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EN

GREISINGER electronic GmbH

Temperature Probe for potentially explosive atmospheres

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

Operating Manual

GTF 103-Ex ...

CE 0081

Made in Germany

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1 Introduction

1.1 General

The temperature-probes GTF 103-Ex are mounting probes for usage in potentially explosive atmospheres of all zones. Greatest flexibility is given by the modular build up of the GTF 103-Ex.
The temperature-probes are equipped with a head (IP 65). The head can function as a connection head or as a housing for a head transmitter.

The probe-inserts of the GTF 103-Ex 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 103-Ex can be employed in medium-temperatures from -**200°C to + 900°C**.
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 screwed cable gland. For the standard screwed cable gland the permissible maximal ambient temperature ranges from –20°C to + 60°C (see chapter 2.3) and for the modification „higher ambient temperature" (GTF 103-Ex-...H...-types) from -20°C to +80°C.
Apart from the probe-inserts with a probe diameter 3mm all probe-inserts of the GTF 103-Ex are exchangeable.

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.
If the medium-temperature exceeds 100°C all GTF 103-Ex must have a neck tube length of at least 50mm (standard). It is also possible to produce longer neck tubes.

You can choose between 48 **GTF 103-Ex basis-types.** Also all basis-types could be produced according to your instructions.

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

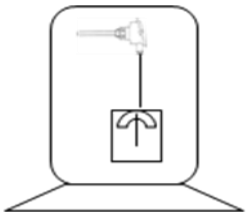
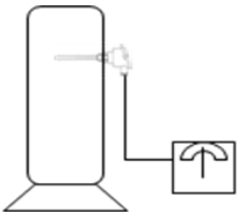
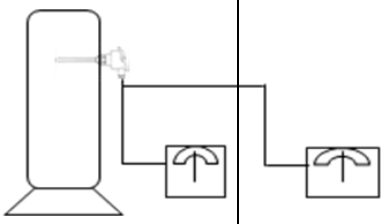
A GTF 103-Ex can be used, if the temperature has to be acquired in Ex-zone 0 or 20. Only ATEX- certified display- and control-devices, matching the demands of the certain zone, are allowed to be used.

Zone 1,2 or 21, 22

A GTF 103-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 103-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 103-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 103-Ex-… types	**GTF 103-Ex-G..J..** **GTF 103-Ex-O..J..** **with special provisions (see chapter 2.2**Fehler! Verweisquelle konnte nicht gefunden werden.)	**GTF 103-Ex-G..J..** **GTF 103-Ex-O..J..**	**GTF 103-Ex-G...** **GTF 103-Ex-O...**	**GTF 103-Ex-O...**
ATEX-marking GTF 103-Ex-…	**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 e T6** **II 2D Ex tD A21** **IP65 T80°C**	**II 2G Ex e T6** **II 2D Ex tD 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 103-Ex type-code is shown in chapter „ Specification “.

2 Safety instructions

2.1 General

1. Only install the GTF 103-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. Setting up the head transmitter is only allowed to be done in a non hazardous area.
5. Before changing the measuring-insert the connections must be disconnected.
6. In the case of using the complete GTF 103-Ex in the hazardous area which required the category 1, the safety instructions for zone 0 or zone 20 (p.r.t. chapter 2.2**Fehler! Verweisquelle konnte nicht gefunden werden.**) have to be fulfilled.
7. 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.
8. Arrange circuit points according to the given connection diagram. The anode (positive pole) of thermocouples is marked with a red label.
9. 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.
10. 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.
11. The chemical resistance of the material has to be checked with the manufacturer, if using in aggressive mediums.
12. 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 Safety instructions for zone 0 or zone 20

These instructions are only valid if the complete GTF 103-Ex is to be installed in zone 0 or zone 20.

