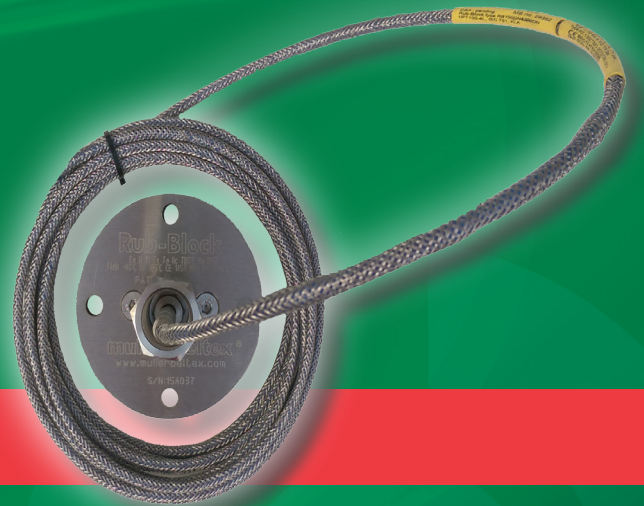


Rub-Block with ½ NPT Conduit Entry included a PT100 sensor, type RB100DN

Belt off-tracking WARNING device, for use in hazardous areas

Brochure



ACCURATE

FAIL-SAFE



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1. Application

Conveyor belts that are off track in bucket elevators can be very dangerous because they can rub up against the side walls generating dangerous levels of heat. To avoid a possible dust explosion, it is a good idea to continuously monitor the alignment of the belt.

The “Rub-Block” with a PT100 temperature sensor is designed to report the belt off-tracking of a conveyor belt or elevator belt, whereby belt off-tracking can be detected in a timely manner. The Rub-Block is equipped with a brass plate insulated with a plastic PTFE FDA-approved High-Heat intermediate plate (see photo 3.1), the purpose of which is to prevent outflow of heat to the stainless steel mounting plate or the elevator casing or the mounting bolts on the Rub-Block.

The Rub-Block is mounted on both sides of a conveyor or elevator belt at belt height. When a belt is mis-aligned, it will rub against the brass friction plate and the PT100 temperature sensor will detect the generated heat. When the trip point is reached, an alarm and shutdown can be triggered and will alert the operator of dangerous conditions. The measuring principle is: 1°C temperature difference results in a difference in resistance of 0.348 Ohms.

1.1 Rub-Block use in hazardous areas

The Rub-Block RB200DN has the following CSA approval : Class II, Division 1

1.2 The use of a Rub-Block in a hazardous environment

In order to avoid additional risks when utilising this instrument, the Rub-Block should be used as described in the CSA regulations:

80°C to shut down the elevator or conveyor.

We recommended installing a pre-alarm programme to prevent product pile-up in the elevator or conveyor.

Before installing the Rub-Block, we recommended first taking the following measures:

- Field cabling to the PLC;
- Set the configuration of the maximum temperature in the transmitter and in the PLC (see 1.2 zone related).

2. Built in Reed Switch “Fail-Safe”

When a service engineer forgets to return the PT100 sensor correctly into the Rub-Block during a maintenance job, the Pt100 sensor will measuring the ambient temperature instead of measuring the brass friction plate.

For this we provided the PT100 probe with a single reed switch and the Rub-Block with a magnet. When the PT100 sensor is not properly installed into a Rub-Block there will be no signal active in the PLC.

This signal is only activated when the PT100 sensor is placed correctly into the Rub-Block. If a service engineer now forgets to return the PT100 sensor correctly into the Rub-Block during a maintenance job, the elevator or conveyor will not start, because there’s an high alarm visible into the PLC (no temperature located).

The alarm can be reset in order to correctly installed the PT100 sensor in the Rub-Block ‘fail-safe’.

