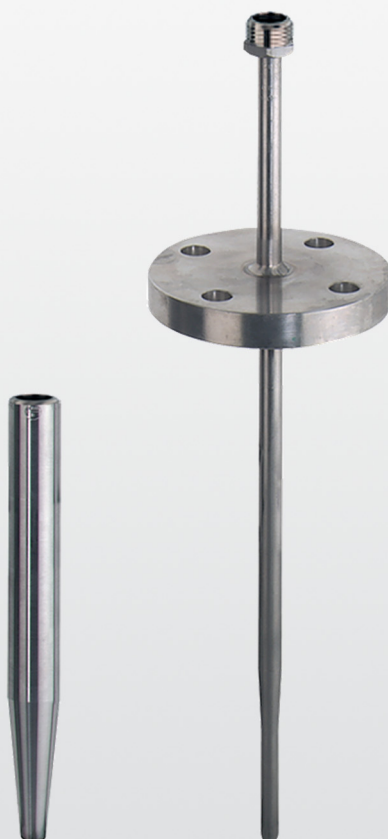


ABB MEASUREMENT & ANALYTICS | DATA SHEET

SensyTemp TSW200, TSW300

Welded and drilled thermowells



Measurement made easy

Safe, robust and reliable thermowells for industrial temperature sensors

Developed in accordance with international standards

- ISO 9001

Manufactured with complete materials testing

- Traceability back to the production site
- Material certification
- Welding certification

Areas of application

- Chemical industry
- Energy industry
- General process engineering
- Container and pipeline construction
- Mechanical engineering and plant construction
- Offshore and coastal areas
- Oil / natural gas production and transport
- Petrochemical industry
- Food and beverage industry in accordance with EU Directives no. 1935 and no. 2023

Available versions

The range of conventionally welded (TSW200) and drilled (TSW300) thermowells from ABB comprises the following versions. Companies with their own standards may select "Other versions" and provide a drawing to obtain a corresponding quote.

Flanged connection (TSWX20)

Thermowells with a flanged connection are available in two manufacturing options:

- **Welded with a fillet and butt weld**
Fillet and butt welding is usually adequate in most cases; the weld is more stable than the operating pressure requires.
- **Full penetration welded**
Full penetration welding provides a more stable welded joint and is mandatory in cases where the integrity of the piping must be absolutely guaranteed.

Weld-in (TSWX10) and Screw-in (TSWX30)

The ABB weld-in and screw-in thermowell versions are manufactured from a single piece of top-quality material and do not have any welded seams.

Profiles

There are three basic profile types available:

- **Straight shaft**
The shaft diameter remains constant over the entire length.
- **Tip tapered** (conical form)
The profile tapers toward the tip in a conical form after initially maintaining a constant diameter.
- **Tip reduced** (stepped)
In the lower area of the thermowell, the diameter is reduced by one increment.

Thermowell functions

- Protection against aggressive media, high process pressures, and high medium velocity
- Replacement or recalibration of the sensor element without interrupting the process

Depending on the medium, temperature and process pressure, several different designs and materials are available.

The thermowells are divided into two categories:

- Welded protective fittings manufactured from pipe material for TSPX21
- Drilled thermowells manufactured from bar stock material for TSPX31

Available in accordance with DIN 43772 or ABB standard.

Use in contact with food

Selected welded and drilled thermowells are permitted for use with food in accordance with EU regulations no. 1935 and no. 2023. In this context, this involves the following thermowells:

Welded thermowells:

- Flange thermowell, straight (DIN 43772, Form 2F)
- Screw-in thermowell, straight (DIN 43772, Form 2G)
- Flange thermowell with stepped tip 9 mm (0.36 in) (ABB Form 2FS/9)
- Screw-in thermowell with stepped tip 9 mm (0.36 in) (ABB Form 2GS/9)

Drilled thermowells:

- Weld-in thermowell manufactured from bar stock material, (DIN 43772, Form 4)
- Flange thermowell manufactured from bar stock material, (DIN 43772, Form 4F)

The following thermowell materials are possible:

- Stainless steel 1.4571 (ASTM 316Ti)
- Ni alloy 2.4819 (Hastelloy C-276)
- Ni alloy 2.4610 (Hastelloy C-4)

Other thermowells and materials available on request.

... Available versions

Use in highly aggressive media

A special coating of PFA or ECTFE with a standard coat thickness of 0.5 mm (0.02 in) can be applied for the corresponding use.

Use in highly corrosive applications

For thermowells with flange, a tantalum sheath can be applied for the corresponding usage. The tantalum sleeve is brazed to the flange in two points.

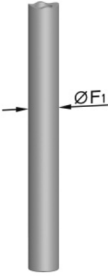
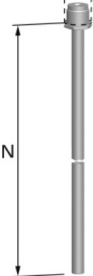
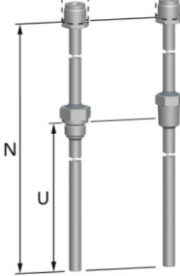
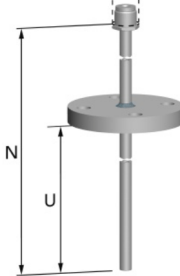
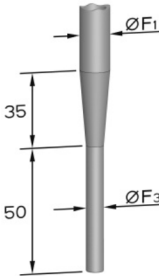

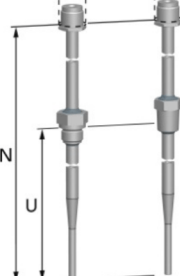
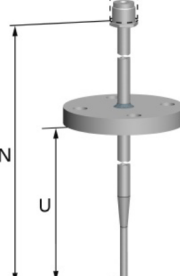
If required, contact your ABB partner.

Response times in accordance with IEC 60751 and IEC 60584

The thermowell used in each application and the thermal contact between thermowell and measuring inset have an impact on the response times of TSP temperature sensors. In the case of TSPX21 and TSPX31 temperature sensors, the design of the thermowell tip has been adapted to the measuring inset. This maximizes heat transmission. The following table shows typical response times for the SensyTemp TSP series, measured in accordance with IEC 60751 in water with 0.4 m/s and a temperature rise from 25 °C (77 °F) to 35 °C (95 °F).

Thermowell form	Diameter [mm]	In water 0.4 m/s	
		t _{0,5}	t _{0,9}
Resistance thermometer			
2, 2G, 2F, 2G0	9 × 1	23	64
	11 × 2	25	77
3, 3G, 3F	12 / 9 mm tip	15	38
2S, 2GS, 2FS, 2GS0	12 / 6 mm tip	21	55
Thermocouples			
2, 2G, 2F, 2G0	9 × 1	10	24
	11 × 2	12	28
3, 3G, 3F	12 / 9 mm tip	12	24
2S, 2GS, 2FS, 2GS0	12 / 6 mm tip	6	14
	14 / 6 mm tip	6	14

Welded thermowells (TSW200)

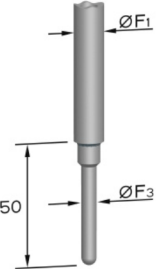
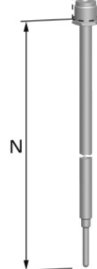
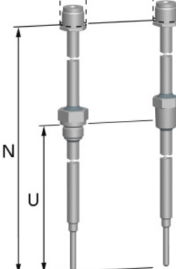
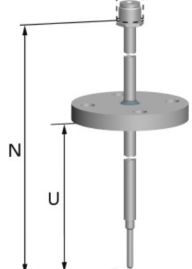
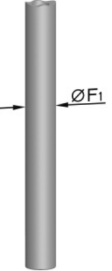
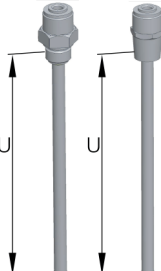
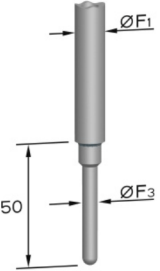
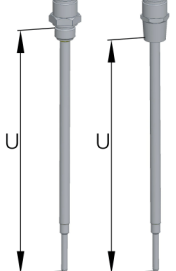
Straight shaft			
	DIN 43772 – form 2	DIN 43772 – form 2G	DIN 43772 – form 2F
	M24 x 1.5 head connection		
			
1.4571/316Ti	F1 = 12, 14 mm	F1 = 9, 11, 12, 14 mm	F1 = 11, 12, 14 mm
1.4404/316L	F1 = 12, 14 mm	F1 = 12, 14 mm	F1 = 12, 14 mm
2.4819/C-276	—	F1 = 13.7 mm*	F1 = 13.7 mm**
Measuring inset	Ø 6 mm	Ø 6 mm	Ø 6 mm
Tapered tip***			
	DIN 43772 – form 3	DIN 43772 – form 3G	DIN 43772 – form 3F
	M24 x 1.5 head connection		
			
1.4571/316Ti	F1/F3 = 12/9, 16/10 mm	F1/F3 = 12/9 mm	F1/F3 = 12/9, 16/10 mm
1.4404/316L	F1/F3 = 12/9 mm	F1/F3 = 12/9 mm	F1/F3 = 12/9 mm
Measuring inset	Ø 6 mm	Ø 6 mm	Ø 6 mm

* Only with G½A, ½" NPT thread

** Flange 1.4571/316Ti, flange disc 2.4819/C-276

*** With a diameter of the tapered tip of 9 mm, the bottom plug is welded in accordance with the NAMUR recommendation. The effective diameter is approx. 10 mm.

