Product Information TSBF **FOOD**

Temperature Sensor Big

CLEANadapt FLEXadapt

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 with EHEDG approval
- 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 ø 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
- IO-Link Master (IOM-1)
- Add-On Instructions are available at www.anderson-negele.com/aoi

Configurable design

Communication

IO-Link 4...20 mA

Temperature sensor TSB with Tri-Clamp

Temperature sensor TSB with CLEANadapt with PEEK sealing ring

TSB with display option

Temperature sensor		
Process connection	CLEANadapt FLEXadapt ESF G3/8" Sensor G3/8" Tri-Clamp Varivent Thread Plain rod	M12, G1/2", G1/2"-P, G1/2"-SP, G1/2"-PFF, G1/2"-SPFF Sensor with cap nut, sensor tip ø 3 mm Sensor with cap nut, sensor tip ø 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)
Tightening torque	CLEANadapt M12, G1/2"-P, -SP, -PFF, -SPFF CLEANadapt G1/2"	10 Nm 20 Nm
Dimensions	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
Materials	connecting head, spacer wetted parts CLEANadapt G1/2"-P, -SP, -PFF, -SPFF	stainless steel 1.4301 / AISI 304 stainless steel 1.4404 / AISI 316L PEEK, FDA 21 CFR 177.2415
Surface finish		R_a ≤ 0.8 µm / 32 µin
Operating pressure	CLEANadapt CLEANadapt G1/2"-P, -SP, -PFF, -SPFF	50 bar / 725 psi maximum 10 bar / 14.5 psi maximum
Process temperature	standard range extended range	-50...250 °C / -58...482 °F -200...400 °C / -328...752 °F
Resistance Temperature Detector (RTD)	accuracy classes	Class A: ±(0.15 + 0.002 × | t |) °C Class AA / 1/3 DIN B: ±(0.1 + 0.0017 × | t |) °C Class AAA / 1/10 DIN B: ±(0.03 + 0.0005 × | t |) °C
Electrical connection	plug connection cable gland	M12 plug 1.4301 / AISI 304 M16 x 1.5
Protection class		IP 69 K (with electrical connection M12 plug)

Transmitter TTB.H, TTB.D		
Temperature ranges	ambient (with Display) storage	-40...85 °C / -40...185 °F 0...70 °C / 32...158 °F -55...90 °C / -67...194 °F
Measuring ranges		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 programable
Accuracy	input repeatability	≤ 0.1 K (at ambient ≤ 85 °C / 185 °F) ≤ 0.05 K
Temperature drift	typical maximum	5 mK/K (at 25 °C / 77 °F) 10 mK/K (at 25 °C / 77 °F)
Adjustments	damping offset slope	0...120 s ≤ ±10 K ≤ ±25 %
Digital output	 digital resolution master cycle time power supply	IO-Link 0.01 K ≥ 51.2 ms 18...30 V DC according to IO-Link
Analog output	signal accuracy temperature drift typical temperature drift max effect of supply voltage variations maximum load resistance power supply	4...20 mA, 2 wire ≤ 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 ≤ (V DC - 12 V) : 0.024 A (at 25 °C / 77 °F), see diagram 12...30 V DC

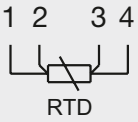
Accuracy classes of temperature sensors | Tolerances for Pt100 acc. to DIN EN 60751			
Pt100	**Class A**	**Class AA / 1/3 DIN B**	**Class AAA / 1/10 DIN B**
0 °C / 100 Ω	±0.15 K / ±0.06 Ω	±0.10 K / ±0.04 Ω	±0.03 K / ±0.01 Ω
100 °C / 138.5 Ω	±0.35 K / ±0.13 Ω	±0.27 K / ±0.10 Ω	±0.08 K / ±0.03 Ω

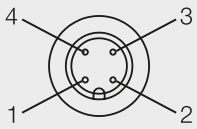
Accuracy classes of temperature sensors | Tolerances for Pt1000 acc. to DIN EN 60751			
Pt1000	**Class A**	**Class AA / 1/3 DIN B**	**Class AAA / 1/10 DIN B**
0 °C / 1000 Ω	±0.15 K / ±0.6 Ω	±0.10 K / ±0.4 Ω	±0.03 K / ±0.1 Ω
100 °C / 1385.1 Ω	±0.35 K / ±1.3 Ω	±0.27 K / ±1.0 Ω	±0.08 K / ±0.3 Ω

Electrical connection without transmitter

With 1x or 2x M12 plug

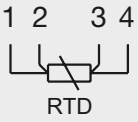
same connection for 2nd M12 plug (2 x RTD)

