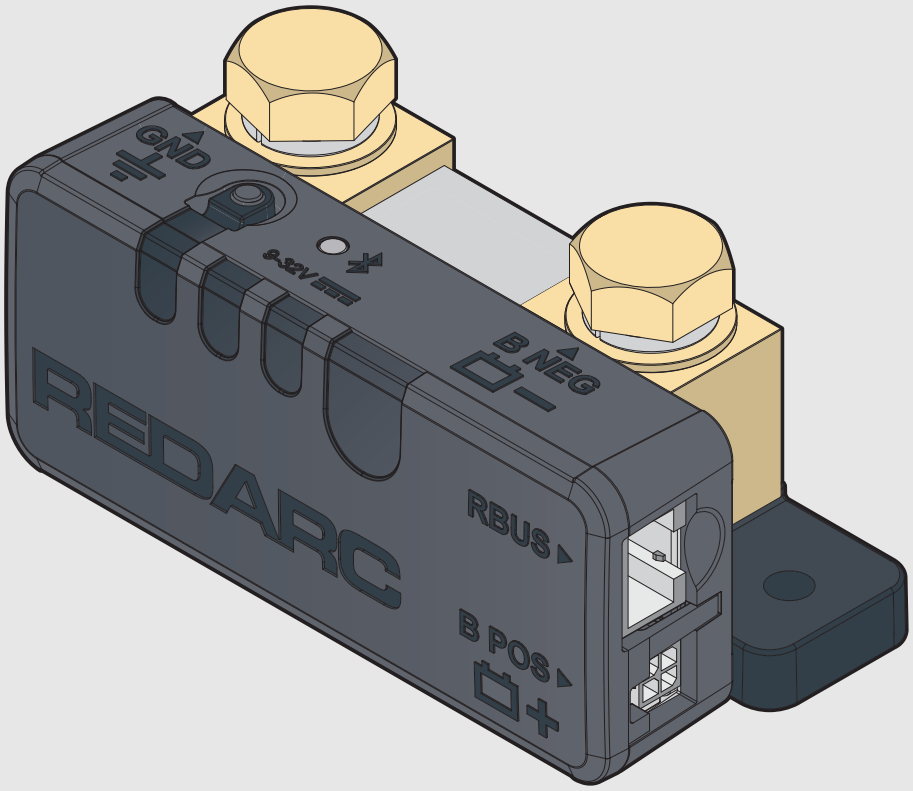
THE POWER OF REDARC®

Smart Battery Monitor

BSEN500



AUSTRALIAN MADE®

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WARNINGS & SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS — This manual contains important safety instructions. Do not operate the system unless you have read and understood this manual. REDARC recommends that the products referenced in this manual be installed by a suitably qualified person.

Disclaimer: REDARC accepts no liability for any injury, loss or property damage which may occur from the improper or unsafe installation or use of its products.

SAFETY MESSAGE CONVENTIONS

Safety messages in this manual include a signal word to indicate the level of the hazard as follows:

⚠ **WARNING:** Indicates a potentially hazardous situation which could result in death or serious injury to the operator or to bystanders.

⚠ **CAUTION:** Indicates a potentially hazardous situation which may result in moderate or minor injury to the operator or to bystanders.

NOTICE: Indicates a situation that may cause equipment damage.

⚠ WARNING

1. **RISK OF EXPLOSIVE GASES:** Working in vicinity of a Lead-Acid battery is dangerous. Batteries generate explosive gases during normal operation. For this reason, it is of utmost importance that you follow the instructions when installing and using the Battery Monitor.
2. Keep clear of naked flame, sparks and other sources of ignition. Do not allow other conductive materials to interfere with electrical installation.

⚠ CAUTION

1. Do NOT alter or disassemble the Battery Monitor under any circumstances. All faulty units must be returned to REDARC for repair. Incorrect handling or reassembly may result in a risk of electric shock or fire and may void the unit warranty.
2. The Battery Monitor should not be used by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they are supervised or have been instructed on how to use the appliance by a person responsible for their safety. Children should be supervised to ensure that they do not play with the Battery Monitor.
3. Only use the Battery Monitor with Standard Automotive Lead Acid, Calcium Content, Gel, AGM, SLI, Deep Cycle or Lithium Iron Phosphate type 12 V batteries.
4. Cable sizes are specified by various codes and standards which depend on the type of vehicle the battery is installed in. Selecting the wrong cable size could result in harm to the installer or user and/or damage to the Battery Monitor or other equipment installed in the system. The installer is responsible for ensuring that the correct cable sizes are used when installing this Battery Monitor.
5. NEVER smoke or allow a spark or flame in vicinity of battery or engine. This may cause the battery to explode.
6. The Battery Monitor is designed to accurately measure current within its maximum measurement range. The Battery Monitor cannot sustain prolonged exposure to currents exceeding 300 A due to thermal rise. Caution must be taken in high current system applications.

PERSONAL SAFETY PRECAUTIONS: To assist with the safe operation and use of the Battery Monitor when connected to the battery:

a. **HOT SURFACE:** High amperage loads connected to the Battery Monitor can cause the terminal/metal components to become extremely hot. To avoid burns, do not touch the hot parts without suitable personal protective equipment.

b. Wear complete eye protection and clothing protection. Avoid touching eyes while working near a battery.

c. If battery acid contacts your skin or clothing, remove the affected clothing and wash the affected area of your skin immediately with soap and water. If battery acid enters your eye, immediately flood the eye with running cold water for at least 10 minutes and seek medical assistance immediately.

NOTICE

Keep the Battery Monitor away from major heat sources, high voltages, and avoid exposure to sunlight for long periods of time.

PRODUCT OVERVIEW

The Battery Monitor provides critical system information including battery voltage, current, State of Charge (SoC) and temperature information of the connected battery via the RedVision® App.

