GÜNTHER

ATEX

Assembly and operating instructions

Product group R9 - T9

Ex d – Flameproof enclosure
Ex t – Protection by enclosure

Rev. Nr. 08 | 28.09.2023

Temperature Measurement Technology
Reliable . Precise . Certified

ATEX Assembly and operating instructions – Product group R9 - T9

ATEX Assembly and operating instructions – Product group R9 - T9

1. General remarks

1.1 Introduction

This manual contains basic and essential instructions for the installation, operation and maintenance of the R9 series resistance thermometers and T9 series thermocouples.

- 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 Application and construction

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 in the range between -196 °C to + 600 °C (resistance thermometers) and -600 °C to + 1800 °C (thermocouples).

R9 resistance thermometers and T9 thermocouples are used as pressure-resistant encapsulated equipment for temperature measurements in liquid and gaseous media. Temperature sensors consist of a protective fitting with various process connections, a neck, a connection head and a replaceable measuring insert.

The protective fitting is not part of the type approval and can therefore also be manufactured by the customer.

The measuring insert of the R9 series sensors consists of a mineral-insulated cable with a measuring resistor 1xPt100 connected at the measuring tip and encapsulated in the 2-, 3- or 4-wire circuit or 2x Pt100 in the 2-wire or 3-wire circuit. The measuring resistance is compliant with the DIN EN 60751 standard in tolerance class AA, A or B.

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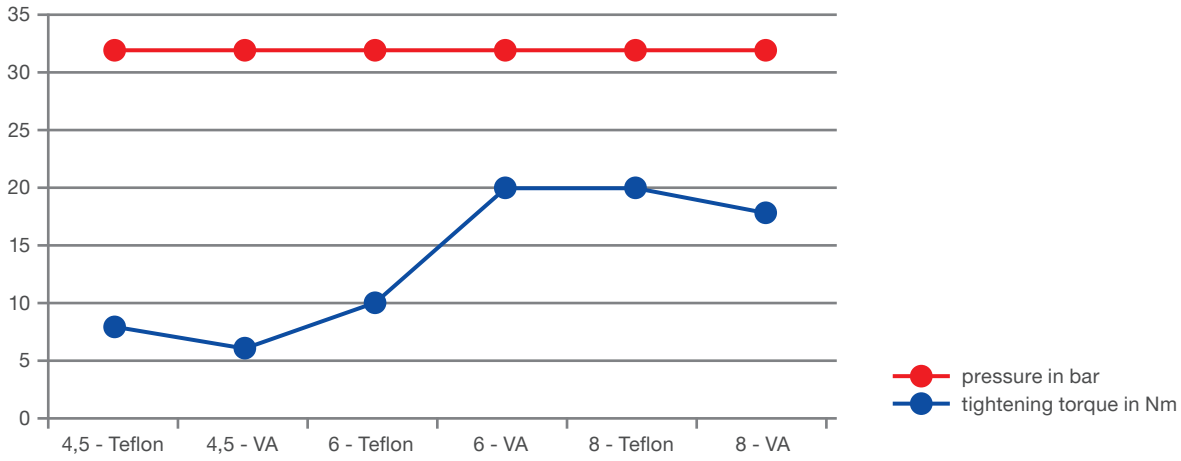
The measuring insert of the T9 series sensor consists of a mineral-insulated cable, the inner thermocouples of which are welded to the measuring tip as a thermocouple joint. The possible types include: type J, K, N or E according to DIN EN 60584-1, tolerance class 1 or 2

