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EN

GREISINGER electronic GmbH

Temperature Probe for potentially explosive atmospheres

(Measuring ranges from -200 to +900°C)

Operating Manual

GTF 101-Ex …
GTF 102-Ex …

CE 0081

Made in Germany

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1 Introduction

1.1 General

The temperature-probes GTF 101-Ex and GTF 102-Ex are mounting probes for usage in potentially explosive atmospheres. As the probes are very small-sized they can be used in places difficult to access. The probes are ready to use. They only have to be connected to the end device, as their cables are already connected and converted.

The probe-inserts of the GTF 101-Ex and GTF 102-Ex are attached and sealed, therefore they cannot be exchanged. The probe-inserts are available for two different sensor-groups:
resistance thermometer: Pt 100, Pt 1000 or **thermocouple** : type K, type N (standard).
Only mineral insulated sensor elements are used.

The GTF 102-Ex can be used up to zone 0 or zone 20 for medium-temperatures from **-200 °C to +900 °C**. If the medium-temperature exceeds 100 °C all temperature probes must have a neck tube length of at least 50mm (standard). It is also possible to produce longer neck tubes.

The GTF 101-Ex can be used for medium-temperatures from **-200 °C to 900 °C**, but is not permitted for zone 0 or zone 20. If the medium-temperature exceeds 100 °C an adequate distance from the screw joint to the head must be adhered as well (see GTF 102).

The permissible ambient temperature in the area of the connection head depends on the temperature class, the potential explosive zone, the medium-temperature, and the cable gland. For the standard cable gland the permissible maximal ambient temperature ranges from -20 °C to +60 °C (see chapter 2.2) and for the modification „higher ambient temperature“ (GTF 10.-Ex-...H...-types) from -20 °C to +80 °C.

The used material of the probes which encounter the medium are made of stainless steel (e.g. 1.4404, 1.4435, 1.4571 or Inconel 600). This ensures high stability against many chemical compounds.

For applications with head-transducer or clamp-blocks we suggest the series GTF 103-Ex..

1.2 Which temperature-probe, transmitter, display etc. do I need?

You can easy find out the needed temperature-probe or transducer for your special application from the table given below.

Zone 0 or 20

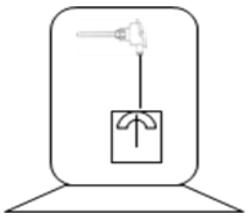
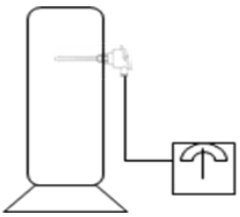
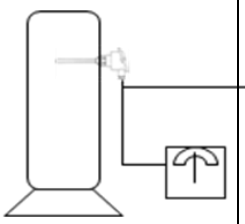
A GTF 102-Ex can be used, if the temperature has to be acquired in Ex-zone 0 or 20.
Only ATEX- certified display- and control-devices, matching the demands of the certain zone, are allowed to be used.

Zone 1,2 or 21, 22

A GTF 102-Ex or GTF 101-Ex matching the protection class Ex ia IIC T6 or Ex e II T6 and Ex iaD or Ex tD A21 can be used, if the temperature has to be acquired in EX-zone 1, 2 or 21, 22.
In case the controlling- or displaying device is also in zone 1, 2 or 21, 22 only ATEX certified devices matching the demands of the certain zone are allowed to be used.

