

For each application the exactly fitting solution

# TSB – One Temperature sensor for All

## The new temperature class

With its flexibility, performance and unparalleled reliability and durability, the new TSB, a further development of the successful TFP series, sets new standards in temperature measurement.

- **Extended process temperature range: -200...400°C**
- Greatly improved **measuring accuracy: <math>\pm 0.1\text{ K}</math>**
- Higher ambient **temperature resistance: 90°C**
- One-piece design completely in stainless steel: **lasting stability and application reliability**
- **CLEANadapt with PEEK sealing edge:** the new hygienic screw process connection is based on the proven metal-to-metal solutions and is already **3-A approved**
- Dual Pt100: the **twin RTD sensor** enables redundant, parallel measurement and thus self-monitoring of sensor performance

## IO-Link & 4...20 mA with Flex-Hybrid

The **Flex-Hybrid technology** with IO-Link and 4...20 mA combines the **best of both worlds**: Data can be transmitted in **digital or analogue** mode.

- Flexible plug & play communication: **installation and commissioning save both time and costs**
- **Simple individual programming** with IO-Link master, e.g. changing the measuring range or two-point adjustment using offset and span
- **Sensor replacement is easier than ever before** thanks to the "Smart Replace Design" with automatic sensor identification, configuration and parameterisation through IO-Link

## Fully modular and TFP compatible

Thanks to the **completely modular concept**, you can configure **your individual sensor** in just a few steps.

- For **new equipment**, Flex-Hybrid technology offers maximum flexibility and sustainability.
- For **retrofitting**, TSB can replace any TFP sensor in existing installations - with all additional benefits
- For the **replacement of third-party devices**, a suitable model is always possible due to the large selection of process adaptations and maximum flexibility in the configuration

## Also available as mini version TSM



## Technical specification at a glance

- **One Temperature sensor for all applications**
- **Flex-Hybrid Technology** with digital + analog interface (**IO-Link + 4...20 mA**)
- **Modular Design: step-by-step configuration** from the economic basic version to the high-end model
- Available with up to two **integrated transmitters**
- **Head orientation** vertical or horizontal, optional LCD Display
- **RTD as required:** Pt100 or Pt1000, single or double, accuracy class A, AA or AAA
- Insertion length **0...2000 mm, flush available**
- Slim sensor tip for **reduced response time**
- Installation with thermowell possible, thus **sensor removal without process opening**
- **Protection class IP 69K** for max. application safety
- **Two-point calibration** possible using offset and span

## Configurable design for Maximum flexibility



# SENSORS FOR FOOD AND BIOPHARMA.

## Order code

**TSBF** Temperatur Sensor Big for Food Applications, material wetted parts 1.4404 (AISI 316L)

**Standard temperature range (-50...250 °C / -58...482 °F)**  
**Process connection (⊗): 3-A conform)**

**T05** Tri-Clamp 1/2" and 3/4" (⊗ only for 3/4")  
**T10** Tri-Clamp DN10  
**TC1** Tri-Clamp 1" and 1½" ⊗  
**TC2** Tri-Clamp 2" ⊗  
**T25** Tri-Clamp 2½" ⊗  
**TC3** Tri-Clamp 3" ⊗  
**V10** Varivent type B DN10/15  
**V25** Varivent type F DN25 ⊗  
**V40** Varivent type N DN40/50 ⊗  
**C01** CLEANadapt M12  
**C02** CLEANadapt G1/2"  
**C03** CLEANadapt G1/2"-P (PEEK) ⊗  
**C04** CLEANadapt G1/2"-SP (short version, PEEK) ⊗  
**N01** Plain rod  
**G01** Thread G1/2"  
**G02** Thread G1/4"

**Ext. temperature range (-200...400 °C / -328...752 °F)**  
**Process connection**

**CH1** CLEANadapt M12 (incl. spacer)  
**CH2** CLEANadapt G1/2" (incl. spacer)  
**GH1** Thread G1/2" (incl. spacer)  
**NH1** Plain rod (incl. spacer)

**Process connection without media contact**

**M01** FLEXadapt ESF G3/8" with cap nut, sensor tip ø 3 mm, spring loaded  
**M02** FLEXadapt ESF G3/8" with cap nut, sensor tip ø 3 mm  
**M03** Sensor G3/8" with cap nut, sensor tip ø 4 mm  
**M04** FLEXadapt ESF G3/8" with cap nut, sensor tip ø 4 mm, spring loaded

**Spacer extension**

**X** Without spacer (perm. process temp. ≤ 100 °C (212 °F), standard for extended temperature range)  
**S** Short spacer (permanent process temperature ≤ 150 °C (305 °F))  
**H** Long spacer (permanent process temperature ≤ 250 °C (482 °F))

