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USER MANUAL

EarthGuard

Insulation Monitoring Device



EG-600

Installation & Operation

AER12 REV 2.0.3, 9 NOV 2026

AERL.COM.AU

EG-600 · INDOOR TYPE 1 / IP20

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Document

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About AERL

Company & manufacturer information

01

Australian Energy Research Laboratories (AERL) was founded in 1985 by Stuart Watkinson to commercialise the Power Optimizer, which he developed while studying at the University of Queensland. It became the AERL MAXIMIZER™, a universal maximum power point tracker (MPPT).

Today AERL designs, integrates and supports power conversion, lithium energy storage, monitoring and earth-fault detection products for commercial, industrial and off-grid energy systems, including oil and gas, mining and telecommunications sites.

1.1 Contact Information

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1.2 Disclaimer

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Important Safety Information

Symbols, audience, manual scope

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This manual contains important safety information and installation instructions for the EarthGuard EG-600 insulation monitoring device. It uses the following symbols for important operating information and potentially dangerous conditions.

Important

Information you must follow for the EarthGuard to operate correctly.

Caution

A procedure that is critical to installing the EarthGuard safely. Take extreme care when you perform it.

Important — local standards & certified installation

The installation must comply with the electrical standards, codes and wiring rules in force at the site, and must be done by an installer accredited or licensed for solar PV and battery systems in your jurisdiction. Standards cited in this manual reflect the design intent at publication; where your current local standards differ, follow them.

2.1 About This Manual

- This manual gives installation and operating instructions for the EarthGuard. Read all of its instructions and cautions before you start the installation.
- Only qualified electricians and technicians may install the EarthGuard. This manual is for installers and the system owner.
- Do not disassemble or attempt to repair the EarthGuard unless you are a qualified technician and have authority in writing from AERL to do so.
- AERL will not be held responsible in any way for the mishandling of this product or for installation of the product in a manner that does not follow the instructions in this manual or as advised by an AERL technician.

2.2 Firmware

This manual covers EarthGuard EG-600 firmware **v2.0.0 and later**.

Warranty Conditions

Period, start, registration

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Warranty duration

Warranty requirements	Total duration
You are the original purchaser of the EarthGuard.	**2 years**

The warranty starts 30 days after AERL dispatches the EarthGuard.

Our goods come with guarantees that cannot be excluded under the Australian Consumer Law. You are entitled to a replacement or refund for a major failure and compensation for any other reasonably foreseeable loss or damage. You are also entitled to have the goods repaired or replaced if the goods fail to be of acceptable quality and the failure does not amount to a major failure.

Full terms: AERL warranty statement for the EarthGuard EG-600 and EG-600-SC, aerl.com.au.

Register your EarthGuard

Register your EarthGuard at aerl.com.au/warranty-registration. Registration does not change the 2-year warranty.

Specifications

Mechanical, LV side, HV side, standards

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4.1 General

Parameter	Typical
Weight	**300 g**
Dimensions (W × H × D)	**170 × 90 × 35 mm**
Enclosure type	**Indoor Type 1 / IP20**
Operating temperature	**−25 to 60 °C**
Storage temperature	**−25 to 80 °C**
Connection terminals (Test & Earth)	**Lever push-in · 0.2–10 mm² (22–8 AWG)**

4.2 Low-voltage side

Parameter	Value
Input power (DC input)	**12–60 Vdc**
Max current draw (DC input)	**100 mA**
Input power (USB-C)	**4.5–5.5 Vdc**
Max current draw (USB-C)	**250 mA**
Alarm indication relays	**2 × signal (dry contact), NO, fail-safe**

4.3 High-voltage side

Parameter	Value
Voltage range	**40–600 Vdc**
Leakage trip threshold (±10%)	**30 kΩ, fixed (firmware 2.2.1)**
Isolation to LV side	**4 kV (transient)**

4.4 Designed to meet

Domain	Standard
Electrical Safety	**AS/NZS 3100:2017**
EMC	**AS/NZS 61000.6.3:2012**

4.5 Applicable installation standards

(informative)

Intended for installations designed to the applicable local standards in the jurisdiction of use. In Australia/NZ: **AS/NZS 3000**, **AS/NZS 5033**, **AS/NZS 5139**.

