

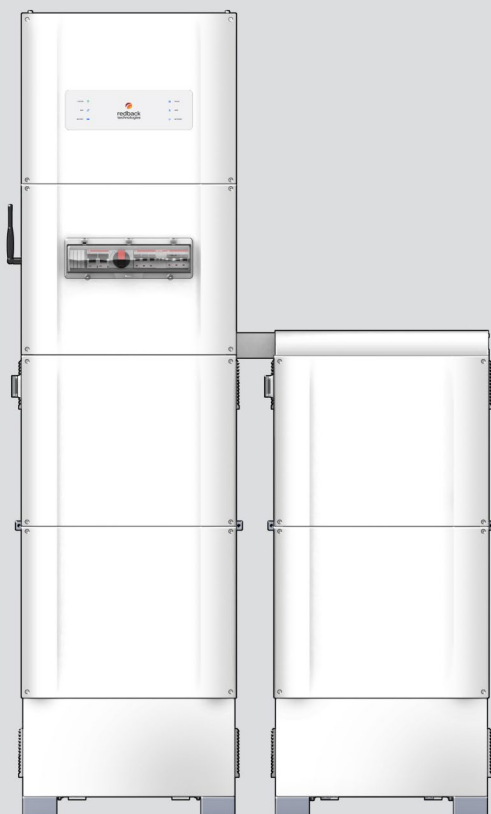


Installation Manual

Redback Smart 3-Phase Hybrid System

ST10000 Inverter and BE14000-HV Battery Enclosure

v4.5



HISTORY

VERSION	ISSUED	COMMENTS
1.1	28-Apr-20	First published
1.2	17-Jun-20	Max Apparent power from utility specification added
1.3	17-Jul-20	Added DRED cable information; added RCDs on backup circuits; updated specifications
1.31	02-Sep-20	2.5 Simplified language; 2.14.3 Updated relay wire colour assignments. 4.3 Updated restart procedure
1.4	07-Jul-21	Added SLDs; added wire stripping and screw torque information; corrected BoS connection block appearance; Notes on Regional settings
1.5	09-Sep-21	Rebrand; miscellaneous updates.
1.6	17-Nov-21	Updated specifications table
1.7	19-Dec-21	Updated specifications table; Add View Firmware.
1.8	04-Mar-22	Updated Wi-Fi compatibility
4.0	10-May-22	P11,16,18,19,22,23 Cooling clearance increased to 150mm was 100mm. Text, tables, and dimensions revised; P12 Add limitation: untested for multi-inverter installations; P25 Add warnings re: BMS earth continuity; P28 RCD information added to connections diagram; P32 BoS comm's connections rewritten and redrawn; DRED information refined; P52 Add earth fault alarm section; P63 Reformat Close-up and Handover to table; move to inside back cover.
4.1	30-Jun-22	P59 Specification Table updated
4.2	26-Jul-22	P12 Added information about backup outputs limited by battery quantity; P36 Add information about balance charging and updating FW when adding or replacing batteries.
4.3	02-Aug-22	P59 Added footnote regarding I_{sc} Max.
4.4	09-Sep-22	P28 Reference to bung removed; P60 Qualify Inverter Noise Emissions; P60 Added BE Noise emissions and footnote.
4.5	16-Jun-23	P20 Added Multiple ST10000 Installations- Preparing for a successful Site Manager implementation. P25, 26 Added BMS Module Earth Cable instructions P44 Smart Load Control introduction and references added. P59 Add "Maximum PV Input Power" and footnote. P59 Correct "Maximum Back Feed Current" (was Feedback). P59 Correct "Battery Port>Max. Power(discharge)" (was (charge)). P59 Add Rated Active Power footnote.

CONTACT INFORMATION

Phone: 1300 240 182
International phone: +61 7 3180 2325
Address: Building 1015, 80-120 Meiers Rd, Indooroopilly QLD 4068, Australia
Email: customersupport@redbacktech.com
Website: redbacktech.com

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PRIVACY NOTICE

Redback will use the personal information provided to us only for warranty purposes. Without this information we will not be able to process your warranty claim. If you require further information about our privacy policy, please visit our website at redbacktech.com.

Start here...

This manual describes the installation and commissioning of a Redback ST10000 Smart 3-Phase Hybrid Inverter (hereafter called the ST10000 or the “Inverter” or the “System”) and the Redback BE14000-HV Battery Enclosure (hereafter called the BE14000-HV or the “Enclosure”).

The Redback ST10000 inverter enables the connection of three solar array strings; battery storage; 3-phase grid supply; and up to three relay-controlled devices; and provides a 3-phase backup power supply for AC loads. The energy produced by the solar array is automatically directed—for the highest performance and best economic return—to the AC loads, battery, and utility grid, depending on operating conditions.

The goal is to maximise solar energy usage and minimise energy consumed from the utility.

This manual is for use by Installers and Installer Companies.

Before you go to site...

1. Read this manual.

The installation manual has all the information you will need for most installation scenarios.

2. Book a support call

If you think you will need help, book Redback Technical Support 2 days before going to site. This ensures that technical support is reserved for you if you are on-site and need help. Redback support is in Brisbane, Australia and is available 8am-4pm (Brisbane time) Monday to Friday. There are three ways to book a support call:

Web: redback.link/support

SMS: +61 417 632 065

Call from Australia: 1300 240 182

Call from New Zealand: +61 7 3180 2325

3. Register the installation

Early registration makes it possible to do a functional, testable installation even if some information is not available e.g., installation in a spec home where the owner’s information is not available. You can also pre-assign the installation inspector.

Register the installation at redback.link/register (+Add device).

Need something else?

1. Visit the Redback Document Library

Installer and Owner documentation is available for our current products. Go to redback.link/docs

2. Contact the Redback Customer Support Team (Monday to Friday, 8am-4pm AEST)

In Australia: 1300 240 182

In New Zealand: +61 7 3180 2325

Email: customersupport@redbacktech.com

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Symbols used in this manual

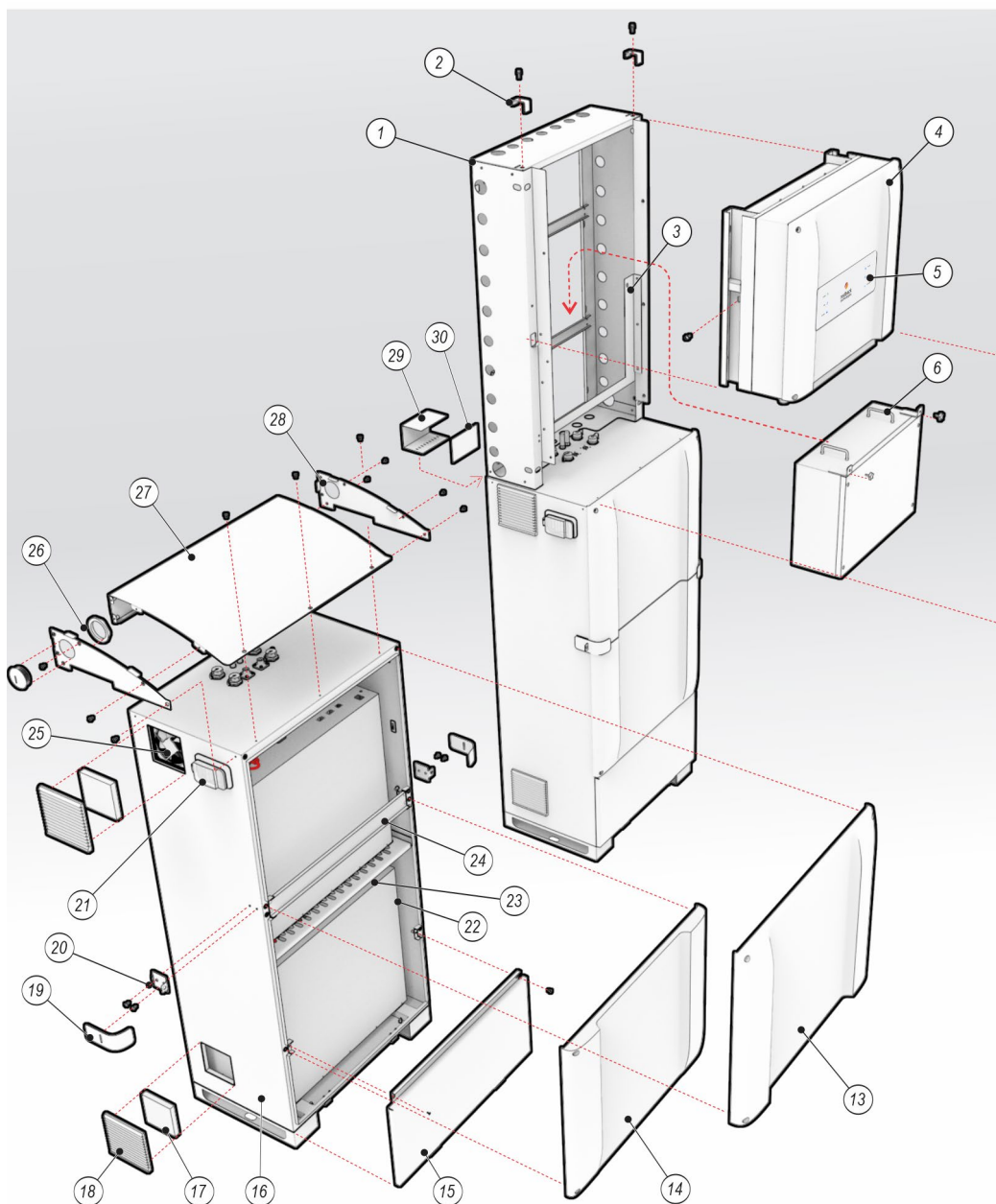
SYMBOL	DEFINITION	SYMBOL	DEFINITION
	LETHAL DANGER. Risk of electrocution.		CAUTION! Hazard to equipment
	DANGER. Risk of electrical shock.		EXPLOSION HAZARD
	WARNING! Hazard to human life		LIGHTNING STRIKE HAZARD
	WARNING! BURN HAZARD.		SHARPS HAZARD
	TIPPING HAZARD. Do not leave unattended.		FIRE HAZARD
	HEAVY LIFT. Seek help.		DELAY. Wait specified time.
	INFORMATION. The information supplied is important for the correct installation, operation and or maintenance of the equipment. Failure to follow the recommendations could result in a warranty claim being denied.		PPE REQUIRED. Use appropriate personal protective equipment.

Symbols used elsewhere

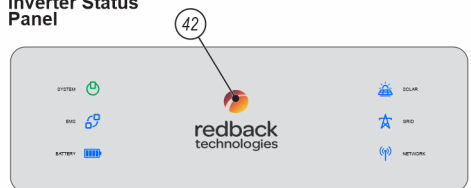
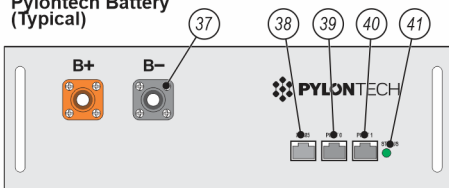
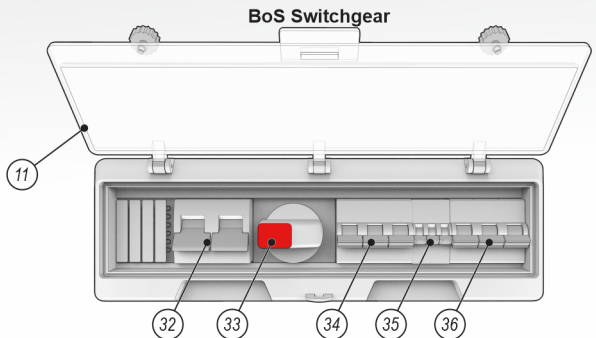
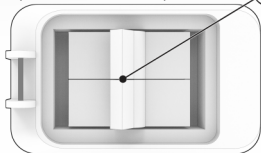
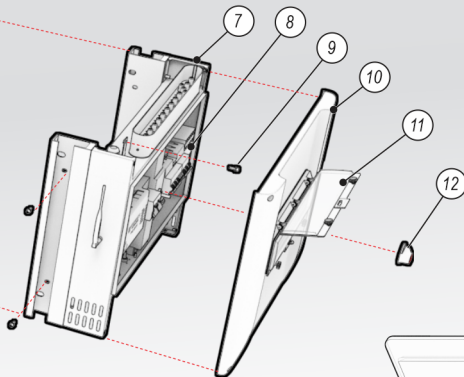
SYMBOL	DEFINITION	SYMBOL	DEFINITION
	HEAVY! Bend knees to lift.		DELAY. Wait specified time.
	HEAVY! Two-person lift needed.		REFER TO DOCUMENTS.
	PACKAGE MASS. In kilograms.		Do not dispose as household waste.
	THIS SIDE UP. The package must always be transported, handled, and stored with arrows pointing up.		This product has recyclable parts. Dispose of correctly.
	STACKING LIMIT. Stack packages six high or less.		FRAGILE. Handle with care. Do not tip. Do not sling.
	KEEP DRY The package/product must be protected from excessive humidity and must be stored under cover.		

1. Know your product

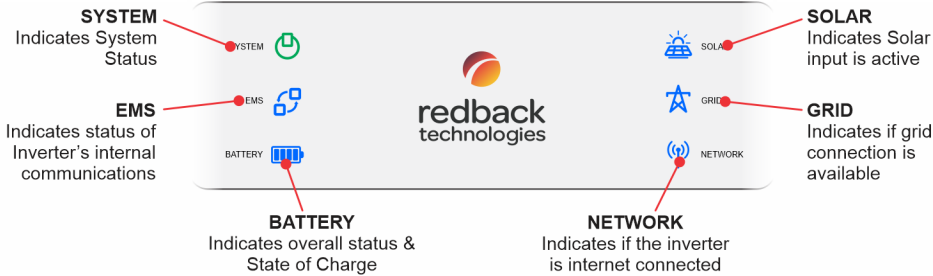
1.1 Major components



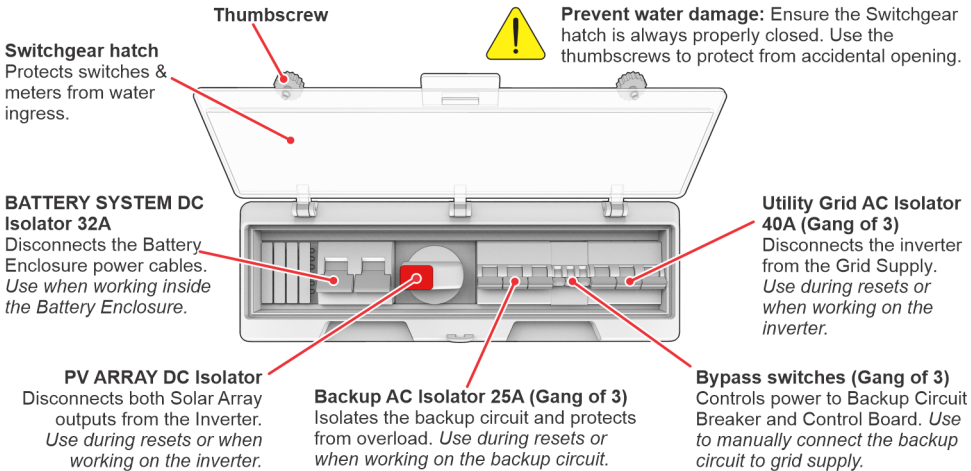
#	Part name
1	Wall mounting frame
2	Inverter retainer yokes
3	BMS mounting rail
4	Inverter assembly
5	Inverter status panel
6	BMS assembly
7	Balance of System (BoS)
8	BoS switch panel
9	Inverter-to-BoS security screw
10	BoS front cover
11	BoS switch panel cover
12	PV isolator switch knob
13	BE upper front cover
14	BE lower front cover
15	BE kick panel
16	Battery Enclosure (BE) cabinet
17	BE intake air filter
18	BE intake air filter cover
19	BE cover security clamp
20	Security clamp padlock hoop
21	BE isolator switch cover
22	Battery (4 required)
23	Battery shelf
24	BE cross brace
25	BE extractor fan
26	Connection kit side RHS cover
27	Connection kit top cover
28	Connection kit side LHS cover
29	Connection kit cable duct
30	Connection kit cable duct cover
31	BE isolator switch
32	Battery System DC Isolator
33	PV Array DC Isolator
34	Backup AC Isolator
35	Bypass Switch
36	Utility Grid AC Isolator
37	Battery Power Terminals
38	Battery RS485 Port
39	Battery Port 0
40	Battery Port 1
41	Battery Status LED
42	Reset Switch (concealed)