... Available versions

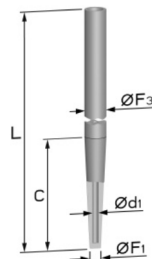
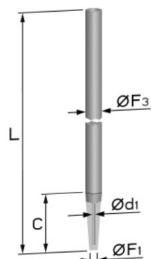
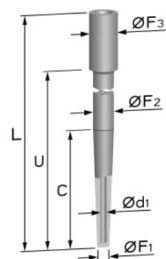
Stepped tip	ABB – form 2S	ABB – form 2GS	ABB – form 2FS
M24 × 1.5 head connection			
			
1.4571/316Ti	F1/F3 = 12/6, 14/6 mm	F1/F3 = 11/6, 12/6, 14/6 mm	F1/F3 = 11/6, 12/6, 14/6 mm
1.4404/316L	F1/F3 = 12/6, 14/6 mm	F1/F3 = 12/6, 14/6 mm	F1/F3 = 12/6, 14/6 mm
2.4819/C-276	—	F1/F3 = 13.7/6 mm*	F1/F3 = 13.7/6 mm**
Measuring inset	Ø 3 mm	Ø 3 mm	Ø 3 mm
Straight shaft, without extension tube	ABB – form 2G0	Recessed tip, without extension tube	ABB – form 2GS0
M24 × 1.5 head connection			
			
1.4571/316Ti	F1 = 9, 11, 12 mm*	1.4571/316Ti	F1/F3 = 11/6, 12/6 mm*
Measuring inset	Ø 6 mm	Measuring inset	Ø 3 mm

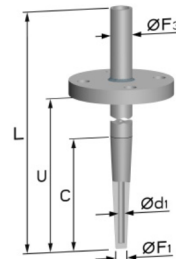
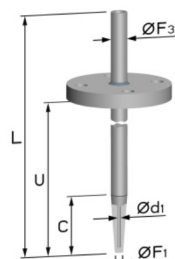
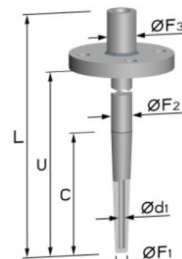
* Only with G½A, ½" NPT thread

** Flange 1.4571/316Ti, flange disc 2.4819/C-276

Other diameters and materials available on request.

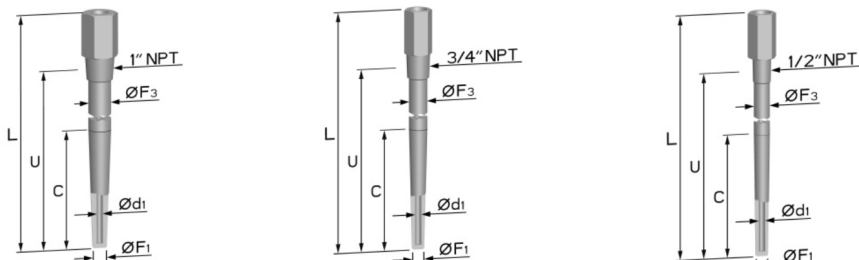
Drilled thermowells (TSW300)

Weld-in thermowell		DIN 43772 – form 4		DIN 43772 – form 4		ABB – form PW	
Extension tube connection		M18 × 1.5		M14 × 1.5		½ in NPT	
							
Material		1.4404/316L; 1.4571/316Ti 1.4404/316L; 1.4571/316Ti; 1.7335/13CrMo4-5; 1.5415/15Mo3 1.4876/Incoloy® 800; 2.4360/Monel® 400 2.4816/Inconel® 600; 2.4819/C-276					
F3/F2/F1	d1	24h7/12.5 mm	7 mm	18h7/9 mm	3.5 mm	32/23/13.5 mm	7 mm
Measuring inset		Ø 6 mm		Ø 3 mm		Ø 6 mm	

Flange thermowell		DIN 43772 – form 4F		DIN 43772 – form 4FS		ABB – form PF	
Extension tube connection		M18 × 1.5		M14 × 1.5		½ in NPT	
							
Material		1.4404/316L; 1.4571/316Ti		1.4404/316L; 1.4571/316Ti 1.4876/Incoloy® 800; 2.4360/Monel® 400* 2.4816/Inconel® 600; 2.4819/C-276*		1.4404/316L; 1.4571/316Ti	
F3/F2/F1	d1	24/12.5 mm	7 mm	18/9 mm	3.5 mm	32/23/13.5 mm	7 mm
Measuring inset		Ø 6 mm		Ø 3 mm		Ø 6 mm	

* 1.4876/Incoloy® 800; 2.4360/Monel® 400; 2.4816/Inconel® 600; 2.4819/C-276 with flange in 1.4571/316Ti and flange disc

... Available versions

Screw-in thermowell	ABB – form PS		ABB – form PS		ABB – form PS		
Extension tube connection	½ in NPT; WAF 36		½ in NPT; WAF 27		½ in NPT; WAF 27		
							
Material		1.4404/316L; 1.4571/316Ti; 1.4876/Incoloy® 800; 2.4360/Monel® 400; 2.4816/Inconel® 600; 2.4819/C-276					
F3/F1	d1	25/16 mm	7 mm	20/13.5 mm	7 mm	17/13.5 mm	7 mm
Measuring inset		Ø 6 mm					

Other diameters and materials available on request.

Standard lengths

Welded thermowells mm (in)		
Form	N = 230 (9.055)	U = 100 (3.94)
2; 2G; 2F,	N = 290 (11.42)	U = 160 (6.30)
3; 3G; 3F;	N = 380 (14.96)	U = 250 (9.84)
2S; 2GS; 2FS	N = 530 (20.87)	U = 400 (15.75)
Drilled thermowells mm (in)		
Form 4	L = 140 (5.51)	C = 65 (2.56)
	L = 200 (7.87)	C = 65 (2.56)
	L = 200 (7.87)	C = 125 (4.92)
	L = 260 (10.24)	C = 125 (4.92)
	L = 410 (16.14)	C = 275 (10.83)
Form 4S	L = 110 (4.33)	C = 65 (2.65)
	L = 140 (5.51)	C = 65 (2.65)
Form PW; PF; PS	U = 100 (3.94), 150 (5.91), 200 (7.87), 250 (9.84), 300 (11.81), 350 (13.78)	L = U + 65 (2.56)
Form 4F	U = 130 (5.12), L = 200 (7.87)	C = 65 (2.56)
	U = 190 (7.48), L = 260 (10.24)	C = 125 (4.92)
	U = 340 (13.39), L = 410 (16.14)	C = 275 (10.83)
Form 4FS	U = 130 (5.12), L = 200 (7.87)	C = 65 (2.65)

Pressure and vibration resistance of thermowell

The permissible compressive loads for thermowells at various temperatures are illustrated in the following figures (thermowells conforming to DIN 43772).
The curves can also be applied to identical thermowell models.

