

# TSF Thermometers Ø 63 - 80 - 100 - 160 - 250

## Remote measurement industrial thermometer

The stainless steel gas expansion thermometer is specially intended for remote temperature measurement in the following industries: Petrochemicals, Chemicals, Food, Pharmaceuticals and Biotechnology.

The instrument works with the specified precision if the minimum immersion  $L_s$  is respected.



## Specifications (20°C)

<b>Measurement ranges</b>	up -200 to 800°C
<b>Accuracy class</b>	class 1 EN 13190
<b>Case and sleeve</b>	AISI 304/1.4301 stainless steel bayonet closing
<b>Sight glass</b>	4mm glass Polycarbonate for additional appliance
<b>Movement</b>	brass
<b>Face</b>	white with black graduations DIN 16 109, 16 128 Succession of lines and figures to T0.305
<b>Needle</b>	black aluminium, DIN 16 099
<b>Zero setting</b>	on the side or back of the case
<b>Degree of protection</b>	IP 65 (DIN 40 050)
<b>Plunger</b>	1.4541 stainless steel
<b>Accessories</b>	unions and thermometer wells, see sheets B51.01 (AGF/AGW), T6.215 (Ø 8), T6.120 and T6.220 (Ø 14)

## Options

Class error limit :	0.5. <b>Code 0843</b> 0.6. <b>Code 0840</b>	} (only for diameters 100; 160 and 250)
Filling liquid	glycerine standard silicon oil <b>Code 0776</b> ondina ®	
Face with parallax mirror for diameters 160 and 250	<b>Code 0733</b>	
Movement, stainless steel	<b>Code 0651</b>	
150 mm Ø case available :	contact us for details	
Case :	(316L) 1.4404 stainless steel <b>Code 0110</b>	


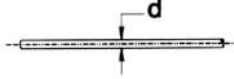

**BOURDON  
HAENNI**

made to measure

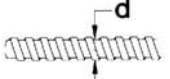



## Capillary tubes

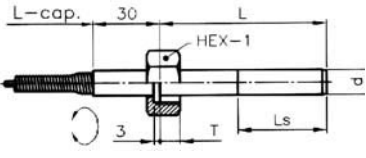
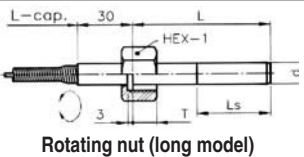
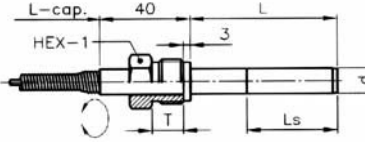
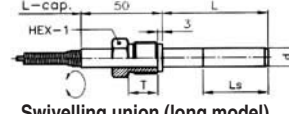
### Capillary tube material

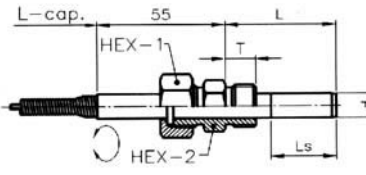
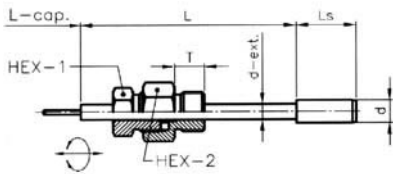
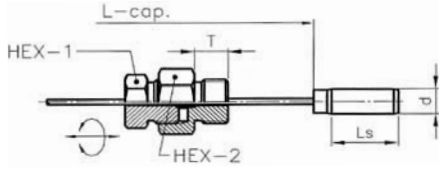
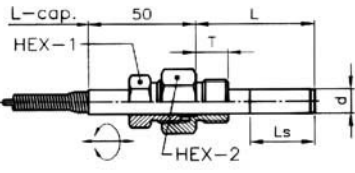
EQUIPMENT	MODEL	Ø in mm	T°C min	T°C max
Copper alloy		2.5	-120	+400
AISI 321 / 1.4541 stainless steel (standard version)		2.5	-250	+800
AISI 321 / 1.4541 Stainless steel + PVC		4	-60	+120

### Capillary tube protection

EQUIPMENT	MODEL	Ø in mm	T°C min	T°C max
AISI 304 / 1.4301 stainless steel pipe (standard version)		6	-260	+800
Stainless steel pipe - AISI 304 / 1.4301+ PVC		7.5	-60	+120

