

TEPEX d.o.o. 10090 Zagreb, Medarska 69 tel. +38549222900 fax +38549426450 e-mail: tepex@tepex.hr	USER MANUAL FOR EXPLOSION PROTECTED GROUNDING AND GROUNDING CONTROL DEVICE type GGCD-01/..	
	No: TEPEX.RS.040	Rev : 3

1. MANUFACTURER

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2. PURPOSE

GGCD 01 device (Grounding and grounding control device) along with the grounding clamps makes the active system for static grounding and grounding control and it is used in areas that may be endangered by explosive mixtures of gas and vapours of flammable liquid with air, in danger zones 1 i 2 according to the HRN EN 60079-10-1:2009 (EN 60079-10-1:2009).

Device ensures that objects like tanks are electrostatic grounded correctly during the loading and unloading of flammable liquids. The device provides a conductive connection to the ground and monitors in parallel the quality of the connection. The electrostatic level of the tank is kept on a safe level. An occasional discharge in conjunction with sparks is prevented and therefore the explosion protection ensured.

3. DEGREE OF PROTECTION

Explosion protection is in accordance with the "general requirements" in the types of protection "flameproof enclosure", "increased safety", "intrinsic safety" and "encapsulation" in accordance with standards: HRN EN 60079-0:2009, HRN EN 60079-1:2008, HRN EN 60079-7:2007, HRN EN 60079-11:2007 HRN EN 60079-18:2010 (EN 60079-0:2009, EN 60079-1:2007, EN 60079-7:2007, EN 60079-11:2007, EN 60079-18:2009).

Apparatus category: II 2G

Explosion protection marking: Ex d e [ib] mb IIC T5 Gb

Ambient temperature: $-20^{\circ}\text{C} > T_{\text{amb}} > +50^{\circ}\text{C}$

Mechanical protection: IP 66 category 1, according to the EN 60529:1991/A1:2000

Degree of protection: I (protective grounding), according to the EN 61140:2002/A1:2006

Certificate: Ex-Agency [E-1/08] - HREx T 10.024

The device complies with standards:

- CENELEC CLC/TR 50404 (Electrostatics-Code of practice for the avoidance of hazards due to static electricity),
- CEN 1755 +A1 (Safety of industrial trucks-Operation in potentially explosive atmospheres-Use in flammable gas, vapour, mist and dust),
- BGR 132 – BG Rules for avoiding ignition hazards as a result of electromagnetic charges

4. MODEL CODE

GGCD 01 / . .

- _____ basic device marking
- _____ - K1 - type with one clamp K1, with 10m cable,
- _____ - K2 - type with two clamps K1, with 2 x 10m cable.

Each version of GGCD device has two operating modes (which can be selected with control switch):

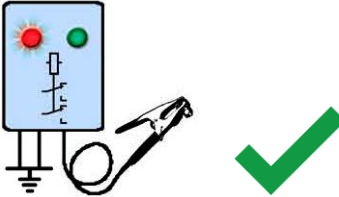
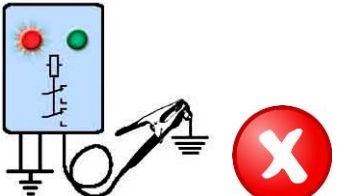
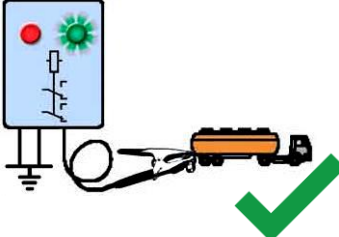
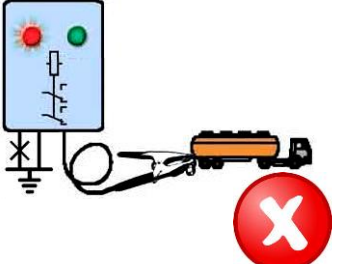
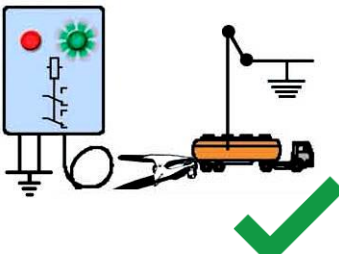
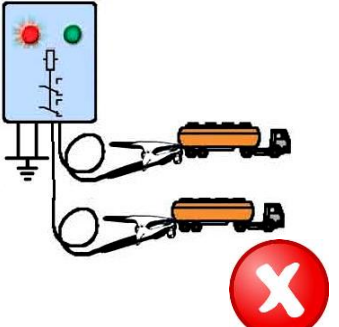
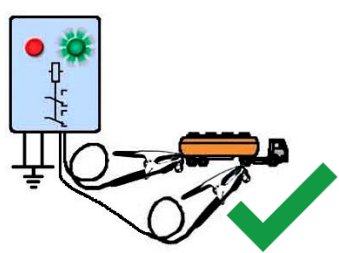
MODE 1 – Device doesn't recognize if object is grounded in any other way in the moment of connecting grounding clamps. It is used when the object because of itself construction can't be isolated from ground (rail cars, tank containers). Pushbutton START has no function in this mode.

MODE 2 – Device inside control time (cca 10s) recognize if object is already grounded in some other way with $R_{Z\text{ UK}} < 7\text{ k}\Omega$, and if clamps are connected correctly to grounded object. Mode is started pushing to START pushbutton. It can be used when grounded object is isolated from ground (tank trucks, etc...).

