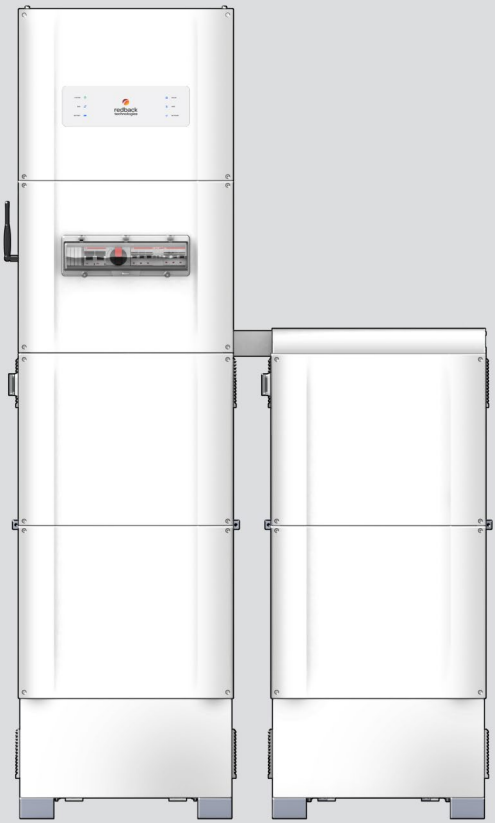
Owner's Manual

Redback Smart 3-Phase Hybrid System
ST10000 Inverter and BE14000-HV Battery Enclosures

V3.4



History

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1.2	07-Jul-21	Minor edits
1.3	09-Sep-21	Rebrand
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1.7	30-Jun-22	P9 System overview added; P12 Increased cooling zone to 150mm was 100mm; P22,24 Added Earth Fault alarm info; P28 Updated specification table
3.0	26-Jul-22	P2 Major version synced to PN; P10 P11 P12 Added information regarding backup outputs limited by battery quantity; P10 Added requirements when adding or replacing batteries.
3.1	02-Aug-22	P28 Added footnote regarding I_{SC} Max
3.2	09-Sep-22	P29 Qualify Inverter Noise Emissions; P29 Added BE Noise emissions and footnote.
3.3	05-Jun-23	P5 Reformat. P13 Add “Use Redback’s Site Manager feature” P28 Add “Maximum PV Input Power” and footnote. P28 Correct “Maximum Back Feed Current” (was Feedback). P28 Correct “Battery Port>Max. Power(discharge)” (was charge). P28 Add Rated Active Power footnote.
3.4	04-Jul-23	P12 Added “You may also affect your warranty coverage if the system is offline”.

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NOTICE OF COPYRIGHT

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.

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1. Welcome

Congratulations on the purchase of your new Redback system, including a Redback ST10000 Smart 3-Phase Hybrid Inverter and one or two Redback BE14000-HV High Voltage Battery Enclosures. Our products are designed and manufactured to our high-quality standards and will provide years of service.

The system's goal is to maximise the use of your self-generated solar energy while minimizing the amount of energy consumed from the grid.

This manual describes the features, use and maintenance of your Redback system.

2. Introduction

Your Redback system coordinates up to three solar arrays, battery storage, grid supply and your home, including a backup circuit and up to three relay-controlled devices.

The energy produced by the solar array is automatically directed to the battery, your home and/or the utility grid for the highest performance and best economic return.

The backup functionality enables users to have continued supply of electricity to the backup circuit in case of a utility power outage.

The MYRedback app and the Redback portal provide a comprehensive view of the energy consumed or generated by your home, providing the information required to fine-tune your system settings or optimise your energy usage patterns.

3. Getting help

Contact your installer first. You can usually find their contacts details on the inverter, inside the meter box, or inside the back page of this booklet. If your installer is unable to assist, try one of the other resources below or open a case with our Customer Support Team at https://portal.redbacktech.com/supportrequest.

4. Other resources

Source	Comment	Link
Homeowner's guide	Latest version of this document in pdf format	redback.link/stog
Redback Document Library	Password required	redback.link/docs

5. Transfer of ownership

If a Redback system is already installed in your new home, welcome to the Redback family. To get the best from your Redback system, and to receive important notifications from your system, you need to setup an account using a valid email address. You can then access the system using the Redback app or portal, see how the system is working for you, and gain insights to help maximise your consumption of self-generated energy.

When we setup your account, we'll also arrange for remaining warranty to be transferred to your name and we can answer any questions you may have about your system.

To get started, initiate a case with the Redback Customer Support Team at https://portal.redbacktech.com/supportrequest. We'll get back to you as soon as possible. We'll need some proof of ownership too, so be ready for that.

Important safety instructions – please read

This document contains 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 additional 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.