In case the controlling- or displaying device is beyond the explosion hazardous area, this device does not need an Ex-certification if a temperature-probe GTF 102-Ex or GTF 101-Ex matching the protection class increased safety (Ex e II T6 or Ex tD A21) is used and the safety instructions given in chapter 2 are fulfilled

Table 1: Overview of application and demands to a GTF 102-Ex or GTF 101-Ex and the display-/ control-device in different Ex-zones

Ex-zone: probe	**0, 20**	**0/1, 20/21**	**1, 2, 21, 22**	**1, 2, 21, 22**
Ex-zone: device	**0, 20**	**1, 2, 21, 22**	**1, 2, 21, 22**	***no Ex-zone***
applicable GTF 101-Ex-… GTF 102-Ex-... types	**nonlicenced (see GTF 103-Ex)**	**GTF 102-Ex-...**	**GTF 101-Ex-... GTF 102-Ex-...**	**GTF 101-Ex-... GTF 102-Ex-...**
ATEX-marking of the probe	**II 1G Ex ia T6 II 1D Ex iaD 20 IP65 T80°C Ta = -20 °C ... +40 °C**	**II 1/2G Ex ia T6 II 1/2D Ex iaD 20 IP65 T80°C**	**II 2G Ex ia T6 II 2D Ex iaD 21 IP65 T80°C or II 2G Ex em T6 II 2D Ex mbD A21 IP65 T80°C**	**II 2G Ex em T6 II 2D Ex mbD A21 IP65 T80°C**
				
ATEX demand on devices	**II 1G or II 1D**	**II 1G; II (1)2G Ex ia IIC, II 2G Ex ia IIC or II 1D; II (1)2D Ex iaD IIC, II 2D Ex iaD IIC**	**II 2G or II 2D**	***without ATEX-admission***

GTF 102-Ex and GTF 101-Ex type-code is shown in chapter „ Specification “.

2 Safety instructions

2.1 General

1. Only install the GTF 101-Ex and GTF 102-Ex according to the given manufacturer's instructions and observe general standards and precepts.
2. The temperature sensors with the type of protection "Increased Safety" (e) are allowed to be connected only to the resistance sensors or thermocouples according to the relevant standard for this part. The nominal electrical operating parameters may not exceed.
3. Every temperature sensor with the type of protection „Increased Safety" (e), has to be used with a series fuse, which is suitable for the possible short-circuit current of 1500A. The series fuse can be installed into the associated supply device or into the evaluation device.
4. Only use cable with allowable diameter and associated sealings of the cable entry point. The connection piece of the cable entry point must not be detached. Use blue pressure screw of the cable entry point for intrinsic safety circuits.
5. Arrange circuit points according to the given connection diagram. The anode (positive pole) of thermocouples is marked with a red label.
6. The maximal ambient temperature which is specified in the EC-type-examination certificate do not may be over ranged in the entire area of the connection head. Influences of adjacent heat-sources are to be considered.
7. The self heating of the device's tube has to be considered for the application, if loading the measure-circuitry with more than 40mW.
   The summation of the medium-temperature and the temperature of the sensor-tube from the device's self heating must always be lower than the ignition temperature of the medium.
8. The chemical resistance of the material has to be checked with the manufacturer, if using in aggressive mediums.
9. The probe line of the temperature sensor is to be installed in such a way which ensures sufficient protection against mechanical damage. The bending especially of the long sensor tube has to be prevented. Where appropriate fasten elements are to be mounted in suitably distances.

2.2 Limited ambient conditions

2.2.1 GTF 101-Ex-O... and GTF 102-Ex-O... types	
temperature class T6	-20°C ≤ Ta ≤ +60°C
2.2.2 GTF 101-Ex-O...H... and GTF 102-Ex-O...H... types	
temperature class T6	-20°C ≤ Ta ≤ +80°C

2.3 Connection values and ambient conditions

The measure-circuit should not be loaded with more than 40mW. When not exceeding this value, the temperature at the sensor-tube will raise 4°C maximum compared to ambient temperature. The temperature probe GTF 101-Ex and GTF 102-Ex must only be used, if this increase of temperature compared to the medium-temperature within the container is allowable.