The Battery Monitor can be combined with REDARC R-Bus compatible products, including the Manager with the RedVision® Display.

The Battery Monitor can also be used independently to monitor and provide information of the connected battery via the RedVision® App.

Get the Free Configurator App

Configure the settings of your Battery Monitor using your smartphone via Bluetooth®.

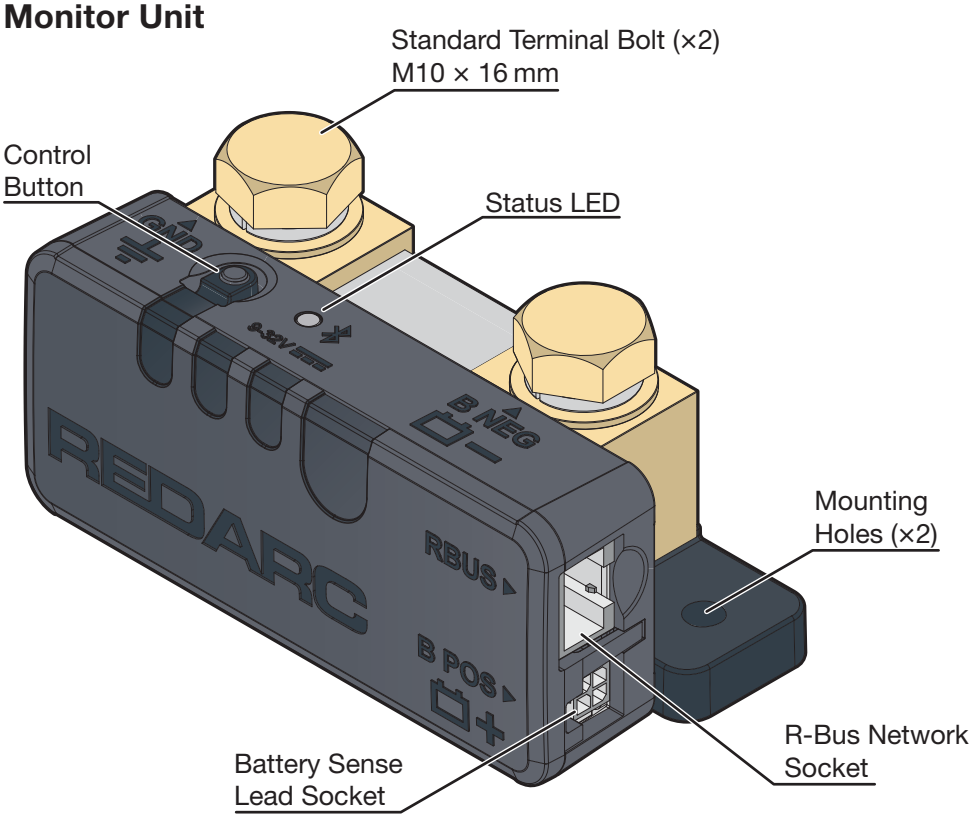
Get the Free RedVision® App

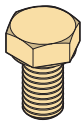
Monitor and control your RedVision® System using your smartphone via Bluetooth®.

The RedVision® App and the Configurator App and their interactions with the Battery Monitor have not been tested on all smartphone models. Visit the application pages within your App store to view compatibility details.

