

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: $< \pm 0.1$ K**
- **Ambient temperature resistance: -40...85 °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 parallel measurement and thus redundant temperature monitoring**

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**
- **Optional Display with programming function**

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 pharma version TSBP and 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



TSBF for Food Applications:

Order code	
TSBF	Temperatur Sensor Big for Food Applications, material wetted parts 1.4404 (AISI 316L)
	Process connection (A): 3-A conform)
	Standard temperature range (-50...250 °C / -58...482 °F)
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)
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
M01	FLEXadapt ESF G3/8" with cap nut, spring loaded, sensor tip ø 3 mm
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, spring loaded, sensor tip ø 4 mm
	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
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

TSBF for Food Applications (continued):

<p>Variable probe length [mm] - for process connections not mentioned below</p> <p>0 Only for front-flush version C03, C04, C05, C06</p> <p>10...150 In steps of 5 mm</p> <p>151...500 In steps of 10 mm</p> <p>501...1000 In steps of 50 mm</p> <p>1001...2000 In steps of 100 mm</p> <p>Intermediate lengths Minimum order quantity: 3 pieces, not for M0x, C03, C04, C05, C06</p> <p>Probe lengths [mm] for different process connections</p> <p>For process connection C03, C04</p> <p>0 Front-flush version</p> <p>10 With probe ø 8 mm</p> <p>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</p> <p>For front-flush process connection C05, C06</p> <p>0</p> <p>For process connection without media contact M01, M02</p> <p>37</p> <p>59</p> <p>83</p> <p>97</p> <p>160</p> <p>For process connection without media contact M03, M04</p> <p>68</p> <p>148</p> <p>198</p> <p>234</p> <p>238</p> <p>249</p>	<p>Probe diameter</p> <p>00 0 mm (standard for front-flush version: C03, C04, C05, C06)</p> <p>03 3 mm (standard for M02, not for xHx)</p> <p>04 4 mm (standard for M03)</p> <p>06 6 mm (standard for C03, C04 with probe length 20 mm up to 500 mm)</p> <p>08 8 mm (standard for C03, C04 with probe length 10 mm, not for T05, V10, C01, CH1)</p> <p>10 10 mm (not for Txx, Vxx, C01, G02, CH1)</p> <p>12 12 mm (not for Txx, Vxx, C01, G02, CH1)</p> <p>Sensor tip diameter, only for probe length ≥ 50 mm</p> <p>X Without reduction (standard for M02, M03)</p> <p>3 For probe ø 6 mm</p> <p>4 For probe ø 6, 8, 10 mm</p> <p>6 For probe ø 8, 10, 12 mm</p> <p>Material</p> <p>0 1.4404 (AISI 316L) without certificate (standard for C03, C04, G01, G02, M0x)</p> <p>1 1.4404 (AISI 316L) incl. material certificate</p> <p>Surface finish</p> <p>0 $R_a \leq 0.8 \mu\text{m} / 32 \mu\text{in}$</p>	<p>Transmitter</p> <p>0 Without transmitter [1]</p> <p>H TTB.H (hybrid: analog and IO-Link) [1]</p> <p>D TTB.D (hybrid: analog and IO-Link, display optional) [2]</p> <p>Z TTB.Z (1st transmitter TTB.H, 2nd transmitter TTB.D) [2]</p> <p>Y TTB.Y (1st transmitter TTB.H, 2nd transmitter TTB.H) [3]</p> <p>Measurement range</p> <p>000 Without transmitter</p> <p>00C Unit °C (only with transmitter)</p> <p>00F Unit °F (only with transmitter)</p> <p>00K Unit K (only with transmitter)</p> <p>04C -10...40 °C</p> <p>05C 0...50 °C</p> <p>10C 0...100 °C</p> <p>15C 0...150 °C</p> <p>20C 0...200 °C</p> <p>25C 0...250 °C</p> <p>10F 0...100 °F</p> <p>15F 0...150 °F</p> <p>20F 0...200 °F</p> <p>23F 30...230 °F</p> <p>25F 0...250 °F</p> <p>M00 TTB custom configuration</p> <p>Orientation/display</p> <p>0 Vertical no display</p> <p>1 Vertical with display</p> <p>2 Horizontal with display</p> <p>Electrical connection</p> <p>1 1x Cable gland</p> <p>2 2x Cable gland (only with RTD type 2, 3, 7, 8, 9, B, C, D)</p> <p>4 1x M12 plug</p> <p>5 2x M12 plug (only with RTD type 2, 3, 7, 8, 9, B, C, D)</p> <p>Enclosure [2], only selectable with transmitter D, Z, Y (see notes below)</p> <p>S Stainless steel cap</p> <p>P Plastic cap</p>
<p>TSBF / C01 / X / 0 / 100 / 06 / 4 / 0 / 0 /</p>	<p>0 / 0 / 000 / 0 / 4 / 5</p>	

