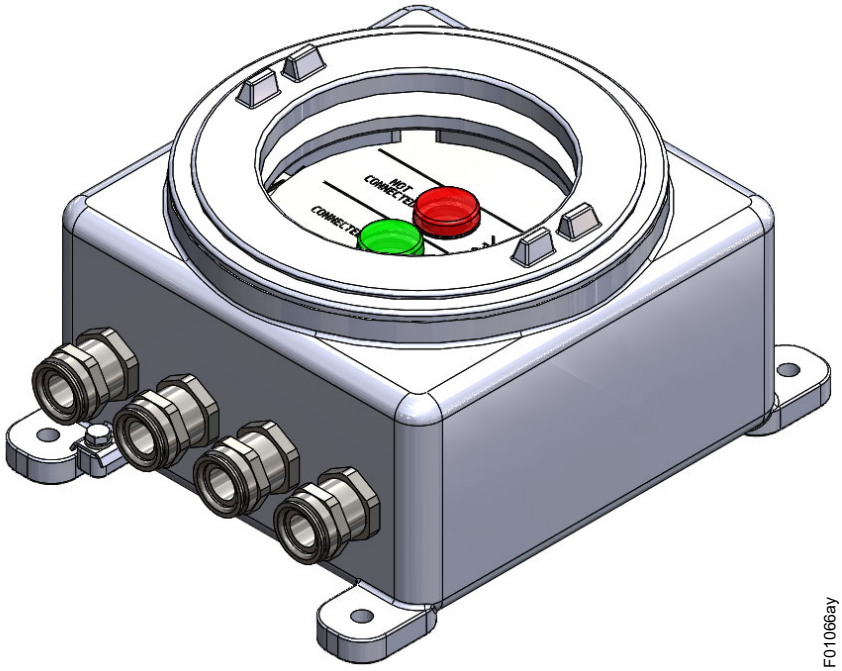
Operating Instructions



TERRACAP
Ground monitoring system TCB040-V2

BA-en-4009-2508

electrostatic innovations

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Dear customer,

When combustible products are loaded/off-loaded from a tanker truck there is a risk of an explosion occurring due to ignition caused by a static discharge from the truck itself. To prevent this occurring the truck must be connected to ground and fully discharged before loading can proceed. To ensure that loading cannot take place without the truck being grounded, a monitoring system is required to ensure that a good connection has been made to the truck by means of a clamp, the ground monitor will then allow the conveying process to be started by means of a relay.

For a ground monitoring system to be effective it must be able to distinguish between a connection to a truck and any other metallic body such as ductwork, girders, cable trays etc. In order to make the distinction, the ground monitoring system TERRACAP TCB040-V2 measures the capacitance of the metal body connected to the clamp, it checks whether the capacitance is correct for a truck, and finally provides both visual indication and the closing of a relay contact when the capacitance is correct.

The Eltex types 70CG and 70CK clamps have been designed especially for use in electrostatic grounding. They are designed for a continuous and effective connection between the control unit and the object to be grounded / monitored.

As long as the clamp is not connected to a conducting body the connection between the clamp jaws remains open. Once the clamp is connected to a metallic object the control unit then performs the static discharge and capacitance verification process.

Please read the operating instructions carefully before starting the units. This will help you prevent personal injuries and damage to property.

Please give us a call if you have any suggestions, proposals or ideas for improvements. We greatly appreciate the feedback from the users of our appliances.

1. Overview Ground monitoring system TCB040-V2

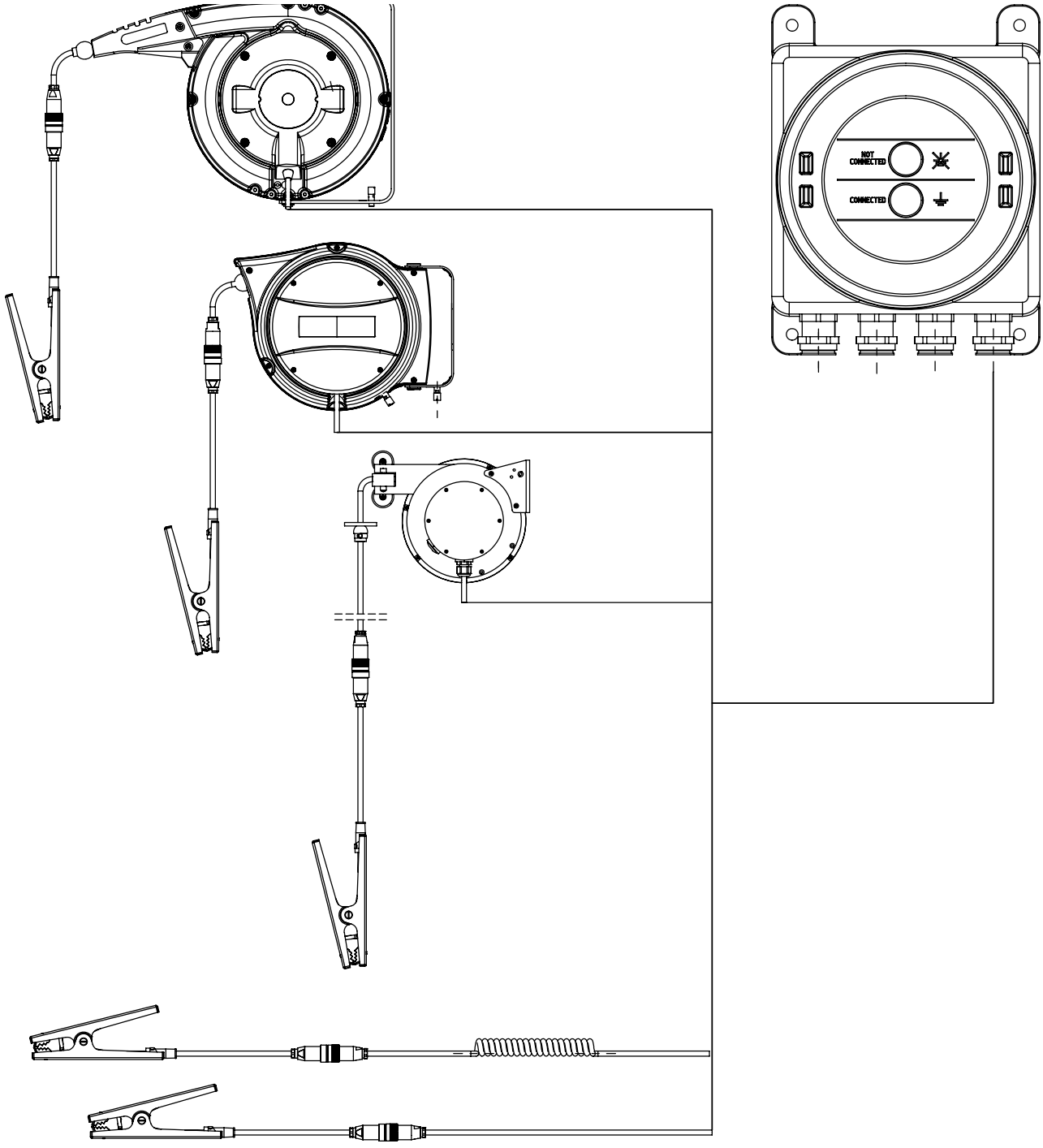

Fig. 1:
Overview
Ground monitoring system TCB040-V2 with cable rewinder and clamps

1.1 Components

TCB040-V2
for installation in explosion hazard areas,
operating voltage 24 V DC or 100 - 240 V AC, depending on design,
for connecting one ground contact maker)

Key switch TCS (optional)
Bypass function of the capacitive to resistive mode for operation in extreme wet conditions (capacity check)

Function control unit TERRA-TU (optional)
Unit to verify the correct functioning of the ground monitoring system TCB040-V2
see Operating instructions BA-en-4019

Cable rewinders 601KR/AW, 601KR/DW, 601KR/KW (optional)
see Operating instructions BA-en-4007

Ground clamps 70CG, 70CK

Clamp holder no. 113112 (optional)

2. Safety

The units have been designed, built and tested using state-of-the-art engineering and particularly the directives and standards of explosive atmospheres [2014/34/EU]; low voltage [2014/35/EU] und EMC [2014/30/EU] and have left the factory in a technically and operationally safe condition. If used improperly, the units may nevertheless be hazardous to personnel and may cause injury or damage.

Read the operating instructions carefully and observe the safety instructions.

However, if used improperly, if used by unqualified personnel or if it is used for other purposes, the device can be a source of danger.

Every safety-relevant malfunction must be remedied immediately.

In addition to the operating instructions, the generally applicable legal and other (local) provisions and regulations for accident prevention must be observed and made known to the personnel. The operating instructions must be supplemented by instructions taking into account the peculiarities prevailing at the place of operation (e.g. work organization, work procedures, staff employed).

Please note the safety and hazard signs on the device. All warning signs must remain legible at all times.

The manufacturers will not assume any liability and warranty if the units are used improperly or used outside the intended purpose.

Modifications or changes made to the devices are not permitted.

Use only original Eltex spare parts and accessories.

For warranty conditions, please refer to the General Terms and Conditions (GTC), see www.eltex.de.

2.1 Identification of risks and hazards

Possible risks and hazards resulting from the use of the units are referred to in these operating instructions by the following symbols:

Warning!
This symbol appearing in the operating instructions refers to operations which, if carried out improperly, may result in serious personal injuries.

Caution!
This symbol appearing in the operating instructions refers to operations which, if carried out improperly, may result in damage to property.

Ex Warning!
Only for units with Ex approval.
This symbol denotes the special conditions which must be observed when operating the units in explosion hazard areas as specified in the approvals.

2.2 Technical advance

The manufacturer reserves the right to make changes to the technical specifications without prior notice in order to adapt the units to state-of-the-art engineering. Eltex will provide the latest information on any changes or modifications in the operating instructions on request.

2.3 Proper use

Electrostatic charges can arise when loading and unloading flammable liquids or powders. If the generated energy is large enough, a discharge spark can cause an explosion. This risk is avoided by grounding of all conductive parts, including trucks.

The TERRACAP TCB040-V2 ground monitoring system detects a low-resistance connection across the jaws of the clamp. If a connection is detected, the unit safely discharges any electrostatic charges via a resistor to prevent sparking. The control unit then checks the capacity recognized at the clamp. If the capacitance for the tank truck is correct, then the green indicator lights up and the interlock relay enables the conveying procces. The unit will then provide a low resistance connection to ground to prevent further build-up of electrostatic charges. The connection via the clamps is then continually monitored during the conveying process. If the connection is interrupted, the unit switches to the RED state "no connection" and the conveying process is stopped via the interlock relay.

The TCB040-V2 ground monitoring system is intended to ground trucks of normal dimensions (permissible total weight 12 tons or more) with the help of ground clamps in a safe and controlled manner so that loading and unloading operations can be carried out safely. These devices can be part of a preventive system of a process installation.

The TCB040-V2 ground monitoring system belongs to device group II category 2GD and can be used in an environment with explosion risk in zones 1 or 2 or in zones 21 or 22.