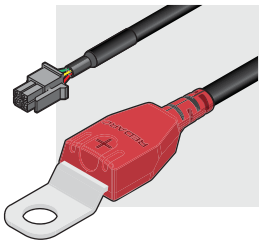
KIT CONTENTS

Smart Battery Monitor Unit

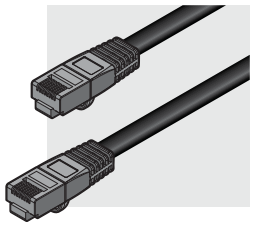




Alternative Terminal Bolt
M10 × 20 mm

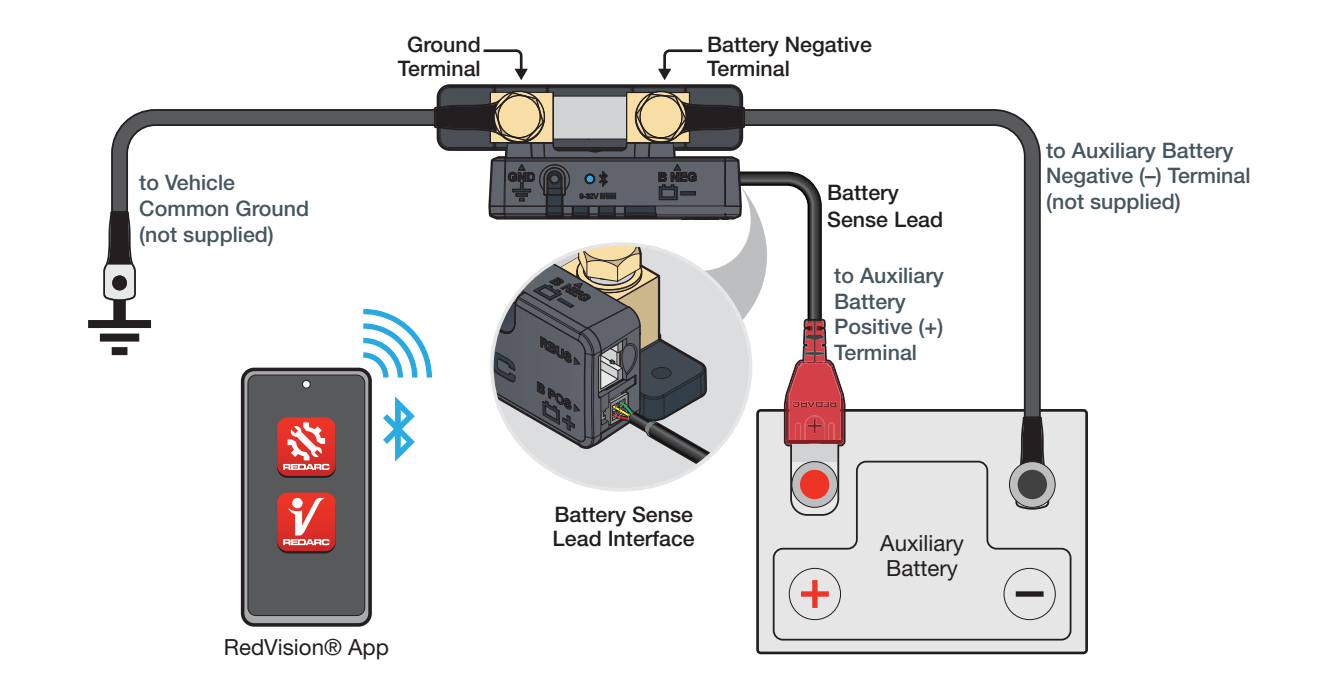


Battery Sense Lead
1 m (3.3')

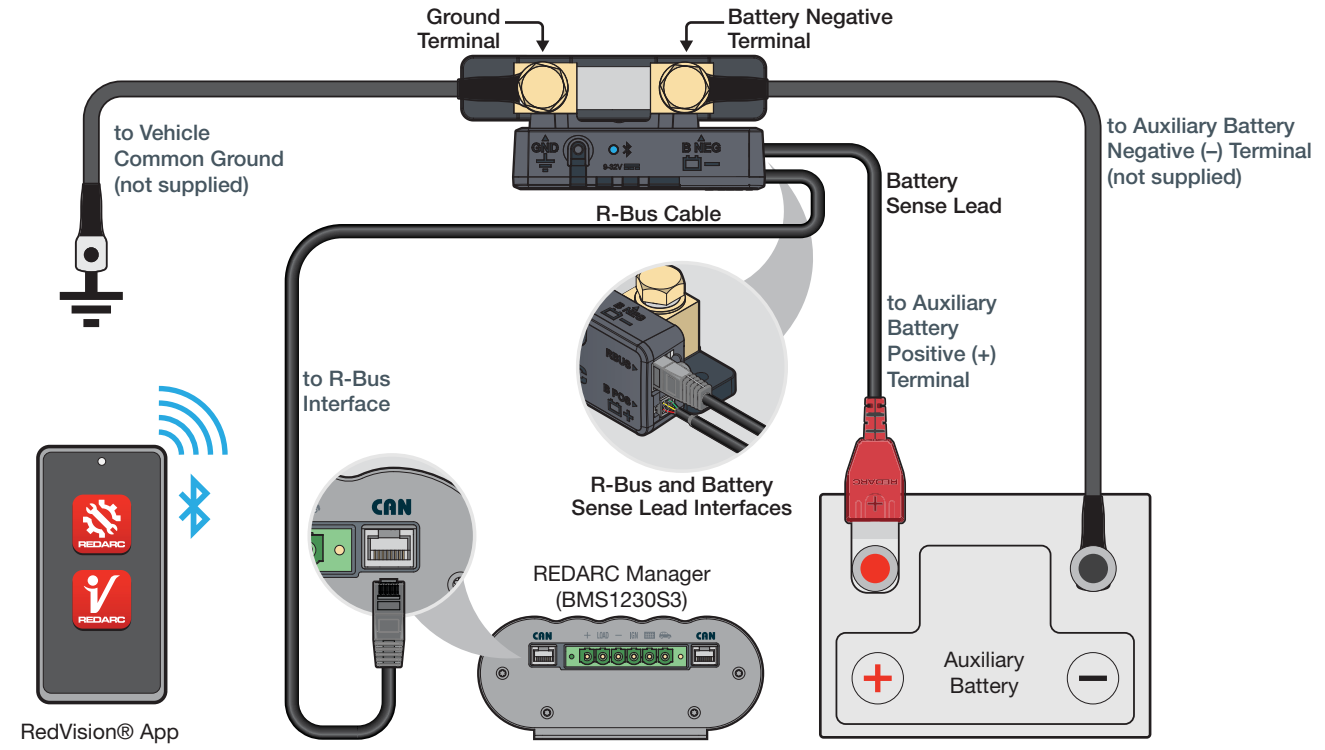


R-Bus (RJ45) Cable
2 m (6.6')

WIRING DIAGRAM — STANDALONE INSTALL



WIRING DIAGRAM — R-BUS INSTALL



Refer to the Instruction Manual supplied with your Manager for detailed mounting and installation instructions. This wiring diagram shows a common/typical system configuration. If unsure, contact REDARC Technical Support for advice on your individual system requirements. **See** page 15 **for more information on R-Bus system wiring.**

SYSTEM PLANNING

WHAT YOU WILL NEED

To mount, install and manage cabling of the Battery Monitor, the following common automotive electrical tools and consumables may be required:

- Heatshrink
- Suitable cable lug crimping tool
- Cable cutters
- Screwdriver / power drill
- Spanner or Socket to suit M10
- Cable ties
- P-Clips

COMMON GROUND

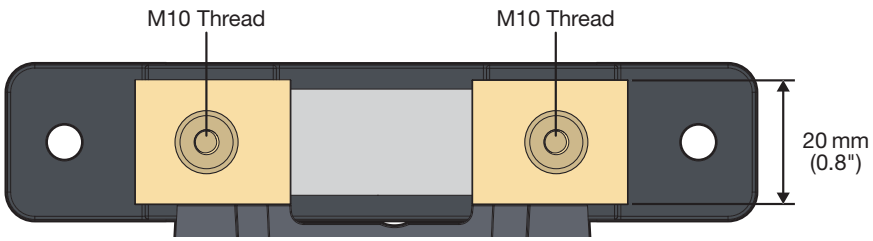
Before planning wiring, consider that the Ground (GND ⏚) connection and all components in your setup must share a common electrical ground for correct system operation. This is typically achieved by connecting all grounds to the vehicle body.