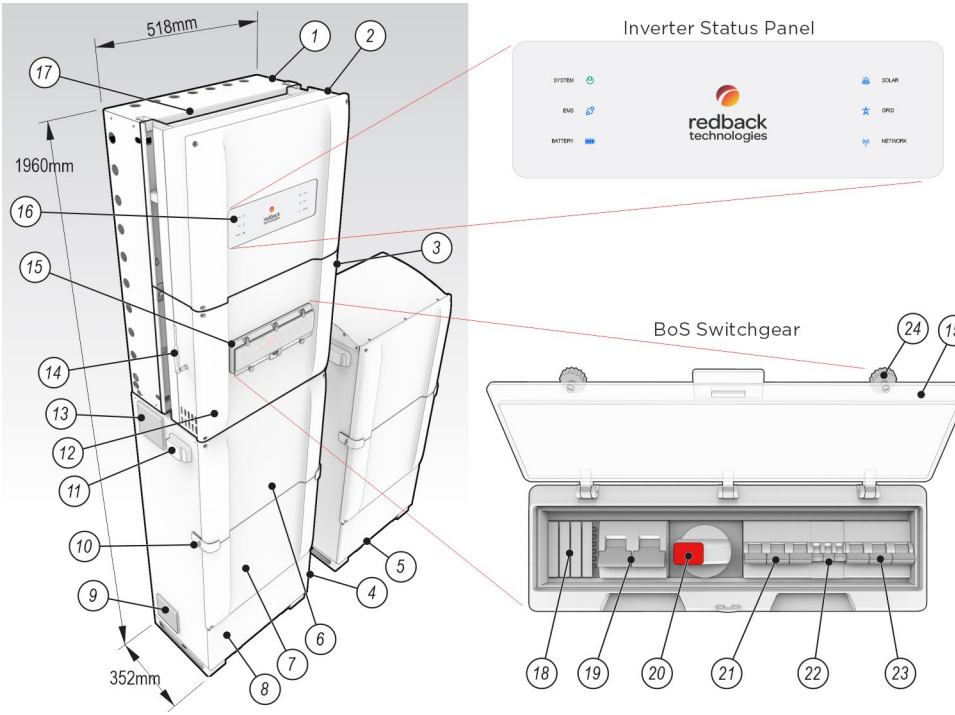
Symbol	Definition
	WARNING: LETHAL VOLTAGE INSIDE Do not remove the Inverter or Battery Enclosure covers unless qualified to do so or have been instructed to do so by Redback Technologies technical support personnel. Do not perform any servicing other than that specified in the maintenance instructions. Solar arrays may be energised even in low ambient light.
	DANGER. Risk of electrical shock. Proceed with caution.
	WARNING: Burn Hazard. External and internal parts may be hot. Do not remove covers during operation or touch any internal parts.
	CAUTION: Hazard to Equipment Only use components or accessories recommended or sold by Redback Technologies or its authorised agents. Handle all parts with care and follow instructions provided.
	WARNING: Fire hazard Do not keep combustible or flammable materials in the same room as the equipment. The Redback Smart 3-phase Hybrid Inverter and or Battery Enclosures contain relays and switches that are not ignition protected. Do not allow storage of any item inside the Inverter, or any items inside the Battery Enclosure other than batteries. Ensure clearance requirements are strictly enforced. Keep all vents clear of obstructions that can prevent proper air flow around, or through, the unit.
10m	**DELAY.** Wait specified time.
	This symbol indicates the information provided is important for the correct operation and or maintenance of the equipment. Failure to follow the recommendations may result in annulment of the product warranty.
	IMPORTANT Only use the battery types recommended by Redback Technologies. Follow the battery manufacturer's recommendations for installation and maintenance. Insulate batteries appropriately against freezing temperatures. A discharged battery will freeze more easily than a charged one. Remote or automatic generator control systems: disable the starting circuit and/or disconnect the generator from its starting battery while performing maintenance.

6. Features and benefits of your Redback system

System feature	Benefit	Requirement
Internet connected	Inverter monitoring and management using the MYRedback app or the Redback portal. Remote viewing of Inverter status.	Permanent internet connection using your Wi-Fi or ethernet based home network.
MYRedback app and the Redback portal	Monitor your home energy performance in real time, including up to 3-phases of grid consumption, using high quality, detailed charts. See your true usage patterns for ways to further reduce your electricity bill. Share system access with family, tenants etc.	Permanent internet connection using your Wi-Fi or ethernet based home network.
All-in-one design	Neat appearance; Easy to keep clean.	
Status Panel	Colour coded LEDs to aid diagnostics.	
EMS	The Redback Energy Management System (EMS) is the inverter's internal Control Board.	Internet connection for occasional software updates.
Switchgear panel	Convenient control of solar and battery connections. Ability to bypass inverter backup without affecting house or backup circuit.	
Low maintenance	Homeowner can complete essential annual maintenance. Service person is not usually needed.	Basic mechanical skills and tools.
Supports multiple battery enclosures	Improved management and consumption of self-generated energy. Extend the storage capacity to suit your actual usage patterns.	Ask your installer for advice on upgrading your system storage.
Backup functionality	Some devices stay available during a grid outage if batteries have charge.	Optional backup circuit needed and active; battery needed.
Relay control	Up to three relay-switched house circuits or devices can be timer controlled using the MYRedback app or portal.	Requires optional relays and relay-controlled circuits.
Grid power quality monitoring	Inverter can self-protect from poor quality grid power and recover when quality improves.	
Internal overload protection	The inverter will self-protect if it detects excessive heat or excessive internal currents.	
Battery Management System	Batteries self-monitor to manage heat and State of Charge (SoC) to extend battery life.	
Critical setting protection	Critical system settings may only be changed by electrically qualified personnel.	
Solar array ground fault and insulation monitoring	Electrical safety for all parts of your system.	

7. Know your product

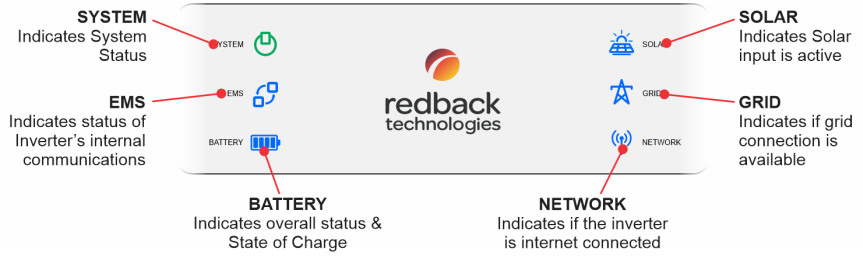
7.1 Major components and dimensions



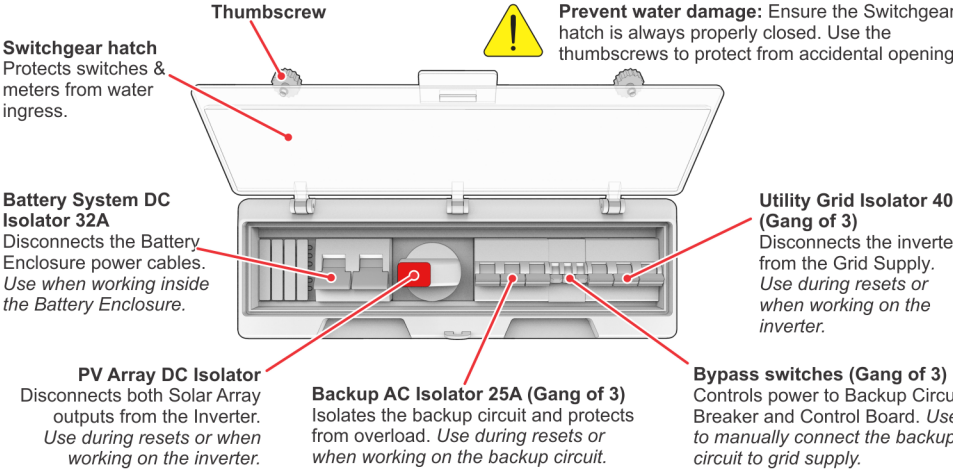
#	Part name
1.	Wall mounting frame
2.	Inverter module
3.	Balance of system module (BoS)
4.	Primary Battery Enclosure
5.	Secondary Battery enclosure (optional)
6.	Battery enclosure upper front cover
7.	Enclosure lower front cover
8.	Enclosure kick panel
9.	Enclosure air inlet (Filter cover)
10.	Enclosure padlock hoop
11.	Enclosure isolator
12.	BoS front cover