Thermowell form 2 (material 1.4571)

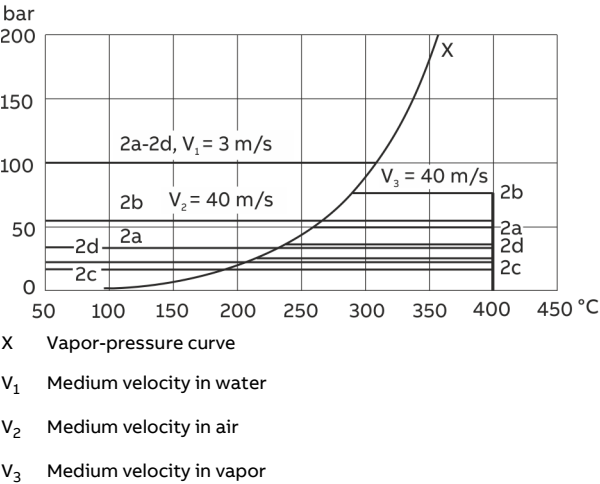


Figure 1: Thermowell Form 2

Curve	Installation length (mm)	Thermowell diameter (mm)
2a	250	11
2b	250	14
2c	400	11
2d	400	14

Thermowell form 3 (material 1.4571)

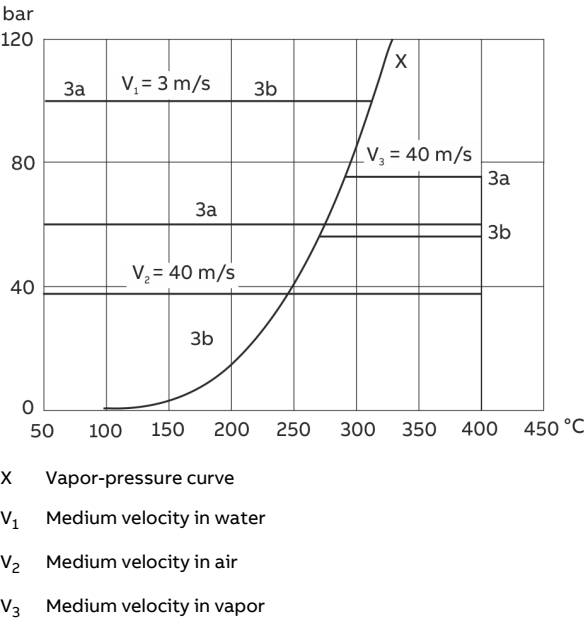


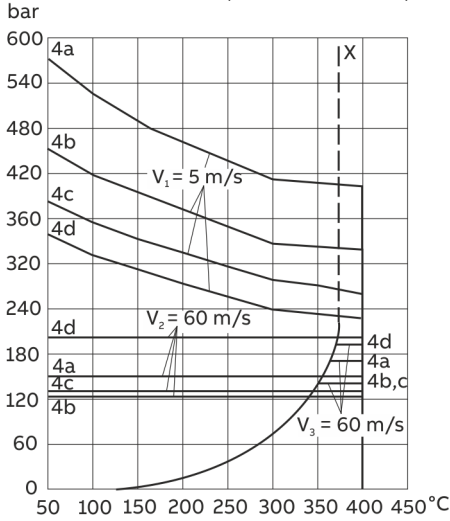
Figure 2: Thermowell Form 3

Curve	Installation length (mm)	Thermowell diameter (mm)
3a	225	12/9
3b	285	12/9



... Available versions

Thermowell form 4 (material 1.4571)



- X Vapor-pressure curve
- V₁ Medium velocity in water
- V₂ Medium velocity in air
- V₃ Medium velocity in vapor

Figure 3: Thermowell Form 4

Curve	Installation length (mm)	Thermowell diameter (mm)
4a	65	18
4b	125	24
4c	125	26
4d	125	32

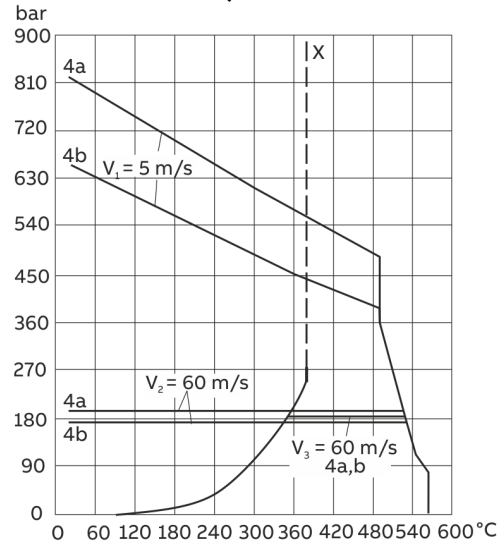
Note

The diagrams above have been taken from DIN 43772. They are based on the Dittrich calculation model. They do not take possible vibration caused by vortex excitation of the flowing medium into account.

ABB's standard thermowells are sufficiently robust for most industrial applications provided that design, material, and length are properly selected.

Most thermowell failures are caused by flow-related vibration. For this reason, ABB offers a stress analysis for ABB thermowells, based on the respective usage parameters.

Thermowell form 4 (material 1.7335 and 1.7380))



- X Vapor-pressure curve
- V₁ Medium velocity in water
- V₂ Medium velocity in air
- V₃ Medium velocity in vapor

Figure 4: Thermowell Form 4

Curve	Installation length (mm)	Thermowell diameter (mm)
4a	65	18
4b	125	24

The stress analysis conforms to ASME PTC 19.3-2010. It is based on recognized theoretical methods and is intended to support thermowell selection for critical applications. It is not, however, a guarantee against failure of the thermowell.

Given the relatively unreliable computational estimation of the natural frequency of a thermowell and taking the numerous influencing factors into account, experimental testing is recommended in critical cases.

For more detailed information about thermowell loads and calculation methods, please see DIN 43772.

Process connections

Plug-in thermowells, welded	Sliding connection
DIN 43772 – form 2, straight shaft	G $\frac{1}{2}$ in A, $\frac{1}{2}$ in NPT
DIN 43772 – form 3, tapered tip	
ABB – form 2S, stepped tip	

Note

In principle, ABB supplies compression fittings made from stainless-steel 1.4571 without material certification in accordance with EN 10204.

Screw-in thermowells, welded	Fixed connection
DIN 43772 – form 2G, straight shaft	G $\frac{3}{8}$ in A, G $\frac{1}{2}$ in A, G $\frac{3}{4}$ in A, G1 in A, $\frac{1}{2}$ in NPT, $\frac{3}{4}$ in NPT, 1 in NPT
DIN 43772 – form 3G, tapered tip	M20 × 1,5, M27 × 2,
ABB – form 2GS, stepped tip	$\frac{1}{2}$ in BSPT, $\frac{3}{4}$ in BSPT, 1 in BSPT
ABB – form 2G0, without extension tube	G $\frac{1}{2}$ in A, $\frac{1}{2}$ in NPT
ABB – form 2GS0, without extension tube	
Stepped tip	

Flange thermowells, welded	Flange in accordance with EN 1092-1 Form B1/B2 sealing surface*	Flange in accordance with ASME B16.5 TW Form RF sealing surface*	Tri-clamp flange BS4825
DIN 43772 – form 2F, straight shaft	DN 15, PN 10 to PN 40 DN 20, PN 10 to PN 40	Nominal diameter 1 in., Nominal pressure 150, 300, 600 lbs.	On request
DIN 43772 – form 3F, tapered tip	DN 25, PN 10 to PN 40, PN 63 to PN 100 DN 32, PN 16 to PN 40, PN 63 to PN 100 DN 40, PN 10 to PN 40, PN 63 to PN 100	Nominal diameter 1 $\frac{1}{2}$ in, nominal pressure 150, 300, 600, 900/1500 lbs. Nominal diameter 2 in, Nominal pressure 150, 300, 600, 900/1500 lbs.	
ABB – form 2FS, stepped tip	DN 50, PN 6, PN 25 to PN 40 PN 63 to PN 100 DN 80, PN 16 DN 100, PN 40		

* Others available on request

... Process connections

Weld-in thermowells, drilled

Weld-in thermowells are available as DIN 43772 form 4 and ABB form PW. Other forms are available on request.