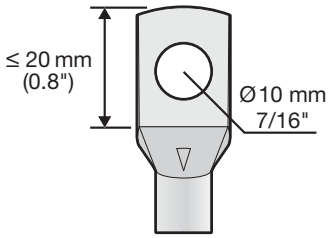
LUG REQUIREMENTS

The Ground (GND ⏚) and Battery Negative (B NEG ▭ –) terminals have M10 screw threads. Select lugs with a 10 mm (7/16") stud hole and a cable barrel that suits the required cable gauge.

The Ground (GND ⏚) terminal is capable of connecting multiple loads, for important lug requirements and instructions see 'Connecting multiple loads' (page 12).

NOTE: If installing the lugs to the Battery Monitor terminals facing downwards, select a lug where the lug tongue is long enough to cover the shunt surface. This is to ensure the lug cable barrel does not hit against the shunt. See 'Strain-Relief and Cable Management' (page 16) for more information.





CABLE REQUIREMENTS

⚠ CAUTION:

- Cable sizes are specified by various codes and standards which depend on the type of vehicle the battery is installed in. Selecting the wrong cable size could result in harm to the installer or user and/or damage the Battery Monitor or other equipment installed in the system. The installer is responsible for ensuring that the correct cable sizes are used when installing the Battery Monitor.
- If an undersized Battery Negative cable is used, frequent device over temperature faults may occur.
- Wiring must be installed in protected areas away from heat sources and sharp objects. Cables must not be routed over or through moving parts of the vehicle. Additional protection such as conduit may be required, especially if routing cables through the engine bay.

Appropriate cables are required for the Ground (GND ⏚) and Battery Negative (B NEG ▭ –) terminals.

BATTERY NEGATIVE CABLE

The Battery Negative cable should be no longer than 1 m (3'3") to minimise the voltage drop between the Battery Monitor and auxiliary battery. Refer to the table below to determine a suitable cable gauge for this connection based on the current your system setup has.

IMPORTANT: The following table should be used as a reference only. A different cable size and insulation may be required in certain system setup conditions such as:

- The maximum current may draw for periods longer than 30 minutes.
- Cables run through a location with higher ambient temperatures.
- Required to use cable length longer than the recommended maximum cable length (1 m (3'3")).

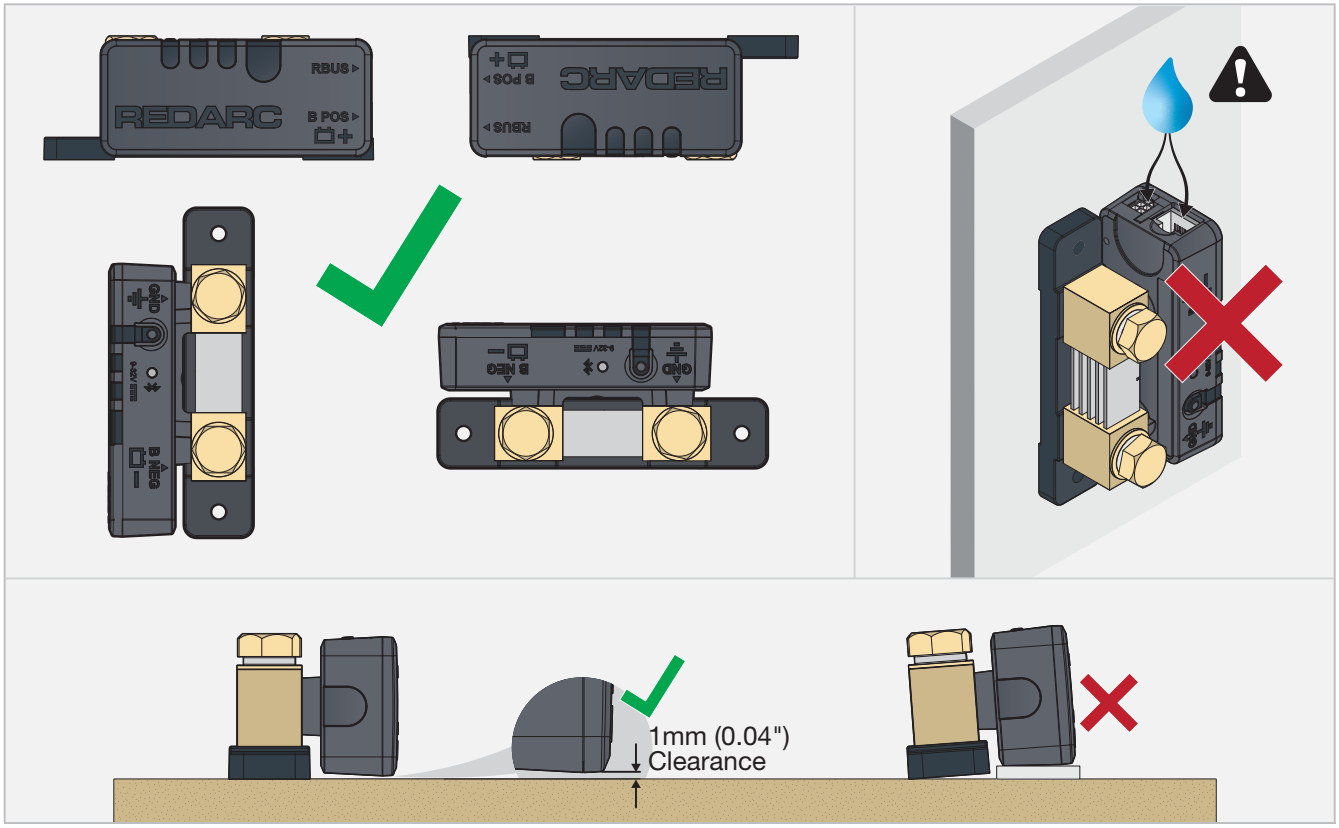
System Current	100 A	200 A	300 A	400 A	500 A
Maximum Cable Length	1 m (3'3")				
Recommended Cable Cross Section	35 mm²	70 mm²	95 mm²	120 mm²	150 mm²
Closest Equivalent AWG/BAE/B&S	1	3/0	4/0	250 kcmil	300 kcmil