**RTD type**

**0** 1x Pt100 A, 2-wire (probe length ≤ 250 mm)  
**1** 1x Pt100 AA, 2-wire (probe length ≤ 150 mm)  
**2** 2x Pt100 A, 2-wire (probe length ≤ 250 mm)  
**3** 2x Pt100 AA, 2-wire (probe length ≤ 150 mm)  
**4** 1x Pt100 A, 4-wire (probe length ≥ 50 mm)  
**5** 1x Pt100 AA, 4-wire (probe length ≥ 50 mm)  
**6** 1x Pt100 AAA, 4-wire  
**7** 2x Pt100 A, (3-) 4-wire (probe length ≥ 50 mm, 3-wire with sensor tip ø 3 mm)  
**8** 2x Pt100 AA, (3-) 4-wire (probe length ≥ 50 mm, 3-wire with sensor tip ø 3 mm)  
**9** 2x Pt100 AAA, 4-wire  
**A** 1x Pt1000 A, 2-wire  
**B** 1x Pt1000 AA, 2-wire  
**C** 2x Pt1000 A, 2-wire  
**D** 2x Pt1000 AA, 2-wire

Variable probe length [mm]	Probe length for process connection [mm]
<b>0</b> Only for C03, C04	<b>M01, M03, M02, M04</b>
<b>10...50</b> In steps of 5 mm	<b>37 68</b>
<b>51...250</b> In steps of 5 mm	<b>59 148</b>
<b>251...500</b> In steps of 10 mm	<b>83 198</b>
<b>501...1000</b> In steps of 50 mm	<b>97 234</b>
<b>1001...2000</b> In steps of 100 mm	<b>160 238</b>
<b>Intermediate lengths</b> Not for M0x	<b>249</b>

**Probe diameter**

**03** 3 mm (standard for M01, M02, not for xHx)  
**04** 4 mm (standard for M03, M04)  
**06** 6 mm (standard for C03, C04)  
**08** 8 mm (not for T05, V10, C01, CH1)  
**10** 10 mm (not for Txx, Vxx, C01, C03, C04, G02, CH1)  
**12** 12 mm (not for Txx, Vxx, C01, C03, C04, G02, CH1)

TSBF / C01 / X / 0 / 100 /

06 / 4 / 0 / 0 / 000 / 4 / X / 0

## Sensor tip diameter, only for probe length ≥ 50 mm

- X** Without reduction (standard for M0x)
- 3** For probe diameter 6 mm
- 4** For probe diameter 6 mm, 8 mm, 10 mm
- 6** For probe diameter 8 mm, 10 mm, 12 mm

## Material

- 0** 1.4404 (AISI 316L) without certificate (standard for C03, C04, G01, G02, M0x)
- 1** 1.4404 (AISI 316L) incl. material certificate

## Surface finish

- 0**  $R_a \leq 0.8 \mu\text{m}$  (32  $\mu\text{in}$ )

## Transmitter

- 0** Without transmitter
- H** TT.B.H (hybrid: analog and IO-Link)
- D** TT.B.D (hybrid: analog and IO-Link, display optional)
- Z** TT.B.Z (1st transmitter TT.B.H, 2nd transmitter TT.B.D)
- Y** TT.B.Y (1st transmitter TT.B.H, 2nd transmitter TT.B.H)

## Measurement range

- 000** Without transmitter
- 00C** Unit °C (only with transmitter)
- 00F** Unit °F (only with transmitter)
- 00K** Unit K (only with transmitter)
- 04C** -10...40 °C
- 05C** 0...50 °C
- 10C** 0...100 °C
- 15C** 0...150 °C
- 20C** 0...200 °C
- 25C** 0...250 °C
- 10F** 0...100 °F
- 15F** 0...150 °F
- 20F** 0...200 °F
- 23F** 30...230 °F
- 25F** 0...250 °F
- M00** TT.B custom configuration

## Electrical connection

- 1** 1x cable gland (only with RTD type 2, 3, 7, 8, 9, B, C, D)
- 2** 2x cable gland
- 4** 1x M12 plug (4 pin, only with RTD type 2, 3, 7, 8, 9, B, C, D)
- 5** 2x M12 plug (4 pin)

## Enclosure

- X** Opaque plastic cap
- P** Clear plastic cap
- M** Stainless steel cap without control window
- W** Stainless steel with control window

## Orientation/display

- 0** Vertical no display
- 1** Vertical with display
- 2** Horizontal with display

## Order code

**TSBP** Temperatur Sensor Big for Pharma Applications, material wetted parts 1.4435 (AISI 316L)

**Standard temperature range (-50...250 °C / -58...482 °F)**  
**Process connection (⊗): 3-A approval)**

**T05** Tri-Clamp 1/2" and 3/4" (⊗ only for 3/4")  
**T10** Tri-Clamp DN10  
**TC1** Tri-Clamp 1" and 1½" ⊗  
**TC2** Tri-Clamp 2" ⊗  
**T25** Tri-Clamp 2½" ⊗  
**TC3** Tri-Clamp 3" ⊗  
**C01** CLEANadapt M12  
**C02** CLEANadapt G1/2"  
**N01** Plain rod  
**I46** Ingold 46 mm (Fermenter)  
**I52** Ingold 52 mm (Fermenter)  
**E08** PHARMadapt EPA-8 ⊗  
**E18** PHARMadapt EPA-18 ⊗

**Process connection without media contact**

**G03** Thread G1/4", sensor tip ø 3 mm, spring loaded  
**M01** PHARMadapt ESP G3/8" with cap nut, sensor tip ø 3 mm, spring loaded  
**M04** Sensor G3/8" with cap nut, sensor tip ø 4 mm, spring loaded

## Accessories: IOM-01

IO-Link Master with USB connection for control and programming of all Anderson-Negele IO-Link devices



**Product Information TSBF**

**FOOD**

# Temperature Sensor Big



**Application/Specified usage**

- Temperature sensor in big housing for food applications
- Aseptic temperature process connections without product contact for inline, precise and fast measurement. Prefabricated thermowells and build-in systems avoid opening process.
- Demounting the sensor without opening the process and without electrical disconnection avoid downtime of the equipment at calibration and maintenance.