#	Part name
13.	Enclosure extractor fans (Filter cover)
14.	Wi-Fi antenna
15.	BoS switchgear hatch
16.	Status panel
17.	Inverter heatsink fins
18.	Blanking panels
19.	Battery System DC isolator (2, bridged)
20.	PV Array DC isolator
21.	Backup circuit AC isolator (3, bridged)
22.	Bypass switch (3, bridged)
23.	Inverter AC isolator (3, bridged)
24.	Thumbwheel

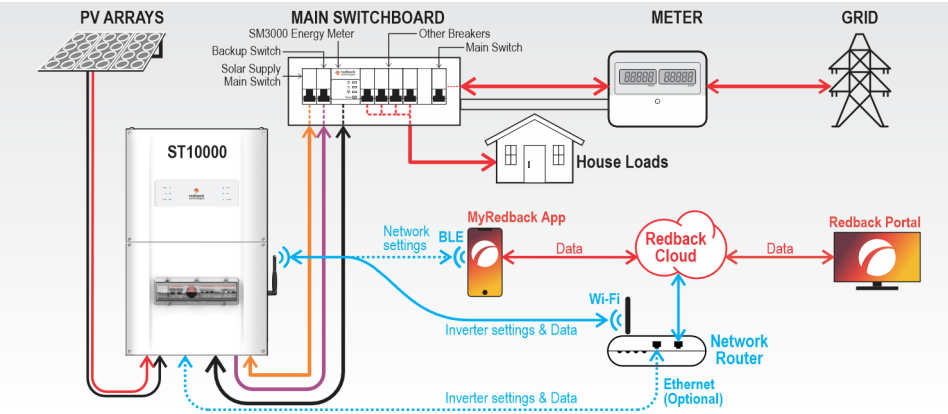
7.2 Status Panel LEDS



7.3 BoS switchgear



7.4 System overview



7.5 Batteries

Your Redback system has a storage capacity of up to 28.4 kWh using 4 or 8 Pylontech lithium-ion batteries and one or two BE14000-HV Battery Enclosures. Batteries are serial connected, and all batteries must be in serviceable condition. The allowable battery combinations are shown at right, noting that all batteries must be the same models i.e., no mixing models.

Qty	Capacity (kWh)●	
	H48050 @2.4kWh	H48074 @3.55kWh
4	9.6	14.20
8	19.2	28.40

●Usable capacity is typically 90% of total capacity

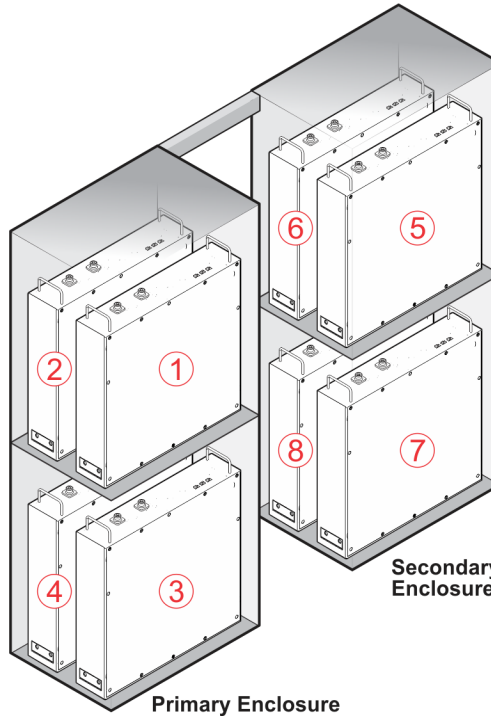
Your Redback system is fitted with a Pylontech Battery Management System (BMS) to manage battery performance (protecting the batteries from heat damage). The BMS also protects the batteries from total discharge, improving system reliability and longevity. The BMS also monitors the Battery Enclosure temperatures and activates fans as needed.

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. Your installer will manage this process for you.

Your installer may identify batteries as 1; 2; 3; 4 etc. This refers to the position of individual batteries in the BMS chain of command—the first connected battery is number 1.

The diagram below shows the BMS battery numbering convention and locations.

The number of batteries determines the largest load that the backup circuits can sustain.



7.6 Backup circuit (optional)

Your Redback inverter can directly control and power three backup circuits (one per phase). This feature is used to extend the run time of a small number of low power or occasional use devices that you have prioritised for use during a power outage.

- During a grid outage, your inverter powers the backup circuit from batteries and or solar.
- If grid supply is available, the inverter chooses the power source from solar, batteries or grid.

Adding a backup circuit to your home requires planning to maximise the benefits of your investment. A new, dedicated circuit will give a better result than re-purposing an existing circuit. Your installer can help you specify an affordable system that balances cost and performance, based on your expected usage patterns and your backup expectations i.e., what you expect to run, and for how long.

Loads on the backup circuit must be carefully selected to extend the backup power availability, noting:

- As far as practical loads should be balanced across all backup circuits i.e., the total running loads (in W) on each circuit should be similar and not exceed the limits below.
- Battery storage capacity and availability: the number of installed batteries affects backup power delivery
  - For 4-battery systems: up to 5kVA continuous (total of all backup circuits, with up to 3.3kVA on one circuit), *even when grid is connected.*
  - For 8-battery systems: up to 10kVA continuous (total of all backup circuits, with up to 3.3kVA on all circuits), *even when grid is connected.*
- Inverter behaviour during overload events.
- Inverter behaviour during high temperature events.
  - Above 45˚C ambient, power output is reduced.
  - Above 60˚C, the inverter will shut down.