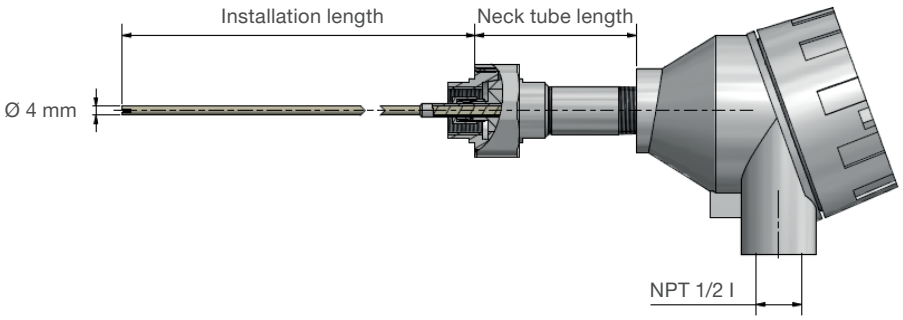
It is also possible to provide measuring inserts for high-temperature applications. Instead of the mineral-insulated wire, a ceramic multi-hole insulating bar is used as insulator for the thermocouple. The possible types include: type S, R or B according to DIN EN 60584-1, tolerance class 1 or 2, (only tolerance class 2 is possible for type B).

The measuring inserts are fixed by means of a compression fitting located in the pipe fitting to guarantee a pressure-tight installation.
The measuring inserts are installed at the factory with the following tightening torques:



Temperature sensors fulfill the requirements for the explosion group II category 2G and 2D. They may therefore be used in potentially explosive atmosphere of zone 1 or zone 21. The degree of protection of the temperature sensors is Ex d for group IIC and IIIC and the temperature class T6 or 80 °C (EPL Gb and Db)

Schematic diagram:



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1.4 Installation and use

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

- If the temperature sensors are mounted on the system parts which constitute zone separation, the installation must be carried out appropriately in tight or flame-proof variant.
- Defective temperature sensors must not be used.
- Repairs may only be carried out by authorized persons.
  There is no provision for repairing the puncture-proof column.
- Repairs may only be carried out with original spare parts of the original supplier, otherwise the requirements of the approval are not guaranteed.
- Where a component of an electrical equipment to which the explosion protection is subject has been repaired, the electrical equipment shall not be put into operation until an expert has determined that it meets the requirements in the characteristics essential for explosion protection.
- As spare parts the manufacturer supplies only measuring inserts complete with neck and connection head.

Before commencing the disassembly or opening the connection head, the measuring circuit must be disconnected.

1.5 Installation and connection instructions

- In principle, the Regulation on the Use of Electrical Installations in Hazardous Areas (BetrSichV) must be observed!
- When installing the temperature sensors in machines or installations, make sure that the fastening element (threaded connector, flange or welded connection) is tightly connected to the process connection of the machine or system and it is secured against self-loosening.
- If the installation of a transducer is carried out by the user himself, he or she must ensure that the measuring circuit or circuits are operated in accordance with the connection diagram of the transducer. Also, in the case of installation of a cable gland by the Customer, ensure that a model with corresponding ex d certification is used.
- Possible connection threads are 1/2 -14 NPT or M24x1.5. At least 6 threads must be screwed in.
  The thread must be secured with a suitable Loctite.
- The cover of the connection head must be secured against self-loosening by screwing on the head of the head with the securing screw.

- After careful installation and connection of the connection cable, ensure that the degree of protection is at least IP65 according to IEC 60529.
- 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.

2. Technical data

2.1 Type examination certificate

IBExU17ATEX1087 X

2.2 Applicable standards

DIN EN 60079-0: 2018
DIN EN 60079-1: 2014
DIN EN 60079-14:2014
DIN EN 60079-31:2014

Directive 2014/34/EU

2.3 Type of ignition protection

II 2G Ex db IIC T6...T3 Gb

II 2D Ex tb IIIC T80°C...T195°C Db

2.4 Electric threshold values

max. voltage (U) → 5 V
max. current (I) → 2 mA

2.5 Permissible ambient temperature

Ambient temperature at connection head:
-20 °C ..... +60 °C for type XDA, or -20 °C ..... +85 °C for type XD-AD

Permissible operating temperature at the potting:
-20 °C ..... +85 °C, or +150 °C when potting the mineral-insulated sheath measurement inserts with Loctite Stycast 2850 / CAT 27-1

2.6 Type plate

Product group: R9/T9 (Label)

