GT-04

Gas Expansion Thermometer with Nitrogen Filling

Description:

The GT-04 series of gas expansion thermometers consists of a housing with integrated movement and a sensor system connected directly or through a capillary tube. The sensors are filled with neutral nitrogen gas that serves as a transmission medium for the temperature data. The nitrogen gas pressure in the sensor system is evaluated by the movement and mechanically displayed.

Features

/ Housing sizes from 2.5" to 10"

/ Stainless steel housing

/ Directly att. sensor or capillary tube

/ Temperature sensor and process connection, individually configurable

/ Measuring ranges up to +800˚C

/ Optionally, alarm or analogue output

/ Measuring acc.: Cl. 1.0 and Cl. 0.6

Application:

Thanks to a wide variety of possible versions, GT-04 gas expansion thermometers can be used in nearly any type of applications where the process temperature needs to be captured locally or by means of a remote display. Moreover, limit contacts, analogue output signals or optionally available temperature recorders enable evaluation of temperature data as well as controlling processes upstream or downstream.
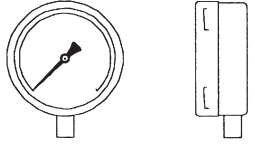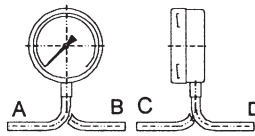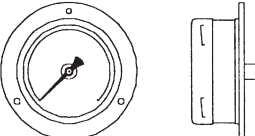
Ordering Codes:
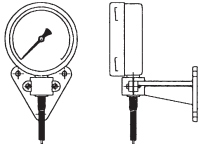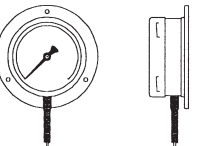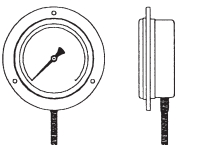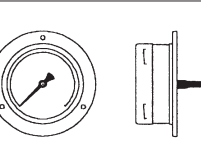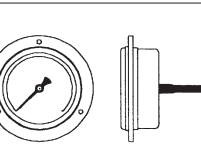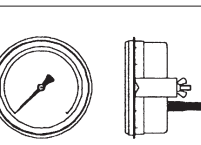
| Order number | GT-04. | R. | X. | 100. | L. | A. | 37. | 0. | 0. | 9x90. | BX1. | 0. | 0 |

GT-04 Gas Expansion Themometer

Version (table 1) /
R   = with directly mounted sensor
C   = with capillary tube
S   = special design

Housing material /
X   = stainless steel

Housing diameter /
63   = 2.5"(63 mm)
80   = 3" (80 mm)
100   = 4" (100 mm)
160   = 6" (160 mm)
250   = 10" (250 mm)
xxx   = special design, please specify in detailed text

Damping /
X   = unfilled (standard)
L   = with glycerin filling
S   = with silicone oil filling
K   = with oil filling for devices with built-in limit contacts

Version /
A...H   = as per table 1

Operating range /
1...47   = as per table 2

Capillary tube (in mm) /**
0   = none
X   [...] = as per table 3
XP   [...] = as per table 3

Capillary sheathing /
0   = none
SP...PB   = as per table 4 (only for capillary tube X)

Sensor /
DxL   = sensor diameter x sensor length as per table 5

Process connection /
BX1...CS3X6 = as per table 6

Electrical output signals /
0   = none
M...TT2   = as per table 7

Options /
Multiple naming possible
0   = none
A...L   = as per table 8

** Example: X [1000] = Capillary tube; Material: stainless steel 1.451; Length: 1000 mm;

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Version (table 1):

with directly mounted sensor		
	connection at the bottom	**A**
	connection at the back, in the center	**E**
	connection at the bottom, at 90° angle (A to D: direction of 90° angle)	**T**
	connection at the back, at the center with rim at the back	**F**

with capillary tube		
	connection at the bottom with wall holder	**A**
	connection at the bottom with rim at the back for surface-mounting	**B**
	connection at the bottom with rim in the front for flush mounting	**D**
	connection at the back with rim at the back	**F**
	connection at the back, in the center with rim in the front	**G**
	connection at the back, eccentric with triangular front ring and U-clamp for flush mounting	**H**

Technical Specifications:

Versions and material /	see the following pages
Limit contacts and analogue outputs /	see table 7
Options /	see table 8
max. Process pressure /	
without protection sleeve:	min. 16 bar (depending on temperature, sensor diameter and length)
with protection sleeve:	25 bar (special designs for higher pressure on request)
min. Sensor length /	see table 5 (shorter lengths on request)

Depending on the medium and the sensor diameter

different minimum sensor lengths are recommended.