### Types of capillary tube connection

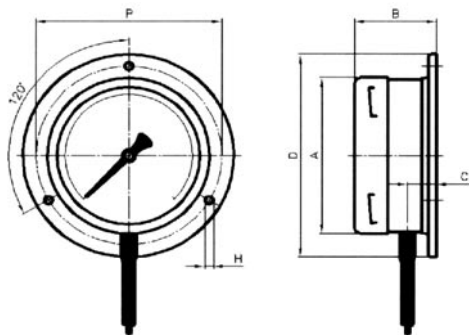
Models	Code	Type of union	HEX-1	HEX-2	T	Ø max. plunger
 <p>Rotating nut (standard)</p>	731A	1/4 Gas	22	-	7	6 to 8
	731B	3/8 Gas	27	-	9	6 to 11
	731C	1/2 Gas	27	-	9	6 to 15
	731D	3/4 Gas	32	-	9	6 to 20
	731E	1" Gas	41	-	13	6 to 20
	731P	M18x1.5	27	-	8	6 to 12
	731Q	M20x1.5	27	-	9	6 to 14
	731R	M24x1.5	32	-	9	6 to 18
 <p>Rotating nut (long model)</p>	732C	1/2 Gas	27	-	14	6 to 15
	732D	3/4 Gas	32	-	16	6 to 20
	732E	1" Gas	41	-	18	6 to 20
 <p>Swivelling union (standard)</p>	733A	1/4 Gas	17	-	12	6 to 8
	733B	3/8 Gas	22	-	12	6 to 11
	733C	1/2 Gas	22	-	14	6 to 15
	733D	3/4 Gas	30	-	16	6 to 20
	733E	1" Gas	36	-	18	6 to 20
	733P	M18x1.5	22	-	12	6 to 12
	733Q	M20x1.5	22	-	14	6 to 14
733R	M24x1.5	27	-	14	6 to 18	
 <p>Swivelling union (long model)</p>	734C	1/2 Gas	22	-	20	6 to 15
	734D	3/4 Gas	30	-	20	6 to 20
	734E	1" Gas	36	-	25	6 to 20

Models	Code	Type of union	HEX-1	HEX-2	T	max. plunger Ø
 <p>Rotating nut + double union</p>	735A	1/4 Gas	27	22	12	6 to 8
	735B	3/8 Gas	27	22	12	6 to 11
	735C	1/2 Gas	27	22	14	6 to 15
	735D	3/4 Gas	27	27	16	6 to 20
	735E	1" Gas	27	36	18	6 to 20
	735H	1/4 NPT	27	22	14	6 to 8
	735J	1/2 NPT	27	22	20	6 to 15
	735K	3/4 NPT	27	27	20	6 to 20
	735L	1" NPT	27	36	25	6 to 20
	735P	M18x1.5	27	22	12	6 to 12
	735Q	M20x1.5	27	22	14	6 to 14
	735R	M24x1.5	27	27	14	6 to 18
 <p>Union sliding on tube</p>	736A	1/4 Gas	22	27	12	6 to 11
	736B	3/8 Gas	22	27	12	6 to 14
	736C	1/2 Gas	22	27	14	6 to 18
	736D	3/4 Gas	22	32	16	6 to 23
	736E	1" Gas	22	36	18	6 to 30
	736H	1/4 NPT	22	27	14	6 to 13
	736J	1/2 NPT	22	27	20	6 to 20
	736K	3/4 NPT	22	27	20	6 to 25
	736L	1" NPT	22	36	25	6 to 32
	736P	M18x1.5	22	27	12	6 to 16
	736Q	M20x1.5	22	27	14	6 to 18
	736R	M24x1.5	22	27	14	6 to 22
 <p>Union sliding on capillary tube</p>	737A	1/4 Gas	22	27	12	6 to 11
	737B	3/8 Gas	22	27	12	6 to 14
	737C	1/2 Gas	22	27	14	6 to 18
	737D	3/4 Gas	22	32	16	6 to 23
	737E	1" Gas	22	36	18	6 to 30
	737H	1/4 NPT	22	27	14	6 to 13
	737J	1/2 NPT	22	27	20	6 to 20
	737K	3/4 NPT	22	27	20	6 to 25
	737L	1" NPT	22	36	25	6 to 32
	737P	M18x1.5	22	27	12	6 to 16
	737Q	M20x1.5	22	27	14	6 to 18
	737R	M24x1.5	22	27	14	6 to 22
 <p>Union sliding on plunger</p>	738A	1/4 Gas	22	27	12	6 to 8
	738B	3/8 Gas	22	27	12	6 to 11
	738C	1/2 Gas	22	27	14	6 to 15
	738D	3/4 Gas	22	32	16	6 to 20
	738E	1" Gas	22	36	18	6 to 20
	738H	1/4 NPT	22	27	14	6 to 8
	738J	1/2 NPT	22	27	20	6 to 15
	738K	3/4 NPT	22	27	20	6 to 20
	738L	1" NPT	22	36	25	6 to 20
	738P	M18x1.5	22	27	12	6 to 12
	738Q	M20x1.5	22	27	14	6 to 14
	738R	M24x1.5	22	27	14	6 to 18

