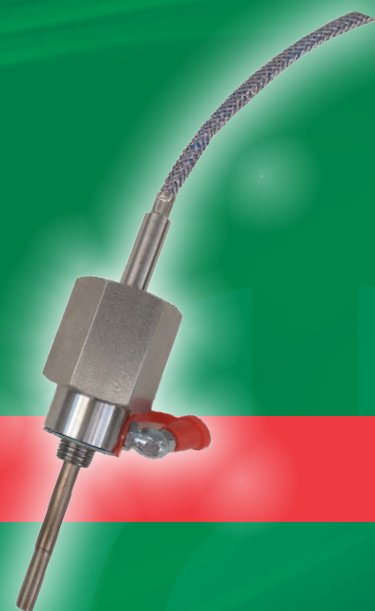


## Adjustable PT100 Bearing Temperature Sensor with 1/2 NPT Conduit Entry

Hot bearing WARNING device, for use in hazardous areas

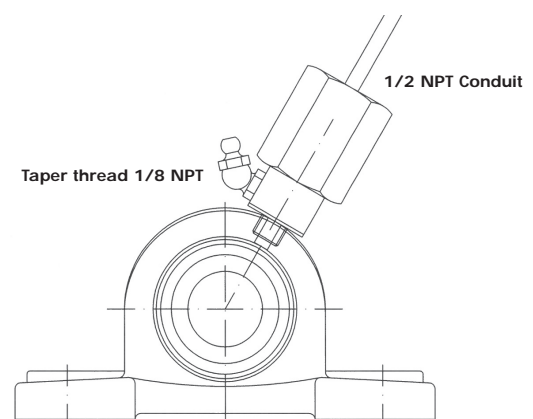
### Installation guide

PT100V3C



### Adjustable Bearing Temperature Sensor With Grease nipple

The adjustable PT100 bearing temperature sensor with grease nipple is specially designed for accurate measuring of universal bearing housings. The PT100 sensor is very easy to mount in the bearing housing without need for modifications. Use this installation method to avoid losing the guarantee on the bearing. The advantage of measuring with a PT100 is that it sends a continuous output signal to the operating system (PLC - SKADA System).



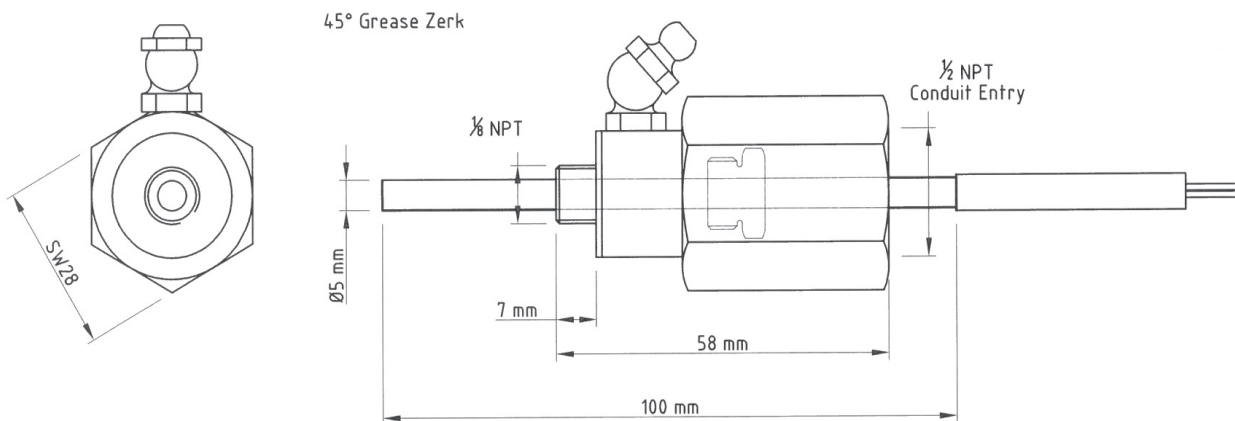
## Contents

The adjustable bearing temperaturesensor with grease nipple, is specially designed for accurate measuring of universal bearing housings. The bearing temperaturesensor emits a standard analogue output signal. The signal can be implemented very simply in an operating system. If the analogue signal is interrupted, the reason for this must be investigated (failsafe). Early detection of high temperature can prevent the bearing from becoming overheated, thereby reducing the risk of possible dust explosions.