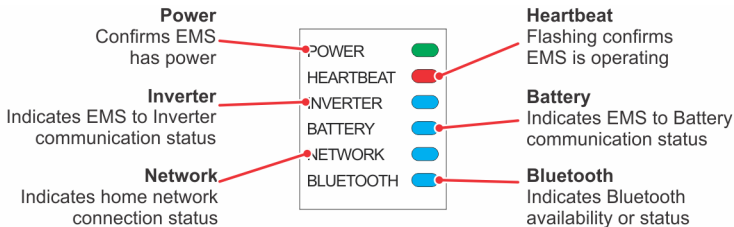
1.2 Status Panel LEDs



1.3 BoS switchgear



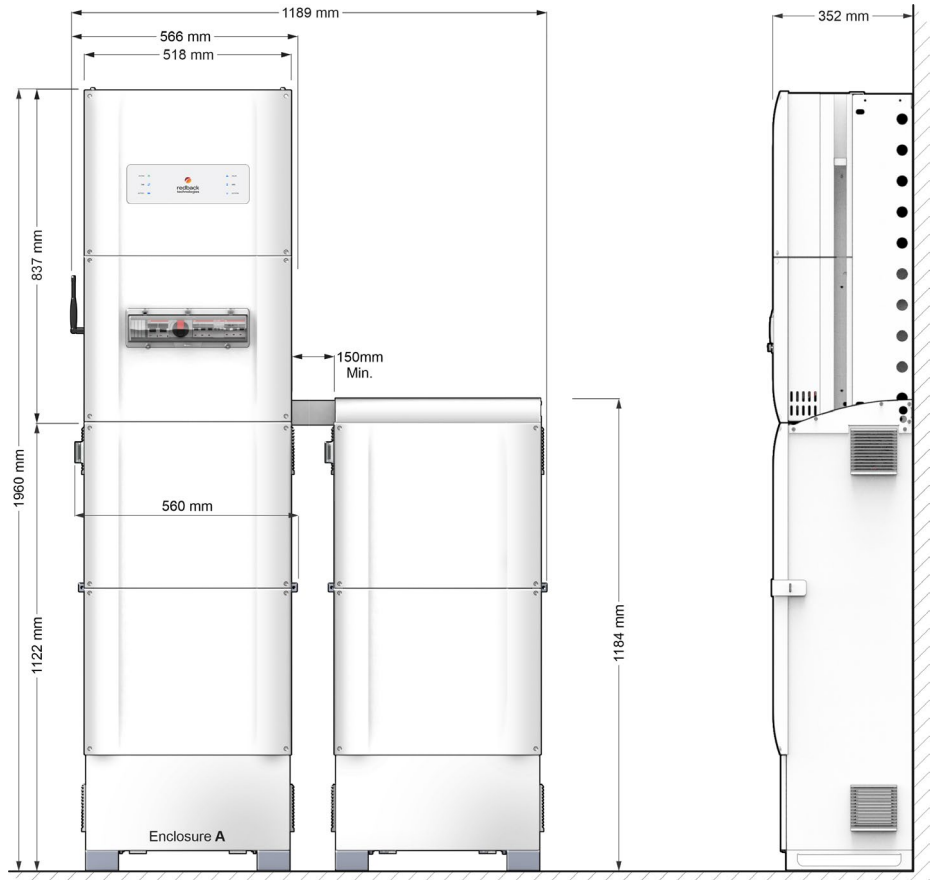
1.4 EMS LEDs



1.5 Dimensions, weights & configurations

Item	Width (mm)	Height (mm)	Depth (mm)	Shipping Mass (kg, ea.)	Component Mass (kg, ea.)	
Inverter	518	840	360	54.5	Mounting Frame:	4.0
					BoS:	13.0
					Inverter:	28.5
Battery Enclosure	545	1125 min	348	46.5	36.5 [●]	
Connection Kit	520	85	315	4.5	3	
Combined (1 Enclosure)	566 [■]	1960 typ [◆]	352	-	-	
Combined (2 Enclosures [◆])	1276 ^{■◆}	1960 typ [◆]	352	-	-	
BATTERIES[▼]						
Pylontech H48050 2.4kWh	442	390	100	24.0	22.5	
Pylontech H48074 3.55kWh	442	390	132	34.0	32.0	

●Excluding batteries. ■Includes Wi-Fi antenna and padlock hoops and minimum 150mm clearance between enclosures. ◆May vary slightly due to installation variation ◆2nd enclosure may be installed to left or right of existing system ♦For guidance only- weights may vary slightly.



1.6 Compatibility and limitations

The Redback ST10000 is a transformer-less Inverter; all other components of the PV system must be compatible with this type of Inverter architecture.

AC-coupled installations are possible, enabling an existing grid-tied inverter's output to charge a Redback controlled battery.

The Redback ST10000 Smart Hybrid Inverter and BE14000-HV Battery Enclosure are not suitable for:

- Batteries other than Pylontech H48050 or H48074 (which may not be mixed).
- Off-grid installations, where there is not normally a grid connection.
- Locations without internet access: the system can operate off-line but should normally have internet available – failing to provide the internet connection may result in a delay in being able to process your warranty claim or our ability to provide clear support.
- Installation in full-sun locations: the inverter may overheat resulting in reduced efficiency and or automatic shutdown.
- Exposed locations where wind driven rain may penetrate the enclosure.
- Use with generators.
- Use with Backup Circuits if batteries are not fitted or are inactive.
- Connection to 5Ghz Wi-Fi networks.

Multiple inverter energy systems

- ST10000 systems have not been tested for Section 5 of AS4777.2:2020—installation of ST10000s in a multiple inverter energy system requires they are installed & used in accordance with the requirements of AS/NZS 4777.1.

1.7 Backup circuit design notes

The ST10000 includes one Backup circuit per phase, activated during a grid outage and powered by the available PV or system batteries. The backup circuit maximum power is limited by the battery discharge rate i.e., the number of batteries fitted (4 or 8). The battery loads on the backup circuit must be carefully selected in to extend the backup power availability, noting:

- As far as practical, loads should be balanced across all three phases.
- For a 4-battery system: continuous battery-only power delivery up to 5kVA max. (total of all three phases, up to 3.3kVA on one phase).
- For an 8-battery system: continuous battery-only power delivery up to 10kVA max. (3.3kVA max. per phase).
- Peak power delivery of 16.5kVA for up to 60 seconds (for high starting currents).
- System self-protects and shuts down if power limits are exceeded.
- Output is reduced above 45°C ambient temperature.
- System shuts down if 60°C ambient is exceeded.

The Backup circuit is suitable for low power or intermittent use devices such as domestic refrigerators; freezers; LED or florescent lighting; small kitchen appliances; computers; radio or televisions.

High starting-current or high operating-current loads must not be connected to the Backup circuit e.g., hot water systems; air conditioners; ovens or cooktops; spas or saunas or pool pumps.

Backup circuit	New circuit required?	☐ Yes ☐ No	
	Backup circuit inclusions	☒ Acceptable	☒ Not Acceptable
		Refrigerators and freezers	Critical medical devices
		Fans	Air conditioners & heaters
		Small, occasional use, plug-in appliances e.g., microwaves, kettles, toasters	Ovens and cooktops
		TVs, radios, telephones	Home theatres & projectors
		Computers, tablets, routers	Hot water systems
		Mobile phone or small device chargers	Spas, saunas, pool pumps
		Soft-start household water pumps	Battery chargers & corded power tools
		Low-energy LED or CCFL lighting	Incandescent or high-power lighting



WARNING. This equipment is NOT intended for use with life support equipment or other medical equipment or devices.



WARNING: This product must be installed with direct PV input, to enable black starts.



WARNING. Installation in violation of these limitations may void the warranty (refer to the Warranty document).



WARNING. Batteries must be fitted and active if a backup circuit has been connected. PV-only power is not satisfactory for backup circuits—backup load and PV power are variable and unpredictable—when backup load exceeds PV power the Inverter will automatically shut down and restart.

2. Installation

Important safety instructions – please read

This document has important safety instructions for products produced by Redback Technologies. Please read all the instructions and cautionary markings on the product and on any accessories or extra equipment included in the installation. Failure to follow these instructions could result in severe shock or possible electrocution. Always use extreme caution to prevent accidents.

Audience

Installation, maintenance, and connection of Inverters must be performed by qualified personnel, in compliance with local electrical standards, wiring rules and the requirements of local power authorities and/or companies (for example AS4777 and AS/NZS 3000 in Australia). The Redback Smart Hybrid strictly conforms to all related safety rules in design and test.

Safety regulations relevant to the location should be followed during installation, operation, and maintenance. Improper operation may cause electric shock, or damage property, inverter, or equipment.

These instructions are for use by skilled, qualified personnel who:

- Meet all local and governmental code requirements for licensing and training for the installation of electrical power systems with AC and DC voltage up to 600 volts.
- Have CEC accreditation for installing grid-connected PV systems and energy storage systems.
- Have knowledge of the functional principles and operation of grid-connected systems and knowledge of the installation of electrical devices
- Understand the risk associated with installing and using electrical devices and can implement proper risk management strategies.
- During the preceding 12 months, have completed Redback approved training on the installation of the Redback ST10000 Smart Hybrid Inverter and BE14000-HV Battery Enclosure.

General safety

Symbol	Definition
	WARNING: LIMITATIONS ON USE This equipment is NOT intended for use with life support equipment or other medical equipment or devices.
	CAUTION: EQUIPMENT DAMAGE Only use components or accessories recommended or sold by Redback Technologies or its authorised agents.
	IMPORTANT Do not try to install this equipment if it appears to be damaged in any way. See the Warranty document for instructions on returning the equipment.

Personal safety

Symbol	Definition
	WARNING: PERSONAL INJURY
	• Use safe lifting techniques when handling this equipment. For guidance visit safeworkaustralia.gov.au or contact your local WHS authority.
	• Use standard safety equipment when working on this equipment such as safety glasses, ear protection, steel-toed safety boots, safety hard hats, etc.
	• Use standard safety practices when working with electrical equipment e.g., remove all jewellery, use insulated tools, wear cotton clothing etc.
	• Never work alone when installing or servicing this equipment. Have someone nearby that can help if necessary.
	• Do not touch the inverter during operation. The temperature of some parts may exceed 60°C during operation. After shutdown, allow the inverter to cool for at least 5 minutes before touching.
	• Ensure that children, pets, and other animals are kept away from the inverter, solar arrays, battery bank and utility grid components.
	• If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

Battery safety

SYMBOL	DEFINITION
	IMPORTANT • Use the battery types recommended by Redback Technologies. Follow the battery manufacturer's recommendations for installation and maintenance. • Insulate batteries appropriately against freezing temperatures: Discharged batteries freeze more easily. • Remote or automatic generator control systems: disable the starting circuit and/or disconnect the generator from its starting battery prior to performing maintenance.

Equipment safety

SYMBOL	DEFINITION
	WARNING: LETHAL VOLTAGE • Review the system to identify all possible sources of energy. Ensure all sources of power are disconnected before performing any installation or maintenance on this equipment. Confirm that the terminals are de-energised using a validated voltmeter (rated for a minimum 1000 VAC and 1000 VDC) to verify the de-energised condition. • Do not perform any servicing other than that specified in the installation instructions unless qualified to do so or have been instructed to do so by Redback Technologies technical support personnel. • Solar arrays may be energised even in low ambient light. Install a high voltage DC rated disconnect, circuit breaker, or accessible fuse box to ensure a safe disconnect from the system (depending on local code requirements). • To avoid electric shock, disconnect the DC input and AC input of the Inverter at least 5 minutes before performing any installation or maintenance. • Completely disconnect all sources of power before going ahead with any maintenance. Do not remove the Inverter Upper Front Cover. • Do not tighten the AC and DC terminals or pull on the AC and DC wiring when the Inverter is running.
	WARNING: BURN HAZARD • External and internal parts may be hot. Do not remove the cover during operation or touch any internal parts. Allow enough time for internal parts to cool down before attempting maintenance.
	WARNING: FIRE HAZARD • Do not keep combustible or flammable materials in the same room as the equipment. The Redback Smart Hybrid has relays and switches which are not ignition protected. • Ensure AC, DC and ground cable sizes conform to local codes and are fit for purpose. See product manuals for minimum size requirements. Ensure all conductors are in good condition. Do not operate the unit with damaged or substandard cabling.
	CAUTION: EQUIPMENT DAMAGE • When connecting cables from the Inverter to the battery terminals, ensure the proper polarity is observed. Connecting the cables incorrectly can damage or destroy the equipment and void the product warranty.
	• Thoroughly inspect the equipment prior to energising. Verify that no tools or equipment have been inadvertently left behind.
	• Ensure clearance requirements are strictly enforced. Keep all vents clear of obstructions that can prevent proper air flow around, or through, the unit.
	• Do not open the inverter Upper Front Cover. Apart from performing work at the wiring terminals (as instructed in this manual), touching, or changing components without authorisation may cause injury to people, damage to the Inverter and annulment of the warranty.
	• Static electricity may damage electronic components. Take proper steps to prevent such damage to the Inverter otherwise the warranty may be annulled.
	• Ensure the output voltage of the proposed solar array is lower than the maximum rated input voltage of the Inverter otherwise the inverter may be damaged, and the warranty annulled. • Solar modules should have an IEC61730 Class A rating.
	CAUTION: LIGHTNING PROTECTION • PV arrays in the system should be protected by a Lightning Protection System as described in AS/NZS5033:2021.

2.1 Installation overview



Installation by non-approved installers may void the product warranty.

You are approved to install Redback products if you:

- Are a Redback registered and qualified installer, and
- Hold the required qualifications for installing grid-connected inverters, and
- Have a Redback Installer login.



Not sure?

Contact Redback on 1300 240 182 if you are unsure of your approval status.

2.1.1 BEFORE YOU GO TO SITE

A few simple preparations will help the installation run smoothly.

1. If you think you will require assistance, book a support call at redback.link/support
2. Register the installation at redback.link/register (+Add device)
3. Gather the required tools

- Normal electrician's tools including crimping kit and Cat 5 cable tools
- Electric drill/driver with 4mm Hex bit; Phillips head screwdriver bit; drill bits suitable for drilling walls
- Tape measure and spirit level
- Internet connected device with RedbackINSTALL app

4. Gather information needed

Gather the following information for use during registration, installation, onboarding, and commissioning.

System serial number:

Your Redback Installer Login: Apply at redback.link/apply

Homeowner details (required)	Full name:	
	Installation address:	
	Email:	
	Mobile:	
Homeowner Wi-Fi details	Wi-Fi Name:	
	Wi-Fi Password:	

Installation configuration

Regional Safety Zone	
Soft Export Limit	
Hard Export Limit	
Soft Generation Limit	
Hard Generation Limit	
Compliance Inspector	
Relay Assignments	Relay 1
	Relay 2
	Relay 3

2.1.2 AT SITE

Conduct a risk assessment

Redback recommends installers complete a risk assessment of the proposed works, to the standard required by relevant authorities.

Ensure Wi-Fi availability (if to be used)

Measure the home Wi-Fi strength at the proposed installation site. Review installation plan if Wi-Fi strength is less than -70dBm, otherwise ongoing connection problems may occur.

Wi-Fi Strength ¹ :	☐ None ²	☐ Weak (< -70dBm) ³	☐ Good (approx. -70dBm)	☐ Strong (> -70dBm)
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1. Test inverter location before installation
2. Mandatory: Request Redback Customer Service to set the inverter to “Off Comms”
3. Find an installation site with Good or better Wi-Fi strength

Review the proposed inverter location.

- Does it meet the requirements of AS/NZS5139? See section 2.2.
- Is it out of direct sunlight?
- Will it be exposed to heavy rain and wind, or is there a flood risk?
- Is it a coastal environment? Will it be exposed to salt spray?
- Is the mounting wall flat (to prevent distortion) and structurally sound (to carry 47kg load)? Are spacers needed?
- Is the floor surface flat? Do you need packers?
- Is there 150mm clearance all-round (for cooling) and at least 2150mm height available?

Hardware installation

- Install Primary Battery Enclosure
- Install Wall Mounting Frame
- Install secondary Battery Enclosure (optional)
- Install BoS
- Install Inverter

Electrical connection

- Run and connect LV cables and conduits to the BoS from PV and main or sub-board
- Install any non-standard accessories e.g., relays or new backup circuit
- Install the Redback Smart Meter and run ethernet from meter to BoS
- Run ethernet from home network router to BoS (recommended)
- Install batteries and associated cables
- Complete connections to BoS (switchboard, PV, backup circuit)

Commissioning

- Test the electrical installation
- Power ON the inverter
- Commission using RedbackINSTALL
- Fit covers and clean worksite
- Document the installation
- Handover to homeowner

2.2 Guide to AS5139 installation requirements for BE14000-HV

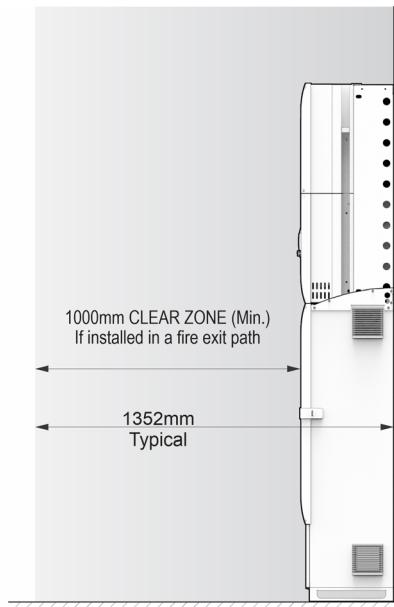
For AS5139:2019 compliance, the BE14000-HV is defined as a pre-assembled battery system. AS5139 prescribes allowable battery system locations and fire-proofing requirements. AS5139 is referenced in AS4777.1, AS3000 and the BCA, and all new or modified battery system installations must comply.

The installer is responsible for completing installation in accordance with all relevant standards and regulations. The key AS5139 requirements for BE14000-HV installation are:

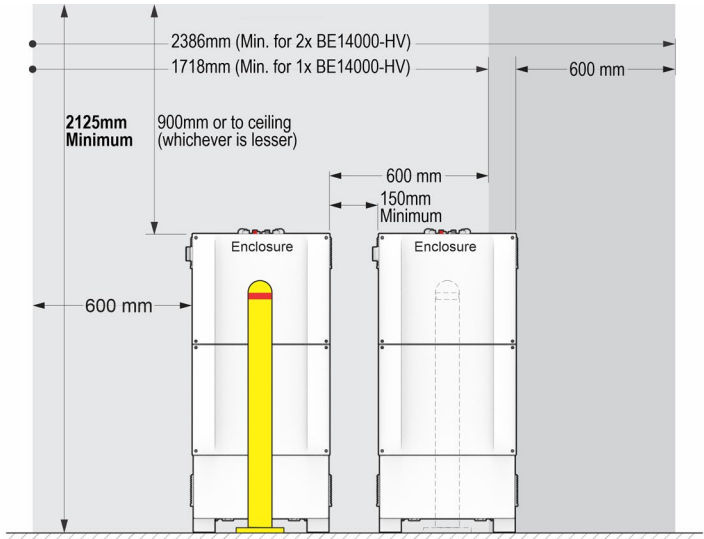
- Install the BE14000-HV against a wall in a clear zone containing no windows, doors, exits, vents, or appliances other than the ST10000 inverter.
- Include in the zone any wall within 600mm of the sides and 900mm above the BE14000-HV.
- Fireproof any combustible wall in the zone if a habitable room exists on the opposite side of that wall. Fire-proofing materials must comply with AS1530.1.
- Fireproof any structure e.g., ceiling or eave less than 900mm above the BE14000-HV to the full width of the clear zone and the lesser of 950mm from the wall or to the edge of the structure.
- Use fire-retardant sealant to seal all penetrations through the wall that exceed 5mm internal diameter.
- Ensure 1m clearance in front of the BE14000-HV if it is located on a fire exit path.
- Protect the BE14000-HV from vehicle impact if this is a likely occurrence- use a bollard or similar device.