The self heating of the device has to be considered for the application, if loading the measure-circuit in fault with more than 40mW. **The summation of the medium- temperature and the temperature of the sensor-tube from the device's self heating up must always, even in fault, be lower than the ignition temperature of the medium.**

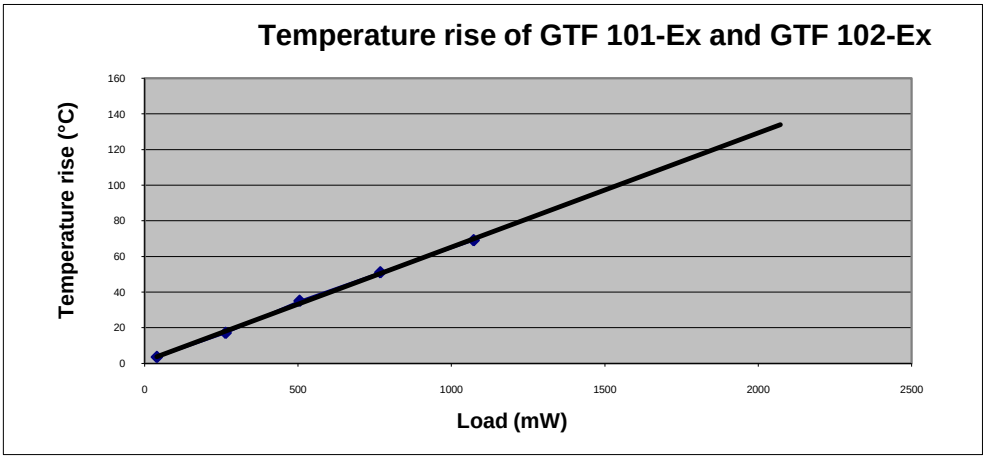


Figure1: Temperature rise vs. load of the measure circuit

The given requirements in safety instructions for the supply-unit and the display-/control-device must be objected.

3 Installation hints

3.1 Layout for Pt 100 and Pt 1000 in 2-, 3- , 4- wire technology

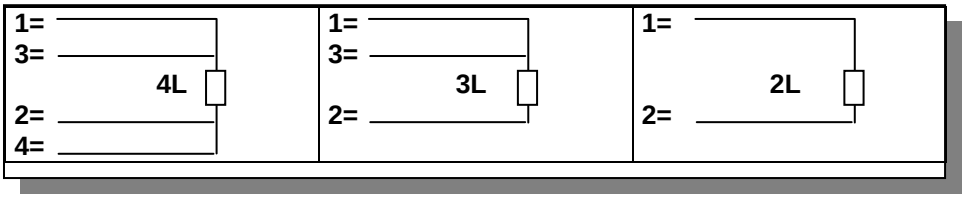


Figure 2: Layout

3.2 Thermocouples type K and type N

The connection for the anode (positive pole) is marked with a red label.

Notes for wire colour:

- type K (red / green):	*red = plus,*	*green = minus*
- type K (green / white):	*green = plus,*	*white = minus*
- type N:	*pink = plus,*	*white = minus*

3.3 Cable gland

Factory-made the connection piece of the screwed cable gland is clotted with the sensor head. Violent dismounting or detaching is not permissible (Torque > 3,75 Nm).
The pressure screw of the screwed cable gland has to be tested for leak, regularly and has to be tightened if necessary. Reconstruction or modifications at the screwed cable gland or the sensor are not allowed. Only original parts are allowed to be used if repair work is necessary.
Only round cables with the following external diameters (ED) are allowed to use:
Standard: ED: 4 - 7 mm
Higher ambient temperature: ED: 3 - 6,5 mm

4 Probe-types and areas of application

The GTF 101-Ex and GTF 102-Ex are available in 16 different designs each.

All further specifications adapt to the sensor, the temperature-range, the ambient temperature, and the needed type of protection.

Standard-probes are manufactured with a probe-length of 100 mm, a probe-diameter of 6 mm, a screw thread G=1/2” (GTF 102-Ex) and for media-temperatures >100 °C with a neck tube-length of 50 mm.