1. The explosive mixtures are allowed to occur only in atmospheric conditions of -20°C ≤ Ta ≤ +60°C and 0,8 bar ≤ p ≤ 1,1 bar.
2. Please take notice of the limited ambient temperatures (see chapter 2.3)
3. The power supply circuit must fulfil ignition classification Ex ia IIC or Ex iaD IIC.
4. The GTF 103-Ex materials must be completely compatible with the measured media (housing : aluminium, sealing: silicon; label: polyester with acrylic glue)
5. The GTF 103-Ex must be installed so that there is no chance of electrostatic charging.

2.3 Limited ambient conditions

2.3.1 GTF 103-Ex-G...-types		
temperature class T6	zone 0 -20°C ≤ Ta ≤ +40°C	zone 1 and 2 -20°C ≤ Ta ≤ +50°C
2.3.2 GTF 103-Ex-O...-types		
temperature class T6	zone 0 -20°C ≤ Ta ≤ +40°C	zone 1 and 2 -20°C ≤ Ta ≤ +60°C
2.3.3 GTF 103-Ex-O...H...-types		
temperature class T6	zone 0 -20°C ≤ Ta ≤ +60°C	zone 1 and 2 -20°C ≤ Ta ≤ +80°C

2.4 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 103-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.**

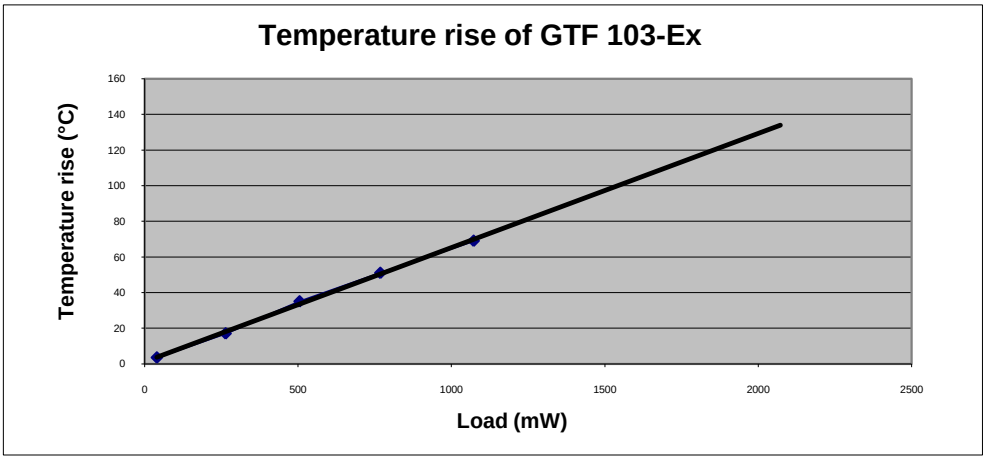


Figure1: Temperature rise vs. load of the measure circuit

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

3 Installation hints

The layout **for GTF 103-Ex-G...types** with head-transmitter GITT01-Ex or TMT181..-B.. is given in the operating manual of the head-transmitter.

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

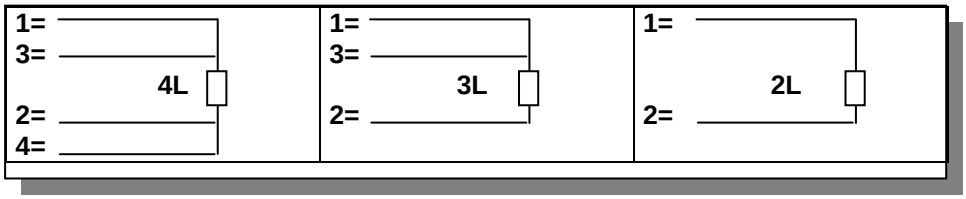


Figure 2: Layout

3.2 Thermocouples type K and type N

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

3.3 Screwed cable gland

The protection-degree of the connection head is IP 65. The user is committed to use cables with the specified diameter only. The assembly has to be done appropriate.
If the assembly is not done appropriate explosion hazard is given!
Attention: the cable has to be protected against pull out (e.g. with a cable clamp).
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.