The most likely installation scenarios are illustrated below: any clear zone may need to be fireproofed.

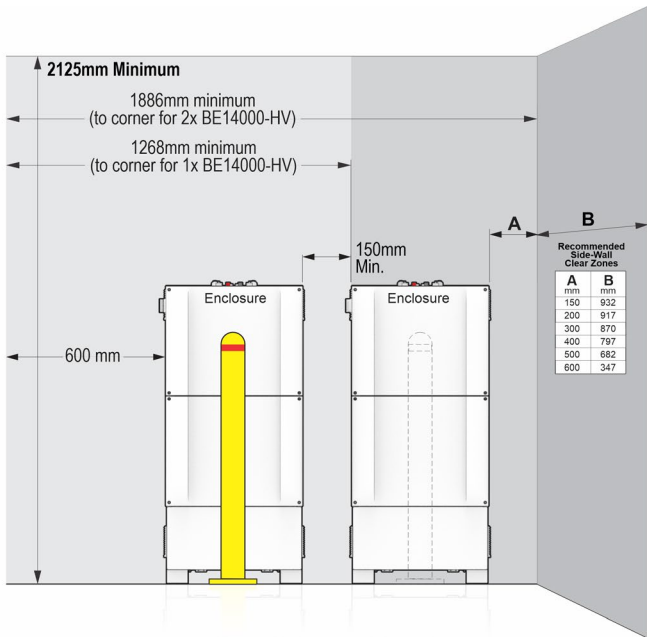
2.2.1 INSTALLATION ON AN EXIT PATH



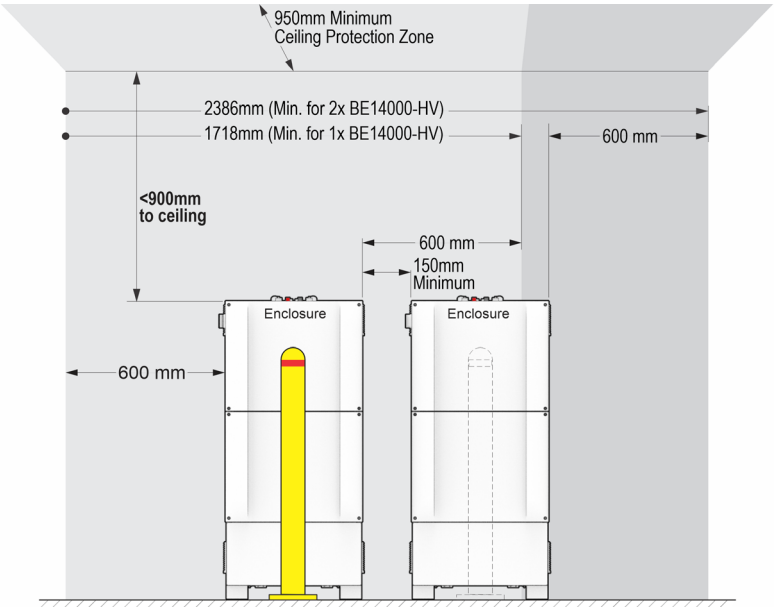
2.2.2 INSTALLATION ON A BLANK WALL



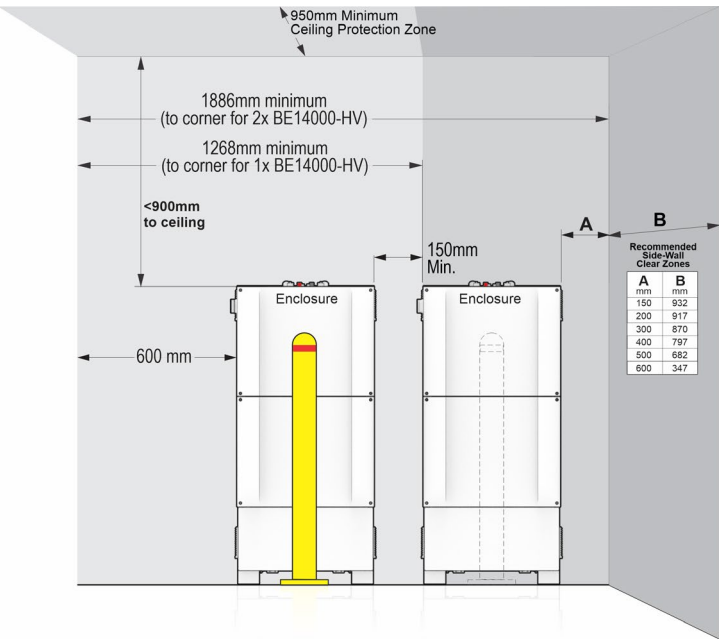
2.2.3 INSTALLATION NEAR A CORNER



2.2.4 INSTALLATION WITH A LOW CEILING



2.2.5 INSTALLATION NEAR A CORNER, WITH LOW CEILING



2.3 Multiple ST10000 installations – Preparing for a successful Site Manager implementation



If a Site Manager implementation is planned, download, read, and understand **KB87 Site Manager Installation Guide** from redback.link/stsm before commencing installation.

Redback recommends booking Technical Support 2 days before attempting your first Site Manager implementation. This ensures that technical support is reserved for you when you are on-site. See contact details on page 3.

Redback’s Site Manager feature enables the installation of multiple, cooperative ST10000 inverters behind the meter, at one site. Correctly configured, the charging and discharging of the batteries is balanced across all ST10000 systems on site to ensure the equal utilization of every system.

Successful implementation of Site Manager requires:

- All systems are ST10000s running ROSS 2.17 or greater.
- All systems are ethernet connected to the same network switch.
- Each system must have its own SM3000 power meter, correctly installed.
- One system must be nominated as the “Master”, and others as “Workers”.
- The Master system must have the appropriate Site Export Limit applied.

2.4 Preliminary electrical installation

The Inverter, BMS module and Balance of System (BoS) are hung on the Wall Mounting Frame. When hung, access to the cable routing space is restricted.

The Wall Mounting Frame has numerous pass-throughs to accommodate rigid or flexible conduit up to $\varnothing 32\text{mm}$. Typical conduit routing is shown at right.

Run cables and conduits after fitting the BMS module and before hanging the BoS or Inverter. Ensure that the cable tails have generous bend radii, are long enough to reach the BoS, and form effective drip loops.

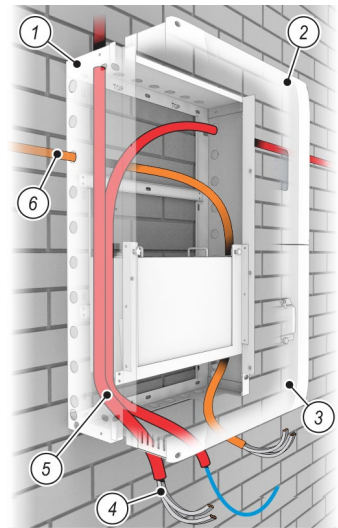
Route conduit and cables to the left or right of the BMS module. Do not use:

- The underside (affects Battery Enclosure installation)
- The 40mm holes (reserved for a secondary enclosure)

Cables that can be run in advance include:

- Solar array output
- Grid connection to main or sub-board, using 5x6mm2 core or 5x10mm2 core Orange Circular cable (3 phases + neutral + earth)
- Cables to BACKUP AC isolator (3 phases + neutral + earth)
- Communications cable (to Smart Meter)
- Ethernet cable (to home network router)

All connections between Inverter, BoS and BMS are internal, using supplied cables except where any second Battery Enclosure is placed more than 500mm from the first, in which case some cables must be fabricated.



#	PART NAME
1.	Wall Mounting Frame
2.	Inverter
3.	BoS Front Cover
4.	Cables
5.	32mm conduit
6.	25mm conduit

2.5 Installing the primary BE14000-HV Battery Enclosure



WARNING TIPPING HAZARD. Keep children and animals out of the worksite. Do not leave the enclosure unattended during installation. Fasten enclosure to the wall as soon as practical.

The BE14000-HV Battery Enclosure is designed for Redback ST10000 Smart Hybrid Inverters. Up to two enclosures may be fitted: The Primary enclosure is installed directly below the inverter. The Secondary enclosure may be placed to the left or right of the primary enclosure.

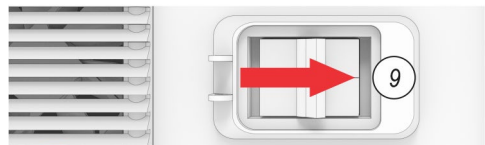
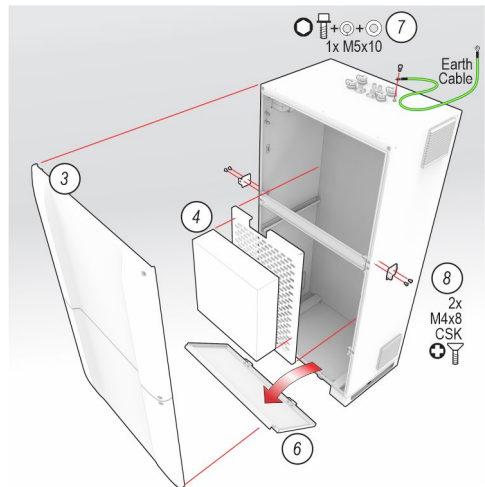
The enclosure is not suitable for other inverters.

The enclosure requires four Pylontech H48050 2.4kWh or H48074 3.5kWh batteries. The process is:

- Remove front covers and kick panel.
- Review the packing list. Verify all parts have been supplied.
- Remove battery shelf and upper cross brace (optional).
- Fit padlock hoops.
- Position and install the enclosure.

2.5.1 PRE-ASSEMBLY

1. Open the BE14000-HV carton.
2. Remove the cabinet from the transport carton. Place on a protective surface, front-side up.
3. Remove the upper and lower front covers and set aside. Take care not to damage the internal seal.
4. The Accessories Box and Battery Shelf are cable-tied to the enclosure for transport. Cut the cable tie to access these parts.
5. Locate the packing list inside the Accessories Box. Use the packing list to verify all parts have been delivered. Contact Redback if any parts are missing.
6. Remove the kick panel to ease battery loading. The kick panel is hinged at the bottom edge – remove the screws at the top corners, tilt the panel forward and slide it off the hinge pins. Take care not to damage the internal seal.
7. Attach the longest earth cable to the top of the enclosure using a M5x10 screw, and spring and flat washers, as shown.
8. Attach the two padlock hoops using M4x8 countersunk screws.
9. Ensure Battery Enclosure isolator is OFF (to the Right).



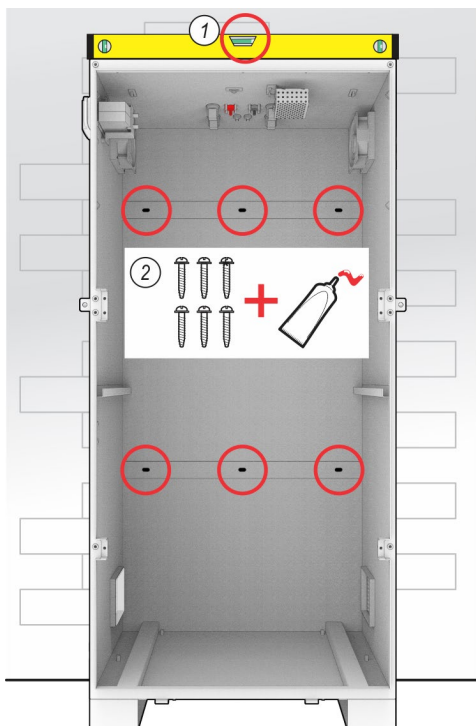
2.5.2 INSTALLATION

Installation notes

- The BE14000-HV is pre-wired for use with a ST10000 inverter, four batteries, and a second BE14000-HV.
- Reduce heat load by installing out of full sun: ideally, the installation will be against a south facing external wall, and under eaves.
- Ensure the location is not flood prone from water across ground, nearby downpipes, or guttering.
- Stand the enclosure on a stable, level surface. Use packers under feet if needed.
- Fasten the enclosure to a flat, structurally sound wall. Waterproofing will be affected if the enclosure is twisted or damaged. Use spacers if needed.
- Installer to supply suitable wall fasteners, up to $\phi 7\text{mm}$.
- The enclosure features fan-assisted cooling. Ensure there is at least 150mm clear space either side of the enclosure. Do not block the cooling intakes or exhaust vents.
- Ensure at least 1000mm clear height is available above the enclosure (for inverter fitting).

Installation process

1. Place the enclosure in the required location: on the floor; against the wall; 150mm clear space both sides.
2. Set the enclosure level. Use a spirit level as needed. Add packers under feet if necessary.
3. Check that the wall is flat. Use spacers as needed to ensure the enclosure does not distort when fastened to the wall.
4. Six mounting points are provided, as shown at right.
5. Fix the enclosure to the wall using suitable fasteners.
6. Seal around the fasteners using the supplied sealant.



2.6 Installing the Wall Mounting Frame

The installation process is:

- Open the Inverter shipping carton.
- Review the packing list.
- Verify all parts have been supplied.
- Install the Wall Mounting Frame

2.7 Installation



WARNING: STRUCTURAL REQUIREMENTS!

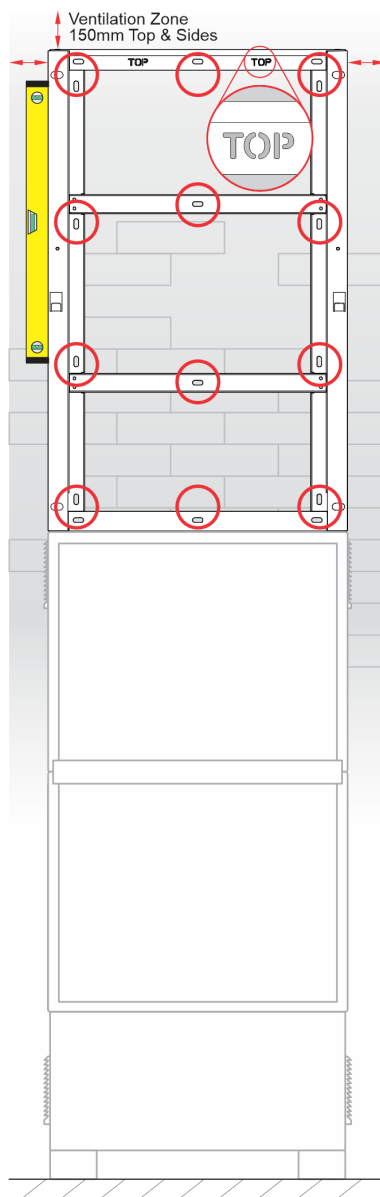
The wall and fasteners should be suitable to secure the hung weight of the system. Please ensure that the selected wall is made from a suitable material (e.g., solid brick) and you use at least the recommend number of fasteners.

Installation notes

- Stand the mounting frame on top of and aligned to the BE14000-HV.
- The inverter is convection cooled: provide 150mm clearance to top and sides to ensure airflow.
- Install the mounting frame correctly - observe "TOP" markings
- Installer to supply suitable wall fasteners, up to $\phi 7\text{mm}$.

Fasten the Wall Mounting Frame to the wall.

1. The mounting frame is secured by eight fasteners at any of 12 points. Choose fastener locations that will spread loads to the structural part of the wall.
2. Use the mounting frame as a template for fasteners.
3. Fix the enclosure to the wall using eight (8) suitable fasteners.
4. Check the frame is vertical—use a spirit level—then tighten the fasteners.



2.8 Installing a second Battery Enclosure

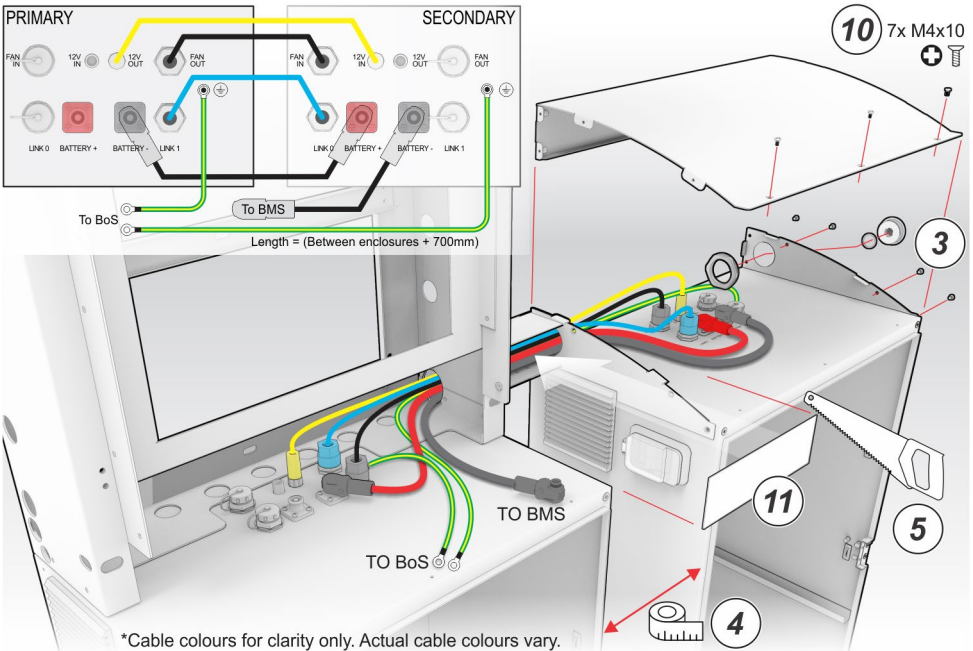


OPTIONAL Go to Section 2.10 if a second BE14000-HV is not needed.

The BE14000-HV Connection Kit includes parts to complete the installation of a 2nd battery cabinet up to 500mm left or right of the primary cabinet. For cabinets more than 500mm apart, installers will need to fabricate all cables and supply a suitable 60x60mm cable duct.