INSTALLATION — MOUNTING

MOUNTING REQUIREMENTS

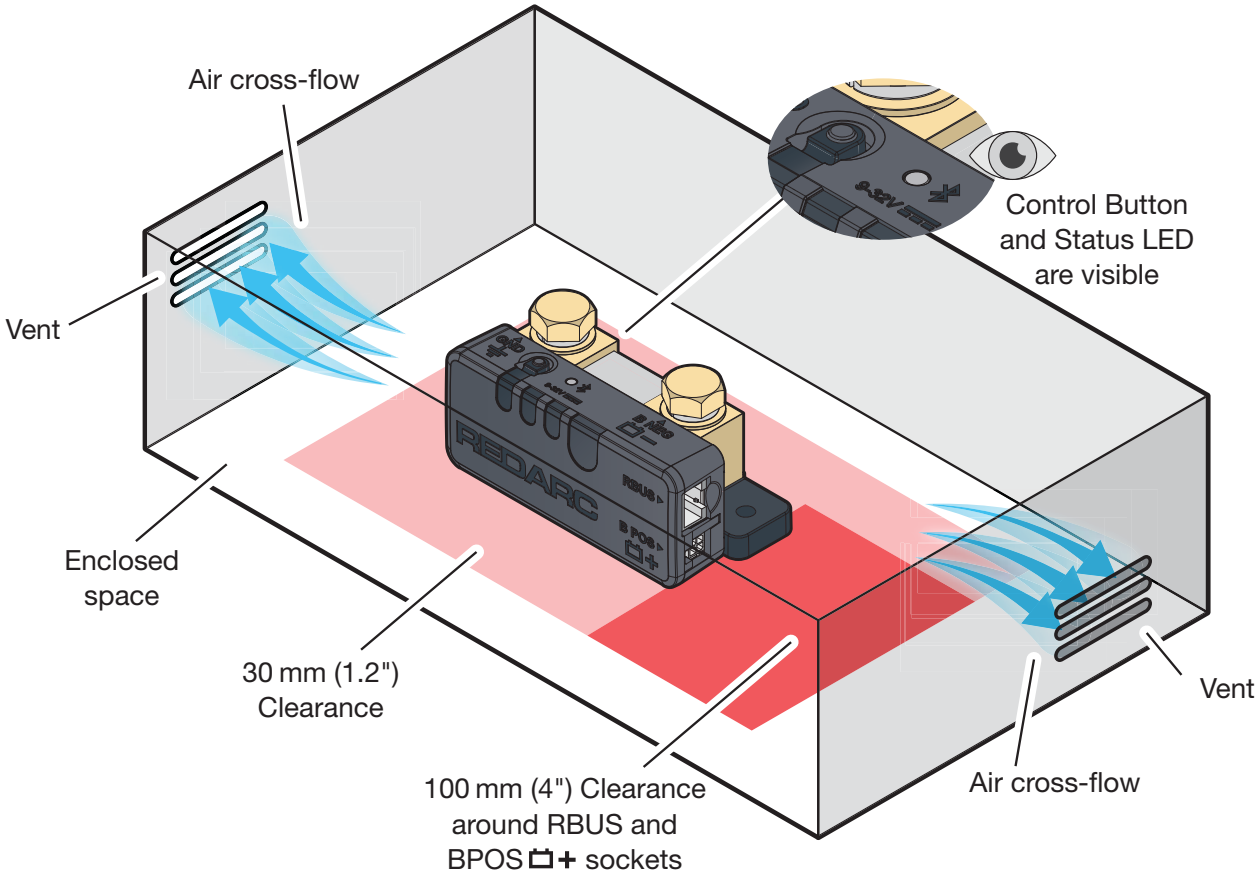
IMPORTANT: DO NOT install the Battery Monitor in the engine bay, this Product is not designed to operate in engine bay environments.

- Mount in a location that will avoid using excessive cable length.
- Test that the Battery Sense Lead will comfortably reach between the Battery Monitor and auxiliary battery before installation (1 m (3'3") of cable length).
- Test that the R-Bus cable will comfortably reach between the Battery Monitor and the R-Bus input on a compatible REDARC product before installation (2 m (6'6") of cable length).
- Mount in a location that is dry and is not prone to high humidity. Liquid or vapour entering the Battery Monitor can cause irreparable damage.
- DO NOT mount with the RBUS and B POS (⊡ +) sockets facing upwards, to prevent condensation/liquids running into the Battery Monitor. The Battery Monitor can be mounted in any other orientation.
- Mount the Battery Monitor permanently to a fixed surface that has adequate strength to support it when all connections and wiring are in-place. DO NOT mount on any moveable parts.
- The mounting surface must be flat and safe to drill through — check the reverse side before drilling.
- Ensure the main housing of the Battery Monitor is clear from any protrusions (1 mm (0.04") clearance).