Screw-in thermowells, drilled

DIN 43772 – form 6 and ABB – form PS

Screw-in thread

G $\frac{1}{2}$ in A, $\frac{1}{2}$ in NPT, $\frac{3}{4}$ in NPT, 1 in NPT, M20 × 1,5

Flange thermowells, drilled

DIN 43772 – form 4F, F2 = 18 mm, 24 mm, 26 mm,
thermowell manufactured from bar stock
material

ABB – form PF, thermowell manufactured from
bar stock material

Flange in accordance with EN 1092-1 Form B1/B2 sealing surface*

DN 25, PN 10 to PN 40, PN 63 to PN 100
DN 32, PN 16 to PN 40
DN 40, PN 10 to PN 40, PN 63 to PN 100
DN 50, PN 6, PN 25 to PN 40, PN 63 to PN 100
DN 80, PN 16
DN 100, PN 40

Flange in accordance with ASME B16.5 TW Form RF sealing surface*

Nominal diameter 1 in.,
Nominal pressure 150, 300, 600 lbs.
Nominal diameter 1 $\frac{1}{2}$ in, nominal
pressure 150, 300, 600, 900 / 1500 lbs.
Nominal diameter 2 in, Nominal
pressure 150, 300, 600, 900/1500 lbs.

Tri-clamp flange BS4825

On request

* Others available on request

Note

Other process connections are available on request. If required, contact your ABB partner.

Materials

ABB can manufacture thermowells from almost any commercially available material. If the material required is not listed in the following list, contact ABB to seek advice.

Stainless steel 1.4404 (ASTM 316L)

The most commonly used material for thermowells combines good corrosion resistance with high strength and good availability. Operating temperature up to 800 °C.

Stainless steel 1.4571 (ASTM 316Ti)

An improved version of 316 with a small amount of titanium to stabilize the material at temperatures up to 800 °C. Good resistance against intergranular corrosion. Suited for low temperatures.

Stainless steel 1.4541 (ASTM 321)

Has properties similar to 316Ti.

Stainless steel 1.4539 Uranus B6 (ASTM 904L)

A stainless steel for use in applications in the process industry that are subject to high levels of corrosion. Very good resistance against attacks in acidic media, e.g. sulfuric, phosphoric and acetic acids, acidic gas conditions. Very good resistance against pitting corrosion in neutral media containing chloride (sea water, salt solutions). High resistance against stress corrosion cracking and crevice corrosion.

Heat-resistant steel 1.4841 (ASTM 314 Ti)

Heat-resistant chrome-plated steel up to 1150 °C. Good resistance against nitrogenous and oxygen-deficient gases. Low resistance against sulfurous gases. High resistance against oxidation with high mechanical strength and excellent chemical resistance up to 1100 °C.

Highly heat-resistant stainless steel 1.4961 (ASTM 347 H)

Highly heat-resistant stainless steel with very good resistance against high temperatures up to 750 °C.

Ni alloy 2.4610 Hastelloy C-4

A material for applications at temperatures up to 1100 °C, suited to a wide variety of applications in corrosive media plus oxidizing and reducing conditions such as wet chlorine gas and chloride solutions. High resistance against pitting and crevice corrosion and stress corrosion cracking.

Ni alloy 2.4819 Hastelloy C-276

A material suited for applications at temperatures up to 1100 °C in atmospheres and processes containing chloride. It is not advisable to use stainless steel grades from the 300-series in environments with high chloride and low oxygen concentration.

NiCr alloy 2.4816 (Inconel 600)

This alloy with is suitable for use in high temperatures and in oxidizing and reducing atmospheres. Good resistance against stress corrosion cracking caused by chloride.

NiCu alloy 2.4360 (Monel 400)

This highly heat-resistant and chemical-resistant NiCu alloy is suited to use in a wide range of ambient conditions. Operating temperature up to 600 °C.

Duplex stainless steel 1.4462

A ferritic / austenitic stainless steel with good resistance against pitting and intercrystalline corrosion. A stainless steel designed specifically for use in environments with media contaminated by chlorides at elevated temperatures, in which excellent corrosion resistance is required.

Stainless steel 1.4301 (ASTM 304)

Heat- and corrosion-resistant stainless steel up to 550 °C (max. 800 °C). Good resistance at moderate temperatures to organic acids, salt solutions (such as sulfates and sulfides) as well as to alkaline solutions.

... Materials

NiCrFe alloy 1.4876 (Incoloy 800)

Particularly good heat resistance due to the addition of titanium and aluminum. Suitable for applications up to 1100 °C where the highest load capacity is required, in addition to resistance to scaling. Resistant to carburization, nitride hardening, high-temperature corrosion and thermal shock.

Steel 1.4749 (ASTM A446-1) and 1.4762 (ASTM A268)

Heat-resistant chrome steel up to 1150 °C with high to very high resistance to oxidizing and reducing flames and to sulfurous gases and salts due to a high chromium content. Very good oxidation resistance both at constant and cyclical temperature loads.

Note

The temperatures indicated are maximum values (pressure-free in air).

The effects of viscosity, medium velocity, pressure and temperature in the process usually cause these values to drop.

For applications in pressure vessels, the recognized regulations, Pressure Equipment Directives etc. must be observed.

Disclaimer:

All of the information above is provided as guidance and must be checked in accordance with the required operating conditions.

Additional requirements

Materials for use in "acidic" environments (i.e. environments with high concentrations of hydrogen sulphide) must normally correspond to the relevant NACE standard. ABB can meet all of these requirements.

Load calculation in accordance with ASME PTC 19.3 2010 TW

These are the only published specifications for evaluating the load to which thermowells are exposed when in use. The technicians from ABB can conduct such a calculation on request in line with ASME specifications. A certification may also be provided if requested.

Positive material identification (PMI)

If absolute verification of the materials supplied is required, ABB can conduct a positive material identification process in-house. This technique involves the quantitative analysis of the heavy elements in the chemical composition of the material. The result can then be compared with the certification provided by the manufacturing plant.

Pressure test

ABB offers two type of hydrostatic pressure tests:

External

Test of the thermowell, in which external pressure 1.5 times the nominal pressure for the flange is applied.

Internal

Examination of the interior of the thermowell for leakage.

Examination of the welding integrity

The integrity of the welding can be determined by:

Dye penetration test

For detecting external defects in the welding.

X-ray

For examining the welding for internal defects deep within the material.

The X-ray examination is the only test that generates a permanent record of the integrity of the welding in the form of a photo (X-ray image).

Bore hole concentricity

The concentricity of the bore hole in the thermowell is fundamentally important to the operating performance and safety of the thermowell. ABB uses specially designed deep-hole drilling machines in order to absolutely ensure the concentricity of the bore hole. At ABB plants, ultrasound tests for bore hole concentricity form part of standard procedure. X-ray images on two axes of the concentric bore holes are offered as an additional verification option.

Treatment of stainless steel surfaces

The corrosion resistance of stainless steel is provided by a thin chromium-oxide coating on the surface. This coating may be damaged during the production process by contamination. In order for the oxide coating to regenerate, which in turn guarantees the thermowell's corrosion resistance, it is essential for this contamination to be removed. The standard ABB procedure involves the thorough degreasing of each individual thermowell on the inside and outside prior to delivery.

ABB can also conduct a separate "pickling and passivation process" on request. This involves dipping the thermowell in a bath of hot acid to remove any contamination. Then the thermowell is "passivated" in order to rebuild the chromium oxide layer.

Installation instructions

The usual way of ensuring that thermal measurements are accurate is to comply with the minimum installation length of the temperature sensor. Ideally, in the case of pipelines, the sensor on a thermometer should be located in the center of the pipe. If this is not possible, both in the case of pipes and containers, a minimum installation length of 10- to 15-times the thermowell diameter is assumed to be sufficient.

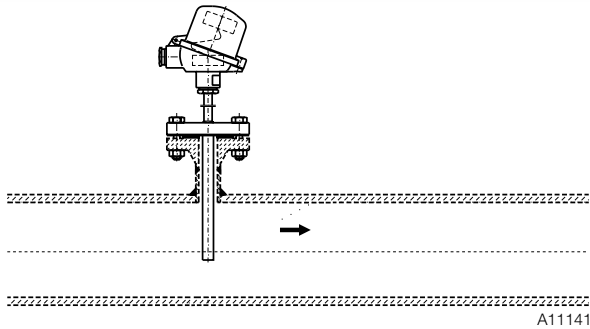


Figure 5: Recommended installation

Insufficient nominal diameter

In the case of pipelines with very small nominal diameters, insertion inside an elbow pipe is recommended. The thermowell tip is set in opposition to the flow direction of the medium. Inserting the thermowell with an adapter at an acute angle against the flow direction can also distort measurement results.