Installation procedure

1. Select a suitable location.
2. Install the second battery cabinet as in Section 2.7 but do not fit the supplied earth cable.
3. Fit the Connection Kit Side Covers and Blind Grommet as shown below.
4. Note the distance between the Wall Mounting Frame and the nearest side cover.
5. Cut the Extension Kit Cable Duct to the required length (1-2mm less than measured distance).
6. Align the cable duct channel to the 40mm holes in the side cover and fasten to the wall.
7. Identify the Fan/Comms cable harness, battery power cables and earth cable. Thread all cables and the harness through the 40mm holes and cable duct as shown (one at a time).
8. Plug in all cables as shown. Ensure all glands are tight and plugs are fully seated.
9. Attach the earth cable to the secondary enclosure earth point using the supplied screw.
10. Fasten the Connector Kit Cap at top and sides using the 7 screws supplied.
11. Snap on the Cable Duct Cover.



2.9 Battery Management System (BMS) Module

The BMS module manages the performance of connected batteries. The BMS connects to:

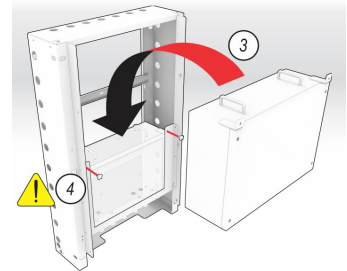
- BE14000-HV
- BoS

To mount the BMS module

1. Remove thumbscrews from BMS module. Set aside.
2. The BMS Module-to-BoS earth cable is pre-fitted. Loosen the cable from the retainer label. The cable will be connected to the BoS later.
3. Insert BMS Module into the mounting frame. Rest the module on the bottom rail.
4. Fasten the Module to the frame using the thumbscrews. Thumbscrews must be tight—they earth the BMS module to the Wall Mounting Frame.
5. Test BMS-to-Wall Frame earth continuity.



Release Earth Cable from sticker



Lift in BMS Module and tighten thumbscrews

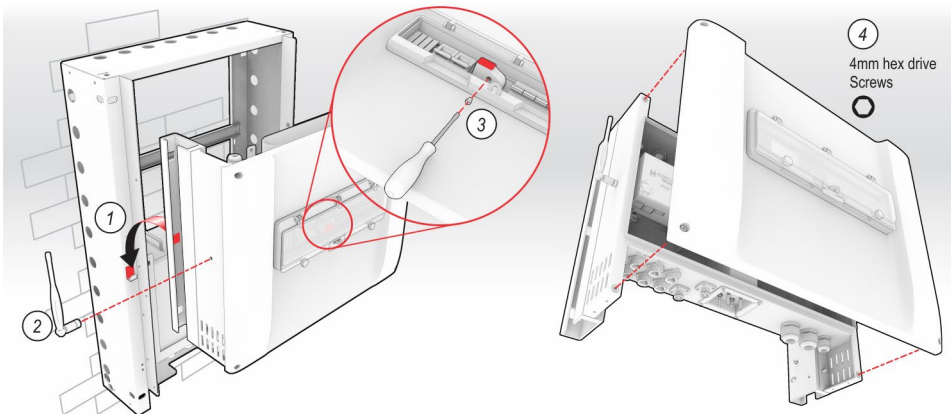
2.10 Balance of System (BoS)

Installation notes

- The BoS is supported on the Wall Mounting Frame using two integrated hooks.
- The PV ARRAY DC isolator must be OFF, and the knob removed before the BoS front cover can be released.

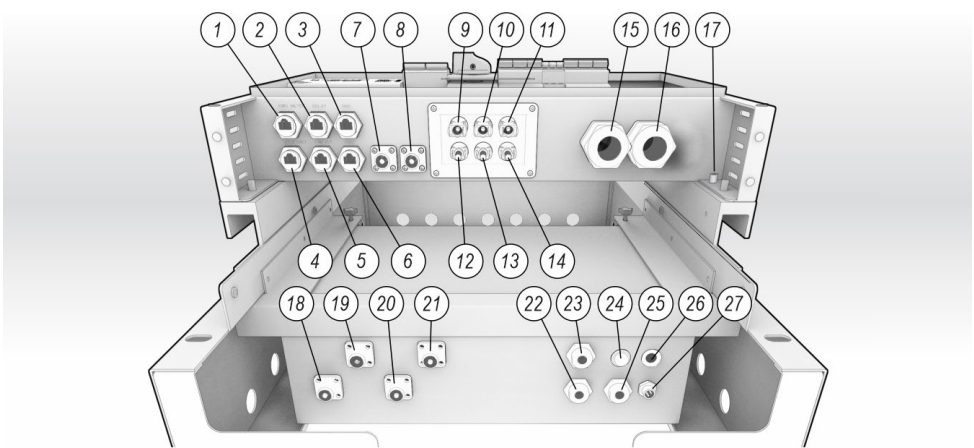
Prepare and mount the BoS

1. Lift the BoS assembly onto the hooks in Wall Mounting Frame as shown – use the middle slots. This is a temporary location: it provides better access and visibility when connecting cables.
2. Screw in the Wi-Fi antenna.
3. Loosen the grub screw from the PV ARRAY DC isolator knob. Remove the knob.
4. Loosen the four 4mm, hex-drive screws. Remove the BoS front cover and set aside.



2.11 BoS and BMS connections

All connections to the BMS, BoS and Inverter are through dedicated sockets or glands, as shown.



#	CONNECTOR
1	Smart Meter (KWH METER)
2	RELAYS
3	BMS
4	ETHERNET (to home network)
5	FAN (Controller) OUT
6	DRED
7	Battery IN +ve (Orange)
8	Battery IN -ve (Black)
9	PV1 +ve (MC4 style)
10	PV2 -ve (MC4 style)
11	PV3 -ve (MC4 style)
12	PV1 -ve (MC4 style)
13	PV2 +ve (MC4 style)
14	PV3 +ve (MC4 style)

#	CONNECTOR
15	Backup circuit cable gland*
16	Grid supply cable gland*
17	Battery enclosure earth binding post
18	Battery IN +ve (Orange)
19	BMS DC OUT +ve (Orange)
20	Battery OUT -ve (Black)
21	BMS DC OUT -ve (Black)
22	BMS cable OUT
23	CONSOLE
24	BMS Reset Switch
25	LINK
26	BMS Earth terminal
27	Fan Controller 12V DC OUT

* Cable glands suit up to 5x6mm² Orange Circular.

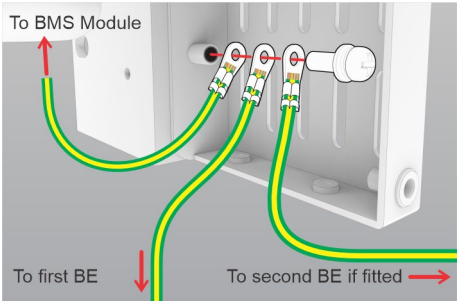
2.11.1 BATTERY CABINET EARTH CONNECTIONS

1. Identify the earth binding post located at the right-hand side of the BoS (#17 above).
2. Fasten the BMS-to-BoS and Battery Enclosure-to-BoS earth cables enclosure to the binding post using one M5x10 screw.
3. Test earth continuity of BMS module and Battery enclosures to BoS and Wall Frame.



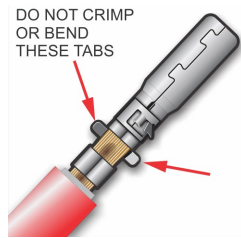
WARNING: EARTH CONTINUITY

Earth continuity is essential for correct operation and charging of batteries.



2.11.2 SOLAR ARRAY CONNECTIONS

	ONLY USE THE SUPPLIED PV CONNECTORS. AS5033 prohibits mixing of PV connector types and brands.
	WARNING: SHOCK HAZARD. Solar arrays generate energy even in low light. Handle cables and connectors carefully to avoid shock or arcing.
	CAUTION: LIGHTNING PROTECTION. PV arrays in the system should be protected by a Lightning Protection System as described in AS/NZS5033:2021
	WARNING: ELECTRICAL DAMAGE RISK. Solar arrays must be electrically isolated from each other: Do not bridge arrays, connect in parallel or serial, or share isolator switches. Do not connect or disconnect PV while the inverter is ON.
	WARNING: ELECTRICAL DAMAGE RISK. CRIMP WITH CARE! The connectors used in this product are similar but not identical to MC1-style connectors. Use the correct Crimping tool. The connectors have small “barbs” that are needed to ensure correct alignment and penetration of the connectors within the plastic housing. DO NOT crimp, bend, or change these barbs in any way otherwise severe inverter damage may result. Damaged connectors must be discarded.

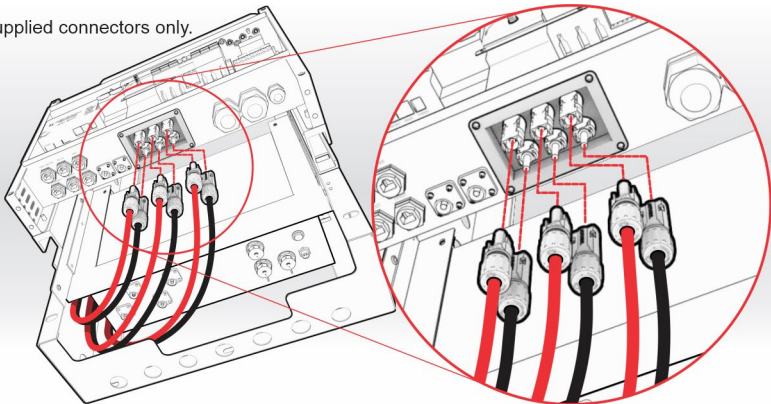


The ST10000 inverter accepts power from one, two or three solar arrays, using dedicated connectors on the BoS. PV2 and PV3 are combined in parallel, internally.

1. Run the PV Array cables to the left of the BMS module.
2. Shorten the cables to form drip loops.
3. Terminate the cables using the supplied connectors only. Note polarity assignments: Red is positive; Black is negative.
4. Plug the cables into the sockets as shown, ensuring that cables stay paired.
5. Gently push any excess cable up into the cavity behind the BoS, forming a drip loop.



Use supplied connectors only.



2.11.3 THREE-PHASE GRID CONNECTION

Connect the BoS to 3-phase supply and the Backup circuit.

1. Installer to select cable sizes to suit the installation, following applicable wiring rules, accounting for voltage drop.
2. Cables are to be connected inside the BoS:
 - Supply cables (L1, L2, L3, Neutral, Earth).
 - Backup circuits (L1, L2, L3, Neutral, Earth)
 - Battery cabinet earth.
3. A terminal block is provided in the BoS with individual ports for each cable.
 - Cable size: 16mm² max.
 - Stripping length: 9-10mm
 - Cable clamp torque: 1.5Nm max.
4. Cable glands are supplied to suit up to 5x6mm² Orange Circular cable.



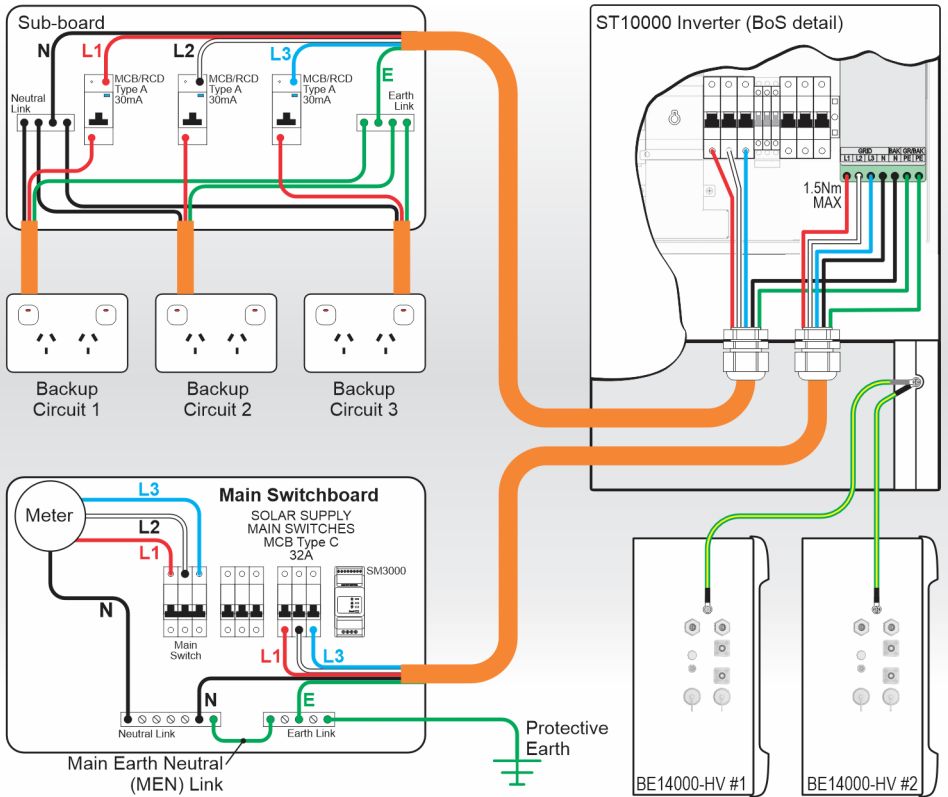
ELECTROCUTION HAZARD.
Lethal voltages may be present. Isolate all sources of power and test before starting work inside the BoS.



MINIMUM CABLE SIZE.
Grid connect cables to be minimum of 6mm²



PHASE ROTATION MATTERS!
Ensure phase rotation is correct otherwise meter readings will be invalid.



2.12 Installing the SM3000 Smart Meter & CTs



WARNING. Connect the Smart Meter as shown in the following sections. Ensure that Current Transformers (CTs) and corresponding supply cable are connected to the same phase. Incorrect connection will cause incorrect data and may damage the meter.

2.12.1 OVERVIEW

The Redback Smart Meter measures the instantaneous voltage, current, power and energy of up to three phases of a grid supply system. The power data is transmitted to the Redback inverter and used to manage grid inputs from solar or battery power sources. The energy meter uses “split core” type current transformers (CT). The CT installations are not intrusive: they simply clip onto the target cable. The installation process is:

- Install the Smart Meter to meter box or suitable location.
- Attach CTs, hook up supply, and run communication cable to the inverter.

2.12.2 INSTALLATION NOTES

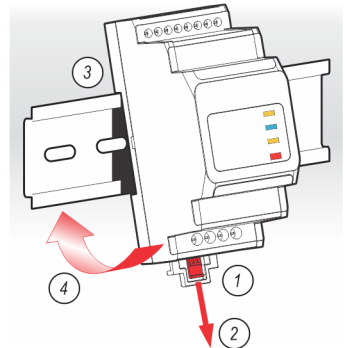
- Inspect the meter box or other installation site. Identify:
 - Mounting options for new meter
 - Attachment points for Current Transformers (CTs) on L1, L2, L3
 - Supply take-off point (L1, L2, L3, N)
 - Communications cable routing options (to Redback inverter)
- The meter is not waterproof and must be mounted in a weatherproof enclosure, preferably inside a meter box.
- The SM3000 Smart Meter and CTs are mated and calibrated at the factory. Ensure disconnected CTs are reconnected to the original terminals.
- CTs have a 2m long cable. The cable can be shortened or coiled if necessary.
- The communication cable is a straight-thru CAT-5 ethernet: the meter has an adaptor to suit.
- Phase rotation will be tested by the RedbackINSTALL app during commissioning.
- A comprehensive installation manual is located at redback.link/smim

2.12.3 METER INSTALLATION

The meter has a 35mm DIN rail mount. If no DIN rail position is available the meter may be installed in a weatherproof, auxiliary enclosure.

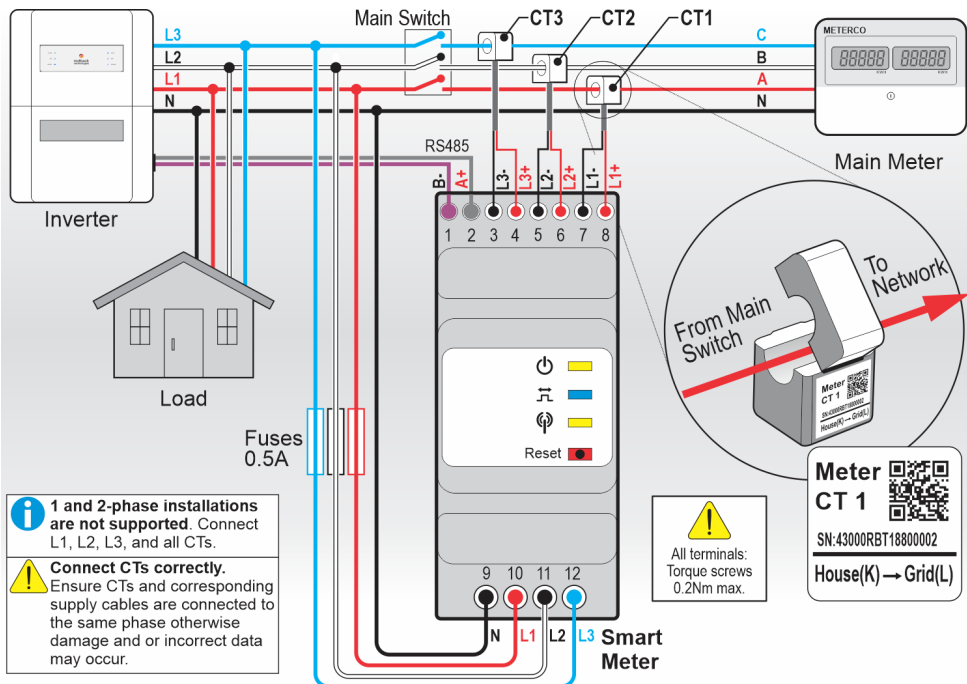
To mount the Smart Meter on a DIN rail:

1. Press the unlock lever
2. Release the clip
3. Hook meter onto DIN rail
4. Rotate so that body is flush against the rail
5. Push clip up until there is a tactile “Click!”.



2.12.4 CONNECTIONS- INDEPENDENT OR AC-COUPLED INSTALLATIONS

1. At the main switchboard, trace each phase to a circuit that can have a load added. Note the associated isolators.
2. Connect the SM3000 as shown below.
3. To ensure correct readings, ensure CTs are clipped onto cables as shown below.
4. Coil any excess cable neatly, and store.



