p> <p>In addition, the static loads due to lateral flow and the process pressure are calculated depending on the temperature.</p> <p>The calculation can be carried out independently using an online tool or as a WIKA engineered service (subject to charges).</p> <p>→ For further information see Technical information IN 00.15 "Wake frequency calculation".</p>

Dimensions in mm [in]

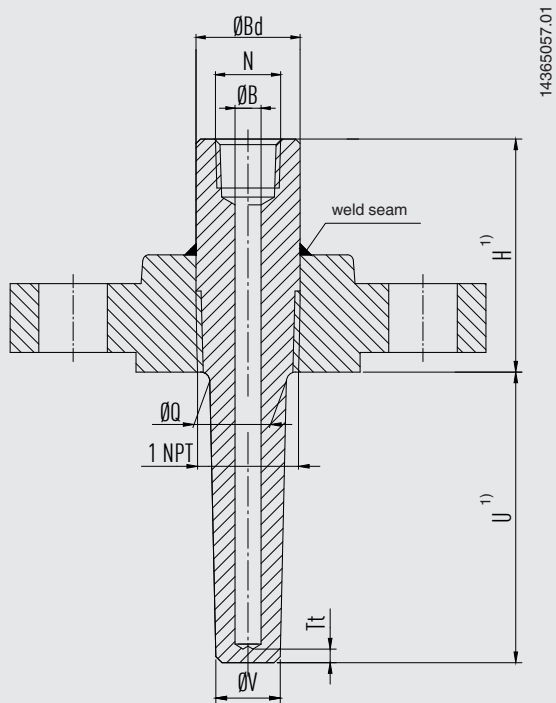
Design TW10-F



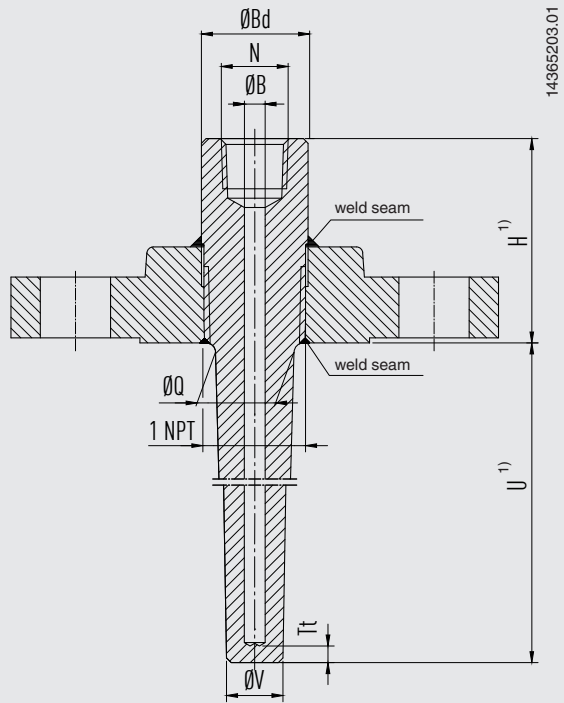
Design TW10-P, TW10-R



Design TW10-S

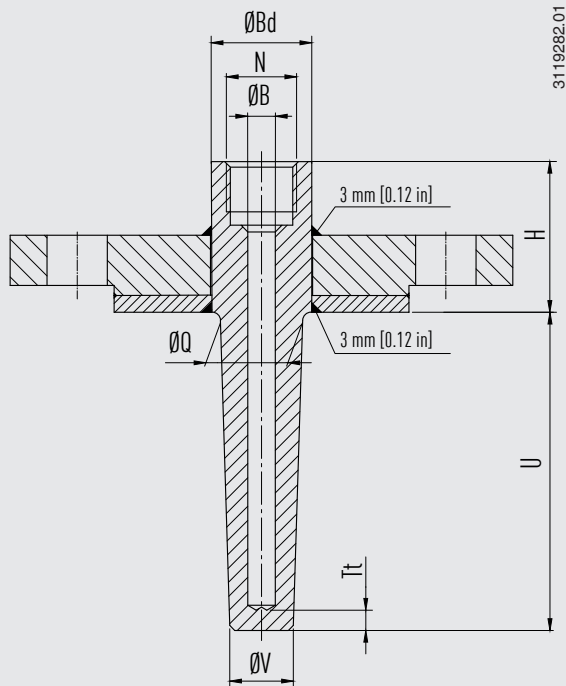


Design TW10-B

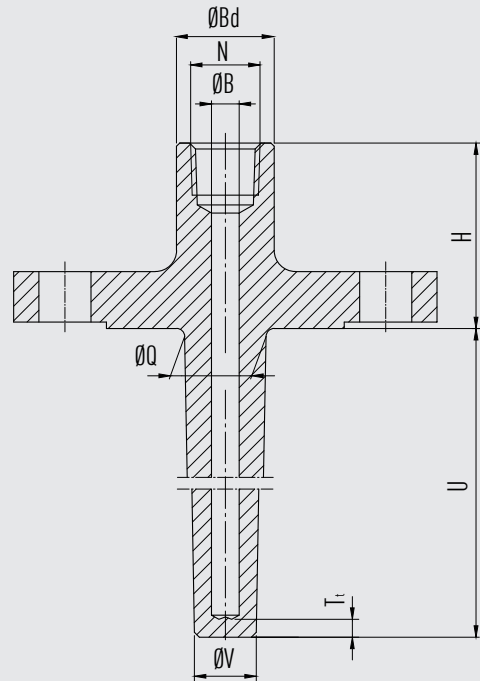


1) For technical reasons around the 1 NPT thread, the connection length, H, and also the insertion length, U, can move with a tolerance of ± 5 mm [± 0.02 in] to the specified nominal dimension. A flush connection of the thread with the flange sealing face can therefore not be guaranteed.