The Rub-Block with reed switch are available in two versions:

- With a reed switch built in, type RS-RB100DN round
- With a reed switch built in, type RS-RB200DN rectangular

2.2 Measuring transmitter (head transmitter)

The measuring transmitter can only be supplied by ordering; it is not delivered standard with the Rub-Block. Various models are available, (see 8.2)

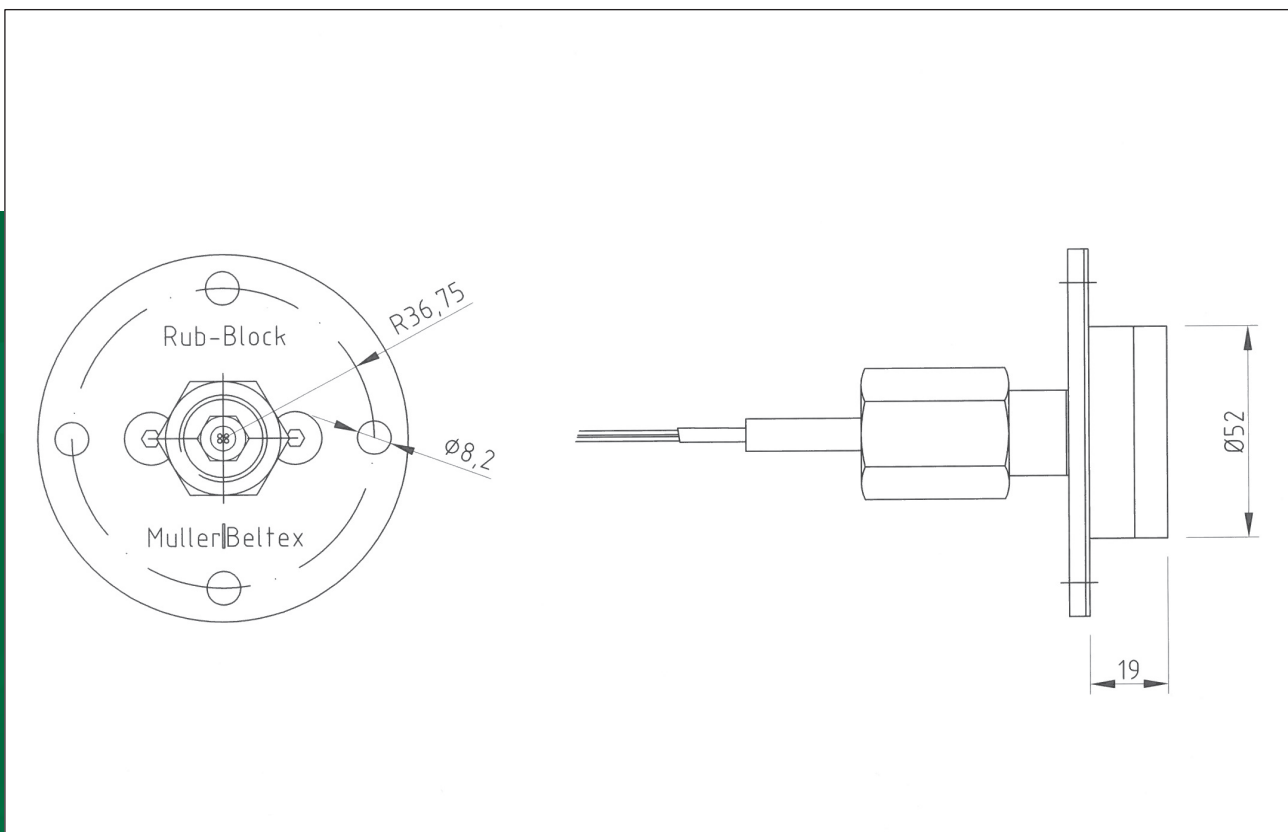
The transmitter transforms the temperature-dependant resistance into a standardised digital or Profibus jump signal of 4 to 20mA. The signal can be transmitted without distortion over great distances.