Function principle

The TCB040-V2 ground monitoring system combines all of the features listed below. It checks the low resistance between the ground clamp jaws. If the device also detects a truck, via a capacity measurement, the release contact is switched and a green lamp lights. The truck is now discharged in a safe and controlled manner. The connection is continuously checked during discharging and charging. As soon as this connection is broken, a red lamp lights up.

If the TCB040-V2 ground monitoring system is connected to the process installation via a release contact, the discharging and charging is automatically interrupted. The cycle is restarted by disconnecting and reconnecting of the ground clamp.

Functions:

- resistance measurement of the ground clamp
- safe discharge of electrostatic charges
- check of the electrical capacity of the truck
- bypass function of the capacitive to resistive mode for operation in extreme wet conditions (capacity check)
- potential-free contact release for charging and discharging functions
- signal lamps (red and green) for the local status indication
- power supply 100-240 V AC or 24 V DC standard
- certifes for use in ATEX environments

The manufacturers will not assume any liability and warranty if the units are used improperly or used outside the intended purpose.

Modifications or changes made to the devices are not permitted.

Use only original Eltex spare parts and equipment.

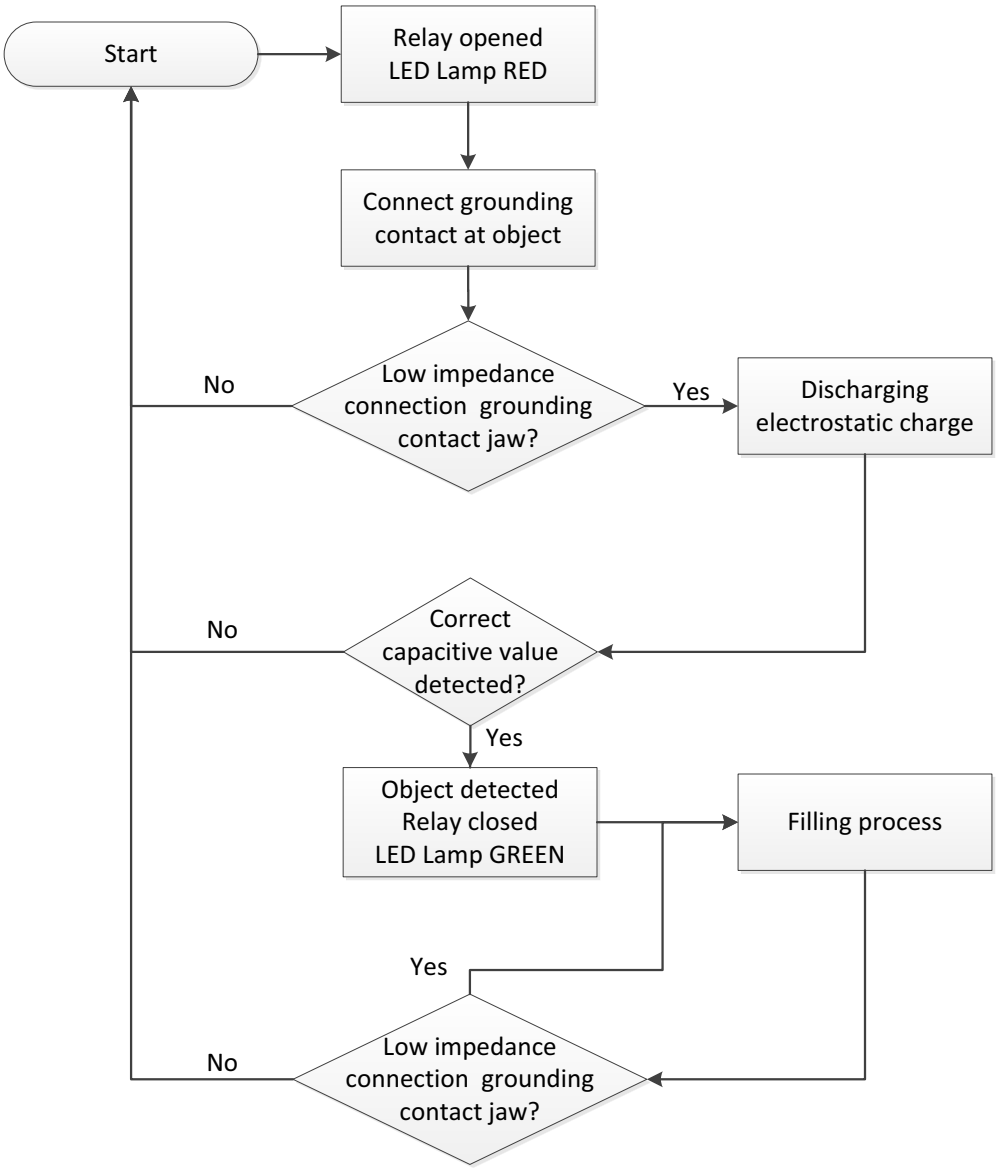

Fig. 2:
Function principle

2.4 Work and operational safety

Warning!
Carefully observe the following notes and the complete chapter 2 "Safety", page 8!

- The local standards, rules and regulations relating to the installation and operation of electrical appliances in potentially explosive atmospheres must be observed.
- Appliances designed for use in potentially explosive atmospheres must not be modified. The technical specifications for ambient conditions and operation must be maintained and observed (see chapter 7 "Technical specifications", page 36).
- Electrical systems used in explosion hazard areas must at all times be in a technically faultless condition. Any defects must be repaired or remedied immediately (see chapter 4 "Operation", page 29).
- Any work involving the units must be carried out by qualified electricians (see chapter 3 "Assembly and Installation", page 15, chapter 5 "Maintenance", page 32).
- The unit may only be used by qualified personnel trained for explosion hazard areas.
- The ground clamps must not be clamped under tensile in order to avoid an uncontrolled retraction of the cable with ground clamps (see chapter 3 "Assembly and Installation", page 15).
- The cable rewinder must be mounted so that the cable can be withdrawn and rewound freely without risk of damaging the cable (see chapter 3 "Assembly and Installation", page 15).
- Make sure that the unit, the clamps and the connectors are adequately protected against rain and direct sunlight to avoid sudden temperature fluctuations and condensation (see chapter 3.1.2 "Assembly", page 16).
- The device must be connected to the equipotential bonding via the external ground connection (1, Fig. 3). In addition, the ground terminal inside the enclosure must be connected to a protective conductor or to a equipotential bonding conductor (see chapter 3.2 "Electrical installation", page 17).
- The connecting leads inside the connection space must be routed such that intrinsically safe and non-intrinsically safe leads cannot touch each other even if a wire should come loose. Use cable ties, if necessary (see chapter 3.2 "Electrical installation", page 17).
- The safety insulation plates between the terminals must not be removed as they are necessary to ensure intrinsic safety (see chapter 3.2.1 "Grounding of the TCB04-V2 ground monitoring system", page 18).

- The metal parts of the active clamp and the cable rewiners are grounded via the system itself and should not be grounded separately. Grounding them separately will inhibit correct functioning of the system (see chapter 3.2.1 "Grounding of the TCB04-V2 ground monitoring system", page 18).
- Use 3G 1.5 mm² cables (min. 0.75 mm² and max. 2.5 mm²) in accordance with the local installation regulations. If the system is installed in an ATEX zone, approved ATEX-certified cable glands must be used (see chapter 3.3 "Supply voltage", page 24).
- The minus pole of the 24 V DC supply voltage must be grounded in the TCB040-V2 unit (see chapter 3.3.1 "Supply voltage 24 V DC", page 24).
- The de-energised output contact must be used to ensure that the conveying process cannot start until the truck is properly grounded. The conductor is laid inside the unit using an ATEX cable gland (see chapter 3.5 "Switching contacts", page 24).
- The cable rewinder must be mounted so that the cable can be withdrawn and rewound freely without risk of damaging the cable (see chapter 3.6 "Cable rewinder", page 25).
- If the TCB040-V2 ground monitoring system is used together with a cable rewinder, the metal bracket must be grounded (see chapter 3.6 "Cable rewinder", page 25).
- It is important that a truck is grounded prior to connecting the conveying hoses. If the hoses are connected first and they are conductive to ground, then the control unit will remain in the RED state and conveying will be inhibited (see chapter 4 "Operation", page 29).
- Please note the type plate indicating the connection data (supply voltage) of the units (see chapter 4 "Operation", page 29).
- Before connecting the power supply and before applying the voltage, check the steps in chapter 4.1.1 "Check before connecting the power supply", page 29 and in chapter 4.1.2 "Applying the voltage", page 29. Then connect the grounding unit in the order of the steps in chapter 4.1.3 "Connecting the ground unit to the truck", page 30.
- If the system is not used, the clamps must hang freely, be placed in the clamp holder (optional) or be connected to a non-conductive object (see chapter 4.2 "Using a cable rewinder", page 31).
- It is important that the TCB040-V2 ground monitoring system is not left permanently in bypass mode (see chapter 4.3 "Bypass Mode", page 31).
- Ground monitoring system, cables, clamps and cable rewinders must not be damaged. Damaged units must be replaced with new parts (see chapter 5 "Maintenance", page 32, chapter 6 "Troubleshooting", page 34).

- The TCB040-V2 ground monitoring system is safety equipment and must be able to operate at any time. Any fault affecting safety must be rectified immediately (see chapter 5 "Maintenance", page 32, chapter 6 "Troubleshooting", page 34).
- To check the functionality of the TCB040-V2 ground monitoring system, please use the optionally available TERRA-TU function control tester (see chapter 5.2 "Function control", page 32).
- Check visually the ground cables and the ground clamps at regular intervals for wear or corrosion. Make sure that the contacts are always clean (see chapter 5.3 "Checking the ground cable and the ground clamp", page 33).
- The ground clamp must be cleaned depending on the degree of pollution, so that a secure connection to the equipotential bonding is guaranteed and to avoid incorrect switching when the clamps are active (see chapter 5.3 "Checking the ground cable and the ground clamp", page 33).
- Check by measurements whether the cable rewinder and the bracket are grounded (see chapter 5.4 "Cable rewinder", page 33).
- Check the cable rewinder at regular intervals to ensure that the cable and the insulation show no tears or abrasion that could impair the insulation or functionality (see chapter 5.4 "Cable rewinder", page 33).
- Defective devices must be sent in for repair.

2.5 Special conditions according to the declaration of conformity

none

3. Assembly and Installation

- When installing the system in explosion hazard areas, every precaution must be taken to ensure that no explosive atmosphere exists in the working area!
- Any work involving the units must be carried out by qualified electricians trained for explosion hazard areas.
- The ground clamps must not be clamped under tensile in order to avoid an uncontrolled retraction of the cable with ground clamps.

