# WellTEMP® 70
## Thermowells for General and Harsh Industrial Applications

- **Pressure up to 400 bar, temperature up to 620 °C**
- **Designed for welding on, screwing in or flanged connection according to customer specifications**
- **Cylindrical or conical shape for measuring inserts with diameter 3 to 8 mm**
- **Standard and highly resistive materials:**
  **- carbon steels 1.0570, 1.0425 (P265GH),**
  **- fire-resistant steels 1.7715, 1.4903,**
  **- stainless steels 1.4541, 1.4571,**
  **- special materials, Titanium Gr. 2, Tantalum 99 %, Monel 400, Hastelloy C-22, Nickel 200/201 and others**
- **Protective coats with high resistance against corrosion and abrasion**
- **EU Certificate on type examination acc. to Directive 2014/68/EU, issued by TÜV**

### Application

Thermowells are designed to protect thermometer measuring stems against mechanical and chemical effect of measured medium. They are used for completion of resistance and thermocouple temperature sensors that do not have their own thermowell. Thermowells are designed for welding on, screwing in or flanged connection on pieces or walls of the technological equipment. Screwed thermowells for high parameters are usually secured by securing welds. Depending on used material and design the thermowells can be used within range of temperatures -200 to +620 °C and pressures up to 40 MPa. Conical thermowells for high parameters allow use for superheated steam with velocity of flow up to 90 m/s.
In the case that there is chosen a suitable material or protective coat, the thermowells can be also used for various corrosive and abrasive media. Thermowells meet requirements of standards EN 61152, EN ISO 15614-1, EN ISO 9606-1, EN 10204, EN ISO 9712, IEC 61520 and DIN 43772. Thermowells are certified as pressure accessories of energetic equipment, category III acc. to European Directive PED and certified acc. to Directive 2014/68/EU, issued by TÜV.

### Description

Thermowells are either welded or drilled. Welded thermowells consist of head, thermowell body and bottom, possibly reduced end of the thermowell. Drilled thermowells are made from one piece and they are more resistant against high parameters of measured medium.
Design of the thermowells differ in their inner and outer connection threads, diameters for welding or used flanges. The connection dimensions are based on metric or inch size series. Thermowells WT70 D acc. to DIN 43772 are welded into special welded on pieces with tolerated diameter.

Basic materials of thermowells:

Standard thermowells - steel 1.0570, 1.0425, 1.4541, 1.4571,
High parameter drilled thermowells - steel 1.7715, 1.4541, 1.4903,
High chemical resistance thermowells
- Monel 400, Nickel 200/201, Hastelloy C-22, Titanium Gr.2, Tantalum 99 %.

Quality of production of the thermowells is ensured using a quality system. Within the scope of this system all thermowells are subjected to checks of tightness using inner overpressure and drilled thermowells are additionally checked by X-ray snaps.

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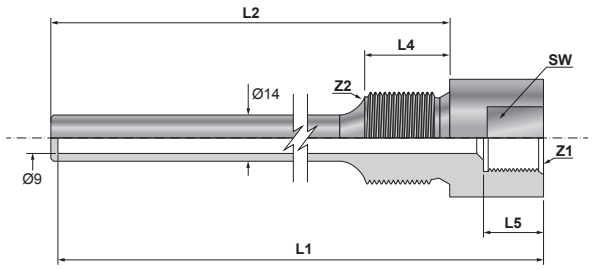
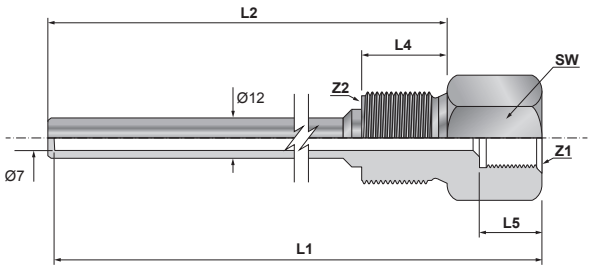
## Dimensional Drawings

### WT70 C, to Screwing

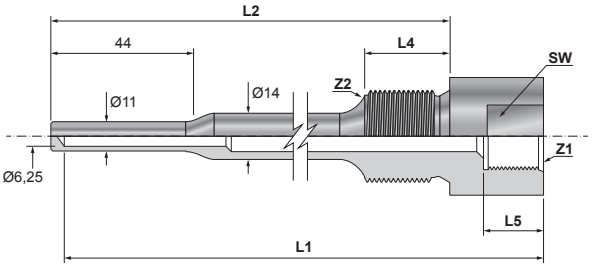
WT70 C 01 V900 ...



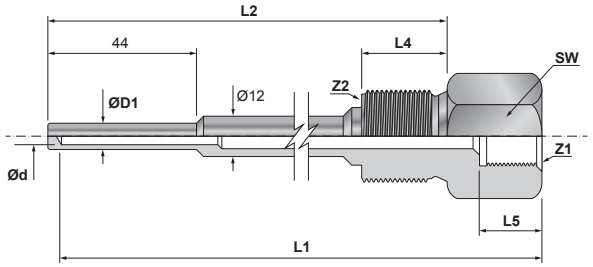

WT70 C 01 V700 ...




WT70 C 01 V625 ...

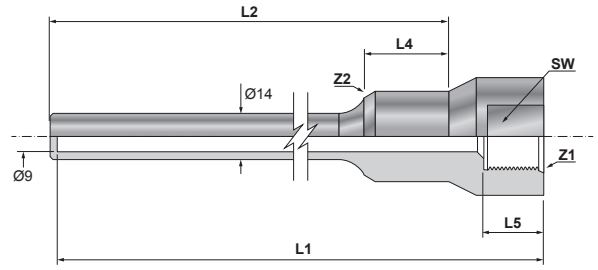



WT70 C 01 V350 / V500 ...

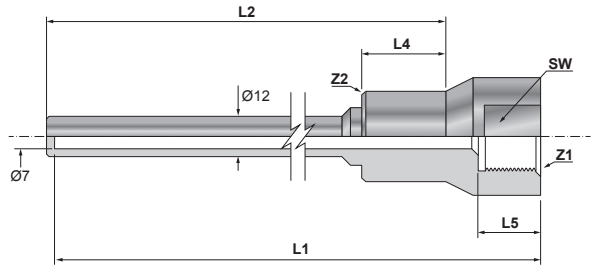



### WT70 C, to Welding

WT70 C 02 V900 ...




WT70 C 02 V700 ...