2.7 Thermal resistance (Measuring tip is outside of an Ex zone)

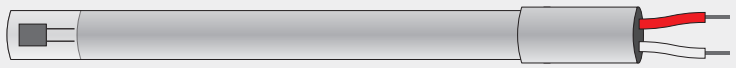
Thermal resistance R_{TH} (Surface measuring point of the measuring insert)

- Sheath-Ø 3.0 mm → 165 K/W
- Sheath-Ø 4.5 mm → 110 K/W
- Sheath-Ø 6.0 mm → 90 K/W

3. Connection options

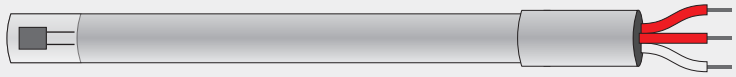
3.1 Cable sensors – Resistance thermometers (Colour coding)

1x Pt100 2-wire connection



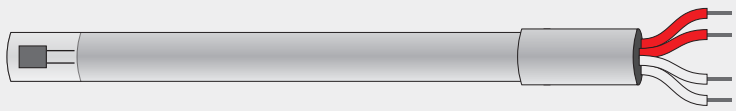
1 red
2 white

1x Pt100 3-wire connection



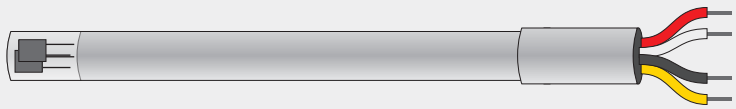
1 red
2 red
3 white

1x Pt100 4-wire connection



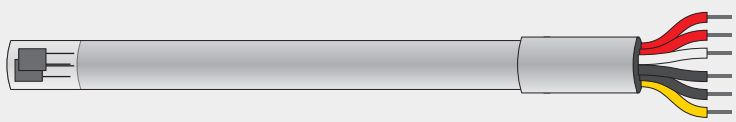
1 red
2 red
3 white
4 white

2x Pt100 2-wire connection



1 red
2 white
3 black
4 yellow

2x Pt100 3-wire connection

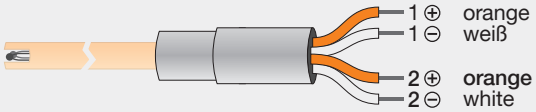


1 red
2 red
3 white
4 black
5 black
6 yellow

3.2 Precious metal thermocouples - Colour coding of ceramic measuring inserts

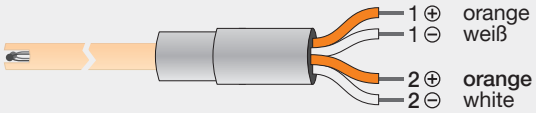
1x Pt10Rh-Pt (Type S)

2x Pt10Rh-Pt (Type S)



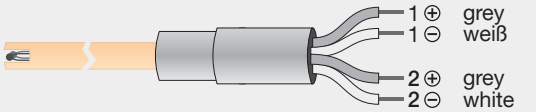
1x Pt13Rh-Pt (Type R)

2x Pt13Rh-Pt (Type R)



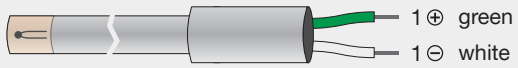
1x Pt30Rh-Pt6Rh (Type B)

2x Pt30Rh-Pt6Rh (Type B)

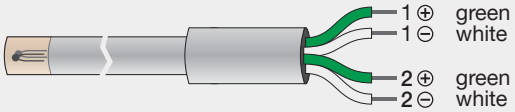


3.3 Mineral insulated thermocouples - Colour coding of measuring inserts

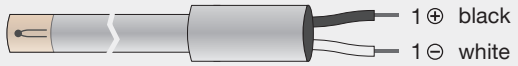
1x NiCr-Ni (Type K)



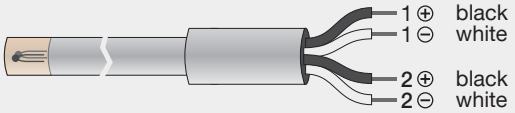
2x NiCr-Ni (Type K)



