GROUNDING CONTROL DEVICE EKX-4 LT

Technical Description | English

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1. General Information

For use in gas and combustible dust hazardous areas of zones 1 and 21 according to EAC regulation TR-CU 012/2011 for a temperature range of -55 °C up to +50 °C.

The explosion-proof EKX-4 LT Grounding Control Device ensures the controlled discharge of electrostatics occurring during filling processes of petrochemical, chemical or other products. It is characterized by ease of installation, convenient operation, highest functional safety and a user-friendly state-of-the-art explosion protection concept designed by Timm.

products or within an explosive gas or dust atmosphere.

To prevent from static-caused ignitions, the electrostatic charge has to be dissipated safely. The EKX-4 LT Grounding Control Device provides and monitors the required connection continously. Therefore it is installed firmly connected to the ground reference potential of the filling station (ground connection).

An additional housing with a self-regulating integrated heating in combination with our special cold-resistant PUR grounding cable ensures an application within a temperature range

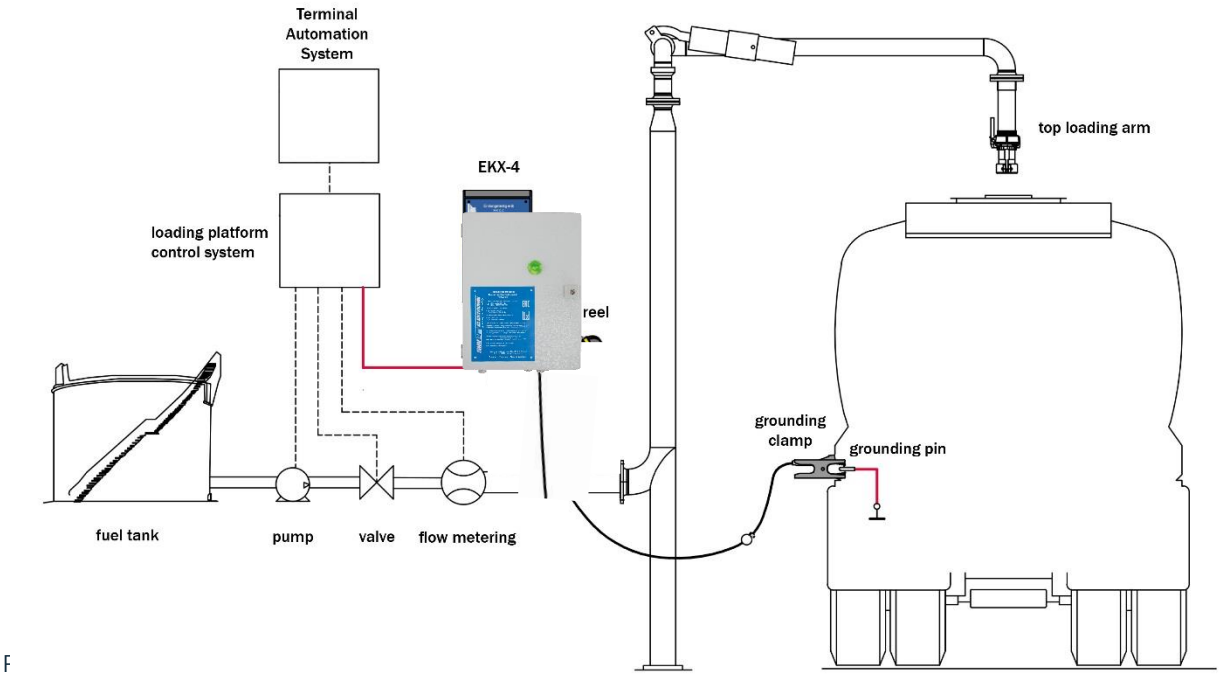


Figure 1: Monitored grounding with Grounding Control Device EKX-4 LT

2. Functional Principle

Electrostatic charges can arise by filling of certain fluids, granulate materials or other products to road tank trucks, railway tank wagons, containers etc. An exceptional hazardous situation will be present, if this electrostatics happen with inflammable

from minus 55 °C up to plus 50 °C.