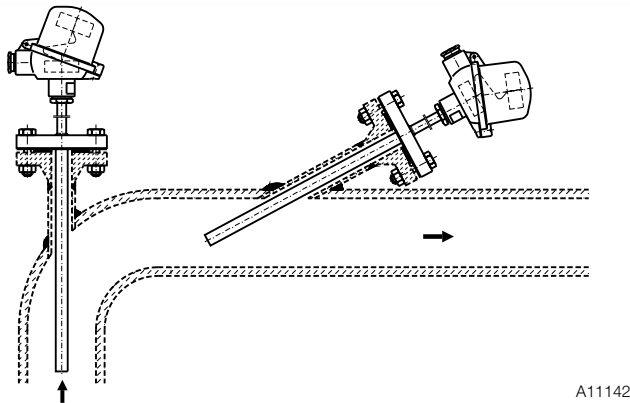


Figure 6: Recommended installation with small nominal diameter

Response time

The factors affecting the response time are both numerous and very varied, including:

- Thermal conductivity of the medium
- Flow rate of the medium
- Thermal conductivity of the thermowell material
- Dimensions of the thermowell

Each of these factors influences the ultimate response time.

Generally, measuring instruments fitted in the thermowells respond more quickly to temperature changes than the process itself. If a faster response time is required, this can be achieved by reducing the amount of material surrounding the sensor element, i.e. a stepped thermowell must be used. However, a compromise must be found between the targeted response time and the stability required by the thermowell. For further information on response times, see **Response times in accordance with IEC 60751 and IEC 60584** on page 4.

Special forms

Situations may arise in which a thermowell design is required that cannot be developed from the specifications available. The technicians from ABB can help with such requirements. ABB has experience with the development of special designs and can provide you with a quote for such special cases.

Some customers require an approval before the production of such designs. This can be obtained by using the special design constructed by ABB.

No matter what your requirements look like, whether it is a special design or problems with erosion or corrosion, the technicians from ABB are here to help you.

Ordering Information

SensyTemp TSW210 Thermowell

Base model	TSW210	XX	XX	XX	XX	XX	XX
SensyTemp TSW210 Thermowell, tubular, weld in							
Thermowell Type							
Tubular thermowell with straight shaft (DIN 43772, Form 2)	A1						
Tubular thermowell, stepped tip (ABB Form 2S)	B1						
Tubular thermowell, tapered (DIN 43772, Form 3)	C1						
Tubular thermowell, stepped tip 9 mm (0.36 in) (ABB Form 2S/9)	K1						
Wetted thermowell material							
Stainless steel ASTM 316L (1.4404)	S1						
Stainless steel ASTM 316Ti (1.4571)	S2						
Stainless steel ASTM 904L (CrNi, 1.4539); (Uranus B6)	S4						
Duplex stainless steel (CrNi, 1.4462)	S9						
Heat resistant steel ASTM A446 (1.4762)	H2						
Heat resistant steel ASTM A314 (CrNi, 1.4841)	H3						
Ni-Alloy Hastelloy C-276 (2.4819)	N1						
Ni-Alloy Hastelloy C-4 (2.4610)	N2						
2.4816 / Inconel 600	N5						
Others	Z9						
Process Connection							
Without process connection (weld-in type)	Y00						
Adjustable compression fitting G ½, material 1.4571	A01						
Adjustable compression fitting ½ in NPT, material 1.4571	A02						
Adjustable flange DN 25 PN 10 to PN 40, to EN 1092-1, material 1.4571	A03						
Adjustable flange 1 in 150 lbs, ASME B16.5, material 1.4571	A07						
Others	Z99						
Thermowell Diameter							
6 mm × 1.45 mm	A9						
8 mm × 2 mm	A5						
9 mm × 1 mm	A1						
10 mm × 1.5 mm	A6						
11 mm × 2 mm	A2						
12 mm × 2.5 mm	A3						
13,5 mm × 2.3 mm	B6						
13,7 mm × 2.24 mm	B2						
14 mm × 2.5 mm	A4						
15 mm × 2 mm	A7						
16 mm × 3 mm	A8						
22 mm × 2 mm	B1						
Others	Z9						

Continued on next page

... Ordering Information

Main ordering information SensyTemp TSW210		XX	XX
Immersion Length			
Without fixed immersion length		Y0	
Nominal Length			
N = 230 mm (9.1 in)			N1
N = 290 mm (11.4 in)			N3
N = 380 mm (15 in)			N5
N = 530 mm (20.9 in)			N7
Customer specific length			Z9

Additional ordering information

SensyTemp TSW210		XX	XX	XX
Thermowell Options				
Thermowell incl. tests and certificates AD-2000 standard for austenitic steel		S6		
Thermowell clean for oxygen service		S9		
Thermowell stress calculation according Dittrich / Kohler		SD		
Others		SZ		
Certificates				
Test report according EN 10204-2.2, material monitoring for wetted parts			C1	
Inspection certificate according EN 10204-3.1, material monitoring for wetted parts			C2	
Inspection certificate according EN 10204-3.1, visual, dimensional and functional test			C6	
Inspection certificate according EN 10204-3.1, helium leakage test			C7	
Inspection certificate according EN 10204-3.1, dye penetration test			C9	
Inspection certificate according EN 10204-3.1, Positive Material Identification (PMI)			CA	
Inspection certificate according EN 10204-3.1, pressure test on thermowell			CB	
Inspection certificate according EN 10204-3.1, x-ray- test for weldings			CU	
Documentation Language				
German				M1
English				M5

SensyTemp TSW220 Thermowell

Base model	TSW220	XX	XX	XX	XX	XX	XX
SensyTemp TSW220 Thermowell, tubular, flanged							
Thermowell Type							
Flanged tubular thermowell with straight shaft (DIN 43772, Form 2F)	A2						
Flanged tubular thermowell, stepped tip (ABB Form 2FS)	B2						
Flanged tubular thermowell, tapered (DIN 43772, Form 3F)	C2						
Flanged tubular thermowell, stepped tip 9 mm (0.36 in) (ABB Form 2FS/9)	K2						
Wetted thermowell material							
Stainless steel ASTM 316L (1.4404)			S1				
Stainless steel ASTM 316Ti (1.4571)			S2				
Stainless steel ASTM 904L (CrNi, 1.4539); (Uranus B6)			S4				
Duplex stainless steel (CrNi, 1.4462)			S9				
Heat resistant steel ASTM A446 (1.4762)			H2 ¹				
Heat resistant steel ASTM A314 (CrNi, 1.4841)			H3 ¹				
Ni-Alloy Hastelloy C-276 (2.4819)			N1 ²				
Ni-Alloy Hastelloy C-4 (2.4610)			N2 ³				
2.4816 / Inconel 600			N5 ⁴				
Others			Z9				
Process Connection							
Flange DN 15 PN 10 to PN 40, EN 1092-1				F01			
Flange DN 20 PN 10 to PN 40, EN 1092-1				F02			
Flange DN 25 PN 10 to PN 40, EN 1092-1				F03			
Flange DN 25 PN 63 to PN100, EN 1092-1				F29			
Flange DN 32 PN 16 to PN 40, EN 1092-1				F30			
Flange DN 40 PN 10 to PN 40, EN 1092-1				F04			
Flange DN 40 PN 63 to PN 100, EN 1092-1				F37			
Flange DN 50 PN 6, EN 1092-1				F06			
Flange DN 50 PN 10 to PN 40, EN 1092-1				F05			
Flange DN 50 PN 63, EN 1092-1				F33			
Flange DN 50 PN 100, EN 1092-1				F34			
Flange DN 80 PN 16, EN 1092-1				F35			
Flange DN 100 PN 40, EN 1092-1				F36			
Flange 1 in 150 lbs, ASME B16.5				F07			
Flange 1 in 300 lbs, ASME B16.5				F08			
Flange 1 in 600 lbs, ASME B16.5				F09			
Flange 1 in 900 / 1500 lbs, ASME B16.5				F10			
1 Flange material 316Ti (1.4571)							
2 Flange material 316Ti (1.4571) with flange disc C-276 (2.4819)							
3 Flange material 316Ti (1.4571) with flange disc C-4 (2.4610)							
4 Flange material 316Ti (1.4571) with flange disc Inconel 600 (2.4816)							