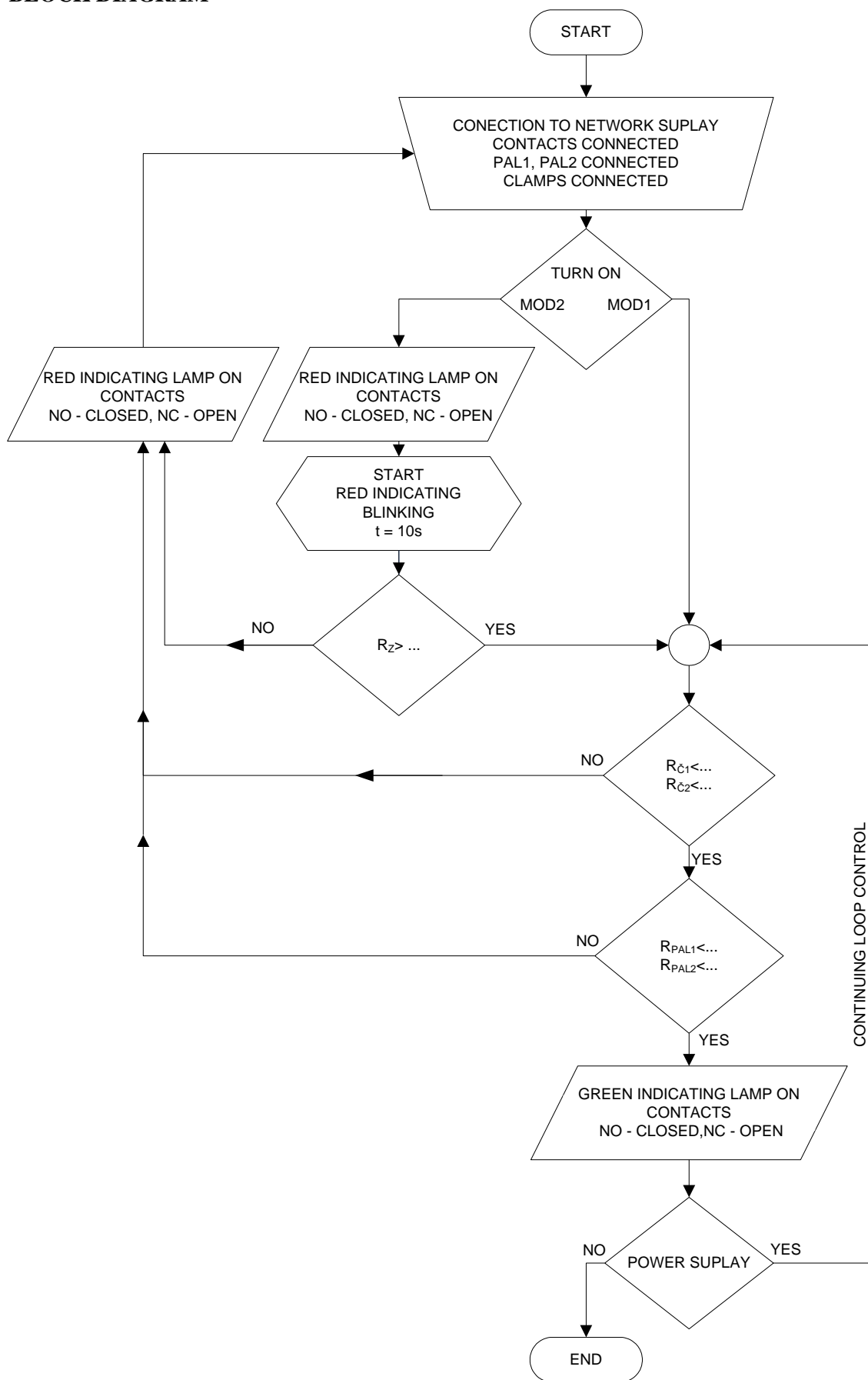
Control switch can be locked with padlock in any of operating modes.

The product complies with the LV Directive 2006/95/EC, EMC Directive 2004/108/EC and RoHS Directive 2002/95/EC.

5. OPERATING PRINCIPLE

State of earthing process		Reaction of the earthing monitoring device
	<p>GGCD 01/K1 is not correct connected and turned ON. Clamp is not connected, grounding equipment not in use</p>	<p>Earthing incorrect</p> <ul style="list-style-type: none"> • Red indicating lamp ON • Green indicating lamp OFF • Contact OPEN
	<p>GGCD 01/K1 is correct connected and turned ON, but clamp is directly grounded, e.g. via the loading platform</p>	<p>Earthing incorrect (only MOD 2)</p> <ul style="list-style-type: none"> • Red indicating lamp ON • Green indicating lamp OFF • Contacts OPEN
	<p>GGCD 01/K1 is correct connected and turned ON. Clamp connected to tank vehicle.</p>	<p>Earthing OK</p> <ul style="list-style-type: none"> • Red indicating lamp OFF • Green indicating lamp ON • Contacts CLOSED
	<p>GGCD 01/K1 is correct connected and turned ON, but cable to the grounding is disconnected.</p>	<p>Earthing incorrect</p> <ul style="list-style-type: none"> • Red indicating lamp ON • Green indicating lamp OFF • Contacts OPEN
	<p>GGCD 01/K1 is correct connected and turned ON. Clamp connected to tank vehicle. Tank vehicle is grounded subsequently (e.g. via the loading arm).</p>	<p>Earthing OK</p> <ul style="list-style-type: none"> • Red indicating lamp OFF • Green indicating lamp ON • Contacts CLOSED
	<p>GGCD 01/K2 is correct connected and turned ON. Two clamps are connected on two separate object grounding.</p>	<p>Earthing incorrect</p> <ul style="list-style-type: none"> • Red indicating lamp ON • Green indicating lamp OFF • Contacts OPEN
	<p>GGCD 01/K2 is correct connected and turned ON. Two clamps are connected on one object grounding.</p>	<p>Earthing OK</p> <ul style="list-style-type: none"> • Red indicating lamp OFF • Green indicating lamp ON • Contacts CLOSED