**Prior to fitting the adjustable bearing temperature sensor it is of great importance to ensure that:**

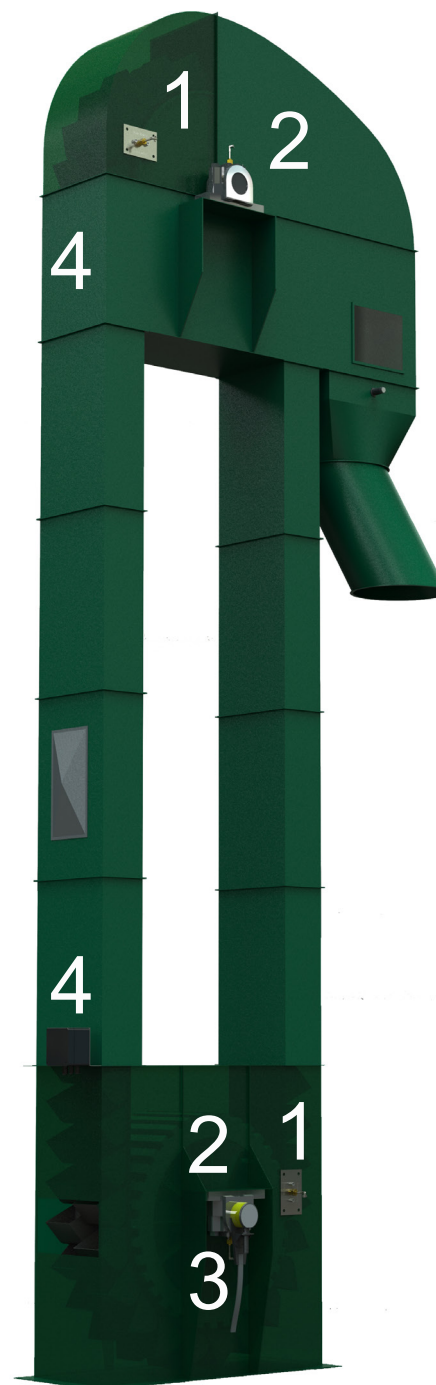
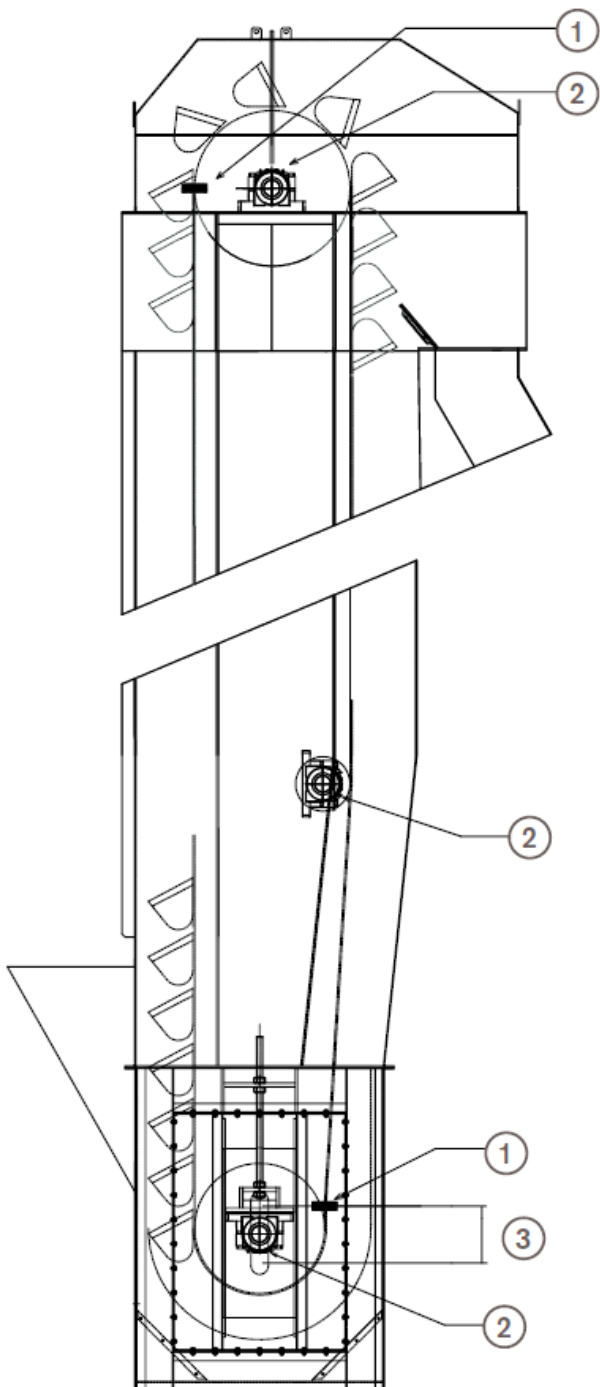
- Fitting is implemented by qualified personnel only.
- Proper and safe work conditions are provided.
- Bearings have a correct design and are in good condition.
- The spot where the PT100 sensor is to be mounted is clean and free of dust.
- A good earth wire is available to ensure precise reading.
- If the supply leads are terminated in a hazardous area, the termination arrangement must comply with the Zone/Category/EPL of the hazardous area that it is to be installed.

## Mounting details PT100



## Mounting location

1. Rub-Block RB100DN or RB200DN belt misalignment monitoring location (both sides)
2. Bearing temperature sensor monitoring PT100 location (both sides)
3. Speed monitoring
4. Junction box small or large



## Mounting PT100

**Before the bearing temperaturesensor can be mounted, it is important that the following steps will be taken:**

First of all, the electrical signal for the PT100 sensors has to be operational. If this is not the case, you must put back the existing grease nipple till the electrical signal is operational. For fieldcabling we recommend using a shielded core cable in order to avoid any electrical interference.