Note: Minimum immersion length:

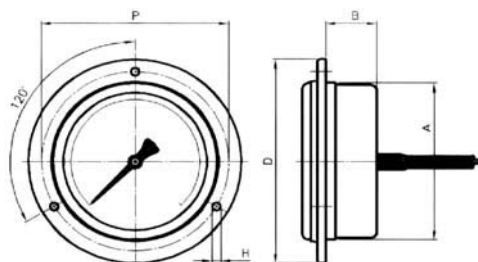
Ls for Ø8 = 85 mm (up to 5 meters)  
Ls for Ø8 = 170 mm (over 5 meters)  
Ls for Ø14 = 50 mm

**Type A (code 31)**



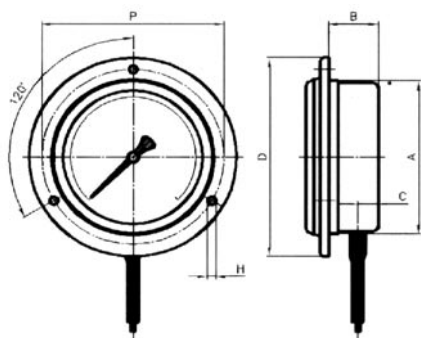
DIAMETER	DIMENSIONS in mm					
	A	B	C	D	H	P
63	65	33	13	86	3.5	75
80	83	29	13	110	4	95
100	101	31	13	132	5.5	116
160	161	32	13	196	6	178
250	252	45	13	285	6	270

**Type B (code 22)**



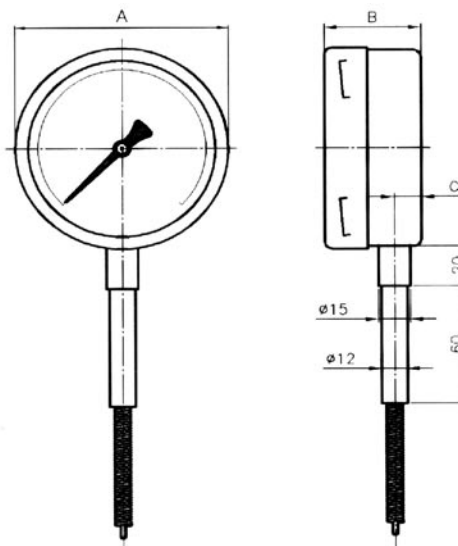
DIAMETER	DIMENSIONS in mm				
	A	B	D	H	P
63	65	41	86	3.5	75
80	83	40	110	4	95
100	101	51	132	5.5	116
160	161	51	196	6	178
250	252	57	285	6	270

**Type C (code 21)**



DIAMETER	DIMENSIONS in mm					
	A	B	C	D	H	P
63	65	41	13	86	3.5	75
80	83	40	13	110	4	95
100	101	51	13	132	5.5	116
160	161	51	13	196	6	178
250	252	57	13	285	6	270

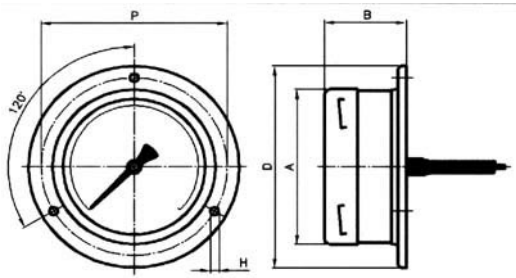
**Type D (code 11)**



DIAMETER	DIMENSIONS in mm		
	A	B	C
63	65	38	13
80	83	37	13
100	101	45	13
160	161	45	13
250	252	55	13

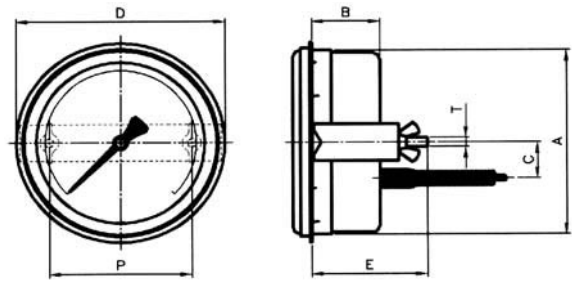
\* Mounting clamp  
 \*\* 20mm on the left (front view)  
 + with 3 clamps at 120°C

