Battery Sense

Remote Temperature and Voltage Sensor



BAT-SENSE

Installation and Operation User Manual

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About AERL

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.

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Effective Date

November 2026 (11/2026)

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Contact Information

Australian Energy Research Laboratories, 1/75 Bluestone Circuit, Seventeen Mile Rocks QLD 4073, Australia

aerl.com.au · sales@aerl.com.au · 1800 950 865

Important Safety Information

About this manual

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This manual contains important safety information and installation instructions for the AERL Battery Sense remote temperature and voltage sensor. It uses the following symbols for important operating information and potentially dangerous conditions.

Important

Indicates information that must be followed to ensure proper installation or operation of the Battery Sense.

Caution

Indicates a critical procedure for the safe installation or operation of the Battery Sense.

1.1 About This Manual

This manual gives installation and operating instructions for the Battery Sense. Read all of its instructions and cautions before you start the installation.

Only qualified electricians and technicians may install the Battery Sense. This manual is for installers and the system owner.

Do not disassemble or attempt to repair the Battery Sense 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 AERL.

Warranty Conditions

Warranty duration

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2.1 Warranty Duration

Warranty requirements	Total warranty duration
You are the original purchaser of the Battery Sense.	2 years

The warranty starts 30 days after AERL dispatches the Battery Sense.

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 CoolMax Battery Sense, aerl.com.au.

Specifications

Mechanical views, general specifications, characteristics

03

3.1 Mechanical Views

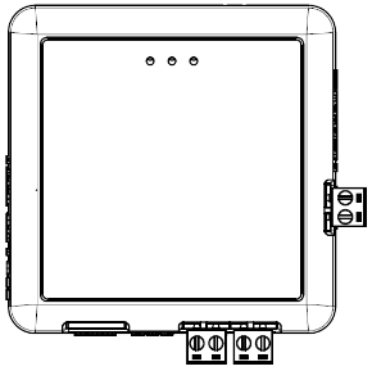


Figure 3.1 Top view, showing the three LED indicators

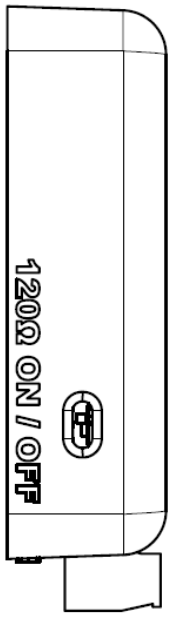


Figure 3.2 Termination switch side (120 Ω ON / OFF)

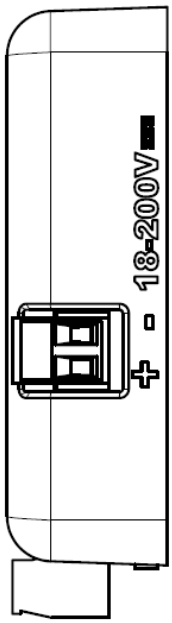


Figure 3.3 Voltage input side (18–200 V)

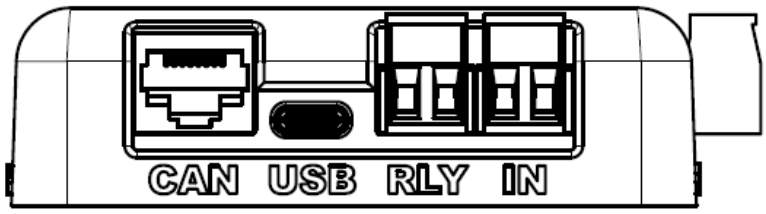


Figure 3.4 Connector side: CAN, USB, RLY (Float Indication Output) and IN (Float Switch Input)

3.2 General Specifications

Parameter	Typical
Weight	0.25 kg
Dimensions (W × H × D)	15 × 15 × 3 cm
Enclosure Type	Indoor Type 1 / IP20
Mounting Method	Double-sided Adhesive Tape
Voltage Input Connector	Screw terminals (0.5–2.5 mm²)