### STEP 1:

1. Ensure the installation and surroundings are quite dust-free and clean.
2. Remove the existing grease zerk from the bearing house. The body of the PT100V3C has a grease zerk, allowing lubrication of the bearing without the need to remove the sensor.
3. Clean the threaded hole with airflow.

### STEP 2:

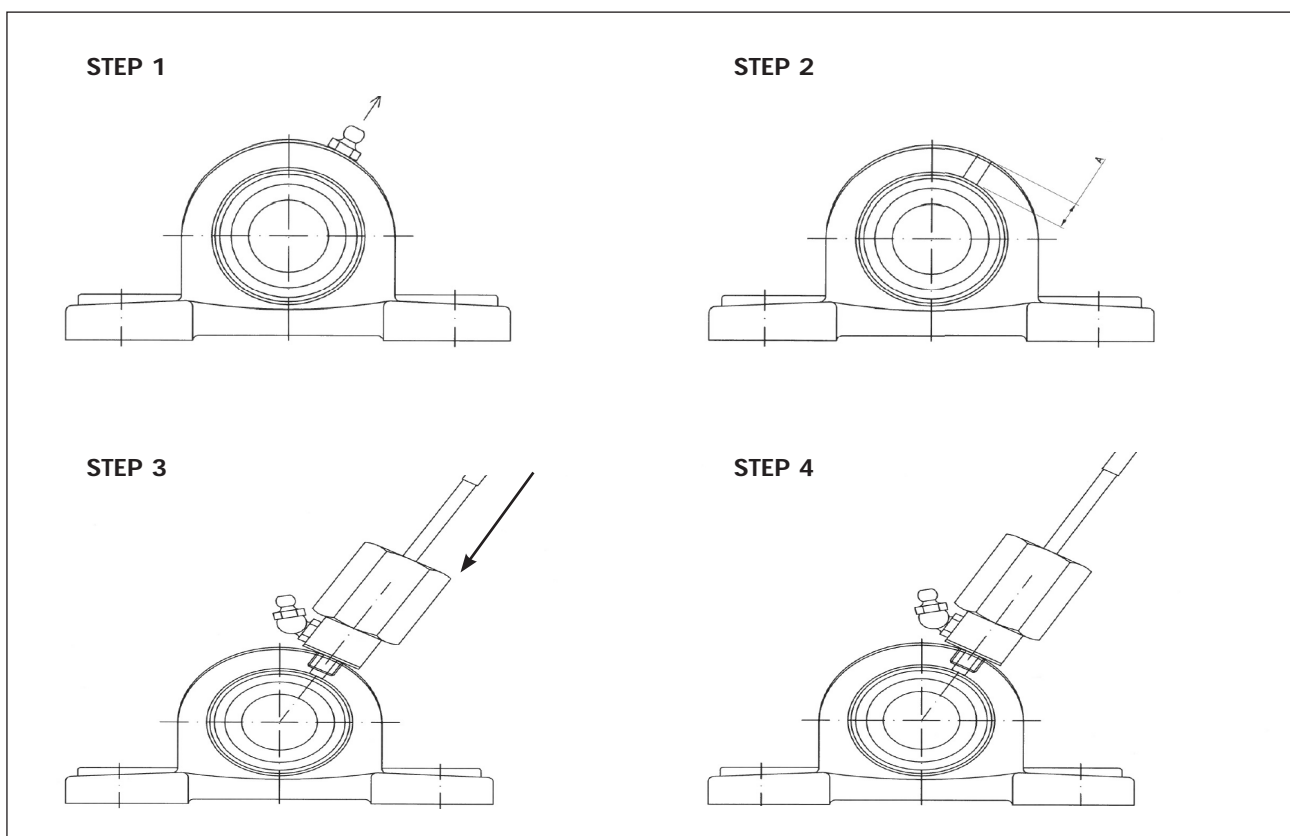
1. Measure the depth (A) from the top of bearing house till the inner bearing ring.
2. Before mounting the PT100 stainless steel body please make sure you will use the gasket and the PTFE tape on the thread from the stainless steel body to ensure that the IP 67 class will be prevented.
3. Screw the sensor body in to the 1/8" NPT threaded hole in the bearing housing.

