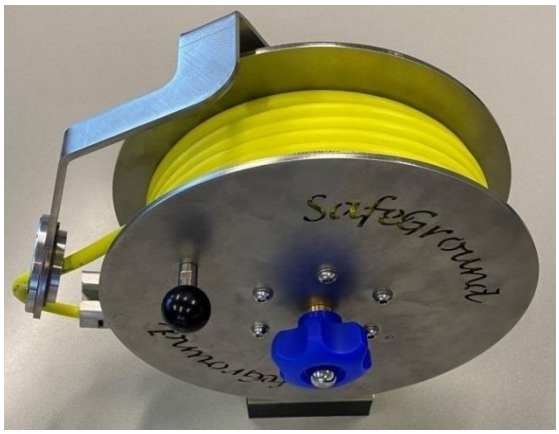
SafeGround manual for mobiele verhicles



Manual version: 1.03 Suitable for module: **EARTH204** version V1.xx 02/2021

Description SafeGround controller:

The SafeGround is a microprocessor-controlled module which generates an indication when a mobile vehicle is grounded to an earth point of an external installation.
The SafeGround controller is placed between the chassis of the vehicle and the earth clamp, which means the grounding of the vehicle will always run through this safe Ground controller. The SafeGround controller is two-wire carried out up to the earth clamp.
The entire circuit from the SafeGround controller to the earth clamp is two-wire.
See drawing 1 on page 8.
It is necessary for proper functioning of the SafeGround controller that the earth wire (terminal block-12) and measuring signal (terminal block-13) are connected to the earth clamp via the cable reel remains insulated from the chassis of the vehicle.

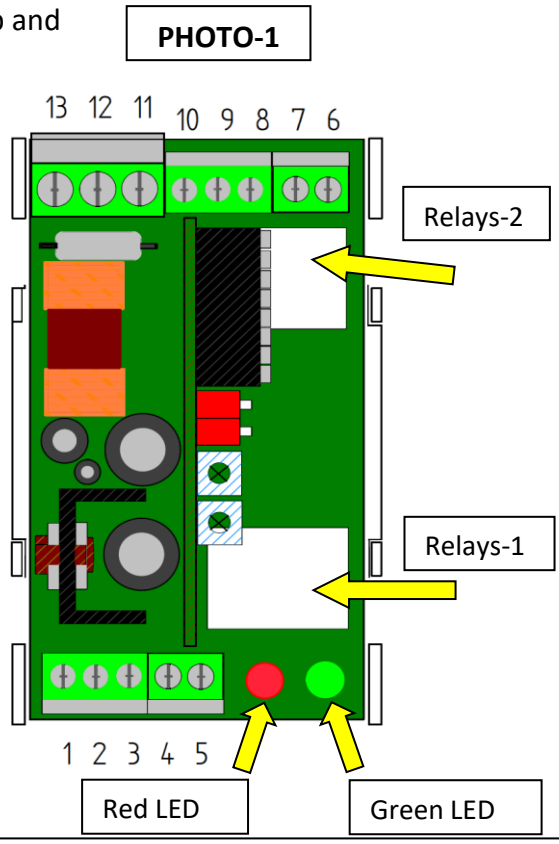
In case the earth wire in the cable reel is connected to the chassis of the cable reel, the cable reel must be insulated from the vehicle!

By connecting the earth clamp to a fixed external earth point, the SafeGround controller will detect this and give a safe signal. If the grounding is connected incorrectly or it's not being connected at all, the SafeGround controller will give an alarm signal.

NOTE: The SafeGround controller does *not check* the grounding resistivity, this is the responsibility of the company.

The module can detect the following 4 possibilities:

1. When the vehicle is not grounded, the red LED lights up and relay-2 switches on, with this an external alarm can be managed
2. When the vehicle is grounded correctly, the red LED goes out, the green LED lights up and relay-1 switches on. With this can for example, an external green lamp be managed (see photos 1 and 2).
3. If the transition resistance between earth clamp and earth point is too high (> 10 ohm), the red LED will flash quickly and relay-2 will activate, this can be used to manage an external alarm.
4. When the earth clamp of the vehicle makes connection (short circuit) with the vehicle itself (for example placing the earth clamp on the chassis of the vehicle itself) the red LED and relay-2 will flash, via relay-2 an external alarm can be managed (see photo- 1 and 2).