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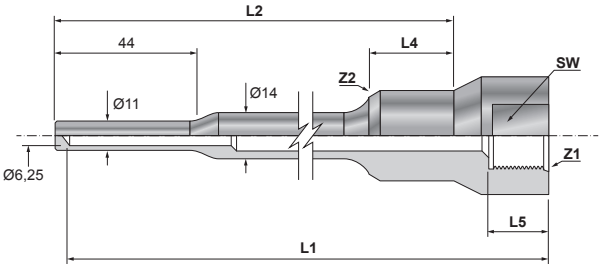
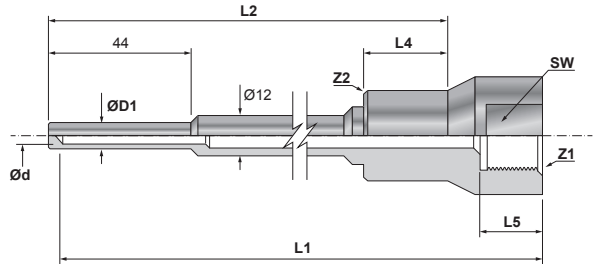
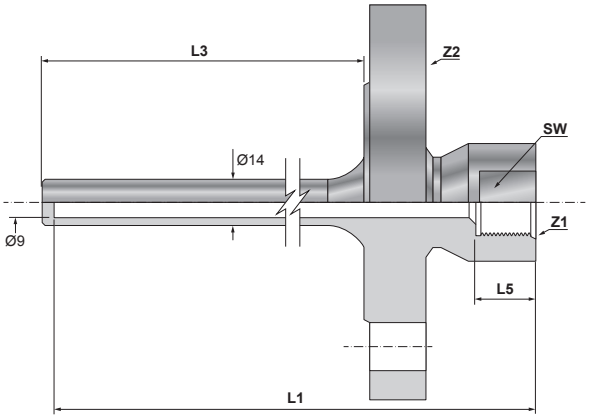



WT70 C 02 V350 / V500 ...



## WT70 C, with Flange

WT70 C 03 V900 ...

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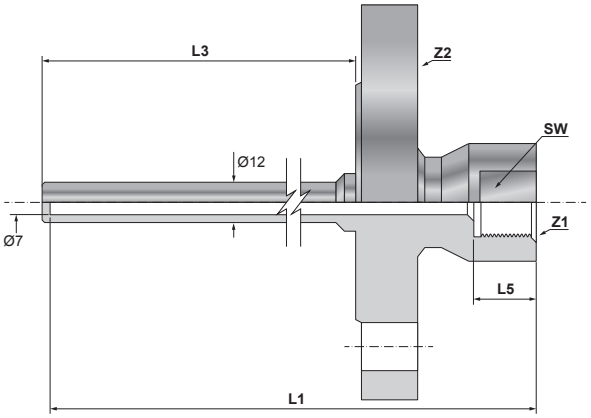
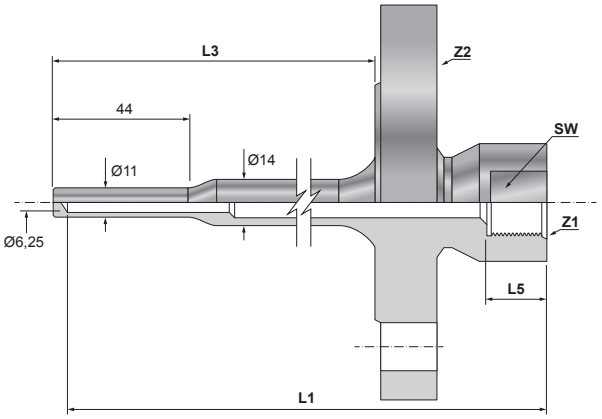
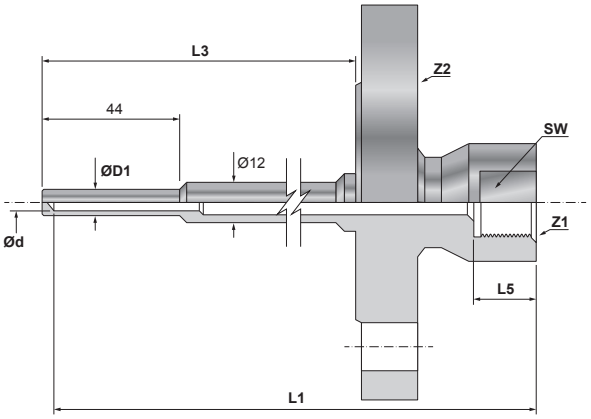



WT70 C 03 V625 ...

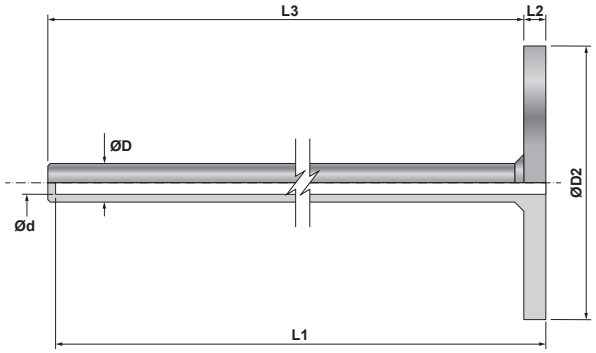



WT70 C 03 V300 / V500 ...



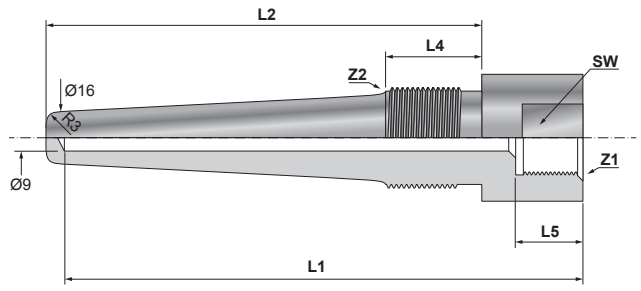

## WT70 C, between Flanges

WT70 C 03 ... P89

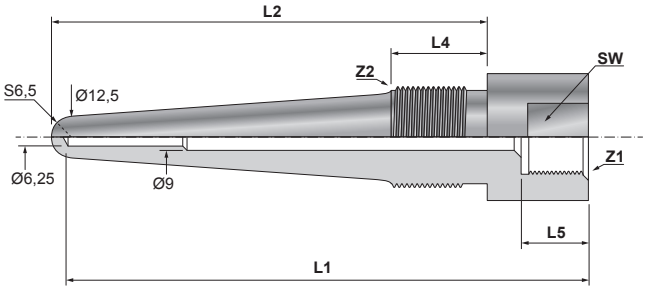


## WT70 T, to Screwing

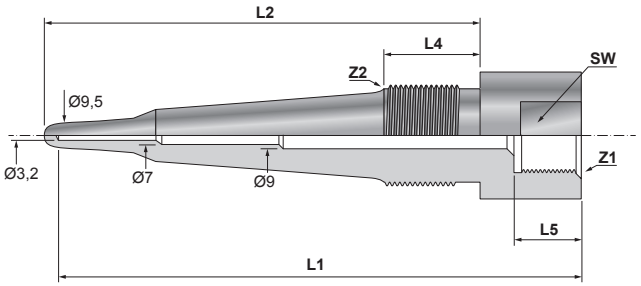
WT70 T 21 V900 ...