**Application examples**

- Monitoring of CIP-/SIP-process
- Safe temperature measurement in hot steam and pressurized pipes
- Measurement in vessels with agitators with front flush version
- Temperature monitoring in vessels or pipes

**Hygienic design/Process connection**

- Hygienic process connection with CLEANadapt or FLEXadapt
- Versions available to conform to 3-A Standard 74-
- All wetted materials are FDA-conform
- Sensor completely made of stainless steel or stainless steel and PEEK
- Complete overview of process connections: see order code
- The Anderson-Negele CLEANadapt and FLEXadapt system offers a flow-optimized, hygienic and easily sterilizable installation solution for sensors.

**Features/Advantages**

- High accuracy and high ambient temperature resistance
- Customer offset and slope adjustment
- Flex hybrid mode with digital IO-Link or analog 4...20 mA
- Process temperature range -50...250 °C (-58...482 °F)
- Extended temperature range -200...400 °C (-328...752 °F)

**Options/Accessories**

- 2x RTD
- Front flush mounting
- 2x transmitter possible
- Programmable transmitters TTB.H and TTB.D using IO-Link
- Different RTDs (Pt100, Pt1000) and classes of accuracy (A, AA, AAA)
- Fast response sensor tip  $\varnothing$  3 mm (0.12 in)
- Spacers for high process temperature up to 250 °C (482 °F)
- Pre-assembled connecting cable for M12 plug
- Available also as mini version with head 18 mm: See TSMF

**Configurable design**



**Communication**



**Temperature sensor TSB with Tri-Clamp**



**Temperature sensor TSB with CLEANadapt with PEEK sealing ring**



Temperature sensor		
<b>Process connection</b>	CLEANadapt FLEXadapt ESF G3/8" Sensor G3/8" Tri-Clamp Varivent Thread Plain rod	M12, G1/2", G1/2"-P, G1/2"-SP Sensor with cap nut, sensor tip $\varnothing$ 3 mm Sensor with cap nut, sensor tip $\varnothing$ 4 mm 1/2", 3/4", DN10, 1", 1½", 2", 2½", 3" (DIN 32676) DN10/15 (type B), DN25 (type F), DN40/50 (type N) G1/4", G1/2" (DIN ISO 228)
<b>Tightening torque</b>	CLEANadapt M12, G1/2"-P, G1/2"-SP CLEANadapt G1/2"	10 Nm 20 Nm
<b>Dimensions</b>	insertion length probe diameter sensor tip diameter	0...2000 mm (0...78.74 in) 3, 4, 6, 8, 10, 12 mm (0.12, 0.16, 0.24, 0.31, 0.39, 0.47 in) 3, 4, 6 mm (0.12, 0.16, 0.24 in), see dimensional drawings
<b>Materials</b>	connecting head, spacer wetted parts CLEANadapt G1/2"-P, G1/2"-SP	stainless steel 1.4301 (AISI 304) stainless steel 1.4404 (AISI 316L), $R_a \leq 0.8 \mu\text{m}$ (32 $\mu\text{in}$ ) PEEK, FDA 21 CFR 177.2415
<b>Surface finish</b>		$R_a \leq 0.8 \mu\text{m}$ (32 $\mu\text{in}$ )
<b>Operating pressure</b>	CLEANadapt CLEANadapt G1/2"-P, G1/2"-SP	50 bar maximum 10 bar maximum
<b>Process temperature</b>	standard range extended range	-50...250 °C (-58...482 °F) -200...400 °C (-328...752 °F)
<b>Resistance Temperature Detector (RTD)</b>	accuracy classes	Class A: $\pm(0.15 + 0.002 \times  t )$ °C Class AA / 1/3 DIN B: $\pm(0.1 + 0.0017 \times  t )$ °C Class AAA / 1/10 DIN B: $\pm(0.03 + 0.0005 \times  t )$ °C
<b>Electrical connection</b>	plug connection cable gland	M12 plug 1.4301 (AISI 304) M16 x 1.5
<b>Protection class</b>		IP 69 K (with electrical connection M12 plug)