### Type E (code 32)



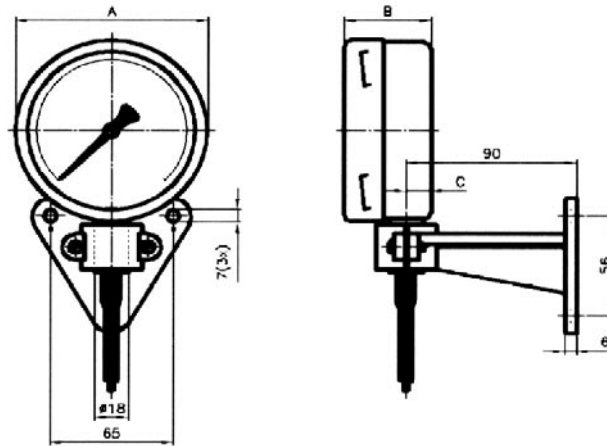
DIAMETER	DIMENSIONS in mm				
	A	B	D	H	P
63	65	41	86	3.5	75
80	83	40	110	4	95
100	101	51	132	5.5	116
160	161	51	196	6	178
250	252	57	285	6	270

### Type G (code 53)



DIAMETER	DIMENSIONS in mm						
	A	B	C	D	E	P	T
63*	65	30	20**	70	50	33	M5
80	83	35	25	95	55	59	M5
100	101	35	20	112	60	75	M5
160	161	35	20	180	60	139	M5
250+	252	45	0	270	70	+	M5

### Type H (code 61)



DIAMETER	DIMENSIONS in mm		
	A	B	C
63	65	38	13
80	83	37	13
100	101	45	13
160	161	45	13
250	252	55	13

**Type A (code 31)**

**Type B (code 22)**

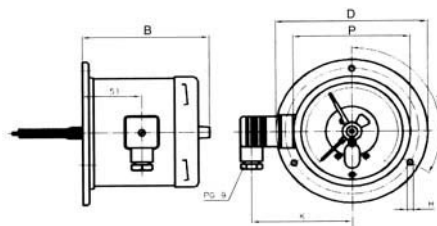
DIAMETER	DIMENSIONS in mm						
	A	B	C	D	H	P	K
100	101	110	19	132	5.5	116	122
160	161	114	19	196	6	178	122

DIAMETER	DIMENSIONS in mm									
	A	B	C1	C2	D	H	P	K1	K2	
100	101	80	26	10	101	5.5	116	123	15	
160	161	83	0	0	196	6	178	126	0*	

\* 54 mm on the right (front view)

**Type D (code 11)**

**Type E (code 32)**



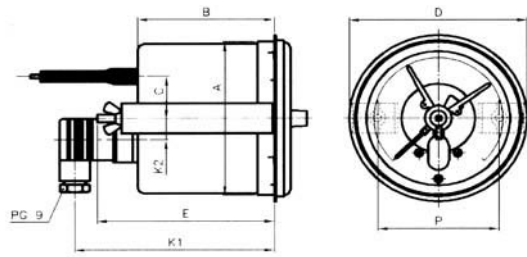
DIAMETER	DIMENSIONS in mm		
	A	B	K
100	101	104	92
160	161	108	122

DIAMETER	DIMENSIONS in mm						
	A	B	D	H	P	K	
100	101	110	132	5.5	116	92	
160	161	114	196	6	178	122	

\* Mounting clamp  
 \*\* 20mm on the left (front view)  
 + with 3 clamps at 120°C

## Type G (code 53)

## Type H (code 61)



DIAMETER	DIMENSIONS in mm							
	A	B	C	D	E	P	K1	K2
100	101	84	25	112	109	75	128	15
160*	161	88	0	180	113	139	131	54**

\* U-Clamp fitted vertically

\*\* 54 mm on the right (front view)

DIAMETER	DIMENSIONS in mm		
	A	B	K
100	101	104	92
160	161	108	122

### Equivalence table: mounting types

	Mounting type (7' digits)		Plunger position (8' digits)	
A =>	3	Wall mounting, Rear flange	1	Bottom outlet
B =>	2	Board mounting, Front flange	2	Rear outlet
C =>	2	Board mounting, Front flange	1	Bottom outlet
D =>	1	Without flange	1	Bottom outlet
E =>	3	Wall mounting, Rear flange	2	Rear outlet
F =>	1	Without flange	2	Rear outlet
G =>	5	Board mounting with mounting clamp	3	Rear outlet with clamp
H =>	6	Wall mounting with support console	1	Bottom outlet