Continued on next page

... Ordering Information

SensyTemp TSW220	XXX	XX	XX	XX
Process Connection (continuation)				
Flange 1-½ in 150 lbs, ASME B16.5	F11			
Flange 1-½ in 300 lbs, ASME B16.5	F12			
Flange 1-½ in 600 lbs, ASME B16.5	F13			
Flange 1-½ in 900 / 1500 lbs, ASME B16.5	F14			
Flange 2 in 150 lbs, ASME B16.5	F15			
Flange 2 in 300 lbs, ASME B16.5	F16			
Flange 2 in 600 lbs, ASME B16.5	F17			
Flange 2 in 900 / 1500 lbs, ASME B16.5	F18			
Others	Z99			
Thermowell Diameter				
6 mm × 1.45 mm		A9		
8 mm × 2 mm		A5		
9 mm × 1 mm		A1		
10 mm × 1.5 mm		A6		
11 mm × 2 mm		A2		
12 mm × 2.5 mm		A3		
13,5 mm × 2.3 mm		B6		
13,7 mm × 2.24 mm		B2		
14 mm × 2.5 mm		A4		
15 mm × 2 mm		A7		
16 mm × 3 mm		A8		
22 mm × 2 mm		B1		
Others		Z9		
Immersion Length				
U = 100 mm			U1	
U = 160 mm			U3	
U = 250 mm			U5	
U = 400 mm			U7	
Customer specific length			Z9	
Nominal Length				
N = 230 mm (9.1 in)				N1
N = 290 mm (11.4 in)				N3
N = 380 mm (15 in)				N5
N = 530 mm (20.9 in)				N7
Customer specific length				Z9

Continued on next page

Additional ordering information

SensyTemp TSW220	XX	XX	XX	XX
Thermowell Options				
With additional tantalum sleeve, tantalum sleeve is brazed to the flange in two points	S1			
Thermowell coated with 0.5 mm (0.02 in) E-CTFE / Halar, wetted parts incl. flange surface	S2			
Thermowell coated with 0.5 mm (0.02 in) PFA, wetted parts incl. flange surface	S3			
Thermowell incl. tests and certificates AD-2000 standard for austenitic steel	S6			
Thermowell clean for oxygen service	S9			
Thermowell stress calculation according Dittrich / Kohler	SD			
Others	SZ			
Flange Connection Options				
Flange raised face form RF, ASME B16.5		F6		
Flange raised face form B1 acc. EN 1092-1		F7		
Flange raised face form B2 acc. EN 1092-1		F8		
Flange facing with tongue form C EN 1092-1		F1		
Flange facing with groove form D acc. EN 1092-1		F2		
Flange facing with RTJ surface acc. ASME B16.5		F3		
Others		FZ		
Certificates				
Test report according EN 10204-2.2, material monitoring for wetted parts			C1	
Inspection certificate according EN 10204-3.1, material monitoring for wetted parts			C2	
Inspection certificate according EN 10204-3.1, visual, dimensional and functional test			C6	
Inspection certificate according EN 10204-3.1, helium leakage test			C7	
Inspection certificate according EN 10204-3.1, dye penetration test			C9	
Inspection certificate according EN 10204-3.1, Positive Material Identification (PMI)			CA	
Inspection certificate according EN 10204-3.1, pressure test on thermowell			CB	
Inspection certificate according EN 10204-3.1, x-ray- test for weldings			CU	
Wetted parts according to EC 1935			CX	
Documentation Language				
German				M1
English				M5

... Ordering Information

Main ordering information SensyTemp TSW230 tubular

Base model	TSW230	XX	XX	XX	XX	XX	XX
SensyTemp TSW230 Thermowell, tubular, screw in							
Thermowell Type							
Screwed tubular thermowell with straight shaft (DIN 43772, Form 2G)		A3					
Screwed tubular thermowell, stepped tip (ABB Form 2GS)		B3					
Screwed tubular thermowell, tapered (DIN 43772, Form 3G)		C3					
Screwed tubular thermowell without extension, straight shaft (ABB Form 2G0)		A4					
Screwed tubular thermowell without extension, stepped tip (ABB Form 2GS0)		B4					
Screwed tubular thermowell, stepped tip 9 mm (0.36 in) (ABB Form 2GS/9)		K3					
Wetted thermowell material							
Stainless steel ASTM 316L (1.4404)			S1				
Stainless steel ASTM 316Ti (1.4571)			S2				
Stainless steel ASTM 904L (CrNi, 1.4539); (Uranus B6)			S4				
Ni-Alloy Hastelloy C-276 (2.4819)			N1				
Ni-Alloy Hastelloy C-4 (2.4610)			N2				
Others			Z9				
Process Connection							
Cylindrical thread G 3⁄8 A				S15			
Cylindrical thread G 1⁄2 A				S01			
Cylindrical thread G 3⁄4 A				S02			
Cylindrical thread G 1 A				S03			
Cylindrical thread M20×1.5				S07			
Cylindrical thread M27×2				S08			
Conical thread 1⁄2 in NPT				S04			
Conical thread 3⁄4 in NPT				S05			
Conical thread 1 in NPT				S06			
Conical thread 1⁄2 in BSPT				S09			
Conical thread 3⁄4 in BSPT				S10			
Conical thread 1 in BSPT				S11			
Others				Z99			

Continued on next page

Main ordering information SensyTemp TSW230				XX	XX	XX
Thermowell Diameter						
6 mm ×1.45 mm				A9		
8 mm×2 mm				A5		
9 mm×1 mm				A1		
10 mm×1.5 mm				A6		
11 mm×2 mm				A2		
12 mm×2.5 mm				A3		
13,5 mm×2.3 mm				B6		
13,7 mm×2.24 mm				B2		
14 mm×2.5 mm				A4		
15 mm×2 mm				A7		
16 mm×3 mm				A8		
22 mm×2 mm				B1		
Others				Z9		
Immersion Length						
U = 100 mm					U1	
U = 160 mm					U3	
U = 250 mm					U5	
U = 400 mm					U7	
Customer specific length					Z9	
Nominal Length						
N = 230 mm (9.1 in)						N1
N = 290 mm (11.4 in)						N3
N = 380 mm (15 in)						N5
N = 530 mm (20.9 in)						N7
Customer specific length						Z9

Continued on next page

... Ordering Information

Additional ordering information

SensyTemp TSW230	XX	XX	XX
Thermowell Options			
Thermowell coated with 0.5 mm (0.02 in) E-CTFE / Halar, wetted parts incl. flange surface	S2		
Thermowell coated with 0.5 mm (0.02 in) PFA, wetted parts incl. flange surface	S3		
Thermowell incl. tests and certificates AD-2000 standard for austenitic steel	S6		
Thermowell clean for oxygen service	S9		
Thermowell stress calculation according Dittrich / Kohler	SD		
Others	SZ		
Certificates			
Test report according EN 10204-2.2, material monitoring for wetted parts		C1	
Inspection certificate according EN 10204-3.1, material monitoring for wetted parts		C2	
Inspection certificate according EN 10204-3.1, visual, dimensional and functional test		C6	
Inspection certificate according EN 10204-3.1, helium leakage test		C7	
Inspection certificate according EN 10204-3.1, dye penetration test		C9	
Inspection certificate according EN 10204-3.1, Positive Material Identification (PMI)		CA	
Inspection certificate according EN 10204-3.1, pressure test on thermowell		CB	
Inspection certificate according EN 10204-3.1, x-ray- test for weldings		CU	
Wetted parts according to EC 1935		CX	
Documentation Language			
German			M1
English			M5