Transmitter TTB.H, TTB.D		
<b>Temperature ranges</b>	ambient (with Display) storage	-40...85 °C (-40...185 °F) 0...70 °C (32...158 °F) -55...90 °C (-67...194 °F)
<b>Measuring ranges</b>		standard °C: -10...40, 0...50 / 100 / 150 / 200 °C standard °F: 0...100, 0...150, 0...200, 30...230, 0...250 °F custom ranges programmable
<b>Accuracy</b>	input repeatability	$\leq 0.1$ K (at ambient $\leq 85$ °C (185 °F)) $\leq 0.05$ K
<b>Temperature drift</b>	typical maximum	5 mK/K (at 25 °C (77 °F)) 10 mK/K (at 25 °C (77 °F))
<b>Adjustments</b>	damping offset slope	0...120 s $\leq \pm 10$ K $\leq \pm 25$ %
<b>Digital output</b>	digital resolution master cycle time power supply	IO-Link 0.01 K $\geq 51.2$ ms 18...30 V DC according to IO-Link
<b>Analog output</b>	signal accuracy temperature drift typical temperature drift max effect of supply voltage variations maximum load resistance power supply	4...20 mA, 2 wire $\leq 0.05$ % of upper range limit 0.0005 %/K (at 25 °C (77 °F)) 0.003 %/K (at 25 °C (77 °F)) $< 0.001$ %/V (at 24 V DC) $R \leq (V_{DC} - 12 V) : 0.024$ A (at 25 °C (77 °F)), see diagram 12...30 V DC

Accuracy classes of temperature sensors | Tolerances for Pt100 acc. to DIN EN 60751

Pt100	Class A	Class AA / 1/3 DIN B	Class AAA / 1/10 DIN B
0 °C / 100 Ω	±0.15 K / ±0.06 Ω	±0.10 K / ±0.04 Ω	±0.03 K / ±0.01 Ω
100 °C / 138.5 Ω	±0.35 K / ±0.13 Ω	±0.27 K / ±0.10 Ω	±0.08 K / ±0.03 Ω

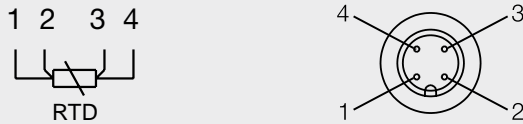
Accuracy classes of temperature sensors | Tolerances for Pt1000 acc. to DIN EN 60751

Pt1000	Class A	Class AA / 1/3 DIN B	Class AAA / 1/10 DIN B
0 °C / 1000 Ω	±0.15 K / ±0.6 Ω	±0.10 K / ±0.4 Ω	±0.03 K / ±0.1 Ω
100 °C / 1385.1 Ω	±0.35 K / ±1.3 Ω	±0.27 K / ±1.0 Ω	±0.08 K / ±0.3 Ω

Electrical connection without transmitter

With 1x or 2x M12 plug

same connection for 2nd M12 plug (2 x RTD)

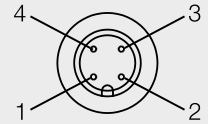


Electrical connection with transmitter

1x or 2x RTD with M12 plug for analog operation

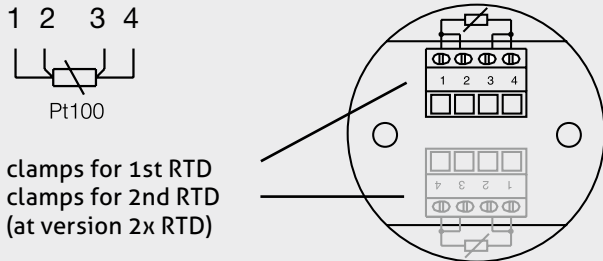
same connection for 2nd M12 plug (2 x RTD)

- 1: + power supply
- 2: - power supply 4...20 mA
- 3: not connected
- 4: not connected



With 1x or 2x cable gland

Configuration strip terminal

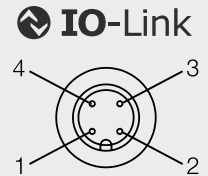


clamps for 1st RTD  
clamps for 2nd RTD  
(at version 2x RTD)

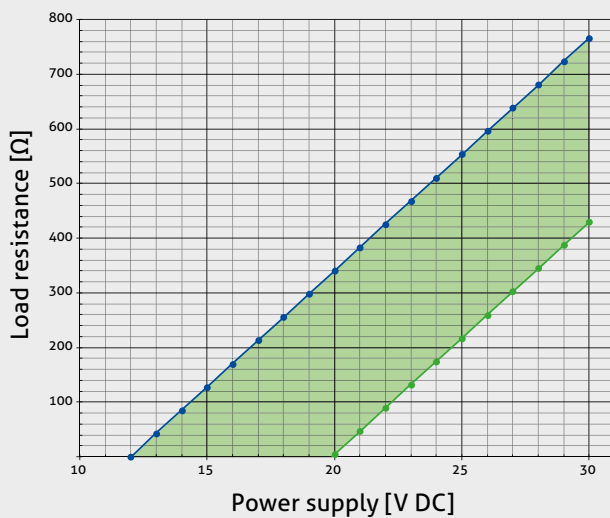
1x or 2x RTD with M12 plug for IO-Link operation

same connection for 2nd M12 plug

- 1: + power supply 24 V DC
- 2: not connected
- 3: - power supply
- 4: IO-Link



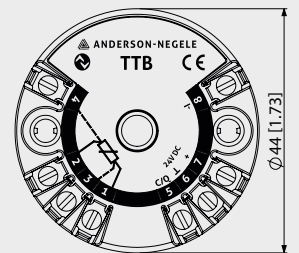
Load resistance diagram at ambient temperature 85 °C