3. Mounting and Fitting Rub-Block

3.1 Rub-Block type RB100DN detail drawing

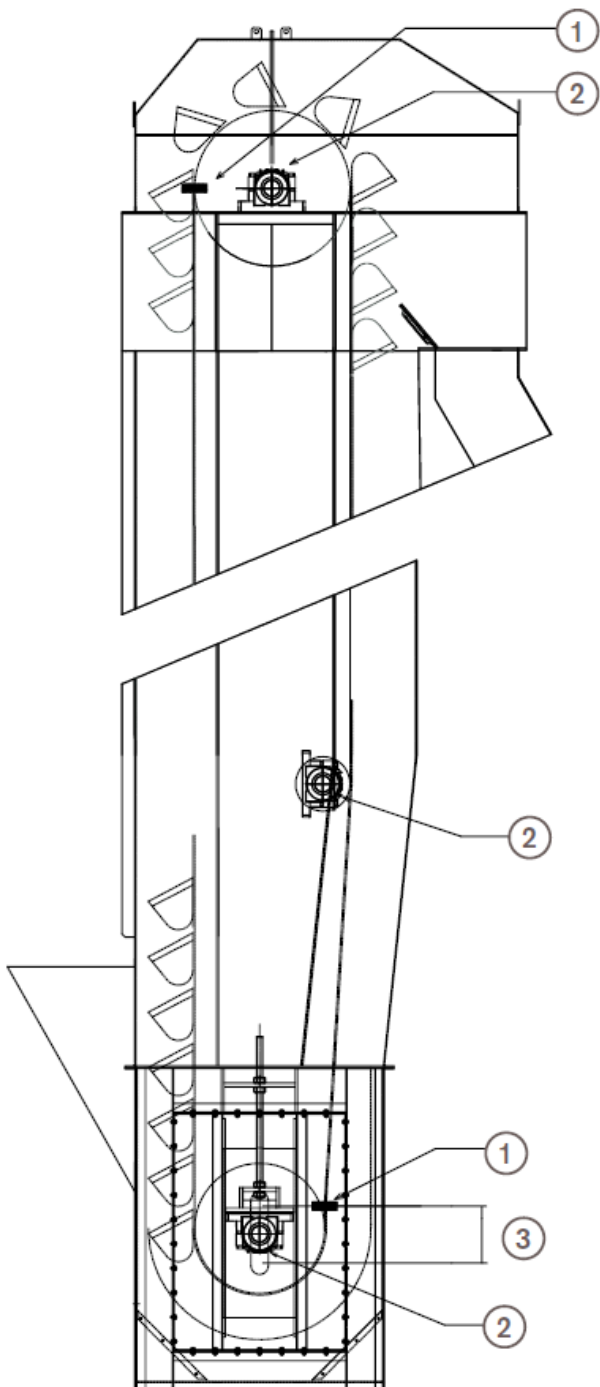
Front View

Sideview



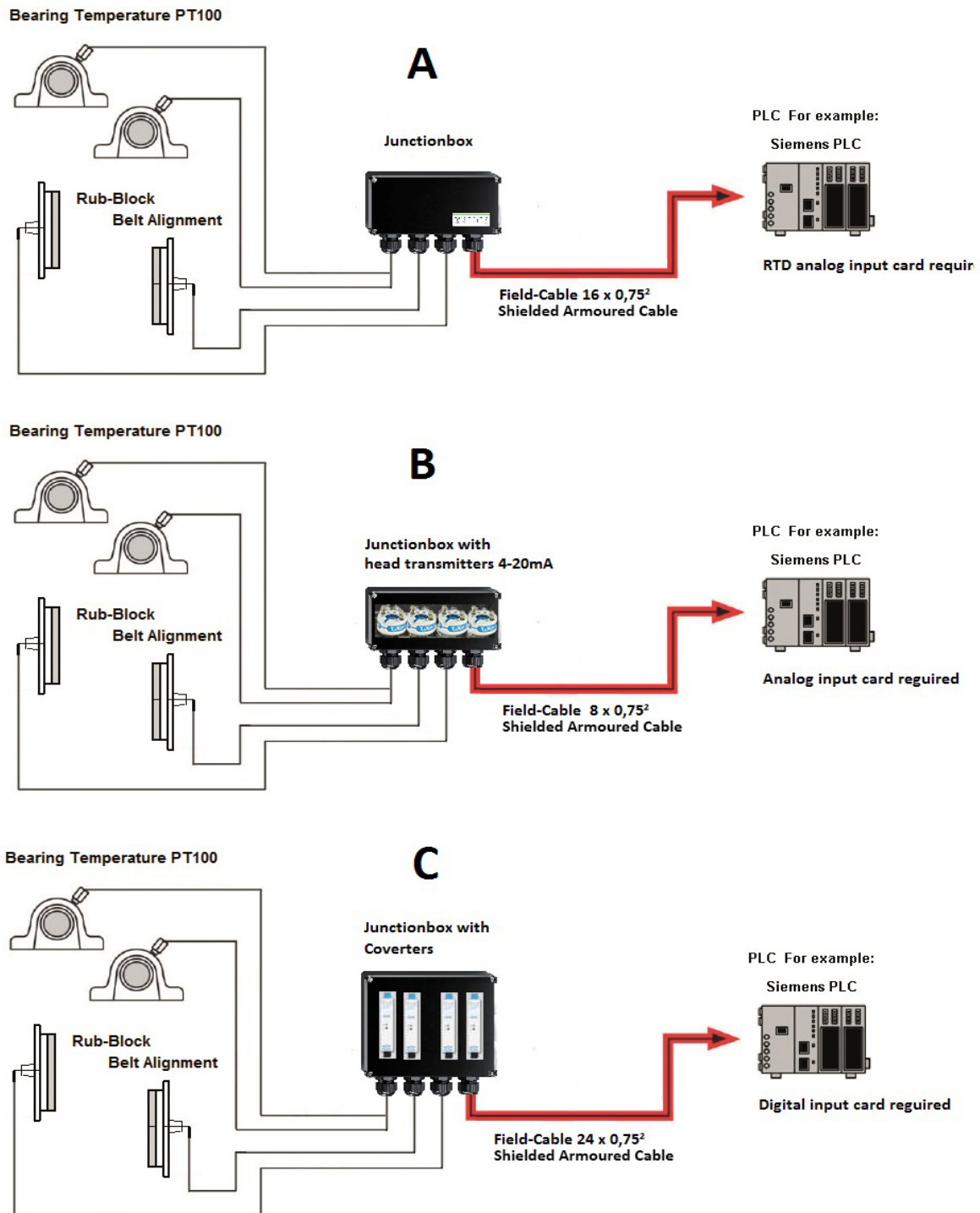
4. Mounting location

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



5. Installation requirements

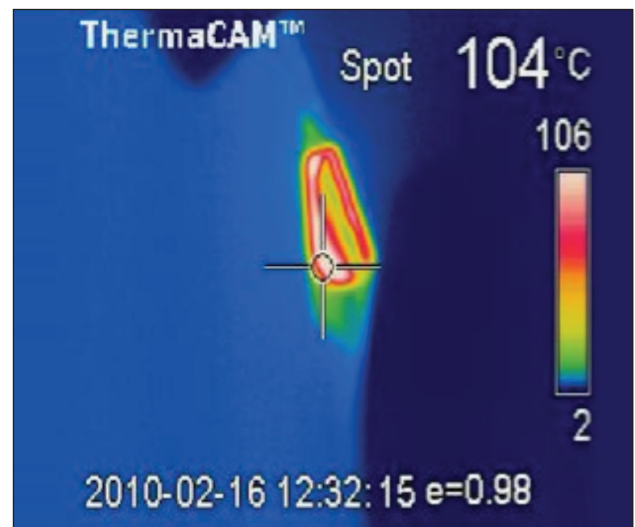
5.1 Installation options Rub-Block and Bearing temperature sensor



5.2 Positioning RB100DN



Rub-Block **RB100DN** view from inside the elevator.



Warm heat photo **RB100DN**

5.3 Installation instructions

First of all preventative measure should be taken;

- install correctly constructed drums;
- keep the installation and surroundings clean;
- earth the apparatus.

We recommend inserting the Rub-Block a minimum of 2 mm and a maximum of 6 mm inside the elevator during installation (see installation guid)

The PT100 sensor should be inserted up to the stop in the predrilled hole provided using the compression fitting supplied. If not properly fitted, there will be no precise measuring and the risk of breaking the sensor will be very high.

The PT100 produces a standard analogue output signal. It is easy to implement this signal in a PLC system, for example a SIEMENS S7. If it is not possible to implement an analogue signal, an analogue card is required or a HEAD transmitter with a digital output signal of 4-20mA (see 7.2 further on in the documentation) can be used. Software for the visualisation can be programmed by a software engineer.

