

Multipoint temperature sensor

ATEX „t“ / „ia“



Persons concerned:
Experienced professional electricians
as per EU Directive 1999/92/EC and
trained personnel

B 903530.0
Operating Manual

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Safety Information

General Information

This manual contains information that must be observed in the interest of your own safety and to avoid damage to assets. This information is supported by symbols which are used in this manual as follows. Please read this manual before commissioning the device. Keep the manual in a place accessible to all users at all times.

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Technical support: **0892 700 733** (0,80 €/min)

If difficulties occur during commissioning, please refrain from carrying out any manipulations that could jeopardize your warranty rights.

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1 Equipment and intended application

The multipoint temperature sensors from Jumo are used for temperature measurement in storage of cereals, of flour, dried mud, sugar refinery, ... as well as for dusts.

Resistance probes for silos may be anchored to the structure or to a concrete screed, as preferred.

Connection housings in aluminium or stainless steel with IP 6x protection indices allow the replacement of the measuring element when the silo is full.

Connection of the measuring cable to the IP 6x housing compliant with directive 2014/34/EC.

Resistive sensor Pt100 or Pt1000, PTC, NTC compliant with standard .

Digital temperature sensor : allows several sensors to be placed on the same network and communicates with a 1-wire bus with each specific sensor on the network.

The polyethylene conduit has undergone migration tests to validate its suitability for contact with food:



* Référence document: regulation EU n° 1935/2004 of 27/10/2004

* Test Rapport : LNE P175256

2 Marking

Example of sensor marking :



- ⁽⁵⁾ Resistif sensor ⁽⁸⁾
 II 1 D Ex ia III C T₂₀₀ 100°C Da
Ui:25V Ii:50mA Pi:250mW Li:0 Ci:0
-40<=Tamb<=+80°C
- Digital temperature sensor
 II 1 D Ex ia III C T₂₀₀ 100°C Da
Ui:5,5V Ii:550mA Pi:650mW Li:0 Ci:30pF
-40<=Tamb<=+75°C
DEKRA 20ATEX0014 X ⁽⁷⁾

WARNING-POTENTIAL ELECTROSTATIC
CHARGING HAZARD, SEE INSTRUCTION

⇒ **WARNING – DO NOT OPEN UNDER VOLTAGE - SEE INSTRUCTIONS**

⁽¹⁾ Manufacturer's address

⁽²⁾ Type of sensor

⁽³⁾ Manufacturing number: order number + position

⁽⁴⁾ Notified body: 0344 = DEKRA

⁽⁵⁾ Choice of measuring element

⁽⁶⁾ Ex marking of group and category for dust zone

⁽⁷⁾ Type examination certificate

3 Safety notes

The device is designed exclusively for use within the values indicated on the identification plate and in the technical specifications (see section on technical specifications in the operating manual or the technical data sheet).

- The maximum service temperature may not be exceeded.
- The permissible ambient temperature may not be exceeded.
- The protection type of the device must be followed during the implementation. Upon installation, sensor connection must comply with the electrical values determined in Ex attestations.

The digital temperature sensor can only be used in Ex "i" protection mode.

It is not permissible to make any alterations to the sensors. In such a case, proper fault-free operation is no longer assured. The guarantee is also invalidated by any alterations. When exchanging measuring inserts, use only original JUMO replacement parts of the same type

Make sure the cable or insulation are not damaged while mounting the sensor on the process. The cable is to be installed so as to be fixed. While mounting, removing or operating the sensor, make sure that no pulling force or pressure above 17 Newton is applied on the cable. The technical data that are relevant to the use of the device in an area with an explosion hazard (Ex area) are presented in the corresponding data sheet.