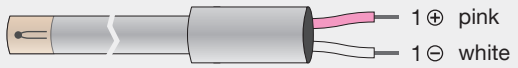
1x Fe-CuNi (Type J)



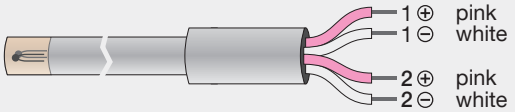
2x Fe-CuNi (Type J)



1x NiCrSi-NiSi (Type N)

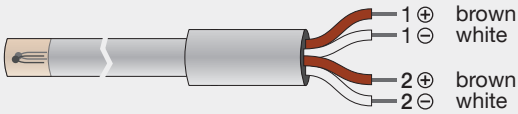


2x NiCrSi-NiSi (Type N)



1x Cu-CuNi (Type T)

2x Cu-CuNi (Type T)



4. Special conditions of use

See type examination certificate point 17

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[1] **EU-TYPE EXAMINATION CERTIFICATE** - Translation

[2] Equipment or protective systems
intended for use in potentially explosive atmospheres, Directive 2014/34/EU

[3] EU-type examination certificate number **IBExU17ATEX1087 X** | Issue 1

[4] Product: **Temperature sensor**
Type: R9 and T9

[5] Manufacturer: Günther GmbH, Temperaturmesstechnik

[6] Address: Bauhofstraße 12
90571 Schwaig
GERMANY

[7] This product and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

[8] IBExU Institut für Sicherheitstechnik GmbH, notified body number 0637 in accordance with Article 17 of Directive 2014/34/EU of the European Parliament and of the Council, dated 26 February 2014, certifies that this product has been found to comply with the essential health and safety requirements relating to the design and construction of products intended for use in potentially explosive atmospheres given in Annex II to the Directive.

The examination and test results are recorded in the confidential test report IB-22-3-0158.

[9] Compliance with the essential health and safety requirements has been assured by compliance with:
EN IEC 60079-0:2018 EN 60079-1:2014 EN 60079-31:2014
except in respect of those requirements listed at item [18] of the schedule.

[10] If the sign "X" is placed after the certificate number, it indicates that the product is subject to the specific conditions of use specified in the schedule to this certificate.

[11] This EU-type examination certificate relates only to the design and construction of the specified product. Further requirements of the Directive apply to the manufacturing process and supply of this product. These are not covered by this certificate.

[12] The marking of the product shall include the following:

Ex II 2G Ex db IIC T6...T3 Gb
Ex II 2D Ex tb IIIC T80°C...T195°C Db

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Certificates without signature and seal are not valid. Certificates may only be duplicated completely and unchanged. In case of dispute, the German text shall prevail.

By order

Dipl.-Ing. K. Wilamowski

- Seal -
(notified body number 0637)

Freiberg, 2023-09-29

IBExU Institut für Sicherheitstechnik GmbH
An-Institut der TU Bergakademie Freiberg

[13] **Schedule**

[14] **Certificate number IBExU17ATEX1087 X** | Issue 1

[15] **Description of product**
The temperature sensors of type R9 and T9 are used for registration, control and threshold monitoring of process temperatures and are intended for use in potentially explosive atmospheres the require equipment of category 2G or 2D.

The temperature sensors are implemented as resistance thermometers (type R9) or thermocouples (type T9), which transform the temperature at the measurement point into an electrical parameter (resistance, voltage). In combination with appropriate transmitters temperatures in the range of -196 °C…+600 °C (resistance thermometer) or, resp., -40 °C…+1800 °C (thermocouples) can be registered.

The temperature sensors are implemented in type of protection flameproof enclosure "d". They consist of a replaceable transducer with potted lead wires and a flameproof terminal head with integrated terminal or electronic transmitter. Both components are connected via a neck tube and a screw joint. The distal end of the transducer equipped with a protection tube is inserted into the process that has to be investigated. The protection tube as an armature with process connection individually designed for the respective application is not part of the electrical equipment. Moreover, the temperature sensors are dustproof and comply with the requirements of type of protection dust ignition protection by enclosure "t".