For the cabling of the PT100 to the PLC, we recommend using a shielded 0,75 mm² core cable in order to avoid any electrical interference.

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

6. Technical data

4.1 Rub-Block RB100DN with PT100 technical data

PT100 sensor

Sensor type:	: R7-63527320-0090/050.S01 with 1 x 4L connection wires
Protection type connection head:	: IP 67
Tolerance class:	: Class A DIN IEC751
Cable type:	: PFA-PFA-V2A Cn 4 x 0,22 mm ²
Ambient temperature limit for cable:	: - 40°C to + 185°C
Cable Length:	: 5 meter
Measuring temperature limit:	: - 40°C to + 280°C
Measuring current:	: 1mA
Output signal:	: Analogue
Probe length	: 60 mm
Probe Diameter	: Stainless Steel 5 mm
Probe-tip Diameter	: Brass 3 mm

Material Rub-Block

Mounting plate round	: Stainless steel Ø 90 mm x 4 mm
NBR-Gasket	: 1 mm thick
Insulation material round	: PTFE high-heat plastic FDA-approved Ø 52 mm x 12 mm
Friction Plate round	: Brass Ø 52 mm x 8 mm

PT100 materials

Housing sensor head	: Brass
Diameter screw head connection	: M12 fine
PT100 sensor plug size	: 60 mm square
Stainless steel probe diameter	: 5 mm
Brass probe diameter	: 3 mm