Modular Sensor platform with IO-Link and 4...20 mA

The Flex-Hybrid Technology with IO-Link and 4...20 mA combines the best of both worlds: Data from the sensor can be transmitted digitally, analogously or in parallel. The bidirectional communication enables status control and preventive maintenance at any time to avoid production downtimes. Installation and commissioning are time- and cost-saving thanks to plug-and-play technology, and sensor replacement is easier than ever before thanks to "Smart Replace Design" with automatic detection, configuration, and parameterization.

TSBP for Pharma Applications:

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")	G03 Thread G1/4", sensor tip ø 3 mm, spring loaded
T10 Tri-Clamp DN10	M01 PHARMadapt ESP G3/8" with cap nut, sensor tip ø 3 mm, spring loaded
TC1 Tri-Clamp 1" and 1½" ⊗	M04 Sensor G3/8" with cap nut, sensor tip ø 4 mm, spring loaded
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 ⊗	

Spacer extension

X Without spacer (permanent process temperature ≤ 100 °C (212 °F))
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]				
	G03	M01	M04	E08	E18
10...50	In steps of 5 mm				
51...250	In steps of 5 mm	36	37	68	10 20
251...500	In steps of 10 mm	61	59	148	25 50
501...1000	In steps of 50 mm	75	83	198	50
1001...2000	In steps of 100 mm	93	97	234	100
Intermediate lengths	Not for G03, M01, M04, E08, E18	100	160	238	
		105		249	
		115			
		120			
		130			
		140			
		160			

Probe diameter

03 3 mm (standard for G03, M01)
04 4 mm (standard for M04)
06 6 mm (not for E08)
08 8 mm (not for T05, C01, E08, E18)

Sensor tip diameter, only for probe length ≥ 50 mm

X Without reduction (standard for G03, M01, M04)
3 For probe diameter 6 mm
4 For probe diameter 6 mm, 8 mm
6 For probe diameter 8 mm

Material

0 1.4404 (316L) without certificate (standard for G03, M01, M04)
3 1.4435 (316L) incl. material certificate (standard for Txx, Cxx, Ixx, Exx, N01)

Surface finish

0 $R_a \leq 0.8 \mu\text{m}$ (32 µin) (standard for G03, M01, M04)
1 $R_a \leq 0.8 \mu\text{m}$ (32 µin) electro-polished
2 $R_a \leq 0.6 \mu\text{m}$ (24 µin) mechanically polished
3 $R_a \leq 0.6 \mu\text{m}$ (24 µin) electro-polished
4 $R_a \leq 0.4 \mu\text{m}$ (16 µin) mechanically polished
5 $R_a \leq 0.38 \mu\text{m}$ (15 µin) electro-polished

Transmitter

0 Without transmitter
H TTb.H (hybrid: analog and IO-Link)
D TTb.D (hybrid: analog and IO-Link, display optional)
Z TTb.Z (1st transmitter TTb.H, 2nd transmitter TTb.D)
Y TTb.Y (1st transmitter TTb.H, 2nd transmitter TTb.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 TTb 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 without control window
W Stainless steel with control window

Orientation/display

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

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