

TZ04

Dial Thermometer (nitrogen-filled gauge)

- Housing sizes from 63 to 250 mm
- Stainless steel housing
- Available with directly attached sensor or with capillary line
- Temperature sensor and process connection individually configurable
- Measuring ranges: from -200 - +50°C to 0 - 800°C
- Optional alarm contacts or analog output
- Measuring accuracy: accuracy classes 1.6, 1.0 and 0.6



Description:

Model series TZ04 dial thermometers feature a housing with integral gauge mechanism and a sensor system that is either attached directly or by means of a capillary tube. The sensors are filled with neutral nitrogen, which transmits the temperature information. The gauge mechanism reacts to the pressure exerted by the nitrogen in the sensor system, causing corresponding movement of the gauge indicator needle.

Typical Applications:

Because they are available in a variety of designs, TZ04 dial thermometers can be used in almost any kind of application where it is necessary to measure process temperatures by means of a local or remote gauge.

In addition, limit contacts, analog output signals or an optionally available temperature recorder (thermograph) allow the temperature information to be evaluated and upstream or downstream processes to be controlled.

Technical Specifications:

Ausführungen und Werkstoffe:	See pages 3-5
Limit contacts and analog outputs:	See page 6
Options:	See page 6
Max. process pressure:	
Without protective sleeve:	min. 16 bar (Depends on temperature, sensor diameter and length)
With protective sleeve:	25 bar (Special models for higher pressures available upon request)
Min. sensor length:	See Table 5, page 5
<i>Different minimum sensor lengths are recommended, depending on the substance being monitored and the sensor diameter. Example:</i>	
Sensor diameter:	10 mm
Monitored media (liquid, gas):	
Water:	$L_{min} = 60 \text{ mm}$
Oil:	$L_{min} = 100 \text{ mm}$
Air:	$L_{min} = 160 \text{ mm}$
Max. sensor length:	3 m (Longer lengths available upon request)
Max. length of capillary tube:	40 m
Accuracy:	
NG 63, 80:	Class 1.6
NG 100, 160, 250:	Class 1.0
Optional:	
NG 160, 250:	Class 0.6
Overload protection:	30% of measured range end value, up to max. 800°C (optional 100%)

Model Coding:

Order no. TZ04. R X. 100 L A 37. 0 0. 9x90 BX1. 0. 0

Dial thermometer

Model (page 3):

R = with directly attached sensor
C = with capillary tube
S = special order

Housing materials (page 3):

X = stainless steel

Housing diameter (page 3):

63 = 63 mm
80 = 80 mm
100 = 100 mm
160 = 160 mm
250 = 250 mm
xxx = special order; please specify in writing.

Damping (page 3):

X = unfilled (standard)
L = glycerin-filled
S = silicon-oil-filled
K = oil-filled, for devices with integral limit contacts

Version (page 3):

A to H = see Table 1

Measuring range (page 4):

1 to 47 = see Table 2

Capillary tube (page 4):

0 = none
X = see Table 3

Capillary tube jacket (page 4):

0 = ohne
S = see Table 4

Sensor (page 5):

DxL = sensor diameter x sensor length
see Table 5

Process connection (page 5):

BX1 to CS3X6 = see Table 6

Electrical output signals (page 6):

0 = ohne
M to TT2 = see Table 7

Options (page 6):

More than one may be selected
0 = none
A to L = see Table 8

Models:

R = Thermometer with directly attached sensor

C = Thermometer with capillary tube

Materials:

X = Housing of stainless steel 1.4301, with bayonet ring, IP-65
Sight glass of mineral glass, 4 mm
Aluminum scale, white with black markings
Aluminum indicator needle, black
Gauge mechanism, brass

Housing diameter

Nominal size: Diameter: 63, 80, 100, 160, 250 mm

Sonderbauformen: square housing
(auf Anfrage) 72 x 72, 96 x 96,
144 x 144, 192 x 192,
72 x 144 vertical or horizontal,
96 x 192 vertikal or horizontal
Temperature recorder (thermograph),
square:
192 x 192, 288 x 288 mm,
round: d = 260 mm

Damping

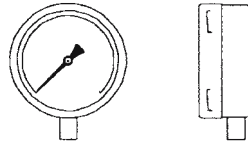

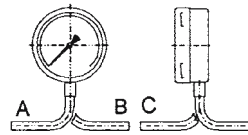
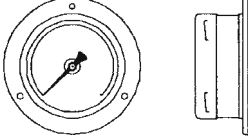
X = unfilled