Before starting any filling process, the tanker, railcar or container must be grounded by attaching the grounding clamp
As soon as the grounding control device detects a sufficient conductive connection, it will switch the control

outputs and the indicator lamp to 'filling release'.
If the proper grounding connection breaks, the device will switch immediately to the 'no release' state.

3. Special Features

3.1. Compliance with the EAC Standards

The EKX-4 LT Grounding Control Device was specially designed for application in cold ambient and fully complies with the EAC Standards for use in gas and combustible dust hazardous areas.

3.2. Intelligent Explosion Protection

TIMM`s intelligent explosion protection concept (IEPC) combines protection by intrinsic safety, increased safety, powder filling and protection by enclosure. With this combination of protection types, the grounding control device can be opened in gas hazardous areas for configuration.

Opening the outer housing is just possible at ambient temperatures of above -30 °C. Below this temperature, the power supply of the device must be permanently turned on and the outer housing must be closed.

3.3. Proven Factory Settings

Every unit is delivered pre-configured and ready-for-use right after installation. The factory settings of the object recognition result from long standing experiences and are suitable to all standard grounding applications.

3.4. Configurability

Many functions of the grounding control device can be configured in order to cover the wide range of possible electrostatic applications. This includes setting the object to be grounded, e.g. road tank truck or railway tank wagon, adjusting the limit values of object recognition, the type of release signal at the electronic output and the cable compensation function. Thus, the device can be adjusted easily during installation and operation according to the local requirements at site of operation.

Figure 2: Opened outer housing of the EKX-4 LT

3.5. Object Recognition

With the setting 'tank truck', the grounding control device can distinguish between correct grounding and faulty operation, e.g. attaching the grounding clamp to the filling frame. 'Filling release' will only be given with proper grounding connection. This protection against false operation increases operational safety and ensures explosion prevention by compulsive grounding.

3.6. Functional Safety

The grounding control device performs several internal monitoring functions like a plausibility check of the device configuration, internal self-tests of all safety related functions, an automatic calibration of the measuring circuit electronics and tests of the relay reliability of the release outputs before every switching. The conductivity of the grounding connection is monitored permanently during operation. The unit's design and the selection of its component parts under aspects of explosion prevention and protection assure

exceptional equipment reliability and functional safety.

Figure 3: Configuration of EKX-4 in gas hazardous areas with opened enclosure and power switched on

3.7. Ease of Commissioning

With the factory settings and the easy-to-open enclosure, the grounding control device is installed, electrically connected and ready for operation within short time. Except from visual inspections, the device is maintenance-free. The electronic works reliably and requires no readjustment of the switching thresholds. The housing is extra coated for high resistance against chemicals and other environmental influences. With the integrated connection terminals, broken grounding cables can be replaced on site quickly.

3.8. Bright Signal Light

The EKX-4 LT has a multicolor signal light that is clearly visible even in bright environments. It is mounted considerably raised at the front of the enclosure and can be recognized sidewise, also with the additional housing.

The signal light indicates the operational state of the device as large display. With opened enclosure, the signal light's six LEDs are used as detail display for indicating measured data, limit values and error diagnostics.

3.9. Cable Compensation

Every grounding cable has a parasitic capacitance against ground potential. Without compensating this cable capacitance, the device may issue a release signal accidentally during connecting the cable to the object to be grounded. The cable compensation function of the EKX-4 LT Grounding Control Device prevents from these fault releases by enabling a very high accuracy of the object recognition measurements. Besides, increased lengths of grounding cables are possible with active cable compensation.

3.10. Supervision of Interfering Voltages

Separate source voltages result in unregulated stray currents and have to be suspend from hazardous areas. Furthermore, they can interfere the functioning of grounding control devices.