Batteries are needed for best performance during a grid outage. Solar-only power is not satisfactory—backup load and solar power are variable and unpredictable—when backup load exceeds the available solar power the inverter will automatically shut down and restart.

To ensure reliable backup, part of the battery storage can be reserved, powering the backup circuit until the battery reaches the minimum state of charge (SoC). The size of the reserve can be varied according to your needs e.g., more for backup means less for daily use. See Section 7.3.

8. System limitations

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

Your Redback system is not suitable for:

- Single- or 2-phase grid supply: 3-phase supply is required, and all phases must be connected to the inverter.
- Use with batteries other than Pylontech H48050 or H48074 (which may not be mixed).
- Off-Grid installations (where the grid is intentionally disconnected).
- Locations without internet access: the system can work off-line, but you will be unable to review consumption or performance; or make informed decisions about system settings or consumption patterns. Warranty support will also be affected.
- Prediction of your energy bills. The Redback meter is a Class 1 meter: it provides a good indication of energy consumption; however, readings may vary slightly from the Network meters used for billing.
- Use with generators.
- Use with 5Ghz Wi-Fi network

9. Getting the best from your system

Your Redback system is designed to work autonomously – the level of interaction is up to you.

A set-and-forget approach will work fine: occasional maintenance is all that is needed.

Alternatively, you can dive deep into your data and make informed decisions to optimise your system and lifestyle to maximise the return on your investment.

Either way, the first step is to look after your Redback.

9.1 Keep your system in good condition

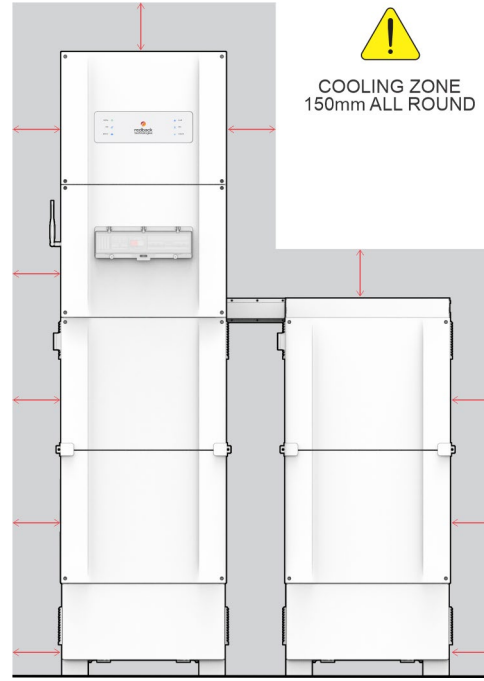
Keeping your system in good condition maintains efficiency, increases longevity, and helps us help you, if the need arises. There are three key items requiring your attention.

Cooling

Your system uses fresh air to cool the inverter and batteries. If your system becomes too hot its efficiency decreases, and it may even shut down.

There must always be 150mm of clear space beside and above your system. Ensure no items are left near the base of the system or placed on top of the inverter, as vents will be obstructed.

The system must not be enclosed i.e., do not build a cabinet around it.



Maintenance

Complete the annual maintenance items in Section 11. In very dusty conditions you may need to clean the filters more often.

Internet connection

Data is needed to get the best out of your inverter. A permanent internet connection enables the inverter to send data to the Redback cloud, where the MYRedback app and Redback portal present helpful information, enabling you to see your system's performance. Your installer or Redback can also use the data to diagnose problems or suggest improvements to settings, based on your actual usage.

Note: Your inverter will continue to function without an internet connection, but you will be unable to receive any fault notifications, no data will exist for the period of disconnection, software updates will not occur, and remote support will be limited. You may also affect your warranty coverage if the system is offline.

9.2 Use Redback's Site Manager feature (if applicable)

Introduced in 2023, Redback's Site Manager enables the installation of multiple, cooperative ST10000 inverters behind the meter, at one site. Correctly configured, the charging and discharging of batteries is balanced across all ST10000 systems on site to ensure the equal use of each system, thereby improving performance and longevity of all your systems.

Site Manager requires that your systems have the latest software, communicate by ethernet, and are configured as Master and Workers. When implemented, Site Manager works autonomously, with no intervention needed unless there is a hardware problem.

Contact your installer for advice on implementing Site Manager at your site. If you have multiple ST10000 inverters, setting up Site Manager may require little or no hardware changes, and it may even be possible to implement remotely.

9.3 Monitor performance

Redback offers two choices for monitoring the energy performance of your household.

9.3.1 MYREDBACK APP

MYRedback provides a simple, up-to-date view of what's happening at your place – it's great for quickly checking the energy flow at home. MYRedback is available for Android 7 or higher and iOS 12.1 or higher. Use the app to:

- Check your home energy usage.
- Reconnect your system to the internet.
- Review your system settings- but you'll need to contact your installer if changes are needed.

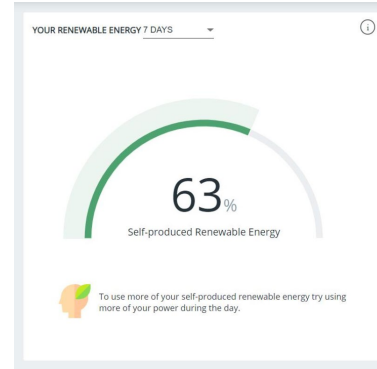
9.3.2 REDBACK PORTAL

The Redback portal portal.redbacktech.com offers all the features of the MYRedback app plus a comprehensive history of your systems performance, much greater detail about your system, and direct access to support documents.

DASHBOARD

The dashboard view provides an overview of your system:

- Energy consumption trends
- Power demand
- Power being bought or exported
- Power from solar
- Power to/from batteries
- Stored energy



If nothing else, you should view the Renewable Energy Meter regularly; it shows the system's impact on your energy consumption during the past 7, 30 or 90 days. If it falls below 60%, it's worth reviewing your usage habits or your system size and settings.

9.4 Getting the best from your batteries

Your batteries will do a great job of looking after themselves, with no intervention needed if they have the correct State-of-Charge (Soc) settings for your needs.