● R<sub>max</sub>  
● R<sub>min</sub> (85 °C (185 °F) ambient temperature)

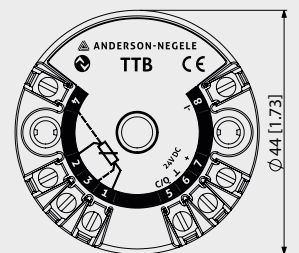
Connection with IO-Link output

- 1: RTD
- 2: RTD
- 3: RTD
- 4: RTD
- 5: IO-Link
- 6: - power supply (4...20 mA)
- 7: + power supply (24 V DC)
- 8: not connected



Connection with 4...20 mA output

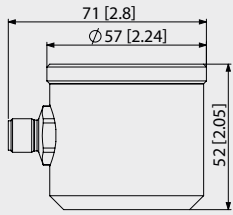
- 1: RTD
- 2: RTD
- 3: RTD
- 4: RTD
- 5: not connected
- 6: not connected
- 7: + power supply (24 V DC)
- 8: - power supply (4...20 mA)



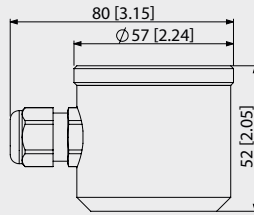
Electrical connection | Head Big



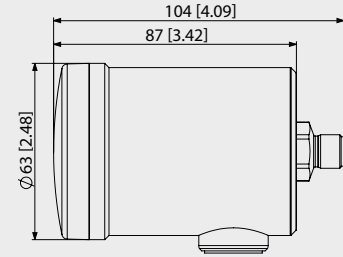
Head unit with 1 transmitter (no display) and M12 plug



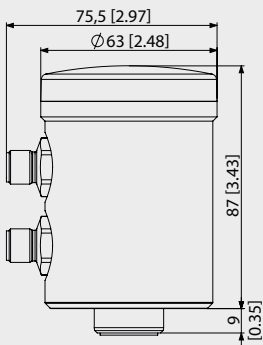
Head unit with 1 transmitter (no display) and cable gland



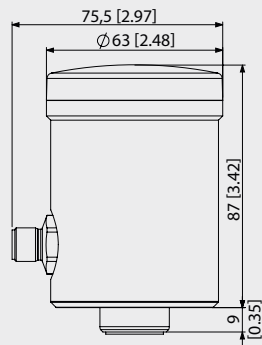
Head unit horizontal with 1 or 2 transmitter and display



Head unit with 2 transmitter (display optional)



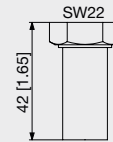
Head unit with 1 transmitter, display and M12 plug



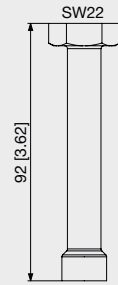
Spacer extension



Short



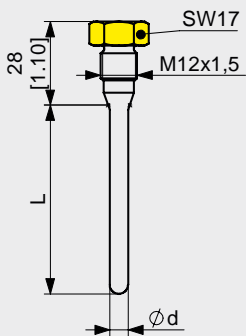
Long



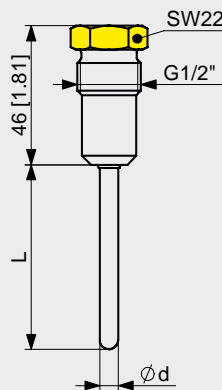
Process connection



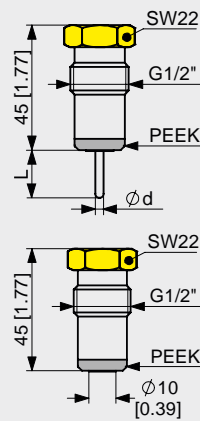
C01 | CLEANadapt M12



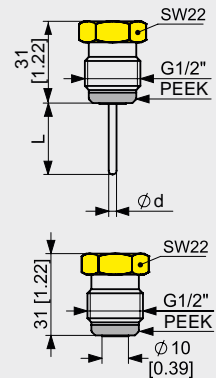
C02 | CLEANadapt G1/2"