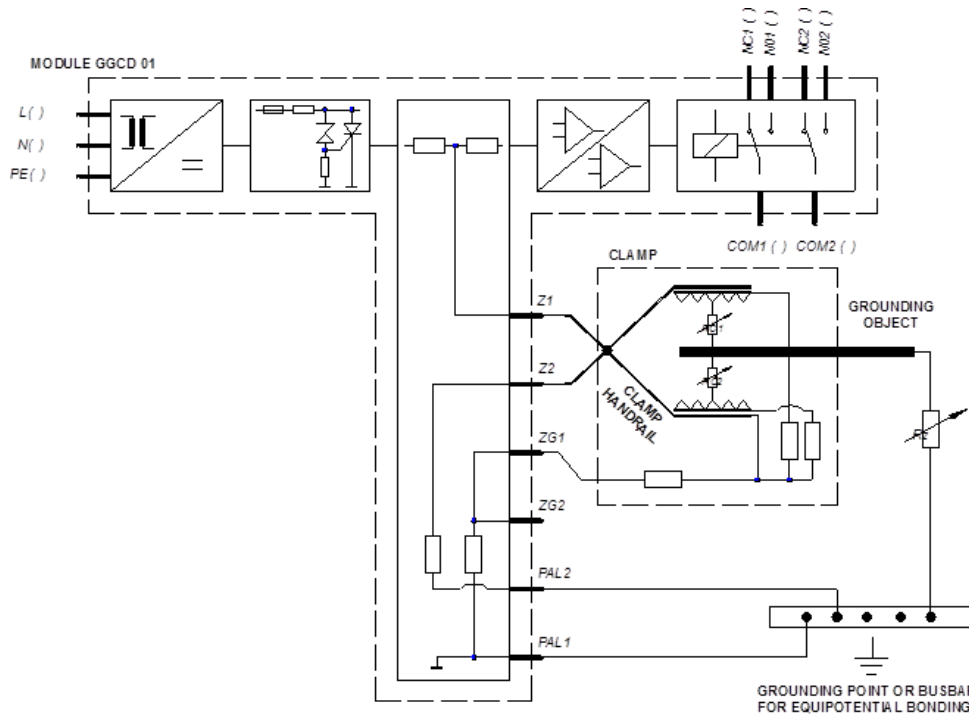
6. BLOCK DIAGRAM



7. TECHNICAL DATA

Nominal voltage U_n :	230 V \pm 10 10%, 50 Hz
Nominal current I_n :	50 mA
Nominal power P_0 :	10 W
Output circuit:	2 switch over contacts $U_n=250$ V AC, $I_n=8$ A / 230 V, 4 A at $\cos \varphi = 0,4$
Indicating lamps:	Red: - blinking inside control time (10 sec - MOD2), contacts NO are open, contacts NC are closed, - continuous operation (MOD1 and MOD 2), contacts NO are open, contacts NC are closed Green: - continuous operation (MOD1 and MOD 2), contacts NO are closed, contacts NC are open
Max. r.m.s. voltage U_m :	253 V
Max. open circuit voltage U_0 :	15 V
Max. current I_0 :	1,60 mA
Max. power P_0 :	6,0 mW - linear characteristics
Max. external inductance L_0 :	50 mH
Max. external capacity C_0 :	45 nF
Maximum length of the clamp cable:	100 m
Connecting terminals:	- network supply terminal, output contacts: 1,5-4 mm ² stranded, flexible - Cable to the grounding point or busbar for equipotential bonding: 25 mm ² max. stranded, flexible
Stripping length:	4 mm ² - 10 mm, 25 mm ² - 14 mm
Tightening torque of terminal screws:	terminal 4 mm ² - 0,6 Nm, terminal 25 mm ² - 3,0 Nm
Cable ferrules:	Stranded and flexible cables are installed with cable ferrules according to DIN 46228 T1
Cover screws:	M6x30 (Z4) - 4,8 A2
Tightening torque for cover screw:	1,5 Nm
Cable glands and plugs:	- GGCD 01/K1: 3xM25 Exi cable glands and 2xM25 Exe cable glands for cable $\varnothing_v=9-15$ mm, 1 x M25 Exi plug, 1 x M25 Exe plug - GGCD 01/K2 - 4xM25 Exi cable glands, 2xM25 Exe cable glands for cable $15 > \varnothing_v > 9$ mm, 1 x M25 Exe plug
Tightening torque for cable glands:	- cable gland body 3,5 Nm, - cable gland nut 2,5 Nm
Tightening torque for plugs:	3,5 Nm
Clamp cable:	3 or 2x1,5 mm ² - cable capacity (wire-wire) 135 nF/km - wire inductance 0,65 mH/km - wire resistance 12,0 Ω /km
Dimension (LxWxH):	255 x 250 x 160 mm without clamps
Dimension of clamps holder(L x W x H):	300 x 300 x 195 mm without clamps
Mounting enclosure onto surface:	With screw kit M6 through the holes in the enclosure $\varnothing 7/\varnothing 12$ mm at the top of the rectangle 235 x 200 mm
Mounting clamps holder onto surface:	With screw kit M8 at the top of the rectangle 225 x 260 mm
Weight (without clamps):	ca. 6,0 kg
Weight of clamps with 10 m cable:	ca. 2,5 kg

8. BLOCK DIAGRAM OF DEVICE AND OPERATING INSTRUCTIONS



It is generally considered that object is satisfactorily electrostatic grounded if resistance to earth is not higher than $10^6 \Omega$.

Open – closed threshold of output relay depends of clamps resistance $R_{\check{c}} = R_{\check{c}1} + R_{\check{c}2}$, loop resistance PAL of conduit R_{PAL} and possible resistance object of grounding of outside grounding R_Z (just in MOD 2 operation inside control time). That given substitute resistance from Z1 to equipotential bonding determines open – closed threshold $R_{UK ON}$.

In ideal case when $R_Z = \infty$ and $R_{PAL} = 0$ in MOD 2 outside control time and in MOD 1 operation:

- $R_{\check{c}1} + R_{\check{c}2} < 1,7 \text{ k}\Omega$ object is electrostatic grounded, green signal light is on, output NO contact is closed, and NC is open,
- increasing $R_{\check{c}1} + R_{\check{c}2} > 2,3 \text{ k}\Omega$ is considering that object is not satisfactorily electrostatic grounded, red signal light is turning on, output NO contact is opening and NC is closing.

In second case when $R_Z = 0$ and $R_{PAL} = 0$ in MOD 2 outside control time and in MOD 1 operation:

- $R_{\check{c}1} < 5,0 \text{ k}\Omega$ object is electrostatic grounded, green signal light is on, output NO contact is closed and NC is open,
- increasing $R_{\check{c}1} > 5,6 \text{ k}\Omega$ s considering that object is not satisfactorily electrostatic grounded, red signal light is turning on, output NO contact is opening and NC is closing.

Inside control time in MOD 2 operation in boundary case when are $R_{\check{c}1} = 0$ and $R_{\check{c}2} = 0$ in order to electrostatic grounding is satisfactorily, i.e. that output NO contact is closed, it must be $R_Z > 7,0 \text{ k}\Omega$.

9. INSTALLING, CONTROL, MAINTENANCE AND REPAIR

It is necessary to read this manual before installing and usage and if it is needed to request extra informations from manufacturer. Installing and usage of device is allowed only to qualified and authorized persons. Installing of device have to be done in non-voltage state. PAL (equipotential bonding connection) terminals inside device are connected to PA (equipotential bonding connection) busbar or grounding point with two single wire cables. It that case control loop is achieved and permanent monitoring of galvanic continuity connection PAL (equipotential bonding connection) terminal with PA (equipotential bonding connection) busbar or grounding point. Connection is made with conductor with cross-section $6-25 \text{ mm}^2$.