SensyTemp TSW310 Thermowell

Base model	TSW310	XX	XX	XX	XX	XX	XX	XX
SensyTemp TSW310 Thermowell, drilled, weld in								
Thermowell Type								
Weld-in thermowell from bar stock material, diameter F2 = 24 mm (DIN 43772, Form 4)	D1							
Weld-in thermowell from bar stock material, quick response, diameter F2 = 18 mm (ABB-Form 4S)	D2							
Weld-in thermowell from bar stock material, diameter F2 = 26 mm (DIN 43772, Form 4)	D5							
Weld-in thermowell from bar stock material, diameter F2 = 24 mm (0.95 in), tip 11 mm (0.44 in)(ABB, Form DR)	R1							
Weld-in thermowell from bar stock material, diameter F2 = 25 mm (1 in), (ABB, Form RD)	R3							
Weld-in thermowell from bar stock material, diameter F2 = 32 mm (1.26 in), (ABB, Form PW)	P1							
Wetted thermowell material								
Carbon steel ASTM A105 (1.0460)	C1							
Stainless steel ASTM 316L (1.4404)	S1							
Stainless steel ASTM 316Ti (1.4571)	S2							
Stainless steel ASTM 904L (CrNi, 1.4539); (Uranus B6)	S4							
Stainless steel ASTM 304 (CrNi, 1.4301)	S5							
Stainless steel ASTM 321 (CrNi, 1.4541)	S6							
Duplex stainless steel (CrNi, 1.4462)	S9							
Highly heat-resistant stainless steel ASTM A446-1 (1.4749)	H1							
Heat resistant steel ASTM A446 (1.4762)	H2							
Heat resistant steel ASTM A314 (CrNi, 1.4841)	H3							
Heat-resistant stainless steel ASTM A182 F12 (1.7335)	W1							
Heat-resistant stainless steel ASTM A182 F22 (1.7380)	W2							
Heat-resistant stainless steel ASTM A182 F1 (1.5415)	W3							
Highly heat-resistant stainless steel ASTM A347 H (1.4961)	W4							
Highly heat-resistant stainless steel ASTM A182 F91 (1.4903)	W5							
Ni-Alloy Incoloy 800 (1.4876)	H4							
Ni-Alloy Hastelloy C-276 (2.4819)	N1							
Ni-Alloy Hastelloy C-4 (2.4610)	N2							
NiCu-Alloy Monel 400 (2.4360)	N4							
2.4816 / Inconel 600	N5							
Others	Z9							
Process Connection								
Without process connection (weld-in type)				Y00				
Others				Z99				
Thermowell Connection								
Internal thread M14 × 1,5					M1			
Internal thread M18 × 1,5					M2			
Internal thread M20 × 1,5					M3			
Internal thread M24 × 1,5					M4			
Internal thread G 3/8 A					G3			
Internal thread G 1/2 A					G1			
Internal thread 1/2 in NPT					N1			
Others					Z9			

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... Ordering Information

SensyTemp TSW310	XX	XX	XX
Thermowell Diameter			
18 mm / 9 mm	C2		
23 mm / 13,5 mm	C4		
24 mm / 12,5mm	C5		
24 mm / 11 mm	C8		
25 mm / 16 mm	C6		
26 mm / 12,5 mm	C9		
Others	Z9		
Immersion Length			
Without fixed immersion length		Y0	
Thermowell Length			
L = 110 mm (4.4 in), C = 65 mm (2.5 in)			D1
L = 115 mm (4.6 in), C = 40 mm (1.5 in)			D2
L = 140 mm (5.6 in), C = 65 mm (2.5 in)			D3
L = 200 mm (8 in), C = 65 mm (2.5 in)			D4
L = 200 mm (8 in), C = 125 mm (5 in)			D5
L = 260 mm (10.3 in), C = 125 mm (5 in)			D6
L = 410 mm (16.2 in), C = 275 mm (10.9 in)			D7
According ABB-standard (immersion length + 65 mm (2,5 in))			P1
Accordinging customer specification			D9
Accordinging customer specification			Z9

Continued on next page

Additional ordering information

SensyTemp TSW310	XX	XX	XX
Thermowell Options			
Thermowell incl. tests and certificates AD-2000 standard for austenitic steel	S6		
Thermowell incl. tests and certificates AD-2000 standard for high temperature steel	S7		
Thermowell clean for oxygen service	S9		
Thermowell stress calculation according ASME 19.3-TW 2010 (Murdock)	SM		
Thermowell with plug, gasket and chain	SP		
Thermowell with plug and gasket	SR		
Others	SZ		
Certificates			
Test report according EN 10204-2.2, material monitoring for wetted parts		C1	
Inspection certificate according EN 10204-3.1, material monitoring for wetted parts		C2	
Inspection certificate according EN 10204-3.2, material monitoring for wetted parts		C3	
Inspection certificate according EN 10204-3.1, visual, dimensional and functional test		C6	
Inspection certificate according EN 10204-3.1, helium leakage test		C7	
Inspection certificate according EN 10204-3.1, Positive Material Identification (PMI)		CA	
Inspection certificate according EN 10204-3.1, pressure test on thermowell		CB	
Inspection certificate according EN 10204-3.1, x-ray- test for bore concentricity		CV	
Inspection certificate according EN 10204-3.1, ultrasonic- test for bore concentricity		CW	
Wetted parts according to EC 1935		CX	
Documentation Language			
German			M1
English			M5

... Ordering Information

SensyTemp TSW320 Thermowell

Base model	TSW320	XX	XX	XX	XX	XX	XX	XX
SensyTemp TSW320 Thermowell, drilled, flanged								
Thermowell Type								
Flanged thermowell from bar stock material, diameter F2 = 24 mm (DIN 43772, Form 4F)		D3						
Flanged thermowell from bar stock material, quick response, diameter F2 = 18 mm (DIN 43772, Form 4FS)		D4						
Flanged thermowell from bar stock material, diameter F2 = 26 mm (DIN 43772, Form 4F)		D6						
Flanged thermowell from bar stock material, diameter F2 = 24 mm (0.95 in), tip 11 mm (0.44 in) (ABB, Form DRF)		R2						
Flanged thermowell from bar stock material, diameter F2 = 25 mm (1 in), (ABB, Form RDF)		R4						
Flanged thermowell from bar stock material, (ABB, Form PF)		P2						
Wetted thermowell material								
Stainless steel ASTM 316L (1.4404)		S1						
Stainless steel ASTM 316Ti (1.4571)		S2						
Stainless steel ASTM 904L (CrNi, 1.4539); (Uranus B6)		S4						
Stainless steel ASTM 304 (CrNi, 1.4301)		S5						
Stainless steel ASTM 321 (CrNi, 1.4541)		S6						
Duplex stainless steel (CrNi, 1.4462)		S9						
Ni-Alloy Hastelloy C-276 (2.4819)		N1*						
NiCu-Alloy Monel 400 (2.4360)		N4						
2.4816 / Inconel 600		N5**						
Others		Z9						
* flange material 316Ti (1.4571) with flange disc C-276 (2.4819)								
** flange material 316Ti (1.4571) with flange disc Inconel 600 (2.4816)								

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SensyTemp TSW320	XX	XX	XX	XX	XX
Process Connection					
Flange DN 15 PN 10 to PN 40, EN 1092-1	F01				
Flange DN 20 PN 10 to PN 40, EN 1092-1	F02				
Flange DN 25 PN 10 to PN 40, EN 1092-1	F03				
Flange DN 25 PN 63 to PN100, EN 1092-1	F29				
Flange DN 32 PN 10 to PN 40, EN 1092-1	F30				
Flange DN 40 PN 10 to PN 40, EN 1092-1	F04				
Flange DN 40 PN 63 to PN 100, EN 1092-1	F37				
Flange DN 50 PN 6, EN 1092-1	F06				
Flange DN 50 PN 10 to PN 16, EN 1092-1	F38				
Flange DN 50 PN 25... PN 40, EN 1092-1	F05				
Flange DN 50 PN 63, EN 1092-1	F33				
Flange DN 50 PN 100, EN 1092-1	F34				
Flange DN 80 PN 10 to PN 16, EN 1092-1	F35				
Flange DN 100 PN 25 to PN 40, EN 1092-1	F36				
Flange 1 in 150 lbs, ASME B16.5	F07				
Flange 1 in 300 lbs, ASME B16.5	F08				
Flange 1 in 600 lbs, ASME B16.5	F09				
Flange 1 in 900 / 1500 lbs, ASME B16.5	F10				
Flange 1-1/2 in 150 lbs, ASME B16.5	F11				
Flange 1-1/2 in 300 lbs, ASME B16.5	F12				
Flange 1-1/2 in 600 lbs, ASME B16.5	F13				
Flange 1-1/2 in 900 / 1500 lbs, ASME B16.5	F14				
Flange 2 in 150 lbs, ASME B16.5	F15				
Flange 2 in 300 lbs, ASME B16.5	F16				
Flange 2 in 600 lbs, ASME B16.5	F17				
Flange 2 in 900 / 1500 lbs, ASME B16.5	F18				
Others	Z99				