Design TW10-P in washer disc construction



Design TW10-W



Legend:

H Connection length

U Insertion length

N Connection to thermometer

Ø B Bore size, see table „Process connection“ page Seite 3

Ø Q Root diameter, see table „Process connection“ page Seite 3

Ø V Tip diameter

Ø Bd Bar diameter (depending on selected root diameter or customer specification. Note 1: Tolerance of up to ± 1 mm [± 0.04 in], depending on design and dimensions)

Tt Tip thickness (6.4 mm [0.25 in])

ASME flanges, tapered thermowell form

DN	PN in lbs	Dimensions in mm [in]			Weight in kg [lbs] (approx.)		
		H	Ø Q	Ø V	U = 4"	U = 13"	U = 22"
1"	150	approx. 57 [2 ¼]	22 [0.875]	16 [0.625]	1.4 [3.086]	1.9 [4.188]	2.3 [5.070]
	300	approx. 57 [2 ¼]	22 [0.875]	16 [0.625]	2.1 [4.629]	2.6 [5.732]	3.0 [6.613]
	600	approx. 57 [2 ¼]	22 [0.875]	16 [0.625]	2.3 [5.070]	2.8 [6.172]	3.2 [7.054]
	1,500	approx. 83 [3 ¼]	22 [0.875]	16 [0.625]	4.3 [9.479]	4.8 [10.582]	5.2 [11.464]
	2,500	approx. 83 [3 ¼]	22 [0.875]	16 [0.625]	5.6 [12.345]	6.1 [13.448]	6.5 [14.330]
1 ½"	150	approx. 57 [2 ¼]	25 [1.000]	19 [0.750]	1.8 [3.968]	2.4 [5.291]	3.0 [6.613]
	300	approx. 57 [2 ¼]	25 [1.000]	19 [0.750]	3.3 [7.275]	3.9 [8.598]	4.5 [9.920]
	600	approx. 57 [2 ¼]	25 [1.000]	19 [0.750]	4.0 [8.818]	4.7 [10.361]	5.3 [11.684]
	1,500	approx. 83 [3 ¼]	25 [1.000]	19 [0.750]	6.4 [14.109]	7.1 [15.652]	7.7 [16.975]
	2,500	approx. 83 [3 ¼]	25 [1.000]	19 [0.750]	12.0 [26.455]	12.6 [27.778]	13.3 [29.321]
2"	150	approx. 57 [2 ¼]	25 [1.000]	19 [0.750]	2.5 [5.511]	3.1 [6.834]	3.7 [8.157]
	300	approx. 57 [2 ¼]	25 [1.000]	19 [0.750]	3.7 [8.157]	4.3 [9.479]	4.9 [10.802]
	600	approx. 57 [2 ¼]	25 [1.000]	19 [0.750]	4.2 [9.259]	4.9 [10.802]	5.5 [12.125]
	1,500	approx. 83 [3 ¼]	25 [1.000]	19 [0.750]	11.0 [24.250]	11.6 [25.573]	12.3 [27.116]
	2,500	approx. 108 [4 ¼]	25 [1.000]	19 [0.750]	17.0 [37.478]	17.6 [38.801]	18.3 [40.344]

EN and DIN flanges, tapered thermowell form - only for design TW10-P and TW10-R

(only for welding version with weld seam, 3 mm [0.12"] or 6 mm [0.24"] on both sides)

DN	PN in bar	Dimensions in mm [in]			Weight in kg [lbs] (approx.)	
		H	Ø Q	Ø V	U = 160 mm	U = 500 mm
25	40	45 [1.771]	22 [0.875]	16 [0.625]	1.9 [4.188]	2.6 [5.732]
	63/64	45 [1.771]	22 [0.875]	16 [0.625]	3.2 [7.054]	3.9 [8.598]
	100	45 [1.771]	22 [0.875]	16 [0.625]	3.2 [7.054]	3.9 [8.598]
40	40	45 [1.771]	25 [1.000]	19 [0.750]	3.1 [6.834]	4.0 [8.818]
	63/64	45 [1.771]	25 [1.000]	19 [0.750]	4.8 [10.582]	5.7 [12.566]
	100	45 [1.771]	25 [1.000]	19 [0.750]	4.8 [10.582]	5.7 [12.566]
50	40	45 [1.771]	25 [1.000]	19 [0.750]	3.9 [8.598]	4.8 [10.582]
	63/64	45 [1.771]	25 [1.000]	19 [0.750]	5.2 [11.464]	6.1 [13.448]
	100	45 [1.771]	25 [1.000]	19 [0.750]	6.6 [14.550]	7.5 [16.534]
80	40	60 [2.362]	25 [1.000]	19 [0.750]	6.6 [14.550]	7.5 [16.534]
	63/64	60 [2.362]	25 [1.000]	19 [0.750]	7.6 [16.755]	8.5 [18.739]
	100	60 [2.362]	25 [1.000]	19 [0.750]	10.2 [22.487]	11.1 [24.471]
100	40	60 [2.362]	25 [1.000]	19 [0.750]	8.3 [18.298]	9.2 [20.282]
	63/64	60 [2.362]	25 [1.000]	19 [0.750]	10.9 [24.030]	11.8 [26.014]
	100	60 [2.362]	25 [1.000]	19 [0.750]	15.0 [33.069]	15.9 [35.053]

Ordering information

Model / Thermowell form / Thermowell material / Flange material / Head diameter / Connection to the thermometer /
 Bore size Ø B / Nominal diameter DN / Pressure rating PN / Sealing face / Wall thickness of flange nozzle / Insertion length U /
 Connection length H / Coating / Assembly with thermometer / Certificates / Options

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