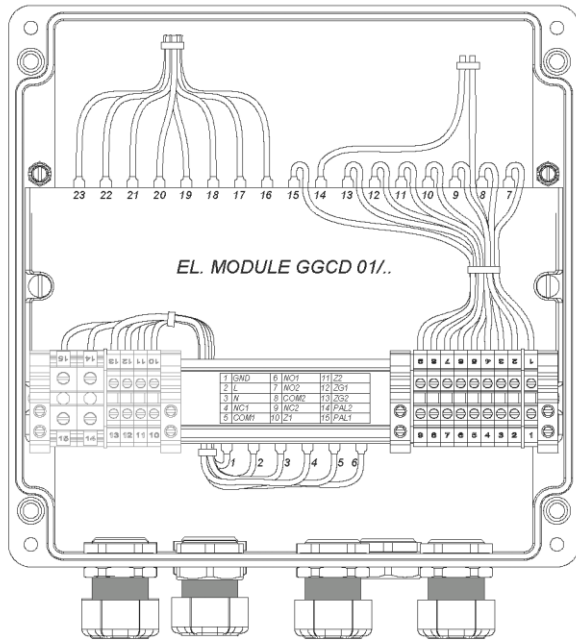
Electric connection, and cables for output connections inside enclosure must be conducted separately from intrinsic safety conduits. It is not allowed to connect output connectors into other intrinsic safety circuits. Along whole area of grounding equipotential bonding (PA) must be done. At enclosure closing, cover screws, cable glands and plugs must be tightened with torque specified in this manual.

Every afterwards enclosure opening is allowed only when supply is switched off.

Before connecting clamps for grounding on the object of grounding, object itself must be electrostatically discharged which must be secured in appropriate way.

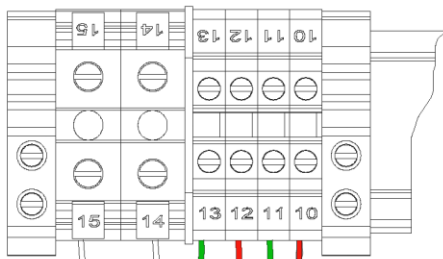
Electric connection scheme of cables and conductors:

TOP view without built-in components



RELAY OUTPUT 1	RELAY OUTPUT 1	POWER SUPPLY	Terminals
NC1	COM1	N	4
NO1	COM2	L	5
NO2	NC2	N	6
COM2			7
			8
			9
			10
			11
			12
			13
			14
			15
			16
			17
			18
			19
			20
			21
			22
			23

GGCD 01/K2

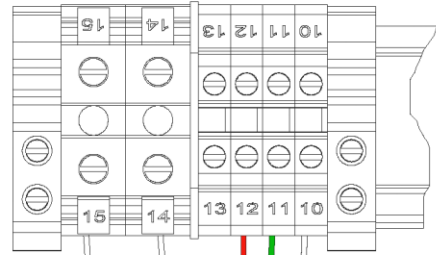
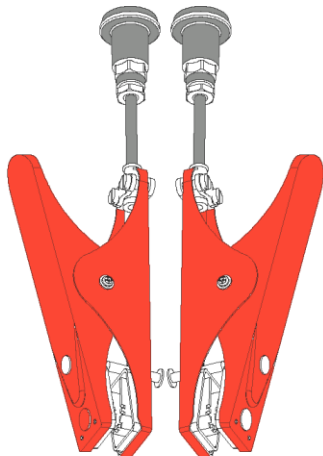


CONDUCTOR 1 TO GROUNDING POINT OR PA-BUSBAR (PAL1)

CONDUCTOR 2 TO GROUNDING POINT OR PA-BUSBAR (PAL2)

GGCD 01/K2 - TWO CLAMPS CLAMP 1 : 1 - "10", 2 - "12"

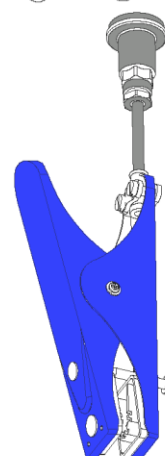
GGCD 01/K2 - TWO CLAMPS CLAMP 2 : 1 - "11", 2 - "13"



CONDUCTOR 1 TO GROUNDING POINT OR PA-BUSBAR (PAL1)

CONDUCTOR 2 TO GROUNDING POINT OR PA-BUSBAR (PAL2)

GGCD 01/K1 - ONE CLAMP 1 - "10", 2 - "11", 3 - "12"



GGCD 01/K1

10. SPARE PARTS AND ACCESSORIES

Spare parts

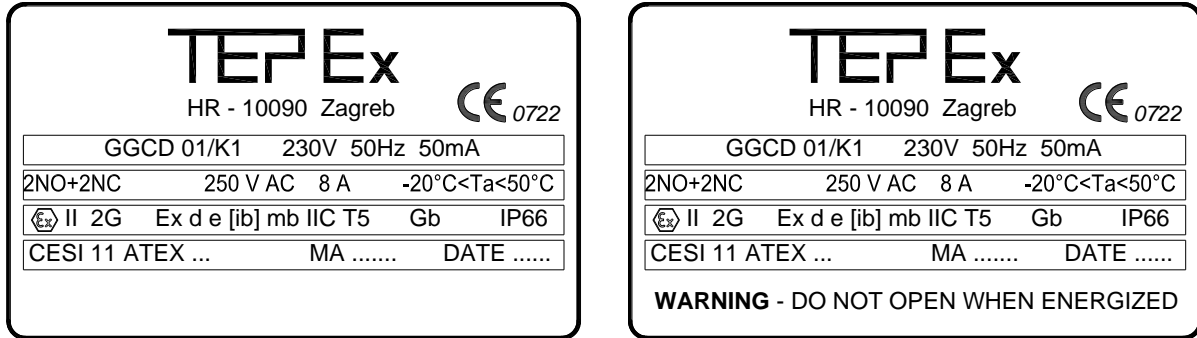
- Control module GGCD 01,
- Connecting cable 0,5 m with coupler GGCD 01/K1,
- Connecting cable 0,5 m with coupler GGCD 01/K2,
- Clamp K1 with 10 m cable with plug,
- Clamp K2 with 10 m cable with plug,
- Pushbutton PBT 02,
- Signal lamp SLP,
- Switch SMS 03/GGCD,
- Pushbutton actuator SPO 01/7,
- Front element of signal lamp SPO 02/1,
- Front element of signal lamp SPO 02/2,
- Switch actuator SMO 17/GGCD
- Terminal EURO 4/35
- Terminal EURO 4/35 BL
- Terminal EURO E4/35
- Terminal EURO E16-25/35
- Cable gland SPU 25 black,
- Cable gland SPU 25 blue,
- Plug SPC 25 black,
- Plug SPC 25 blue,
- Enclosure gasket SKX 16,
- Enclosure screws SKX 16, M6x30 (Z4) - 4,8 A2