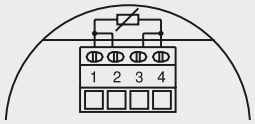




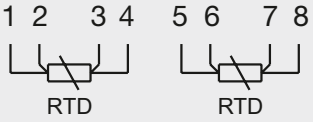
With 1x or 2x cable gland

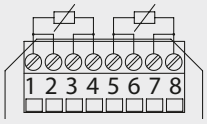
Configuration strip terminal 1x RTD



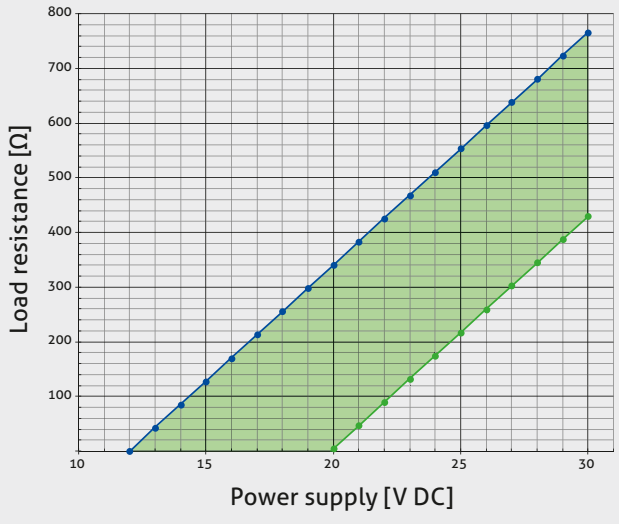


Configuration strip terminal 2x RTD





Load resistance diagram at ambient temperature 85 °C / 185 °F

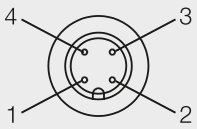


Electrical connection with transmitter

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

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

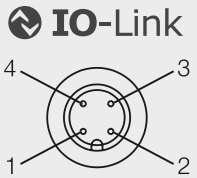
1: + power supply
2: - power supply 4...20 mA
3: not connected
4: not connected



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

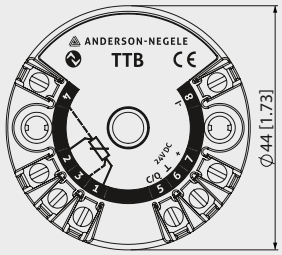
same connection for 2nd M12 plug

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



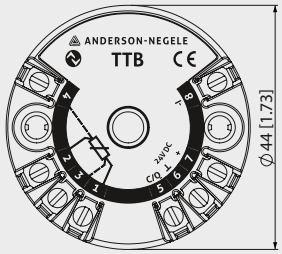
Connection with IO-Link output

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



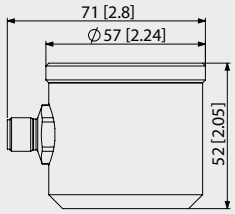
Connection with 4...20 mA output

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)

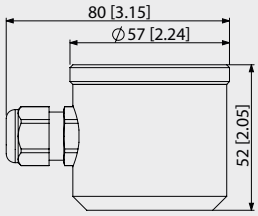


Electrical connection | Head Big

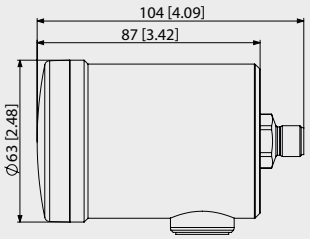
Head unit with 1 transmitter (no display) and M12 plug



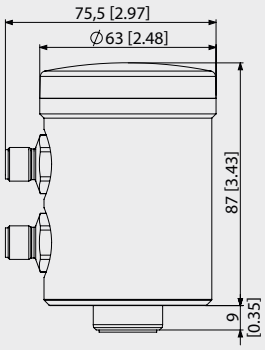
Head unit with 1 transmitter (no display) and cable gland



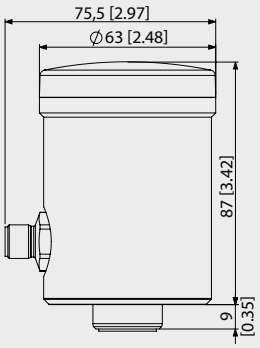
Head unit horizontal with 1 transmitter, display and M12 plug



Head unit with 2 transmitter (display optional)