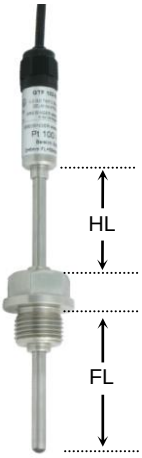
For extra charge we will assemble probes according to your instructions (as far as possible).

GTF 101-Ex-.K.

GTF 101-Ex-.M.

GTF 102-Ex-.K.

GTF 102-Ex-.M.



5 Specification

Measuring range:	**GTF 101-Ex and GTF102-Ex without neck tube** Pt100 / Pt 1000: -200 °C .... +100 °C Thermocouples: type K,N -200 °C .... +100 °C **GTF 101-Ex and GTF 102 with tube** Pt100 / Pt 1000: -200 °C ... +600 °C Thermocouples type K -200 °C ... +900 °C Thermocouples type N -200 °C ... +900 °C
Sensor- elements	All sensor-elements are mineral insulated Pt100 cl. B, Pt1000 cl. B with 2-, 3-, or 4-wire connection thermocouples type K, type N
Probe-tubes:	Material of screw thread and probe-tubes: stainless steel (1.4404, 1.4435, 1.4571, Inconel 600 et al.) Standard: **GTF 101-Ex** without neck tube: clamping ring screwing G = ½“A, FL = 100 mm, D = 6 mm, WS ≥ 1,0 mm with neck tube: screw thread G = ½“A, FL = 100 mm, D = 6 mm, WS ≥ 1,0 mm, HL = 50 mm, D = 8 mm **GTF 102-Ex** without neck tube: clamping ring screwing G = ½“A, FL = 100 mm, D = 6 mm, WS ≥ 1,0 mm with neck tube: screw thread G = ½“A, FL = 100 mm, D = 6 mm, WS ≥ 1,0 mm, HL = 50 mm, D = 8 mm
Cable gland:	
Standard ambient temperature max.: -20°C...+60°C	Material: polyamide, sealing CR/NBR IP 66 Clamping range: 4 - 7 mm
higher ambient temperature max.: -20°C...+80°C	Material: polyamide, sealing and O-Ring NBR IP 68 - 10 bar Clamping range: 3 - 6.5 mm

For individual types please make exact specification of:
probe-length (FL), probe-diameter (D), neck-tube-length (HL), ambient temperature, measuring range, sensor-element , sensor-accuracy, and type of protection

Available components (possibly not useable for all protection-types and zones)

Probe-tube diameter: 3, 4, 5, 6, 8 mm
notice: at diameter 3 mm: minimum-length = 60 mm, the diameter is reduced: 6mm to 3mm

Kind of screw thread: G, R, NPT, M - external screw thread

Size of screw thread: 1/8“, ¼“, 3/8“, ½“, ¾“, 8x1, 10x1, 14x1

Sensor-elements: Pt 100, Pt 1000, TC-type K, TC-type N

6 Ordering information

6.1 for GTF 101-Ex-... probes

Ordering information for GTF 101-Ex ... probes

GTF 101-Ex- [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ] / MB: [ ]

Sensor-element:

P	Pt100
S	Pt1000
T	Thermocouple type K
U	Thermocouple type N

Neck tube:

K	without neck tube (for T ≤ 100 °C)
M	with neck tube (for T > 100 °C)

Ambient temperature:

A	Standard
	-20 °C ... +60 °C
H	Higher ambient temperature
	-20 °C ... +80 °C
	only for protection type intrinsic safety "i"

Neck-tube length:

xxx	length in mm
	e.g. 050 (= 50 mm = standard length)

Probe-tube diameter:

x	3, 4, 5, 6 or 8 mm
	Hints:
	- observe for D = 3 mm (only for Pt100 or Pt1000 available):
	• minimum length is 60 mm
	• the probe diameter is reduced,
	tube top D = 3 mm (for approx. 30 mm) after this D = 6 mm

Probe length:

xxxx	length in mm
	e.g. 0100 (= 100 mm)

Cable length: (4-wire)

x	length in m
	e.g. 1 (= 1 m)

