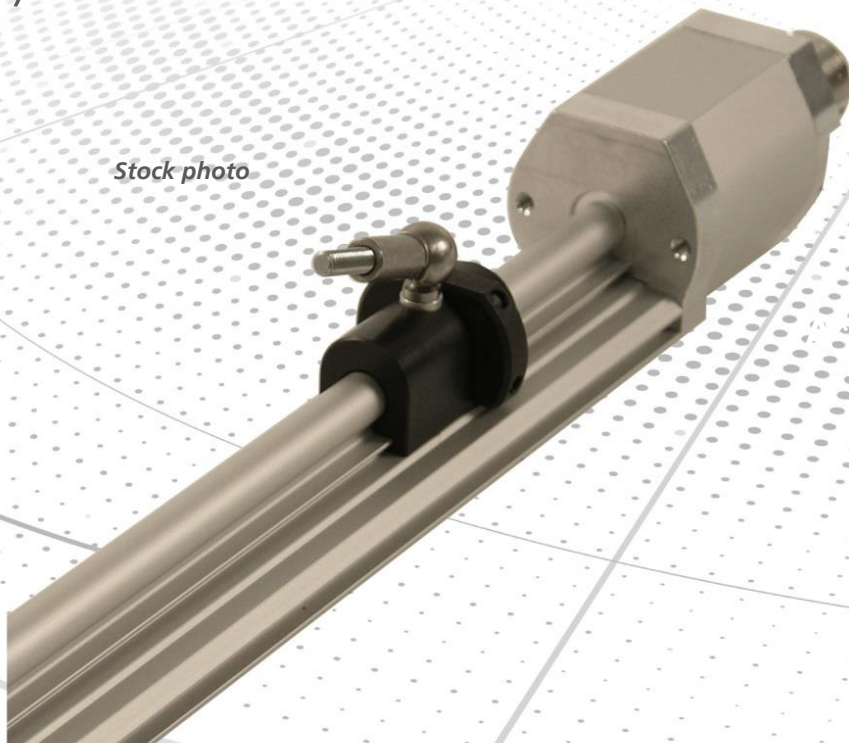


Explosion Protection Enclosure with integrated measuring system

Explosion Protection Enclosure - Type LP-46 (K)

Stock photo



CE

 3G Ex ec IIB T5 Gc X

 3D Ex tc IIIB T95°C Dc X

Date of manufacture: DD.MM.YYYY

- _ Basic safety instructions
- _ Intended use
- _ Product description
- _ Technical data
- _ Explosion protection characteristics
- _ Assembly



User Manual

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Text

Cursive or **bold** text represents the title of a document or is used for emphasis.
`Courier`-text shows text which is visible on the display or screen as well as software menu-selections.
" < > " refers to keys on your computer keyboard (e.g. <RETURN>).

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Amendment-index


Amendment	Date	Index
First edition	02/13/2017	02
Analog variant added	04/26/2017	03
EU declaration of conformity updated	06/26/2018	04
- New Equipment protection: "increased safety", e - EU declaration of conformity updated	08/20/2020	05
Updating the declaration of conformity	03/02/2022	06
ATEX string updated to current standard	01/15/2026	07

1 General


This -User manual contains all relevant explosion-safety information and includes the following topics:

- Basic safety instructions
- Intended use
- Product description
- Technical data
- Explosion protection characteristics
- Assembly

Since the documentation has a modular structure, this -User manual represents a supplement to the other documentation such as for example product data sheets, dimensional drawings and leaflets etc.

The -User manual is included, but can also be ordered separately.


1.1 Scope

This -User manual applies exclusively to the following explosion protection enclosure series:

- LP-46 (K),  II 3G Ex ec IIB T5 Gc X  II 3D Ex tc IIIB T95°C Dc X

The products are labelled with affixed nameplates and are components of a system.

It thus applies together with the following documentation:

- the operator's system-specific operation instructions
- this -User manual
- the pin assignment
- the interface-specific user manual
- the product data sheet

1.2 Relevant directives and standards

The explosion protection enclosure is developed, constructed and finished under compliance with the applicable European- or International standards and directives.