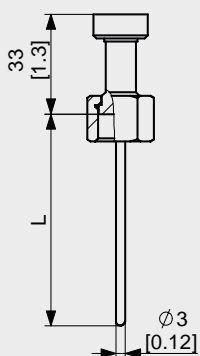
C03 | CLEANadapt G1/2"-P



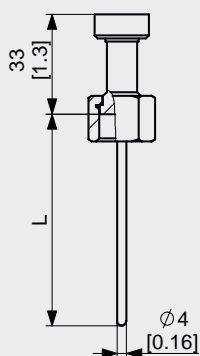
C04 | CLEANadapt G1/2"-SP



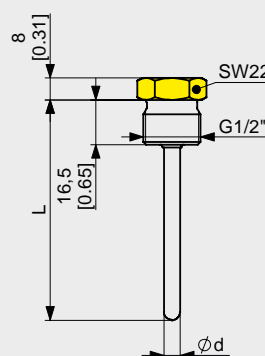
M02 | FLEXadapt G3/8" cap nut, Ø 3 mm



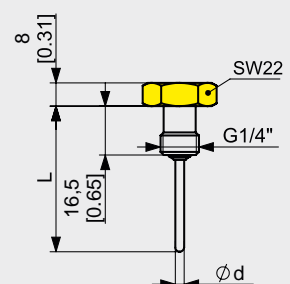
M03 | Sensor G3/8" cap nut, Ø 4 mm

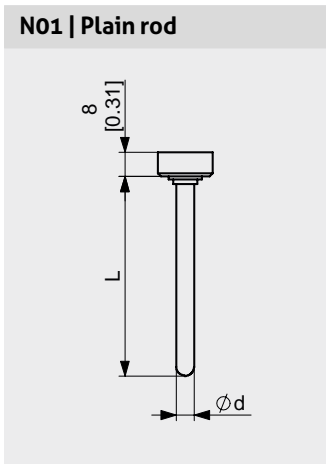
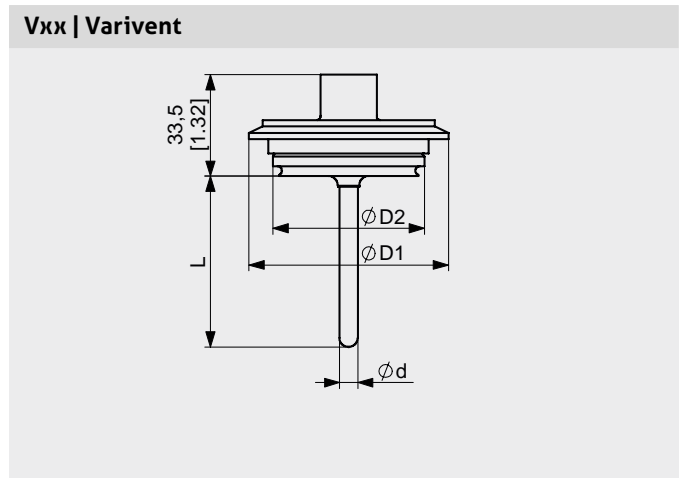
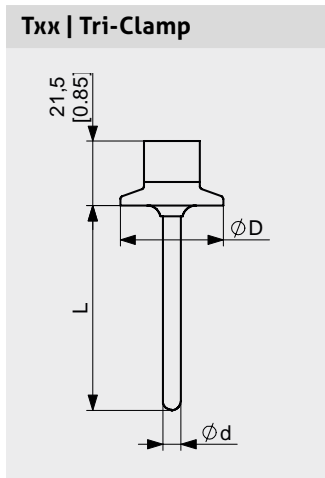
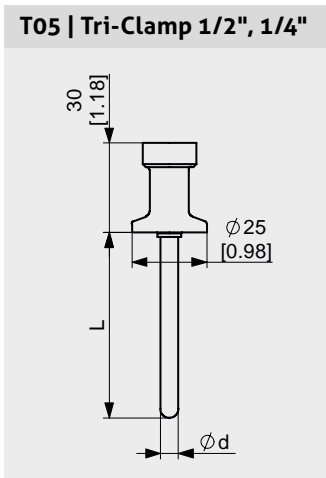
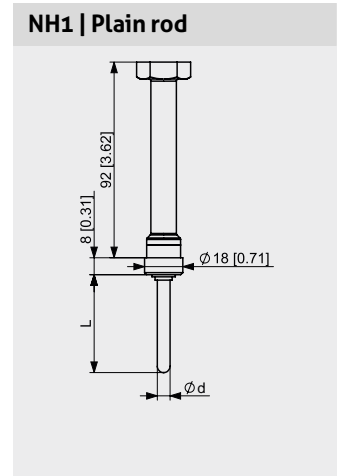
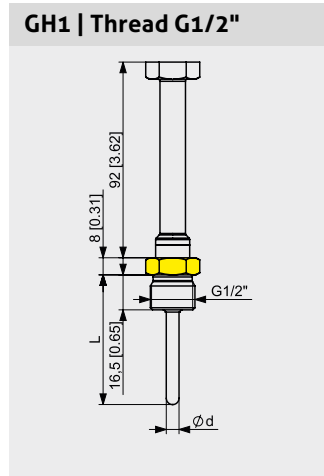
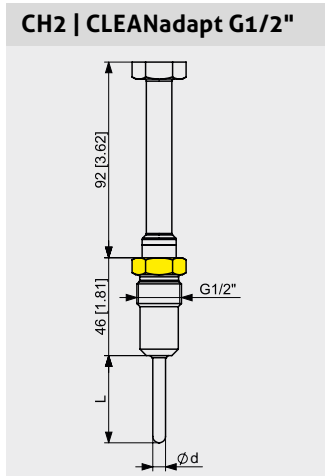
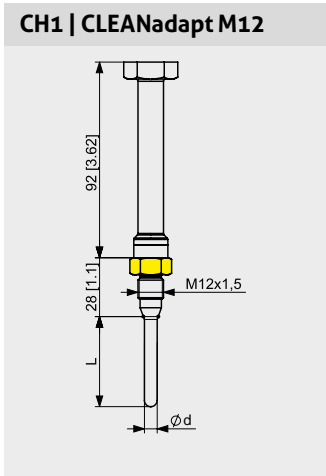


G01 | Thread G1/2"



G02 | Thread G1/4"





**Tri-Clamp size**

Type	$\phi D$ [mm / inch]
T10	34.0 / 1.34
TC1	50.5 / 1.99
TC2	64.0 / 2.52
T25	77.5 / 3.05
TC3	91.0 / 3.58

**Dimensions table Varivent**

Type	Varivent type	$\phi D1$ [mm / inch]	$\phi D2$ [mm / inch]
V10	B	52.7 / 2.09	31.0 / 1.22
V25	F	66.0 / 2.60	50.0 / 1.97
V40	N	84.0 / 3.31	68.0 / 2.68

**Advice**



Tighten the sensor only at the lower, marked in yellow spanner flat!