3.3 Characteristics

Parameter	Specification
Voltage Input Range	18–200 Vdc
Communication Interface	CAN Bus (RJ45)
Maximum Cable Length	10 metres
Power Supply	5 V (via CoolMax CAN port)
Float Indication Output Relay	12 V / 2 A (fused)
Float Switch Input	Normally Open (NO), voltage-free contacts
Termination	120 Ω (switchable)
Status Indicators	Active (Green Heartbeat), Fault (Red), CAN Activity (Yellow Blinking)
Max Altitude Rating	2000 m
Storage Temperature	−30 to 70 °C
Self-Consumption @ Idle	0.1 W
Allowable Relative Humidity	95% (Non-Condensing)
Ambient Operating Temperature Range	−20 to 50 °C
Designed to meet	EN 61000-6-3:2012 EN 61000-6-4:2012

Introduction

Features

04

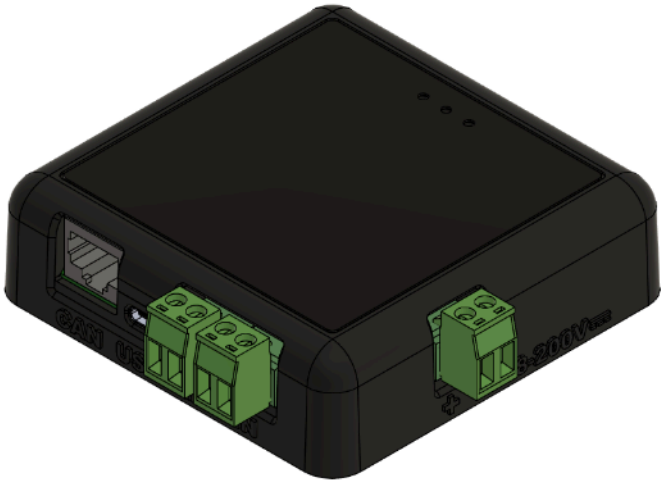


Figure 4.1 Battery Sense Remote Temperature and Voltage Sensor

Thank you for purchasing an Australian made Battery Sense Remote Temperature and Voltage Sensor.

The Battery Sense is an accessory for AERL CoolMax solar charge controllers. It measures battery temperature and voltage at the battery, so the controller can compensate its charging for temperature and monitor the battery more accurately.

4.1 Features

With a CoolMax SRX controller, the Battery Sense provides:

- **Temperature Compensation:** Provides accurate battery temperature data for optimal temperature-compensated charging
- **Voltage Monitoring:** Delivers precise battery voltage readings directly from the battery terminals
- **Float Switch Input:** Allows synchronisation with third-party charging equipment
- **Float Indication Output:** Signals to external devices when the battery reaches float stage
- **CAN Bus Integration:** Connects to CoolMax SRX controllers
- **Status Indicators:** Provides visual confirmation of device operation and status

Installation

Standards & requirements, mounting the device

05

All installations must comply with national and local electrical standards and codes of practice.

AERL recommends professional installation. No ongoing maintenance is required.

5.1 Standards & Requirements

Important

The Battery Sense must be installed in a clean, dry location away from direct sunlight on a flame retardant or non-flammable surface.

Caution – hazard

Ensure all circuit breakers are in the OFF position before connecting or disconnecting the Battery Sense.

5.2 Mounting the Device

Use the pre-applied double-sided tape on the back of the Battery Sense to mount it on a vertical surface near the battery bank.

When selecting a mounting location, consider the following:

1. Mount the device in the same ambient environment as the batteries
2. Avoid direct sunlight, heat sources, or areas with restricted airflow
3. Ensure the location allows for proper cable routing to both the battery terminals and the CoolMax controller
4. Keep away from areas exposed to water, high humidity, or chemical vapours

To mount the device:

1. Clean and dry the mounting surface thoroughly
2. Remove the protective backing from the double-sided tape

3	Press the Battery Sense firmly against the mounting surface
4	Allow the adhesive to set for at least 1 hour before connecting cables

5.3 Mounting Clearances

When mounting the Battery Sense, a clearance zone around the device should be maintained for optimal operation:

- Top: 5 cm
- Bottom: 5 cm
- Sides: 5 cm

This clearance ensures proper air circulation and access for wiring connections.