MOUNTING CLEARANCES

- Leave at least 100 mm (4") of clearance around the RBUS and B POS (+) sockets to allow for R-Bus cable routing. This clearance also provides room for strain-relief and cable management once wiring is complete. See 'Strain-Relief and Cable Management' (page 16) for more information.
- Mount in a location where the Control Button and Status LED are visible and accessible.
- Leave at least 30 mm (1.2") of clearance on all sides and above the Battery Monitor to allow for air-flow. The Battery Monitor shunt may become hot with high currents.
- If installing the Battery Monitor in an enclosed space, make sure there is adequate venting. Two vents should ideally be positioned at the top and bottom of the enclosure for cross-flow of air.

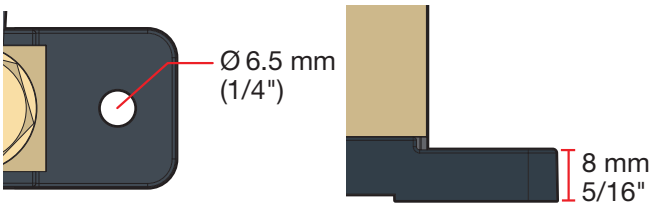


MOUNTING INSTRUCTIONS

MOUNTING HARDWARE

When mounting the Battery Monitor, both Mounting Holes must be used.

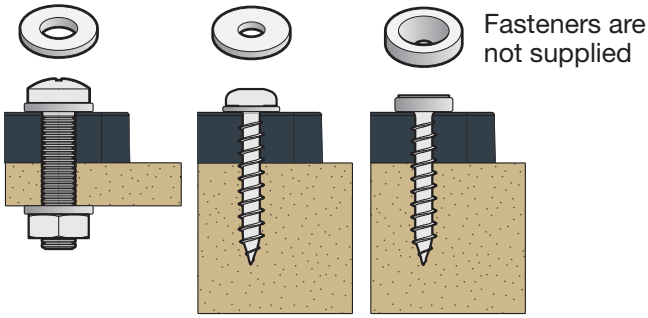
Ensure the selected fasteners are suitable for the mounting surface and there is clearance-fit through the Mounting Holes on the Battery Monitor.



Two fasteners are required for mounting the Battery Monitor. REDARC recommend using M6 (1/4") to M4 (8#) fasteners with washers.

If using countersunk fasteners, apply countersunk washers to avoid damaging the Mounting Holes.

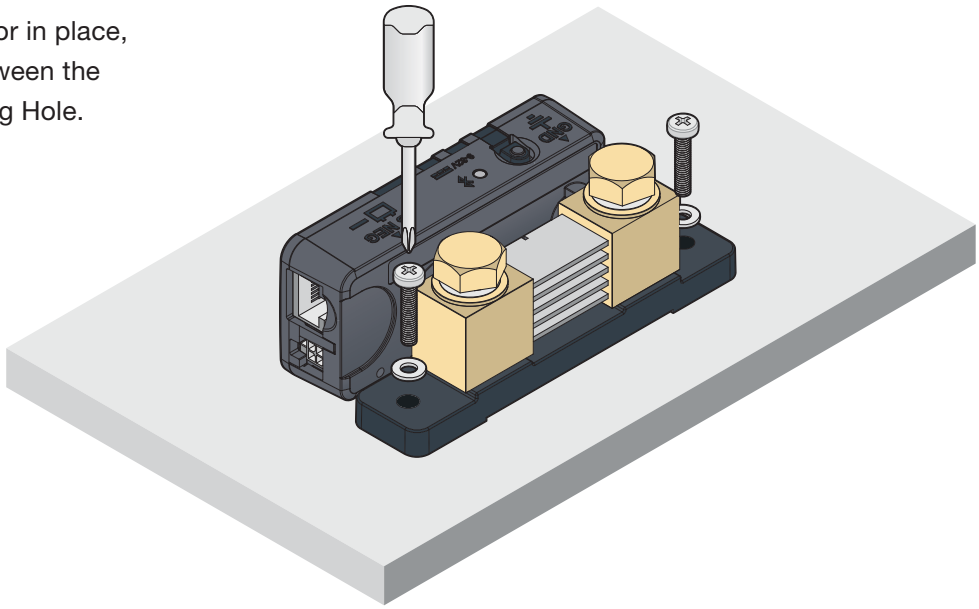
Do not mount the Battery Monitor using adhesives or adhesive tape.



MOUNTING STEPS

⚠ WARNING: Use suitable Personal Protective Equipment (PPE) when operating power tools.

1. Confirm clearances around the Battery Monitor are adequate.
2. If clearance/pilot holes need to be drilled, place the Battery Monitor in its final position and mark the centre of each Mounting Hole.
3. Remove the Battery Monitor and drill the holes.
4. Fasten the Battery Monitor in place, applying a washer in between the fastener and the Mounting Hole.



INSTALLATION — WIRING

⚠ **CAUTION:** Ensure the correct cable and lug sizes is used to suit the application. Selecting the wrong cable and lug size could result in harm to the installer or user and/or damage to the battery or other equipment installed in the system. The installer is responsible for ensuring that the correct cable sizes is used when installing the Battery Monitor.

NOTICE:

- The installer is responsible for applying the correct torque to the Terminal Bolts. Over-torquing bolts may damage the terminals.
- Do not bottom-out thread when fastening Terminal Bolts into the terminal, this may cause a poor electrical connection (see 'Correct Lug Fitment' (page 14)).

IMPORTANT: Only connect the Battery Sense Lead once ALL other wiring is complete.

LUG ASSEMBLY

Before making any connections to the Battery Monitor, assemble (or purchase) the Ground and Battery Negative cables with the appropriate size lug and heatshrink as shown below.

REDARC recommends using heatshrink to protect the cable and lug connection from harsh environments, sharp edges and abrasion.

Strip the end of the cable back enough to ensure the insulation does not enter the barrel of the lug when fully inserted.