Setting name	Comment
Minimum SoC %*	In day-to-day use, your batteries may discharge down to this % of total capacity.
Minimum SoC Offgrid %*	This is the deep discharge limit- it protects the battery from damage due to over-discharge during a backup event i.e., during a blackout.

*State of Charge: The battery manufacturer will specify the lowest acceptable value.

Frequent deep discharging will shorten the life of your battery. If you experience frequent blackouts in your area, ask your installer to set the Minimum SoC higher than usual. This extends your backup run-time and reduces the number of deep discharge events.

Backup Reserve

Your system configuration and backup requirements will guide your settings, which create the Battery Usage Plan, as shown right.

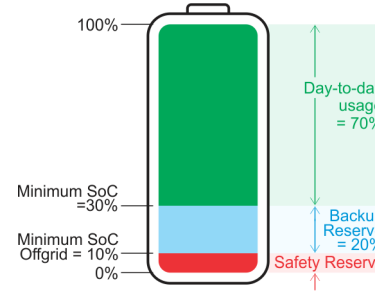
The Backup Reserve is the energy withheld for use by the backup circuit during a grid outage event.

Backup Reserve = (Minimum SoC – Minimum SoC Offgrid) %

The Backup Reserve is a balancing act: A large reserve increases the backup run-time when needed but may decrease the everyday use of self-generated energy.

Put another way, it's blackout security v. energy cost.

Think about your own needs, then ask your installer to adjust the Minimum SoC according to your priorities.



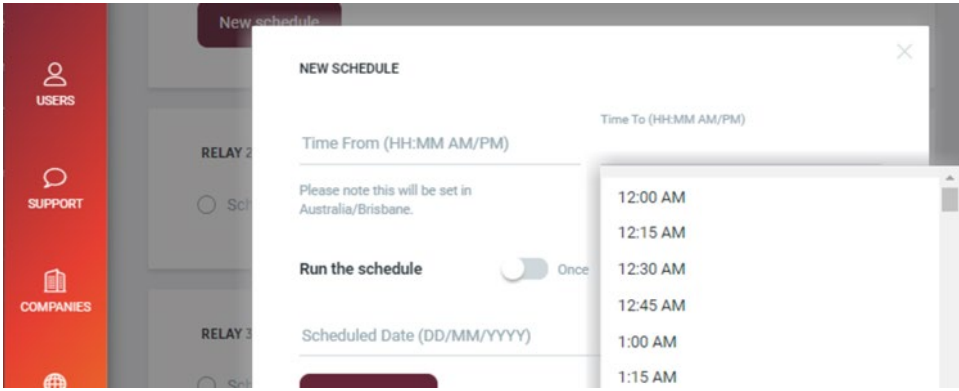
Battery Usage Plan

9.5 Getting the best from your relays

Your system can control up to three optional relays - usually used to turn specific equipment ON or OFF remotely, or ON and OFF according to a once-off or daily schedules. The aim is to move power usage into daylight hours, after batteries have charged, and when excess solar power is being exported or not used at all. Typical applications are pool or water tank pumps, and hot water systems.

To use this feature, ask your electrician to install a dedicated, relay-controlled circuit for the equipment.

The schedules are created in the Redback portal, under the CONTROL tab. Multiple daily events are allowed excepting that they may not overlap and must start and finish on the same day. Manual control is also possible, using the ON and OFF controls.



9.6 Getting the best from your backup circuit

Your inverter includes a backup circuit that is activated during a grid outage and powered by the system batteries and or solar. The Inverter can supply power to the backup circuit if:

- Power is available from batteries or solar, and
- For 4-battery systems: total household, continuous power demand is less than 5kW, or
- For 8-battery systems: total household, continuous power demand is less than 5kW, and
- Total power demand is less than the power available from batteries and solar.

AVOID INVERTER SHUTDOWNS! The total power load matters: simultaneously running a kettle, toaster, microwave, large fridge, TV, and a few lights can easily exceed the allowable power delivery, and an inverter shutdown will occur.

Solution: Minimise devices in use.

Generally, you should connect and use the minimum number of devices at any one time.

Only essential or low consumption devices or appliances should be connected to the backup circuit. Devices that require high currents should not be connected as they may trip the inverter or rapidly discharge the batteries. The table below lists the suitability of common devices.

The inverter can fulfil demand of 16.5kW for up to 60 seconds: this is useful for devices that have high starting power, but low power demand when running.

The inverter will reduce power output below -10˚C or above 45˚C ambient and shut down above 60°C.

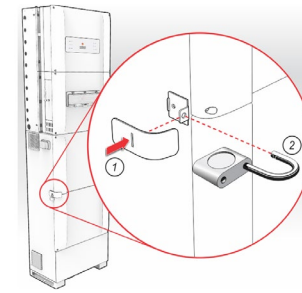
If the system battery reaches minimum State of Charge during a grid outage the inverter will try to fulfil the backup circuit demand from Solar- if demand exceeds available solar power the inverter will shut down automatically. Solar is unpredictable—it varies with cloud cover—so this situation is best managed by minimizing devices in use.

☑ SUITABLE	☒ NOT SUITABLE
Refrigerators and freezers	Critical Medical Devices
Fans	Air conditioners & heaters
Small, occasional use, plug-in appliances e.g., microwaves, kettles, toasters	Ovens & cooktops
TVs, radios, telephones	Home theatres and 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

10. Inverter operation

Your Redback inverter has sophisticated software controls available in the Redback app or portal, however there are some physical controls or functions at the unit.

10.1 Locking up the batteries



Secure the Battery Enclosures to:

- Prevent unauthorised access to the batteries.
- Discourage battery theft.

The battery enclosures are secured by trapping the Front Covers: clamps at either side are padlocked in position, restricting access to front cover fasteners, and resisting forcing of the covers. Note: The security clamps will discourage a casual or opportunistic intruder but will not stop a determined thief.

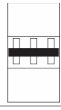
10.2 EMS restart

Occasionally, it may be necessary to restart the EMS. 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 logo.