3.1 Ground monitoring system TCB040-V2

3.1.1 View of appliance

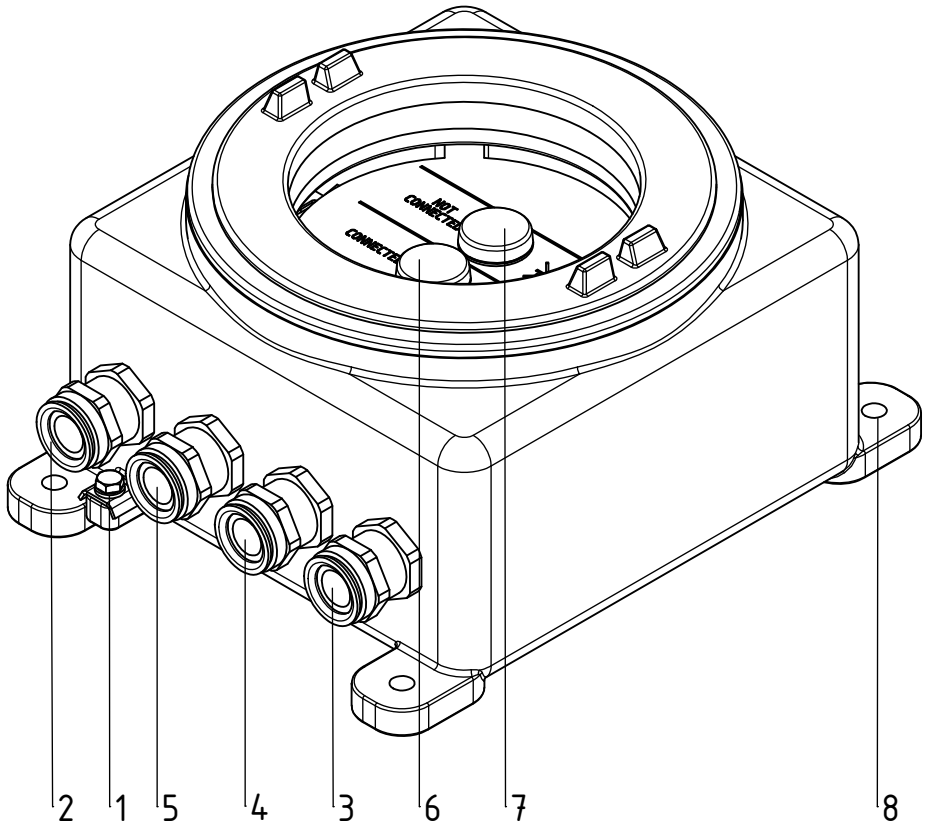

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Fig. 3: Ground monitoring system TCB040-V2

1 Ground terminal
2 Cable inlet, power supply
3 Cable inlet (Ex)
4 Cable inlet (optional key switch)
5 Cable inlet relay
6 Indicator lamp green
7 Indicator lamp red
8 Fixing attachment (4)

3.1.2 Assembly

When installing the system in explosion hazard areas, every precaution must be taken to ensure that no explosive atmosphere exists in the working area!

Mount the TCB040-V2 ground monitoring system on a vertical pillar or on a wall, with the cable glands facing downwards.

Make sure that the unit, the clamps and the connectors are adequately protected against rain and direct sunlight to avoid sudden temperature fluctuations and condensation.

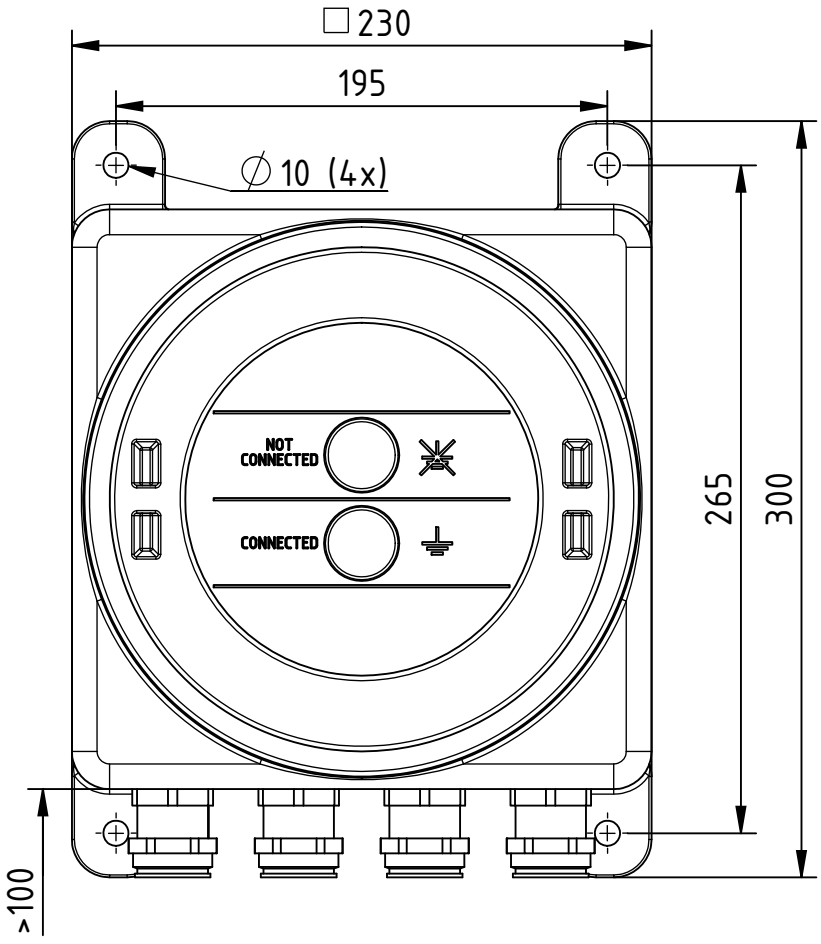

Fig. 4: Mounting dimensions TCB040-V2

3.2 Electrical installation

Before carrying out maintenance or service work in the explosion hazard area, make sure that there is no potentially explosive atmosphere in the working zone.

The device must be connected to the equipotential bonding via the external ground connection (1, Fig. 3). In addition, the ground terminal inside the enclosure must be connected to a protective conductor or to a equipotential bonding conductor.

After opening the enclosure cover, the connection area is accessible. On the right are the terminals for the ground contactors. These circuits are intrinsically safe. On the left side are the non-intrinsically safe connection terminals for the supply voltage and the signal contacts (see Fig. 6 / Fig. 7). The connecting leads inside the connection space must be routed such that intrinsically safe and non-intrinsically safe leads cannot touch each other even if a wire should come loose. Use cable ties, if necessary.

The cable glands are designed for cables with circular cross-section and outer diameter of 7 ... 12 mm .

- To connect the cable, first loosen the union nut of the screw connection and, if necessary, remove the blind plug.
- Insert cable and connect according to Fig. 6 / Fig. 7.
- The union nut must be tightened to a torque of approx. 12 Nm (applies to Eltex grounding cable with a cable outer diameter of 8.6 mm). The seal must not be damaged.
- When using other cables or other cable diameters, the tightening torques must be determined by the user. The cable gland and the cap nut must be tightened firmly.
- Tightening the connection thread or the union nut too loosely or too tightly can impair the type of protection, the tightness and the strain relief.

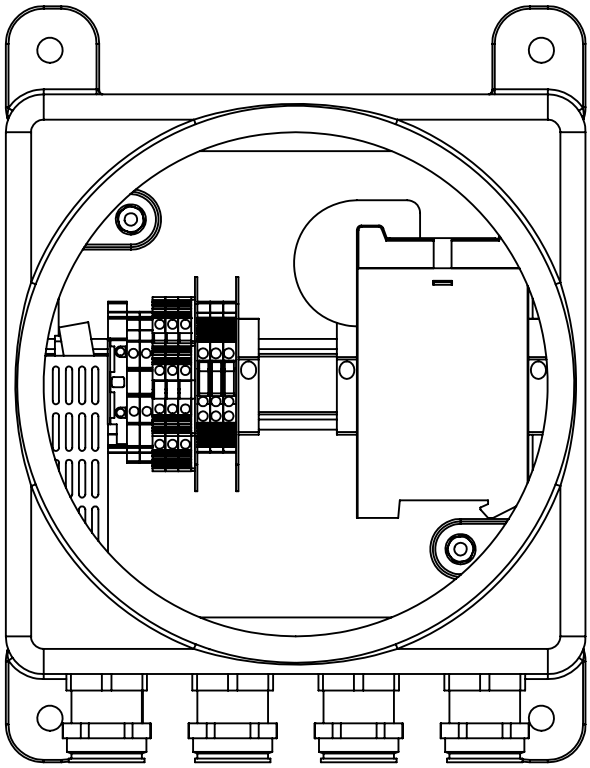

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Fig. 5:
Inside view
TCB040-V2

3.2.1 Grounding of the TCB04-V2 ground monitoring system

The metal enclosure of the unit has an internal ground terminal which is used to connect the ground wire of the mains cable.

The enclosure also has an external ground point. Connect this ground point with an external ground terminal with a minimum of 6 mm² and a maximum of 16 mm² to the local equipotential bonding network. If a network of this type is not available, then provide a local ground point with an ground resistance, preferably less than 10 ohms.

The safety insulation plates between the terminals must not be removed as they are necessary to ensure intrinsic safety.

The metal parts of the active clamp and the cable rewiners are grounded via the system itself and **should not be grounded separately**. Grounding them separately will inhibit correct functioning of the system.

3.2.2 Electrical connection

Connection example TCB040-V2
at 100 - 240 V AC supply voltage

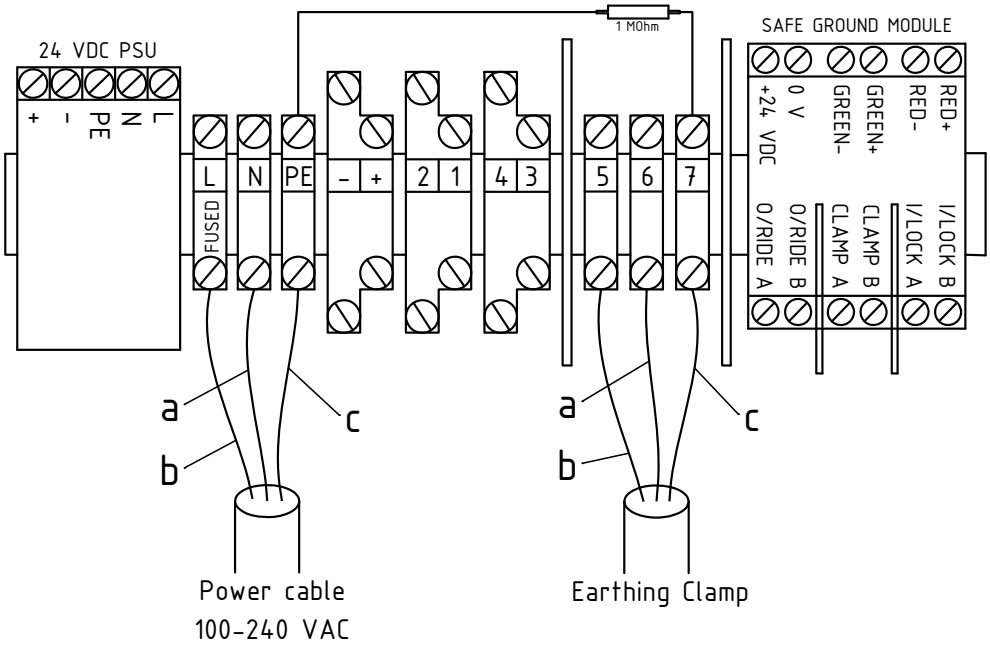

Fig. 6: Connection example at 100 - 240 V AC supply voltage

core colors: a: blue b: brown c: green/yellow

Terminals	Connection
L, N, PE	L, N, PE of mains supply 100 / 240 V AC 47 / 63 Hz, max. 1 A
1, 2	closed release contact relay 30 V DC, 240 V AC, max. 1 A
3, 4	optional key switch (bypass)
5, 6, 7	ground contact maker