**Sensor tip diameter and response time**

All temperature sensors are available with smaller sensor tips, to ensure a shorter response time. The mentioned times were measured by emerging a temperature sensor from room temperature into boiling water. The response times given are typical measured values and may vary due to factors such as process connection, immersion length and medium.

**$\phi 6$  mm**

$t_{50} \leq 1.8$  s  
 $t_{90} \leq 5.2$  s  
 D: 8, 10, 12 mm

**$\phi 4$  mm**

$t_{50} \leq 1.2$  s  
 $t_{90} \leq 3.5$  s  
 D: 6, 8, 10 mm

**$\phi 3$  mm**

$t_{50} \leq 0.8$  s  
 $t_{90} \leq 2.2$  s  
 D: 6 mm

**Frontflush**

$t_{50} \leq 4$  s  
 $t_{90} \leq 30$  s

**Mechanical connection/Installation**

- Use Negele CLEANadapt or FLEXadapt system for safe operation of measuring point!

**Transport/Storage**

- Do not store outside
- Store in an area that is dry and dust-free
- Do not expose to corrosive media
- Protect against solar radiation
- Avoid mechanical shock and vibration
- Storage temperature -55...90 °C (-67...194 °F)
- Relative humidity max. 98 %

**Cleaning/Maintenance**

- When using a pressure washer, do not point the nozzle directly at the electrical connections.

**Reshipment**

- Sensors shall be clean and free of media or heat-conductive paste and must not be contaminated with dangerous media!
- Use suitable transport packaging only to avoid damage of the equipment!

**Note on 3-A Sanitary Standard 74-**

For more information about 3-A conform installation please visit our webpage:  
[www.anderson-negele.com/3A74.pdf](http://www.anderson-negele.com/3A74.pdf)

Click on the PDF icon to download the document.



**Click or Scan**

**Conventional usage**

- Not suitable for applications in explosive areas.
- Not suitable for applications in safety-relevant system parts (SIL).

**Standards and guidelines**

- Compliance with the applicable regulations and directives is mandatory.

**Note on CE**

- Applicable directives:  
Electromagnetic Compatibility Directive 2014/30/EU
- Compliance with the applicable EU directives is identified by the CE label on the product.
- The operating company is responsible for complying with the guidelines applicable to the entire installation.

**Disposal**

- Electrical devices should not be disposed of with household trash. They must be recycled in accordance with national laws and regulations.
- Take the device directly to a specialized recycling company and do not use municipal collection points.

**Accessories**

**PVC-cable with M12 connection made of 1.4305 (AISI 303), IP 69 K, unshielded**

**M12-PVC / 4-5 m** 4 pin, length 5 m

**M12-PVC / 4-10 m** 4 pin, length 10 m

**M12-PVC / 4-25 m** 4 pin, length 25 m

**TPE-cable with M12 connection made of 1.4571 (AISI 316Ti), IP 69, shielded**

**M12-TPE / 8-5 m** 8 pin, length 5 m

**M12-TPE / 8-10 m** 8 pin, length 10 m

**IOM-1**

Anderson-Negele USB IO-Link Master for IO-Link Sensors  
 incl. power supply, USB cable,  
 M12 connection cable (1.5 m/59.1 inch)

