



GÜNTHER

ATEX

Assembly and operating instructions



Product group RE6

Ex e – Increased safety

Ex t – Protection by enclosure

ATEX Assembly and operating instructions – Product group RE7 - TE8

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1. General remarks

1.1 Introduction

This operating manual contains basic instructions for the installation, operation and maintenance of resistance thermometers of the RE 7.1, RE 7.2, RE 8.1, RE 8.2 series and thermocouples of the TE 8.1, TE 8.2 series.

- The document should be read thoroughly before installation and commissioning of the equipment by the installer, as well as by the personnel responsible for the unit.
- These operating instructions must be available and accessible at the site at all times.
- It must also be ensured that the temperature sensors are operated exclusively in the undamaged and clean condition.

The following sections contain important safety instructions, whose non-observance may lead to risks for humans and animals, things and objects.

1.2 Staff qualifications

The equipment may be operated only by qualified personnel that has been familiarised with installation, commissioning and operation of this product which was assembled and put into operation.

Qualified persons are those that due to their specialised training, know-how and experience and their knowledge of the relevant standards assess the work assigned to them and recognise possible dangers and hazards.

In the case of explosion-proof equipment, the staff must have appropriate education or training, or authorisation to work on explosion-protected equipment in explosion-hazard areas.

Dangers related to the failure to comply with safety instructions

Failure to comply with these safety instructions, foreseen applications or limiting values provided in the technical data of the unit may lead to dangers and damages of persons, environment or the installation.

In such a case damages claims against GÜNTHER GmbH Temperaturmesstechnik shall be excluded.

1.3 General

Temperature sensors are used to convert temperature at a measuring location into an electrical quantity (voltage, resistance). They are used for the measurement, registration, regulation and limit value monitoring of temperatures for product group RE7 in the range between -40 °C to +200 °C and for product group RE8 in the range between -40 °C to +400 °C (Thermocouples of product group TE7 -40 °C to +200 °C, product group TE8 -40 °C to +1000 °C).

The resistance thermometers and thermocouples RE 7.1, RE 7.2, RE 8.1, RE 8.2, TE 8.1, TE 8.2 are used as equipment with increased safety for temperature measurements in liquid and gaseous media as well as in areas at risk of dust explosion. The resistance thermometers are equipped with Pt100, Pt500 or Pt1000 temperature sensors compliant with DIN EN 60751 in tolerance classes A, AA or B in two-, three- or four-wire technology. Models with two measuring circuits are also possible. Thermocouples are optionally equipped with the thermocouples T, J, K, E and N according to DIN EN 60584-1 in tolerance classes 1 or 2 as single or double measuring circuit. They are certified in type of protection Ex e or Ex tb and are suitable for use in hazardous areas of zone 1 for gas and zone 21 for dust.

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1.4 Installation and operation

During installation relevant standards must be complied with, e.g. EN 60079-14
“Electrical equipment for potentially explosive atmospheres”.

- Defective temperature sensors must not be used.
- Repairs must be performed only by appropriately authorised persons.
- Repairs may be done only using original spare parts from the original supplier, otherwise the requirements of the approval are not guaranteed.
- If a component of electrical unit which is of vital importance for the protection against explosion has been repaired, the unit may be put into operation again only after an expert has determined that its features vital for explosion protection comply with the requirements.

1.5 Installation and connection instructions

- In principle, the Regulation on the Use of Electrical Installations in Hazardous Areas (BetrSichV) must be observed!
- Ensure that the specified permissible ambient temperature values are not exceeded. When laying a connection cable, ensure that the cable insulation does not come into contact with parts which have a higher surface temperature than the insulation resistance.
- It must also be ensured that the required degrees of protection (IP rate) are met for the complete temperature sensors. A galvanic connection (grounding) must be ensured by permanent installation of the sensor in the system.

Required for type of protection  **II 2 G Ex eb IIC T6...T1 Gb**

Required for type of protection  **II 2 D Ex tb IIIC T80°C...T440°C Db** → Protection class min.IP6X

Sliding compression fittings or adjustable flanges are provided as process connections Pressure rings are made of metal or PTFE. Modified versions (thermal decoupling) are to be used as process connections for temperature sensors for surface measurements.