Connection example TCB040-V2
at 24 V DC supply voltage

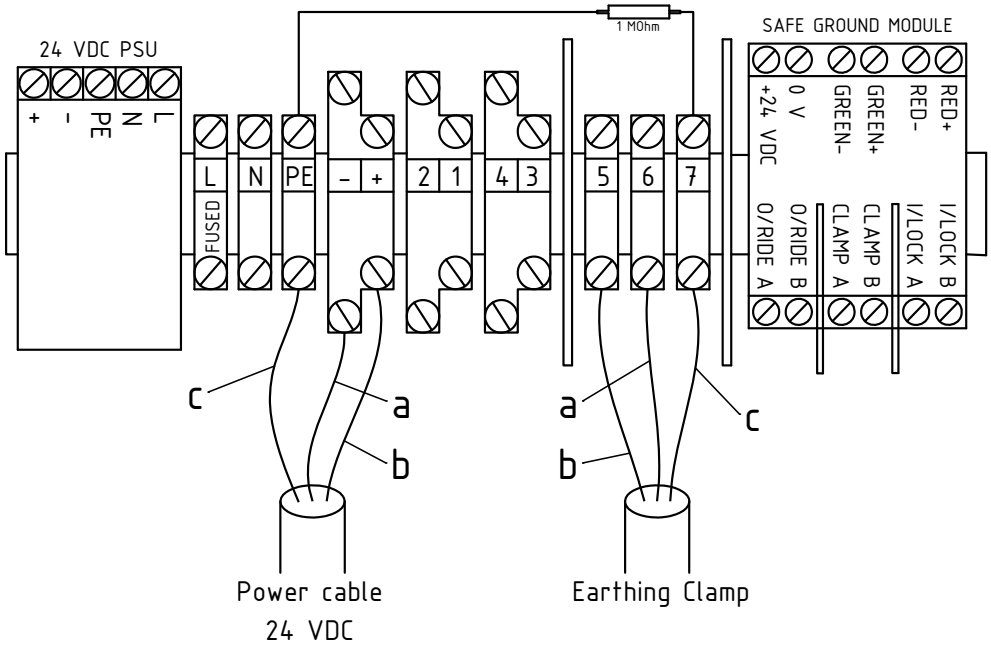

Fig. 7: Connection example at 24 V DC supply voltage

core colors: a: blue b: brown c: green/yellow

Terminals	Connection
+, -	alternative 24 V DC supply (observe the notes in chap. 3.3.1)
1, 2	closed release contact relay 30 V DC, 240 V AC, max. 1 A
3, 4	optional key switch (bypass)
5, 6, 7	ground contact maker

Installation and wiring diagram

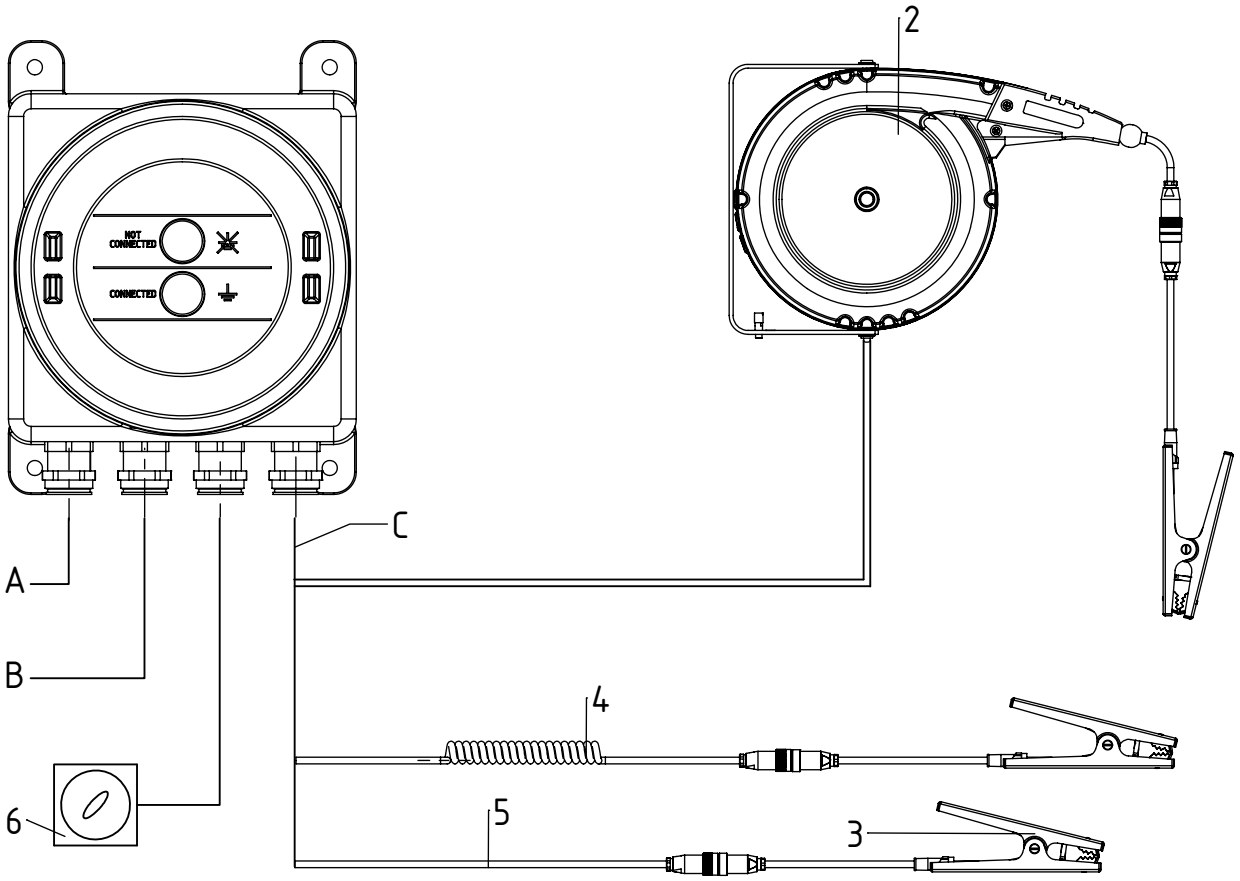

Fig. 8:
Overview
TCB040-V2 ground monitoring system with cable rewinder and clamps

1 TERRACAP TCB040-V2
2 Cabel rewinder aluminium 601KR/AW with ground clamp
3 Ground clamp 70CG resp. 70CK
4 Helix ground cable KG/BSA
5 Ground cable KG/BNA
6 Key switch TCS (optional)
A Mains cable
B Release contact
C intrinsically-safe circuit: identification blue

The maximum cable length between clampf and TCB040-V2 is 25.5 m.

3.2.3 Connection to the cable rewinder

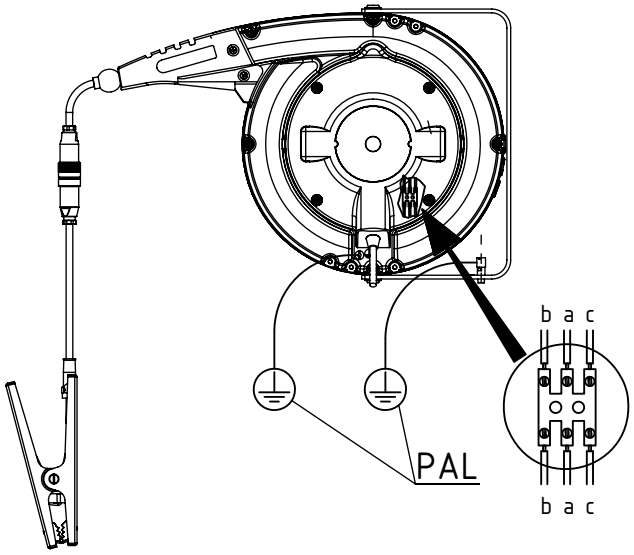

Fig. 9: Connection cable rewinder 601KR/AW

a = blue
b = brown
c = green/yellow
resp. yellow

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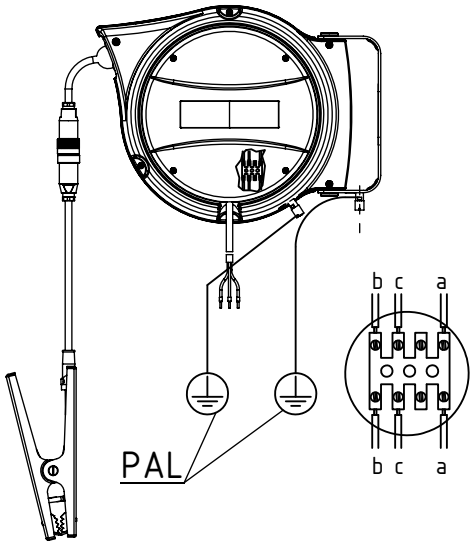

Fig. 10: Connection cable rewinder 601KR/DW

a = blue
b = brown
c = green/yellow
resp. yellow

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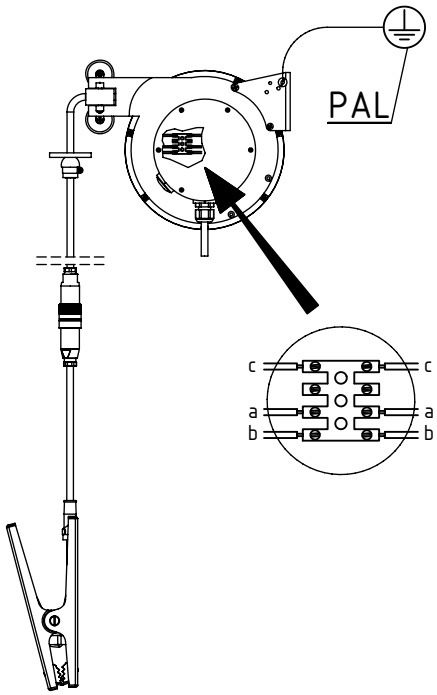

a = blue
b = brown
c = green/yellow
resp. yellow

Fig. 11: Connection cable rewinder 601KR/KW

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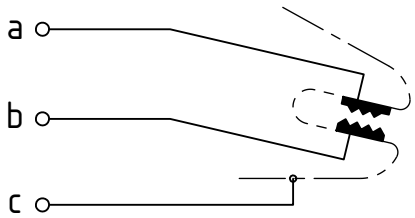
3.2.4 Circuit diagramms of the ground contact makers



a = blue
b = brown
c = green/yellow
resp. yellow

Fig. 12: Circuit diagram ground clamp 70CG and 70CK

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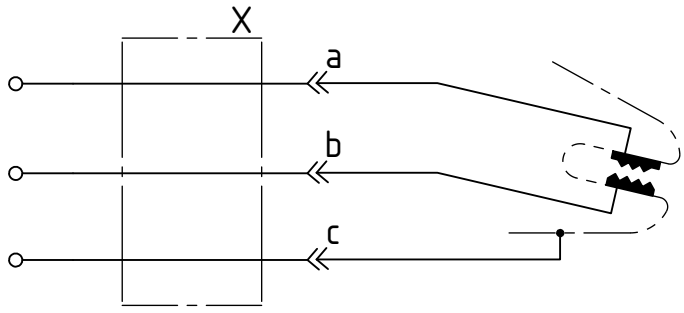


X stands for:
601KR/AW
601KR/DW
601KR/KW
KG/BNA_
KG/BSA050
KG/BSA100

Fig. 13: Circuit diagram ground clamp 70CG and 70CK with ground cable resp. cable rewinder

Z-117396ay_4

3.3 Supply voltage

Use 3G 1.5 mm² cables (min. 0.75 mm² and max. 2.5 mm²) in accordance with the local installation regulations. If the system is installed in an ATEX zone, approved ATEX-certified cable glands must be used.