5.4 Wiring Information

> **Important**
> - Wire sizes must comply with local and national standards.
> - Copper wiring must be rated at 75 °C or higher.

Use a minimum of #18 AWG (0.75 mm²) high strand count double insulated cable for the voltage sense connection between the Battery Sense and the battery terminals.

Torque all Battery Sense wire terminals to 0.5 Nm (4.4 in-lb).

5.5 Voltage Sense Wiring

> **Caution – hazard**
> Always install appropriate fusing for the voltage sense connection near the battery terminals.

1. Select an appropriate gauge wire for the voltage sense connection
2. Install an in-line fuse holder near the battery connection point
3. Connect the voltage sense wires to the battery terminals, ensuring correct polarity
4. Secure all connections and verify they are tight and corrosion-free

> **Caution – hazard**
> Reversing the polarity of the voltage sense connection may damage the Battery Sense and void product warranty.

Confirm polarity with a multimeter before you connect the voltage sense wires.

Operation

Connection to CoolMax SRX, LED status indicators

06

6.1 Connection to CoolMax SRX

The Battery Sense connects to the CoolMax SRX controller via one of the CAN bus RJ45 ports.

Required materials

- High-quality CAT6 Ethernet cable (maximum 10 metres)
- RJ45 connectors and crimping tool (if custom cable length is required)

Connection steps

1	Locate the CAN bus RJ45 ports on the CoolMax SRX controller (located between the power terminals)
2	Ensure the 5 V power toggle switch on the CoolMax SRX communications board is set to the ON position
3	Set the 120 Ω termination switch on the Battery Sense to the ON position if this is the last device in the CAN bus chain
4	Insert one end of the CAT6 cable into the RJ45 port on the Battery Sense
5	Insert the other end of the CAT6 cable into one of the CAN bus ports on the CoolMax SRX
6	Verify the connection is secure with the locking tab engaged

> **Important**
> Use only high-quality CAT6 cables for reliable communication. Maximum cable length is 10 metres.

Once properly connected, the Battery Sense will automatically begin transmitting temperature and voltage data to the CoolMax SRX controller.

6.2 LED Status Indicators

The Battery Sense features three LED indicators to provide visual status information:

LED	State	Meaning
Green (Active)	Slow heartbeat (brief flash every ~1.5 s)	Device is powered and operating normally
Green (Active)	Off	Device is not powered
Red (Fault)	Solid On	Fault condition detected (e.g. watchdog initialisation failure)
Red (Fault)	Brief 3× flash	Float event acknowledgement (Float Switch Input closed, or float charge state received from a CoolMax SRX)
Red (Fault)	Off	Normal operation
Yellow (CAN Activity)	Brief blink	A CAN message has been transmitted or received
Yellow (CAN Activity)	Off	No CAN bus activity

At power-on, all three LEDs illuminate briefly as a self-test, then return to their normal states.

The LED indicators are located on the front of the device and are visible through the transparent cover.

6.3 Temperature Compensation

Temperature compensation measures the temperature of the batteries and adjusts the float and absorb voltage set points to the ideal voltage for batteries at that temperature.

Using the temperature of the batteries, the CoolMax SRX adjusts voltages by a factor in millivolts per °C, set in AERL Link. The factor is per bank, not per cell; the factory default is 50 mV/°C.

> **Important**
> The CoolMax SRX compensates whenever it has a battery temperature reading, from the Battery Sense or from a battery BMS over CAN. Without one, it charges to the uncompensated set points.