EU-Directive 2014/30/EU	Electromagnetic compatibility
EU-Directive 2014/34/EU	Equipment and protective systems intended for use in potentially explosive atmospheres
EN 61000-6-2	EMC: Interference immunity
EN 61000-6-3	EMC: Interference emission
EN 60079-0	Explosive atmospheres: General requirements
EN IEC 60079-7	Explosive atmospheres: Equipment protection by increased safety "e"
DIN EN 60079-14	Explosive atmospheres: Electrical installations design, selection and erection
EN 60079-15	Explosive atmospheres: Equipment protection by type of protection "n"
EN 60079-31	Explosive atmospheres: Equipment dust ignition protection by enclosure "t"
DIN EN 60529	Degrees of protection provided by enclosures (IP code)

1.3 Used abbreviations / Terms

LP-46	Explosion protection enclosure with integrated measuring system of the LP-46 series, type with profile-housing.
EU	E uropean U nion
EMC	E lectro m agnetic c ompatibility
ESD	E lectro S tatic D ischarge
IEC	I nternational E lectro-technical C ommission
VDE	Association for Electrical, Electronic & Information Technologies

1.4 Product description

The aluminum explosion protection enclosure with built-in systems and integrated evaluation electronics serves the detection of linear movements for fixed installations.

The explosion protection enclosure has the ignition protection type

- "e": increased safety (potential gas-explosive atmosphere) and / or
- "t": protection by the enclosure (potential dust-explosive atmosphere)

Through its manner of construction, the types of ignition protection and additional measures, the enclosure is suitable for the incorporation of non-explosion protected installation devices such as the measuring system of the series LP-46.

The construction, as well as the interaction of the individual components and the housing with regards to their possibilities for use in potentially explosive areas, are tested by the company TR Electronic GmbH and confirmed by identification with the nameplate.

2 Basic safety instructions

2.1 Symbol- and note definition



WARNING means that death or serious injury can occur if the required precautions are not met.



CAUTION means that minor injuries can occur if the required precautions are not met.

NOTICE

means that damage to property can occur if the required precautions are not met.



indicates important information or features and application tips for the product used.



signifies that respective ESD-safety measures according to DIN EN 61340-5-1 supplement 1 are to be observed.


2.2 Obligation of the operator prior to commissioning

As an electronic device and for use in potentially explosive areas, the explosion protection enclosure with integrated measuring system is subject to the provisions of the EU-directives EMC and ATEX.

Therefore commissioning of the device is only allowed once it has been established that the system/machine in which the device is to be installed, complies with the provisions of the EU-directives EMC and ATEX, the harmonized standards, European standards or the respective national standards.

2.3 General dangers with the use of this product

The product, hereafter referred to as **equipment** is manufactured using the latest technology and according to recognized safety regulations. **Nevertheless, non-intended use can cause danger to life and limb of the user or third parties or cause damage to the equipment and other property!**

Only use the equipment for its intended use, with safety- and danger awareness and in compliance with the -**user manual** and the **interface specific user manual!**

The operator of an electrical system in a potentially explosive environment should keep the equipment in a proper condition, it should be properly operated and monitored and maintenance- as well as repairs are to be performed. This also includes inspection of the equipment for possible transport damage prior to commissioning.

Power connections may not be connected or disconnected with the power engaged. Generally, wiring work as well as opening and closing of electrical connections may only be performed with the power switched off.

The equipment may not be used in case of defects, as a basic principle it may not be opened and dust deposits > 2 mm must be removed.



2.4 Intended use

The equipment is used for the detection of linear movements as well as the processing of the measurement data for a downstream control through industrial process- and control procedures.

The equipment is a fixed-installation device for use in the Ex-Zone 2 (potentially gas-explosive areas, II 3 G, device protection level Gc) or 22 (areas with combustible dust II 3 D, device protection level Dc).