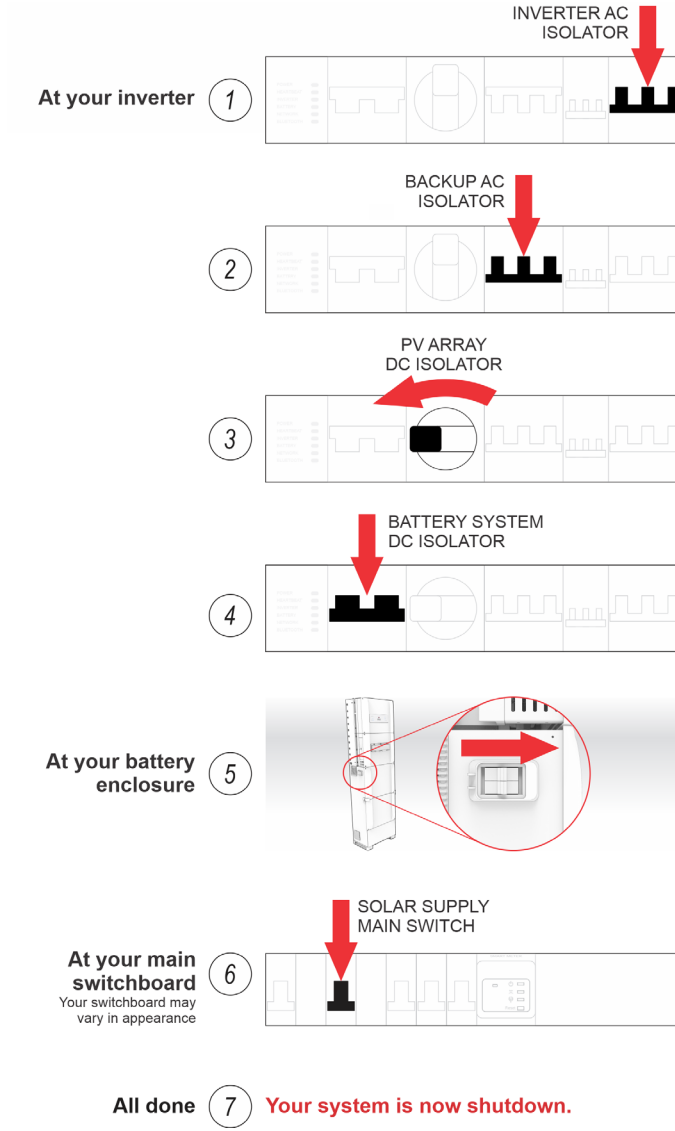
10.3 Inverter – Changing bypass modes

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.

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; not working reliably; or if a large, temporary load must be placed on the backup circuit. 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 Operational mode. 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 state of charge.

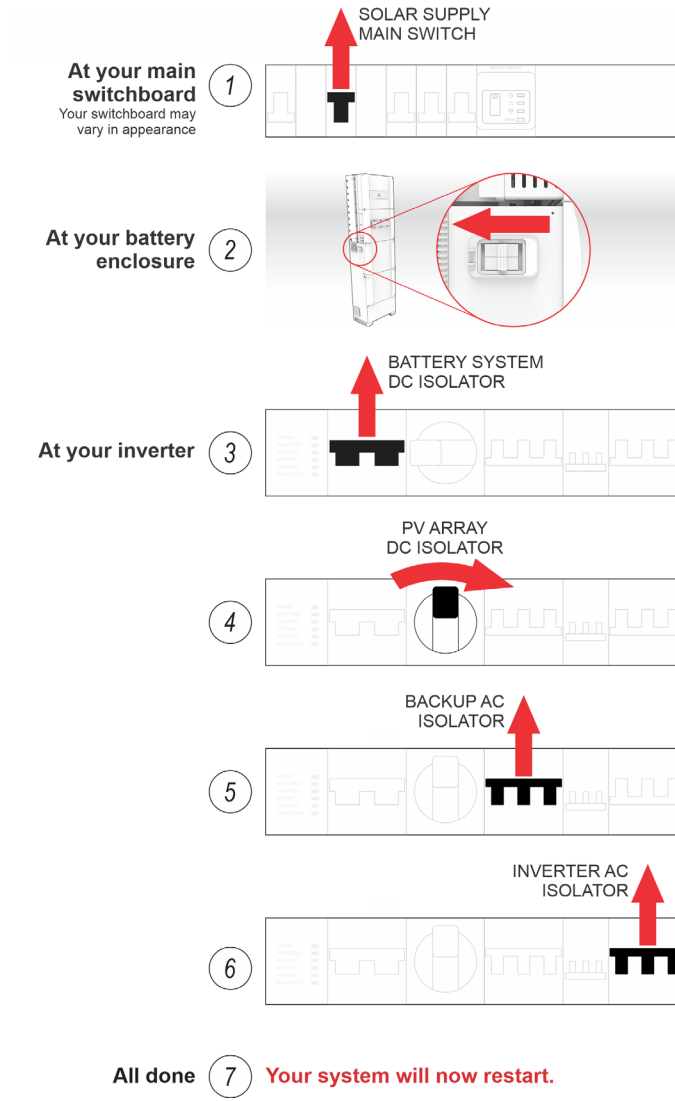
10.4 Shutdown procedure

Occasionally, it may be necessary to shut down the inverter interrupting all inverter functions, noting that PV, battery, and grid supplies are still energised to the isolators. Follow the procedure below to shut down your system.



10.5 Start procedure

Start your inverter as shown below.



10.6 Inverter operating modes

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

10.7 Auto mode

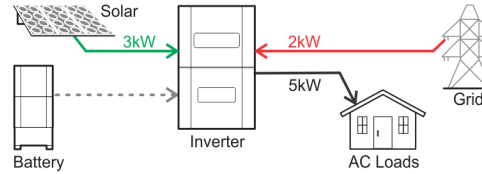
AUTO is the default operating mode, maximising consumption of self-generated and stored energy. If the inverter mode has been changed, AUTO can be reselected from the Redback app or portal.