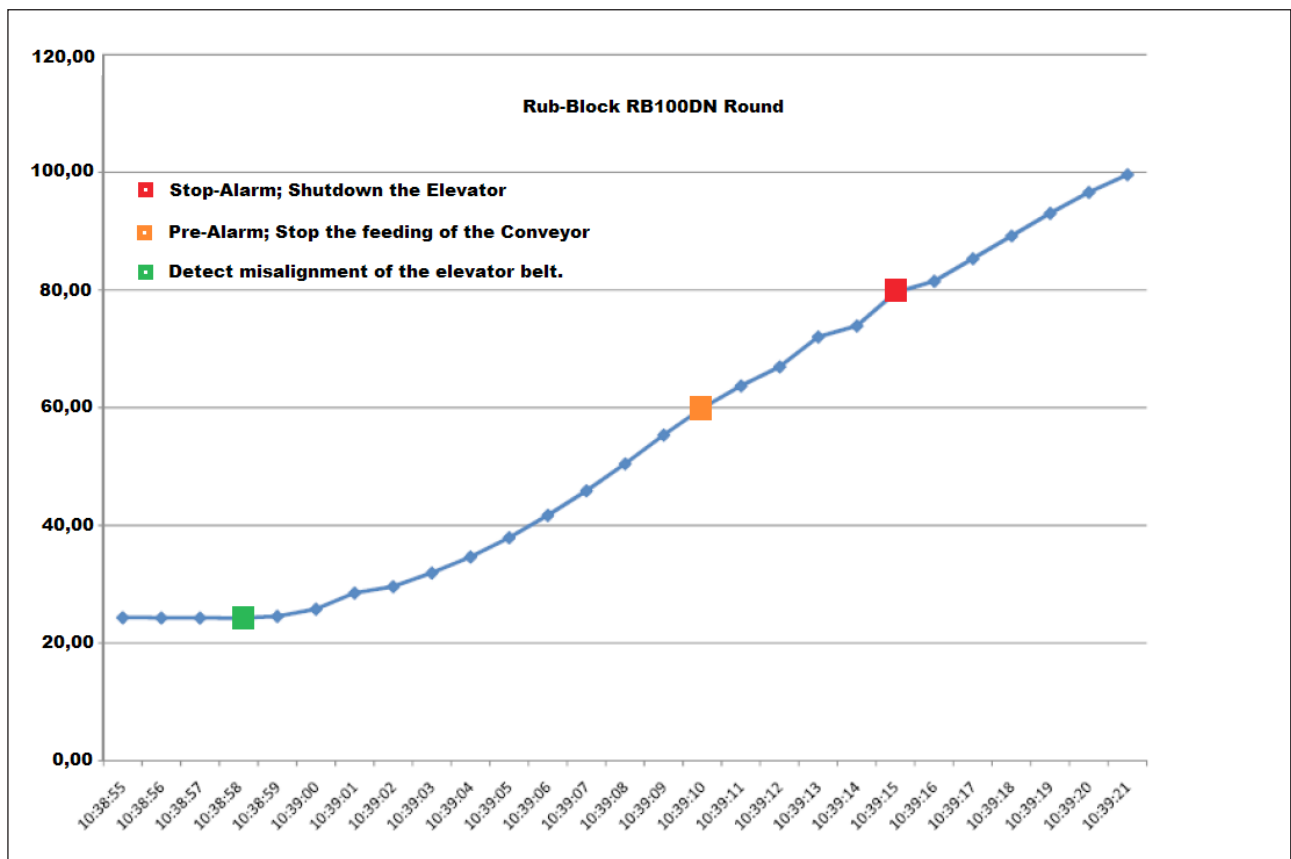
Hazardous area classification

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	: Ui 5 V
Maximum current input	: Ii 40 mA

6.2 Elevator belt misalignment test with a RB100DN

This measuring was done on an elevator with a height of **50 meters** and an elevator belt with a thickness of **13 mm**. The elevator belt runs at a speed of **3 meters** per second.

Diagram (°C) Time (min.)



Ambient temperature of 25°C

Duration contact of elevator belt and Rub-Block **RB100DN** because of belt off-tracking: 60 sec.

Duration temperature rise to 100°C **PT100**: **Approximately 23 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 belt misalignment. It prevents unnecessary wear of the brass plate from the Rub-Block and you will be informed for a threatening belt misalignment.

- 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

7. Explosion protection worldwide

IEC
EC directive
NEC 500
NEC 505

Ex ia IIC T6
II 1G Ex ia IIC T6
Intrinsic safety Class I Division 1 Group ABCD T6
Class I Zone 0 AEx ia IIC T6



Groups

IEC/ATEX/NEC 505		NEC 500/CEC	
Gas groups			
Group I			
I	Methane	-*	
Group II			
IIA	Propane	Propane	Class I, Group D
IIB	Ethylene	Ethylene	Class I, Group C
IIB + H2	Ethylene + hydrogen	Acetylene	Class I, Group B
IIC	Acetylene Hydrogen	Hydrogen	Class I, Group A
Dust groups			
Group III*		Class II/Class III	
IIIA	Combustible flyings	Fibres, flyings	Class III
IIIB	Non-conducting dust	Non-carbon-containing dust	Class II, Group G
IIIC	Conducting dust	Carbon-containing dust	Class II, Group F
		Metal dust	Class II, Group E
* Are not within the scope of NEC or CEC ** per IEC 2007 and CENELEC 2009			

7.1 ATEX Groups

Conditions hazardous areas								
Material Groups	Temporary behaviour of the flammable material in the hazardous area	Classification of hazardous area						
		IEC	EPL*	EU Directive 94/9/EC (ATEX)			US NEC 500 Canada CEC	US NEC 505
				Zone	Group	Category		
Gases, vapours	Are present continuously, for long periods or frequently	Zone 0	Ga	Zone 0	II	1 G	Class I Division 1	Class 1 Zone 0
	Occur occasionally	Zone 1	Gb	Zone 1	II	2 G		Class 1 Zone 1
	Probably do not occur at all, but if they do, only rarely or for short periods	Zone 2	Gc	Zone 2	II	3 G	Class I Division 2	Class 1 Zone 2
Dust	Are present continuously, for long periods or frequently	Zone 20	Da	Zone 20	II	1 D	Class II Division 1	-
	Occur occasionally	Zone 21	Db	Zone 21	II	2 D		-
	Probably do not occur at all, due to suspended dust, but if they do, only rarely or for short periods	Zone 22	Dc	Zone 22	II	3 D	Class II Division 2	-
Methane, dust	Hazardous areas	-	Ma	-	I	M1	-	-
	Potentially hazardous areas	-	Mb	-	I	M2	-	-
Fibres/ flyings		-		-	-	-	Class III	-