Accessories

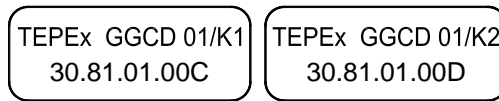
- Cable reel with 20 m cable, with connector for control module and clamps, type GGCD 01/KO 20,
- Cable gland for armoured cable type Ex e II, type SIB-DEF 4F, $9 < \varnothing_v < 27,5$ mm, $6 < \varnothing_u < 19,5$ mm, $f = 1,25 - 16$ mm, LCIE 05 ATEX 6146 X
- Telemetry system for remote monitoring of up to 27 devices, type GGCD 01/PC CONTROL. The system consists of:
 - The auxiliary module GGCD 01/M1 located in the unit enclosure,
 - Peripheral central unit located outside of the hazardous area - the connection to devices and to PC computer with RS 232 interface
 - Software application compatible with Windows operating system

11. MARKING

Explosion protected grounding and grounding control device type GGCD 01/K1, K2 are labeled with internal and external labels:



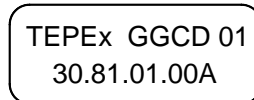
Cable with connector for GGCD 01/K1, GGCD 01/K2 is labeled:



Clamps K1, K2 for GGCD 01/K1, GGCD 01/K2 are labeled:



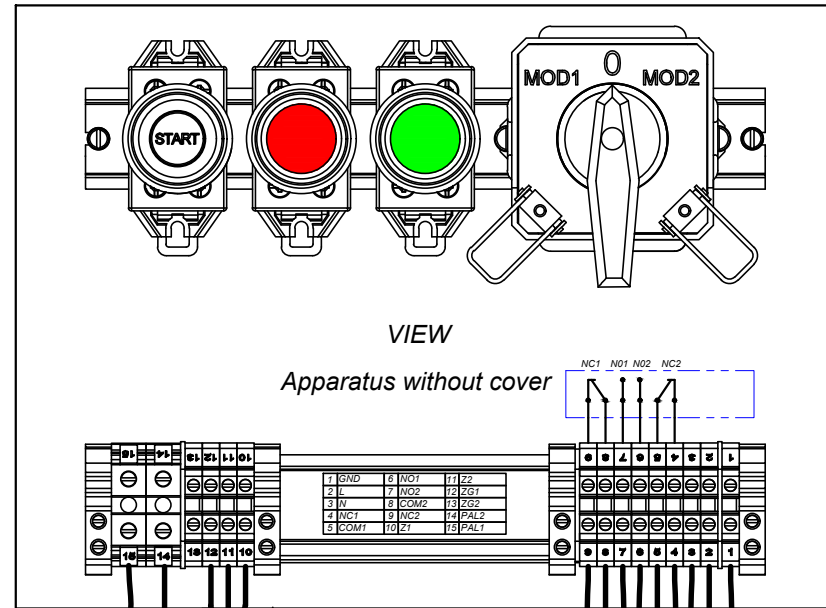
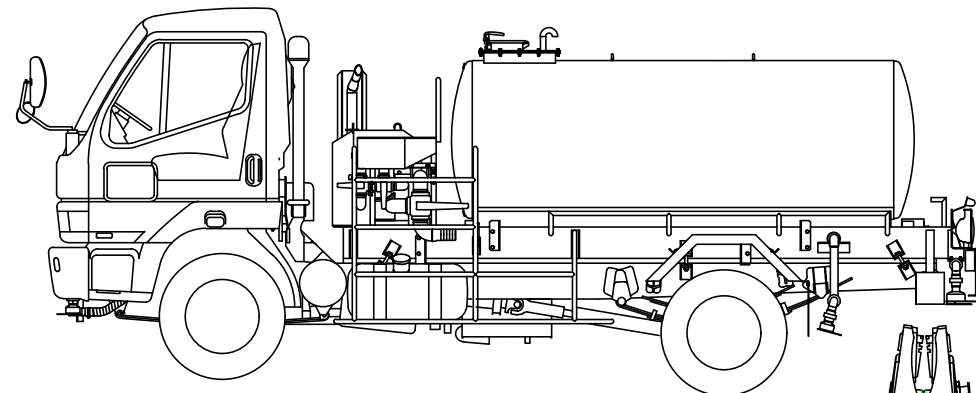
Module GGCD 01 is labeled:



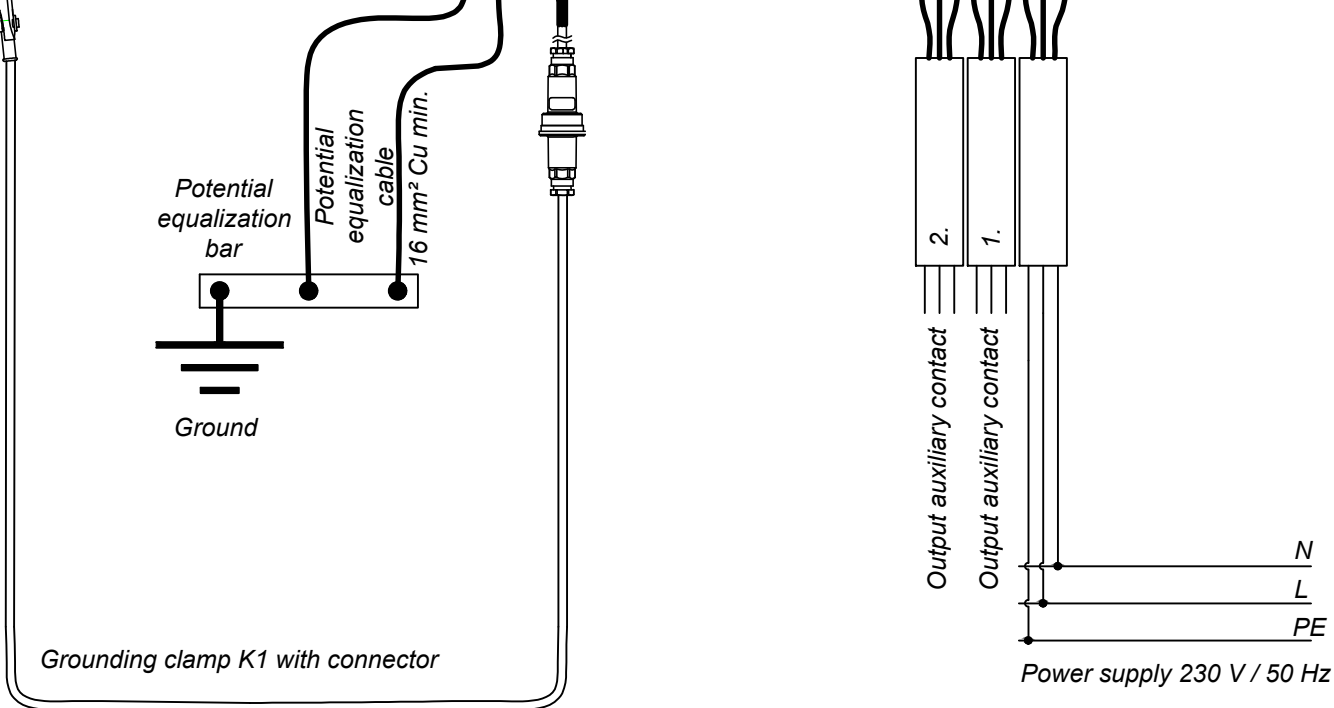
12. STORAGE AND TRANSPORT

Transport and storage is only allowed in the original packaging, on the way pointed out on the carton box.

GGCD 01/K1



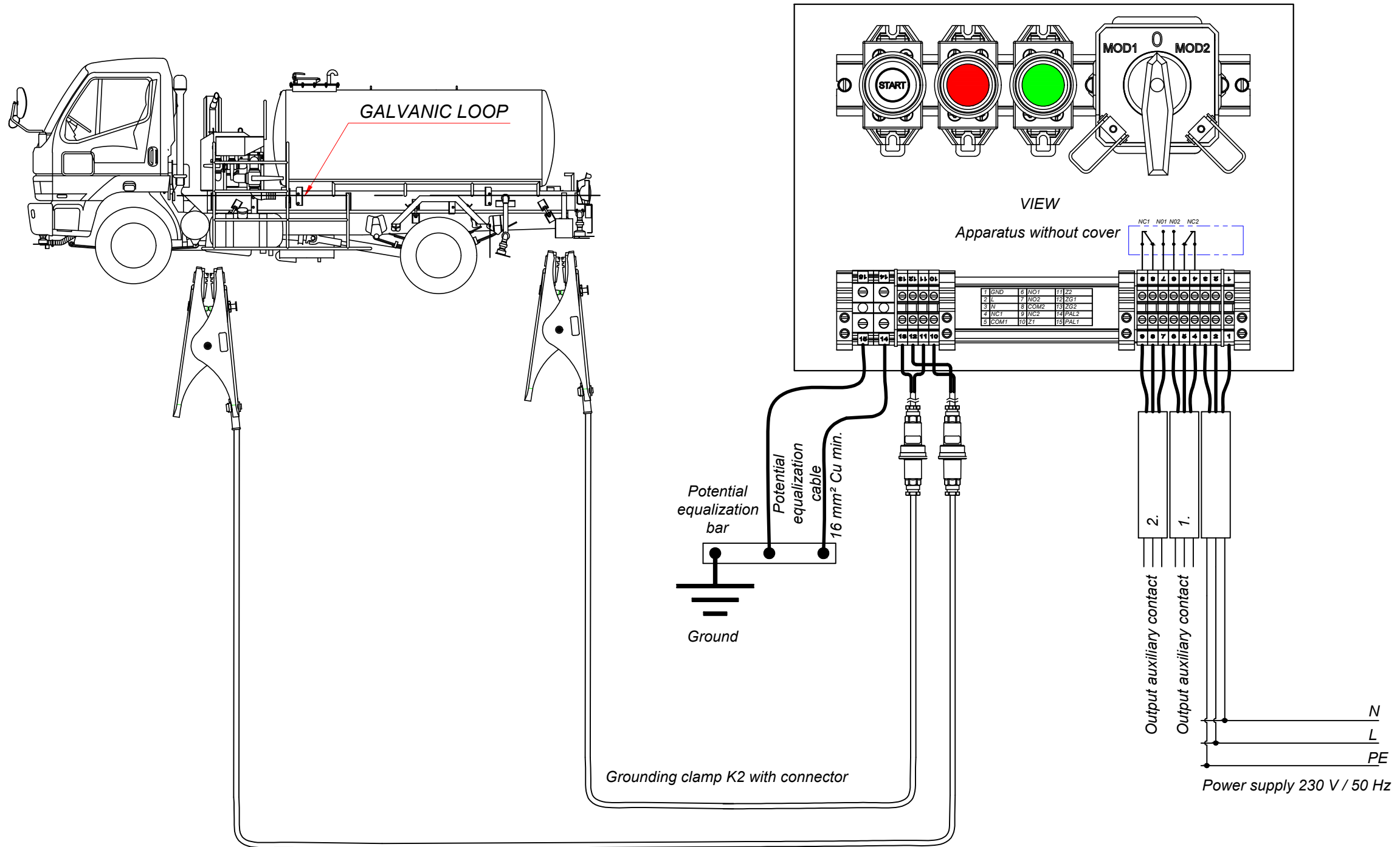
VIEW
Apparatus without cover




Proizvod: EXPLOSION PROTECTED GROUNDING AND GROUNDING CONTROL DEVICE				Kote koje se kontroliraju prema planu kontrole kvalitete.			Površinska zaštita:	
Tip:				Tolerancije slobodnih mjera:			Materijal:	
Sastavni crtež:							Šifra: Format: A3	
Zaštita: II 2G Ex d e [ib] mb IIC T5 Gb							Naziv:	
				Datum			Ime	
				Konstr. 07.2017			V.SRB	
				Kontrol. 07.2017			HRG	
				Odobrio 07.2017			Z.SRB	
							Mjerilo:	
St. Izmjene Datum Odobrio							Br. crteža:	