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2. Electrical and Thermal Characteristics

2.1 Electric limiting characteristics

- Electric strength test:
U = 500 V/AC Measuring circuit/sheath and between measuring circuits for double measuring circuit
- Maximum values: $I_N = 2 \text{ mA}$ (Nominal current)
 $U_{\text{max}} = 30 \text{ V}$
 $P_{\text{max}} = 102 \text{ mW}$

A current limiter must be provided as overcurrent protection. $I_{\text{max}} = 1,7 \times I_N$ (I_N = Nominal safety current according to IEC 60127)

With these temperature sensors in type of protection Ex e, design measures are taken to prevent impermissibly high temperatures and the occurrence of sparks and arcs during normal operation or under specified exceptional conditions.

For sensors used in dust zones (zone 21), the sensors also meet the requirements “Protection through housing” (tD), Required protection rate according to EN 60529: IP6x

2.2 Thermal characteristics

- P_O can be taken from the name plate of the associated equipment.
- Thermal resistance (power loss) R_{TH} (to determine the self-heating at the sensor surface):
 - Sheath/tube-Ø 3.0 mm → 165 K/W
 - Sheath/tube-Ø 5.0 mm → 110 K/W
 - Sheath/tube-Ø 6.0mm - 8.0 mm → 90 K/W
 - Sensor tube with cable connection → 300 K/W

The self-heating of thermocouples is negligible.

The table shows the maximum permissible media temperature (°C) in relation to the respective power supplied as an example for resistance thermometers of sheath measuring insert Ø 3.0 mm

Sheath measurement insert diameter	Temperature class	Max. media temperature T_M at maximum power P_i at sensor	
		$P_i \leq 25 \text{ mW}$	$P_{i(\text{max})} \leq 102 \text{ mW}$
3.0 mm	T1; +450 °C	+430.0 °C	+423.0 °C
	T2; +300 °C	+280.0 °C	+273.0 °C
	T3; +200 °C	+190.0 °C	+178.0 °C
	T4; +135 °C	+125.0 °C	+113.0 °C
	T5; +100 °C	+90.0 °C	+78.0 °C
	T6; +85 °C	+75.0 °C	+63.0 °C

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The table shows the maximum permissible media temperature (°C) in relation to the respective power supplied as an example for cable sensors

Cable sensor	Temperature class	Max. media temperature TM at maximum power Pi at sensor	
		$P_i \leq 25 \text{ mW}$	$P_{i(\text{max})} \leq 102 \text{ mW}$
	T1; +450 °C	+432.5 °C	+409.4 °C
	T2; +300 °C	+282.5 °C	+259.4 °C
	T3; +200 °C	+187.5 °C	+164.4 °C
	T4; +135 °C	+122.5 °C	+99.4 °C
	T5; +100 °C	+87.5 °C	+64.4 °C
	T6; +85 °C	+72.5 °C	+49.4 °C

As the surface temperature of the sensor can be higher than the permissible ambient temperature due to heat dissipation, the operator must ensure that the maximum continuous temperature resistance of +60 °C is not exceeded at the epoxy resin potting points (see drawings)!

The temperature measuring range for resistance thermometers can be RE7 -40 °C to +200 °C, RE8 -40 °C to +400 °C and thermocouples TE7 -40 °C to +200 °C, TE8 -40 °C to +1000 °C at the measuring tip.

The operator must take suitable measures to ensure that the temperature class indicated in the Ex area and the permissible operating temperatures are complied with.

2.3 Cables and wires

Screened cables with different cross-sections and insulation materials are used for connection. The primarily used cross-sections are 0.22 mm² to 1.5 mm².

The insulation materials used are:

- PVC (high quality) for temp. up to 105 °C
- FEP for temp. up to 200 °C
- Silikon for temp. up to 200 °C
- PTFE/PFA for temp. up to 260 °C
- Glass silk for temp. up to 300 °C

3. Types of protection and coding of individual series

Product group: RE7-TE8 (RE7.1; RE7.2; RE8.1; RE8.2; TE8.1; TE8.2) (Heat shrink tubing)

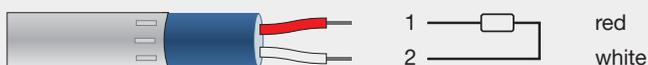
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	II 2 D Ex tb IIIC T80°C...T440°C Db
Type: >>> Article Number <<<	
	IBExU20 ATEX1011X