*) Equipment Protection Level per IEC 2007 and CENELEC 2009

Ignition protection types (examples)

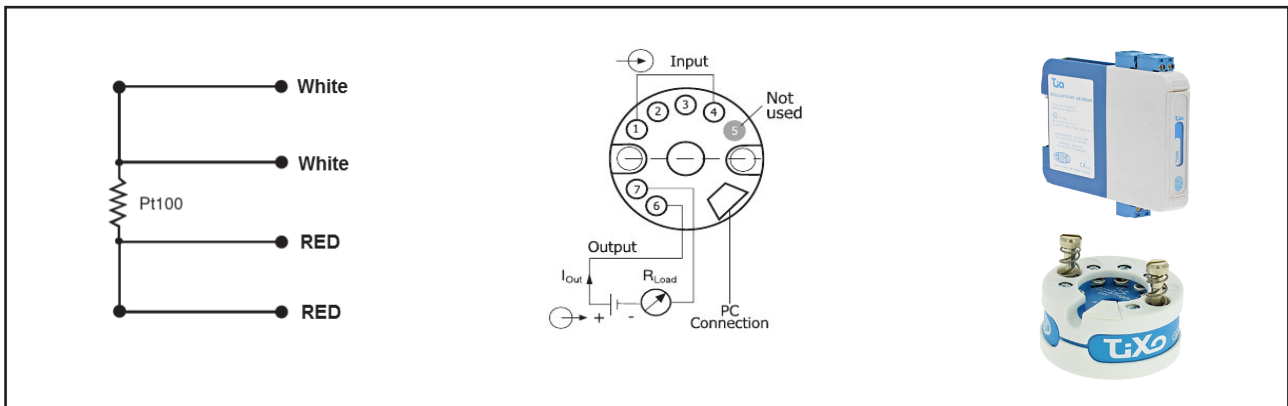
Ignition protection type	Marking	Definition	IEC	ATEX approval	FM / UL
Flameproof enclosure	Ex d	Propagation of an explosion to the outside is prevented	IEC 60079-1	EN 60079-1	FM 3615 UL 1203
Intrinsic safety	Ex i	Limitation of the energy of sparks and temperatures	IEC 60079-11	EN 60079-11	FM 3610 UL 913
n	Ex n	Different protection principles only for Zone II/Div. 2	IEC 60079-15	EN 60079-15	FM 3611 ANSI/ISA 12.12.01

Temperature classes and max. surface temperatures

Class	T1	T2	T2A, T2B T2C, T2D	T3	T3A, T3B T3C	T4	T4A	T5	T6
IEC/ATEX/NEC 505	450°C	300°C	-	200°C	-	135°C	-	100°C	85°C
NEC 500/CEC	450°C	300°C	280°C 260°C 230°C 215°C	200°C	180°C 165°C 160°C	135°C	120°C	100°C	85°C

8. Connection

8.1 PT100 connection diagram



8.2 Various indicators and transmitters available

GSI 48 Series – Universal input – Panel mounting

SPECIFICATION

Description

Process indicator for analogue signals. Displaying a process, temperature, load cell or potentiometer signal in engineering units.

Input	
thermocouples	: J, K, T, E, R, S, N
RTD	: Pt100
current	: 4÷20 mA
voltage	: 0÷50mV, 0÷10V

Accuracy

$\pm 0.25\% FS \pm 1^\circ C$: for thermocouples J, K, T, E, N
$\pm 0.25\% FS \pm 3^\circ C$: for thermocouples S, R
$\pm 0.2\% FS$: for Pt100
$\pm 0.2\% FS$: for input voltage, current

Alarm output

2x SPDT relay contact, 260Vca/1A/150VA

4x SPST relay contact, 260Vca/0,1A/50VA

Isolated 4...20mA

Operating Conditions: -10 ÷ +55°C/20 ÷ 85%RH

Power supply: 10-70Vdc and 21-53Vac or 85-260Vac and 100-300Vdc

Dimensions: 48 x 96 x 90 mm



9. 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.

9.1 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.

**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.
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.

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