The assembly takes place through the established attachment possibilities. The electrical data provided on the nameplate, as well as the device category, temperature class etc. for the place of use are to be observed. The operating temperature range of the equipment is -20°C to +60°C.

Intended use also includes:

- observation of all instructions contained in this -User manual and in the interface-specific user manual,
- observation of the nameplate and possible prohibition- or instruction labels on the equipment,
- observation of the supplementary documentation e.g. the accompanying product sheet, connector assignments etc.,
- observation of the machine- or system manufacturer's operating manual,
- operating of the equipment within the limits indicated in the technical data (-User manual/interface-specific user manual).

2.5 Non-intended use

Risk of death, bodily injury or damage resulting from non-intended use of the equipment!

WARNING

- Since the equipment is **not a safety component** according to the EU-machine directive, a plausibility test of the measuring-system-values has to be performed through the downstream control.
- It is compulsory for the operator to incorporate the equipment into their own safety system.

NOTICE





- The following uses are especially prohibited:
 - in environments with an explosive atmosphere of the Zones 0, 1, 20 and 21
 - for medical aims
 - commissioning of the equipment if the nameplate is no longer readable or is completely missing.

2.6 Warranty and liability

The "General terms and conditions" ("Allgemeine Geschäftsbedingungen") of the company TR Electronic GmbH apply in general. This will be available to the operator with the contract confirmation or –conclusion at the latest. Warranty- or liability claims with regards to personal- and property damage are excluded, if they are the result of one or more of the following causes:

- Non-intended use of the equipment.
- Improper assembly, installation, commissioning, programming, maintenance or dismantling of the equipment.
- Improperly executed work on the equipment by unqualified personnel.
- Operating of the equipment in the presence of technical defects.
- The performance of unauthorized mechanical or electrical modifications of the equipment.
- The performance of unauthorized repairs
- Catastrophic incidents caused by external forces or acts of God.

2.7 Organizational measures

- The -User manual must always be kept within reach in the equipment's operating location.
- In addition to the -User manual, the generally applicable legal regulations and other mandatory directives for work safety, accident prevention and environmental conservation are to be observed and conveyed.
- The applicable national-, site- and system-specific provisions and requirements are to be observed and conveyed.
- The operator has the obligation to point out any special operational features and requirements to the personnel.
- Before starting work, the personnel responsible for work on or with the equipment must have read and understood the -User manual, in particular the chapter on "Basic safety instructions".
- The nameplate and possible affixed prohibition- or instruction labels on the equipment must be kept in a readable condition.
- Do not perform any mechanical or electrical modifications to the equipment, except those which are specifically described in this -User manual.
- Repairs may only be performed by the manufacturer, or by a person or body who carries the manufacturer's authorization.

2.8 Personnel selection and -qualification; basic obligations

2.8.1 Electrical installations design, device selection and erection

The project development of electrical systems, the selection of the devices and the installation in potentially explosive atmospheres may only be performed by persons whose training includes instruction in various types of ignition and installation techniques, applicable regulations and prescriptions as well as general principles of the Zone-classification. The persons must have the relevant competence for the type of work to be performed.

The personnel must regularly undergo corresponding further training or courses.

For definitions on the knowledge, expertise and competence of the "responsible persons", "manual workers" and "planners", the IEC 60079-14 or DIN EN 60079-14 standards are to be additionally consulted [suppliers e.g. Beuth Verlag GmbH, VDE-Verlag GmbH].

2.8.2 Inspection, maintenance and repair

The inspection, maintenance and repair of electrical systems in potentially explosive environments may only be performed by experienced personnel who have also gained knowledge on the various types of ignition and installation procedures, the requirements of the IEC / DIN EN 60079-17 standard, relevant national provisions and company regulations for the system as well as on the general principles of the Zone-classification during their training.

Personnel are to undergo appropriate further training or instruction regularly. Proof of the relevant experience and completed training must be available.