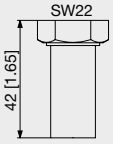


Head unit with 1 transmitter, display and M12 plug

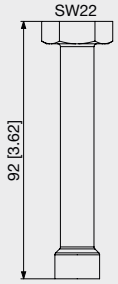


Spacer extension

Short

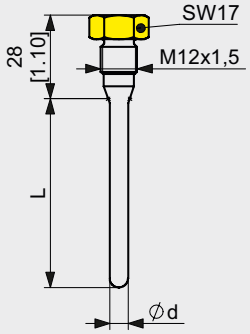


Long

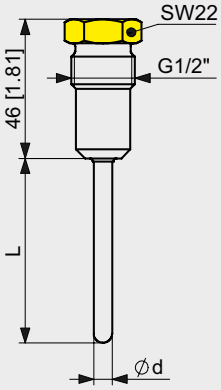


Process connection

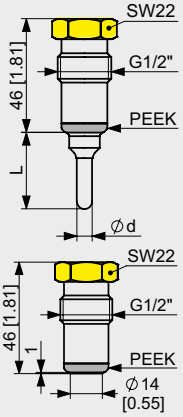
C01 | CLEANadapt M12



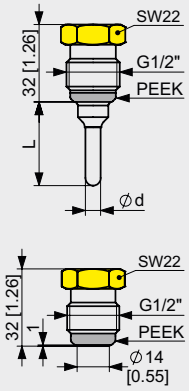
C02 | CLEANadapt G1/2"



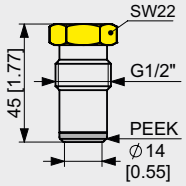
C03 | CLEANadapt G1/2"-P



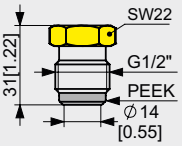
C04 | CLEANadapt G1/2"-SP



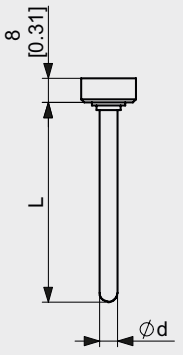
C05 | CLEANadapt G1/2"-PFF



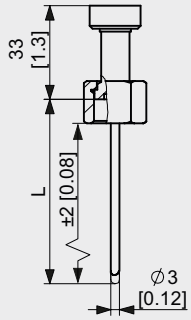
C06 | CLEANadapt G1/2"-SPFF



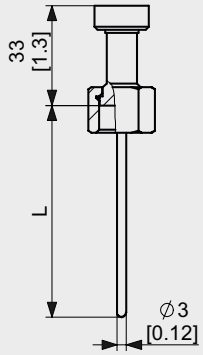
N01 | Plain rod



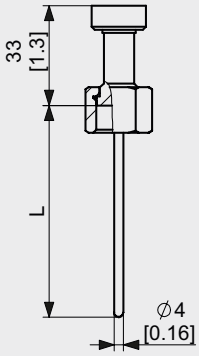
M01 | FLEXadapt ESF G3/8" cap nut, ø 3 mm, spring loaded



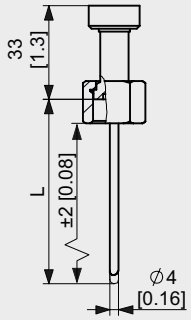
M02 | FLEXadapt ESF G3/8" cap nut, ø 3 mm



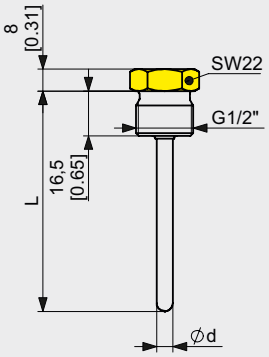
M03 | Sensor G3/8" cap nut, ø 4 mm



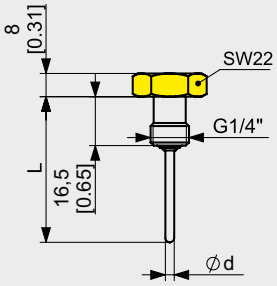
M04 | Sensor G3/8" cap nut, ø 4 mm spring loaded



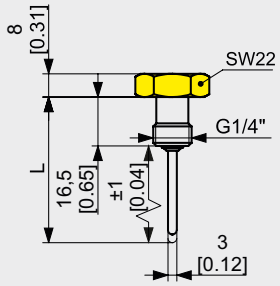
G01 | Thread G1/2"



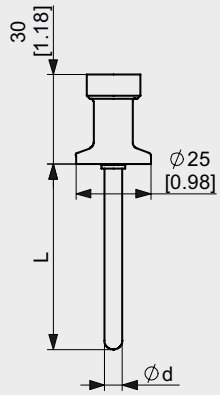
G02 | Thread G1/4"