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

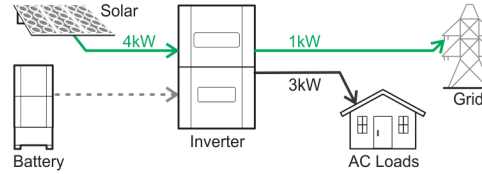
1. Solar
2. Battery
3. Grid

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

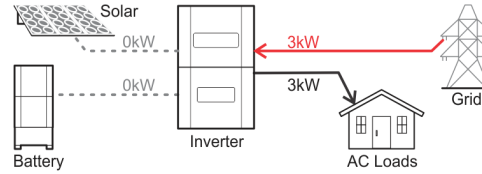


AUTO Mode: Solar Generation exceeds AC Load

10.8 Standby mode

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

The inverter automatically reverts to the previous mode of operation when solar or battery energy is available.



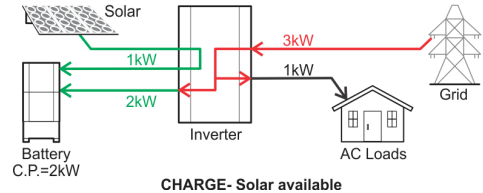
STANDBY MODE- No Solar or Battery energy available

10.9 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 10kW.

AC Loads are fulfilled by the grid.



CHARGE- Solar available

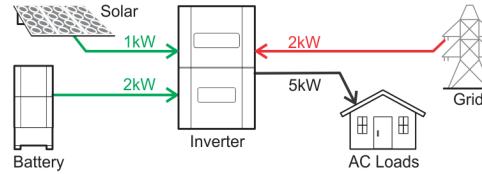
10.10 Discharge battery mode

DISCHARGE mode is user selectable in the app or portal, and prioritises battery discharge to the following:

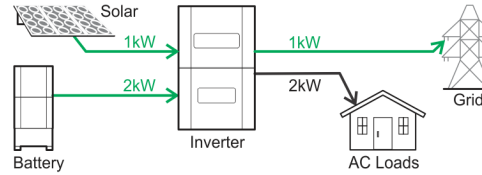
1. AC loads
2. Grid

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.



DISCHARGE- Solar + Battery is less than AC Load



DISCHARGE- Solar + Battery is greater than AC Load

10.11 Backup mode

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

In BACKUP mode, the inverter provides energy to the backup circuit only. Energy consumption from solar is prioritised and excess solar charges the batteries.

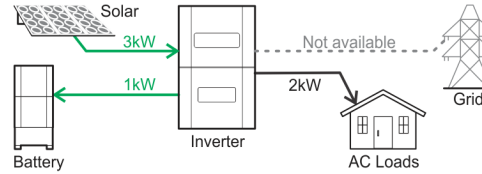
To maximise the effectiveness of the backup circuit, the circuit should only support essential appliances such as refrigerators, or low energy devices such as fans, computers, tablets, or phones.

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 1 minute.

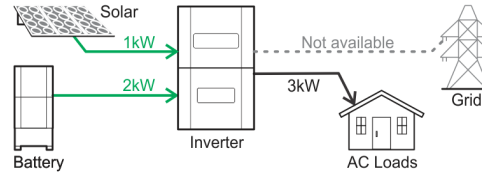
BACKUP mode may also be known as “Stand-alone Mode”.

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.

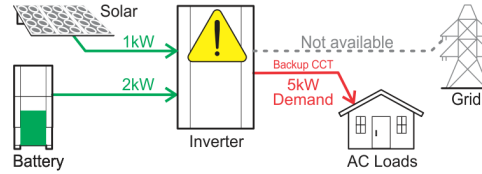
The inverter will restart after approximately one minute. If overload persists, the cycle will repeat.



BACKUP Mode- Solar generation is greater than Backup Load



BACKUP Mode- Backup Load is greater than Solar



Solar+Battery < Backup Load

11. Onboarding the inverter

Onboarding connects your inverter to the internet using your network. If you can login to the Redback portal and your system is “Online”, then your system is onboarded. Connection to the network is by Ethernet cable or Wi-Fi.

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

Occasionally, it may be necessary to reconnect your inverter to the internet. This most often occurs after a significant disruption to your network such as replacing your router, changing passwords, or changing internet providers.

There are two onboarding processes: Ethernet or Bluetooth Low Energy (BT or BLE).

11.1 Ethernet

Ethernet is the preferred method of connection: onboarding occurs automatically, confirmed by:

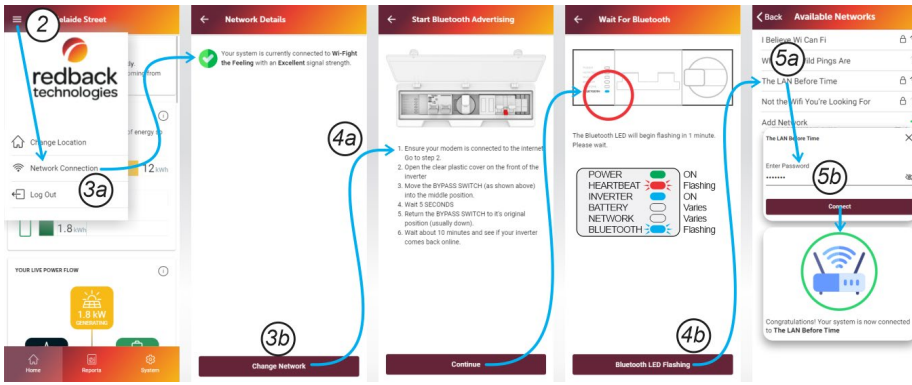
- Status Panel NETWORK icon is Blue (continuous i.e., not flashing) and
- Status Panel EMS icon is Blue (continuous).

11.2 Bluetooth Low Energy (BLE)

BLE onboarding is needed if ethernet is not available–a Bluetooth connection is established between the inverter and the MYRedback app, and the app will guide you through the process of connecting the inverter to your Wi-Fi network.

To onboard using Bluetooth:

1. Go to your inverter. Ensure your network signal is Good or better at this location.
2. On your device, open MyRedback and login. Touch the **Hamburger** to display the flyout menu.
3. Select **Network Connection.** Note your system status and select **Change Network**.
4. You may be notified to start Bluetooth—follow the on-screen instructions. Bluetooth advertising is active when the BLUETOOTH LED is flashing steadily. Touch **Bluetooth LED Flashing** to continue.
5. Select **your Wi-Fi network** from the list.
6. Enter **Password** if asked, and touch **Connect**. A success message will appear.
7. Wait a few minutes and then confirm onboarding success:
   - On the app, check that data is refreshing every 20 seconds.
   - On the Portal, check that your system is online, and refreshing every 60 seconds.
8. If onboarding fails, try again, or contact Redback Customer Support for help.