2.12.5 INSTALLATION NOTES – INDEPENDENT INSTALLATIONS

The SM3000 monitors all three phases - informing the inverter of total consumption - and enabling the inverter to deploy self-generated energy as needed. The meter aggregates energy data from each phase and reports the net energy flow: the inverter manages energy accordingly.

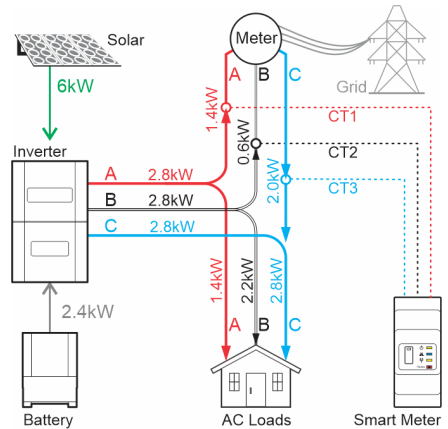
Example

In this situation the self-generated energy offsets grid consumption.

$$\begin{aligned}\text{Generation} &= P_{PV} + P_{BAT} \\ &= 6.0 + 2.4 \\ &= 8.4\text{kW}\end{aligned}$$

$$\begin{aligned}\text{Loads} &= P_A + P_B + P_C \\ &= 1.4 + 2.2 + 4.8 \\ &= 8.4\text{kW}\end{aligned}$$

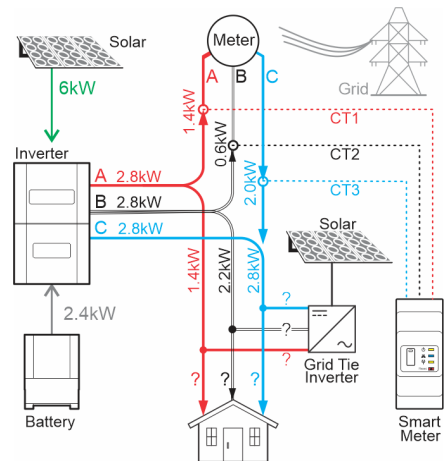
$$\begin{aligned}\text{Metering} &= P_{CT1} - P_{CT2} - P_{CT3} \\ &= 1.4 + 0.6 - 2.0 \\ &= 0\text{kW (net balance)}\end{aligned}$$



2.12.6 INSTALLATION NOTES – AC-COUPLED INSTALLATIONS

The ST10000 and BE14000 can be successfully installed in an AC-coupled configuration, enabling the batteries to be charged using energy from the existing PV system, however there are hardware and software limitations.

No CTs are available to detect existing PV output: the ST10000 software has no control or direct knowledge of the output from the existing PV system, therefore the true house load cannot be calculated, and the daytime loads shown in the Redback app or portal may be incorrect.



Therefore, the ST10000 sees the calculated house load:

$$\text{CALCULATED HOUSE LOAD (per phase)} = \text{ABSOLUTE (TRUE HOUSE LOAD - GRID-TIE INVERTER OUTPUT)}$$

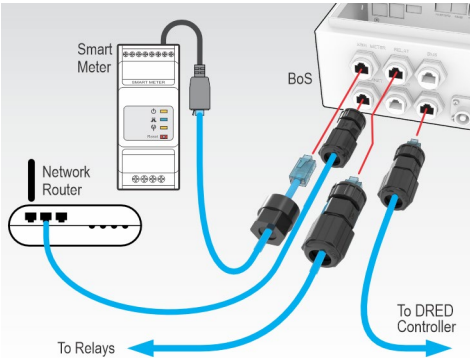
The ST10000 software detects the total power at the meter (per phase) and throttles export-to-grid to keep the ST10000 output below the site's Export Limit.

$$\text{ST10000 OUTPUT (per phase)} = \text{SITE EXPORT LIMIT} + \text{CALCULATED HOUSE LOAD}$$

2.13 Inverter communications connections

2.13.1 SMART METER

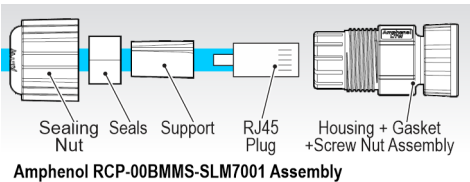
If not already installed, run the Smart Meter communications cable to the inverter and insert the RJ45 plug into the KWH METER port at the bottom of the BoS.



2.13.2 ETHERNET (RECOMMENDED)

The ethernet port is used if the inverter is to be connected to the home network using ethernet cable (not Wi-Fi). If not already installed, run ethernet cable from the home network to the inverter and connect to the ETHERNET port.

Terminate using Amphenol RCP-00BMMs-SLM7001 configured straight-thru. Connect to the ETHERNET port.



2.13.3 DRED (DEMAND RESPONSE ENABLING DEVICE)

An RJ45 socket is provided at the BoS to enable Demand Response Enabled Device control. Run the DRED cable from the DRED device to the BoS. Terminate using 8-pin RJ45 and Amphenol RCP-00BMMs-SLM7001 gland. Assign pins as below.

PIN	ASSIGNMENT	ILLUSTRATION
1	DRM 1 / 5	The diagram shows two components: a DRED (Demand Response Enabled Device) and an RJ45 Plug. The DRED is a circular device with 8 pins labeled 1 through 8. The RJ45 Plug is a rectangular device with 8 pins labeled 1 through 8.
2	DRM 2 / 6	
3	DRM 3 / 7	
4	DRM 4 / 8	
5	RefGen	
6	COM / DRM 0	
7	NC	
8	NC	

Method for asserting DRM

MODE	RJ45 SOCKET ASSERT BY SHORTING PINS	FUNCTION
DRM 0	6 5	Operate the disconnection device

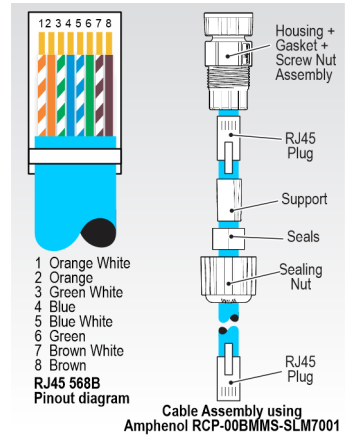
2.13.4 RELAYS

Add relays using Redback RK-1 Relay Kits. The kit enables programmed or remote control of connected circuits and attached devices e.g., pumps or hot water can be scheduled during daylight hours to consume excess solar.

Relays may be connected as Normally OFF or Normally ON, as shown below. Setup, schedule, and control relays as described in [Section 3.7](#).

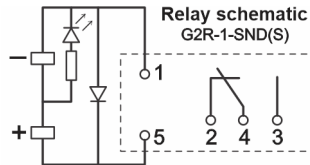
ROUTE AND FABRICATE THE RELAY CABLE

1. Route Cat5 ethernet cable from the Relay to the Redback System, making the cable as short as practical and not more than 10m long.
2. At the relay end, terminate the cable with a RJ45 plug, configured 586B straight-thru as shown right.
3. At the BoS, remove the cap from the Relay port.
4. Terminate the system end of the cable using Amphenol RCP-00BMMs-SLM7001.
5. Configure as RJ45; 586B straight-thru.
6. Insert the plug into the Relay port and tighten the gland.



RELAY CONNECTIONS

The relay can directly control loads up to 10A@240V AC and can be connected or configured to achieve Normally ON or Normally OFF, and to control loads over 10A.



Loads up to 10A@240V AC

1. Connect the load directly as shown right.
2. During installation, in the RedbackINSTALL app, rename the relay to include its default state e.g., HWS Normally OFF, and set the default state to match—changing the default state will change the scheduling from ON/OFF to OFF/ON.

Loads over 10A@240V AC

Loads over 10A@240V AC must be controlled using a secondary contactor (installer to supply).

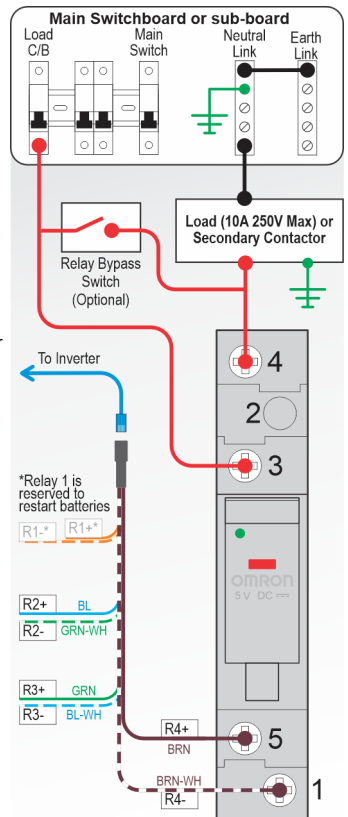
1. At the secondary contactor, mechanically configure or select the contactor to be Normally ON or Normally OFF as required. This will ensure the relay returns to the normal state if the inverter is off.
2. Connect the RK-1 relay as shown right.
3. In the app, configure the RK-1 to match the secondary relay i.e., Normally OFF or Normally ON.
4. Set the schedules as required.

RK-1 connection

1. Connect relays as shown right.
2. Do not connect R1 leads: R1 is already assigned internally for BMS restarting.

Note: In the app and portal:

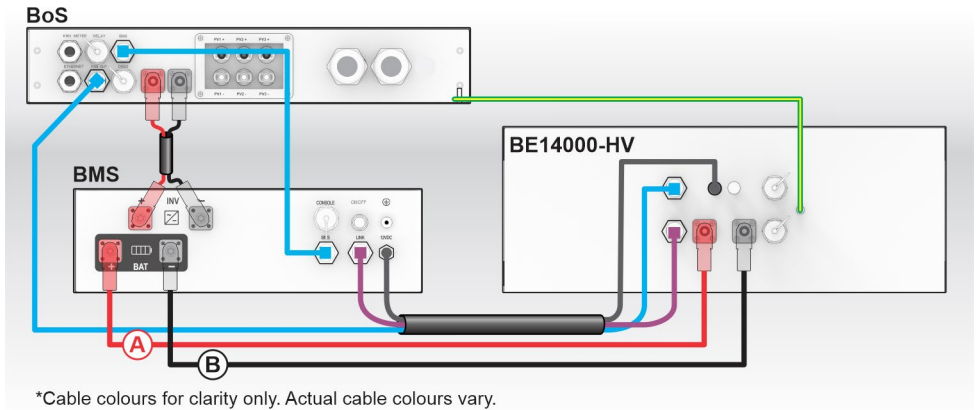
- R2 is aliased as "Relay 1 (RK2)"
- R3 is aliased as "Relay 2 (RK3)"
- R4 is aliased as "Relay 3 (RK4)"



2.13.5 PRIMARY BATTERY ENCLOSURE CONNECTIONS

The enclosure is fitted with waterproof connectors for power and data, and all cables are fitted with waterproof caps. The battery leads are terminated with colour-coded connectors. An earth lead is supplied.

1. Connect all cables between BMS, BoS and BE14000-HV as shown below (all cables and harnesses are included in the ST10000 inverter accessories box).
2. Ensure all plugs are fully seated and all glands are tight.



2.14 Installing the ST10000 Inverter



WARNING: HEAVY LIFT. The Inverter is heavy: 2-person lift needed.

2.14.1 MOVE BOS TO FINAL LOCATION

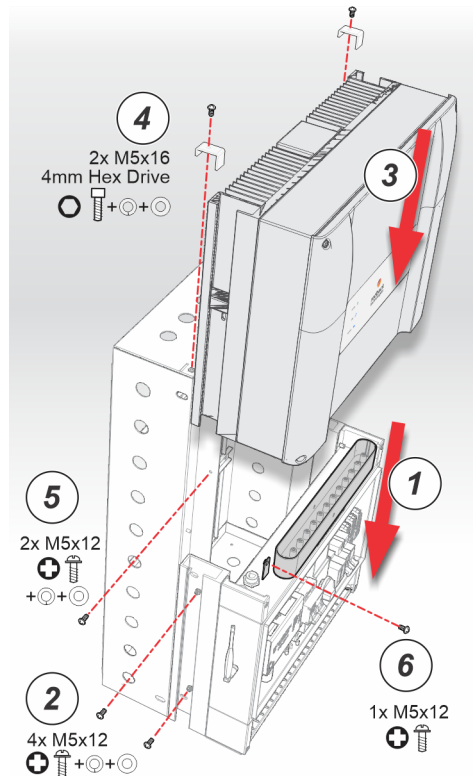
1. Lift BoS from the Wall Mounting Frame and re-attach using the upper slots in the aluminium sides. If there is any resistance check that cables are not binding, being pulled on, bending excessively, or being stressed in any way. Rearrange cables as needed – ensure all cables remain correctly fitted.
2. Fasten BoS to Frame using the screws, flat and spring washers supplied (2x M5x10 each side).

2.14.2 INSTALL INVERTER

The Inverter sits on top of the BoS, engaging the large connector, and is secured to the Wall Mounting Frame using two yokes at the top, one screw at each side, and one internal screw.

Install the inverter

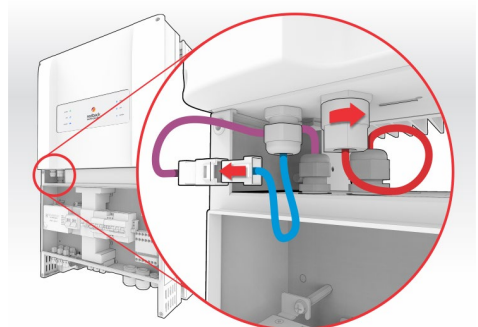
3. With an assistant, lift Inverter on top of the BoS. Align the large connector and pull the inverter down until the connector is fully engaged.
4. Fit the upper yokes using the M5x16 socket head screws supplied, including flat and spring washers. Ensure the inverter is flush to the Wall Mounting Frame.
5. Fit the two M5x10 side retainer screws, including flat and spring washers.
6. Fit the M5x12 Inverter-to-BoS security screw.



2.14.3 BOS TO INVERTER CONNECTIONS

The BoS and Inverter are pre-wired with two pairs of plugs, found at the left-hand top of the BoS.

1. Plug the Smart Meter cable (shown red) into the inverter side socket. Tighten the waterproof cap.
2. The EMS Power cables are joined using a four-pin connector. Join the two cables ensuring the two halves "Click" together, indicating that the waterproof seal is enabled.



Cable colours for clarity only

2.15 Battery installation



WARNING. SHOCK HAZARD. New batteries contain charge. Turn the inverter BATTERY SYSTEM DC isolator OFF during installation.



INFORMATION FOR FUTURE USE. When replacing or adding batteries, all batteries must be charge balanced and firmware must be updated, otherwise system performance will be affected.

Installation notes

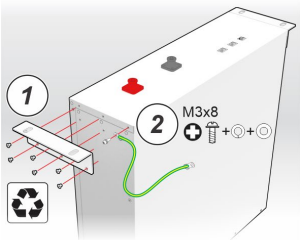
- 1. The Redback system has a storage capacity of up to 28.4kWh using four or eight Pylontech batteries and up to two BE14000-HV battery enclosures.
- 2. Use Pylontech H48050 or H48074 batteries but do not mix models. The nominal capacities are shown right.
- 3. The battery naming and positioning convention is shown in section 2.16.3.
- 4. To ensure even cooling, batteries must be installed in the approximate positions shown. Batteries must not touch the rear or sides of the enclosure, or each other.
- 5. Batteries are unrestrained on the enclosure shelves, held in place by their own weight.
- 6. Batteries must be independently earthed to the cabinet as shown below.

QTY	CAPACITY (KWH)	
	H48050 (@2.4KWH)	H48074 (@3.55KWH)
4	9.6	14.20
8	19.2	28.40

2.15.1 PREPARING PYLONTECH BATTERIES

BMS cables connect the Fan Controller to the first battery, and between subsequent batteries. Each battery must be earthed to the enclosure cabinet.

- 1. Remove the rack-mounting brackets. Dispose of responsibly.
- 2. Connect an earth cable to the bracket mount point, as shown, using the M3x8 screw and washers.
- 3. Note the location of enclosure battery earth studs.



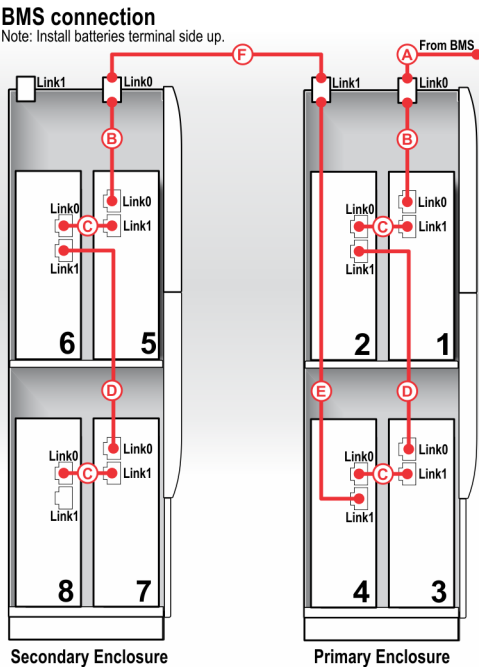
2.15.2 BATTERY POSITIONING AND EARTH CONNECTIONS

- 4. Position batteries in the cabinet as shown right. Place the batteries with approximately equal air gap all round, to optimise cooling.
- 5. Connect the earth cable from each battery to a nearby earth post.



2.15.3 BMS CABLE CONNECTIONS

- 1. Connect BMS cables in the sequence shown, using the supplied cables.
- 2. Store any unused cables in the enclosure.



CABLE LEGEND					
A	BMS to BE	500mm	1x	Included with ST10000	
B	BMS IN	400mm	1x	Pre-fitted to BE14000-HV	
C	BMS (BATT to BATT)	300mm	2x	Included with BE14000-HV	
D	BMS (BATT to BATT)	900mm	1x	Included with BE14000-HV	
E	BMS OUT	1000mm	1x	Included in Connection Kit	
F	BMS BE to BE	1200mm	1x	Included in Connection Kit	
1,2,3 etc	Battery number (in BMS sequence)				

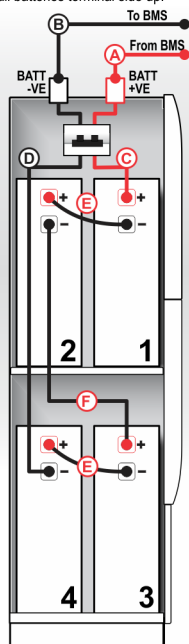
2.15.4 BATTERY POWER AND CONNECTIONS

Connect the battery power connections as shown below.