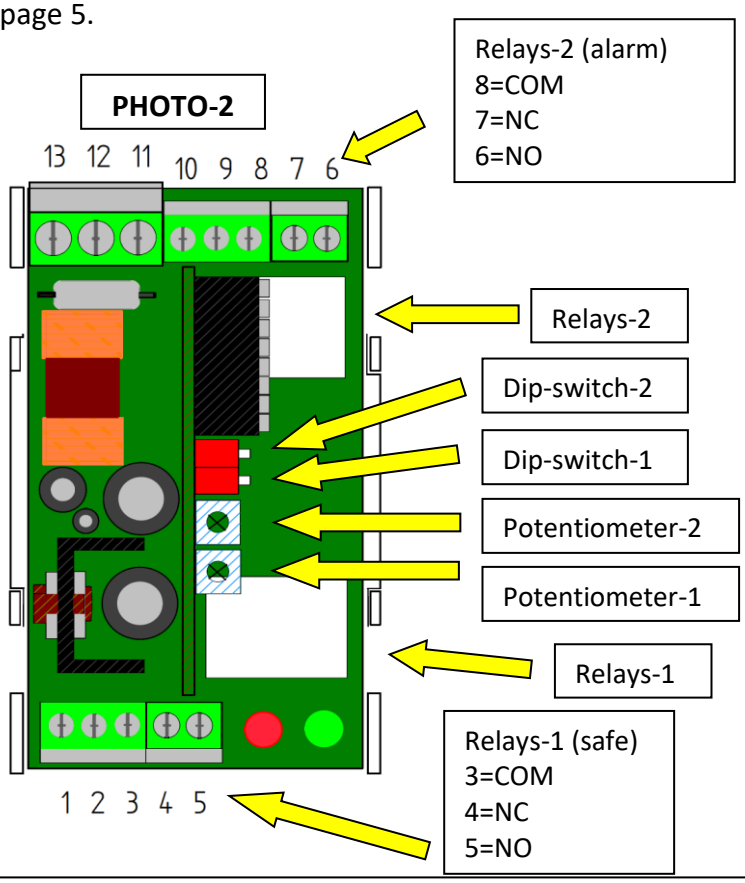
Settings:

With the adjustment trimming potentiometers, the SafeGrond controller is adjusted once according to the circumstances such as type of vehicle (2 axles, 3 axles etc.), type cable reel (aluminium, PVC, etc.) and used cable with earth clamp (see photo-2).

Potentiometer-1: Switching point setting of transition resistance between earth clamp and earth point depending on the type of cable reel and earth clamp (detection of bad connection between earth clamp and earth point).
Potentiometer-2: Switching point setting for grounding in function of vehicle type (detection for functional earth point).

Dip-switch-1:
Dip-switch to OFF (down), check for resistance between earth clamp and earth point is now disabled.
Dip-switch to ON (up), check if the resistance is lower than 10 Ohm, otherwise an alarm will be generated, see alarms page 5.

Dip-switch-2:
Dip-switch to OFF (down), short-circuit detection is disabled.
For cable reels with more than 25 meters cable, vehicle with hydraulic support legs, etc., it is possible that the switching point cannot be set reliably. In this case it is better do disable this function.
Dip-switch ON (up), short circuit detection is enabled (default), during a short circuit, there will be an alarm generated, see alarms page 5.



Specifications according to the SIR:

It is recommended to make adjustments with the SafeGround tester EARTH1212.

1. The SafeGround tester EARTH1212 is provided with 2 switch buttons to simulate various conditions in order that the earthing controller EARTH204 can be adjusted. As determined by the SIR, the earthing transition resistance must not exceed 1000 ohms and the earth clamp transition resistance to the earth point must not exceed 10 ohms.

2. During an inspection, a control is made for 1100 Ohm, the earthing controller EARTH204 must then generate an error (red LED and relay-2 switch on). There will also be a check for 220 Ohm, the controller EARTH204 must then approve the grounding (the green LED lights up and the relay-1 switches on).

3. After this, the transition resistance of the earth clamp is checked towards the earth point at 11 Ohm (earth controller EARTH204 will generate an error) and at 2 Ohm (earth controller EARTH204 will approve this).

4. The earthing controller EARTH204 is adjusted to 680 ohms, this value is approximately in the middle of the two measuring points (220 and 1100 ohms) which are checked by an inspection. The transition resistance of the earth clamp has already been set by SafeGround to 5 ohms, this value is approximately in the middle of the two measuring points (11 ohms and 2 ohms) which are checked by the inspection.

Adjusting the earthing controller EARTH1212:

Before correct adjustment of the potentiometers of the earthing controller EARTH204 it is necessary to switch the DIP-switches 1 and 2 to OFF (downwards).