Example of equivalence: Type A = Codes 31 (7' and 8' digits)

# Codification

TSFxxxxxxxxxx

Type	1'... 4' digits		
Standard industrial thermometer		TSF	
Electrical contact industrial thermometer		TSFE	
Case diameter	5'...7' digits		
Ø 63 mm		063	
Ø 80 mm		080	
Ø 100 mm		100	
Ø 160 mm		160	
Ø 250 mm		250	
Case and sleeve	8' digits		
(304)1.4301 stainless steel		2	
Phenol		7	
Mounting type	9' digits		
Without flange		1	
Board mounting, front flange		2	
Wall mounting, rear flange		3	
Wall mounting with mounting clamp		5	
Wall mounting avec console support		6	
Capillary position	10' digits		
Bottom		1	
Back		2	
Back with clamp		3	
Plunger diameter	11' digits		
Ø 6 mm		4	
Ø 8 mm		1	
Ø 11 mm		2	
Ø 14 mm		7	
Other		x	
Capillary tube diameter	12' digits		
Ø 2.5 copper alloy, only up to 250°C (without protection)		4	
Ø 2.5 1.4541 stainless steel, only up to 800°C (without protection)		6	
Ø 4 1.4541 stainless steel, PVC only up to 120°C (without protection)		7	
Ø 2.5 1.4541 stainless steel; protection Ø 6 1.4301 stainless steel		B	
Ø 2.5; 1.4541 stainless steel; protection Ø 7.5 1.4301 stainless steel + PVC		C	
Ø 2.5 1.4541 stainless steel; protection Ø 6 copper + 1.4301 stainless steel		A	
Others		x	
Plunger length (L)	13' digits		
100 mm		2	
160 mm		4	
250 mm		6	
400 mm		7	
600 mm		8	
1000 mm		9	
Others		x	
Measurement ranges	14'...16' digits		
See table			xxx

## Codes to be entered in clear language after Codification

Capillary tube length in meters

Types of connections

Filling liquid

Contacts: electromechanical : see sheet B22T4.105

Induction : see sheet B22T4.110.1

## Example of Codification for an electrical contact industrial thermometer

1" ... 4"	5" ... 7"	8"	9"	10"	11"	12"	13"	14" ... 16"	-	Codes to be entered in clear language after Codification matrix creation																	
T	S	F	E	1	0	0	2	1	1	6	4	2	1	2	T	-	2	/	7	3	8	C	/	4	0	0	1
														Capillary tube length = 2 meters													
														/ => symbolises the separation between two options													
														Type of connection = ½ Gas HEX-1=22 HEX-2 :27 T :14 Ø max. :15													
														<b>Note: no filling liquid =&gt; no code</b>													
														Electromechanical contacts: Dry electrical contacts (C.E.S.) => MAX													

Code	Measurement ranges in °C	Code	Measurement ranges in °F
69T	-200 ... 50	68U	-100 ... 120
77T	-120 ... 40	09U	-50 ... 120
76T	-100 ... 60	08U	-40 ... 160
74T	-80 ... 40	54U	0 ... 140
68T	-70 ... 50	02U	0 ... 200
50T	-60 ... 40	03U	0 ... 250
65T	-40 ... 40	04U	0 ... 300
55T	-30 ... 170	05U	0 ... 400
51T	-30 ... 70	06U	0 ... 500
61T	-30 ... 30	11U	+30 ... 140
84T	-20 ... 100	20U	+30 ... 250
54T	-20 ... 60	13U	+30 ... 320
52T	-20 ... 40	22U	+30 ... 400
53T	-10 ... 30	23U	+30 ... 580
10T	0 ... 40	15U	+30 ... 750
11T	0 ... 60	28U	+100 ... 800
27T	0 ... 80	29U	+200 ... 1000
12T	0 ... 100		
20T	0 ... 120		
13T	0 ... 160		
22T	0 ... 200		
14T	0 ... 250		
23T	0 ... 300		
15T	0 ... 400		
25T	0 ... 500		
16T	0 ... 600		
82T	0 ... 800		
30T	+100 ... 500		

Code	Code Measurement ranges in °C / °F
51V	-30 ... 70 / -40 ... 160
68V	-70 ... 50 / -100 ... 100
55V	-30 ... 170 / 0 ... 350
11V	0 ... 60 / 30 ... 140
20V	0 ... 120 / 30 ... 250
13V	0 ... 160 / 30 ... 320
14V	0 ... 250 / 30 ... 500
15V	0 ... 400 / 30 ... 750
16V	0 ... 600 / 100 ... 1100

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