### STEP 3:

1. Insert the temperature probe with the olive nut into the stainless steel body till the end of the bearing ring.

### STEP 4:

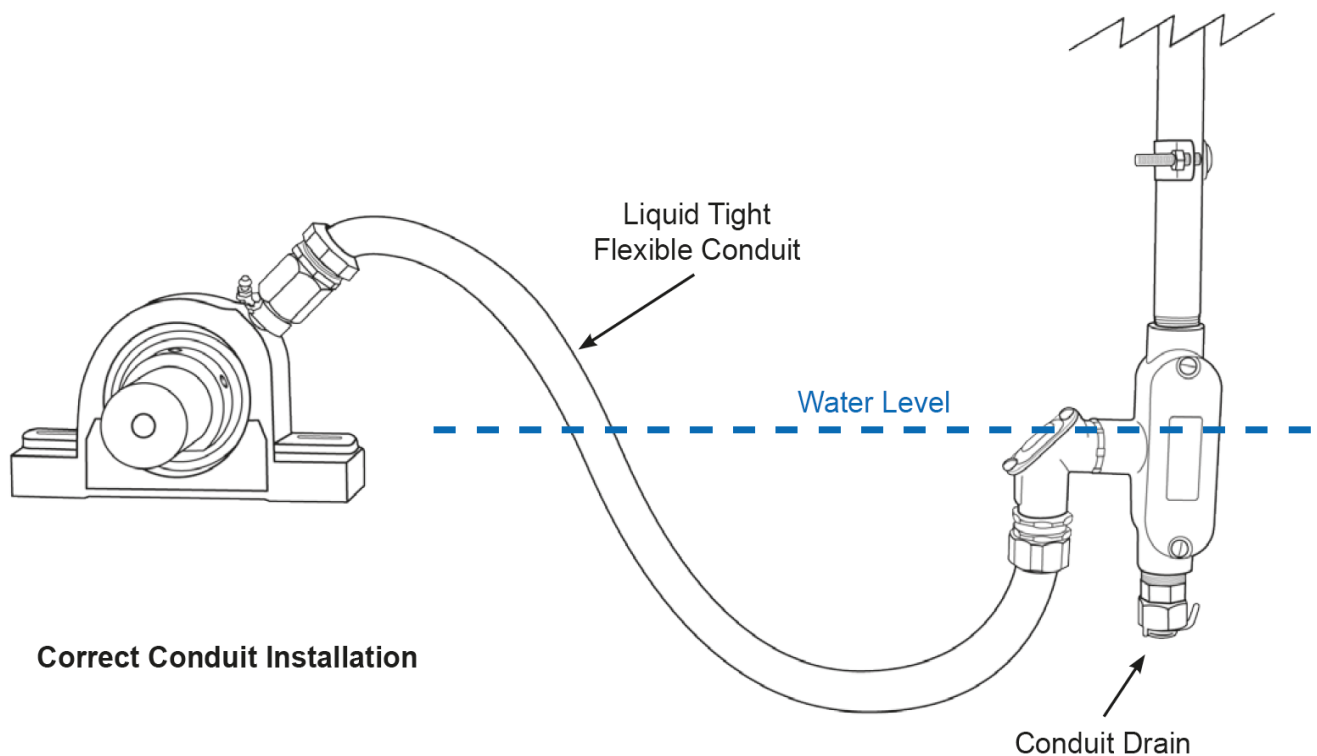
1. Tighten the olive nut using the recommended wrench (PTDN13). The maximum recommended torque for the olive nut is 2Nm (18 lb-in) this is not done properly, no exact measurement can be taken and the risk that the sensor will break is very high.
2. Lubricate the bearing by using the grease nipple on the PT100 sensor body. Use the right grease.
3. After mounting the PT100V3C, the conduit system can be installed correctly.



## Liquid tight flexible conduit installation

Conduit systems can channel water directly to sensors from incorrectly sealed fittings and condensation. Over time, water will adversely affect sensor performance. To prevent this type of damage, it is important to properly install conduit and low point conduit drains. Use rigid metal conduit to protect the cables from the sensors to the control unit.

Figure illustrates the correct installation of liquid tight flexible conduit. Notice that the bearing sensor is above the conduit drain and the water level.



**Correct Conduit Installation**

## Intrinsically safe connection, Ex "i" Protection

The equipment used in areas with an explosion hazard only contains intrinsically safe circuits. A circuit is intrinsically safe if, both in normal operation and in the event of a fault, a short-circuit in the circuit does not produce a spark capable of causing ignition, and the current flowing through the equipment does not heat any part of the surface above the level specified for the 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.

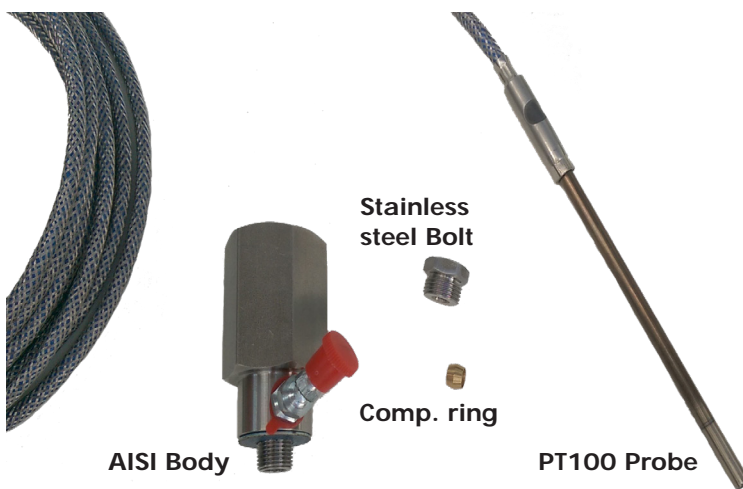
**The fact that a circuit is assembled from devices that are (individually) intrinsically safe, does not guarantee that the circuit as a whole is intrinsically safe.**

For a RTD temperature probe the measuring current (or in case of malfunction the residual current) flows through the sensor element. The result is self-heating of the element and ultimately temperature increase on the surface area of the protection fitting. It is essential to ensure that the limit of the defined temperature class is not exceeded.