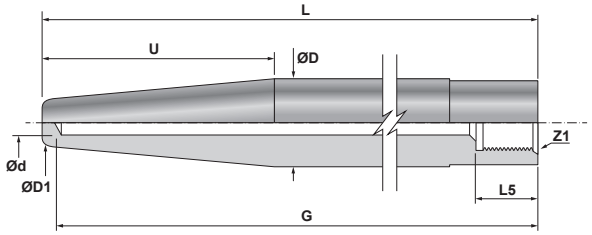

WT70 T 21 V625 ...



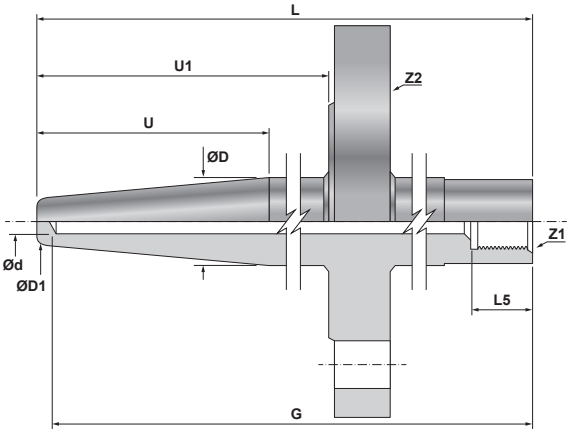

WT70 T 21 V320 ...



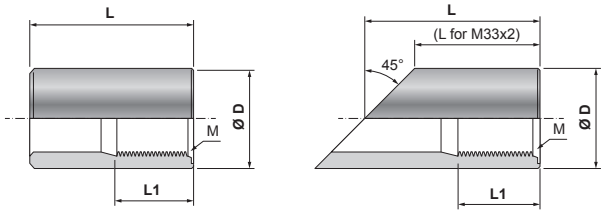

## WT70 D, to Welding



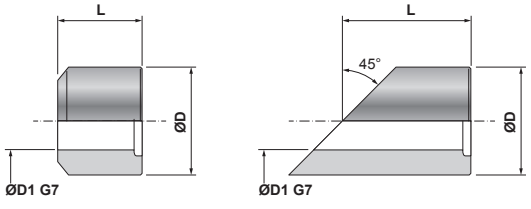

## WT70 D, with Flange



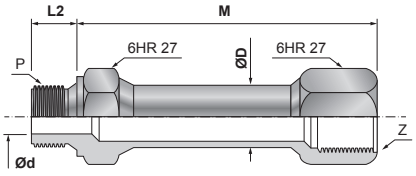

## NV Welded on piece for WT70 C and WT70 T




## NV D Welded on piece for WT70 D




## NT70 Extension piece for temperature sensors



## Technical specifications

**Nominal pressure:**

PN 160 - version WT70 C (according to used material)
PN 250 - version WT70 D (according to used material)
PN 400 - version WT70 T (according to used material)

**Maximal operating temperature:**

400 °C - thermowell material 1.0570
450 °C - thermowell material 1.0425, P265GH
500 °C - thermowell material 1.4571
575 °C - thermowell material 1.7715
600 °C - thermowell material 1.4541
620 °C - thermowell material 1.4903

**Used materials:**

1.0570
1.0425, P265GH
1.4571
1.7715
1.4541
1.4903
Monel 400 (2.4360)
Hastelloy C-22 (2.4602)
Nickel 200/201 (2.4068)
Titanium Gr. 2
Tantalum 99 %
for other options contact the supplier

**Process connection:**

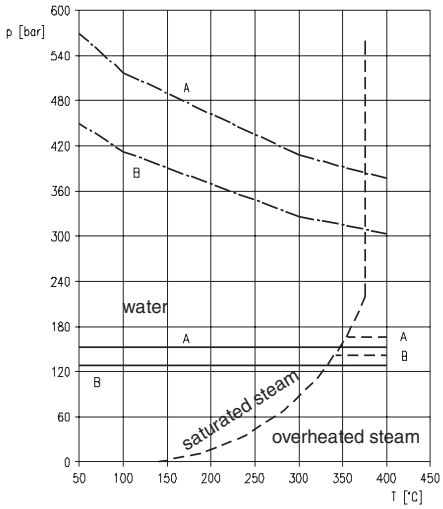
outer thread M33x2
outer thread M27x2
outer thread M20x1.5
outer thread G1“
outer thread G3/4“
outer thread G1/2“
outer thread 1“ NPT
outer thread 3/4“ NPT
outer thread 1/2“ NPT
for welding, outer diameter 27, 26h7, 24h7, 18h7(mm)
flange acc. to EN 1092-1, design B1/B2/C/D/E/F,
nominal size DN 25 to DN 50, PN 16 to PN 250
flange acc. to ANSI B 16.5, design RF/RJ,
nominal size 1“ to 2“, 150 to 2500 lbs
between flanges
for other options contact the supplier

**Inner thread:**

M20x1.5
M18x1.5
M16x1.5
M14x1.5
G1/2“
G1/4“
1/2“ NPT
for other options contact the supplier

## Load diagrams

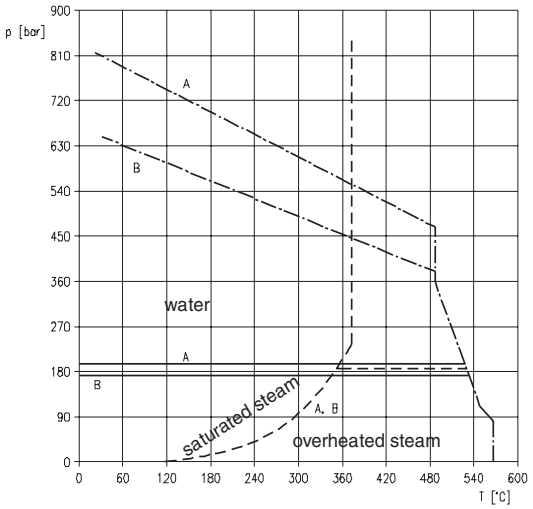
**WT70 D 31 (32)**




A - version WT70 D 31 Z.. L110 M04 (outside diameter 18h7 mm, inner diameter 3.5 mm, U = 65 mm, material 1.4571)