For definitions on the knowledge, expertise and competence of the "responsible persons", "expert person with leadership functions" and the "performing personnel", the IEC 60079-17 or DIN EN 60079-17 standards are to be additionally consulted [suppliers e.g. Beuth Verlag GmbH, VDE-Verlag GmbH].

2.9 First commissioning / Commissioning

Prior to the first commissioning the equipment is to be checked regarding its suitability in the respective zone according to its labeling. The values indicated on the nameplate are not to be exceeded. With use of the equipment in areas which are potentially explosive because of dust, a deposit of dust on the top-side which is more than 2 mm thick is not permissible. Here the installation of an additional covering may be required in circumstances where the deposit of dust cannot be reliably avoided.

The operational safety of the equipment and the correct functional arrangement of the equipment inside the plant must be checked before commissioning. It may only be used in a clean and undamaged condition.

2.10 Assembly, installation and dismantling

With installation and operation of the explosion protective equipment, one should consider protection against hazardous environmental influences which limit the intended use of the equipment. This could be protection against aggressive fluids or weather protection for example. During installation, the IEC 60079-14 and DIN EN 60079-14 as well as other national standards and regulations applicable at the installation site are to be adhered to.

The information on the nameplate must be complied with.

The assembly of the equipment takes place according to the enclosure's established mounting possibilities, but impacts on the equipment such as from hammer blows are to be avoided. Do not bend the sensor rod and do not install the equipment next to magnetic fields.

In potentially explosive areas, the equipment's power supply line with mating connector respectively the connection cable is to be routed in such a way that it is protected from damage and mechanical failure. In case of connection cables without mating connectors the single wires mustn't be damaged. The maximum connection information on the nameplate must be complied with.

Observe the information in chapter " Special conditions for safe use, marking "X" " on page 16.

For metal enclosures in potentially explosive areas an equipotential line with at least 4 mm² is required.

Wiring work, opening and closing of electrical connections may only be performed with the power switched off.


Do not perform any welding work once the equipment has already been wired and switched on.



Touching the equipment-connection contacts with bare hands is to be avoided, or the respective ESD-protective measures are to be implemented.

2.11 Inspection, maintenance and repair

The operator of an electrical system in a potentially explosive environment must keep the equipment in an good condition, operate it properly, monitor it and maintenance and repair work must be performed, also see IEC 60079-17 and DIN EN 60079-17 in this respect.

Maintenance work and defect repairs may only be performed by trained professionals. Before the maintenance or repair, the specified safety precautions are to be observed. The warning notes on the equipment and in the -User manual and the interface-specific user manual are to be adhered to!
The applicable laws and directives are complied with before recommissioning.



- The equipment does not require any maintenance by the operator. Nevertheless, inspections must be performed at regular intervals:
 - Visual inspection
 - of the enclosure for damages
 - of the connection cable as well as the supply line for external damages
 - for dust deposits
 - Type with connectors
 - Checking of the connection plug for a tight fit
 - Type with cable glands
 - Checking of the leading-in for a tight fit
- In case of damages, the equipment is to be taken out of service immediately and to be repaired by the manufacturer!

2.12 Special conditions for safe use, marking "X"

The "X" symbol in the labeling of the equipment is used to indicate special application conditions:

The equipment's installation location and -manner are generally to be selected in such a way that it is protected from external mechanical influences and in a way that no function limitations can result. In order to guarantee this, in some circumstances additional constructional measures must be realized.

Misappropriations of the equipment as

- support
- tread plank
- stirrup
- ...

are prohibited.

- Type with connectors:

The mating connector must be secured against accidental disconnection through the use of a screw locking device.

- Type with cable glands:

The connection of the free end of the supply line must either take place outside of the potentially explosive area or within of an equipment which is permitted for the respective device category.

3 Transport / Storage

Transport – instructions

Do not drop the device or allow hard impacts!

The equipment consists of a magneto-resistive sensor.

Only use the original packaging!

Inappropriate packaging material may cause damage to the device during transport.