Introduction

Methodology, compatibility, detection

05

5.1 Product Description

The EG-600 is a standalone dual-channel insulation monitoring device, designed to support compliance with **AS/NZS 5033** (PV arrays), **AS/NZS 5139** (battery systems) and other applicable local standards. It monitors conductor insulation from 40–600 Vdc and provides integrated audio/visual alarms plus per-circuit fail-safe relay outputs for external fault notification.

5.2 Product Methodology

Resistive earth-fault detection: a small test current is injected between each system conductor and earth, and the resulting insulation resistance is measured. When resistance falls below the configured trip threshold an alarm is raised. Installed on the battery bus, a single unit typically covers both the battery bank and PV array in common-positive / common-negative regulator topologies.

5.3 Product Compatibility

All AERL products are verified compatible. Some third-party devices may exceed permissible leakage thresholds and trigger immediate fault detection on power-up.

Compatible equipment

- Selectronic SP Pro Series 1, 2 & 2i
- Victron SmartSolar & BlueSolar MPPT Series
- Victron MultiPlus & Quattro Series
- Morningstar TriStar Series

Other equipment

Check the device's earth-leakage specification before installation. If the EarthGuard reports a fault at power-up with no insulation fault present, contact AERL.

5.4 Detection Requirements

Whether earth-fault detection is required, on which side(s), and at what threshold depends on installation voltage, power rating and PCE topology. The applicable standards (in Australia/NZ, **AS/NZS 5033** and **AS/NZS 5139**) may change between editions — the installer determines what applies.

Non-isolated systems

Common-positive / common-negative regulators: a single EarthGuard on the battery side typically covers both battery and PV-array circuits. Confirm against your applicable standard.

Galvanically isolated systems

Requirements depend on the decisive voltage class of the battery side — refer to your applicable installation standard and PCE manufacturer documentation.

Installation

Mounting, wiring, AERL Link, sensitivity

06

6.1 Mounting the Device

Fix the EarthGuard to a vertical surface through the mounting holes in the chassis flanges.

Use hardware that suits the surface: expansion anchors for concrete, toggle bolts for plasterboard, machine screws for metal. Check that the unit is level and every mounting point is secure.

> **Important**
> Install the EarthGuard in a clean, dry location, out of direct sunlight and away from moisture.

6.2 Wiring Information

The EarthGuard monitors DC buses from **40 to 600 Vdc**: 48 V and 120 V battery systems and solar PV arrays.

Wire and disconnect sizing

> **Important**
> Wear suitable personal protective equipment (PPE) near live connections, and disconnect all power sources before you change any wiring.

> ⚠ **Caution — hazard**
> Supply the EG-600's 12–60 Vdc input from a current-limited AC–DC or DC–DC power supply. Do not connect it directly to a battery or any other source that is not current-limited: a fault could draw enough current to cause damage or a fire.

- The Test Circuit and Earth terminals are lever push-in (Phoenix Contact LPTA 6), rated **0.2 to 10 mm² (22 to 8 AWG)** (UL/cULus/VDE). Solid and stranded conductors at the small end of the range push straight in with the lever closed. For fine-stranded conductors and larger sizes, lift the lever, insert the conductor, then close the lever.
- Install suitably rated in-line fuses or a circuit breaker between the EG-600's Test Circuit terminals and the DC bus.
- The USB-C (5 Vdc), DC Input (12–60 Vdc) and relay connections are fused internally.

