

Bimetal Thermometers TBI Ø 80 - 100 - 120 - 130 - 160

Application	For chemical industry, oil refineries, food industry and various industrial applications
Temperature range	-70 ... 600°C / -100 ... 1100°F
Accuracy	According to EN 13190, up to 250°C, class 1 above 250°C, class 2
Dial	White, graduations black, according to EN 13190
Pointer	Aluminium alloy black, according to EN 13190
Indicator correction device	Adjustable pointer
Window	Normal glass Plastic for auxiliary units with adjusting device
Protection	IP 67 according to EN 60529
Accessories	Thermowells available. Refer to datasheets: B51 T6.215 for Ø 8 mm B51 T6.210 for Ø 6 mm
Certification	ATEX: Application in explosive environments, in zone 1 and 2, according to the directive 94/9/EC.



Application notes

The TBI operates within the specified accuracy only if the minimum immersion length l_2 is respected (see Drawing section). l_2 is depending on the immersion tube diameter and has to be adapted if the thermometer is mounted into a thermowell:

- Immersion tube diameter Ø 6 mm: l_2 has to be at least 65 mm (70 mm when mounted into a thermowell).
- Immersion tube diameter Ø 8 mm: l_2 has to be at least 50 mm (55 mm when mounted into a thermowell).

The case must not be heated above 110°C (230°F) by the heat given off. It would result in degraded measurement accuracy and could severely damage the thermometer. In order to avoid a too high case temperature, the position of the thermometer, the distance between the case and the assembly point (i.e. screw connection) should be considered before mounting a

thermometer on an equipment. If necessary an insulation between the case and the assembly point must be inserted.

The use of a thermowell is recommended for static pressure above 10 bar, for high velocity applications, and for corrosive fluids. The thermowell makes it possible to remove the thermometer without affecting the tightness of the system and without stopping the process (e.g. calibration check or change of the thermometer).

TBI thermometers should not be continuously exposed to fluid temperatures of more than 400°C (750°F). It could damage the bimetal sensing element. Over temperature limit

- For temperature ranges up to 400°C (750°F): 35%
- Above, only intermittent uses are recommended.

Selection chart TBI

Ordering code digit: Positions	1	2	3	4	5	6	7	8	9	10	11	12
Nominal size												
NS 80	0	8	0									
NS 100	1	0	0									
NS 120 ¹⁾	1	2	0									
NS 130 ²⁾	1	3	0									
NS 160	1	6	0									
Case												
Stainless steel 1.4301 (AISI 304)				2								
Connection												
Without connection (direct mounting)						1						
With sliding connection:												
Sliding screw connection M20x1.5, male						2						
Sliding screw connection M24x1.5, male						3						
Sliding screw connection G $\frac{1}{2}$ " , male						5						
Sliding screw connection $\frac{1}{2}$ "-14 NPT, male						6						
Sliding screw connection G $\frac{3}{4}$ " , male						7						
Sliding screw connection G1" , male						8						
Sliding screw connection G $\frac{1}{2}$ " female						9						
Sliding screw connection G $\frac{3}{4}$ " female						A						
Sliding screw connection G1" female						B						
With fix connection: ³⁾												
Fix screw connection G1/2" , male ³⁾						C						
Fix screw connection G3/4" , male ³⁾						D						
Fix screw connection G1" , male ³⁾						E						
Fix screw connection M20x1.5, male ³⁾						S						
Fix screw connection M24x1.5, male ³⁾						T						
Fix screw connection 1/2"-14 NPT, male ³⁾						Q						
Specific connection (additional code needed, see below)						0						
Immersion tube outlet												
Bottom						1						
Center back						2						
Center back, every angle						4						
Indicator												
Standard							1					
Immersion tube / diameter / material												
6 mm, stainless steel 1.4571 (AISI 316 Ti)								4				
8 mm, stainless steel 1.4571 (AISI 316 Ti)								6				
Immersion tube / installed length l1												
60 mm ⁴⁾									1			
100 mm									2			
160 mm									4			
250 mm									6			
400 mm									7			
600 mm									8			
1000 mm (max. available length)									9			
Customer specific length (see option /9003/) ⁴⁾									0			
Temperature range												
From -70°C up to +600°C (-100°F up to +1100°F)												See table Temperature range

Notes

- 1) NS 120: only available for the bottom version
- 2) NS 130: only available for the center back and the center back, every angle versions
- 3) TBI with fix connection: only available for the every angle version of TBI (Ordering code position 6: code 4)
- 4) Tube < 100 mm: only for immersion tube Ø 8 mm and only for temperature 250°C and below. The case must not be heated over 110 °C.