B - version WT70 D 32 Z.. L201 M04 (outside diameter 24h7 mm, inner diameter 7 mm, U = 125 mm, material 1.4571)

——— air (v = 60 m/s)
– – – steam (v = 60 m/s)
—·— water (v = 5 m/s)

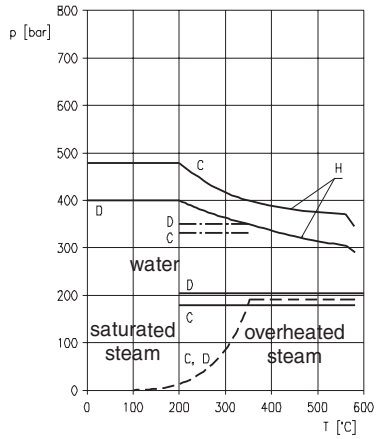



A - version WT70 D 31 Z.. L110 M02 (outside diameter 18h7 mm, inner diameter 3.5 mm, U = 65 mm, material 1.7715)

B - version WT70 D 32 Z.. L201 M02 (outside diameter 24h7 mm, inner diameter 7 mm, U = 125 mm, material 1.7715)

——— air (v = 60 m/s)
– – – steam (v = 60 m/s)
—·— water (v = 5 m/s)

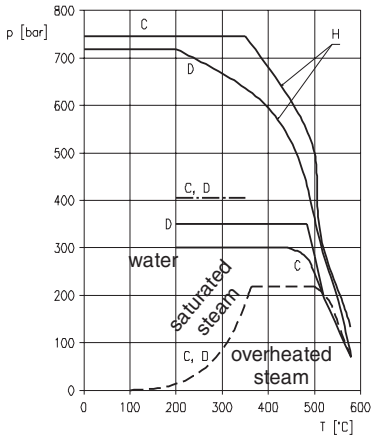
**WT70 T 21 V... Z01 P01 L160**




C - version WT70 T 21 V320 Z01 P01 L160 M03
(M33x2 inner diameter 3.2 mm, material 1.4541)

D - version WT70 T 21 V625 Z01 P01 L160 M03
(M33x2 inner diameter 6.25 mm, material 1.4541)

——— air (v = 80 m/s)
– – – steam (v = 80 m/s)
—·— water (v = 10 m/s)




C - version WT70 T 21 V320 Z01 P01 L160 M02
(M33x2 inner diameter 3.2 mm, material 1.7715)

D - version WT70 T 21 V625 Z01 P01 L160 M02
(M33x2 inner diameter 6.25 mm, material 1.7715)

——— air (v = 80 m/s)
– – – steam (v = 80 m/s)
—·— water (v = 10 m/s)

| Operating medium | | *Steam* | | | | | | | | *Air* | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Thermowell material | | 1.7715 | | | | 1.4541 | | | | 1.7715 | | | | 1.4541 | | | |
| Velocity of flow [m/s] | | 40 | | 60 | | 40 | | 60 | | 40 | | 60 | | 40 | | 60 | |
| Wells version according to diagrams | | C | D | C | D | C | D | C | D | C | D | C | D | C | D | C | D |
| Coefficient S for temperature of operating medium | to 370 °C | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.54 | 1.37 | 1.36 | 1.25 | 1.51 | 1.36 | 1.32 | 1.19 |
| | over 370 °C | 1.10 | 1.05 | 1.07 | 1.03 | 1.17 | 1.16 | 1.11 | 1.06 | 1.20 | 1.12 | 1.12 | 1.07 | 1.32 | 1.19 | 1.20 | 1.11 |

The value of pressure found in the respective diagram is multiplied by the coefficient S according to the table below for velocities of steam and air flow 40 m/s and 60 m/s. However, the obtained values shall not exceed the limit H given in the diagrams.

## Supplementary parameters

For thermowells can be provided following:
(see the ordering table):

- stainless steel closing plug
- material certificate acc. to EN 10204
- pressure test by internal overpressure
- degreasing for oxygen
- check of the thermowell by a calculation

**Surface treatment:**
Standard thermowells are polished and can be also delivered with optional protective coats that increases resistance of the thermowells in hard chemical or abrasive environment.

**Materials used for protective coats:**

- polyamide PA11, $T_{MAX}$= 100 °C (depends on the measured medium)
- ethylene - chlortrifluorethylene E-CTFE „Halar“, $T_{MAX}$ = 170 °C (depends on the measured medium)
- perfluoralkoxy-copolymer of tetrafluorethylene and perfluorated vinylether PFA, $T_{MAX}$ = 260 °C (depends on the measured medium)
- ethylentetrafluorethylene ETFE “Hyflon”, $T_{MAX}$ = 130 °C (depends on the measured medium)
- polytetrafluorethylene PTFE, $T_{MAX}$ = 260 °C (depends on the measured medium)
- corundum spray for extremely abrasive media, $T_{MAX}$ acc. to particular composition of the coat.

Based on the customer’s requirement the particular design of the protective coat of the thermowell or protective pipe of the temperature sensor is developed after specification of the basic information concerning the measured medium (chemical composition, temperature, pressure, flow velocity and level of abrasion in case of abrasive media).

**Properties of protective coats based on fluoroplastic materials E-CTFE, PFA, ETFE, PTFE:**

**- Resistance against high temperatures**
Very good resistance against high temperatures, high melting points, limits of thermal degradation and self-ignition temperatures. Their flammability, released heat and amount of smoke are relatively low.

Fluoroplastic materials remain functional at temperatures highly above limits of other thermoplastic or elastomer materials.

V závislosti na typu tyto materiály mohou být vystaveny trvale ca. 260 °C.

**- Non-adhesivity**
Low surface energy in solid state creates excellent non-adhesive surfaces. Therefore only very few solid substances adheres to these coats and if so, it is very easy to remove them from the surface.

**- Friction coefficient**
These coats show the lowest values of all known solid substances. The values of fluoroplastic coats vary from 0.05 to 0.2, depending on loading, velocity and type of the fluoroplastic material.

**- Wettability**
Coats based on fluoroplastic materials are exceptionally hydrophobic and oleophobic. Cleaning of the surface is therefore easy and simple. In many cases surface is self-cleaning.

**- Dielectric properties**
These materials show excellent dielectric properties, low relative permittivity, low loss coefficient and exceptionally high specific resistance. Therefore they exceed most materials in resistance against electric breakdown and electric arc within a wide scope of working conditions.