1. Batteries are connected in series: four or eight batteries of the same model i.e., all H48050 or all H48074.
2. Connect battery earth leads to a nearby earth stud (M5x10).
3. The battery leads are coiled and zip-tied in place for transport. Use end cutters to release.
4. Route cables to the lower shelf via the portals at sides of the upper shelf. Do not pinch cables.

Single Enclosure

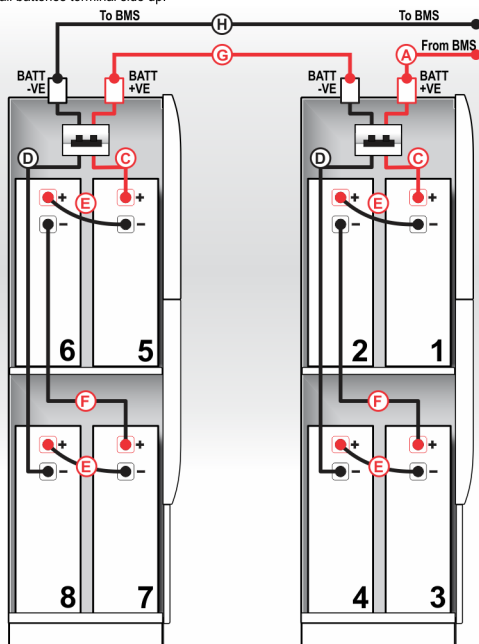
Note: Install batteries terminal side up.



Primary Enclosure

Dual Battery Enclosures

Note: Install batteries terminal side up.



Secondary Enclosure

Primary Enclosure

CABLE LEGEND

A	BMS to BE (Red)	500mm	1x	Included with ST10000
B	BMS to BE (Black)	500mm	1x	Included with ST10000
C	BATTERY 1 B+		1x	Pre-fitted to BE14000-HV
D	LAST BATTERY B-		1x	Pre-fitted to BE14000-HV
E	POWER1	900mm	2x	Supplied with BE14000-HV
F	POWER2	900mm	1x	Supplied with BE14000-HV
G	BE to BE	1200mm	1x	Included with Connection Kit
H	BMS to BE	1200mm	1x	Included with Connection Kit

3. Commissioning

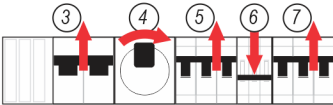
The commissioning process is simple:

1. Start the inverter
2. Initialize the batteries
3. Use RedbackINSTALL to:
 - Connect to the inverter using Bluetooth
 - Connect the inverter to the owner's internet
 - Verify hardware and apply all settings
4. Validate the installation using portal.redbacktech.com.
5. Closeup and handover to the Homeowner.

3.1 Start the inverter

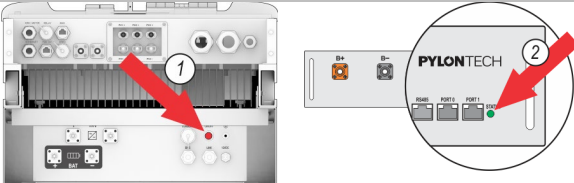
Start-up notes

- If no internet or home network is available at site, the inverter can be pre-configured with all major settings except site registration i.e., it can be left functional but not onboarded.
- Ethernet connected systems will automatically connect to the LAN and the internet. This is indicated after start-up: The EMS NETWORK LED and the Status Panel NETWORK icon are ON, and the EMS icon and EMS BLUETOOTH LED are flashing.
- Do not turn power OFF during start-up: this increases start-up time and may cause the EMS to crash.

#	PROCEDURE	ILLUSTRATION
1.	At the main switchboard, turn the Solar Supply Main Switch ON.	
2.	Switch all Battery Enclosure isolators ON (to the left)	
3.	Turn BATTERY SYSTEM DC isolators ON (up)	
4.	Temporarily refit the PV ARRAY DC isolator knob and turn ON (clockwise to 12 o'clock).	
5.	Switch the BACKUP AC isolators ON (up)	
6.	Switch the BYPASS switch to Backup (down)	
7.	Switch the INVERTER AC isolators ON (up)	
8.	Wait 10 minutes for the Inverter to boot-up and advertise Bluetooth (EMS icon is flashing).	

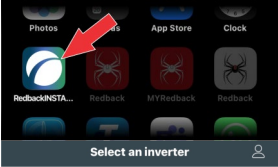
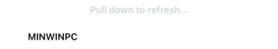
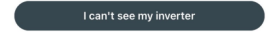
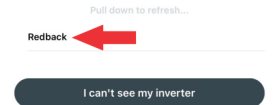
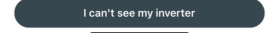
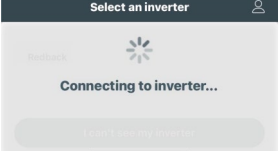
3.2 Start the Pylontech batteries

Under normal operating conditions, the batteries automatically start when you commission using the App and perform the battery selection. If the batteries do not start, or AC power is not available, the batteries can be started manually.

#	PROCEDURE	ILLUSTRATION
1.	Behind the BoS, find the BMS module ON/OFF switch and press ONCE.	
2.	In the battery cabinets, observe the Status LED on each battery. Within 10 seconds they will stabilise to green. The batteries are now initialised.	

3.3 Connect RedbackINSTALL to the inverter

The RedbackINSTALL app is very user friendly... it requires little guidance: there is in-app information when you need it.

#	PROCEDURE	ILLUSTRATION
1.	Ensure the Inverter Status Panel EMS LED is flashing, indicating that Bluetooth is available. If not flashing, press the Sun to restart the system.	
2.	Open RedbackINSTALL and login. RedbackINSTALL will scan for products advertising Bluetooth. Wait up to five minutes.  Do not select MINWINPC if it appears in the inverter list. Wait a few minutes for the EMS to restart and REDBACK to appear in the list.	  
3.	REDBACK will appear. Tap to continue.	 
4.	Wait up to two minutes.	
5.	A success message will appear. Tap Continue to begin onboarding.	

3.4 Onboarding (Connect inverter to the local network)

RedbackINSTALL will advance to this stage after establishing a Bluetooth connection to the Inverter.

Note: If a local network is not available it is possible to temporarily connect the Inverter to a Wi-Fi hotspot, such as your phone. This is useful for configuration but is not an acceptable long-term solution.



This equipment is not compatible with 5Ghz Wi-Fi networks or hotspots. Use 2.4Ghz networks.

PROCEDURE

1. Select the preferred method to connect to the local network and internet. Options are:

- None
- LAN (must be hardwired, will connect automatically)
- Wi-Fi (usually requires network name and password)

ILLUSTRATION



None (No internet)

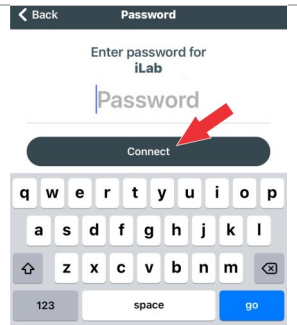
LAN (Ethernet)

Wi-Fi

2. Select the required network or swipe down to refresh the list.



3. Enter the password.
Tap Connect to continue.



4. A Success message will appear.
Tap Continue to go to the Inverter Configuration page.



3.5 Notes on regional settings

Regional Safety Setting is a mandatory choice when configuring the system—the system will not operate if it is not selected.

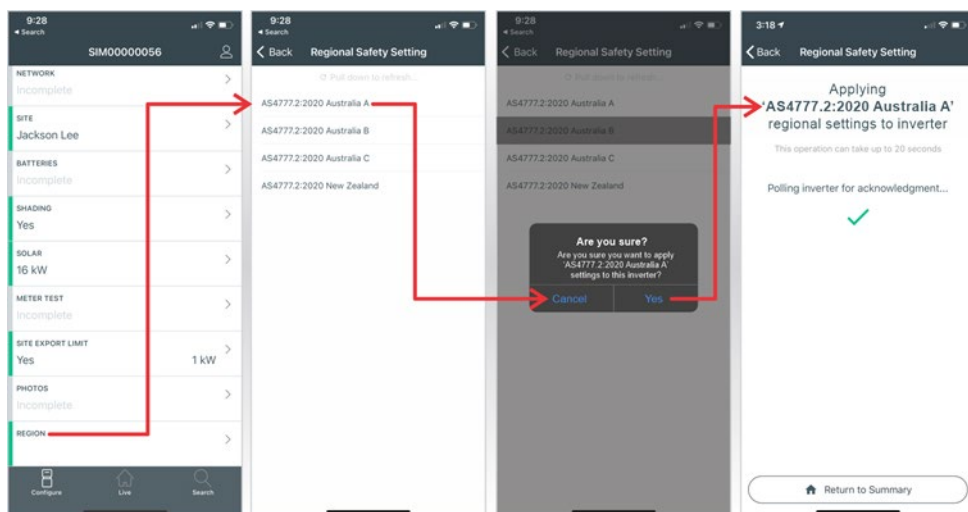
You may be prompted to update the inverter software. Do this if asked.

For convenience, the Regional Safety Settings are set by selecting the Region from the list provided in the RedbackINSTALL app. The list is maintained with the latest settings required by AS4777.2:2020. Choosing a region automatically selects Power Quality Response Mode settings, including:

- Voltage balance mode (where available)
- Voltage and frequency limits
- Sustained operation for frequency variations
- Grid Protection
- Power Rate Limits
- Frequency Response Limits
- Voltage Disturbance Band Withstand
- Volt-Var response
- Volt-Watt response
- Fixed Power Factor Mode
- Reactive Power mode



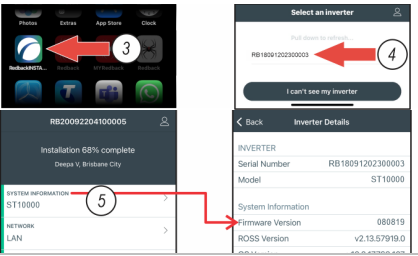
INFORMATION. The local grid operator may request a non-standard safety setting for an installation. If so, contact Redback Technical Support for help in changing settings.



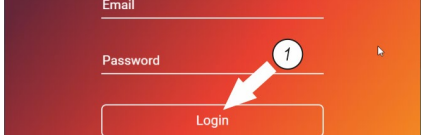
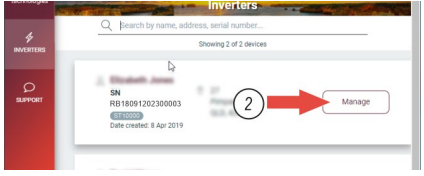
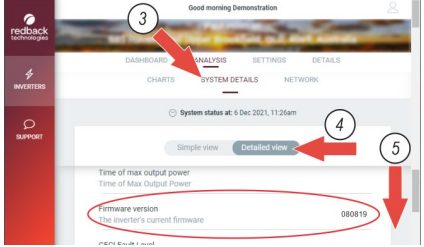
3.6 Redback product firmware version

Redback Smart Hybrid inverter firmware version is 080819.

3.6.1 IDENTIFY USING REDBACKINSTALL

#	PROCEDURE	ILLUSTRATION
1.	Ensure the EMS Bluetooth LED is flashing, indicating that Bluetooth is available. If the LED is not flashing, restart the EMS by moving the BYPASS switch to the MIDDLE position for 5 seconds, then return it to the DOWN position.	
2.	Wait for the Bluetooth LED to begin flashing steadily.	
3.	If not already open, start RedbackINSTALL and sign in.	
4.	The app will display a list of nearby Redback products that are advertising Bluetooth. Select the required Redback product from the list. Settings page will open.	
5.	Touch SYSTEM INFORMATION to view the firmware version.	

3.6.2 IDENTIFY USING THE REDBACK PORTAL

#	PROCEDURE	ILLUSTRATION
1.	On the internet go to portal.redbacktech.com and login. The Inverters list will open (showing accessible inverters). Note: You will be unable to view the firmware of offline or unregistered inverters.	
2.	Find the target inverter and select MANAGE. The Analysis page will display.	
3.	Select SYSTEM DETAILS.	
4.	Select DETAILED VIEW as shown.	
5.	Scroll to the Firmware version or find using your browser's search function.	

3.7 Notes on Relay configuration

The Redback ST10000 supports up to three relays, each controlling a dedicated circuit and attached loads. Each relay has its own switching schedule, enabling the owner to move energy consumption to times of solar generation.

One relay may be nominated as a Smart Relay, enabling greater self-consumption of excess PV that would otherwise be exported or lost. See [Smart Load Control Installation Guide](#) for more information on this feature.

Typical app and portal screens are shown on the right.

Relay configuration rights vary for installers and owners.

Relay 4 (RK1) is not visible. It is reserved for system use.

Installers can:

- Enable relay visibility (RedbackINSTALL)
- Configure as normally ON or normally OFF (RedbackINSTALL)
- Schedule single or multiple relay events (Redback Portal).
- Schedule single or multiple daily relay events (Redback Portal).
- Nominate one relay as the Smart Relay, and setup operation parameters.

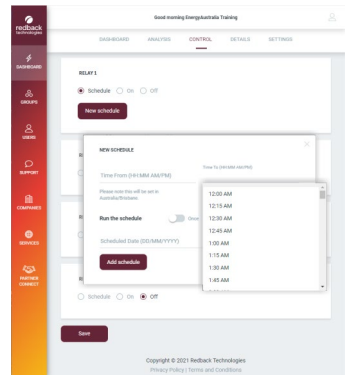
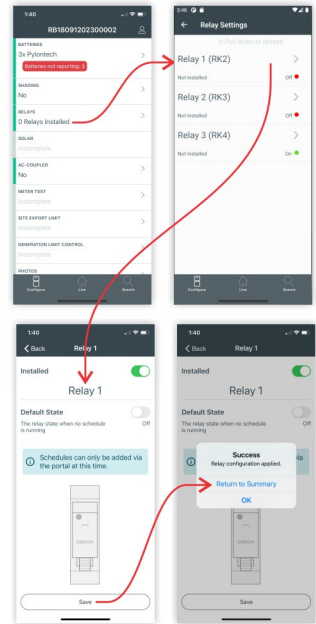
Owners can use the Redback Portal to:

- Turn relays ON and OFF manually
- Schedule single or multiple relay events.
- Schedule single or multiple daily relay events.

Configuration notes:

- Scheduled events must activate and deactivate the Relay i.e., ON and OFF (this is software enforced).
- The inverter must be internet connected to receive new or changed schedules. When received, the schedules are stored on the inverter: events occur even if the internet is not available.
- The relays are OFF when the power supply is lost. When power is restored, the device reads the configuration from memory, and restores the correct state.
- The relay control system is software based: features are often added or improved, and the latest documentation is accessible in the Redback Apps or Portal.

Find more Relay kit information at: redback.link/rk1im
Find more Smart Load Control information at: redback.link/rbslc



3.8 Compliance inspections

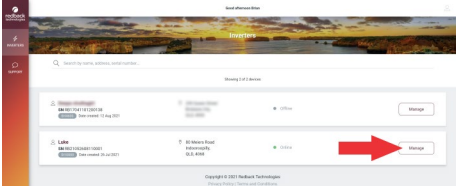
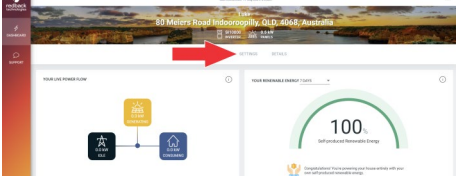
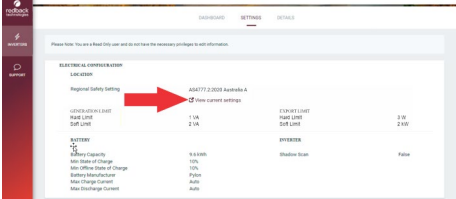
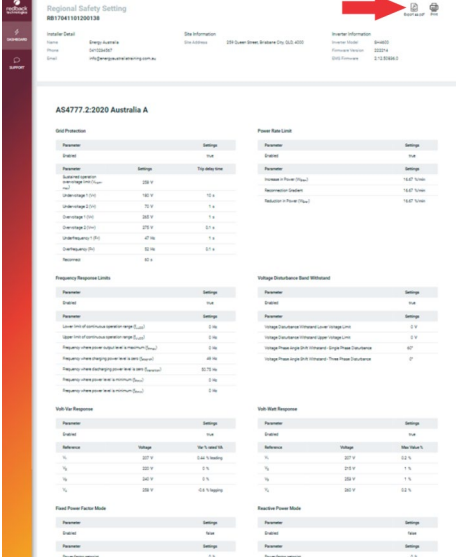
3.8.1 ASSIGNING AN INSPECTOR

Installers may assign a Compliance Inspector to each new product installation. Assignment is completed on the Redback Portal. Products must be registered in the installer's fleet prior to assigning an inspector.

#	PROCEDURE	ILLUSTRATION
1.	Login to the Redback portal at portal.redbacktech.com Search for the required product serial number from the list. Click the required product to open the product properties.	
2.	Click Dashboard .	
3.	Navigate to the Inverters tab and select User Access .	
4.	Add a new user. Enter Inspector's email and name. Select Inspector from the drop-down list. Select Invite to save. Notification emails will be sent to the email address provided.	
5.	The Inspector will now appear in the list of users of this inverter.	

3.8.2 COMPLIANCE INSPECTION

Nominated Compliance Inspectors receive notifications when added as a product user. Their first notification will supply a link to complete their user registration.

#	PROCEDURE	ILLUSTRATION
1.	Login to the Redback portal at portal.redbacktech.com If necessary, search for the required product serial number. Select Manage to open the product dashboard. Note: the first login will require acceptance of the Redback T&Cs.	
2.	Select SETTINGS to open the products general settings.	
3.	Select View current settings to see the Detailed Regional Safety Settings.	
4.	The Detailed Regional Safety Settings are read only. Scroll the page to see all settings. The settings may be Printed or Exported to PDF for record keeping.	

4. Inverter operation

The ST10000 has a small number of physical controls available at the Inverter. All sophisticated functions are managed using the RedbackINSTALL app or Redback web portal.