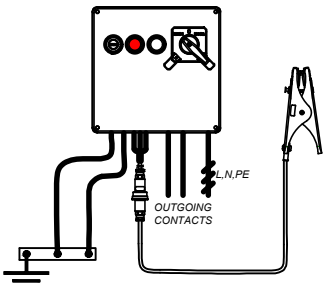
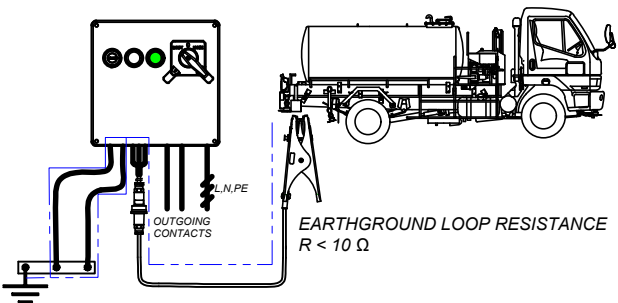
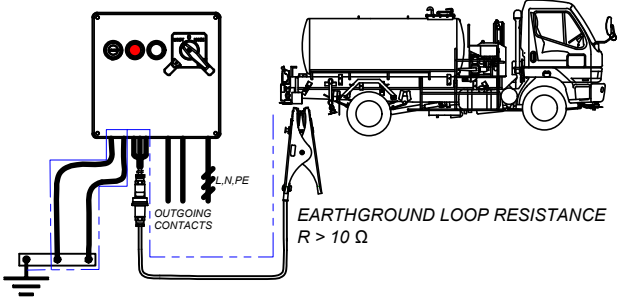
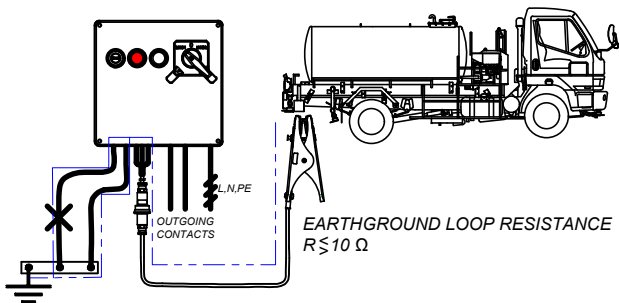
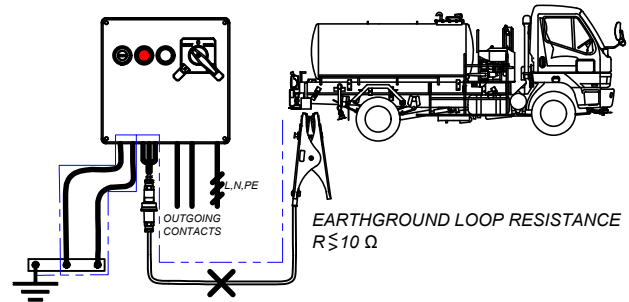
EXPLOSION PROTECTED GROUNDING AND GROUNDING CONTROL DEVICE 01/K2

GGCD 01/K2

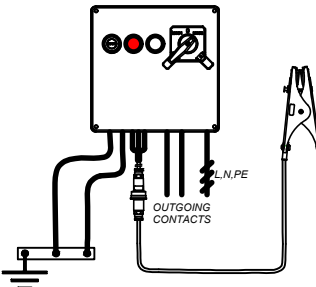
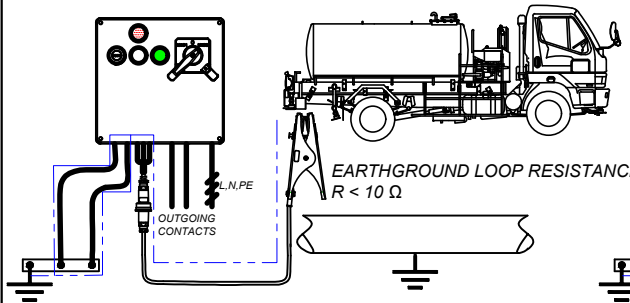
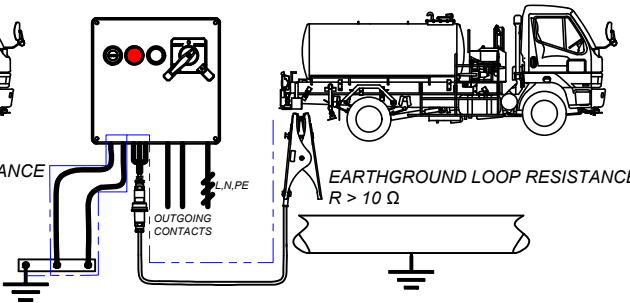
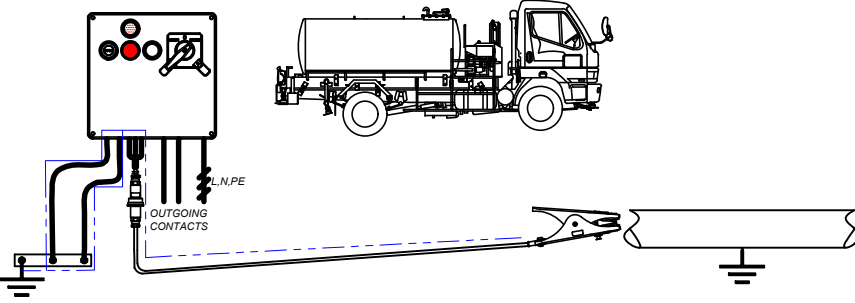
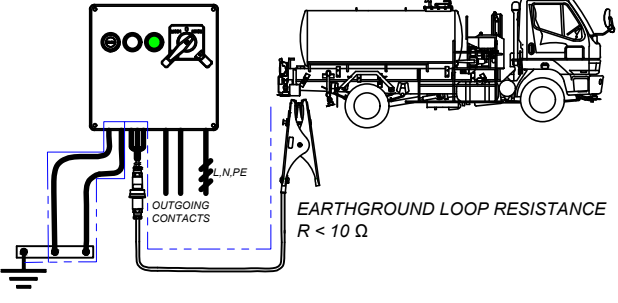
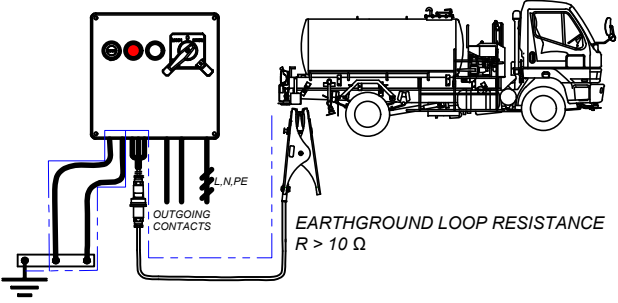
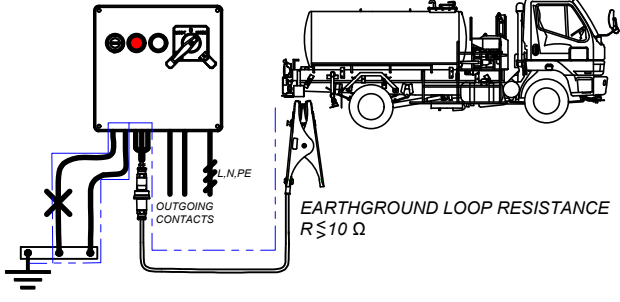
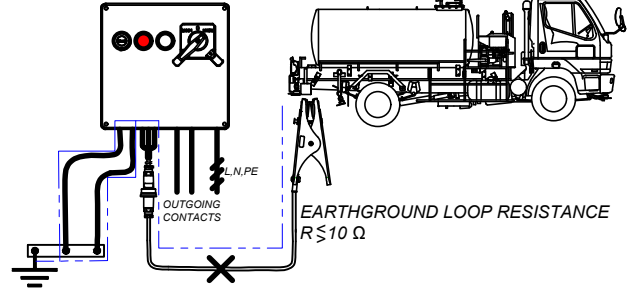