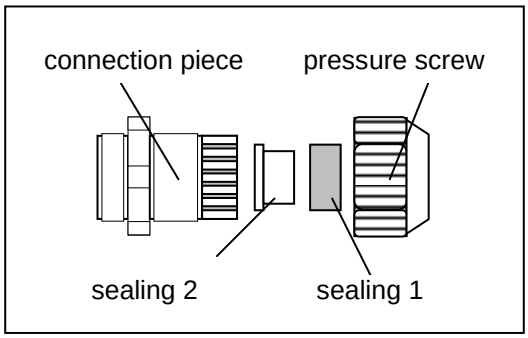
3.3.1 Standard

Only round cables with the following external diameters (ED) are allowed to use:

	ED (mm)	sealing 1 and sealing 2 for ED (mm)	sealing 1 for ED (mm)
GTF 103-Ex	5,5 - 13	5,5 - 8	8-13

Use the right sealing for your cable (see figure 4). The pressure screw has to be tightened well to ensure the protection-degree IP 65 (2,50 Nm).
Violent tightening can lead to impairment of the protection-degree.

figure 4: assembly of the screwed cable gland



clamping range 5,5 – 8 mm: push sealing 1 onto sealing 2 and insert the cable through sealing 2.

clamping range 8 – 13 mm: remove sealing 2 and insert the cable through sealing 1.

3.3.2 Modification: increased ambient temperature

	ED (mm)
GTF 103-Ex-...H...	6,5 - 13

4 Probe-types and areas of application

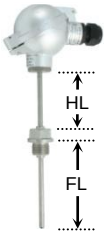
The GTF 103-Ex are available in 48 different designs.
The GTF 103-Ex are equipped with a head. The head has to offer sufficient space for a head transmitter. Furthermore the measuring inserts of the GTF 103-Ex are changeable without dismounting the whole probe (apart from probe-tube ED = 3 mm).

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

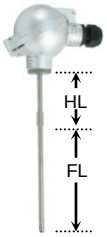
Standard-probes are manufactured with a probe-length of 100 mm, a probe-diameter of 6 mm, a screw thread G=1/2” and for media-temperatures >100 °C with a neck tube-length of 50 mm.

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

GTF 103-Ex-..JM...



GTF 103-Ex-..NM...



GTF 103-Ex-..NK...

5 Specification

Measuring range:	Pt100/Pt1000 without neck tube:	-200 °C....+100 °C
	Pt100/Pt1000 with neck tube:	-200 °C....+600 °C
	Thermocouples without neck tube:	-200 °C....+100 °C
	Thermocouples type K with neck tube:	-200 °C....+900 °C
	Thermocouples type N with neck tube:	-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: without neck tube: screw thread 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	
Head:	Aluminium, protection-degree: IP 65, silicon-sealing ambient temperature (max): -20°C....+80°C D = 68 mm; H = 63 mm, screw thread: M 24x1,5 space for head transmitter: D x H = 44 x 23 mm or connection socket (6 pole)	
Screwed cable gland:		
Standard ambient temperature max.: -20°C...+60°C	Material: polyamide, sealing CR/NBR IP 66 Clamping range: Ø 5,5 - 13 mm	
higher ambient temperature max.: -20°C...+80°C	Material: polyamide, sealing and O-Ring NBR IP 68 - 10 bar Clamping range: Ø 6,5 – 12 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)