Storage

Storage temperature: -30 to +85°C

Store in a dry place

4 Technical data

4.1 Power supply

Rated Voltage	24 V DC
Power consumption	≤ 3,5 W

4.2 Mechanical characteristics

Measuring length.....	50...3600 mm, in steps; see nameplate
Resolution	≥ 0.001 mm; see nameplate
Linearity error	± 0.10 mm ≤ 1500 mm / ± 0.15 mm > 1500 mm
Reproducibility	0.005 mm
Hysteresis	0.02 mm ≤ 1500 mm / 0.1 mm > 1500 mm
Temperature coefficient.....	< 8 µm/°C ≤ 500 mm / < 15 ppm/°C > 500 mm
Analog variant	< 40 ppm/°C, total measuring range
Straight line velocity	no restrictions
Mounting position	no restrictions
Material - Measuring body	Aluminium extruded profile
Magnet	Slider, other on request

4.3 Environmental conditions

Vibration, DIN EN 60068-2-6..... ≤ 100 m/s², sine 50-2000 Hz

Shock, DIN EN 60068-2-27..... ≤ 1000 m/s², half-sine 11ms

EMC

Immunity to disturbance, DIN EN 61000-6-2

Transient emissions, DIN EN 61000-6-3

Working temperature..... -20 °C...+60 °C

Storage temperature..... -30 °C...+85 °C, dry

Relative humidity, DIN EN 60068-3-4 98 %, non-condensing

¹ Protection class..... **IP64**: Degrees of protection provided by enclosures according to DIN EN 60529

4.4 Enclosure materials

Aluminum design


Enclosure material..... Al Mg Si 0.5 F22


Flange material..... EN AW-AlCuMg1

¹ Observe instructions for safe use, see chapter 2.12 on page 16

4.5 Explosion protection characteristics

4.5.1 Ex-labeling, gas

 II 3G Ex ec IIB T5 Gc X

	II	3G	Ex	ec	II	B	T5	Gc	X	
									special conditions	
								Device protection level		
							Temperature (IEC/CENELEC)			
						Subgroup (IEC/CENELEC)				
				Group (IEC/CENELEC)						
			Ignition protection type (IEC/CENELEC)							
		Labeling (IEC/CENELEC)								
	Device category (ATEX)									
	Device group (ATEX)									
Ex-labeling (ATEX)										

Device group..... **II**: potentially gas-explosive areas

Device category..... **3G**: Zone 2
adequate safety with normal operation

Ignition protection type **ec**: increased safety
additional measures to prevent ignition of the
Ex-Atmosphere

Group..... **II**: potentially gas-explosive areas

Subgroup **B**: typical gas: Ethylene

Temperature..... **T5**: max. enclosure surface-temperature ≤ 100 °C

Device protection level **Gc**: Zone 2
Extended level of protection in gas atmospheres

Special conditions..... **X**: see chapter 2.12 on page 16

4.5.2 Ex-labeling, dust

II 3D Ex tc IIIB T95°C Dc X

II	3D	Ex	tc	III	B	T95°C	Dc	X
								special conditions
								Device protection level
								Temperature
								Subgroup (IEC/CENELEC)
								Group (IEC/CENELEC)
								Ignition protection type (IEC/CENELEC)
								Labeling (IEC/CENELEC)
								Device category (ATEX)
								Device group (ATEX)
								Ex-labeling (ATEX)

- Device group**..... **II**: potentially dust-explosive areas
- Device category**..... **3D**: Zone 22
adequate safety with normal operation
- Ignition protection type** **tc**: Protection by enclosure
with adherence to the type of protection and within the
surface temperature limits, Ex-atmosphere cannot be
ignited
- Group**..... **III**: potentially dust-explosive areas
- Subgroup** **B**: Type of dust: nonconductive dust
- Temperature**..... **T95°C**: max. enclosure surface-temperature ≤ 95 °C
- Device protection level** **Dc**: Zone 22
Enhanced level of protection in dusty atmospheres
- Special conditions**..... **X**: see chapter 2.12 on page 16

- ² **Protection class** **IP64**: Degrees of protection provided by enclosures
according to DIN EN 60529

² Observe instructions for safe use, see chapter 2.12 on page 16

5 Assembly



- Dimensions must be taken from the customer-specific drawing
-

Before mounting TR-linear-Transducer, make sure there are no strong magnetic and electric interference fields in the vicinity.