EKX-4 LT monitors the level of interfering voltages at the filling station and indicates as soon as the permitted level for its correct functioning is exceeded. Simple grounding control devices may interfere with stray currents and lead to an ungrounded 'release' state

3.11. Control Outputs

The EKX-4 LT comes like the EKX-4with four control outputs:

- 2 Contact Release Outputs
- 1 Electronic Release Output
- 1 Auxiliary Output

The release outputs can be connected directly to the control system of the filling station, e.g. PLC. Thus, automated filling processes can be released, or interrupted when proper grounding is not ensured.

The contact release outputs are redundant, monitored by return signal and

tested by the device prior to every release switching. Due to a mechanical link inside the relays, any malfunction of the contacts will be detected reliably.

The electronic output can be configured to a static or a dynamic signal. By using the dynamic oscillating signal together with a suitable evaluation electronic at the PLC, failures at the transmission lines can be recognized.

The auxiliary output is intended for not safety related control functions, e.g. external indicator lights.

3.12. Made in Germany

TIMM is an independent manufacturer of electronic equipment for control and measuring applications in hazardous areas. All our products are engineered and produced at our site in Reinbek, Germany - near Hamburg. More than fifty years of experience, co-operations with German universities and best qualified employees ensure the high quality of our products and substantiated technical advices by our sales engineers. With our very flexible production system we can provide best service to our customers, even at unanticipated project situations.

4. Accessories

TIMM provides a variety of accessories for its grounding control devices EKX-4 LT.

4.1. Grounding Clamp

The grounding clamp EZ1 is very durable made of stainless steel V2A. The spring action is limited in such way that for a safe contacting of the clamp no strong force is needed.

The following configurations are available:

Figure 4: Grounding Clamp EZ1

4.1.2. 1-pole Grounding Clamp (EZ1-1pol)

Explosion-proof stainless-steel grounding clamp for Grounding Control Device EKX-4 LT.

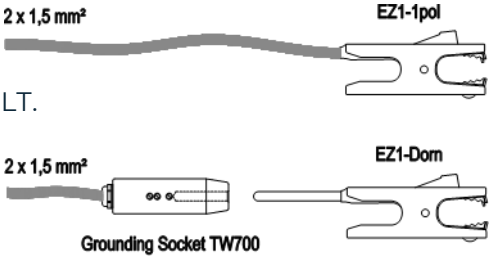


Figure 5: Types of grounding clamp EZ1

4.1.3. Grounding Clamp with Brass Pin (EZ1-DORN)

Explosion-proof stainless steel grounding clamp with mounted brass pin, as breakaway coupling.

4.2. Breakaway Coupling

4.2.2. Grounding Socket (TW700BU)

The grounding socket TW700BU is used for road tankers having a 10 mm thick grounding pin. It is impact and oil resistant.
The combination of grounding socket TW 700 and the grounding clamp with brass pin works as a breakaway coupling for EKX-4 LT.

4.2.3. Grounding Plug TW 700 (TW700ST)

Grounding Plug for connection to Grounding Socket TW 700. Combinable with Grounding Cable with 1-pole Grounding Clamp or Grounding Socket TW 700 as breakaway coupling. The breakaway coupling can be delivered with 1 m cable

at the grounding clamp, too, e.g. for pull relief of the plug-in connection.

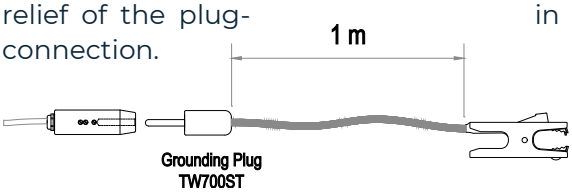


Figure 6: TW 700 Plug-in connection with 1 m grounding cable and clamp

4.3. Special PUR Cable

The associated straight black grounding cable is specified for extreme environmental and operating conditions. It is built from a special PUR mixture to achieve an extended temperature range from -60 °C up to + 70 °C, a high durability against mechanical stress, flame-resistance, high resistance against petrochemical and other aggressive chemical mediums. The tinned cupper wires are insulated and stranded. The grounding clamp or the grounding socket are mounted ready-for-use to the cable.