6.3 Wiring Diagram & Terminal Layout

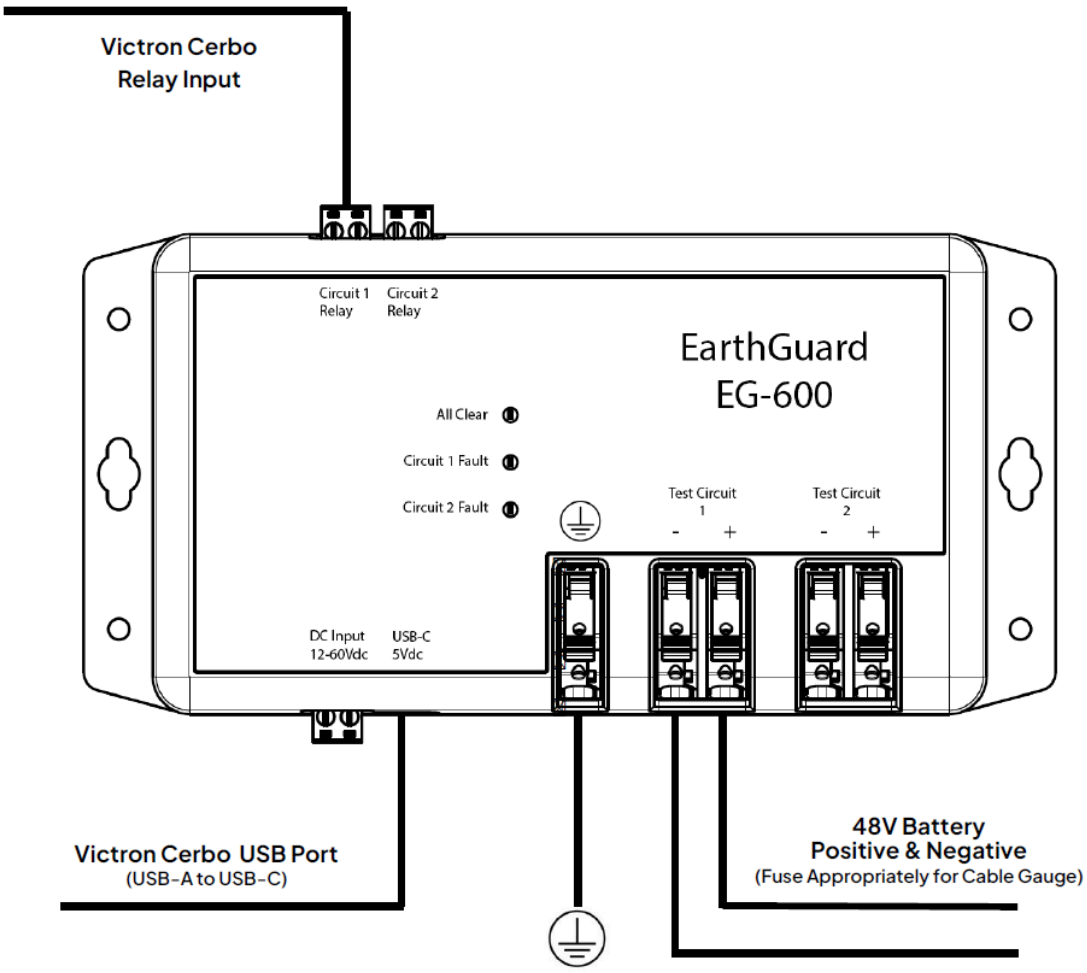


Figure 1 · EG-600 wiring diagram — example with Victron Cerbo

Top edge

Relay 1 / 2	Per-circuit dry-contact pluggable terminals (NO, fail-safe)

Bottom edge, left

DC Input	12–60 Vdc auxiliary supply
USB-C	5 Vdc · service / configuration

Bottom edge, right

⏚ Earth	Reference earth (lever terminal)
Test 1 (– / +)	High-voltage measurement input · circuit 1
Test 2 (– / +)	High-voltage measurement input · circuit 2

6.4 Connecting with AERL Link

Connect a PC to the USB-C port and use AERL Link to view measurements, set the sensitivity and update the firmware. AERL Link shows each circuit's voltage and earth resistance (+ and −) in MΩ, with the device status and firmware version.

> **Important**
> AERL Link runs on Windows 10 and 11. Download it from aerl.com.au/professionals.



Figure 2 · AERL Link — per-circuit insulation overview (demo mode, sample readings)

6.5 Trip Sensitivity Configuration

Choose one of three trip sensitivity levels in AERL Link. The default is **Low (30 kΩ)**.

High	Mid	Low
< 100 kΩ	**< 50 kΩ**	**< 30 kΩ**
Most sensitive	Balanced	**Default**

On firmware 2.2.1, the current release, the trip threshold is fixed at 30 kΩ (Low) whatever sensitivity is set.

6.6 Ground Fault Mode

Set each circuit's mode in AERL Link to match how its DC bus is referenced to earth.