## Mounting the PT100 Probe

Please read this fitting installation instruction carefully before beginning the installation.

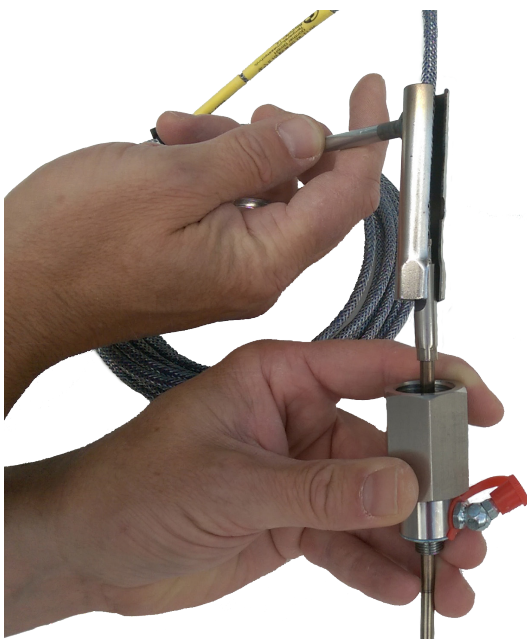
For the correct compression and force that will put on the compression fitting of the PT100 adapter. Please follow the steps and instructions very carefully.



**Step 1:** Start with the three components above.



**Step 2:** Put the PT100 probe including the stainless steel bolt and the compression ring in the stainless steel body



**Step 3:** Use the recommended pipe wrench (PTDN13)



**Step 4:** Tighten the bolt onto the stainless steel body hand-tight.

## Fitting the PT100 Probe

Hold the lower part of the stainless steel body tight with an adjustable spanner or with your hand.



**Step 5:** Turn the pipe wrench (PTDN13) clockwise 1½ **PLEASE DO NOT OVER-TIGHTEN.**

When this is done correctly as above described the PT100 sensor is tighten and secured by the compression ring (olive) into the stainless steel adapter.



**Extra information before mouting the Bearing temperature sensor:**



Before mounting the PT100 stainless steel adapter please make sure you will use PTFE tape on the thread from the adapter to ensure that the IP 67 class will prevented.

If you loosen or disconnect a fitting, remove the old tape and re-wrap it with a fresh piece.

## PT100 signal

### Measuring

The PT100 produces a standard analogue output signal. It is easy to implement this signal in a PLC system, for example a SIEMENS PLC S7 (SIL2). If it is not possible to implement an analogue signal, an analogue card is required or a HEAD transmitter with an analogue output signal of 4-20mA can be used. Software for the visualisation can be programmed by a qualified software engineer.

### PT100 connections

- PT100 connected directly to an RTD I/O card by using a shielded cable in order to avoid any electrical interference
- Local transmitter 4..20mA
- Indicator
- Converter/Barrier

*The transmitter can be either 4..20mA or bus technology (e.g. Profibus PA, Foundation Fieldbus, Modbus, ect.)*

### Required functional specification for the transmitter, 4..20mA version:

- Output 4-20mA
- Calibration Range 4mA = -25°C, 20mA = 125°C
- Fail – Low signal (<4mA) on internal failure
- Electrical approvals – Hazardous approval according to local zoning

### Bus Technology:

- Broken wire detection
- Fail detection on internal failure
- Electrical approvals – Hazardous approval according to local zoning

### Transmitter Failsafe Configuration:

Power loss failure configuration: The transmitter range shall have a high value at 4mA. This assures broken wire alarming in case of a broken wire between the transmitter and the I/O card and/or transmitter power loss. The analog input card shall detect a fault on the analog input, and go to "error".

Internal instrument failure configuration: The failure mode alarm shall be set to low or below 4mA either via Hart handheld programmer or internal hardware switch.

In case of a broken cable in the connection between the PT100 and the transmitter, the transmitter will read the maximum resistance, giving max temperature value on the analog output. The PLC will generate alarm.

### Alarm configuration PLC

Best maximum delay for the sum of the timer and the filter is 5 seconds.

The following alarm points are recommended in a ATEX environment:

- Absolute temperature PRE-ALARM : 60 °C
- Absolute temperature STOP-ALARM : 80 °C

The electrical conductivity of metal (i.e. platinum) is based on the mobility of free electrons. With increasing temperatures the atoms in the metal lattice will vibrate more vigorously and thus impede the free flow of electrons towards the positive pole of a voltage source. This impedance causes a resistance in linear proportion to the temperature.