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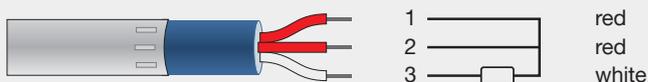
4. Connection options

4.1 Cable sensors – Resistance thermometers (Colour coding according to DIN EN 60751)

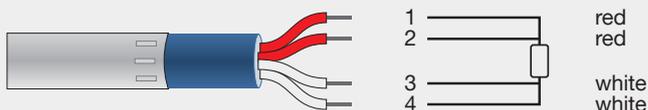
1x Pt100 2-wire connection



1x Pt100 3-wire connection



1x Pt100 4-wire connection



2x Pt100 2-wire connection



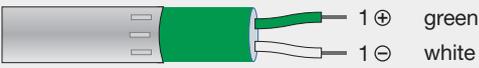
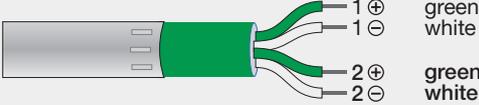
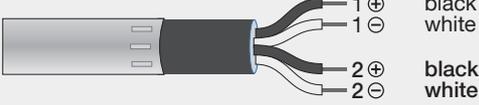
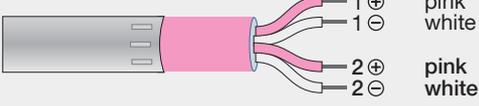
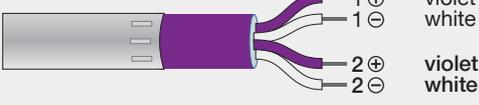
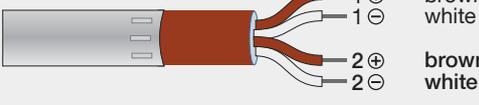
2x Pt100 3-wire connection



Depending on the connecting cable used, deviations in the conductor colours are possible, if the measuring circuits remain clearly assignable.

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4.2 Cable sensors - Thermocouples (Colour coding acc. to DIN EN 60584)

<p>1x NiCr-Ni (Type K)</p>  <p>1⁺ green 1⁻ white</p>	<p>2x NiCr-Ni (Type K)</p>  <p>1⁺ green 1⁻ white 2⁺ green 2⁻ white</p>
<p>1x Fe-CuNi (Type J)</p>  <p>1⁺ black 1⁻ white</p>	<p>2x Fe-CuNi (Type J)</p>  <p>1⁺ black 1⁻ white 2⁺ black 2⁻ white</p>
<p>1x NiCrSi-NiSi (Type N)</p>  <p>1⁺ pink 1⁻ white</p>	<p>2x NiCrSi-NiSi (Type N)</p>  <p>1⁺ pink 1⁻ white 2⁺ pink 2⁻ white</p>
<p>1x NiCr-CuNi (Type E)</p>  <p>1⁺ violet 1⁻ white</p>	<p>2x NiCr-CuNi (Type E)</p>  <p>1⁺ violet 1⁻ white 2⁺ violet 2⁻ white</p>
<p>1x Cu-CuNi (Type T)</p>  <p>1⁺ brown 1⁻ white</p>	<p>2x Cu-CuNi (Type T)</p>  <p>1⁺ brown 1⁻ white 2⁺ brown 2⁻ white</p>



GÜNTHER



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GUENTHER Polska Sp. z o.o.

ul. Wrocławska 27C · 55-095 Długołęka
Polska

Tel. +48 (0)71 / 352 70 70

Fax +48 (0)71 / 352 70 71

www.guenther.com.pl

biuro@guenther.com.pl



LANGKAMP Technology BV

Molenvliet 22 · 3961 MV Wijk bij Duurstede
Nederland

Tel. +31 (0)343 / 59 54 10

www.ltbv.nl

info@ltbv.nl



S.C. GUENTHER

Tehnica Măsurării S.R.L.

Calea Aurel Vlaicu 28-32 · 310159 Arad
Romania

Tel. +40 (0) 257 / 33 90 15

Fax +40 (0) 257 / 34 88 45

www.guenther.eu

romania@guenther.eu