Proizvod: EXPLOSION PROTECTED GROUNDING AND GROUNDING CONTROL DEVICE				Kote koje se kontroliraju prema planu kontrole kvalitete.			Površinska zaštita:	
Tip:				Tolerancije slobodnih mjera:			Materijal:	
Sastavni crtež:							Šifra: Format: A3	
Zaštita: II 2G Ex d e [ib] mb IIC T5 Gb							Naziv:	
				Datum			EXPLOSION PROTECTED GROUNDING AND GROUNDING CONTROL DEVICE 01/K2	
				Konstr. 07.2017 V.SRB				
				Kontrol. 07.2017 HRG				
				Odobrio 07.2017 Z.SRB				
							Mjerilo:	
St. Izmjene		Datum					Odobrio	

GGCD-01 / MODE 1 (APPLIES FOR K1 AND K2)

STATE OF GROUNDING PROCESS	REACTION OF THE GROUNDING MONITORING DEVICE
	<p>GGCD 01 is correctly connected and turned ON in MODE 1. Clamp is not connected. No grounding object.</p> <p>Grounding FALSE - Red indicating lamp ON - Green indicating lamp OFF - Auxiliary contacts: NC - OPEN NO - CLOSED</p>
	<p>GGCD 01 is correctly connected and turned ON in MODE 1. Clamp connected to tank vehicle (grounding object). Earthground loop resistance $R < 10 \Omega$. Grounding and grounding control in progress.</p> <p>Grounding OK - Red indicating lamp OFF - Green indicating lamp ON - Auxiliary contacts: NC - CLOSED NO - OPEN</p>
	<p>GGCD 01 is correctly connected and turned ON in MODE 1. Clamp connected to tank vehicle (grounding object). Earthground loop resistance is $R > 10 \Omega$. Grounding and grounding control in progress.</p> <p>Grounding FALSE - Red indicating lamp ON - Green indicating lamp OFF - Auxiliary contacts: NC - OPEN NO - CLOSED</p>
	<p>GGCD 01 is correctly connected and turned ON in MODE 1. Grounding cable is disconnected or broken. Grounding control in progress.</p> <p>Grounding FALSE - Red indicating lamp ON - Green indicating lamp OFF - Auxiliary contacts: NC - OPEN NO - CLOSED</p>
	<p>GGCD 01 is correctly connected and turned ON in MODE 1. Grounding clamp is disconnected or broken. Grounding control in progress.</p> <p>Grounding FALSE - Red indicating lamp ON - Green indicating lamp OFF - Auxiliary contacts: NC - OPEN NO - CLOSED</p>

GGCD-01 / MODE 2 (APPLIES FOR K1 AND K2)

STATE OF GROUNDING PROCESS	REACTION OF THE GROUNDING MONITORING DEVICE
	<p>GGCD 01 is correctly connected and turned ON in MODE 2. Clamp is not connected. Push testbutton START. No grounding object.</p> <p>Grounding FALSE - Red indicating lamp ON - Green indicating lamp OFF - Auxiliary contacts: NC - OPEN NO - CLOSED</p>
	<p>GGCD 01 is correctly connected and turned ON in MODE 2. Clamp connected to tank vehicle (grounding object). Earthground loop resistance $R < 10 \Omega$. Push testbutton START. Grounding and grounding control in progress.</p> <p>Grounding OK - Red indicating lamp BLINKING for 10 sec - AFTER 10 sec - Green indicating lamp ON - Auxiliary contacts: NC - OPEN NO - CLOSED</p>
	<p>GGCD 01 is correctly connected and turned ON in MODE 2. Clamp connected to tank vehicle (grounding object). Earthground loop resistance $R > 10 \Omega$. Push testbutton START. Grounding and grounding control in progress.</p> <p>Grounding FALSE - Red indicating lamp ON - Green indicating lamp OFF - Auxiliary contacts: NC - OPEN NO - CLOSED</p>
	<p>GGCD 01 is correctly connected and turned ON in MODE 2. Clamp connected to sabotage grounding e.g. loading arm or other metal constructions. Push testbutton START. Grounding control in progress.</p> <p>Grounding FALSE - Red indicating lamp BLINKING for 10 sec - AFTER 10 sec - RED indicating lamp ON - Auxiliary contacts: NC - OPEN NO - CLOSED</p>
	<p>GGCD 01 is correctly connected and turned ON in MODE 2. Clamp connected to tank vehicle (grounding object). Earthground loop resistance $R < 10 \Omega$. Grounding and grounding control in progress.</p> <p>Grounding OK After testing phase - Red indicating lamp OFF - Green indicating lamp ON - Auxiliary contacts: NC - CLOSED NO - OPEN</p>
	<p>GGCD 01 is correctly connected and turned ON in MODE 2. Clamp connected to tank vehicle (grounding object). Earthground loop resistance is $R > 10 \Omega$. Grounding control in progress.</p> <p>Grounding FALSE After testing phase - Red indicating lamp ON - Green indicating lamp OFF - Auxiliary contacts: NC - OPEN NO - CLOSED</p>
	<p>GGCD 01 is correctly connected and turned ON in MODE 2. Grounding cable is disconnected or broken. Grounding control in progress.</p> <p>Grounding FALSE After testing phase - Red indicating lamp ON - Green indicating lamp OFF - Auxiliary contacts: NC - OPEN NO - CLOSED</p>
	<p>GGCD 01 is correctly connected and turned ON in MODE 2. Grounding clamp is disconnected or broken. Grounding control in progress.</p> <p>Grounding FALSE After testing phase - Red indicating lamp ON - Green indicating lamp OFF - Auxiliary contacts: NC - OPEN NO - CLOSED</p>