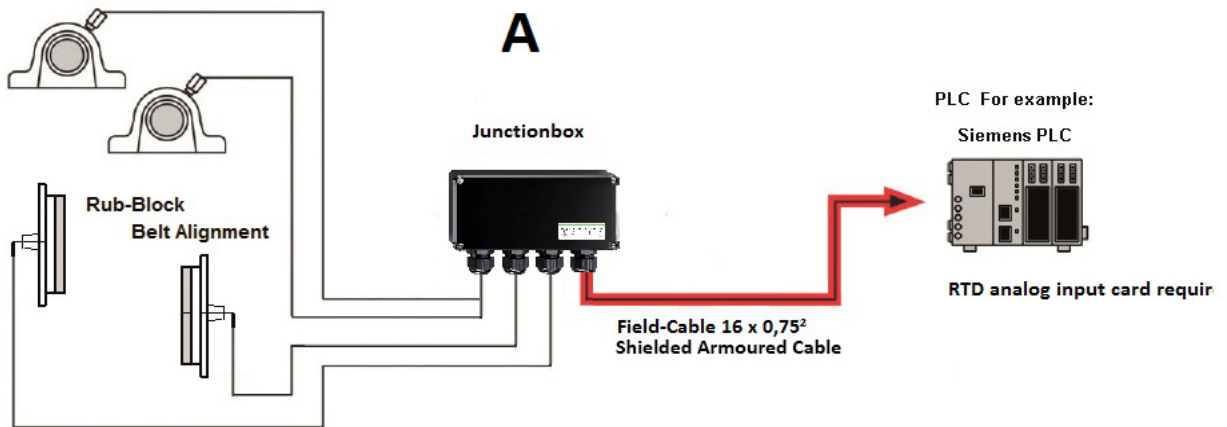
**The resistance value is in conformance with the European standard:  $PT100 = 100 + 0.385\ 055 \times T$ .**