Example:

Sensor diameter: 10 mm

Medium:

water: L_{min} = 60 mm

oil: L_{min} = 100 mm

air: L_{min} = 160 mm

max. Sensor length /	3 m (greater lengths on request)
max. length of capillary tube /	30 m (greater lengths on request)
Accuracy /	
NG 63, 80, NG 100, 160, 250:	Cl. 1.0
Optional NG 100, 160, 250:	Cl. 0.6
Overload safety /	30 % of operating range end value however, max. +800°C (optionally 100 %)
Protection /	IP65

Versions:

GT-04 Gas Expansion Thermometer

R =   Thermometer with directly mounted sensor

C =   Thermometer with capillary tube

Materials:

X =   housing stainless steel 1.4301, with bayonet ring, IP 65 mineral glass dial, 4 mm aluminium scale, white, lettering black aluminium indicator, black brass movement

Housing diameter:

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

Customized designs: (on request)   rectangular housing: 72x72, 96x96, 144x144, 192x192, 72x144 vertical or horizontal, 96x192 vertical or horizontal temperature recorder rectangular: 192 x192, 288x288 mm, round: d = 260 mm

Damping:

X =   unfilled

L =   with glycerin filling for vibration attenuation

S =   with silicon oil filling (increased vibration attenuation)

K =   with oil filling (for devices with built-in limit contacts)

Sensor:

The temperature sensors are basically made of stainless steel 1.4541. Minimum sensor length is limited by the parameter L_s (see Table 5). This parameter indicates the sensitive part of the sensor which must be immersed into the medium in any case.

While specifying, please use the following format:

Sensor diameter x sensor length (in mm)
Example: 10x200

Operating ranges (table 2):

Nr.	Range in °C	Scale division in °C		Annotation
		Class 1.0	Class 0.6	
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
30	-10...+50	1	0.5	option
31	-10...+110	2	1	option
32	-10...+150	5	1	option
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

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Capillary tube (table 3):

only for GT-04.C...

	Material	d (mm)	$T_{min.}$ (°C)	$T_{max.}$ (°C)	Code
d	stainless steel 1.4541	2	-260	800	**X**
d	stainless steel with PVC-coating	4	-60	120	**XP**

Capillary sheathing (tab. 4):

only for GT-04.C...

|	Material	d (mm)	Tmin. (°C)	Tmax. (°C)	Code
d	flexible, stainless steel1.4301 with PVC coating	8	-60	120	**SP**
d	flexible, stainless steel 1.4401	7	-260	800	**X**
d	flexible, stainless steel 1.4401 with PVC coating	7	-60	120	**XP**
d	lead cladding	16	-20	200	**PB**

Limit contacts and analogous outputs:

Limit contacts are intended for alerting when certain threshold limits are crossed in either direction. The GT-04 thermometers in housing sizes 4" (100 mm) and 6" (160 mm) as well as the rectangular housing designs can be optionally equipped with up to 4 snap action contacts or inductive contacts integrated into the housing. The contacts will be designed as NO-contact or NC-contact (as the case may be, with reference to increasing temperature). In addition, micro-switches with higher switching load, contacts mounted on the housing or pneumatic contacts can be supplied on request.

Analogue outputs are meant for transferring the measuring data to higher-level display, evaluation or control systems. Angle of rotation measuring transmitters mounted into the housing or PT-100 measuring transmitters with sensor integrated PT-100 sensor are available.

Sensor dimensions (table 5):

Possible sensor diameter and minimum sensor length Ls (in mm)* (see table)
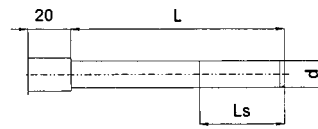
GT-04.R
sensor directly mounted
min. sensor length:
L = Ls
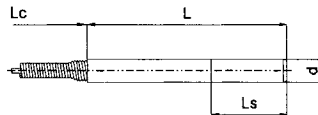
GT-04.C
with capillary tube
min. sensor length:
L = Ls

	Standard Thermometer			Thermometer with alarm contact	
Sensor Diameter (in mm)	GT-04.R sensor directly mounted	GT-04.C with capillary up to 5 m	GT-04.C with capillary above 5 m	GT-04.R sensor directly mounted	GT-04.C span: 80 °C above 5 m
6	120	---	---	120	---
6.35	96	---	---	96	---
7	80	190	---	80	---
8	60	135	---	60	---
9	45	100	190	45	190
10	35	80	150	35	150
11	30	65	120	30	120
12	25	55	95	25	95
12.5	25	50	90	25	90
13	25	50	90	25	90
14	20	40	70	20	70
15	20	35	60	20	60
16	17	30	55	17	55
18	16	30	50	16	50
20	15	20	43	15	43