Slide the heatshrink over the cable.

Insert the stripped wires into the barrel of the lug.

Crimp the lug using the correct crimping tool.

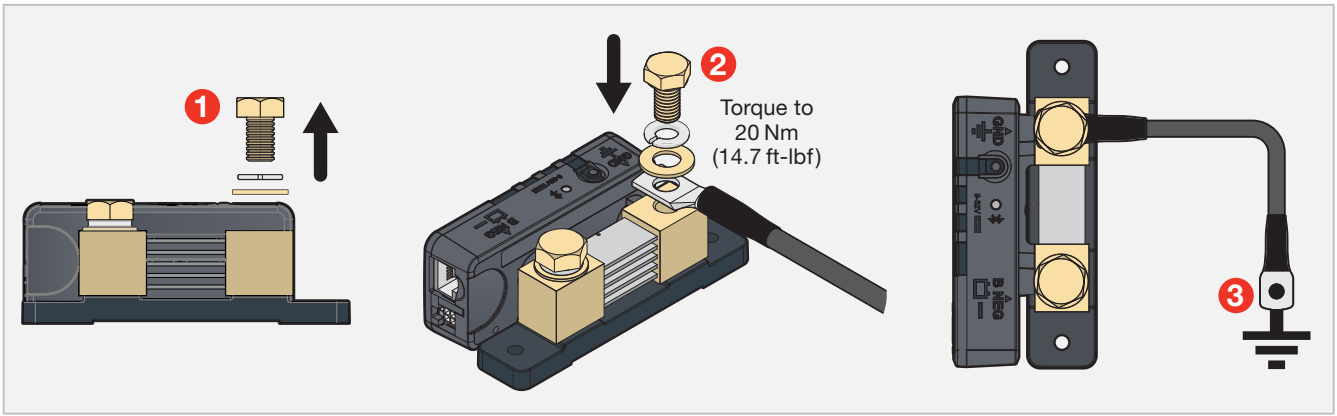
Slide the heatshrink to partially cover the lug, leaving the lug tongue exposed. Leave adequate clearance around the stud hole for the Terminal Bolts.

Shrink the heatshrink.

GROUND (GND) CABLE CONNECTION

Remove the M10 Bolt and washers from the Ground (GND ⏚) terminal **(1)**. Then align the lug stud hole with the terminal and fasten using the flat washer, spring washer and bolt **(2)**. Torque to 20 Nm (14.7 ft-lbf).

Connect the Ground cable to a point that forms a common ground with all components in your setup **(3)**. Most commonly, the vehicle electrical system's ground/earth reference is the metal of the vehicle body/chassis.



CONNECTING MULTIPLE LOADS

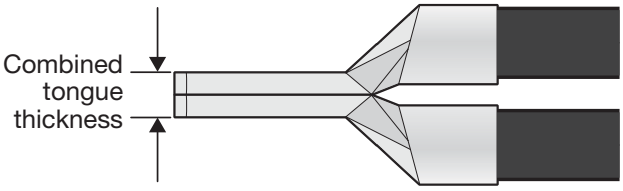
⚠ **CAUTION:** Do not use the Battery Monitor outside the supplied recommendations. Exceeding the recommendations could damage the Battery Monitor and/or other equipment installed in the system. The installer is responsible for ensuring the correct bolt size and Ground cable size is used.

NOTICE: Do not bottom-out the thread when screwing the bolt into the terminal, this may cause a poor electrical connection (see 'Correct Lug Fitment' (page 14)).

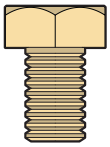
The Battery Monitor is capable of connecting multiple loads to the Ground (GND ⏚) terminal. Depending on your system setup, you may need to use the supplied Alternative Terminal Bolt (M10 × 20 mm). Refer to the table on page 13 to determine if this Bolt is required. The lugs belonging to circuits with the highest currents should be closest to the Battery Monitor terminal.

Bolt Size (supplied)	Combined Thickness of Lug Tongues	
	Minimum	Maximum
Standard M10 × 16 mm	–	4 mm (5/32")
Alternative M10 × 20 mm	4 mm (5/32")	8 mm (5/16")

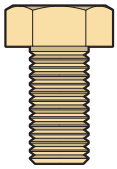
Lug thickness for Ground (GND ⏚) Terminal



Lug side view



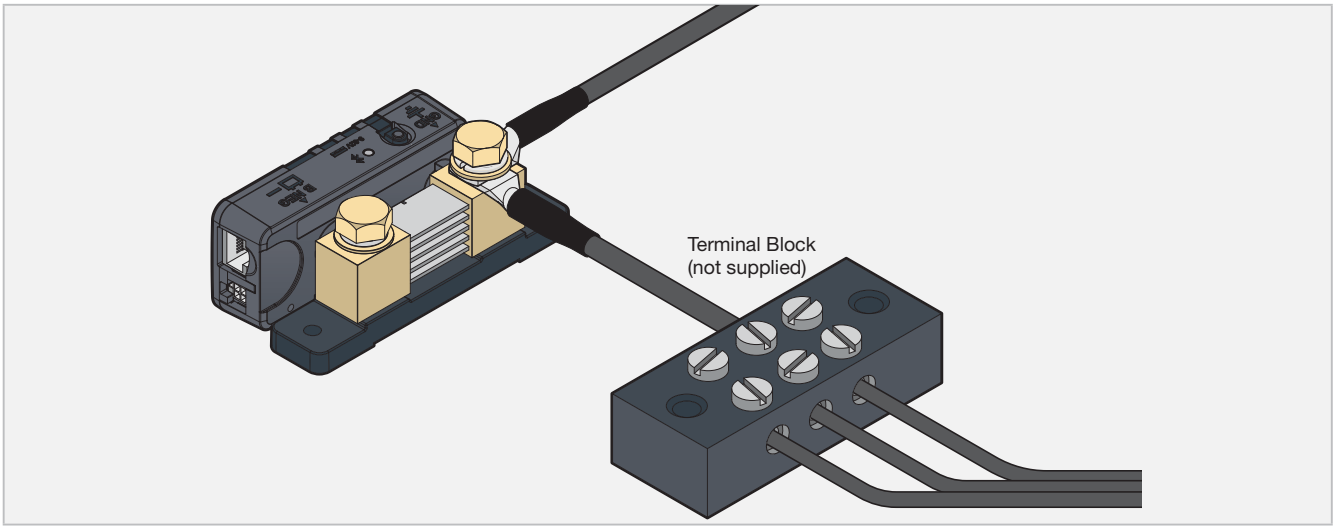
< 4 mm (5/32")
use Standard Bolt
(M10 × 16 mm)