Additional ordering codes

The following ordering codes have to be completed with an additional code to be precisely defined:

Connection Code 0 (Ordering code position 5) – Specific connection

The following additional codes are available. Others on request:

Connections	Sliding	Fix ⁶⁾
G1/4" male	/ 9550	/ 9551 ⁶⁾
1/4"-18 NPT male	/ 9560	/ 9561 ⁶⁾
3/4"-14 NPT male	/ 9562	/ 9563 ⁶⁾
1"-11.5 NPT male	/ 9564	/ 9565 ⁶⁾
M18x1.5 male	/ 9574	/ 9575 ⁶⁾
M27x2.0 male	/ 9576	/ 9577 ⁶⁾
M20x1.5 female	/ 9584	/ -
M24x1.5 female	/ 9586	/ -

Example: TBI 100 204.166.23T /9562

6) TBI with fix connection: only available for the every angle version of TBI (Ordering code position 6: code 4)

Options

Stainless steel housing 1.4404 (316L) ⁸⁾	/ 0110
Dampening grease	/ 0581
Adjustable knob ⁹⁾	/ 0727
Safety glass	/ 0751
Acrylic glass (PMMA or Plexiglas) ¹⁰⁾	/ 0752
Window made of polycarbonate ¹¹⁾	/ 0753
Silicon free, label marking	/ 0793
Silicon free, marking on dial	/ 0794
Customer specific length	/ 9003 / nnnn; nnnn = length in mm
Red mark	/ 9700
Specific temperature range	/ 9704
Customer logo on dial	/ 9710
Specific technical data on dial	/ 9711

Notes

8) Housing 1.4404 (316L): only available with TBI NS 100 and NS 130.

9) Adjustable knob at the back of the case: only available with TBI center back and every angle.

10) Acrylic glass: not suitable for the applications in explosive environments. The case must not be constantly heated over 75°C.

11) Polycarbonate: only available for the center back and center back, every angle TBI, NS 80, 100 and 130. Not suitable for the applications in explosive environments.

Temperature ranges

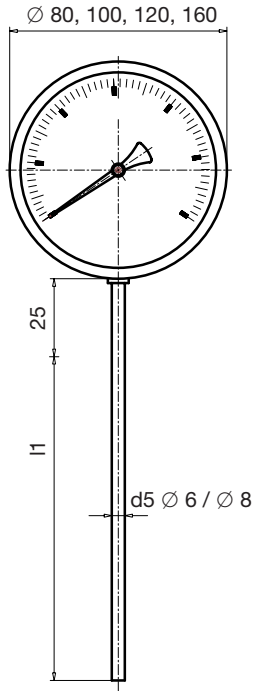
Order No.	Range °C	Order No.	Range ¹⁵⁾ °C	°F	Order No.	Range °F
53 T ¹⁶⁾	-10 ... 30	51V	-30 ... 70	- 40 ... 160	68U	-100 ... 120
52 T	-20 ... 40	68V	-70 ... 50	-100 ... 100	09U	- 50 ... 120
54 T	-20 ... 60	55V	-30 ... 170	0 ... 350	08U	- 40 ... 160
84 T	-20 ... 100	11V	0 ... 60	30 ... 140	54U	0 ... 140
55 T	-30 ... 170	20V	0 ... 120	30 ... 250	02U	0 ... 200
51 T	-30 ... 70	13V	0 ... 160	30 ... 320	03U	0 ... 250
68 T	-70 ... 50	14V	0 ... 250	30 ... 500	04U	0 ... 300
10 T ¹⁶⁾	0 ... 40	15V	0 ... 400	30 ... 750	05U	0 ... 400
11 T	0 ... 60	16V	0 ... 600	100 ... 1100	06U	0 ... 500
27 T	0 ... 80				11U	30 ... 140
12 T	0 ... 100				20U	30 ... 250
20 T	0 ... 120				13U	30 ... 320
13 T	0 ... 160				22U	30 ... 400
22 T	0 ... 200				23U	30 ... 580
14 T	0 ... 250				15U	30 ... 750
23 T	0 ... 300				28U	100 ... 800
15 T	0 ... 400				29U	200 ... 1000
25 T	0 ... 500					
16 T	0 ... 600					
30 T	100 ... 500					