3.3.1 Supply voltage 24 V DC

If you use an external supply voltage with 24 V DC, it must meet the following conditions.

Attention!
The minus pole of the 24 V DC supply voltage must be grounded in the TCB040-V2 unit.

- 24 V DC ±20 %
- 7.2 W
- executed in SELV (Safety Extra Low Voltage)
  ATEX-compliant supply voltage
- fuse with a 1 A melting fuse
  with interrupting capacity (Ik) of 1.5 kA
- Cable insulation must have a thickness of at least 0.5 mm.

3.4 Pin assignment of the coupling connector

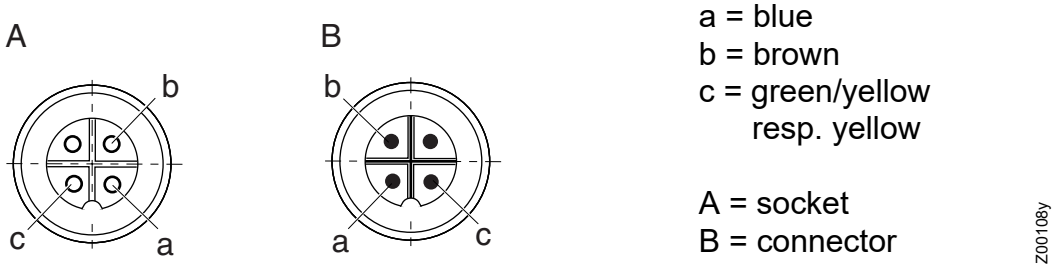


Fig. 14: Pin assignment of the coupling connector

By default, the plugs are already installed on delivery.

3.5 Switching contacts

- The de-energized output contact must be used to ensure that the conveying process cannot start until the truck is properly grounded
- Use a double-core cable, oil-resistant, with a cross-section of up to 2.5 mm².
- The conductor is laid inside the device using an ATEX cable gland.

3.6 Cable rewinder

3.6.1 Assembly of the cable rewinder

- Verify that the IP rating of the cable rewinder is suitable for the location.
- Check the hazardous area classification of the location where the cable rewinder will be installed and verify that it is compatible.
- The cable rewinders are supplied with a wall bracket that allows the reel to rotate in the direction that the cable is pulled. Install the cable rewinder in a position that allows the cable to be withdrawn in the desired direction.
- Mount the cable rewinder on the wall with suitable screws.
- Route the supply cable of the cable rewinder through an ATEX cable gland inside the unit.

The cable rewinder must be mounted so that the cable can be withdrawn and rewound freely without risk of damaging the cable!

3.6.2 Grounding of the cable rewinder

If the TCB040-V2 ground monitoring system is used together with a cable rewinder, the metal bracket must be grounded. The bracket has a ring nut with which the ground wire must be connected. Connect the ground point to the ground wire with a minimum of 6 mm².

3.6.3 Stop mechanism, aluminum cable rewinder

3.6.3.1 Type 601KR/AW

Enabling the stop mechanism:

- Remove the four bolts (1) and take off the side cover (see Fig. 15).
- Take the spring (4) off bolt (5) and hook into bolt (6).
- Remove the screw (2) to make sure that the locking mechanism (3) is free.
- Replace the side cover.

Disabling the stop mechanism:

- Remove the four bolts (1) and take off the side cover (see Fig. 15).
- Take the spring (4) off bolt (6) and hook into bolt (5).
- Turn the locking mechanism (3) by 120° in clockwise direction and turn in the screw (2) fully to make sure that the locking mechanism is disabled.
- Replace the side cover.

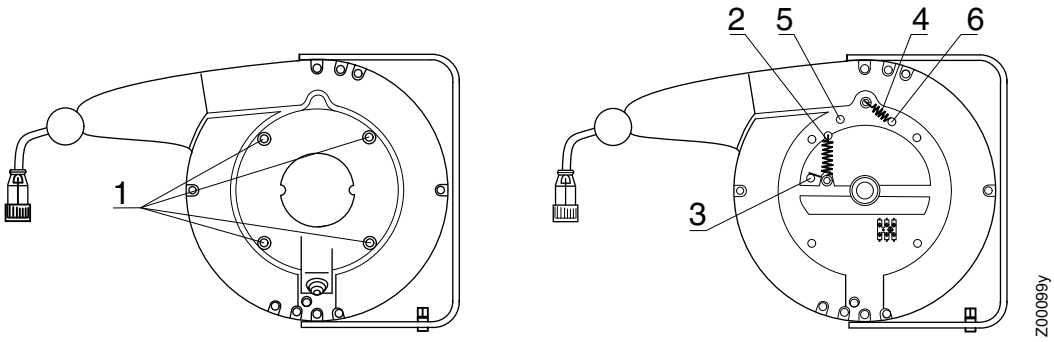
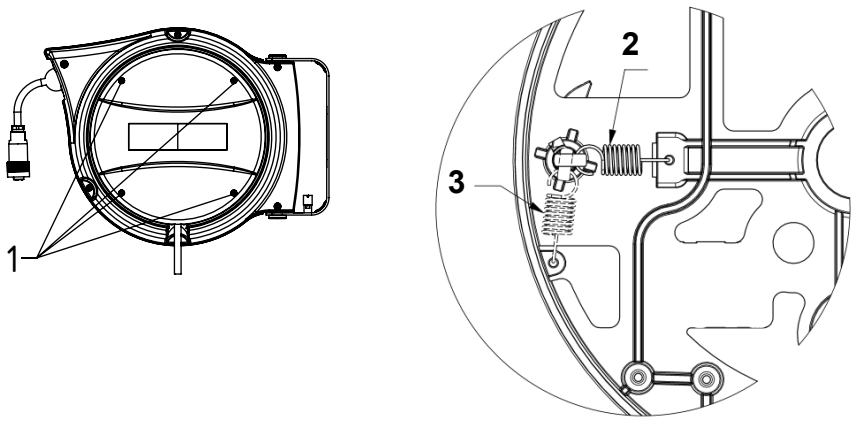


Fig. 15: Locking mechanism of the aluminum cable rewinder for type 601KR/AW

3.6.3.2 Type 601KR/DW

Enabling / Disabling the stop mechanism

- Remove the four bolts (1) and take off the side cover (see Fig. 16).
- Take the spring and hook into according position 2 resp. 3.
- Replace the side cover.



2 = enabled stop mechanism
3 = disabled stop mechanism

Fig. 16: Locking mechanism of the aluminum cable rewinder for type 601KR/DW

Z-114868y_10+Z2017y

3.7 Key switch TCS (optional)

The bypass function for bypassing the capacitive to resistive operating mode can be activated either from the customer's PLC or via a separately available key switch (optional).

Fig. 17:
Key switch TCS

Z00621y

- Install the key switch on the wall using suitable screws.
- Use a 2 x 0.75 mm² flexible wire, enhanced oil-resistant.
- The wire is routed inside the unit using an ATEX cable gland.
- Always refer to the connection diagrams, Fig. 6 / Fig. 7.

3.8 Clamp holder

Attach the clamp station to a vertical wall with suitable screws. The clamp station should be installed close to the unit, such that the clamp can be easily hung in the station when the cable rewinder is fully reeled in.

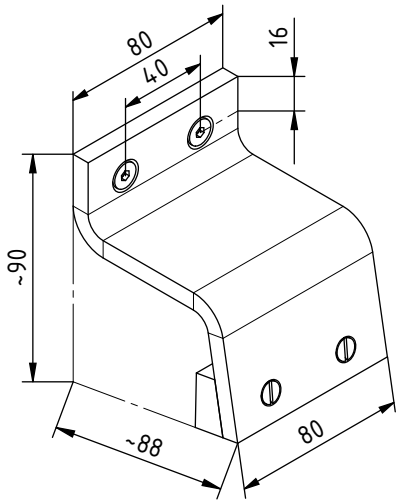


Fig. 18:
Clamp holder
article-no. 113112

Z-113113_2y

4. Operation

- Electrical systems used in explosion hazard areas must at all times be in a technically faultless condition. Any defects must be repaired or remedied immediately.
- It is important that a truck is grounded prior to connecting the conveying hoses. If the hoses are connected first and they are conductive to ground, then the control unit will remain in the RED state and conveying will be inhibited.

Attention!
Please note the type plate indicating the connection data (supply voltage) of the units.

4.1 Start-up

4.1.1 Check before connecting the power supply

- Check that all parts are connected according to the wiring instructions.
- Check the external ground connection via the ground cable and if a cable rewinder is used, check whether the metal bracket of the cable rewinder is grounded.
- Check the continuity of the wiring between the ground clamp and the TCB040-V2 ground monitoring system; check that there is no short circuit between these three wires.
- Check that the resistance between the metal part of the ground clamp and ground is 1 MΩ.
- Check whether the release contact of the TCB040-V2 ground monitoring system is connected to the process control system.
- If no key switch is used, check whether the Ex d blind plug is inserted in the M20x1.5 hole.

4.1.2 Applying the voltage

After carrying out the control steps in chap. 4.1.1 the voltage can be applied and the connection with the truck can be established.

Then carry out the following checks:

- Check that the red lamp lights up.
- Control of the loading / unloading process: it should not be possible to start this process (only if fitted with a release contact).
- Switch off the truck engine!
- **Connection of the ground clamp to the truck**: Do not connect any hoses to the truck, side supports must not be used, make sure that the truck is not connected to e.g. a bump holder, a wall, or any other metal object.