**- Cryogenic properties**
These coats remain solid, stable and fully functional even at cryogenic temperatures, i.e. up to approximately -270 °C, without any loss of these properties.

**Properties of protective coats based on polyamide PA11:**

Polyamide PA11 (meets requirements of the standards BSI WIS 4-52-01, KIWA BRL K759-01 and UL 1091) is suitable as coating material for use with media and showing excellent resistance against corrosion, abrasion, shocks and vibrations and all of them together. Therefore this coat is suitable e.g. for the applications below:

- salt mists
- electrochemical reactions
- hydrocarbons, solvents and other inorganic and organic media.

**Properties of protective coats based on oxides or carbides of metals:**

A series of coats based on oxides or carbides of metals is available for various applications. By combination and composition of additional materials in the applied coat may provide properties that cannot be achieved by any known methods.
Based on the customer's requirement the particular design of the protective coat of the thermowell or protective pipe of the temperature sensor is developed after specification of the basic information concerning to the measured medium (chemical composition, temperature, pressure, flow velocity and size of solid particles).

**Lifetime of the thermowell**
Lifetime of the thermowell depends on many parameters that relate to the design of the thermowell, parameters of the measured medium and other operational conditions. The thermowell may be exposed to corrosive and erosive effects of corrosive substances, high temperatures, mechanical load from flowing medium or other technological elements. As for mechanical load, the most important factor is load of the thermowell by vibrations that may be transferred to the thermowell from the technological equipment (pumps, motors, fans, etc.) or from the flowing medium. Flowing medium creates whirls behind the thermowell. Frequency of ripping off of these whirls is given, primarily by dimensions of the thermowell, velocity and viscosity of the measured medium. In case this frequency is close to own frequency of the thermowell, equality of these frequencies may cause massive absorption of energy by the thermowell and vibrations at the resonance frequency; this may result in strong vibrations of the thermowell and lead to its damage or damage of the built-in temperature sensor. Regulations ASME require the ratio of the excitation frequency from the flowing medium to the own frequency of the thermowell lower than 0.8. In case where the ratio is higher that 0.8, it is necessary to make some changes in the design of the thermowell and way of its installation. There are available following two basic solutions:

A) Decrease the excitation frequency from the flowing medium
- decrease velocity of the flow (enlarge diameter of the piping at the point of installation of the thermowell)

B) Increase own frequency of the thermowell
- shorten the length of the thermowell
- change the material of the thermowell
- use another type of the thermowell with a larger diameter or other shapes

Applicability of use of the thermowell for a particular application can be read from the loading diagrams or let it checked by a strength calculation. Such strength calculation is based on theoretic methods and therefore it cannot be considered as a guarantee against possible failures of the thermowell, because the given particular application may be exposed to other effects that cannot be included in the calculation.

| | Type | Description | | |
|---|---|---|---|---|
| • | **WT70 C** | **Cylindric thermowell, PN 160** | | |
| | **Code** | **Version** | | |
| • | **01** | **For screwing** | | |
| • | **02** | **For welding** | | |
| | 03 | With flange | | |
| | 99 | Other | | |
| | **Code** | **Inner bore [mm] diameter d** [1] | **Outer diameter [mm] diameter D** [1] **/ diameter D1** [1] | |
| • | **V900** | **9** | **14 / 14** | |
| • | **V700** | **7** | **12 / 12 (D1=10 for thermowells material Monel 400 - M08 and Hastelloy C-22 - M09)** | |
| | V625 | 6.25 | 14 / 11 | |
| | V500 | 5 | 12 / 8 | |
| | V350 | 3.5 | 12 / 6.5 | |
| | V999 | Other | | |
| | **Code** | **Inner thread Z1** [1] | **Length L5** [1] | |
| • | **Z01** | **M20x1.5** | **18** | |
| | Z02 | M18x1.5 | 16 | |
| | Z03 | M16x1.5 | 14 | |
| | Z04 | M14x1.5 | 12 | |
| | Z05 | G1/2" | 18 | |
| | Z06 | G1/4" | 16 | |
| | Z07 | 1/2" NPT | 19 | |
| | Z99 | Other | | |
| | **Code** | **Process connection Z2** [1] | **Length L4** [1] | **Wrench size SW** [1] |
| | | *Threaded process connection* | | |
| • | **P02** | **M27x2** | **25.5** | **30** |
| | P03 | M20x1.5 | 15 | 27 |
| | P05 | G3/4" | 25.5 | 30 |
| | P06 | G1/2" | 15 | 27 |
| | P08 | 3/4" NPT | 21 | 30 |
| | P09 | 1/2" NPT | 19 | 27 |
| | | *Welded process connection* | | |
| • | **P31** | **Diameter 27** | **25** | |
| | | *Flanged process connection according to EN 1092-1* | | |
| | P54 | Flange DN25 / PN10 to PN40 | | |
| | P60 | Flange DN25 / PN63 to PN100 | | |
| | P63 | Flange DN25 / PN160 | | |
| | P66 | Flange DN25 / PN250 | | |
| | P55 | Flange DN40 / PN10 to PN40 | | |
| | P61 | Flange DN40 / PN63 to PN100 | | |
| | P64 | Flange DN40 / PN160 | | |
| | P67 | Flange DN40 / PN250 | | |
| | P53 | Flange DN50 / PN10 to PN16 | | |
| | P56 | Flange DN50 / PN25 to PN40 | | |
| | P59 | Flange DN50 / PN63 | | |
| | P62 | Flange DN50 / PN100 | | |
| | P65 | Flange DN50 / PN160 | | |
| | P68 | Flange DN50 / PN250 | | |
| | … B1 | Raised Face | | |
| | … B2 | Raised Face | | |
| | … C | Large Tongue | | |
| | … D | Large Groove | | |
| | … E | Large Male | | |
| | … F | Large Female | | |
| | | *Flanged process connection according to ANSI B 16.5* | | |
| | P71 | Flange 1", 150 lbs | | |
| | P74 | Flange 1", 300 lbs | | |
| | P77 | Flange 1", 600 lbs | | |
| | P80 | Flange 1", 1500 lbs | | |
| | P83 | Flange 1", 2500 lbs | | |
| | P72 | Flange 1,5", 150 lbs | | |
| | P75 | Flange 1,5", 300 lbs | | |
| | P78 | Flange 1,5", 600 lbs | | |
| | P81 | Flange 1,5", 1500 lbs | | |
| | P84 | Flange 1,5", 2500 lbs | | |
| | P73 | Flange 2", 150 lbs | | |
| | P76 | Flange 2", 300 lbs | | |
| | P79 | Flange 2", 600 lbs | | |
| | P82 | Flange 2", 1500 lbs | | |
| | P85 | Flange 2", 2500 lbs | | |
| | … RF | Raised Face | | |
| | … RJ | RJ groove for metal sealing ring model R | | |
| | | *Wafer process connection* | | |
| | P89 | Between flanges | | - consult with supplier (see dimensional drawing) |
| | P99 | Other | | |