**The positive temperature coefficient of a PT100 is 0.385 055 Ohms per Kelvin.**

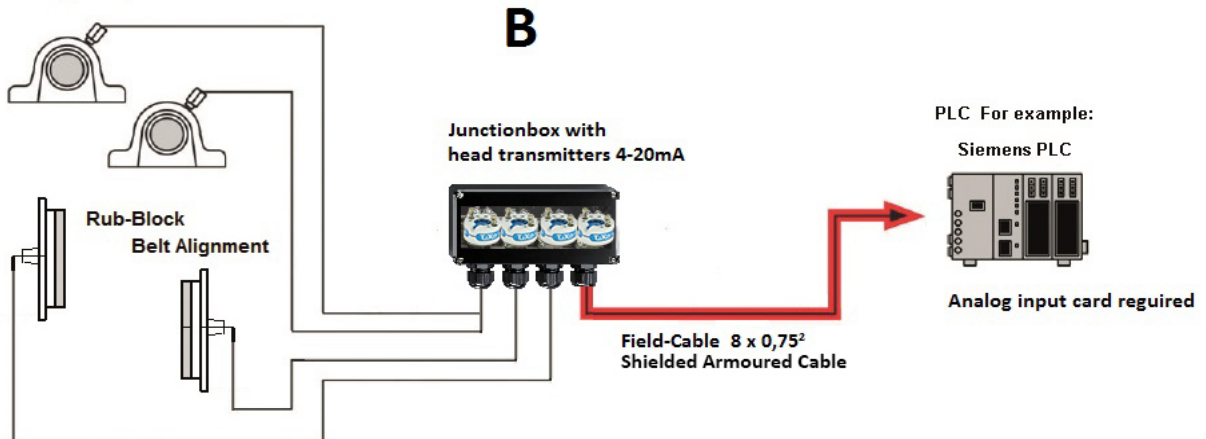


**Installation diagram Rub-Block and PT100 bearing sensor**

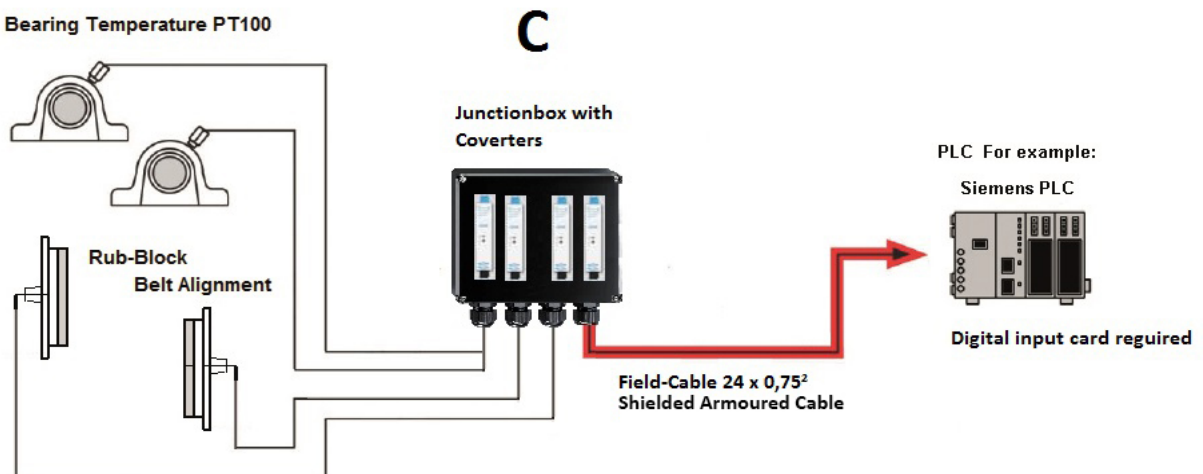
Bearing Temperature PT100



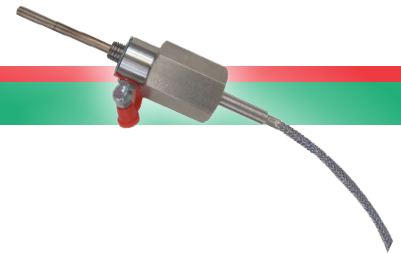
Bearing Temperature PT100



Bearing Temperature PT100



## Technical Data



### PT100V3C technical data

#### PT100 sensor

Sensor type	: R8-81227320-0115/050.S01 with 1 x 4L connection wires
Protection type	: IP 67
Tolerance class	: Class A DIN IEC751
Cable type	: PFA-PFA-V2A Cn 4 x 0,22 mm <sup>2</sup>
Ambient temperature limit for cable	: - 40°C to + 185°C
Cable Length	: 5 meter, (several cable lengths available)
Measuring temperature limit	: - 40°C to + 280°C
Measuring current	: 1mA
Output signal	: Analogue

#### Probe length

PT100V3C/5	: 100 mm
PT100V3C/70	: 70 mm
Standard probe Diameter	: Stainless Steel 5 mm, (several probe lengths available)

#### Electrical Data PT100

Measuring voltage	: U <sub>i</sub> 30 V
Maximum current input	: I <sub>i</sub> 101 mA
Maximum total output	: P 750 mW

#### Connection body PT100V3C

Housing sensorbody	: Stainless Steel
Diameter screw connection head	: 1/8 NPT

#### Hazardous area classification

ATEX Class (Ex-i)	: Ex II 1D Ex iaD T85°C / Ex II 1G IIC T6
Certificate number	: IBEExU13ATEX1079X
IECEX Class (Ex-i)	: Ex II 1D Ex iaD T85°C Da, Ex II 1/2 G Ex ia IIC T6* Ga/GB TAMB -40°C to 185°C
Certificate number	: IECEX IBE 15.0014X
Gost R (Ex-i)	: Ex II 1D Ex iaD T85°C / Ex II 1G IIC T6
Certificate number	: POCC PL.AF.H00052
CSA	: Class II, Division 1
Measuring voltage	: U <sub>i</sub> 5 V
Maximum current input	: I <sub>i</sub> 40 mA
Maximum total output	: P 250 mW

## Operational maintenance

### Test Procedure

The RTD temperature tester has been designed to test adjustable depth bearing temperature sensors in the field. This hand held test unit features an integrated heating block specifically designed to have a RTD probe sensor directly inserted. With integral controls and temperature display, the unit heats the sensor to the desired trip point, and allows quick and easy real life testing of the sensor and temperature monitoring system.

**Method of operation:** During planned maintenance or periodic testing, the RTD Sensor Tester can be used as a diagnostic tool to verify the alarm and shutdown sequences of the control unit are functioning as expected. To test, the heater block should be set above the control units alarm operating temperature. Remove the RTD sensor probe from the housing and insert it into the heater block. As the heater block reaches the alarm temperature, the RTD sensor will relay this data to the control unit, allowing you to verify that the alarm and shutdown sequences run as expected.

### Inspection of the Bearing PT100 sensor

The PT100 needs to be inspected regularly (recommendation: yearly) and after a trip. For this purpose, the PT100 probe must be extracted from the Stainless Steel body.



 **Compression ring**

**Picture:** Pipe wrench 13mm is not included. This part can easily be ordered under the product name “PTDN13”

### PT100 covers

Sunlight does not have an impact on the measurements, the PT100 is protected with several insulating layers, different temperatures on two sides of the bearing have no effect. Problems in hot climate have not occurred.