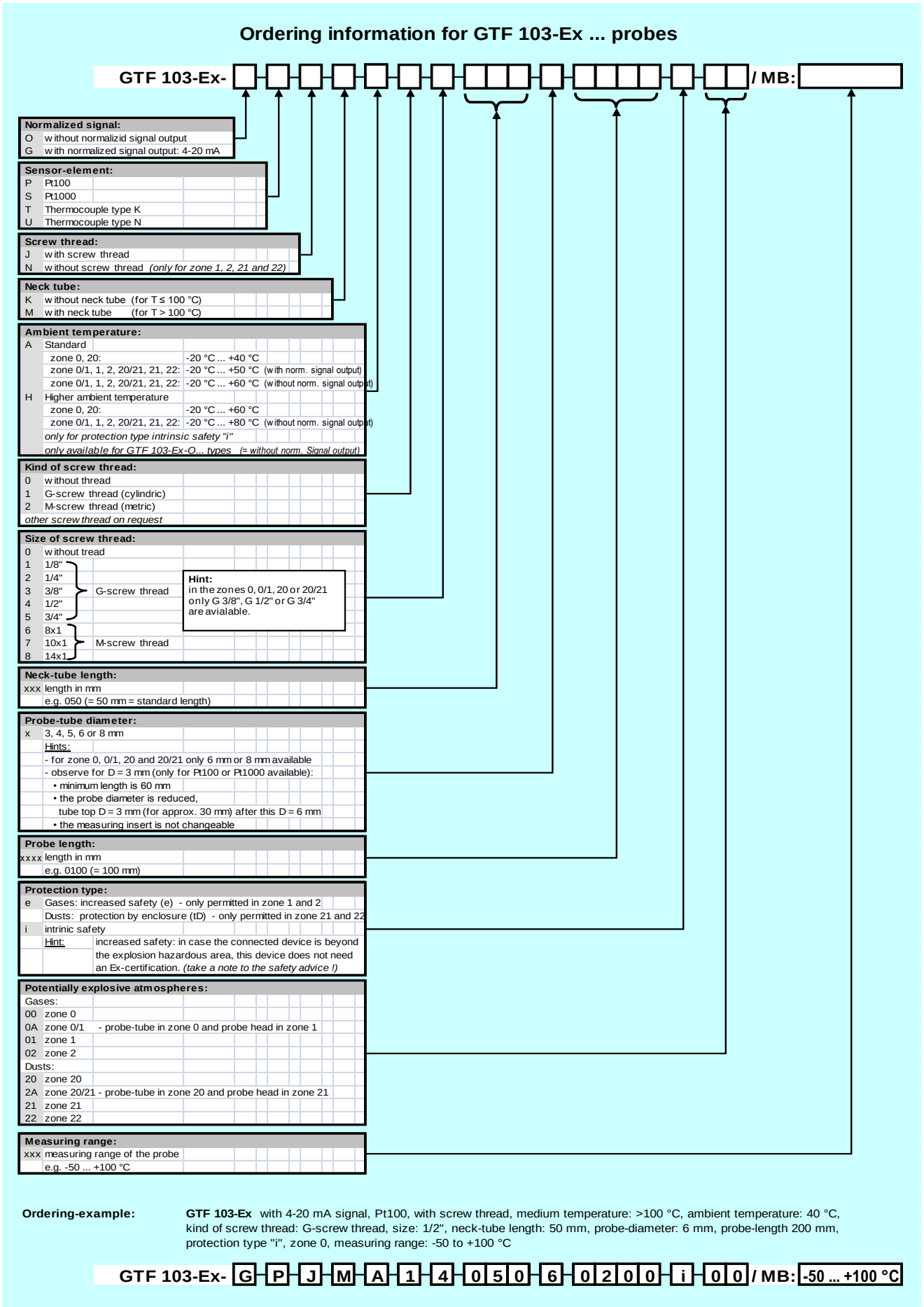
Probe-tube diameter: 3, 4, 5, 6, 8 mm
notice: at diameter 3 mm: minimum-length = 60 mm, the diameter is reduced: 6mm to 3mm

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 for GTF 103-Ex-... probes



Ordering-example: **GTF 103-Ex** with 4-20 mA signal, Pt100, with screw thread, medium temperature: >100 °C, ambient temperature: 40 °C, kind of screw thread: G-screw thread, size: 1/2", neck-tube length: 50 mm, probe-diameter: 6 mm, probe-length 200 mm, protection type "i", zone 0, measuring range: -50 to +100 °C

GTF 103-Ex- G P J M A 1 4 0 5 0 6 0 2 0 0 i 0 0 / MB: -50 ... +100 °C