Inadmissible interference fields can influence the measuring precision. The field strength may be max. 3 mT in the vicinity of the measuring rod.

5.1 Mechanics profile- housing design

Since the position sensor by the measuring body mechanically one leads, is relatively simple the installation the TR-linear-Transducer system. The exact guidance of the captive-sliding magnet and non-contact and wear free measurement system each other optimally. In order to reduce the wear between captive-sliding magnet and measuring body to a minimum, the dimensional tolerances for angle and parallel misalignment must be absolutely kept.

The exact of the measured value depends also on the symmetry of magnetic field geometry. If no captive-sliding magnet is used, the position sensor must be led exactly in axial direction to the measuring body. The admissible maximum distance between position sensor and measuring body may not be exceeded.

6 Equipotential bonding conductor - Connection

An equipotential is required for systems in potentially explosive areas. This is to be done with a minimum wire diameter of 4 mm².

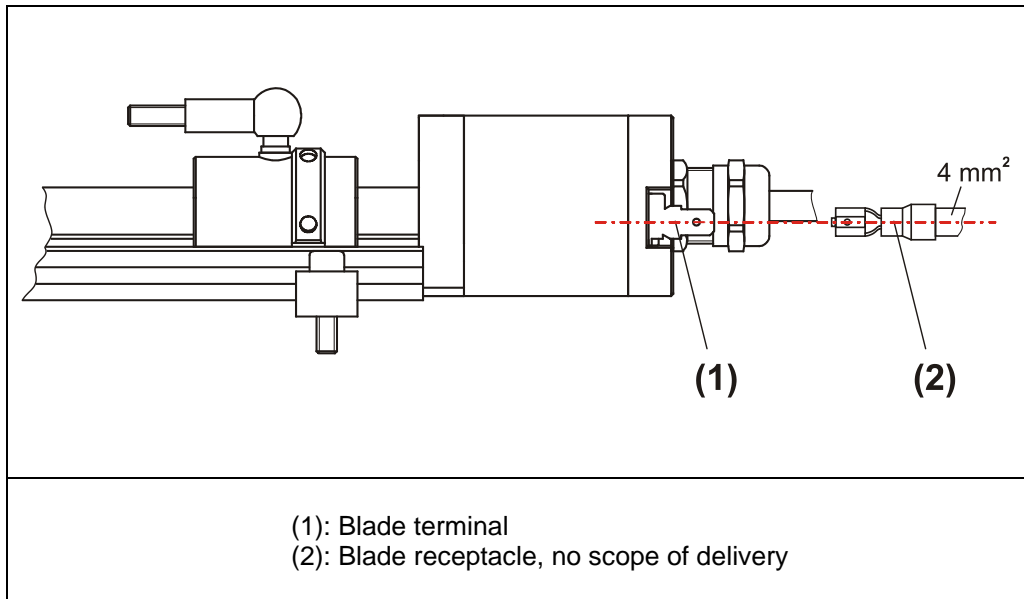


Figure 1: Equipotential bonding conductor - Connection

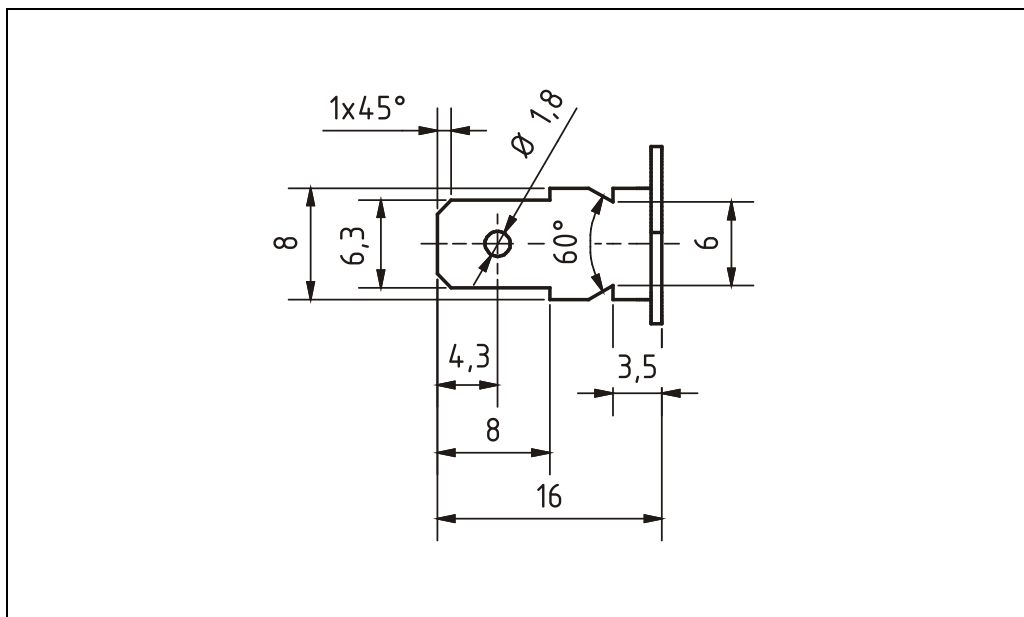


Figure 2: Dimensioned drawing – Blade terminal

7 Disposal

Electronic waste is hazardous waste. The applicable country-specific regulations are to be adhered to for disposal.

8 Annex

8.1 EU declaration of conformity



EU Declaration of Conformity

The Linear Measuring System Series in Explosion Proof Design

Types: LMRS-34 Ex, LP-46K
Order-No.: 346-xxxxx, 334-xxxxx

were developed, designed and manufactured to comply with the EU-Directives

Electromagnetic Compatibility (EMC)	2014/30/EU	(L 96/79)
Equipment and protective systems intended for use in potentially explosive atmospheres (ATEX)	2014/34/EU	(L 96/309)
Restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS)	2011/65/EU	(L 174/88)

under the sole responsibility of

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Germany

The following harmonized standards were applied:

EN 61000-6-2:2005/AC:2005	Generic standards - Electromagnetic compatibility, Immunity (Industrial environments)
EN 61000-6-3:2007/A1:2011	Generic standards - Electromagnetic compatibility, Emissions (Commercial environments)
EN IEC 60079-0:2018	Explosive atmospheres Part 0: Equipment - General requirements
EN IEC 60079-7:2015/A1:2018	Explosive atmospheres Part 7: Equipment protection by increased safety "e"
EN 60079-15:2010	Explosive atmospheres Part 15: Equipment protection by type of protection "n"
EN 60079-31:2014	Explosive atmospheres Part 31: Equipment - Dust ignition protection by enclosure "t"
EN IEC 63000:2018	Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances

Other applied standards:

DIN EN IEC 60079-14:2021	Explosive atmospheres Part 14: Electrical installations design, selection and erection
EN 60529:2014	Degrees of protection provided by enclosures (IP code)

The products are marked additionally with the following characteristics on the name plate:

II 3G Ex X
 II 3D Ex X



For adherence of the conformity the references in the Ex User Manual must be observed, especially in the chapters "Intended use" and "Special conditions for safe use, marking "X"."

Trossingen, 02/17/2022

Mr. Klaus Tessari, CEO

TR-ELA-KE-DG B-0071-02.docx

8.2 Accessories

www.tr-electronic.com/products/linear-encoders/accessories.html

8.3 Interface-specific user manual

Document-No.:	Description
TR-ELA-BA-DGB-0022	Linear measuring systems with SSI interface
TR-ELA-BA-DGB-0015	Linear measuring systems with PROFINET interface
TR-ELA-BA-DGB-0025	Linear measuring systems with Analog interface