Protection type:

e	Gas: increased safety, encapsulation (em)
	Dust: encapsulation (mbD)
i	intrinic safety
	Hint: increased safety ("em"): in case the connected device is beyond the explosion hazardous area, this device does not need an Ex-certification. *(take a note to the safety*

Potentially explosive atmospheres:

Gases:	
01	zone 1
02	zone 2
Dusts:	
21	zone 21
22	zone 22

Measuring range:

xxx	measuring range of the probe
	e.g. -50 ... +100 °C

Ordering-example: GTF 101-Ex with Pt100, medium temperature: >100 °C, ambient temperature: 60 °C, neck-tube length: 50 mm, probe-diameter: 6 mm, probe-length 200 mm, cable length: 5 m, protection type "i", zone 21, measuring range: -50 to +100 °C

GTF 101-Ex- [G][M][A][0][5][0][6][0][2][0][0][5][i][2][1] / MB: [-50 ... +100 °C]

6.2 for GTF 101-Ex-... probes

Ordering information for GTF 102-Ex ... probes

GTF 102-Ex- [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ] **/ MB:** [ ]

Sensor-element:

P	Pt100
S	Pt1000
T	Thermocouple type K
U	Thermocouple type N

Neck tube:

K	without neck tube (for T ≤ 100 °C)
M	with neck tube (for T > 100 °C)

Ambient temperature:

A	Standard -20 °C ... +60 °C
H	Higher ambient temperature -20 °C ... +80 °C
	only for protection type intrinsic safety "i"

Kind of screw thread:

1	G-screw thread (cylindric)
2	M-screw thread (metric)
other screw thread on request	

Size of screw thread:

1	1/8"	G-screw thread
2	1/4"	
3	3/8"	
4	1/2"	
5	3/4"	
6	8x1	M-screw thread
7	10x1	
8	14x1	

Hint:
in the zones 0/1 or 20/21 only G 3/8", G 1/2" or G 3/4" are avialable.

Neck-tube length:

xxx	length in mm
	e.g. 050 (= 50 mm = standard length)

Probe-tube diameter:

x	3, 4, 5, 6 or 8 mm
	Hints:
	- for zone 0/1 and 20/21 only 6 mm or 8 mm available
	- observe for D = 3 mm (only for Pt100 or Pt1000 available):
	• minimum length is 60 mm
	• the probe diameter is reduced,
	tube top D = 3 mm (for approx. 30 mm) after this D = 6 mm

Probe length:

xxxx	length in mm
	e.g. 0100 (= 100 mm)

Cable length: (4-wire)

x	length in m
	e.g. 1 (= 1 m)

Protection type:

e	gas: increased safety, encapsulation (em) - only permitted in zone 1 and 2
	dust: encapsulation (mbD) - only permitted in zone 21 and 22
i	intrinic safety
	Hint: increased safety ("em"): in case the connected device is beyond the explosion hazardous area, this device does not need an Ex-certification. *(take a note to the safety*

Potentially explosive atmospheres:

Gases:	
0A	zone 0/1 - probe-tube in zone 0 and probe head in zone 1
01	zone 1
02	zone 2
Dusts:	
2A	zone 20/21 - probe-tube in zone 20 and probe head in zone 21
21	zone 21
22	zone 22
Note:	
The probe can not be used completely in zone 0 or zone 20!	

Measuring range:

xxx	measuring range of the probe
	e.g. -50 ... +100 °C

Ordering-example: **GTF 102-Ex** with Pt100, medium temperature: >100 °C, ambient temperature: 60 °C, kind of screw thread: G-screw thread, size: 1/2", neck-tube length: 50 mm, probe-diameter: 6 mm, probe-length 200 mm, cable length: 3 m, protection type "i", zone 1, measuring range: -50 to +100 °C

GTF 102-Ex- [G][M][A][1][4][0][5][0][6][0][2][0][0][3][i][0][1] **/ MB:** [-50 ... +100 °C]