- Connect the ground clamp to the ground point of the truck and check that the green lamp lights up.
- Check that the loading / unloading process starts (only if fitted with a release contact).
- Check that the loading / unloading process stops, when the ground clamp is disconnected from the truck (only if fitted with a release contact).
- If fitted, test the key switch by turning it on. Attach the ground clamp to a metal object (not the truck) and check that the green lamp lights up. Then turn the key switch off and put the ground clamp back in the storage location.

The TCB040-V2 ground monitoring system is now ready for use. No further calibration or setup is required.

4.1.3 Connecting the ground unit to the truck

After completing the steps in chap. 4.1.1and chap. 4.1.2 the TCB040-V2 ground system only works correctly if the following steps are taken in the sequence indicated below:

- Park the truck so that it does not come into contact with any object, especially no metal objects (for example, a metal bracket).
- Switch off the truck engine!
- First connect the ground clamp of the TCB040-V2 unit to the intended ground point of the truck. It is important to use only the intended ground point of the truck and, for example, not to connect the ground clamp to the wheel bolts.
- Check that the green lamp on the TCB040-V2 grounding unit lights up.
- Only now connect the loading / unloading hoses; if required, only now fold out the supports.
- Loading or unloading can now safely proceed.

4.1.4 Disconnecting the ground unit

- First disconnect the loading / unloading hoses and fold in the supports.
- Disconnect the ground unit.

4.2 Using a cable rewinder

If a cable rewinder is used, the cable should be pulled out of the reel gently to the required length. The latching mechanism will engage when a clicking sound is heard from the rewinder, this occurs repeatedly as the cable is withdrawn. The cable will then remain withdrawn without any tension. The clamp should then be connected to the grounding point on the truck. The discharge and capacitance checking process will then take place which takes approximately two seconds. If the required criteria are met the control unit will then go into the CONNECTED state and the GREEN indicator will be lit, the interlock relay will change state and allow conveying to proceed. If the GREEN indicator does not light the connection should be remade.

If the ground clamp becomes disconnected during conveying then the control unit will go into the RED NOT-CONNECTED state, the interlock relay will change state and conveying will stop.

To wind the cable back into the cable rewinder it should be pulled out further until the clicking of the latching mechanism ceases. The spring will then pull the cable back into the rewinder. The cable should be manually fed back into the rewinder, damage is likely to occur to the cable rewinder and/or clamp if the cable is allowed to recoil by itself.

When the system is not being used the clamp should hang freely, be put in a clamp station (optional) or be connected to a non-conductive object.

4.3 Bypass Mode

Under extreme weather conditions when the tyres of the truck are very wet, the unit may not be able to measure any capacitance at the clamp and therefore will not give the GREEN-CONNECTED state. A bypass facility is included on the unit to allow it to operate under these conditions. On the TERRACAP TCB040-V2 the bypass facility is enabled by means of a key switch on the front of the unit; on the TCB040-V2 terminals are provided for connection of a remotely located switch (either the optional key switch enclosure or remote via the interlock).

Attention!
It is important that the unit is not left permanently in bypass mode.

5. Maintenance

- Before carrying out maintenance or service work in the explosion hazard area, make sure that there is no potentially explosive atmosphere in the working zone.
- Any work involving the units must be carried out by qualified electricians.
- Ground monitoring system, cables, clamps and cable rewinders must not be damaged. Damaged units must be replaced with new parts.
- The TCB040-V2 ground monitoring system is safety equipment and must be able to operate at any time. Any fault affecting safety must be rectified immediately.

5.1 Checking the TCB040-V2 ground monitoring system

- The conditon of the enclosure must be checked visually.
- Visually check the condition of the soft seal of the enclosure and the cable glands for possible damage or dust deposits.
- The correct ground connection to the unit must be checked via measurement.
- Check the fuse if you use the device in the ATEX zone and with a voltage supply of 24 V DC.
  In case of a blown fuse, the cause of the fault must be traced and corrected before replacement. If it is caused by a fault within the control unit it may only be repaired by Eltex. If fuses have to be replaced only original parts from Eltex should be used.

5.2 Function control

Use the function control unit TERRA-TU (optional available) to check the functions of the TCB040-V2 ground monitoring system.

5.3 Checking the ground cable and the ground clamp

- Check visually the ground cables and the ground clamps at regular intervals for wear or corrosion.
- If necessary, the ground clamp can be lubricated with transparent greas.
- Make sure that the contacts are always clean. Clean contaminated contacts with a non-aggressive grease solvent.
- The ground clamp must be cleaned depending on the degree of pollution, so that a secure connection to the equipotential bonding is guaranteed and to avoid incorrect switching operations.
- Store the ground clamp such that it cannot be damaged. Replace damaged cables and clamps with new parts. Whenever possible, the ground clamp should either be hung up freely or be clamped to a non-conductive object.

5.4 Cable rewinder

- Check by measurements whether the cable rewinder and the bracket are grounded.
- Check the cable rewinder at regular intervals to ensure that the cable and the insulation show no tears or abrasion that could impair the insulation or functionality. Clean the cable with a cloth soaked in warm water to remove dirt or incrustations and ensure perfect unwinding.
- Defective devices must be sent in for repair.

6. Troubleshooting

- Before carrying out maintenance or service work in the explosion hazard area, make sure that there is no potentially explosive atmosphere in the working zone.
- Any work involving the units must be carried out by qualified electricians.
- Ground monitoring system, cables, clamps and cable rewinders must not be damaged. Damaged units must be replaced with new parts.
- The TCB040-V2 ground monitoring system is safety equipment and must be able to operate at any time. Any fault affecting safety must be rectified immediately.

6.1 Ground clamps, cable rewinder, cables

Symptom	Remedy
Cable rewinder grounded?	Ground connection with a 6 mm² cable
Cable worn?	Replace the cable, if wear is visible.
Condition of the ground clamp?	Replace the ground clamp, if damage or corrosion ist visible.
Condition of the connectors between the clamp and the cable rewinder?	Inspect the inside for condensation and damage.

6.2 Correct sequence used for connecting the ground clamps?

- Park the truck so that it does not come into contact with any (metal) object.
- Truck engine is switched off?
- First connect the ground clamp of the TCB040-V2 unit to the intended ground point of the truck (not to the wheel bolts).
- Wait until the green lamp lights up.
- Only if the green lamp lights up, connect the loading / unloading hose, if required fold out the supports.
- Load / unload the product.

6.3 Truck

Symptom	Remedy
Ground point present and known?	The ground point ist marked by the grounding symbol.
Grounding clamp connected to the intended truck ground point?	Connect the ground clamp with the ground point (not with the wheel bolts).
Condition of the ground point on the truck?	Remove corrosion, paint, oil, dirt etc.

6.4 Lights / Non-lights of the lamps

Symptom	Remedy
Both the red and the green lamp do not light up.	• Check the power supply. • Check the lamps. • Check the fuses.
Green lamp does not illuminate, red lamp stays illuminated.	• Clean if the jaws of the ground clamps are clean. • Has the clamp been connected to a part of the truck insulated from the chassis? • Check if the ground cable is not broken / damaged? • Is the concerned object indeed a truck? • Is the truck standing freely on its tyres without any external connection to the ground? If this is not the case, disconnect e.g. the hoses and restart the procedure. • Is the system connected to a trailer on metal supports? Insulate the supports and restart the procedure. • Can the tank truck be considered an “average” tank truck, or is it considerably bigger or smaller? • Has the external ground connection to the control unit been connected correctly?

7. Technical specifications

7.1 TCB040-V2

Material	Aluminum enclosure (copper-free)
Finish	Painted RAL 7035
Power supply	100 - 240 V AC +10 % / -15 %, 50/60 Hz or 24 V DC, see also the installation specifications
Consumption	20 W
Operating ambi-ent temperatures	-30 °C ... +54 °C (-22 °F ... +129 °F)
Storage temperature	-30 °C ... +60 °C (-22 °F ... +140 °F)
Humidity	95 % at 20 °C, non-dewing
Connections	4 inputs M20
Cable glands	Ex d IIC
External ground bolts	M6 length 10 mm
Status signales	red (ungrounded truck or error) green (correctly grounded)
Remote notification	1 potential-free NO contact 1 A, 240 V AC / 30 V DC
Bypass	optional via key switch
Protection calss	IP66
Weight	10 kg
Dimensions	265 x 230 x 150 mm (H x W x D)
Approval Marking	ATEX: ITS-I 20 ATEX 25551 Ⓔx II 2(1) GD Ex db [ia Ga] IIC T6 Gb, Ex tb [ia Da] IIIC T85°C Db IECEx: ITS 20.0001 Ex db [ia Ga] IIC T6 Gb, Ex tb [ia Da] IIIC T85°C Db
SIL class	SIL 2

as shown on appliance marking:

7.2 Key switch TCS

Material	Fibreglas-reinforced polyester
Cable gland	1 cable gland M25, cable outside diameter 7-17 mm
Contacts	1 NO, 1 NG
Dimensions	80 x 93 x 72 mm (H x W x D)
Weight	0.450 kg
Approval Marking	CML 14ATEX3073X Ⓔx II 2G Ex db eb IIC T6 Gb, II 2D Ex tb IIIC T80°C Db IP66 Ex zones 1 and 2 (gas), 21 and 22 (dust)

7.3 Ground clamps

Types 70CG	
Clamp material	stainless steel
Operating ambient temperature	–40...+70 °C (–40...+158 °F)
Ground cable	oil and gasoline resistant control lead, 3 x 1.5 mm^2 color: light blue temperature range –40...+90 °C (–40...+194 °F) connected 4-pin plug IP67
Dimensions	see Fig. 20
Weight	approx. 0.6 kg
Approval Marking	ATEX: DMT 00 ATEX E 068 X ⟨Ex⟩ II 2D Ex ia IIIC T135°C Da, II 2G Ex ia IIC T6 Ga IECEx: BVS 16.0016X Ex ia IIIC T135°C Db, Ex ia IIC T6 Gb

as shown on appliance marking:

IEC IECEx

Ex

CE

Types 70CK	
Clamp material	stainless steel
Operating ambient temperature	–40...+70 °C (–40...+158 °F)
Ground cable	oil and gasoline resistant control lead, 3 x 1.5 mm^2 color: light blue temperature range –40...+90 °C (–40...+194 °F) connected 4-pin plug IP67
Dimensions	see Fig. 21
Weight	approx. 0.3 kg
Approval Marking	ATEX: DMT 00 ATEX E 068 X ⟨Ex⟩ II 2D Ex ia IIIC T135°C Da, II 2G Ex ia IIC T6 Ga IECEx: BVS 16.0016X Ex ia IIIC T135°C Db, Ex ia IIC T6 Gb

as shown on appliance marking:

IEC IECEx

Ex

CE

7.4 Cable rewinders

Type 601KR/AW	
Enclosure	ribbed and reinforced aluminum, protected cable inlet aperture with stopper
Rewind mechanism	automatic, special spring, on-off function
Protection class	IP43, EN 60529
Operating ambient temperature	–40...+70 °C (–40...+158 °F)
Attachment	wall assembly via assembly bracket
Ground cable	20 m oil and gasoline resistant control lead, 3 x 1.5 mm^2, color: light blue temperature range –40...+90 °C (–40...+194 °F), connected 4-pin socket IP67
Connecting lead	2.5 m, connecting cable 3 x 1.5 mm^2
Dimensions	see Fig. 25
Weight	approx. 14 kg with 20 m ground cable
Inductance	approx. 0.1 mH
Capacitance	approx. 2.3 nF
Approval / Identification marking	ATEX: DMT 00 ATEX E 068 X ⟨Ex⟩ II 2D Ex ia IIIC T135°C Db, II 2G Ex ia IIC T6 Gb IECEx: BVS 16.0016 Ex ia IIIC T135°C Db, Ex ia IIC T6 Gb

as shown on appliance marking:

Typ 601KR/DW	
Enclosure	Aluminium with rollers and stopper
Rewind mechanism	automatic, stop mechanism with on/off function
Protection class	IP42 according to EN 60529
Operating ambient temperature	–40...+70 °C (–40...+158 °F)
Attachment	wall assembly via assembly bracket
Ground cable	12 m oil and gasoline resistant control lead 3 x 1.5 mm^2, color: light blue temperature range –40...+90 °C (–40...+194 °F), connected 4-pin socket IP67
Connecting lead	2.5 Meter, connecting cable 3 x 1.5 mm^2, color: light blue
Dimensions	see Fig. 26
Weight	approx. 5.7 kg with 12 m ground cable
Inductance	approx. 0,07 mH
Capacitance	approx. 1.65 nF
Aproval / Identification marking	ATEX: DMT 00 ATEX E 068 X ⟨Ex⟩ II 2D Ex ia IIIC T135°C Db, II 2G Ex ia IIC T6 Gb IECEx: BVS 16.0016X Ex ia IIIC T135°C Db, Ex ia IIC T6 Gb

as shown on applicance marking:

as shown on appliance marking:

Type 601KR/KW	
Enclosure	plastic, cable inlet aperture with rollers
Protection class	IP42 according to EN 60529
Operating ambient temperature	–20...+70 °C (–4...+158 °F)
Attachment	wall assembly via metal assembly plate
Ground cable	9 m oil and gasoline resistant control lead 3 x 1.5 mm^2, color: light blue temperature range –40...+90° C (–40...+194 °F), connected 4-pin socket IP67
Connecting lead	2.5 m, connecting cable 3 x 1.5 mm^2, color: light blue
Dimensions	see Fig. 27
Weight	approx. 4 kg with 9 m ground cable
Inductance	approx. 0.06 mH
Capacitance	approx. 1.25 nF
Approval /	DMT 00 ATEX E 068 X
Identification marking	ATEX: DMT 00 ATEX E 068 X Ⓔx II 2D Ex ia IIIC T135°C Db, II 2G Ex ia IIC T6 Gb IECEx: BVS 16.0016X Ex ia IIIC T135°C Db, Ex ia IIC T6 Gb

8. Dimensions

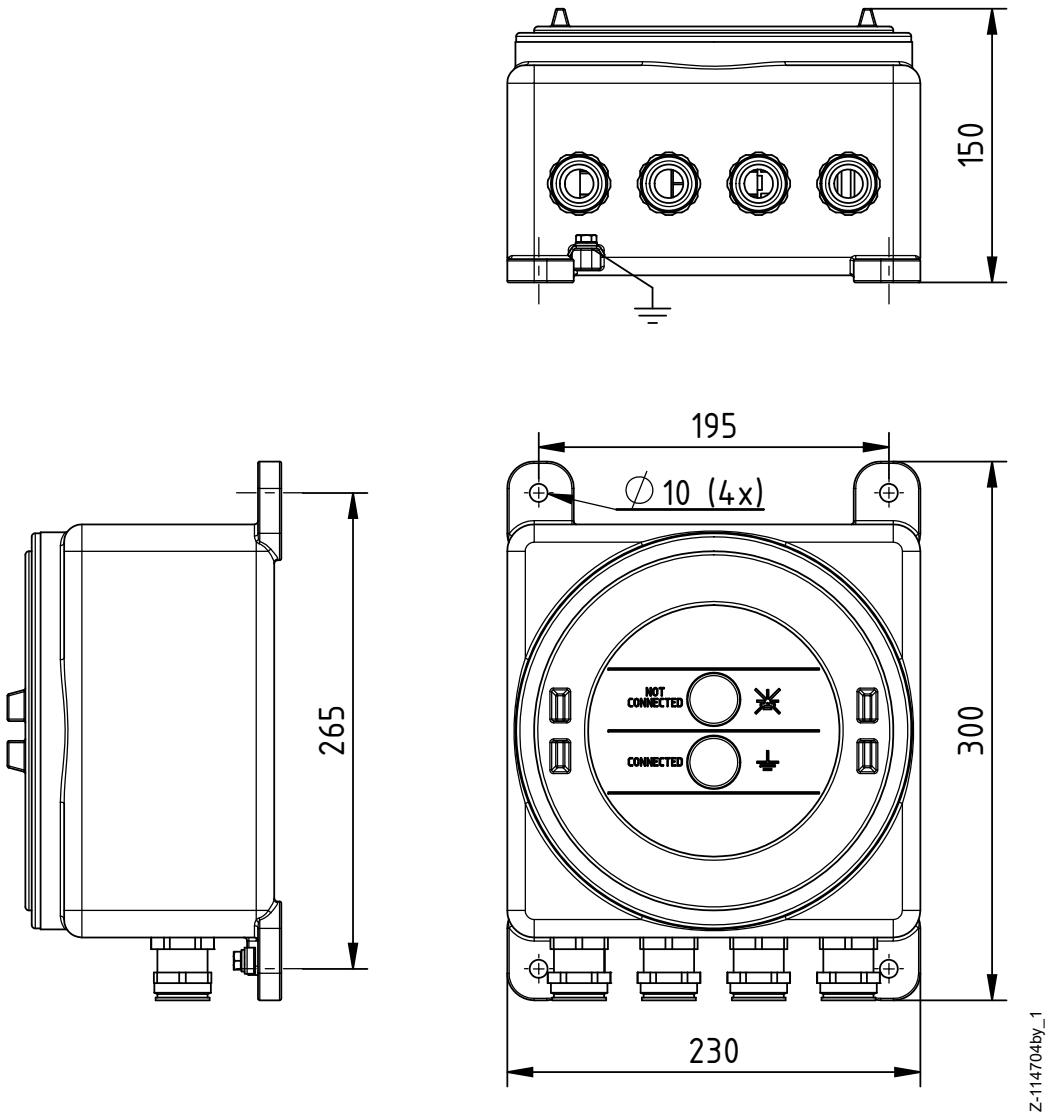
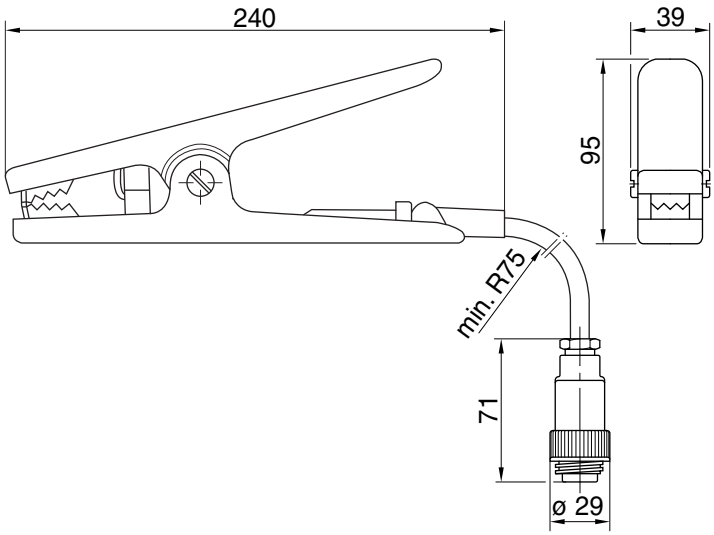
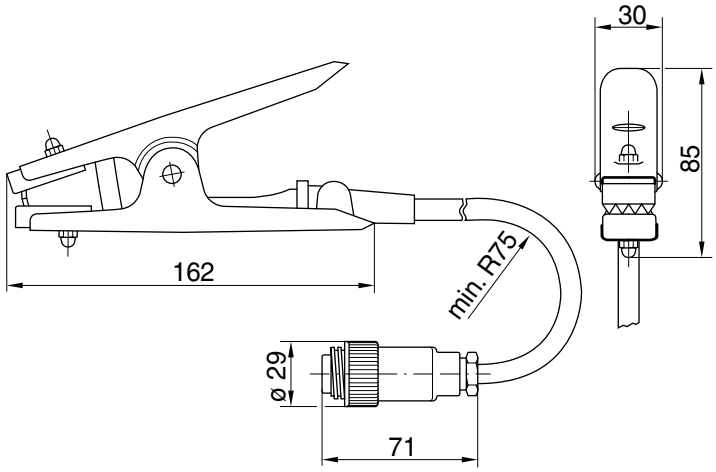