• ... Ex stock version [1]… See dimensional drawings.

| | Code | Nominal length L [1] | Length L1 [1] | Length L2 [1][2] | Length L2 [1][3] | Length L3 [1] |
|---|---|---|---|---|---|---|
| • | **L100** | **100** | **101+1** | **76** | **80** | **50** |
| • | **L160** | **160** | **161+1** | **136** | **140** | **110** |
| | L250 | 250 | 251+1 | 226 | 230 | 200 |
| | L400 | 400 | 401+1 | 376 | 380 | 350 |
| | L630 | 630 | 631+1.5 | 606 | 610 | 580 |
| | L . . . | Other | - fill nominal length L and other dimensions in mm | | | |

| | Code | Thermowell material | $T_{MAX}$ |
|---|---|---|---|
| | M01 [4] | 1.0570 | 400 °C |
| | M11 [4] | 1.0425 (P265GH) | 450 °C |
| • | **M03** | **1.4541** | **600 °C** |
| | M04 | 1.4571 | 500 °C |
| | M06 | Titanium grade 2 | - specific thermowell version consult with supplier |
| | M07 | Tantalum 99 % | - specific thermowell version consult with supplier |
| | M08 | Monel 400 | - specific thermowell version consult with supplier |
| | M09 | Hastelloy C-22 | - specific thermowell version consult with supplier |
| | M10 | Nickel 200/201 | - specific thermowell version consult with supplier |
| | M99 | Other | - specific thermowell version consult with supplier |

| | Code | OPTIONAL ACCESSORIES<br>Protective coat | Tmax (with spray) |
|---|---|---|---|
| | X01 | Polyamide PA11 | 100 °C (depending on measured medium) |
| | X02 | Ethylene-chlortrifluorethylene E-CTFE "Halar" | 170 °C (depending on measured medium) |
| | X03 | Perfluoralkoxy-copolymer tetrafluorethylene and perfluorated vinylether PFA | 260 °C (depending on measured medium) |
| | X04 | Ethylentetrafluorethylene ETFE "Hyflon" | 130 °C (depending on measured medium) |
| | X05 | Polytetrafluorethylene PTFE | 260 °C (depending on measured medium) |
| | X07 | Hard metal coating (Fe-Cr-Mn-Si-B-C) for abrasive medium | 925 °C |
| | X08 | Corundum spray for highly abrasive medium | according to specific composition of coating |
| | X10 | Enamel coating for highly aggressive medium | 220 °C (only with code M99 (carbon steel)) |
| | X99 | Other | |

| | Code | Accessories |
|---|---|---|
| • | **BZS** | **Stainless steel tag (70x15 mm) with description according to order** |
| • | **PPZ** | **Product description according to customer requirements** |
| | UZ | Stainless steel plug, dimension according to thermowell inner thread, including coupling chain |
| • | **Q1** | **Material certificate according to EN 10204, 3.1** |
| • | **TZI** | **Pressure test of thermowell by inside over-pressure** |
| | TZE | Pressure test of thermowell by outside over-pressure (consult with supplier) |
| • | **PZ** | **Penetration test of thermowell welds** |
| | KY | Degreasing version for oxygen |
| | VY | Strength calculation of thermowell (frequency, pressure stress) - see configuration sheet No. 0993 |

**Example of order: WT70 C 01 V700 Z01 P02 L160 M03**

• ... Ex stock version [1]… See dimensional drawings. [2]… Only for process connection codes P02, P05, P31.

[3]… For all process connection except codes P02, P05, P31.

[4]… As standard only for thermowell for welding (code P31) and nominal length max. 250 mm.

| | Type | Description | | |
|---|---|---|---|---|
| • | **WT70 T** | **Conical thermowell, PN400** | | |
| | **Code** | **Version** | | |
| • | **21** | **For screwing** | | |
| | 99 | Other | | |
| | **Code** | **Inner bore [mm] diameter d** [1)] | | |
| • | **V900** | **9** | | |
| • | **V625** | **6.25** | | |
| | V999 | Other | | |
| | **Code** | **Inner thread Z1** [1)] | **Length L5** [1)] | |
| • | **Z01** | **M20x1.5** | **18** | |
| | Z02 | M18x1.5 | 16 | |
| | Z03 | M16x1.5 | 14 | |
| | Z05 | G1/2" | 18 | |
| | Z07 | 1/2" NPT | 19 | |
| | Z99 | Other | | |
| | **Code** | **Process connection Z2** [1)] | **Length L4** [1)] | **Wrench size SW** [1)] |
| • | **P01** | **M33x2** | **30** | **30** |
| | P02 | M27x2 | 25.5 | 30 |
| | P04 | G1" | 30 | 30 |
| | P07 | 1" NPT | 30 | 30 |
| | P99 | Other | | |
| | **Code** | **Nominal length L [mm]** [1)] | **Length L1** [1)] | **Length L2** [1)] |
| • | **L160** | **160** | **161+1** | **136** |
| | L250 | 250 | 251+1 | 226 |
| | L . . . | Other | - fill nominal length L and other dimensions in mm | |
| | **Code** | **Thermowell material** | **$T_{MAX}$** | |
| | M12 | 1.5415 (15Mo3) | 500 °C | |
| | M13 | 1.7335 (13CrMo4-5) | 550 °C | |
| | M14 | 1.7380 (10CrMo9-10) | 580 °C | |
| | M02 | 1.7715 | 575 °C | |
| • | **M03** | **1.4541** | **600 °C** | |
| | M04 | 1.4571 | 500 °C | |
| | M05 | 1.4903 | 620 °C | |
| | M06 | Titanium grade 2 | - specific thermowell version consult with supplier | |
| | M07 | Tantalum 99 % | - specific thermowell version consult with supplier | |
| | M08 | Monel 400 | - specific thermowell version consult with supplier | |
| | M09 | Hastelloy C-22 | - specific thermowell version consult with supplier | |
| | M10 | Nickel 200/201 | - specific thermowell version consult with supplier | |
| | M99 | Other | - specific thermowell version consult with supplier | |
| | | **OPTIONAL ACCESSORIES** | | |
| | **Code** | **Accessories** | | |
| • | **BZS** | **Stainless steel tag (70x15 mm) with description according to order** | | |
| • | **PPZ** | **Product description according to customer requirements** | | |
| | UZ | Stainless steel plug, dimension according to thermowell inner thread, including coupling chain | | |
| • | **Q1** | **Material certificate according to EN 10204, 3.1** | | |
| • | **TZI** | **Pressure test of thermowell by inside over-pressure** | | |
| | KY | Degreasing version for oxygen | | |
| | VY | Strength calculation of thermowell (frequency, pressure stress) | | - see configuration sheet No. 0993 |
| | **Example of order: WT70 T 21 V625 Z01 P01 L160 M03** | | | |