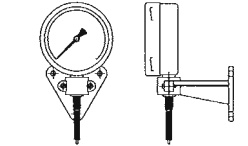
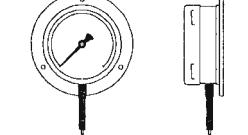
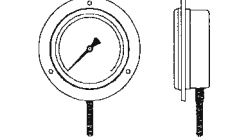
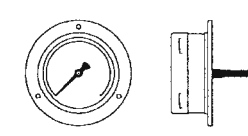
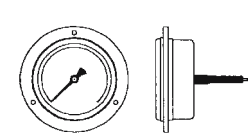
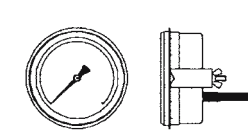
L = filled with glycerin to dampen indicator needle vibrations

S = filled with silicon oil (increased vibration damping)

K = filled with oil (for devices with integral limit contacts)

Version (Table 1):

With directly attached sensor			
	Connection on bottom	A	
	Connection on back in center	E	
	Connection on bottom with 90° angle (A to D: direction of 90° angle)	T	
	Connection on back in center with rim flange	F	

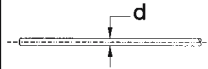

With capillary tube			
	Connection on bottom with wall mounting bracket	A	
	Connection on bottom with rim flange on back for wall mounting	B	
	Connection on bottom with rim flange at front for installation in control panel	D	
	Connection on back in center with rim flange on back	F	
	Connection on back in center with rim flange at front	G	
	Connection on back, not centered with three-angle front ring and retainer for installation in control panel	H	

Measuring ranges (Table 2):

No.	Range in °C	Scale in °C		Comments
		Class 1,0 and 1,6	Class 0,6 (Option)	
1	-200...+50	5	2	Option
2	-120...+40	2	1	Option
3	-110...+50	5	1	Option
4	-100...+100	5	1	Option
5	-100...+50	5	1	Option
6	-80...+40	2	1	Option
7	-60...+40	2	0,5	Option
8	-60...+60	2	1	Option
9	-50...+50	2	0,5	Option
10	-40...+20	1	0,5	Option
11	-40...+40	1	0,5	Standard
12	-40...+60	2	0,5	Option
13	-40...+80	2	1	Option
14	40...+110	5	1	Option
15	-40...+120	2	0,5	Option
16	-40...+160	5	1	Option
17	-30...+30	1	0,5	Standard
18	-30...+50	1	0,5	Option
19	-30...+70	2	0,5	Option
20	-30...+170	5	1	Option
21	-20...+40	1	0,5	Option
22	-20...+60	1	0,5	Option
23	-20...+80	2	0,5	Option
24	-20...+100	2	1	Option
25	-20...+120	2	1	Option
26	-20...+180	5	1	Option
27	-15...+45	1	0,5	Option
28	-10...+15	0,5	0,2	for sizes 72 x 144 and 96 x 192 only
29	-10...+30	1	0,2	
30	-10...+50	1	0,5	Option
31	-10...+110	2	1	Option
32	-10...+150	5	1	Option
33	0...+25	0,5	0,2	for sizes 72 x 144 and 96 x 192 only
34	0...+40	1	0,2	
35	0...+60	1	0,5	Standard
36	0...+80	1	0,5	Option
37	0...+100	2	0,5	Standard
38	0...+120	2	1	Standard
39	0...+160	5	1	Standard
40	0...+200	5	1	Option
41	0...+250	5	2	Option
42	0...+300	5	2	Option
43	0...+400	10	2	Option
44	0...+500	10	5	Option
45	0...+600	10	5	Option
46	0...+700	10	5	Option
47	0...+800	10	5	Option

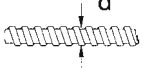
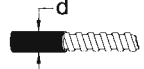

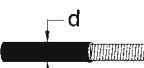
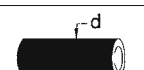
Capillary Tube (Table 3):

only for TZ04.C...

	Material	d (mm)	T _{min.} (°C)	T _{max.} (°C)	Code
	Stainless steel 1.4541	2,5	-260	800	X
	Stainless steel with PVC-Coating	4	-60	120	XP

Capillary Tube Jacket (Table 4):

only for TZ04.C...