Fig. 19: Dimensions TCB040-V2



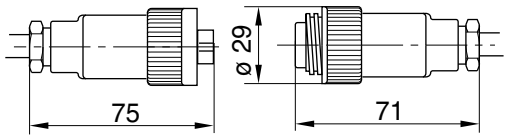
Z00111y

Fig. 20:
Type 70CG
with coupling
connector,
maximum clamp
opening 35 mm



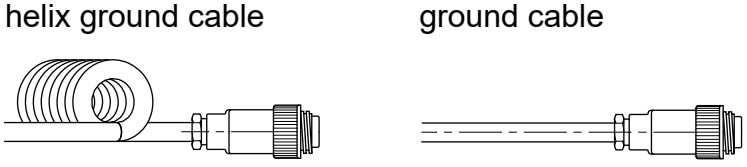
Z00113y

Fig. 21:
Typ 70CK
with coupling
connector,
maximum clamp
opening 35 mm



Z00116y

Fig. 22:
Coupling
connector / socket



Z01156y

Fig. 23:
Cable

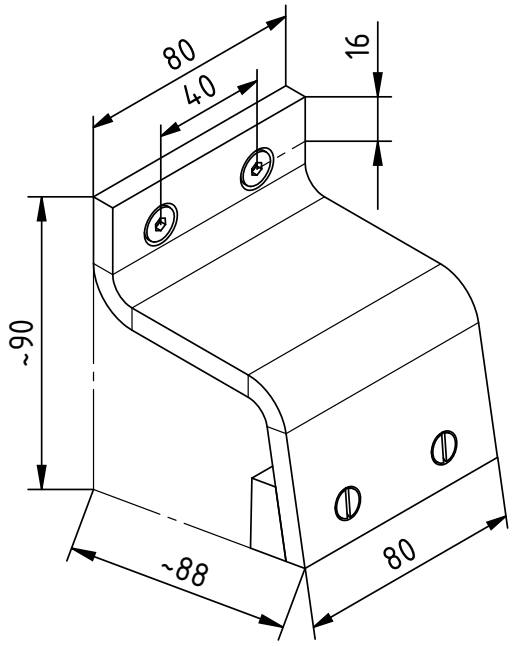


Fig. 24:
Clamp holder
article-no. 113112

Z-113113_2y

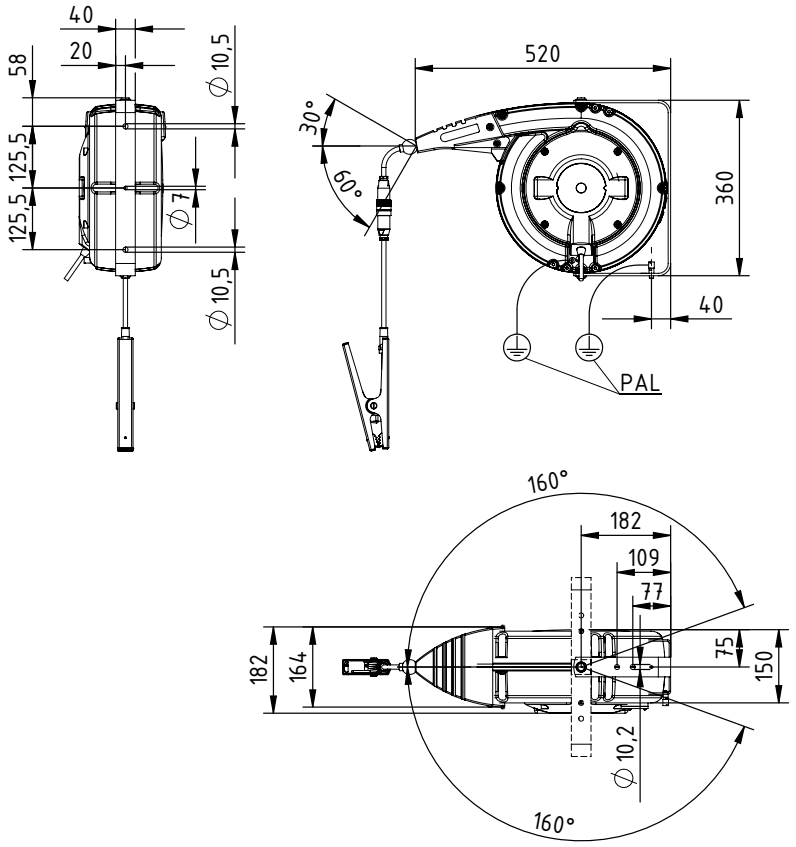


Fig. 25:
Aluminum
cable rewinder
Typ 601KR/AW

Z-114868y_1

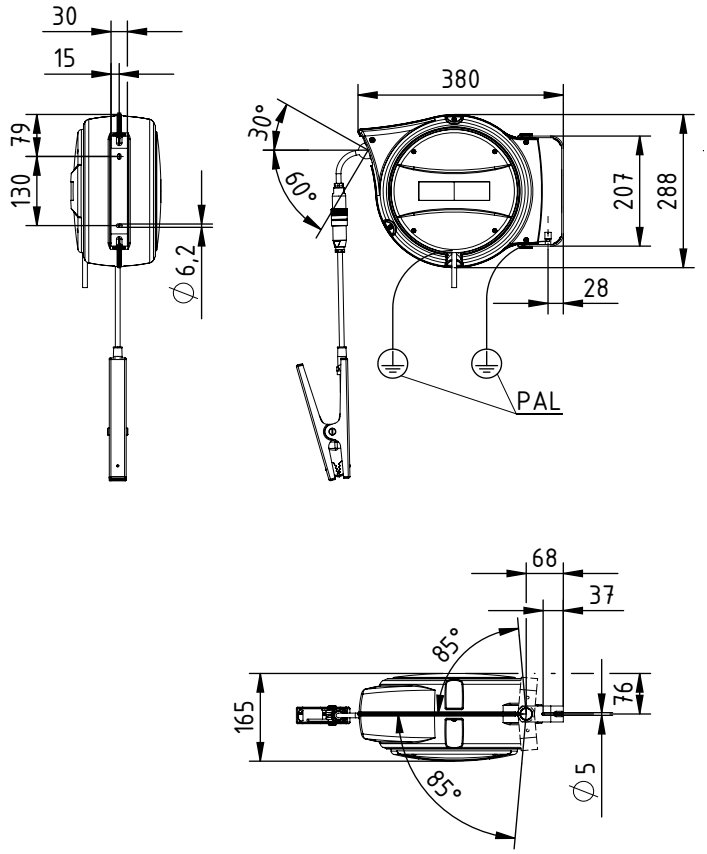


Fig. 26:
Aluminum
cable rewinder
Typ 601KR/DW

Z-114868y_2

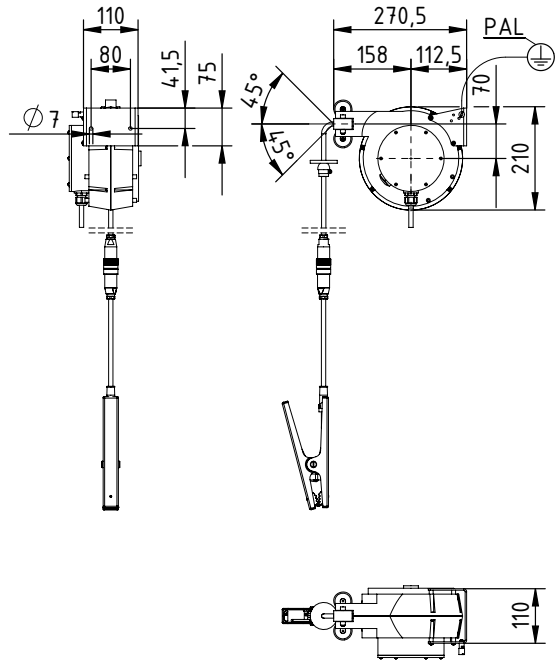


Fig. 27:
Plastic
cable rewinder
Typ 601KR/KW

Z-114868y_3

9. Spare parts and accessories

Article	**Article-No.**
Key switch	TCS
Function control unit **TERRA**TEST	TERRA-TU
Clamp holder	113112
Active ground clamp, large with IP67 coupling connector and 300 mm ± 50mm lead length or without connector and lead length as specified (3, 6, 9, 12, 15 or 18 m) or without connector and helix lead length as specifid (5 or 10 m)	70CG
Active ground clamp, small with IP67 coupling connector and 300 mm ± 50mm lead length or without connector and lead length as specified (3, 6, 9, 12, 15 or 18 m) or without connector and helix lead length as specified (5 or 10 m)	70CK
Cable rewinder, aluminum, for active grounding, 3 meters connecting cable and 20 meters ground cable with coupling IP67 for connecting ground clamps with plug	601KR/AW
Cable rewinder, aluminum, for active grounding, 3 meters connecting cable and 12 meters ground cable with coupling IP67 for connecting ground clamps with plug	601KR/DW
Cable rewinder, plastic, for active grounding, 3 meters connecting cable and 9 meters ground cable with coupling IP67 for connecting ground clamps with plug	601KR/KW
Active helix ground cable, 3-pin with wire end sleeve and coupling socket IP67 for connecting ground clamps, extensible 1 to 5 m, cable color: light blue	KG/ BSAB050
Active helix ground cable, 3-pin with wire end sleeve and coupling socket IP67 for connecting ground clamps, extensible 2 to 10 m, cable color: light blue	KG/ BSAB100
Active helix ground cable, 3-pin with coupling plug and coupling socket IP67 for connecting ground clamps, extensible 1 to 5 m, cable color: light blue	KG/ BSBS050
Active ground cable, 3-pin with with wire end sleeve and coupling socket IP67 for connecting ground clamps, 1 to 95 m in steps of 5 meters, cable color: light blue	KG/BNAB_
Active ground cable, 3-pin with coupling plug and coupling socket IP67 for connecting ground clamps, 1 to 95 m in steps of 5 meters, cable color: light blue	KG/BNBS_

Article	Article-No.
3-pin ground cable for active grounding (specify length)	LEI00009
Coupling socket, 4-pin, IP67	ELM00714
Coupling plug, 4-pin, IP67	ELM00713
Operating Instructions (specify language)	BA-xx-4009

Please specify the article number when ordering.

10. Waste disposal

The electronic parts in the unit may contain harmful substances. When dismantling the device, the existing local regulations must be observed and the disposal carried out according to the methods of general waste disposal (electronic scrap).

EU-Declaration of Conformity

CE-4009-en-2411_TCB040-V2

Eltex-Elektrostatik-Gesellschaft mbH
Blauenstraße 67 - 69
D-79576 Weil am Rhein

declares in its sole responsibility that the product

Ground monitoring device TERRACAP TCB040-V2

Identification:		II 2(1) GD Ex db [ia Ga] IIC T6 Gb, Ex tb [ia Da] IIIC T85°C Db
Certification-no.		ITS-I 20 ATEX 25551
Notified body	:	INTERTEK Italia S.p.A., Via Guido Miglioli 2/A, 20063 Cernusco sul Naviglio – Milano (MI) NB No. 2575

complies with the following directives and standards.

Relevant EU-Directive:

2014/34/EU	Directive: Equipment or Protective System intended for use in potentially explosive Atmospheres

Harmonized standards applied:

EN IEC 60079-0:2018	Explosive atmospheres – Equipment – General requirements
EN 60079-1:2014/AC:2018	Explosive atmospheres – Equipment protection by flameproof enclosures „d“
EN 60079-11:2012	Explosive atmospheres – Equipment protection by intrinsic safety "i"
EN 60079-31:2014	Explosive atmospheres – Equipment dust ignition protection by enclosure „t“

Relevant EU-Directive:

2014/35/EU	Low Voltage Directive

Harmonized standard applied:

EN 60204-1:2018	Safety of machinery – Electrical equipment of machines – General requirements

Relevant EU-Directive:

2014/30/EU	EMC Directive

Harmonized standards applied:

EN 55011:2016 + A1:2017 + A11:2020 + A2:2021	Industrial, scientific and medical equipment – Radio-frequency disturbance characteristics – Limits and methods of measurement
EN IEC 61000-6-2:2019	Electromagnetic compatibility (EMC) – Generic standards – Immunity standard for industrial environments
EN IEC 61000-6-4:2019	Electromagnetic compatibility (EMC) – Generic standards – Emission standard for industrial environments

Relevant EU-Directives:

2011/65/EU	RoHS Directive
(EU) 2015/863	RoHS Delegated Directive

in the version effective at the time of delivery.

Eltex-Elektrostatik-Gesellschaft mbH keep the following documents for inspection:

- proper operating instructions
- plans
- other technical documentation

Weil am Rhein, 05.11.2024
Place/Date

Lukas Hahne, Managing Director

Eltex Unternehmen und Vertretungen

Die aktuellen Adressen aller Eltex Vertretungen finden Sie im Internet unter www.eltex.de

Z01007y

Eltex-Elektrostatik-Gesellschaft mbH
Blauenstraße 67-69
79576 Weil am Rhein | Germany
Telefon +49 (0) 7621 7905-422
eMail info@eltex.de
Internet www.eltex.de