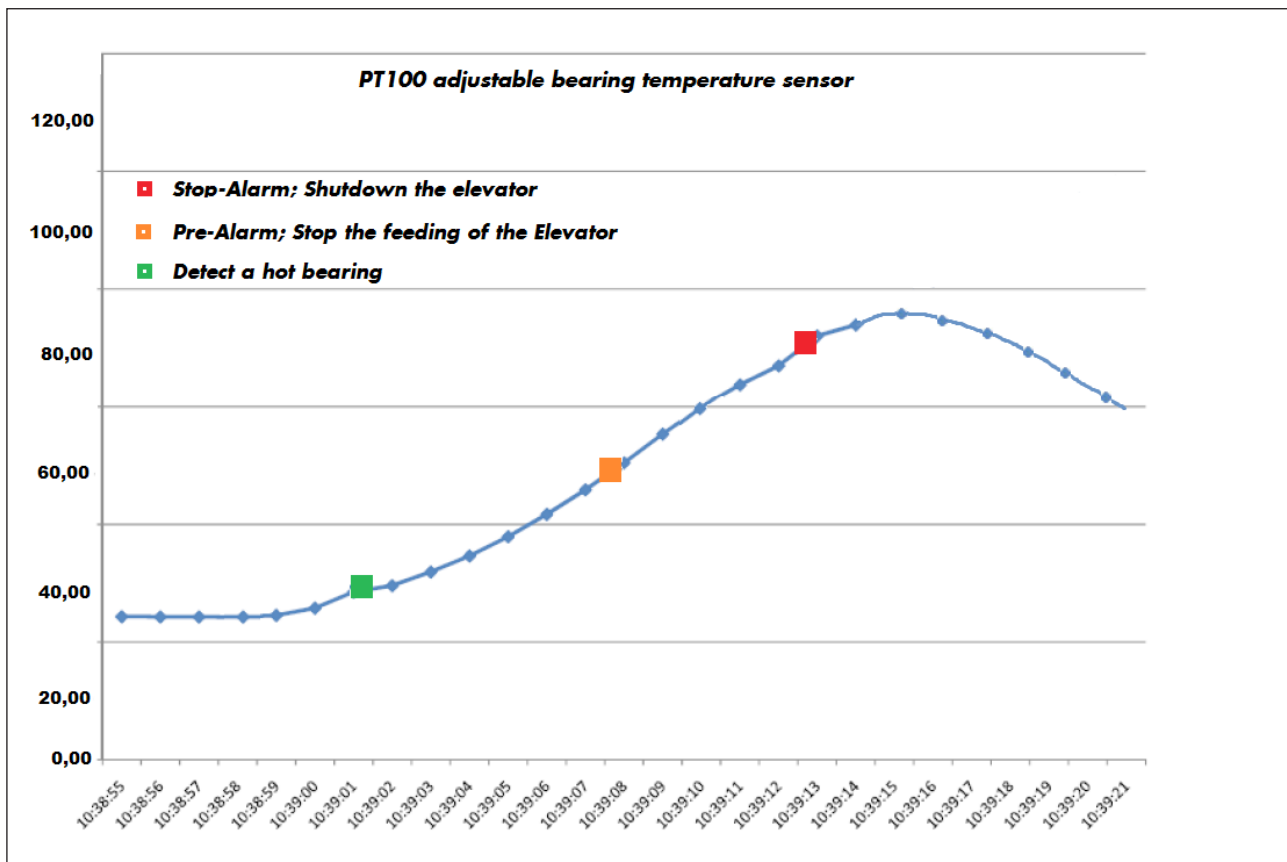
### Thread adapter to resize the thread from the PT100 sensor



## PT100 measurement data

This measuring was done on a bearing from a bucket elevator.

Diagram (°C) Time (min.)



Ambient temperature of 35°C

Duration hot bearing measuring by the PT100V3C adjustable bearing temperature sensor.

Duration temperature rise to 80°C: **Approximately in 40 sec.**

## Additional Notes: for temperature line monitoring

We recommend to use an trending software module. As soon as a difference in temperature occurs within a certain time, there is a slight hot bearing. It prevents unnecessary wear of the bearing and you will be informed for a threatening hot bearing.

- Temperature rise rate STOP-ALARM : 2,5°C /min, max allowed 10°C /min
- Temperature rise rate STOP-ALARM : 1°C /5sec, max allowed 5°C /5sec
- Temperature rise rate PRE-ALARM : 0,2°C /min, max allowed 10°C /min
- Temperature rise rate PRE-ALARM : 0,7°C /5sec, max allowed 5°C /5sec



## Safety notice to our customers

- A. In order to maximize efficiency and safety, selecting the right equipment for each operation is vital. The correct installation of this equipment, as well as regular maintenance and inspection, are equally important to proper operation and safety of the product. The correct installation and maintenance of the products are the responsibility of the user.
- B. All installation and wiring must conform to governing local and national electrical codes and other standards applicable to specific industries. The installation of the wiring should be undertaken by an experienced and qualified professional electrician. Failure to correctly wire the product to any machinery may result in the product or machine failing to operate as intended.
- C. Periodic inspection by a qualified person will help assure that this product performs properly. It is recommended that a documented inspection is carried out at least annually or more frequently in case that the product has been subjected to intensive use.

### Customer safety responsibilities

- 1. Read all literature provided with the product. Read all user instructions and safety manuals to ensure that the product operation is understood and can be used safely and effectively use this product.
- 2. Select a qualified and competent installer; Correct installation of the product is important for safety and performance. It is critical for the safety of your operation and of those who may work with your equipment that a qualified and competent electrical installer is selected to undertake the installation of this product. The product must be installed properly to perform to its designed functions. The installer should be qualified, trained, and competent to perform the installation in accordance with local and National Electrical Codes, all relevant OSHA Regulations, as well as any of the user's own standards and preventive maintenance requirements, and other product installation information supplied with the product. The installer should be provided with all necessary installation information to assist in the installation.

### Warnings and symbols in this operation manual

-  This symbol indicates safety measures that definitely must be taken into account in order to prevent personal injury.
-  This symbol indicates ATEX Certified components with a certain zoning designation.

### The flat sealing surfaces and seals must not be damaged!

**Warning!** Installation and commissioning must be performed by qualified personnel. Read the instructions carefully before starting up. The supplier is not liable for personal injury or property damage incurred by incorrect use.

**It is required to check the latest product information on Muller Beltex' website, before installing this product. Failure to do so, could result in to product failure or damage.**

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