Figure 7: Special cold-resistant PUR cable with clamp

4.4. Testing Equipment

The testing equipment is intended to verify the functioning of a installed grounding control device. By using the rotary switch, the preset thresholds (short-circuit to ground, lower and upper limit of road tankers, limit of railcars) can be checked. For this purpose, the grounding clamp can easily get attached to the metal plate at the front.

Figure 8:: Testing Equipment TQ2

5. International Approval

The EKX-4 LT Grounding Control Device is approved for use in potentially explosive atmospheres according to the customs union standard between Russia, Belarus, Kazakhstan, Armenia and Kyrgyzstan (EACU). The EKX-4 LT is an extension of the EKX-4 approved according to European, Russian and Chinese standards, as well as wherever these standards are valid


ТАМОЖЕННЫЙ СОЮЗ

EAC

Figure 9: Eurasian Economic Union TR-CU 012/2011 (Certificate TC RU C-DE.ГБ08.В.02301)

6. Technical Specifications

6.1. Operating Data

- Type of protection according to EAC Standards TR-CU 012/2011

  Ex 1Ex e q [ib] IIC T4 Gb X

  Ex Ex t [ibD] IIIC T80°C Db

- Degree of enclosure protection

  IP65

- Power Supply
  - Type of protection 'increased safety' Ex e
  - 230 V AC ± 10 %, 50 Hz, about. 75 VA
- Operating temperature range

  -55 °C to +50 °C

- Storage temperature range

  -30 °C to +60 °C

- Dimensions

  305 mm, 440 mm, 185 mm (L, W, H)

- Weight

  12 kg

6.2. Measuring Circuit

For connection of the grounding cable.
The measuring circuit is grounded.

- Type of Protection

  "intrinsic safety" Ex ib / ibD

- Maximum cable length

  50 m (EX Ex related specification, please observe functional limitations)

- Maximum values

  U_o = 6,7 V, I_o = 68 mA, P_o = 114 mW

6.3. Control Outputs

Contact Outputs

- Type of protection "Increased safety" Ex e
- Maximum values: 250 V AC, 3 A, 100 VA
  - ► **2 Release Contacts** (K1, K2)

    2 potential-free closing contacts, intern monitored

  - ► **1 Auxiliary Contact** (K3)

    Potential-free change-over contact, not monitored

Electronic Output (T1)

- Type of protection "Intrinsic safety" Ex ib
- NAMUR-compatible transistor output signaling 'Filling Release'
- Maximum values:

  U_i = 20 V, I_i = 20 mA, P_i = 400 mW

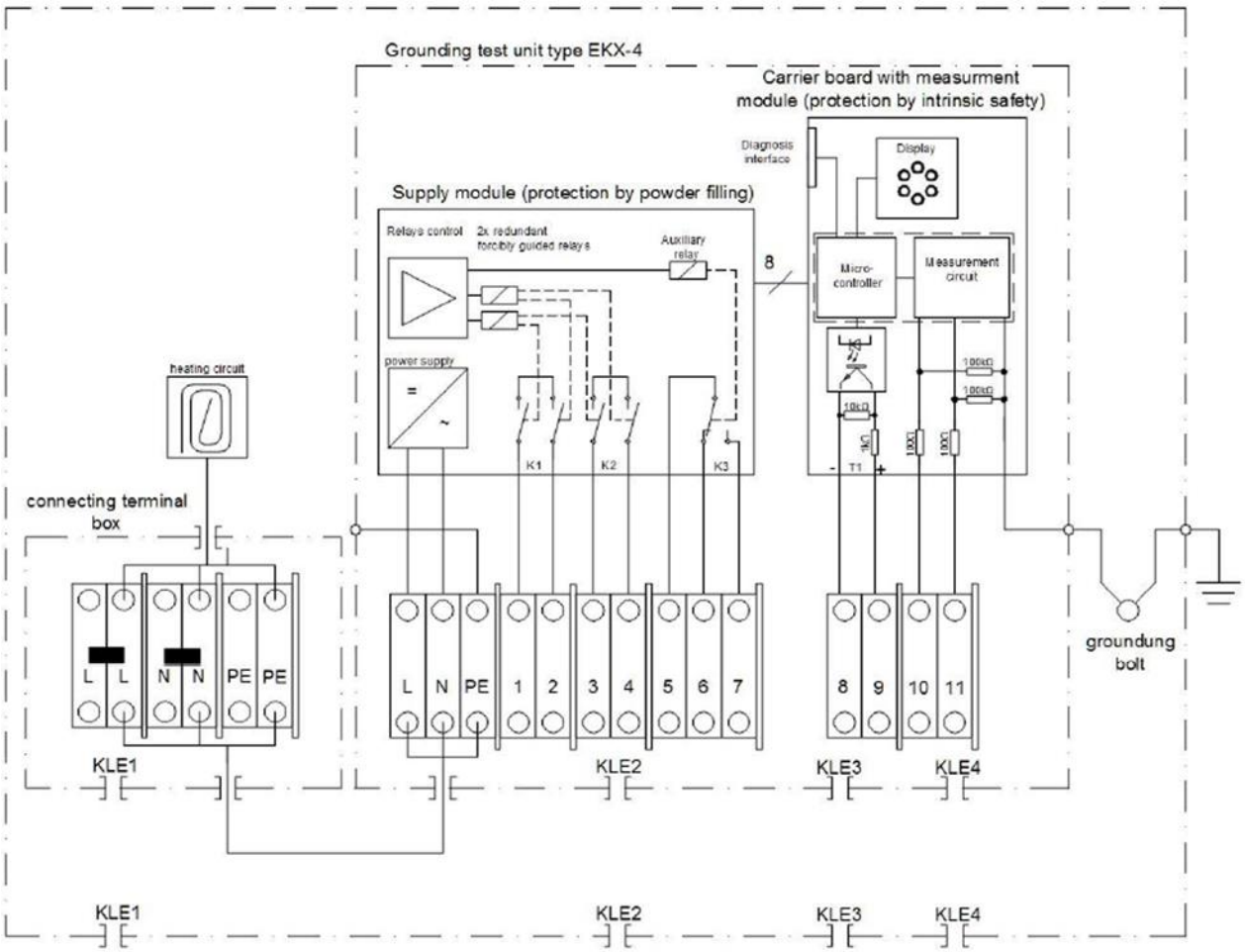
  C_i and Li negligibly small

- Internal resistances:

  1 kOhm and 11 kOhm

- Modulation: 10 Hz, duty factor 1:1

7. Connection Diagram



L, N, PE:	Power supply 230V (±10%) 50Hz, ca. 80VA
1 - 2:	Potential-free relays-contacts 1: N/O (internally monitored output)
3 - 4:	Potential-free relays-contacts 2: N/O (internally monitored output)
5 - 7:	Potential-free relays-contacts 3 (auxiliary relay) Contact rating (terminal 1-7): max. 250VAC, 3A, 100VA
8 - 9:	Potential-free Ex-i transistor output, NAMUR-compatibel Maximum values: Ui=20V, Ii=20mA, Pi=400mW
10:	Grounding cable connection terminal No.10
11:	Grounding cable compensation terminal No.11 Use only cables with a wire diameter of 0.5 - 2.5 mm² (AWG 20 to 12)

Cable and cabel glands:

KLE1	(M20) Power supply cable diameter 7-13mm
KLE2	(M20) Contact outputs cable diameter 7-13mm
KLE3	(M16) NAMUR transistor output cable diameter 4.5-10mm
KLE4	(M20) Grounding cable diameter 7-13mm

8. Contact us

If you would like to contact us regarding **offers and sales or technical support**, our employees will be glad to be available for you on the following contact information.

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