In order to prevent temperature rises due to the accumulation or transfer of heat, keep away from hot parts of the installation and thermal insulation systems, and provide for heat dissipation through unhampered air circulation. The national and international safety and accident prevention regulations must be followed for installing and working on or with the devices. Furthermore, the operator of the plant or installation is responsible for the observance of legal requirements

Ambient temperature range:

Type Examination certificate DEKRA 20ATEX0014 X

Ambient temperature range :

For resistive sensor : -40..+80 °C

For digital sensor : -40..+75 °C

Type Examination certificate LCIE 00 ATEX 6015 X

Ambient temperature range : $-20 \leq T_{amb} \leq 60$ °C

4 Conformance with standards

Type	Attestation ATEX	Normes IEC	Protection mode
Multipoints	LCIE 00 ATEX 6015 X	EN 60079-31 (2009) EN 60079-0 (2012)	protection by enclosures "t"
Multipoints	DEKRA 20ATEX0014 X	EN 60079-11 (2012) EN 60079-0 (2018)	Intrinsic safety Ex "i »

5 Technical Data

⇒ **CAUTION:** for specific data, see the attached technical data sheet/detail drawing and/or the label that is affixed to these operating instructions

5.1 Protection sleeve constant

Electrical values

Type Examination certificate DEKRA 20ATEX0014 X

U_i : 25V I_i : 50mA P_i :250mW L_i :0 C_i :0 only for resistif sensor
U_i : 5,5V I_i : 550mA P_i :650mW L_i :0 C_i :30pF only for digital sensor

Type Examination certificate LCIE 00ATEX6015 X

U :28V I :2mA

The sensing element in a RTD temperature probe carries a current or a leakage current during measurement.

The surface heating itself is influenced by the design of the temperature probe, by the ambient conditions (thermal coupling with the medium being measured) and the power that is applied. The self-heating behavior of the thermometer is characterized by the thermowell constant SK (in °C/W), which represents the increase in the surface temperature (in still air) above the ambient temperature as a function of the applied power. The thermowell constant SK is determined by JUMO, and can be found in the attached technical data sheet or on the affixed label. The user must determine whether the thermometer is suitable for the measurement application and the connected equipment under the given conditions. The maximum permissible measured temperature at the probe tip can be derived from the following equation:

$$T_s = T_K - P_i \times SK$$

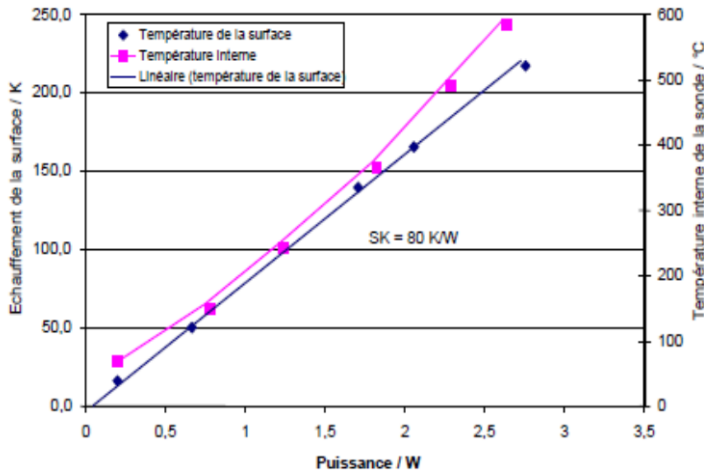
T_s : Maximum permissible temperature at the probe tip

T_K : Maximum permissible surface temperature, depending on the temperature class

P_i : Power in the certified intrinsically safe circuit

SK : Protection sleeve constant (see technical data sheet)

The following diagram illustrates the self-heating of the probe surface of a thermocouple as a function of the applied power and thus the temperature arising within the probe. (Self-heating is independent of the protection type, and also applies to the flameproof enclosure).



Protection sleeve constant from the multipoint sensor with polypropylene suspension cable:
 Pt 100 Ω : 10,5 K/W
 Pt 1000 Ω : 12 K/W

Self-heating of a Pt100 RTD temperature probe Pt100

Example :

Protection sleeve constant SK = 10,5K/W

Maximum power in the circuit P = 0,5 W

$$TS = 85\text{ °C} - 0,5\text{ W} \times 10,5\text{ K/W}$$

$$TS = 85\text{ °C} - 5,25\text{ K} = 79,5\text{ °C}$$

So the maximum temperature (the medium temperature being measured) on the probe tip must not exceed 79,5 °C, since in the event of a fault it is possible that the limit for the temperature class will be exceeded. **DANGER OF EXPLOSION!**

5.2 Intrinsically safe connection, Ex “I”

The equipment used in areas with an explosion hazard only contains intrinsically safe circuits..