**IOM-1, PVC-cable with M12-connection**



## Order code

**TSBF** Temperatur Sensor Big for Food Applications, material wetted parts 1.4404 (AISI 316L)

**Standard temperature range (-50...250 °C / -58...482 °F)**

**Process connection (A): 3-A conform)**

**T05** Tri-Clamp 1/2" and 3/4" (A only for 3/4")

**T10** Tri-Clamp DN10

**TC1** Tri-Clamp 1" and 1½" (A)

**TC2** Tri-Clamp 2" (A)

**T25** Tri-Clamp 2½" (A)

**TC3** Tri-Clamp 3" (A)

**V10** Varivent type B DN10/15

**V25** Varivent type F DN25 (A)

**V40** Varivent type N DN40/50 (A)

**C01** CLEANadapt M12

**C02** CLEANadapt G1/2"

**C03** CLEANadapt G1/2"-P (PEEK) (A)

**C04** CLEANadapt G1/2"-SP (short version, PEEK) (A)

**N01** Plain rod

**G01** Thread G1/2"

**G02** Thread G1/4"

**Ext. temperature range (-200...400 °C / -328...752 °F)**

**Process connection**

**CH1** CLEANadapt M12 (incl. spacer)

**CH2** CLEANadapt G1/2" (incl. spacer)

**GH1** Thread G1/2" (incl. spacer)

**NH1** Plain rod (incl. spacer)

**Process connection without media contact**

**M01** FLEXadapt ESF G3/8" with cap nut, sensor tip ø 3 mm, spring loaded

**M02** FLEXadapt ESF G3/8" with cap nut, sensor tip ø 3 mm

**M03** Sensor G3/8" with cap nut, sensor tip ø 4 mm

**M04** FLEXadapt ESF G3/8" with cap nut, sensor tip ø 4 mm, spring loaded

**Spacer extension**

**X** Without spacer (perm. process temp. ≤ 100 °C (212 °F), standard for extended temperatur range)

**S** Short spacer (permanent process temperature ≤ 150 °C (305 °F))

**H** Long spacer (permanent process temperature ≤ 250 °C (482 °F))

**RTD type**

**0** 1x Pt100 A, 2-wire (probe length ≤ 250 mm)

**1** 1x Pt100 AA, 2-wire (probe length ≤ 150 mm)

**2** 2x Pt100 A, 2-wire (probe length ≤ 250 mm)

**3** 2x Pt100 AA, 2-wire (probe length ≤ 150 mm)

**4** 1x Pt100 A, 4-wire (probe length ≥ 50 mm)

**5** 1x Pt100 AA, 4-wire (probe length ≥ 50 mm)

**6** 1x Pt100 AAA, 4-wire

**7** 2x Pt100 A, (3-) 4-wire (probe length ≥ 50 mm, 3-wire with sensor tip ø 3 mm)

**8** 2x Pt100 AA, (3-) 4-wire (probe length ≥ 50 mm, 3-wire with sensor tip ø 3 mm)

**9** 2x Pt100 AAA, 4-wire

**A** 1x Pt1000 A, 2-wire

**B** 1x Pt1000 AA, 2-wire

**C** 2x Pt1000 A, 2-wire

**D** 2x Pt1000 AA, 2-wire

**Variable probe length [mm]**

**0** Only for C03, C04

**10...50** In steps of 5 mm

**51...250** In steps of 5 mm

**251...500** In steps of 10 mm

**501...1000** In steps of 50 mm

**1001...2000** In steps of 100 mm

**Intermediate lengths** Not for M0x

**Probe length for process connection [mm]**

**M01,** **M03,**

**M02** **M04**

**37** **68**

**59** **148**

**83** **198**

**97** **234**

**160** **238**

**249**

**Probe diameter**

**03** 3 mm (standard for M01, M02, not for xHx)

**04** 4 mm (standard for M03, M04)

**06** 6 mm (standard for C03, C04)

**08** 8 mm (not for T05, V10, C01, CH1)

**10** 10 mm (not for Txx, Vxx, C01, C03, C04, G02, CH1)

**12** 12 mm (not for Txx, Vxx, C01, C03, C04, G02, CH1)

## Order code

Sensor tip diameter, only for probe length  $\geq 50$  mm

- X** Without reduction (standard for MOx)
- 3** For probe diameter 6 mm
- 4** For probe diameter 6 mm, 8 mm, 10 mm
- 6** For probe diameter 8 mm, 10 mm, 12 mm

## Material

- 0** 1.4404 (AISI 316L) without certificate (standard for CO3, CO4, G01, G02, MOx)
- 1** 1.4404 (AISI 316L) incl. material certificate

## Surface finish

- 0**  $R_a \leq 0.8 \mu\text{m}$  (32  $\mu\text{in}$ )

## Transmitter

- 0** Without transmitter
- H** TT.B.H (hybrid: analog and IO-Link)
- D** TT.B.D (hybrid: analog and IO-Link, display optional)
- Z** TT.B.Z (1st transmitter TT.B.H, 2nd transmitter TT.B.D)
- Y** TT.B.Y (1st transmitter TT.B.H, 2nd transmitter TT.B.H)

## Measurement range

- 000** Without transmitter
- 00C** Unit °C (only with transmitter)
- 00F** Unit °F (only with transmitter)
- 00K** Unit K (only with transmitter)
- 04C** -10...40 °C
- 05C** 0...50 °C
- 10C** 0...100 °C
- 15C** 0...150 °C
- 20C** 0...200 °C
- 25C** 0...250 °C
- 10F** 0...100 °F
- 15F** 0...150 °F
- 20F** 0...200 °F
- 23F** 30...230 °F
- 25F** 0...250 °F
- M00** TT.B custom configuration

## Electrical connection

- 1** 1x cable gland (only with RTD type 2, 3, 7, 8, 9, B, C, D)
- 2** 2x cable gland
- 4** 1x M12 plug (4 pin, only with RTD type 2, 3, 7, 8, 9, B, C, D)
- 5** 2x M12 plug (4 pin)

## Enclosure

- X** Opaque plastic cap
- P** Clear plastic cap
- M** Stainless steel cap without control window
- W** Stainless steel with control window

## Orientation/display

- 0** Vertical no display
- 1** Vertical with display
- 2** Horizontal with display

TSBF / C01 / X / 0 / 100 / 06 / 4 / 0 / 0 / 0 / 000 / 4 / X / 0