Technical data:

- Maximum voltage:	5 V
- Maximum current:	2 mA
- Temperature measurement range:	-196 °C…+600 °C (resistance thermometer) -40 °C…+1800 °C (thermocouple)
- Ambient temperature at terminal head:	-20 °C…+60 °C, for Temperature Technology type XD… -20 °C…+85 °C, for Limatherm type XD-A…
- Permissible service temperature at compound:	-20 °C…+85 °C or +150 °C

Variations compared to issue 0 of this certificate:

Variation 1
Change of the casting compound of the cemented joint of the transducer

Variation 2
Corresponding change of the permissible service temperature at the compound

Variation 3
Conformity with current standard EN IEC 60079-0:2018

[16] **Test report**
The test results are recorded in the confidential test report IB-22-3-0158 of 2023-09-29.
The test documents are part of the test report and they are listed there.

Summary of the test results
The temperature sensor of type R9 and T9 fulfils the requirements of explosion protection for electrical equipment of group II, category 2G and 2D in type of protection flameproof enclosure "d" and dust ignition protection by enclosure "t" for explosion group IIC and IIIC.

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[17] **Specific conditions of use**

1. The temperature sensors of type R9 and T9 can be used under the following conditions:

Ambient temperature at terminal head	Temperature class / max. surface temperature at terminal head (1)	Maximum power dissipation (P_{max}) (2)	Permissible terminal head variants
-20 °C…+60 °C	T6 / T80°C	4 W	Limatherm type XD-A…or Temperature Technology type XD…
-20 °C…+85 °C	T5 / T95°C	1.9 W	Limatherm type XD-A…

(1) Equipment with temperature class T6 or T5 are also suitable for use in gas atmospheres with temperature class T4 - T1.

(2) In combination with internal consumers, such as electronic transmitters

2. For compliance with the above mentioned temperature class / maximum surface temperature at the terminal head, the maximum power dissipation P_{max} must not be exceeded. This must be guaranteed under fault conditions by adequate means (e.g. it must be guaranteed by adequate means (e.g. a fuse connected in series to the consumer).
3. For equipment variants with ambient temperature > 60 °C heat-resistant gable glands and connection cables (min. 95 °C) must be used.
4. By means of the process, higher of lower operating temperature can occur at the transducers; however, the temperature at the compound of potted lead wires must not exceed the range of -20 °C to +85 °C or -20 °C…+150 °C, as specified by the manufacturer. This must be ensured by the manufacturer under the respective operational conditions by means of an adequate length of the transducer and the protection armature. Referring to this, the length of the neck tube must be selected so that heating or cooling of the terminal head by means of the process is negligible.
5. The temperature class and the maximum surface temperature of the total equipment must then be specified under consideration of the temperature at the terminal head (≤ 80 °C / ≤ 95 °C for T6 / T5; see Table) or at the compound (≤ 85 °C / ≤ 150 °C for T6…T5 / T4…T3), whichever is the higher.
6. The measuring tip of the transducer is not explosion-proof and must therefore not have direct contact to the potentially explosive atmosphere. Consequently, a sealed mounting of the measuring tip is required using the protective armature provided.
7. Flameproof joints are not intended to be repaired.
8. At the installation of a terminal block or electronic transmitter in the flameproof terminal head, at least 40 % of the cross-sectional area must remain free to permit unimpeded gas flow.
9. The terminal head must not be exposed to high charging processes. Cleaning is permitted only with a damp cloth.

[18] **Essential health and safety requirements**
In addition to the essential health and safety requirements (EHSRs) covered by the standards listed at item [9], the following are considered relevant to this product, and conformity is demonstrated in the test report:
None

[19] **Drawings and Documents**
The documents are listed in the test report.

IBExU Institut für Sicherheitstechnik GmbH
Fuchsmühlenweg 7
09599 Freiberg, GERMANY

By order

Dipl.-Ing. K. Willamowski

Freiberg, 2023-09-29

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09/2023 / EN

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