	Material	d (mm)	T _{min.} (°C)	T _{max.} (°C)	Code
	flexible, stainless steel 1.4301	6	-260	800	S
	flexible, st. steel 1.4301 with PVC-coating	7,5	-60	120	SP
	flexible, stainless steel 1.4401	6	-260	800	X
	flexible, st. steel 1.4401 with PVC-coating	7,5	-60	120	XP
	Lead jacket	16	-20	200	PB

Sensors:

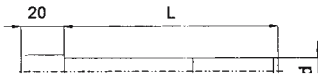
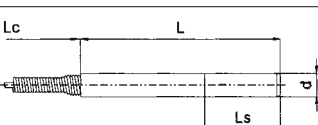
The temperature sensors are all made of stainless steel 1.4541. The minimum sensor length is limited by dimension L_s (see Table 5). This length is the sensitive section of the sensor, which has to be immersed in the gas or liquid being monitored.

When ordering a thermometer, please use the following format to describe it:

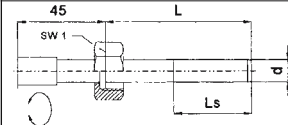
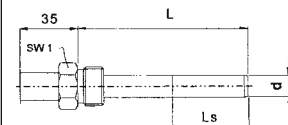
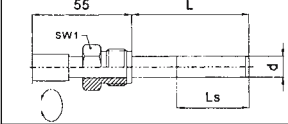
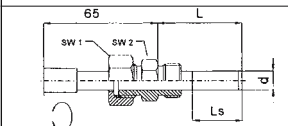
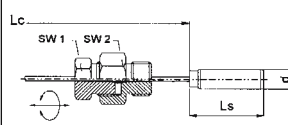
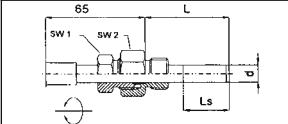
Sensor diameter x sensor length (in mm)

Example: 10 x 200

Sensor Dimensions (Table 5):

Possible sensor diameters and minimum sensor lengths L_s (in mm)					
		TZ04.R Sensor directly attached, minimum sensor length: $L = L_s$			
		TZ04.C With capillary tube, minimum sensor length: $L = L_s$			
Sensor Dia- meter (in mm)	Standard-Thermometer			Thermometer with Alarm Contact	
	TZ04.R Sensor directly attached	TZ04.C with capillary tube up to 5 m	TZ04.C with capillary tube over 5 m	TZ04.R Measuring-range >100° C	TZ04.C Capillary tube over 5 m
6	190	190	---	---	---
6.35	155	155	---	---	---
7	125	125	---	---	---
8	90	90	170	170	170
9	68	68	130	130	130
10	55	55	100	100	100
11	45	45	80	80	80
12	35	35	65	65	65
12.5	35	35	60	60	60
13	35	35	65	65	65
14	30	30	50	50	50
15	25	25	45	45	45
16	25	25	40	40	40
18	20	20	35	35	35
20	20	20	31	31	31

Process Connection (Table 6):

Design	Connection	Material
		Stainless steel 1.4301
	1/2" BSP	BX1
	3/4" BSP 1" BSP	BX2 BX3
	1/2" BSP	CX1
	3/4" BSP	CX2
	1" BSP	CX3
	1/2" NPT	CX4
	3/4" NPT	CX5
	1" NPT	CX6
	1/2" BSP	A04X1
	3/4" BSP	A04X2
	1" BSP	A04X3
	1/2" BSP	B01X1
	3/4" BSP	B01X2
	1" BSP	B01X3
	1/2" NPT	B01X4
	3/4" NPT	B01X5
	1" NPT	B01X6
	1/2" BSP	CS2X1
	3/4" BSP	CS2X2
	1" BSP	CS2X3
	1/2" NPT	CS2X4
	3/4" NPT	CS2X5
	1" NPT	CS2X6
	1/2" BSP	CS3X1
	3/4" BSP	CS3X2
	1" BSP	CS3X3
	1/2" NPT	CS3X4
	3/4" NPT	CS3X5
	1" NPT	CS3X6
Additional process connections: Metric thread, hygienic dairy coupling, Tri-Clamp, surface sensor, spiral sensor for air, etc. (available upon request)		

Limit Contacts and Analog Outputs:

Limit contacts are used to signal the overshooting or undershooting of certain temperature thresholds. Model TZ04 thermometers with round housing sizes of 100 and 160 mm or square housings can have up to four integral magnet-spring or inductive contacts fitted in their housings. These contacts will be either of the normally open (N/O) or normally closed (N/C) type (in each case, based on increasing temperature). In addition, microswitches with higher switching ratings, contacts mounted on the housing or pneumatic contacts are also available upon request.