Notes

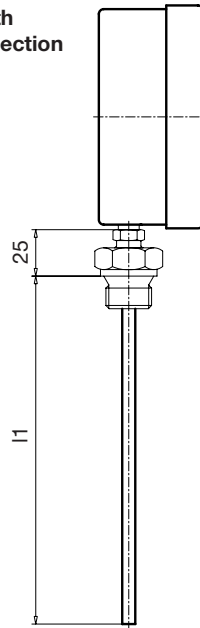
15) Dual ranges: °C range outside / °F range inside

16) Ranges 53T, 10T: only available with NS 80 and NS 100, center back version, maximum tube length 160 mm.

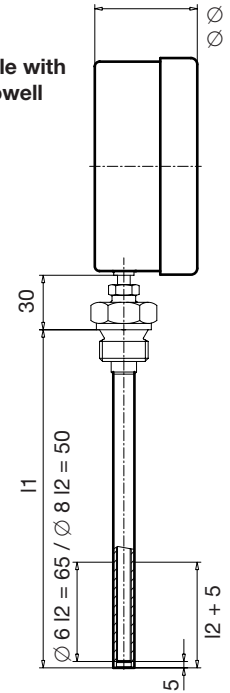
Drawing – TBI bottom (dimensions in mm)



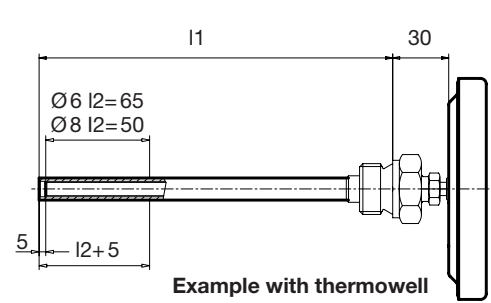
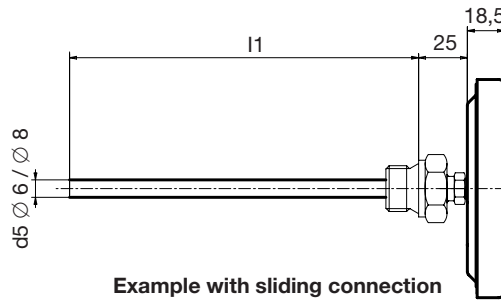
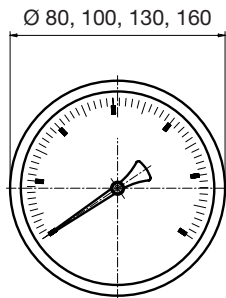
Example with sliding connection



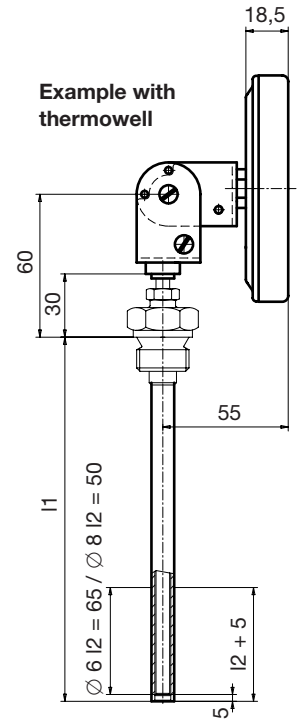
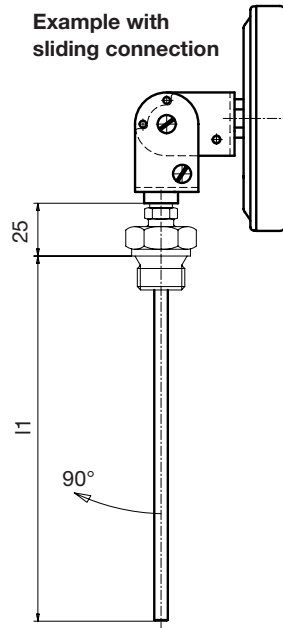
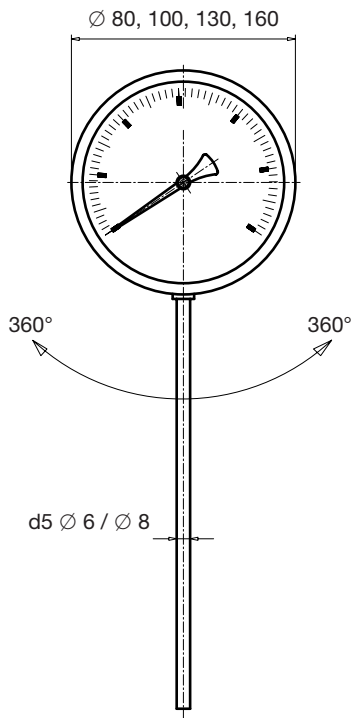
Example with thermowell