4.1 Bypass switch operation

The bypass switch controls the power to the BACKUP AC isolator. Its primary use is to manually connect the Backup circuit directly to grid supply, when needed.

Note for ST10000: The Bypass switch does not restart the EMS.



POSITION	FUNCTION	COMMENTS
	Up Power to the Backup circuit is from the grid supply only. The Inverter no longer controls the Backup circuit.	This mode ensures grid supply to the Backup circuit if the inverter is not available or not operating. If grid supply is lost the Inverter will not supply the Backup circuit.
	Middle Backup circuit is isolated (depowered).	No power is sent to the Backup circuit.
	Down Power to the Backup circuit is supplied and managed by the Inverter, from any source.	This is the recommended mode of operation. If grid supply is lost the Inverter will continue to supply the Backup circuit from the batteries and PV- the entire system will shut down when the batteries reach the minimum SoC.

4.2 EMS restart

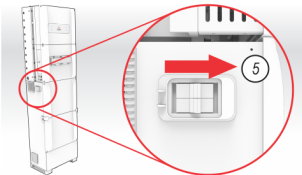
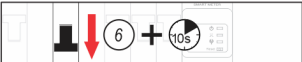
Occasionally, it may be necessary to restart the EMS software. A restart will reboot the EMS, without needing to restart the whole inverter, noting that the Backup circuit will be briefly interrupted.

To restart the system, press the switch concealed under the sun.



4.3 Shutdown procedure

Occasionally, it may be necessary to shut down the inverter interrupting all inverter functions, noting that PV remains energised to the isolators.

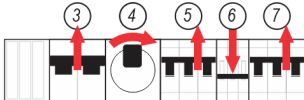
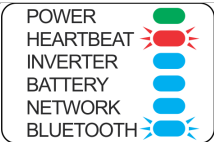
STEP	PROCEDURE	COMMENT/ILLUSTRATION
1.	Open the BoS switchgear hatch. Switch the INVERTER AC isolator OFF (down).	
2.	Switch the BACKUP AC isolator OFF (down).	
3.	Turn the PV ARRAY DC isolator OFF (anti-clockwise).	
4.	Switch the BATTERY SYSTEM DC isolator OFF (down)	
5.	Turn all Battery Enclosure isolators OFF (to right).	
6.	Turn the Solar Supply Main Switch OFF (on switchboard or sub-board). The Inverter is now OFF: All software and communications are stopped, and no energy is being imported or exported from the inverter. Wait 10 seconds before any restart.	



WARNING: PV remains energised to the isolator.

4.4 Inverter restart procedure

Restart the inverter as shown below.

STEP	PROCEDURE	COMMENT/ILLUSTRATION																										
1.	Turn the Solar Supply Main Switch ON.																											
2.	Turn all Battery Enclosure isolators ON (to left)																											
3-7.	Working left to right, turn the inverter isolators and switches ON as shown.																											
8.	The inverter will resume normal operation in about 10 minutes, indicated by:	INVERTER STATUS PANEL LEDS <table><tr><td>SYSTEM</td><td>Green; ON</td></tr><tr><td>EMS</td><td>Blue; FLASHING (BT active)</td></tr><tr><td>BATTERY</td><td>Varies</td></tr><tr><td>SOLAR</td><td>Varies</td></tr><tr><td>GRID</td><td>Blue; ON</td></tr><tr><td>NETWORK</td><td>BLUE; ON</td></tr><tr><td>EMS LEDS</td><td></td></tr><tr><td>POWER</td><td>Green; ON</td></tr><tr><td>HEARTBEAT</td><td>Red; FLASHING</td></tr><tr><td>INVERTER</td><td>Blue; ON</td></tr><tr><td>BATTERY</td><td>Blue; ON (if batteries exist)</td></tr><tr><td>NETWORK</td><td>Blue; ON (if Network OK)</td></tr><tr><td>BLUETOOTH</td><td>Blue; FLASHING (for extra 30 minutes, then OFF)</td></tr></table>  	SYSTEM	Green; ON	EMS	Blue; FLASHING (BT active)	BATTERY	Varies	SOLAR	Varies	GRID	Blue; ON	NETWORK	BLUE; ON	EMS LEDS		POWER	Green; ON	HEARTBEAT	Red; FLASHING	INVERTER	Blue; ON	BATTERY	Blue; ON (if batteries exist)	NETWORK	Blue; ON (if Network OK)	BLUETOOTH	Blue; FLASHING (for extra 30 minutes, then OFF)
SYSTEM	Green; ON																											
EMS	Blue; FLASHING (BT active)																											
BATTERY	Varies																											
SOLAR	Varies																											
GRID	Blue; ON																											
NETWORK	BLUE; ON																											
EMS LEDS																												
POWER	Green; ON																											
HEARTBEAT	Red; FLASHING																											
INVERTER	Blue; ON																											
BATTERY	Blue; ON (if batteries exist)																											
NETWORK	Blue; ON (if Network OK)																											
BLUETOOTH	Blue; FLASHING (for extra 30 minutes, then OFF)																											

4.5 Inverter operating modes

The inverter operating modes are summarised below. Select modes using the Redback app or portal.

4.5.1 AUTO MODE

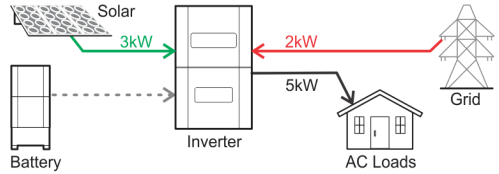
AUTO is the default operating mode, maximizing consumption of self-generated and stored energy. If the inverter mode has been changed, AUTO can be reselected from the app or portal.

If AC loads (House) exceeds solar generation, energy sources are prioritised as follows:

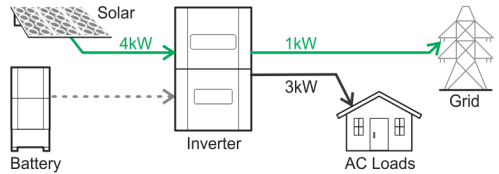
1. Solar
2. Battery
3. Grid

If solar production exceeds AC loads, destinations for self-generated energy are prioritised as follows:

1. AC Loads
2. Battery (storage)
3. Grid (if enabled)



AUTO Mode: AC Load exceeds Solar Generation

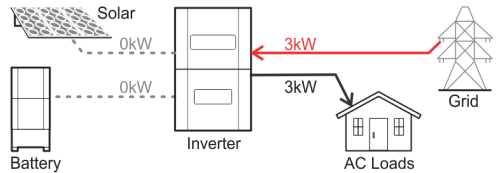


AUTO Mode: Solar Generation exceeds AC Load

4.5.2 STANDBY MODE

STANDBY mode is invoked automatically when no solar or battery energy is available. The ST10000 directs grid power directly to the AC Loads thereby minimising energy losses in the inverter e.g., heat.

The ST10000 automatically reverts to the previous mode of operation when Solar or Battery energy is available.



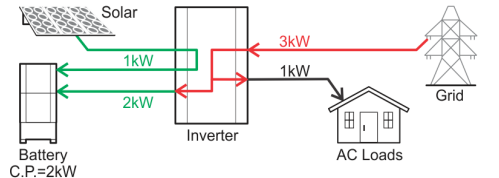
STANDBY MODE- No Solar or Battery energy available

4.5.3 CHARGE BATTERY MODE

CHARGE mode may be used to prepare for a severe weather event, and prioritises charging the battery at the nominated rate, from the grid.

Any available solar will supplement the grid charging up to a maximum charge rate of 4.6kW.

AC Loads are fulfilled by the grid.



CHARGE- Solar available

4.5.4 DISCHARGE BATTERY MODE

DISCHARGE mode is user selectable in the app or portal.

DISCHARGE mode prioritises battery discharge to the following:

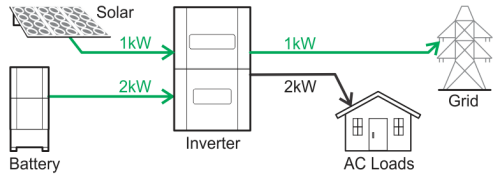
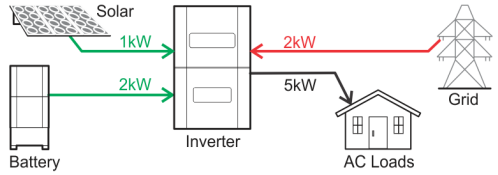
1. AC loads
2. Grid

Battery discharge is at the nominated Discharge Power, supplemented by solar.

If AC Loads exceed (Battery + Solar), energy is imported from the grid.

If (Battery + Solar) exceed AC Loads, excess energy may be exported to the grid.

If (Battery + Solar) exceeds (AC Loads + LEP) the battery discharge is prioritised, at the maximum possible rate, up to the nominated Discharge Power.



4.5.5 BACKUP MODE

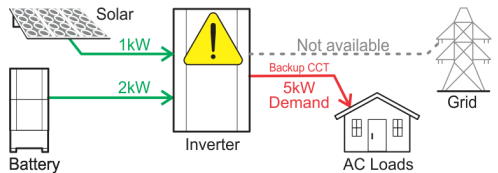
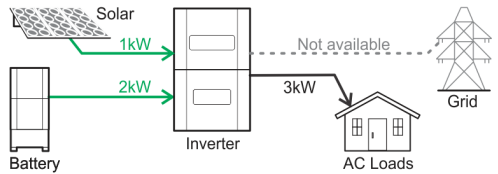
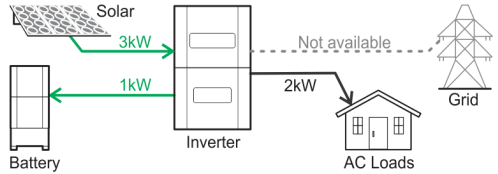
BACKUP mode starts automatically when the grid supply is interrupted (default setting).

In BACKUP mode, the ST10000 supplies energy to the AC Backup circuit only. Energy consumption from solar is prioritised and excess solar charges the batteries.

To maximise the effectiveness of the AC Backup circuit, the circuit should only support essential appliances such as refrigerators, or low energy devices such as fans, computers, tablets, or phones.

BACKUP mode is invoked within 0.05 seconds of a grid interruption. BACKUP mode reverts to the previous mode when the inverter detects grid supply has been restored for over one minute.

BACKUP mode may also be known as “Stand-alone Mode”.



Note: If available Battery and Solar power is less than the detected Backup Load the Inverter will consider this an overload and will automatically shut down.

The Inverter will restart after approximately one minute. If overload persists, the cycle will repeat.

5. Troubleshooting

5.1 Confirm onboarding success

Go to portal.redbacktech.com and search for the inverter (by serial number or address). Onboarding success is confirmed by the inverter being ONLINE and data refreshing every 60 seconds.

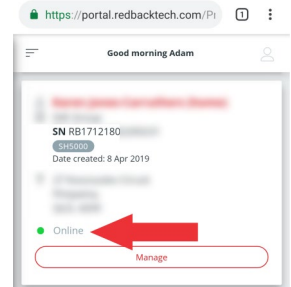
Onboarding notes

Your device connects to the inverter using Bluetooth. The inverter has two visual alerts to indicate that a Bluetooth connection is available:

1. The Status Panel EMS icon is flashing blue.
2. The EMS BLUETOOTH LED is flashing blue.

At first start-up, the LEDs and Icons listed below show the status of system onboarding, noting that Bluetooth times out after 30 minutes of inactivity.

To reactivate Bluetooth, press the Sun. Restart takes up to 10 minutes.



PREFERRED CONNECTION METHOD	COMMENT	INDICATIONS		REDBACKINSTALL IMPACT		
		STATUS PANEL ICON	EMS LED	NET WORK	BLUE TOOTH	
Ethernet	Preferred and automatic if LAN is detected					Onboarded & connected to the Redback Cloud. The app will request confirmation that LAN is the preferred connection.
						Connected to home network using ethernet but Redback Cloud not found. The app will request confirmation that LAN is the preferred connection. Internet troubleshooting needed.
						Not connected to home network. Onboarding required. The app requires you to specify the connection method. LAN troubleshooting needed.
Wi-Fi	Onboard using Bluetooth and Wi-Fi					Connection to home network is needed, including password.
None	Use Bluetooth to partially set up but not register.					The app will request confirmation of this choice. A limited menu of setup options will be available.

5.2 Earth fault alarm

If the Redback system detects an earth fault:

1. An audible alarm will sound in the inverter.
2. The Status Panel System icon will be solid red (see below).
3. An email will be sent to Redback customer service, the installer, and the system owner.

An email is also sent when the alarm is cleared.

5.3 Inverter Status LEDs

The ST1000 is equipped with an Icon array to show system status and aid diagnosis. The table below lists Icon indications, probable cause, and rectification steps. If the problem is not solved contact Redback.



✓ Indicates the homeowner may complete this activity.

✗ Indicates the activity may only be completed by an Electrically Certified person.

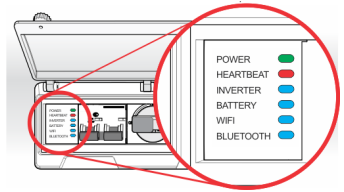
ICON	COLOUR & PATTERN	MEANING AND OR PROBABLE CAUSE	SOLUTION(S)
SYSTEM		System ready	OK
		System starting	✓ Wait up to 10 minutes after a restart- this may be normal behaviour. The system may cycle several times during start-up. Completion of start-up process is indicated by the LED stabilising to ON.
		System is not operating	✓ Restart system. If no response contact Redback.
		Grid voltage and frequency outside range	✗ Report out-of-spec supply to the local DNSP. ✗ Ensure all grid, PV and battery cabling is correct. Check the voltage and polarity of the batteries.
		Solar array overvoltage	✗ Check the PV voltage and ensure solar voltages are within the specified inverter PV input range.
		Over temp. inside inverter	Investigate the incident. <i>Performance will be reduced above 45°C and shut down occurs above 60°C.</i>
		Ground fault alarm.	✓ Turn PV ARRAY DC isolator OFF immediately (turn anti-clockwise to 9 o'clock). Investigate fault.
		Inverter failure	✓ Move the BYPASS switch to UP position to maintain grid supply to the Backup circuit.
SOLAR		Backup circuit overload (Exceeds 16.5A continuous or 30A for 10s at <45°C)	✓ Reduce simultaneous loads on the Backup circuits. ✓ Ensure plug-in devices on the Backup circuit are in accordance with section 1.4. ✗ Reduce permanent devices on the Backup circuit.
		Solar is Active	OK. No action needed.
		Solar is not active	✓ Ensure PV ARRAY DC isolator is ON (12 o'clock) ✗ Ensure PV cables are correctly connected to the inverter (pairing & polarity). ✗ Ensure solar output is within the capabilities of the MPPT trackers i.e. PV1: 125 – 550V DC @ 11A PV2+PV3: 125 – 550V DC @ 22A

ICON	COLOUR & PATTERN	MEANING AND OR PROBABLE CAUSE	SOLUTION(S)
 GRID		Grid active and connected	OK. No action needed.
		Grid is disconnected or not active	Normal behaviour during a grid outage. If grid is available: ☒ Turn UTILITY GRID AC Isolator ON. ☒ Check cables
 EMS		EMS Comm's OK	No action needed.
		EMS Comm's OK Bluetooth is advertising	The system can be accessed using RedbackINSTALL. Flashes for up to 30 minutes.
		EMS comm's failure	
 BATTERY		Battery SoC >75%	OK. No action needed.
		Battery SoC is 50-75%	OK. No action needed.
		Battery SoC is 25-50%	OK. No action needed.
		Battery SoC <25%	OK. No action needed.
		Batteries are disconnected or not active	☒ Ensure BATTERY SYSTEM DC isolator is ON (up). Reset EMS (press the sun on the Status Panel). ☒ Ensure all Battery and BMS cables are installed correctly. Reset EMS.
 NETWORK		Active Wi-Fi, LAN, or Bluetooth.	OK. No action needed.
		In-active Wi-Fi, LAN, Bluetooth.	☒ Internet connection lost. Ensure the local Wi-Fi or Ethernet network is working correctly. ☒ The system is not onboarded. Onboard using RedbackINSTALL.
		EMS failure	☒ If SYSTEM LED is ON check EMS LEDs for activity. Otherwise check UTILITY GRID AC Isolator is ON.
LEGEND:  OFF  ON   Flashing			

5.4 EMS Status LEDs

The EMS Status LEDs and labels are shuttered when the BoS front cover is fitted, therefore homeowners will not be able to easily identify EMS LEDs.

The EMS a.k.a. Inverter Control Board, is in the Balance of System (BoS). The EMS controls the inverter functionality, and all internal and external communications.



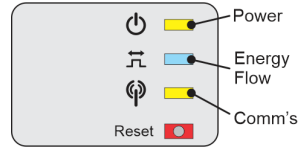
- ✓ Indicates the homeowner may complete this activity.
- ✗ Indicates the activity may only be completed by an Electrically Certified person.

LED	COLOUR & PATTERN	MEANING AND OR PROBABLE CAUSE	SOLUTION(S)
ALL LEDs OFF			
POWER		No Power available	✓ Inverter is Isolated from grid supply. Turn grid supply ON
HEARTBEAT			✓ Grid outage is occurring, and no PV or backup power exists. Wait for grid or PV power to be restored.
INVERTER			✓ Bypass is incorrectly set. Try the BYPASS switch in the UP and DOWN positions- the EMS should power up from grid or battery, if available.
BATTERY			✗ EMS PSU problem (internal). Check for disconnected DC power cable (at EMS or a link between BoS and Inverter).
NETWORK			
BLUETOOTH			
ALL LEDs ON			
POWER		EMS is in start-up phase	✓ Wait two minutes. EMS should stabilise to: Power ON ; Heartbeat flashing ; Inverter ON .
HEARTBEAT			✓ If all EMS LEDs remain ON, restart the EMS. Set BYPASS switch to the middle position for 5 seconds then return to the original position. Wait two minutes.
INVERTER			✗ If all LEDs remain ON, contact Redback for help.
BATTERY			
NETWORK			
BLUETOOTH			
POWER			
	EMS has power	OK. No action needed.	
	EMS does not have power	✓ See ALL LEDs OFF, above.	
		✗ EMS Power Supply failure- Replacement needed.	
		✗ EMS failure- Replacement needed.	
HEART BEAT			
	OK	No action needed. EMS is running normally.	
	EMS is frozen or updating	✓ Wait 5 minutes. If no change, restart the EMS.	
		✗ If still frozen, contact Redback for help.	
	No Power	✓ See ALL LEDs OFF, above.	
	Inverter is off	✓ Start inverter in accordance with section 4.3.	
INVERTER			
	OK	✓ Wait 5 minutes. Settings are being applied.	
	OK	No action needed. EMS is connected to Inverter.	
	EMS is not connected to the Inverter	✗ Check internal communications cables- contact Redback for information.	