Setting temperature compensation

To configure temperature compensation:

1. Connect to the CoolMax SRX using AERL Link software
2. Navigate to the Battery Charge Profile settings
3. Set an appropriate temperature compensation value (refer to your battery manufacturer's recommendations)
4. Apply the changes to the CoolMax SRX

Temperature compensation is particularly important for:

- Systems exposed to wide temperature variations
- Remote installations where battery temperature may differ significantly from the controller temperature
- Critical applications where optimal battery performance and longevity are essential

6.4 Voltage Monitoring

The Battery Sense provides accurate battery voltage readings directly from the battery terminals, allowing the CoolMax SRX to:

- Make precise charging state transitions
- Detect voltage drops due to cable resistance
- Provide more accurate state-of-charge estimation

The voltage monitoring function works automatically once the Battery Sense is properly connected and the voltage sense wires are connected to the battery terminals.

6.5 Float Switch Input

The Battery Sense includes a Float Switch Input that allows external systems to signal when the battery has reached float stage. This is useful for synchronising multiple charging sources.

Connection

- The Float Switch Input requires a simple normally open (NO) contact closure
- No external voltage should be applied to these terminals
- When the contact closes (and remains closed for ~1 second of debounce), the Battery Sense commands the CoolMax SRX to enter float charging mode
- When the contact subsequently re-opens (and remains open for ~1 second), the Battery Sense commands the CoolMax SRX to exit float and return to absorb charging mode

> **Caution – hazard**
> Do not apply any voltage to the Float Switch Input terminals. This input is designed for a voltage-free contact closure only.

Usage scenarios

- Integration with AC chargers or generators
- Coordination with third-party charge controllers
- Manual float mode triggering for maintenance purposes

6.6 Float Indication Output

The Battery Sense provides a Float Indication Output relay that activates when the CoolMax SRX controller enters float charging mode.

Specifications

- Normally Open (NO) relay contact
- Maximum rating: 12 V / 2 A (fused)
- Closes after two consecutive float-state reports are received from a CoolMax SRX device on the CAN bus (a brief debounce to reject spurious single messages)
- Re-opens when a non-float charge state is received

> **Important**
> Do not exceed the 12 V / 2 A rating of the Float Indication Output relay. For higher loads, use an appropriately rated intermediate relay.

Usage scenarios

- Triggering indicator lights or alarms
- Signalling to other charging equipment
- Activating or deactivating auxiliary loads based on battery state

Troubleshooting – LED Indicators

Troubleshooting guide

07

Use the LED indicators to diagnose a problem; their states are listed under LED Status Indicators in the Operation chapter.

7.1 Troubleshooting Guide

Issue	Possible causes	Solution
Green LED not flashing	- 5 V power toggle on SRX not enabled - Poor connection to CoolMax SRX - Faulty CAT6 cable	- Ensure 5 V power toggle on SRX is ON - Check cable connections - Try a different CAT6 cable
Red Fault LED solid on	- Internal device fault (e.g. watchdog initialisation failure) - Voltage sense connection issue - Voltage out of range	- Power-cycle the device - Check voltage sense connections - Verify battery voltage is within 18–200 Vdc range - Contact AERL support
Yellow LED not blinking	- No CAN traffic on the bus - CAN bus configuration problem	- Check cable connections - Verify 120 Ω termination switch positions - Restart the CoolMax SRX
Temperature not showing in AERL Link	- 120 Ω termination not enabled - Communication issue - Device fault	- Set 120 Ω termination switch to ON - Check cable connections - Verify green LED is illuminated
Incorrect voltage reading	- Poor voltage sense connection - Improperly sized fuse - Voltage sense wire damage	- Check voltage sense connections - Verify appropriate fusing - Inspect wiring for damage
Float switch input not working	- Improper connection - External voltage applied	- Verify switch is normally open type - Ensure no voltage is applied to terminals - Check continuity of float switch
Float indication output not working	- Exceeding 12 V / 2 A rating - Blown fuse - Connection issue	- Verify connected load is within rating - Check/replace fuse - Verify connections

If your situation is not covered here, contact AERL support on 1800 950 865 or at support@aerl.com.au.

Australian Energy Research Laboratories

ADDRESS

1/75 Bluestone Circuit
Seventeen Mile Rocks QLD 4073
Australia

CONTACT

sales@aerl.com.au
support@aerl.com.au

aerl.com.au

Phone
1800 950 865

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