A circuit is intrinsically safe if, in normal operation and if there is a failure due to a short circuit, no flammable spark is produced or if the surface of the device does not heat beyond the defined temperature class (see also EN 60079-11).

In order for a circuit to be designated as intrinsically safe, every individual device included in the circuit must be designed to be intrinsically safe. Furthermore, it is necessary to test that the complete circuit of the (individually) intrinsically safe devices forms, as a whole, an intrinsically safe circuit.

Interconnection alone does not guarantee that the circuit is intrinsically safe.

The intrinsic safety loop must be calculated. To provide evidence of intrinsic safety, the electrical boundary values must comply with the attestations covering the equipment.

The conditions are verified by comparing with the permissible boundary values of the electrical equipment:

'i' Electrical equipment			Associated equipment
Voltage (U)	Ui	≧	Uo
Current (I)	Ii	≧	Io
Power (W)	Pi	≧	So
Inductance (mH)	Li (+Lc cable)	≧	Lo
Capacitance (μF)	Ci (+Lc cable)	≧	Co

Electrical values

$U_i \leq 25 \text{ V}$ $I_i \leq 50 \text{ mA}$ $P_i \leq 250 \text{ mW}$ $L_i : 0$ $C_i : 0$ for resistif sensor
 $U_i \leq 5,5 \text{ V}$ $I_i \leq 550 \text{ mA}$ $P_i \leq 650 \text{ mW}$ $L_i : 0$ $C_i : 30\text{pF}$ for digital temperature sensor

Cable electrical parameters : $L_c:1\mu\text{H/m}$ - $C_c:200\text{pF/m}$.

5.3 Use in areas with an explosion hazard caused by dust

Take account of the following values for use in atmospheres that are explosive due to the presence of dust:

All zones:

The surface temperature of the electrical equipment must not increase in a way as to ignite dust in the form of a cloud or a layer. That is possible when the following conditions are met:

Dust in the form of a cloud:

To prevent the ignition of dusty atmospheres, the maximum surface temperature must be limited. It must be lower than the smaller of the two values, or 2/3rds of the self-ignition temperature of the cloud of dust in question.

Dust in layers:

Surfaces on which it is not possible to prevent a hazardous deposit of incandescent dust. The surface temperature must not exceed the incandescence temperature minus 75 K.

If the layer is greater than 5 mm, the surface temperature must be reduced further.

If dust is present in the form of both a cloud and a layer, as is often the case, use the less favourable case.

Note:

In this case, "surface" means the external surface of the equipment, see also EN 60079-14.

The ignition or smoldering temperature of the dust or dust-air mixture that is present must be defined or determined by the operator of the plant system

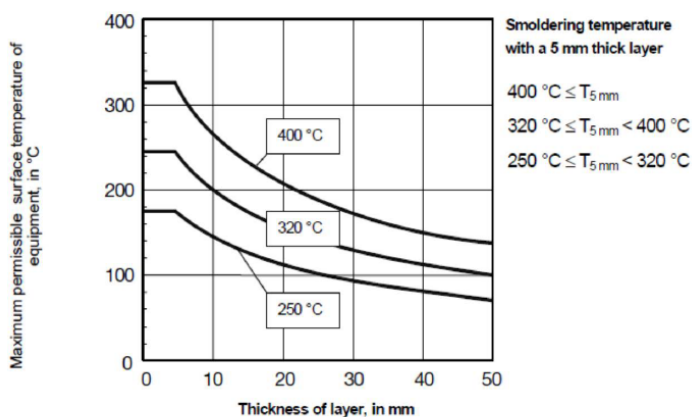


Figure 2: Reduction of the maximum permissible surface temperature with increasing thickness of the dust layer

6 Installation

The valid European and national regulations must be observed for installation and operation. The generally accepted state of the art and these operating instructions must be applied.

Temperature sensors from JUMO from JUMO are used to measure temperature within areas with an explosion hazard, containing flammable or non-flammable liquids, gases or gas-air mixtures or potentially explosive dusts.