Unwind completely the cable reel of your vehicle and connect the earth clamp to the double pole earthing plate of the SafeGround tester EARTH1212 (polarity is unimportant).

Turn the left rotary switch to 0 Ohm and the right rotary switch to 680 Ohm.
Connect the single-pole earth clamp of the EARTH1212 to an official earth point.
Turn on the voltage of the earthing controller EARTH204.

When the green LED lights up:

When the green LED lights up, turn potentiometer-2 counterclockwise until the green LED goes just a bit out and the red LED lights slightly up. The potentiometer-2 is now adjusted.

When the red LED lights up:

When the red LED lights up, turn potentiometer-2 clockwise until the green LED lights up, turn slightly back until the red LED lights slightly up. The potentiometer-2 is now adjusted.

The transition resistance adjustment has already been adjusted by SafeGround but it can be controlled and / or adjusted according to the following method:

Disconnect the earth clamp of the vehicle from the SafeGround tester EARTH1212.
Switch the Dip-switch-1 on the Safeground module back to “On” (up), Dip-switch-2 remains on “Off” (down).
After, turn the left rotary switch to 5 ohms and the right rotary switch to 0 ohms, reconnect the earth clamp to the SafeGround tester.

When the green LED lights up:

When the green LED lights up, turn potentiometer-1 counterclockwise until the green LED just goes out and the red LED starts to flash quickly. Potentiometer-1 is now adjusted.

When the red LED lights up:

When the red LED flashes quickly, turn potentiometer-1 clockwise until the green LED lights up, turn back slightly until the red LED starts flashing (a little) again. Potentiometer-1 is now adjusted.

The SafeGround controller is now fully adjusted, remove the SafeGround Tester EARTH1212.

With Dip-switch-2 you can also switch on again the short-circuit protection, switch it to “ON” (upwards), this does not require any further adjustment.

Digital transistor outputs:

The SafeGround controller is equipped with 2 digital transistor outputs (PNP).
This makes it possible to communicate for example with a PLC.

Output-1	Output-2	Decription	Red LED	Green LED
0	0	No earth point detected	On	Off
1	0	Wrong earth point (short circuit with chassis).	Flashes slowly	Off
0	1	Bad connection with earth point.	Flashes quickly	Off
1	1	Earth point connection approved.	Off	On

Be careful to not overload the digital outputs (more than 100 mA) and do not connect inductive loads such as relays.
This causes damage to the SafeGround controller.

Alarms: (When the power supply is on)

- Red LED lights up.
  - Earth clamp is not connected to an earth point.
  - Earth clamp is connected, but the earth point has a too high spreading resistance
  - Earth clamp is connected but grounding wire is broken/interrupted somewhere in the circuit.
  - Earthing reel EARTH325 has not been locked (tighten up blue star knob).
- Red LED flashes slowly (0.5 sec on, 0.5 sec off)
  - There is a false connection between earth clamp and chassis.
  - Earth clamp is placed on the truck/vehicle.
- Red LED flashes quickly.
  - Earth clamp is connected to an earth point, but the transition resistance is too high. Oxidation may be present on the earth point.
  - Earth clamp is connected to an earth point, there may be damage to the measurement signal.

How to use the SafeGround controller:

1. Unwind the cable reel on the vehicle and connect the earth clamp to an earth point.
2. Lock the earthing reel EARTH325 (retighten the blue star knob).
3. Switch on the SafeGround controller.
4. If the SafeGround controller approves the connection, you can start the activity
5. You can connect the loading and / or loose hoses.
6. The earth point remains connected until the work has been completed.

Note:
Ensure that you first connect the earth clamp of the cable reel to an earth point and that the earth point is approved before making other connections (connecting the hoses etc…).

Electrical Terminal blocks:

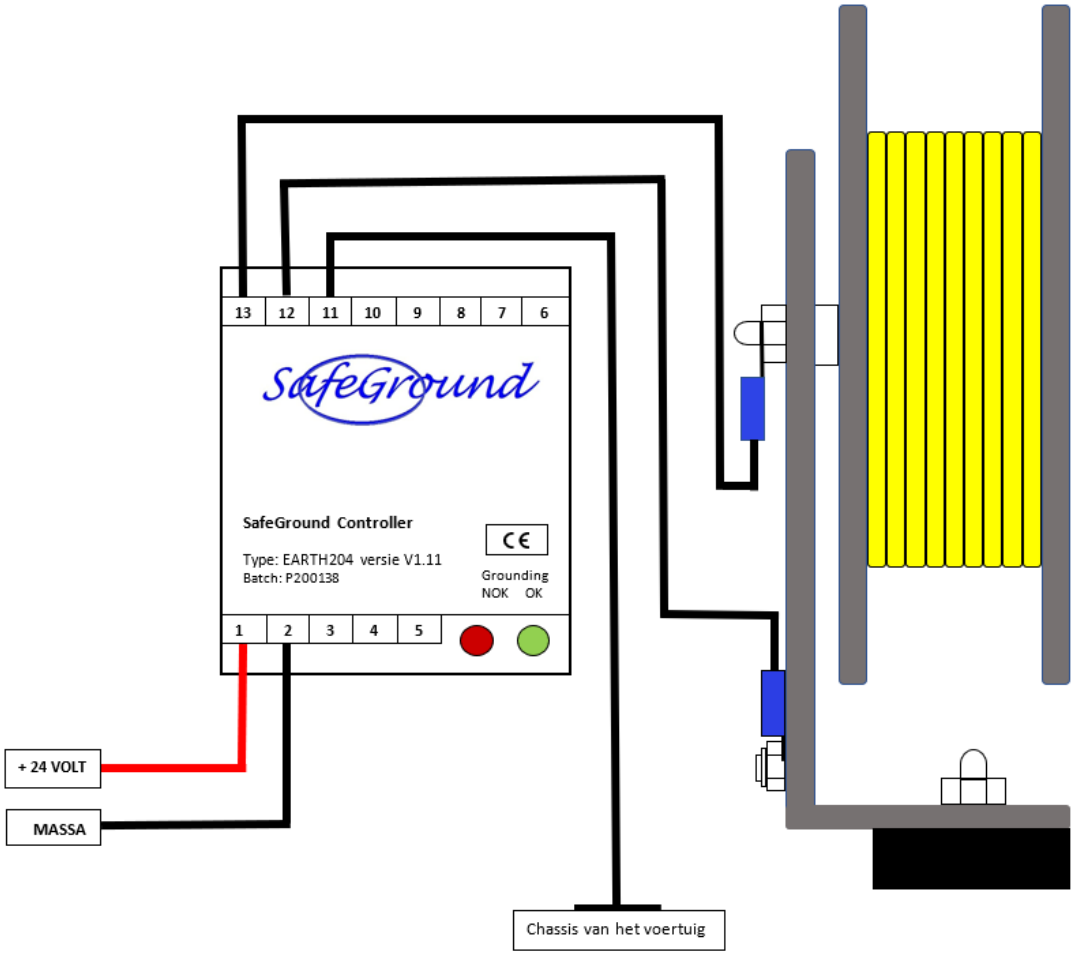
- Terminal block 1 : power supply 24V-DC.
- Terminal block 2 : 0V.

- Terminal block 3 : COM contact relay-1 (works together with the green LED).
- Terminal block 4 : NC contact relay-1 (works together with the green LED).
- Terminal block 5 : NO contact relay-1 (works together with the green LED).

- Terminal block 6 : NO contact relay-2 (alarm relay).
- Terminal block 7 : NC contact relay-2 (alarm relay).
- Terminal block 8 : COM contact relay-2 (alarm relay).

- Terminal block 9 : Digital transistor output-1 (24V-DC max. 100 mA).
- Terminal block 10 : Digital transistor output-2 (24V-DC max. 100 mA).

- Terminal block 11 : Connect the grounding wire with the chassis of the vehicle.
- Terminal block 12 : Connect the grounding wire via the cable reel to the earth clamp .
- Terminal block 13 : Connect the measurement signal via the cable reel to the earth
- clamp.



Specifications:

- Power supply DC minimum 18V and maximum 30V.
- Power consumption maximum 300 mA.
- Measuring signal 55 kHz <20mA 8V max. (Safety voltage).
- Load current terminal block from 1 till 10 is from 0.2 mm² to 2.5 mm² (flexible with wire ferrule)
- Load current terminal block from 11 till 13 is from 0.25 mm² to 4 mm² (flexible with wire ferrule)
- Switching capacity relays-1 en 2:
    - At max.30V DC 10A.
- Not protected against incorrect connection of the supply voltage.
- width: 54 mm.
- Depth: 60 mm.
- Height: 90 mm.
- Housing material polycarbonate light grey.
- Protection: IP 30

Note:
Take the inrush current of inductive loads into account when using the relays.
Short circuits can also damage the relays, even a lamp that breaks down may cause a short circuit.
The best way is to use external relays, if you're not using it, protect the relay outputs as much as possible with the appropriate fuses.

Important:

Placing, connecting, and adjusting the module should **only** be done by a skilled person.

Drawing-1