• ... Ex stock version [1)] … See dimensional drawings.

| | Type | Description | | |
|---|---|---|---|---|
| • | **NV** | **Welded on piece for thermowells WT70 C and WT70 T** | | |
| | **Code** | **Thread dimension** | **Nominal pressure** | **L / L1 / D [mm]** [1)] |
| • | **M20** | **M20x1.5** | **PN160** | **50 / 25 / 30 (28)** |
| • | **G1/2** | **G1/2"** | **PN160** | **50 / 25 / 30 (28)** |
| • | **M27** | **M27x2** | **PN160** | **65 / 30 / 40 (35)** |
| • | **G3/4** | **G3/4"** | **PN160** | **65 / 30 / 40 (35)** |
| • | **M30** | **M30x2** | **PN160** | **65 / 35 / 40 (38)** |
| • | **M33** | **M33x2** | **PN250** | **40 / 35 / 55** |
| | G1 | G1" | PN250 | 40 / 35 / 55 |
| | 99 | Other (specify thread in the order) | | |
| | **Code** | **Version** | | |
| • | **P** | **Straight** | | |
| • | **S** | **Oblique 45°** | | |
| | J | Other (specify angle in the order) | | |
| | **Code** | **Material** | **$T_{MAX}$** | |
| • | **M00** | **1.0308 (only for PN40)** | **300 °C** | |
| • | **M01** | **1.0570** | **400 °C** | |
| | M11 | 1.0425 (P265GH) | 450 °C | |
| | M12 | 1.5415 (15Mo3) | 500 °C | |
| | M13 | 1.7335 (13CrMo4-5) | 550 °C | |
| | M14 | 1.7380 (10CrMo9-10) | 580 °C | |
| • | **M02** | **1.7715** | **575 °C** | |
| • | **M03** | **1.4541** | **600 °C** | |
| | M04 | 1.4571 | 500 °C | |
| | M05 | 1.4903 | 620 °C | |
| | M99 | Other | | |
| | | **OPTIONAL ACCESSORIES** | | |
| | **Code** | **Accessories** | | |
| • | **PPZ** | **Product description according to customer requirements** | | |
| • | **Q1** | **Material certificate according to EN 10204, 3.1** | | |
| | **Example of order: NV M27 P M01** | | | |

• ... Ex stock version [1)] ... Other length of the welded-on piece specify in brackets of ordering code, in brackets are information for material 1.0308.

| | Type | Description | | | | |
|---|---|---|---|---|---|---|
| • | **WT70 D** | **Conical thermowell according to DIN 43772, PN250** | | | | |
| | **Code** | **Version** | **Design** | **Process connection diameter D [1]** | **Inner bore [mm] diameter d [1]** | **Diameter D1 [1]** |
| | 31 [2] | For welding | 4 | Diameter 18h7 | 3.5 | 9 |
| | 32 [3] | For welding | 4 | Diameter 24h7 | 7 | 12.5 |
| • | **33** | **For welding** | **4** | **Diameter 26h7** | **7** | **12.5** |
| | 99 | Other | | | | |
| | **Code** | **Inner thread Z1 [1]** | **Length L5 [1]** | | | |
| • | **Z01** | **M20x1.5** | **19** | **- not for codes 31, 32** | | |
| | Z02 | M18x1.5 | 16 | - only for code 32 | | |
| | Z04 | M14x1.5 | 16 | - only for code 31 | | |
| | Z05 | G1/2" | 19 | - not for codes 31, 32 | | |
| | Z07 | 1/2" NPT | 19 | - not for codes 31, 32 | | |
| | Z99 | Other | | | | |
| | **Code** | **Nominal length L [1]** | **Length U [1]** | **Length G [1]** | **Length U1 [4]** | |
| | L140 | 140 | 65+2 | 135+1 | - | |
| • | **L200** | **200** | **65+2** | **195+1** | **130±2** | |
| | L . . . | Other | - fill nominal length L and other dimensions in mm | | | |
| | **Code** | **Thermowell material** | | **$T_{MAX}$** | | |
| | M01 | 1.0570 | | 400 °C | - not for version with flange | |
| • | **M11** | **1.0425 (P265GH)** | | **450 °C** | **- not for version with flange** | |
| | M12 | 1.5415 (15Mo3) | | 500 °C | - not for version with flange | |
| | M13 | 1.7335 (13CrMo4-5) | | 550 °C | - not for version with flange | |
| | M14 | 1.7380 (10CrMo9-10) | | 580 °C | - not for version with flange | |
| | M02 | 1.7715 | | 575 °C | - not for version with flange | |
| • | **M03** | **1.4541** | | **600 °C** | | |
| | M04 | 1.4571 | | 500 °C | | |
| | M05 | 1.4903 | | 620 °C | | |
| | M06 | Titan grade 2 | | | - specific thermowell version consult with supplier | |
| | M07 | Tantal 99% | | | - specific thermowell version consult with supplier | |
| | M08 | Monel 400 | | | - specific thermowell version consult with supplier | |
| | M09 | Hastelloy C-22 | | | - specific thermowell version consult with supplier | |
| | M10 | Nickel 200/201 | | | - specific thermowell version consult with supplier | |
| | M99 | Other | | | - specific thermowell version consult with supplier | |
| | **Code** | **OPTIONAL ACCESSORIES** | | | | |
| | | **Process connection with flange Z2 [1]** | | | | |
| | | *Flanged process connection according to EN 1092-1* | | | | |
| | P54 | Flange DN25 / PN10 to PN40 | | | | |
| | P60 | Flange DN25 / PN63 to PN100 | | | | |
| | P63 | Flange DN25 / PN160 | | | | |
| | P66 | Flange DN25 / PN250 | | | | |
| | P55 | Flange DN40 / PN10 to PN40 | | | | |
| | P61 | Flange DN40 / PN63 to PN100 | | | | |
| | P64 | Flange DN40 / PN160 | | | | |
| | P67 | Flange DN40 / PN250 | | | | |
| | P53 | Flange DN50 / PN10 to PN16 | | | | |
| | P56 | Flange DN50 / PN25 to PN40 | | | | |
| | P59 | Flange DN50 / PN63 | | | | |
| | P62 | Flange DN50 / PN100 | | | | |
| | P65 | Flange DN50 / PN160 | | | | |
| | P68 | Flange DN50 / PN250 | | | | |
| | … B1 | Raised Face | | | | |
| | … B2 | Raised Face | | | | |
| | … C | Large Tongue | | | | |
| | … D | Large Groove | | | | |
| | … E | Large Male | | | | |
| | … F | Large Female | | | | |
| | | *Flanged process connection according to ANSI B 16.5* | | | | |
| | P71 | Flange 1", 150 lbs | | | | |
| | P74 | Flange 1", 300 lbs | | | | |
| | P77 | Flange 1", 600 lbs | | | | |
| | P80 | Flange 1", 1500 lbs | | | | |
| | P83 | Flange 1", 2500 lbs | | | | |
| | P72 | Flange 1,5", 150 lbs | | | | |
| | P75 | Flange 1,5", 300 lbs | | | | |
| | P78 | Flange 1,5", 600 lbs | | | | |
| | P81 | Flange 1,5", 1500 lbs | | | | |
| | P84 | Flange 1,5", 2500 lbs | | | | |
| | P73 | Flange 2", 150 lbs | | | | |
| | P76 | Flange 2", 300 lbs | | | | |
| | P79 | Flange 2", 600 lbs | | | | |
| | P82 | Flange 2", 1500 lbs | | | | |
| | P85 | Flange 2", 2500 lbs | | | | |
| | … RF | Raised Face | | | | |
| | … RJ | RJ groove for metal sealing ring model R | | | | |
| | P99 | Other | | | | |