* others on request

Process connection (tab. 6):

	Version	Connection		Material stainless steel 1.4301
	with swivel nut for GT-04.R and GT-04.C	1/2"	BSP	BX1
		3/4"	BSP	BX2
		1"	BSP	BX3
	with perma-nent nipple for GT-04.R and GT-04.C	1/2"	BSP	CX1
		3/4"	BSP	CX2
		1"	BSP	CX3
		1/2"	NPT	CX4
		3/4"	NPT	CX5
		1"	NPT	CX6
	with turnab-le nipple for GT-04.R & GT-04.C	1/2"	BSP	A04X1
		3/4"	BSP	A04X2
		1"	BSP	A04X3
	with double nipple and swivel nut for GT-04.R and GT-04.C	1/2"	BSP	B01X1
		3/4"	BSP	B01X2
		1"	BSP	B01X3
		1/2"	NPT	B01X4
		3/4"	NPT	B01X5
		1"	NPT	B01X6
	with double nipple and swivel nut, can be shif-ted to capil-lary for GT-04.C	1/2"	BSP	CS2X1
		3/4"	BSP	CS2X2
		1"	BSP	CS2X3
		1/2"	NPT	CS2X4
		3/4"	NPT	CS2X5
		1"	NPT	CS2X6
	with dou-ble nipple and swivel nut, can be shifted to sensor for GT-04.R and GT-04.C	1/2"	BSP	CS3X1
		3/4"	BSP	CS3X2
		1"	BSP	CS3X3
		1/2"	NPT	CS3X4
		3/4"	NPT	CS3X5
		1"	NPT	CS3X6

Other process connections:

Metric threads, aseptic glands, tri-clamp, surface sensors, helical sensors for air etc. on request

Versions (tab. 7):

snap action contacts		AC: 50 VA (max. 250V) DC: 30 W (max. 250V)
x = 1: NO-contact function x = 2: NC-contact function x = 3: change-over	for housing diameters 4", 6", rectangular housing 96x96, 144x144, 72x144 mm	
1 contact	NC-contact or NO-contact, change-over	**Mx**
2 contacts	NC-contact, NO-contact or 2 change-over	**Mxx**
3 contacts	NC-contact or NO-contact not meant for 72x144 housing	**Mxxx**
4 contacts	NC-contact or NO-contact, not meant for 72x144 housing	**Mxxxx**
Inductive contacts as per NAMUR (intrinsically safe contact protecting relay required for operation)		
1 contact	NC-contact or NO-contact	**Ix**
2 contacts	NC-contact, NO-contact	**Ixx**
3 contacts	NC-contact or NO-contact not meant for 72x144 housing	**Ixxx**
Analogue outputs:		
Angle of rotation measuring transmitter with 0...100 Ohm, 3-wire output	diameters 100, 160 mm 96x96, 144x144 mm	**R**
PT-100-Measuring transmitters with 4 to 20 mA, 2-wire output, including PT-100 element in the sensor and cable	diameters 100, 160 mm 96x96, 144x144, 72x144 mm	**TT2**

Options (tab. 8):

housing stainless steel 1.4401 instead of 1.4301	for GT-04...X...	**A**
dial made of safety glass		**B**
maximum indicator, can be reset with key	for devices without contact	**C**
maximum indicator, can be reset with key	for devices with contact	**D**
micrometer indicator		**E**
movement and indicator made of stainless steel 1.4301		**F**
double scale °C + °F		**G**
precision measuring version class 0.6	for 6" (160 mm), 10" (250 mm), 144x144, 192x192, 72x144 mm only	**H**
mirror scale	in combination with precision measuring version only for 6" (160 mm), 10" (250 mm) only	**I**
polished sensor		**K**
sensor HALAR coated	max. 1000 mm, max. 200°C	**L**

Stainless steel sensor protection sleeves:

can be used for sensors with A04, B, C and CS3 connections

Versions (Table 9):

TS02...
with male thread
sensor-side

TS03...
with female
thread sensor-side

Typ	.1	.2	.3	.4	.5	.6
max. sensor diameter	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**
internal diameter d3 (mm)	10.5	10.5	10.5	13	13	13
external diameter D (mm)	12.5	12.5	12.5	15	15	15
HEX 1 (mm)	22	27	36	22	27	36
HEX 2 (mm)	27	32	36	27	32	36

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

Example: TS02.2.120   protection sleeve with G1/2-male
                              sensor-side, G 3/4male
                              process-side, length 120 mm,
                              for sensor diameter 10 mm

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