LED	COLOUR & PATTERN	MEANING AND OR PROBABLE CAUSE	SOLUTION(S)
BATTERY		Battery detection error, or detection does not match the Installer created configuration.	✓ Restart the EMS. ✗ Check inverter settings. ✗ Check batteries and ensure internal cables are properly connected.
		OK	The EMS & BMS are communicating. No action needed.
		Battery detection error	✗ Turn all batteries OFF. Ensure Battery Power and all BMS cables are correctly installed. Ensure Pylontech DIP switches are correct. Restart batteries.
		Batteries do not match saved configuration	✗ See Battery Detection Error above. Note batteries present. Review configuration in the Redback app or portal.
		OK	Connected to the Redback Cloud. No action needed.
NETWORK		Connected to local network but Redback Cloud not found.	✓ Ensure the local network is internet connected. ✓ Log in to portal.redbacktech.com ✓ Login success: Indicates the home network is preventing the inverter from connecting to the internet. Ask the homeowner to change their network and or firewall settings. ✓ Login failed: Indicates a Redback server issue. Contact Redback for advice.
		Inverter not connected to local network	✓ Ensure the local network is operating correctly. ✓ Inverter requires onboarding.
		Bluetooth is discoverable	✓ If required, connect to the inverter using your phone and the Redback app.
		Bluetooth is connected	✓ Proceed with onboarding or setup.
BLUE TOOTH		Bluetooth OFF	✓ BT deactivates 30 minutes after EMS restart. Restart the EMS to activate discoverable Bluetooth.
LEGEND:  OFF  ON  Flashing			

5.5 SM3000 Smart Meter diagnostics

The Redback SM3000 Smart Meter is usually located at the main switchboard. It detects the grid energy traffic of up to 3 phases and indicates if the site overall is importing or exporting energy to the grid. This information informs inverter operation.



5.5.1 SMART METER LEDS

NAME	COLOUR & PATTERN	MEANING
Power		ON: Meter has power
		OFF: Meter does not have power or has failed
Energy Flow		ON: Site is consuming energy from the grid
		Flashing: Site is exporting energy to the grid
		OFF: Energy flow is not detectable
Comm's		Flashing: Transmitting data
		5x Flash: Reset in progress

5.5.2 SMART METER/CT TROUBLESHOOTING

INDICATION	CAUSE	REMEDY
No Smart Meter LEDs are illuminated	No power to meter	Check all connections. Check meter box Main Switch is ON On Smart Meter, measure voltage between Neutral and each phase (Terminals 10, 11, 12, 13)
	Meter faulty	Replace meter
Power flow direction is not as expected (any phase)	CT installed incorrectly (reversed)	Reverse polarity of CT by reversing direction of K->L relative to cable.
Power readings for two or more phases are incorrect	CTs have been attached to the incorrect phase at meter (L1, L2, L3).	Identify the true phase identity for each cable. Ensure the attached CTs are connected to the correct phase on Smart Meter i.e., the voltage measurement and the CT must match.
Batteries charging at night when inverter is in Auto mode.	CT installed incorrectly (reversed)	Reverse polarity of CT by reversing direction of K->L relative to cable
	CTs have been attached to the incorrect phase at the meter (L1, L2, L3)	Identify the true phase identity for each cable. Ensure the attached CTs are connect to the correct phase at Smart Meter
Portal not showing data & comm's LED flashing	Cable fault (no signal)	Test data cable with data tester and check data terminations

5.6 Internet connection problems

The Redback Inverter will perform best when it is permanently connected to the internet. An internet connection enables the inverter to send data to the Redback cloud, where you can use Redback apps or the portal to view performance and fine tune the system.

Occasionally, the inverter may lose internet connection and be reported as “offline”. Ethernet connected systems usually self-repair after a system restart. Wi-Fi problems usually require that the installation details are updated.

The most common causes of “offline” reports are:

INDICATION	CONNECTION AFFECTED		REMEDY
	Ethernet	Wi-Fi	
Change of Internet Service Provider e.g., Telstra, Optus, TPG, Dodo etc	✓	✓	Ethernet: Restart the System Wi-Fi: Restart and re-onboard
New router or modem	✓	✓	
Change of Network name or SSID	✓	✓	
Change settings in ADSL modem	✓	✓	Wi-Fi: Restart and re-onboard
Changed Wi-Fi or Network password		✓	
Too many users or devices on the home Wi-Fi network		✓	Limit users or devices; upgrade Wi-Fi router; connect using ethernet.
Wi-Fi signal is weak or variable due to obstructions or distance between the inverter and the Wi-Fi router's antenna.		✓	Experiment with Wi-Fi router locations; use a Wi-Fi extender; connect using ethernet.
Attempting connection to a 5Ghz Wi-Fi network		✓	This equipment is not compatible with 5Ghz Wi-Fi networks. Use a 2.4Ghz network or ethernet.

5.7 Inverter unexpected shutdown

The inverter may shut down or isolate itself from the grid if it detects conditions that may cause damage to the inverter or batteries; or create an unsafe situation. Incident causes can be diagnosed by examining the data available on the portal. Unexpected shutdowns may occur in the following circumstances:

CAUSE	RELEVANT CHARTS FOR DIAGNOSIS (IN PORTAL)	COMMENT
Total continuous Backup Load exceeds 16.5A.	Backup Load- Power	May occur when too many devices are active on the Backup circuit. Note: Applies with or without Grid availability.
Total Backup Load exceeds 16.5kVA for more than 60 seconds.	Backup Load- Power	May occur when too many high current appliances are used simultaneously, or when a large load starts up, such as a pump.
Backup Load exceeds available Battery + Solar power.	Backup Load- Power Battery- Power PV- Power	Solar power availability changes rapidly due to shading from moving clouds. Backup loads must be minimised to reduce unexpected shutdowns.
If internal temperature is greater than 60°C.	Inverter- Temperature Battery Cabinet-Temp.	Output is reduced above 45°C.
Grid supply did not comply with local or DNSP requirements.	Grid- Voltage Grid- Frequency Grid- Status	Check Region setting is correct. Check voltage drop calculations. Tap setting on transformer may be incorrect. Contact DNSP. The EMS and Backup circuit will operate if power is available from PV or batteries.

6. Maintenance



WARNING: ELECTROCUTION HAZARD. Lethal voltages may be present. Isolate all sources of power and test before removing covers.

The Redback ST10000 is a low maintenance product. Annual maintenance is needed.

Note: Filters, fans and heatsink fins may require more frequent cleaning in dusty conditions.

ITEM	NAME	REASON	PROCEDURE	BY SERVICE PERSON	BY OWNER
1.	Battery Enclosure vents and filter	Airflow is reduced when dust accumulates on the vents, or the filter is clogged. The lower intake vents are more likely to be affected.	Use a small pry tool to release the vent covers - gently pry next to the notches at top or bottom of cover. Blow or brush the vents clean. Wash the filter pads in soapy water and squeeze dry. Refit all parts ensuring the vents face downward.	✓	✓
2.	Battery Enclosure Fan blades	Fan efficiency is reduced when dust accumulates on the fan blades.	Remove the Upper Vent Cover and filter pad. Gently blow, brush, or wipe off fan blades. Do not overspeed the fan. Replace all parts.	✓	✓
3.	Cabinet	Cabinet may become soiled	Wipe down outside of cabinet with a just-damp cloth. Immediately wipe dry with a microfibre cloth. Do not use cleaning agents as they may damage the finish.	✓	✓
4.	Inverter heatsink fins	Cooling efficiency is reduced when dust, dirt or debris accumulate on the heatsink.	Clean the heatsink fins using a small brush or compressed air.	✓	✗
5.	Battery connections	Battery efficiency may reduce if connections or terminals become dirty or corroded.	Unplug and inspect battery cable connections. Remove corrosion or debris. Spray with contact cleaner.	✓	✗
6.	Cabinet seals	Concealed seals ensure cabinet water resistance	Remove covers and inspect seals for hardening, tears, or other damage. Look for signs of water in cabinets.	✓	✗
7.	Cable seals and caps	Seals and caps prevent water and insects entering the Inverter or connections.	Remove BoS front cover and tighten all cable glands and waterproof caps.	✓	✗

7. Specifications

PV PORT	VERSION 0312	VERSION 0314
Number of MPPTs	2	2
Strings per MPPT Input	2/1	2/1
MPPT Operating Voltage (range)	DC 200 – 550V	DC 200 – 850V
Maximum Input Voltage (Vmax)	DC 600V	DC 1000V
Maximum Current (Imp)	DC 12.5/22A	DC 12.5/22A
Maximum PV Input Power ¹	16000Wp	16000Wp
Short Circuit Current (Isc) ²	DC 17.5/36A	DC 17.5/36A
Maximum Back Feed Current	0A	0A
Decisive Voltage Class (DVC)	DVC-C	DVC-C
¹ Over-panelling benefits vary by location ² Manufacturer’s declared and tested Max Short Circuit Current (Isc Max)		
GRID INTERACTIVE PORT		ALL VERSIONS
Nominal Output Voltage	AC 400/380V	
Nominal Output Frequency	50 Hz	
Rated Output Current	AC 14.5A / phase	
Max. Output Current	AC 16.5A / phase	
Rated Output Active Power	AC 10000W	
Rated Output Apparent Power	10000VA	
Rated Input Current	AC 22.7 A/phase	
Rated Input Apparent Power	15000VA	
Power Factor (range)	0.8 lagging to 0.8 leading	
Output Voltage THD	<3%	
Inrush Current	45A, 2 μs	
Maximum Output Fault Current	45A, 2 μs	
Decisive Voltage Class (DVC)	DVC-C	
BACKUP PORT		
Nominal Output Voltage	AC400/380V	
Nominal Output Frequency	50 Hz	
Rated Current	AC 16.5A / phase	
Rated Active Power	AC 10000W ¹	
Rated Apparent Power	10000VA	
Peak Apparent Power	16500VA (60 sec max)	
Power Factor (range)	0.8 lagging to 0.8 leading	
Output Voltage THD	<3%	
Inrush Current	45A, 2 μs	
Maximum Output Fault Current	45A, 2 μs	
Maximum Output Overcurrent Protection	45A, 2 μs	
Decisive Voltage Class (DVC)	DVC-C	
¹ For 4x Batteries Rated Apparent Power = 5000W; for 8x Batteries Rated Apparent Power = 10000W.		
BATTERY PORT		
Voltage (nominal)	DC 180 - 600V	
Max. Current (charge)	DC 25 A	
Max. Power (charge)	DC 10000W	
Max. Current (discharge)	DC 25 A	
Max. Power (discharge)	DC 10000W	
Battery Type	Li-ion	
Battery Depth of Discharge	90%	
Short Circuit Current	400A	
Decisive Voltage Class (DVC)	DVC-C	

GENERAL INFORMATION		
Operating Temperature		-35°C to 60°C
Operating Temperature Derated Output		below 10°C and over 45°C
Operating Relative Humidity		0 - 95%
Operating Altitude		0 - 4000m
Protective Class		I
Ingress Protection Rating		IP66
AC Overvoltage Category		OVC III
DC Overvoltage Category		OVC II
Active Anti-islanding Method		Active Frequency Drift
Moisture Location Category		4K4H
External Environment Pollution Degree		Grade 1, 2 and 3
Inverter Topology		Non-isolated
Country of Origin		China
Demand Response Modes		DRM 0
Standby Self-Consumption		<15W
Noise Emissions (Inverter only)		<30 dBm
Warranty		10 years
EFFICIENCY		
Maximum Efficiency		97.60%
Maximum Battery to Load Efficiency		97.50%
European Efficiency		96.80%
PHYSICAL DATA		
Installed weight	Including 4 batteries	172-302kg
	Including 8 batteries	210-378kg
Dimensions (W x D x H mm)	ST10000 + 1x BE14000-HV	566 x 360 x 1960
	ST10000 + 2x BE14000-HV	1175(min) x 360 x 1960
Material	Aluminium cabinet and front covers; Stainless steel	
Finish	Powdercoat and internal sealant	
BATTERY ENCLOSURE DATA		
Enclosure Model		BE14000-HV
Name		Smart Hybrid Battery Enclosure
Number of Battery Units (N)		4 or 8
Storage Capacity	N x 2.4kWh	
	N x 3.55kWh	
Battery System Model		RB-HVS-Nx48-50 RB-HVS-Nx48-74
Maximum Capacity		28.4kWh
Nominal Voltage		DC N X 48V
Rated Current		DC 25A
Fan Specification		DC 12V / 0.3A x2
Protective Class		I
Ingress Protection Rating		IP54
Noise emissions		<42dBA◆
Dimensions (W x D x H mm)		545 x 348 x 1125
Material		Steel cabinet; Aluminium covers
Finish		Powdercoat and internal sealants

◆ Measured in Redback laboratory at 1m in front of Battery Enclosure.

ISOLATORS	PV PORT	GRID INTERACTIVE PORT	BACKUP PORT	BATTERY PORT	BATTERY CABINET
Manufacturer Part Number	XBE+3610	S203-C40	S203-C25	S802PV-SP32	NoArk Ex9BP
Rated Insulation Voltage	1100V	440V	440V	DC1500V	DC1000V
Rated Impulse Withstand Voltage	8kV	4kV	4kV	8kV	4kV
Suitability for Isolation	C	C	C	C	C
Rated Operational Current	16A	40A	25A	32A	32A
Utilisation Category	DC-PV2	A	A	A	A
Rated Short-time Withstand Current (Icw)	700A	-	-	-	-
Rated Short-circuit Making Capacity (Icm)	1000A	-	-	-	-
Rated Breaking Capacity (Isc)	5kA	15kA	15kA	5kA	10kA

COMMUNICATIONS PORTS AND PROTOCOLS

Ethernet	RJ45; Straight-thru
DRED	RJ45; DRED
Relays	RJ45; 3x Digital I/O; +DC5V & GND
kWh Meter	RJ45; RS485 MODBUS
RS485	RJ45; Factory Use Only
Wi-Fi	802.11b/g/n/ac; 2.4GHz
LTE	na
Interlock	na

USER INTERFACE

Front Panel Display	Coded, coloured LEDs
Communications	Bluetooth for commissioning; Wi-Fi or ethernet for remote access
Remote Access	Web Portal; MyRedback app
Remote Firmware Updates	Supported
Power/Energy Monitoring	Includes 1 x utility grade energy meter (class 1)

CERTIFICATIONS AND APPROVALS

AS/NZS 4777.2:2020	IEC 62116:2014	IEC 60529	RCM
IEC 62109-1:2010	IEC 62040-1:2017	EN 61000	CE Mark (LVD, EMC, RoHS directives)
IEC62109-2:2011	IEC 62477-1:2012		

DESIGNED WITH INSTALLATION STANDARDS CONSIDERED

AS/NZS 3000:2018	AS/NZS 5139:2019	AS/NZS 5033:2021
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DOCUMENT	COMMENT	LINK
Redback Customer Support Team	Available Mon-Fri 8am-5pm AEST Location: Brisbane, Australia Time zone: UTC +10:00	1300 240 182 (Australia) +61 7 3180 2325 (International)
Manual- ST10000	This document in PDF	redback.link/stim
Single Line Diagram	Handy document template	redback.link/stsld
BE14000-HV Battery Enclosure – Installing a second enclosure	Retrofitting to an installed ST10000+BE14000-HV using the BE14000-HV Connection Kit.	redback.link/stck
Redback SM3000 Smart Meter Installation Guide	Comprehensive installation guide	redback.link/smim
RK-1 Relay Kit	RK-1 Relays- Installation and configuration	redback.link/rk1im
Smart Load Control	Installation and setup guide	redback.link/rbslc
Application form	Apply for Redback Authorised Installer Status	redback.link/apply
Homeowner’s Guide	Day-to-day usage of your inverter and the Redback portal.	redback.link/stog
Redback Document Library	Password required	redback.link/docs
Pylontech	Battery manufacturer website	pylontech.com.cn
SafeWork Australia	Safe work procedures	safeworkaustralia.gov.au

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9. Close-up and handover

9.1 Close-up

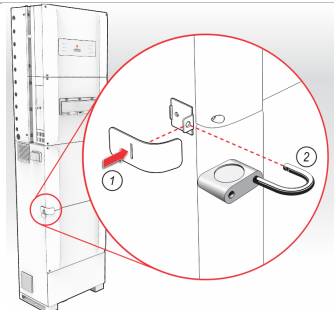
After the Inverter is commissioned:

ITEM	PROCEDURE	COMPLETED
1.	Replace all covers.	
2.	Replace and secure PV ARRAY DC isolator knob.	
3.	Clean worksite and dispose of rubbish appropriately.	

9.2 Handover

With the homeowner:

ITEM	DESCRIPTION	COMPLETED
1.	Walk through the installation, ensuring the homeowner understands what has been installed (and where), including any Backup circuits.	
2.	Have the owner fit the Security Clamps and padlocks (Optional; 2x padlocks per enclosure required). Ensure the owner has the keys.	
3.	Explain the limitations of the system, including the possibility of overloading the backup circuit by using too many devices simultaneously, even when the grid is connected.	
4.	Demonstrate how to recover after a BACKUP circuit overload.	
5.	Demonstrate how and when to use the BYPASS switch.	
6.	Help owner to complete their Redback Account setup, if not already done.	
7.	Help owner to download the app, demonstrate features, and answer questions.	
8.	Help owner to log on to portal and demonstrate, including how to: • Review performance • Setup battery charge/discharge schedules • Setup relay schedules • Raise an on-line support request	
9.	Handover to the homeowner, including: • Homeowner's Guide • Warranty Booklet • Padlock keys (if fitted) • Installation Manual (optional)	



Fit Security Clamps and Padlocks