Floating	Positive Earth	Negative Earth
Both poles	**DC− only**	**DC+ only**
Default	DC+ bonded	DC− bonded

> **Important**
> Positive Earth and Negative Earth modes disable monitoring on the bonded pole for that circuit. Use these modes only when the indicated pole is deliberately and permanently bonded to earth at another point in the installation; otherwise leave the circuit on Floating.

6.7 Remote Monitoring

Two dry-contact signal relays, one per circuit, on the top-edge pluggable terminals connect to an external monitor (for example a Victron Venus GX) where the local alarm cannot be heard.

Each contact is **Normally Open (NO)** and **energise-to-close (fail-safe)**: it is closed in normal operation and opens on an earth fault on its circuit or on loss of power. An earth fault, a power loss and a broken cable all show the external monitor the same open contact.

Operation

LED indicators, troubleshooting

07

The EG-600 continuously monitors the insulation between each pole of each test circuit and reference earth. When it detects a fault it lights that circuit's Fault LED, sounds the buzzer and opens that circuit's relay.

7.1 LED Indicators

The LEDs and buzzer show the device state:

Condition	All Clear	Circuit 1 fault	Circuit 2 fault	Buzzer
All Clear (insulation OK)	On	Off	Off	Off
Circuit 1 earth fault (DC+ or DC−)	Off	On	Off	Pulsing
Circuit 2 earth fault (DC+ or DC−)	Off	Off	On	Pulsing

Note — All Clear is green; the Circuit Fault LEDs are red. In a fault the buzzer sounds for about 1.5 s, then is silent for 1.5 s, until the fault clears. When the insulation recovers, the EG-600 returns to All Clear and closes the relay. AERL Link shows the device status, including an internal self-test fault.

7.2 Troubleshooting a Fault

1. **Prepare.** Wear PPE (insulated gloves, safety glasses), follow your isolation procedure and use rated test equipment.
2. **Shut down.** Turn off the inverter and charge controllers, open the battery breakers and PV array isolators, power down the EarthGuard, and confirm zero voltage with a multimeter.
3. **Inspect.** Look for damaged cables (including rodent damage) and degraded PV module back sheets.
4. **Segment and test.** Measure the resistance to earth of the battery conductors, then of the PV array conductors.
5. **Repair and restart.** Fix the fault and restore power. The EG-600 returns to All Clear once the insulation resistance is above the trip threshold.

Simulating a Fault

Test procedure, support contact

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Caution — potential hazard

An earth fault can damage power conversion equipment (PCE) and connected components. Ask the PCE manufacturer before you simulate an earth fault. AERL takes no responsibility for damage caused by simulating an earth fault.

To check that the EG-600 is working, follow this procedure with **extreme caution**.

1. **Isolation procedure.**
   a. Disconnect all PCE from the EarthGuard.
   b. Disconnect the chargers, inverters and battery from the bus.
   c. Check that the whole system is powered down.
   d. Confirm all equipment is isolated from the EarthGuard.

2. With the EarthGuard and the system powered down, fit a **10–12 kΩ** resistor (**20 kΩ maximum**; not supplied) between the + or − terminal of the circuit under test and the Earth terminal. Any resistance below the trip threshold trips the unit, so 10–12 kΩ trips at all three sensitivity levels.

3. **Testing sequence.**
   a. Reconnect the battery to the Test Circuit terminals.
   b. Restore power to the EarthGuard.
   c. Confirm the EarthGuard reports a fault: the circuit's Fault LED lights, the buzzer sounds and its relay opens.

4. Power down the system, remove the test resistor and reconnect the equipment.

Need help?

If the test does not trip the EarthGuard, or your installation is not covered here, contact AERL support at support@aerl.com.au or on **1800 950 865**.

Installation Record

Record how this EarthGuard is set up and keep this manual with the installation.

Site

Installed by

Licence number

Installation date

Serial number

Firmware version

Supply ☐ 12–60 Vdc input ☐ USB-C

Circuit 1

Monitors

Ground fault mode ☐ Floating ☐ Positive Earth ☐ Negative Earth

Trip sensitivity ☐ High ☐ Mid ☐ Low

Relay 1 connected to

Circuit 2

Monitors

Ground fault mode ☐ Floating ☐ Positive Earth ☐ Negative Earth

Trip sensitivity ☐ High ☐ Mid ☐ Low

Relay 2 connected to

Fault simulation test

Date and result



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