• ... Ex stock version
[1] … See dimensional drawings.
[2] ... Only for inner thread M14x1.5 and nom. length max L260.
[3] ... Only for inner thread M18x1.5.
[4] ... Dimensions are valid only for conical thermowells with flange.

| | Code | Accessories |
|---|---|---|
| • | **BZS** | **Stainless steel tag (70x15 mm) with description according to order** |
| • | **PPZ** | **Product description according to customer requirements** |
| | UZ | Stainless steel plug, dimension according to thermowell inner thread, including coupling chain |
| • | **Q1** | **Material certificate according to EN 10204, 3.1** |
| • | **TZI** | **Pressure test of thermowell by inside over-pressure** |
| | TZE | Pressure test of thermowell by outside over-pressure (consult with supplier) |
| • | **PZ** | **Penetration test of thermowell welds** |
| | KY | Degreasing version for oxygen |
| | VY | Strength calculation of thermowell (frequency, pressure stress) - see configuration sheet No. 0993 |

**Example of order: WT70 D 33 Z01 L170 M03**

• ... Ex stock version

| | Type | Description | | |
|---|---|---|---|---|
| • | **NV** | **Welded on piece for thermowells WT70 D** | | |
| | **Code** | **Inner diameter of welded on piece [mm]** | **Length / outer diameter D [mm]** [1)] | |
| | D18 | 18G7 | 40 / 39 | |
| • | **D24** | **24G7** | **40 / 49** | |
| • | **D26** | **26G7** | **40 / 49** | |
| | D99 | Other | | |
| | **Code** | **Version** | | |
| • | **P** | **Straight** | | |
| | S | Oblique 45° | | |
| | J | Other (specify angle in the order) | | |
| | **Code** | **Material** | **$T_{MAX}$** | |
| | M01 | 1.0570 | 400 °C | |
| | M11 | 1.0425, P265GH | 450 °C | |
| | M12 | 1.5415 (15Mo3) | 500 °C | |
| | M13 | 1.7335 (13CrMo4-5) | 550 °C | |
| | M14 | 1.7380 (10CrMo9-10) | 580 °C | |
| • | **M02** | **1.7715** | **575 °C** | |
| • | **M03** | **1.4541** | **600 °C** | |
| | M04 | 1.4571 | 500 °C | |
| | M05 | 1.4903 | 620 °C | |
| | M99 | Other | | |
| | | **OPTIONAL ACCESSORIES** | | |
| | **Code** | **Accessories** | | |
| • | **PPZ** | **Product description according to customer requirements** | | |
| • | **Q1** | **Material certificate according to EN 10204, 3.1** | | |

**Example of order: NV D26 P M03**

• ... Ex stock version

[1)] ... Other length of the welded on piece specify in brackets of ordering code.

| | Type | Description | | | |
|---|---|---|---|---|---|
| • | **NT70** | **Extension piece for temperature sensors** | | | |
| | | **Version of extension piece** | | | |
| | **Code** | **Diameter D** | | **Material** | **Max. temperature** |
| | D14 | 14x2.5 mm | | 1.4541 | 600 °C |
| • | **D20** | **20x3 mm** | | **1.4541** | **600 °C** |
| | D99 | Other | | | |
| | **Code** | **Length of extension piece M [mm]** | | | |
| | M060 | 60 | | | |
| • | **M090** | **90** | | | |
| • | **M150** | **150** | | | |
| | M200 | 200 | | | |
| | M240 | 240 | | | |
| | M . . . | Other (fill in length of extension piece in mm) | | | |
| | **Code** | **Inner thread Z** | **Length L1 [mm]** | | |
| • | **Z01** | **M20x1.5** | **18** | | |
| | Z02 | M18x1.5 | 16 | | |
| | Z03 | M16x1.5 | 14 | | |
| | Z04 | M14x1.5 | 12 | | |
| | Z05 | G1/2" | 18 | | |
| | Z06 | G1/4" | 16 | | |
| | Z07 | 1/2" NPT | 19 | | |
| | Z99 | Other | | | |
| | **Code** | **Process connection P** | **Length L2 [mm]** | **Diameter d [mm]** | |
| | P1 | Outer thread M14x1.5 | 12 | 7 | - only for D14 |
| | P2 | Outer thread M18x1.5 | 12 | 9 | - only for D14 |
| • | **P3** | **Outer thread M20x1.5** | **15** | **9** | |
| | P5 | Outer thread G1/2" | 15 | 9 | |
| | P7 | Outer thread 1/2" NPT | 8 | 9 | |
| | P9 | Other | | | |
| | | **OPTIONAL ACCESSORIES** | | | |
| | **Code** | **Accessories** | | | |
| | BZS | Stainless steel tag (70x15 mm) with description according to order | | | |
| | PPZ | Product description according to customer requirements | | | |
| | UZ | Stainless steel plug, dimension according to thermowell inner thread, including coupling chain | | | |
| | Q1 | Material certificate according to EN 10204, 3.1 | | | |
| | TZI | Pressure test of thermowell by inside over-pressure | | | |

**Example of order: NT70 D20 M90 Z01 P3**

• ... Ex stock version