Analog outputs are used to transmit measurement information to higher-level display, evaluation or control systems. In this case, there is a choice between having an integral angle-of-rotation measuring transducer or a PT-100 measuring transducer with a PT-100 sensor integrated in the device sensor.

Models (Table 7)

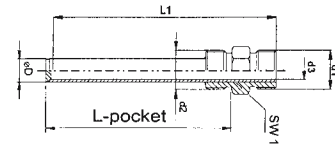
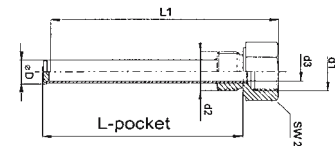
Magnetic-spring contacts (30 W / 50 VA)		
x = 1: Normally open (N/O) x = 2: Normally closed (N/C) x = 3: Changeover switch	For round housing diameters of 100, 160 mm and square housing dimensions of 96x96, 144x144, 72x144 mm	
1 contact	N/C or N/O	Mx
2 contacts	N/C, N/O or 2 changeover switches	Mxx
3 contacts	N/C or N/O Not for 72x144 housing	Mxxx
4 contacts	N/C or N/O Not for 72x144 housing	Mxxxx
Inductive contacts as per NAMUR (requires intrinsically safe contact protection relay)		
1 contact	N/C or N/O	Ix
2 contacts	N/C, N/O or 2 changeover switches	Ixx
3 contacts	N/C or N/O Not for 72x144 housing	Ixxx
Analog outputs:		
Angle-of-rotation measuring transducer with 4 to 20 mA, 3-wire output	Diameter 100, 160 mm Dimensions 96x96, 144x144 mm	RT43
Angle-of-rotation measuring transducer with 0 to 20 mA, 3-wire output	Diameter 100, 160 mm Dimensions 96x96, 144x144 mm	RT03
Angle-of-rotation measuring transducer with 0...100 Ohm, 3-wire output	Diameter 100, 160 mm Dimensions 96x96, 144x144 mm	R
PT-100 measuring transducer with 4...20 mA, 2-wire output, including PT-100 element in sensor and cable	Diameter 100, 160 mm Dimensions 96x96, 144x144 mm	TT2

Options (Table 8):

Housing of stainless steel 1.4401 instead of 1.4301	for TZ04...X...	A
Sight glass made of safety glass	as of NG 100	B
Non-return indicator needle, key reset	for devices without contact	C
Non-return indicator needle, key reset	for devices with contact	D
Micrometer indicator		E
Gauge mechanism and indicator needle made of stainl. steel 1.4301		F
Double scale: °C + °F		G
Precision measurement model, Class 0.6	only for diameters NG 160, 250, and dimensions 144x144, 192x192, 72x144 mm	H
Mirror scale	Only with precision measurement model, only for diameters NG 160, 250	I
Polished sensor		K
HALAR-coated sensor,	max. 1000 mm, max. 200°C	L

Stainless Steel Sensor Protection Sleeves

For sensors with A04, B, C and CS3 connections
Models (Table 9)

	TS02... With male thread on sensor side					
	TS03... With female thread on sensor side					
Type	.1	.2	.3	.4	.5	.6
max. sensor length	10	10	10	12.5	12.5	12.5
L (mm) (min. length)	100	100	100	63	63	63
Sensor connection d1 (mm)	G 1/2	G 1/2	G 1/2	G 1/2	G 1/2	G 1/2
Process connection d2 (mm)	G 1/2	G 3/4	G 1	G 1/2	G 3/4	G 1
Inside diameter d3 (mm)	10.5	10.5	10.5	13	13	13
Outside diameter D (mm)	12.5	12.5	12.5	15	15	15
Wrench size 1 (mm)	22	27	41	22	27	41
Wrench size 2 (mm)	27	32	41	27	32	41

Dimension L1: for sensor connections B, C, CS3: L1 = sensor length
for sensor connection A04: L1 = sensor length + 15

Example: TS02.2.120 Protective sleeve with size 1/2, male thread on sensor side; size 3/4 male thread on process side length 120 mm, for sensor diameter of 10 mm

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