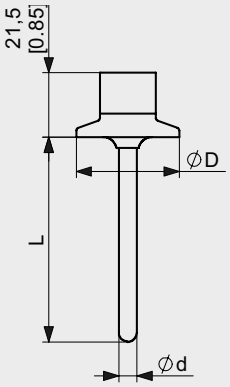
G03 | Thread G1/4" ø 3 mm, spring loaded



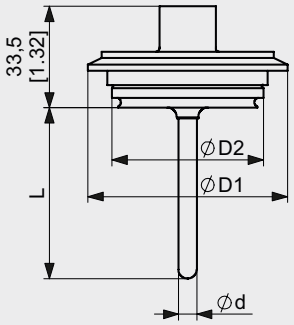
T05 | Tri-Clamp 1/2", 1/4"



Txx | Tri-Clamp



Vxx | Varivent



Advice

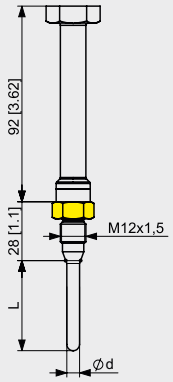
Tighten the sensor only at the lower, marked in yellow spanner flat!

Tri-Clamp size	
Type	**ø 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

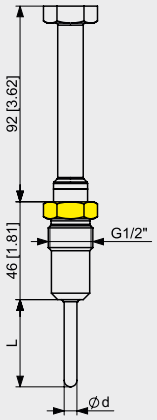
Dimensions table Varivent			
Type	**Varivent type**	**ø D1 [mm / inch]**	**ø D2 [mm / inch]**
V10	B	52.7 / 2.09	31.0 / 1.22
V25	F	66.0 / 2.60	50.0 / 1.97
V40	N	84.0 / 3.31	68.0 / 2.68

Process connections with extended temperature range

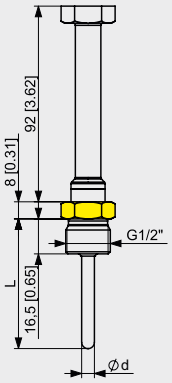
CH1 | CLEANadapt M12



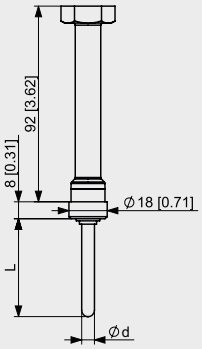
CH2 | CLEANadapt G1/2"



GH1 | Thread G1/2"



NH1 | Plain rod

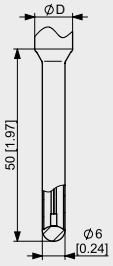


Sensor tip diameter and response time

All temperature sensors are available with smaller sensor tips, to ensure a shorter response time. The mentioned times were measured by emersing 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.

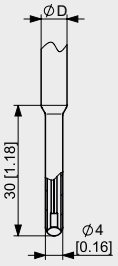
ø 6 mm

t_{50} ≤ 1.8 s
t_{90} ≤ 5.2 s
D: 8, 10, 12 mm



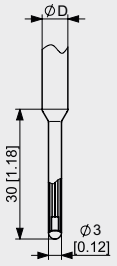
ø 4 mm

t_{50} ≤ 1.2 s
t_{90} ≤ 3.5 s
D: 6, 8, 10 mm



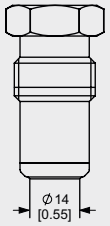
ø 3 mm

t_{50} ≤ 0.8 s
t_{90} ≤ 2.2 s
D: 6 mm



Front-flush

t_{50} ≤ 2.5 s
t_{90} ≤ 15 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-

Information on installation according to 3-A standard is available on our website:
www.anderson-negele.com/3A74.pdf

Click on the PDF icon to download the document.

PDF

Click or Scan

Note on IO-Link

Information on parameters and events are available on our website:

www.anderson-negele.com/iodd

Click on the IO-Link icon to open the website.

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.

Note on EHEDG Hygienic Standard Type EL Class I

Information on installation according to EHEDG standard is available on our website:
www.anderson-negele.com/EHEDG.pdf

Click on the PDF icon to download the document.