4 to 8 mm (5/32 to 5/16")
use Alternative Bolt
(M10 × 20 mm)

USING A TERMINAL BLOCK

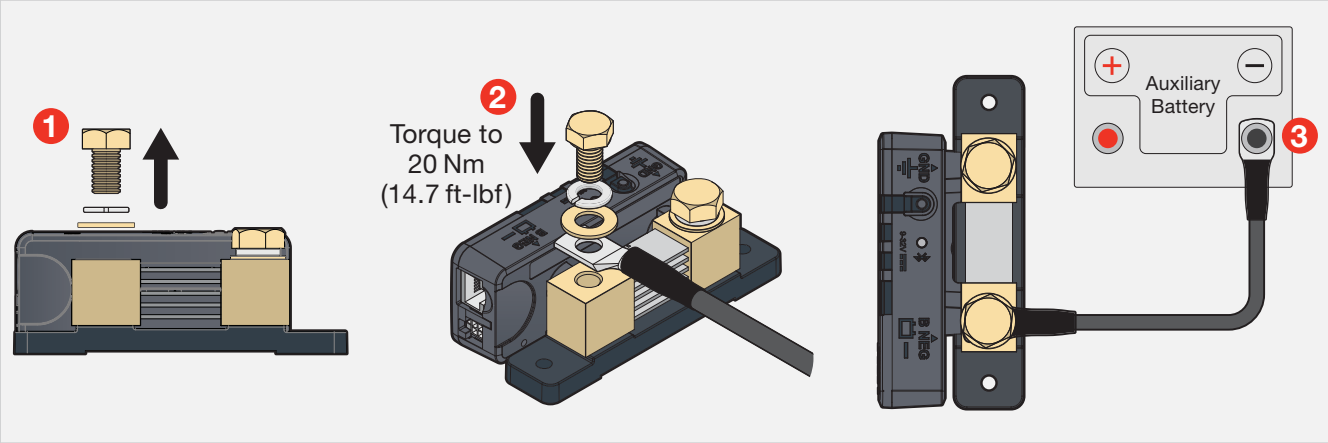
When connecting multiple loads to the Ground (GND ⏚) terminal of the Battery Monitor, using a separate terminal block/earth busbar is recommended. Ensure the Ground cable connection to busbar is a sufficient size to suit your application.

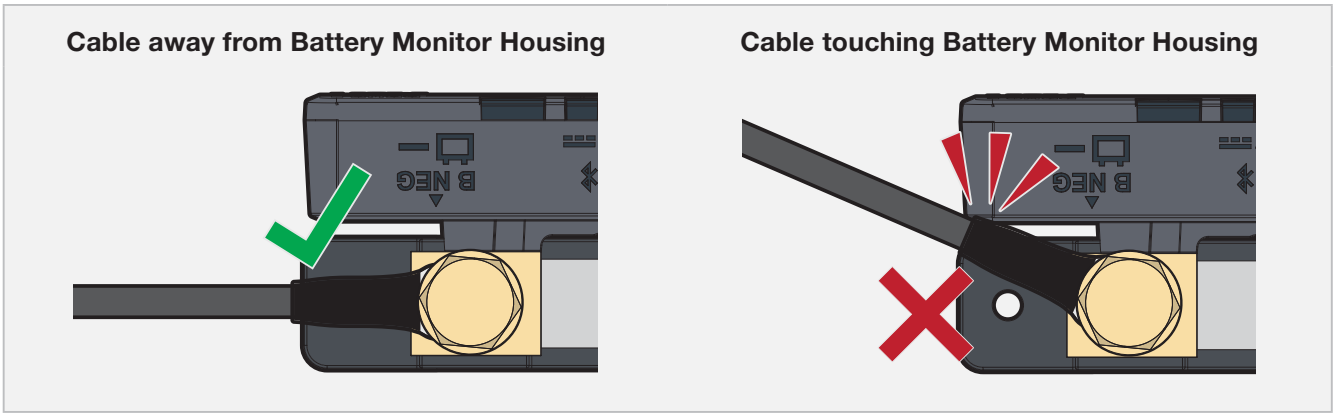


BATTERY NEGATIVE (B NEG) CABLE CONNECTION

Remove the M10 Bolt and washers from the Battery Negative (B NEG –) terminal **(1)**. Then align the lug stud hole with the terminal and fasten using the flat washer, spring washer and bolt **(2)**. Torque to 20 Nm (14.7 ft-lbf).

Connect the Battery Negative cable to the auxiliary battery negative (–) terminal using appropriate fasteners **(3)**.
NOTE: The Battery Negative cable should not exceed 1m (3'3") to minimise voltage drop between the Battery Monitor and auxiliary battery.



CORRECT LUG FITMENT

Hold the Ground and Battery Negative cables when torquing to avoid the cables touching the Battery Monitor Housing, this will prevent from potentially damaging the Battery Monitor.