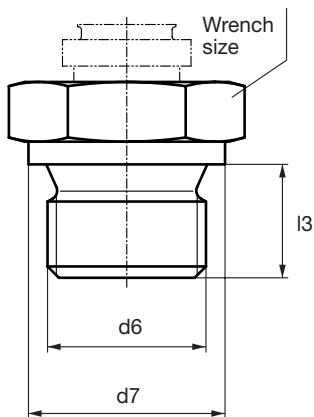
Drawing – TBI center back (dimensions in mm)



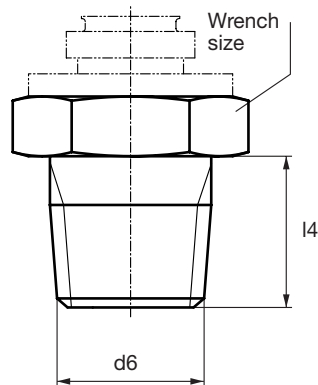
Drawing – TBI center back, every angle (dimensions in mm)



Drawings connections



Cylindrical screw threads, male



Conical screw threads, male

Dimensions (in mm)

d6	d7	l3	l4	Wrench size	Comments
G 1/2", male	26	15	–	27	Form 2 (sliding) and Form 6 (fix) according to EN13190
G 3/4", male	32	16	–	32	Form 2 (sliding) and Form 6 (fix) according to EN13190
G 1", male	39	19	–	41	Form 2 (sliding) and Form 6 (fix) according to EN13190
M 20x1.5, male	27	14	–	27	Form 2 (sliding) and Form 6 (fix) according to EN13190
1/2" - 14 NPT", male	–	–	20	27	Form 3 (sliding) and Form 7 (fix) according to EN13190
G 1/2", female					Female connections
G 3/4", female					
G 1", female					

Weight Chart

TBI bottom NS	Without immersion tube, without connection Weight in kg	Immersion tube. Weight in kg per 100 mm	
		Ø 6 mm	Ø 8 mm
80	0,25	0,007	0,017
100	0,30	0,007	0,017
120	0,40	0,007	0,017
160	0,70	0,007	0,017

TBI center back NS	Without immersion tube, without connection Weight in kg	Immersion tube. Weight in kg per 100 mm	
		Ø 6 mm	Ø 8 mm
80	0,11	0,007	0,017
100	0,16	0,007	0,017
130	0,30	0,007	0,017
160	0,45	0,007	0,017

TBI center back, every angle NS	Without immersion tube, without connection Weight in kg	Immersion tube. Weight in kg per 100 mm	
		Ø 6 mm	Ø 8 mm
80	0,30	0,007	0,017
100	0,35	0,007	0,017
130	0,47	0,007	0,017
160	0,61	0,007	0,017

Connection	Sliding connection	Fix connection
	Weight in kg	Weight in kg
M20x1.5, male		0.09
M24x1.5, male		
1/2"-14 NPT, male	0.095	0.10
G1/2", male	0.095	0.09
G3/4", male	0.15	0.14
G1", male	0.21	0.24
G1/2", female	0.13	-
G3/4", female	0.165	-
G1", female	0.33	-

Accessories

Screw connections

See datasheets B51 T6.110 for immersion tubes Ø 6 mm and B51 T6.115 for immersion tubes Ø 8 mm.

Thermowells

See datasheets B51 T6.210 for immersion tubes Ø 6 mm and B51 T6.215 for immersion tubes Ø 8 mm.