PDF

Click or Scan

Order code

TSBF Temperatur Sensor Big for Food Applications, material wetted parts 1.4404 / AISI 316L

Process connection (Ⓐ: 3-A conform, Ⓔ: EHEDG approval)
Standard temperature range (-50...250 °C / -58...482 °F)

- **T05** Tri-Clamp 1/2" and 3/4" (Ⓐ and Ⓔ 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) Ⓐ Ⓔ
- **C05** CLEANadapt G1/2"-PFF (PEEK front-flush)
- **C06** CLEANadapt G1/2"-SPFF (short version, PEEK front-flush)
- **N01** Plain rod
- **G01** Thread G1/2"
- **G02** Thread G1/4"

Without media contact

- **G03** Thread 1/4", sensor tip ø 3 mm, spring loaded
- **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** Sensor G3/8" with cap nut, sensor tip ø 4 mm, spring loaded

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

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

Spacer extension

- **X** Without spacer (permanent process temperature ≤ 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 (probe length ≥ 50 mm)
- **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 (probe length ≥ 50 mm)
- **A** 1x Pt1000 A, 2-wire
- **B** 1x Pt1000 AA, 2-wire
- **C** 2x Pt1000 A, 2-wire
- **D** 2x Pt1000 AA, 2-wire

Order code

Variable probe length [mm] - for process connections not listed separately

0	Only for front-flush version C03, C04, C05, C06
10...50	In steps of 5 mm
51...150	In steps of 5 mm
151...250	In steps of 10 mm
251...2000	In steps of 10 mm, 251 mm up to 500 mm 50 mm, 501 mm up tp 1000 mm 100 mm, up to 2000 mm
Intermediate lengths	Not for M0x, C03, C04, C05, C06, G03 (Minimum order quantity: 3 pieces)

Probe lengths [mm] for different process connections

For process connection C03, C04

0	Front-flush version
10	With probe ø 8 mm
20...500	With probe ø 6 mm In steps of 5 mm, 20 mm up to 150 mm In steps of 10 mm, 151 mm up to 500 mm

For front-flush process connection C05, C06

0

For process connection without media contact M01, M02

37
59
83
97
160

For process connection without media contact M03, M04

68
148
198
234
238
249

For process connection without media contact G03

36
61
75
93
100
105
115
120
130
140
160

Probe diameter

00	0 mm (standard for front-flush version: C03, C04, C05, C06)
03	3 mm (standard for M01, M02, G03, not for xHx)
04	4 mm (standard for M03, M04)
06	6 mm (standard for C03, C04 with probe length 20 mm up to 500 mm)
08	8 mm (standard for C03, C04 with probe length 10 mm, not for T05, V10, C01, CH1)
10	10 mm (not for Txx, Vxx, C01, G02, CH1)
12	12 mm (not for Txx, Vxx, C01, G02, CH1)

Sensor tip diameter, only for probe length ≥ 50 mm

X	Without reduction (standard for M0x, G03)
3	For probe ø 6 mm
4	For probe ø 6, 8, 10 mm
6	For probe ø 8, 10, 12 mm

Material

0	1.4404 / AISI 316L without certificate (standard for C03, C04, G0x, M0x)
1	1.4404 / AISI 316L incl. material certificate

Order code

Surface finish

0 $R_a \leq 0.8$ µm / 32 µin

Transmitter

0 Without transmitter [1]
H TTB.H (hybrid: analog and IO-Link) [1]
D TTB.D (hybrid: analog and IO-Link, display optional) [2]
Z TTB.Z (1st transmitter TTB.H, 2nd transmitter TTB.D) [2]
Y TTB.Y (1st transmitter TTB.H, 2nd transmitter TTB.H) [3]

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 TTB custom configuration

Orientation/display

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

Electrical connection

1 1x Cable gland
2 2x Cable gland (only with RTD type 2, 3, 7, 8, 9, C, D)
4 1x M12 plug
5 2x M12 plug (only with RTD type 2, 3, 7, 8, 9, C, D)

Enclosure [*], only selectable with transmitter D, Z, Y (see notes below)

S Stainless steel cap
P Plastic cap

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

* Notes on Transmitter and Enclosure

1. When 0 or H transmitter is selected, stainless steel enclosure without control window is included without surcharge. No need to select an enclosure seperately when you order it.
2. When D or Z transmitter is selected an enclosure with control window will be delivered. Please select stainless steel or plastic enclosure during your order.
3. When Y transmitter is selected an enclosure without control window will be delivered. Please select stainless steel or plastic enclosure during your order.

Accessories

PVC-cable with M12 connection, brass nickel-plated, IP69K, shielded

M12-PVC/5G-8m	5 pin, length 8 m
M12-PVC/5G-15m	5 pin, length 15 m
M12-PVC/5G-30m	5 pin, length 30 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 in)

IOM-1

Notes

Notes

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