Continued on next page

... Ordering Information

SensyTemp TSW320	XX	XX	XX	XX
Thermowell Connection				
Internal thread M14 × 1,5	M1			
Internal thread M18 × 1,5	M2			
Internal thread M20 × 1,5	M3			
Internal thread M24 × 1,5	M4			
Internal thread G ¾ A	G3			
Internal thread G ½ A	G1			
Internal thread ½ in NPT	N1			
Others	Z9			
Thermowell Diameter				
18 mm / 9 mm		C2		
23 mm / 13,5 mm		C4		
24 mm / 12,5mm		C5		
24 mm / 11 mm		C8		
25 mm / 16 mm		C6		
26 mm / 12,5 mm		C9		
26 mm / 15 mm		C7		
Others		Z9		
Immersion Length				
U = 100 mm			P1	
U = 130 mm			D1	
U = 150 mm			P2	
U = 190 mm			D2	
U = 200 mm			P3	
U = 250 mm			P4	
U = 300 mm			P5	
U = 340 mm			D3	
U = 350 mm			P6	
Customer specific length			Z9	
Thermowell Length				
L = 110 mm (4.4 in), C = 65 mm (2.5 in)				D1
L = 115 mm (4.6 in), C = 40 mm (1.5 in)				D2
L = 140 mm (5.6 in), C = 65 mm (2.5 in)				D3
L = 200 mm (8 in), C = 65 mm (2.5 in)				D4
L = 200 mm (8 in), C = 125 mm (5 in)				D5
L = 260 mm (10.3 in), C = 125 mm (5 in)				D6
L = 410 mm (16.2 in), C = 275 mm (10.9 in)				D7
According ABB-standard (immersion length + 65 mm (2,5 in))				P1
According customer specification				D9
According customer specification				Z9

Continued on next page

Additional ordering information

SensyTemp TSW320	XX	XX	XX	XX
Thermowell Options				
With additional tantalum sleeve, tantalum sleeve is brazed to the flange in two points	S1			
Thermowell coated with 0.5 mm (0.02 in) E-CTFE / Halar, wetted parts incl. flange surface	S2			
Thermowell coated with 0.5 mm (0.02 in) PFA, wetted parts incl. flange surface	S3			
Thermowell incl. tests and certificates AD-2000 standard for austenitic steel	S6			
Thermowell clean for oxygen service	S9			
Thermowell stress calculation according ASME 19.3-TW 2010 (Murdock)	SM			
Thermowell with plug, gasket and chain	SP			
Thermowell with plug and gasket	SR			
Others	SZ			
Flange Connection Options				
Flange raised face form RF, ASME B16.5		F6		
Flange raised face form B1 acc. EN 1092-1		F7		
Flange raised face form B2 acc. EN 1092-1		F8		
Flange facing with tongue form C EN 1092-1		F1		
Flange facing with groove form D acc. EN 1092-1		F2		
Flange facing with RTJ surface acc. ASME B16.5		F3		
Flange full penetration welded		F4		
Others		FZ		
Certificates				
Test report according EN 10204-2.2, material monitoring for wetted parts			C1	
Inspection certificate according EN 10204-3.1, material monitoring for wetted parts			C2	
Inspection certificate according EN 10204-3.2, material monitoring for wetted parts			C3	
Inspection certificate according EN 10204-3.1, visual, dimensional and functional test			C6	
Inspection certificate according EN 10204-3.1, helium leakage test			C7	
Inspection certificate according EN 10204-3.1, dye penetration test			C9	
Inspection certificate according EN 10204-3.1, Positive Material Identification (PMI)			CA	
Inspection certificate according EN 10204-3.1, pressure test on thermowell			CB	
Inspection certificate according EN 10204-3.1, x-ray- test for weldings			CU	
Inspection certificate according EN 10204-3.1, x-ray- test for bore concentricity			CV	
Inspection certificate according EN 10204-3.1, ultrasonic- test for bore concentricity			CW	
Wetted parts according to EC 1935			CX	
Documentation Language				
German				M1
English				M5

... Ordering Information

SensyTemp TSW330 Thermowell

Base model	TSW330	XX	XX	XX	XX	XX	XX	XX
SensyTemp TSW330 Thermowell, drilled, screw in								
Thermowell Type								
Screwed thermowell from bar stock material, tapered tip, (ABB, Form PS)	P3							
Screwed tubular thermowell from bar stock material, straight shaft (DIN 43772, Form 6)	S1							
Wetted thermowell material								
Carbon steel ASTM A105 (1.0460)		C1						
Stainless steel ASTM 316L (1.4404)		S1						
Stainless steel ASTM 316Ti (1.4571)		S2						
Stainless steel ASTM 904L (CrNi, 1.4539); (Uranus B6)		S4						
Stainless steel ASTM 304 (CrNi, 1.4301)		S5						
Stainless steel ASTM 321 (CrNi, 1.4541)		S6						
Duplex stainless steel (CrNi, 1.4462)		S9						
Highly heat-resistant stainless steel ASTM A446-1 (1.4749)		H1						
Heat resistant steel ASTM A446 (1.4762)		H2						
Heat resistant steel ASTM A314 (CrNi, 1.4841)		H3						
Heat-resistant stainless steel ASTM A182 F12 (1.7335)		W1						
Heat-resistant stainless steel ASTM A182 F22 (1.7380)		W2						
Heat-resistant stainless steel ASTM A182 F1 (1.5415)		W3						
Highly heat-resistant stainless steel ASTM A347 H (1.4961)		W4						
Highly heat-resistant stainless steel ASTM A182 F91 (1.4903)		W5						
Ni-Alloy Incoloy 800 (1.4876)		H4						
Ni-Alloy Hastelloy C-276 (2.4819)		N1						
Ni-Alloy Hastelloy C-4 (2.4610)		N2						
NiCu-Alloy Monel 400 (2.4360)		N4						
2.4816 / Inconel 600		N5						
Others		Z9						
Process Connection								
Cylindrical thread G ½ A			S01					
Conical thread ½ in NPT			S04					
Conical thread ¾ in NPT			S05					
Conical thread 1 in NPT			S06					
Others			Z99					
Thermowell Connection								
Internal thread M14 × 1,5				M1				
Internal thread M18 × 1,5				M2				
Internal thread M20 × 1,5				M3				
Internal thread M24 × 1,5				M4				
Internal thread G ¾ A				G3				
Internal thread G ½ A				G1				
Internal thread ½ in NPT				N1				
Others				Z9				

Continued on next page

SensyTemp TSW330	XX	XX	XX
Thermowell Diameter			
15 mm × 2 mm	A7		
17 mm × 4 mm	B7		
17 mm / 13,5 mm	C1		
20 mm / 13,5 mm	C3		
25 mm / 16 mm	C6		
26 mm / 12,5 mm	C9		
Andere	Z9		
Immersion Length			
U = 100 mm		P1	
U = 150 mm		P2	
U = 200 mm		P3	
U = 250 mm		P4	
U = 300 mm		P5	
U = 350 mm		P6	
Customer specific length		Z9	
Thermowell Length			
According ABB-standard (immersion length + 65 mm (2,5 in))			P1
According customer specification			Z9

Continued on next page

... Ordering Information

Additional ordering information

SensyTemp TSW330	XX	XX	XX
Thermowell Options			
Thermowell coated with 0.5 mm (0.02 in) E-CTFE / Halar, wetted parts incl. flange surface	S2		
Thermowell coated with 0.5 mm (0.02 in) PFA, wetted parts incl. flange surface	S3		
Thermowell incl. tests and certificates AD-2000 standard for austenitic steel	S6		
Thermowell incl. tests and certificates NACE MR 01-75	S8		
Thermowell clean for oxygen service	S9		
Thermowell stress calculation according ASME 19.3-TW 2010 (Murdock)	SM		
Thermowell with plug, gasket and chain	SP		
Thermowell with plug and gasket	SR		
Others	SZ		
Certificates			
Test report according EN 10204-2.2, material monitoring for wetted parts		C1	
Inspection certificate according EN 10204-3.1, material monitoring for wetted parts		C2	
Inspection certificate according EN 10204-3.2, material monitoring for wetted parts		C3	
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Inspection certificate according EN 10204-3.1, Positive Material Identification (PMI)		CA	
Inspection certificate according EN 10204-3.1, pressure test on thermowell		CB	
Inspection certificate according EN 10204-3.1, x-ray- test for bore concentricity		CV	
Inspection certificate according EN 10204-3.1, ultrasonic- test for bore concentricity		CW	
Documentation Language			
German			M1
English			M5

Sales



Service



Trademarks

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