The equipotential bonding (earth connection of the device) include the entire wiring of the measuring circuit!

Metallic connector housings must be grounded via the connecting cables, for equipotential bonding. Non-metallic connector housings must not exceed the max. surface area specified by EN 60079-26.

Norm EN 60079-14 "Explosive atmospheres - Part 14: Electrical installations design, selection and erection" needs to be observed!

Caution: In all cases, zoning is the responsibility of the plant/system operator, and not of the manufacturer/supplier of the equipment!

		Zone class	
Gases, mists, vapors	Dusts	Potentially explosive atmosphere present	Guide values
Zone 0	Zone 20	continually, long-term or frequently	1000 hours/year
Zone 1	Zone 21	Occasionally	10 – 1000 hours/year
Zone 2	Zone 22	infrequently, short-term	10 hours/year

7 Maintenance

The valid European and national regulations must be observed for maintenance, servicing and testing. During maintenance, all parts must be tested that are relevant for the Ex (explosion protection) rating.

In addition, thermometers with a plastic terminal head as well as all plastic components (e.g. connectors and the like) must only be cleaned with a damp cloth, to avoid building up an electrostatic charge.

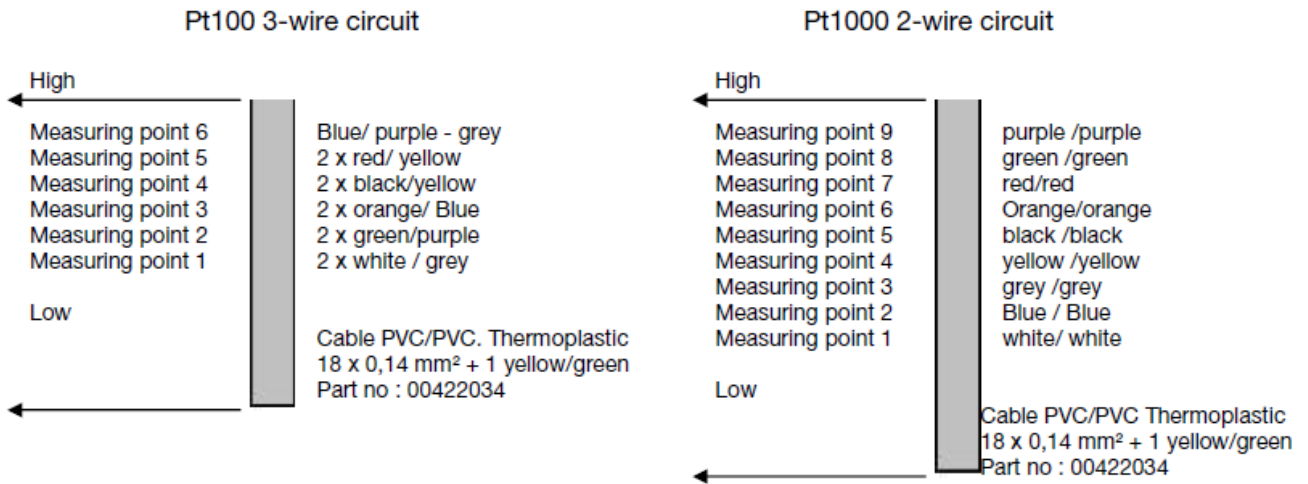
The deterioration of components such as the housing, cable seal or joints cancels the class of protection IP of the multipoint temperature sensor.

8 Connection for silos

applies to Pt500 and Pt1000, for JUMO resistance probes with cable connecting head)

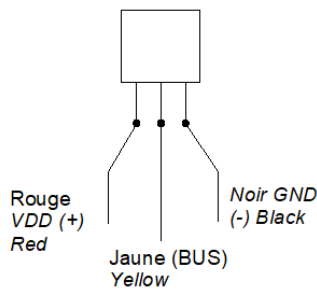
Measuring points on sensors of silos

Pt100 3-wire
Pt1000 2-wire



Digital temperature sensor

Connecting diagram



9 Attestations and certificats

Download Ex attestations and IECEx certificates from our website :

www.jumo.fr



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