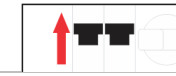


12. Troubleshooting

12.1 Backup circuit has no power

The most common causes are overloaded circuit isolators tripping OFF (anytime), or the battery being fully discharged (during a grid outage). Troubleshoot using the guide below.

The total power load matters, and it adds up fast: a kettle, toaster, large fridge, TV, iron, and a few lights may exceed a backup circuit's allowable power delivery. This rule applies even when the grid is connected.

Indication	Probable cause	Action
No power on the backup circuit (during a grid outage)	BATTERY SYSTEM DC isolator is OFF (down)	Turn BATTERY SYSTEM DC isolator ON. Contact your installer if you suspect the Battery System DC isolator is tripping. 
	Battery is depleted.	On a partly cloudy day, minimise the loads on the backup circuit—the inverter shuts down if demand exceeds the supply available from solar e.g. when the panels are shaded. Otherwise, wait for grid power to be restored.
	Battery depletes prematurely.	As above, and contact your installer if you suspect the battery is not charging correctly.
The House Backup Circuit isolator is tripping	Faulty appliance, overload, or electrical fault.	Identify and deactivate any suspect or excess appliances. Reset the house Backup Circuit isolator at the switchboard. **If the problem persists, contact your installer for help.**
The Inverter BACKUP AC isolator has tripped	The inverter backup circuit is overloaded	Reset the BACKUP AC isolator (move up). If it trips immediately, minimise loads on the backup circuit and try again. 
The Inverter BACKUP AC isolator trips repeatedly.	A more complex problem exists.	Place the inverter in Bypass mode (up). This supplies power to the backup circuit from the switchboard. **Contact your installer.** 
Solar Supply Main Switch trips	There is a wiring or inverter fault.	**Contact your installer for help.** Note: The Solar Supply Main Switch is usually located on the main switchboard.

12.2 Earth fault alarm

If the Redback system detects an earth fault:

1. An audible tone 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.

12.3 Inverter unexpected shutdown

The inverter may shut down or isolate itself from the grid if it detects supply 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
Continuous Backup Load exceeds 10kW.	Backup Load- Power	May occur when too many devices are active on the backup circuit.
Backup Load exceeds 16.5kW for more than 60 seconds.	Backup Load- Power	May occur with too many devices or when a high start-up current device turns on.
Backup Load exceeds available Battery + Solar power.	Backup Load- Power; Battery- Power; PV- Power	
If internal temperature is greater than 60˚C.	Inverter- Temperature Battery Cabinet-Temp.	Output is reduced above 45˚C.
Grid supply is not of acceptable quality, as defined by AS/NZS 4777.2.	Grid-Voltage Grid-Frequency Grid-Status	The EMS and backup circuit will work if power is available from PV or batteries. Ask your installer or electricity provider to investigate if grid supply is often poor.

12.4 Internet connection problems

Occasionally, your 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 system is re-onboarded. 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 the system and re-onboard.
New router or modem	✓	✓	
Change of Network name or SSID	✓	✓	
Changed settings in router or modem	✓	✓	
Changed Wi-Fi or Network password		✓	Wi-Fi: Restart and re-onboard
Too many users or devices on your home Wi-Fi network		✓	Limit users or devices; upgrade Wi-Fi router; connect inverter using ethernet.
Wi-Fi signal is weak or variable due to obstructions or distance between the inverter and your 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.

12.5 Inverter Status Icons

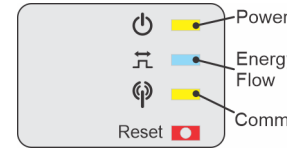
Your Redback inverter is equipped with an icon array to indicate system status and aid diagnosis.
The table below lists indications, probable cause, and rectification steps you can try yourself. Refer to page 9 to identify controls.
If the problem is not solved contact your installer for help.

Name	Icon & Pattern	Meaning and or probable cause	Solution(s)
SYSTEM		System ready	OK. No action needed.
		System is starting up	This may be normal behaviour. The system may cycle several times during start-up: completion is indicated by the System icon stabilising to steady green within 10 minutes.
		System fault	Contact your installer
		Backup circuit is overloaded	Reduce loads on your backup circuit.
		Earth fault	See section 10.2. Contact your installer
		System not operating	If the icon stays OFF for more than one minute, contact your installer.
EMS		Communications OK	OK. No action needed.
		Bluetooth is advertising	Inverter onboarding is available for up to 30 minutes.
		Communications failure	Onboard the inverter
BATTERY		Batteries are more than 75% charged	Contact your installer if this is unexpected behaviour e.g., your battery does not appear to be charging correctly.
		Batteries are 51-75% charged	
		Batteries are 25-50% charged	
		Batteries are less than 25% charged	
		One or more batteries are OFF, disconnected, not active or cannot be detected.	Contact your installer.
SOLAR		Solar is active	OK. No action needed.
		Solar is disconnected or not active	Ensure the PV ARRAY DC isolator in ON. Contact your installer if this is unexpected behaviour.
GRID		Grid is active	No action needed.
		Searching for grid	No action needed.

Name	Icon & Pattern	Meaning and or probable cause	Solution(s)
		Grid not detected	Normal behaviour during a Grid outage. If grid is available: Switch UTILITY GRID AC isolators on. 
NETWORK		Wi-Fi, LAN or BT is connected	No action needed.
		No Wi-Fi, LAN or BT connected	Onboard the inverter.

12.6 SM3000 Smart Meter diagnostics

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



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.

13. Maintenance

13.1 Schedule

WARNING: ELECTROCUTION HAZARD. Lethal voltages may be present. There are no user serviceable parts inside. Do not remove front covers.

Your Redback system is a low maintenance product. You should undertake the minor annual maintenance identified below. Internal maintenance must be conducted by a qualified person, such as your installer.

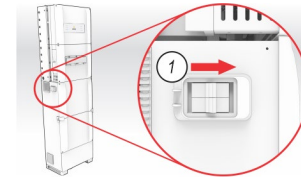
Note: Filters, fans and heatsink fins may require more frequent cleaning in dusty conditions.

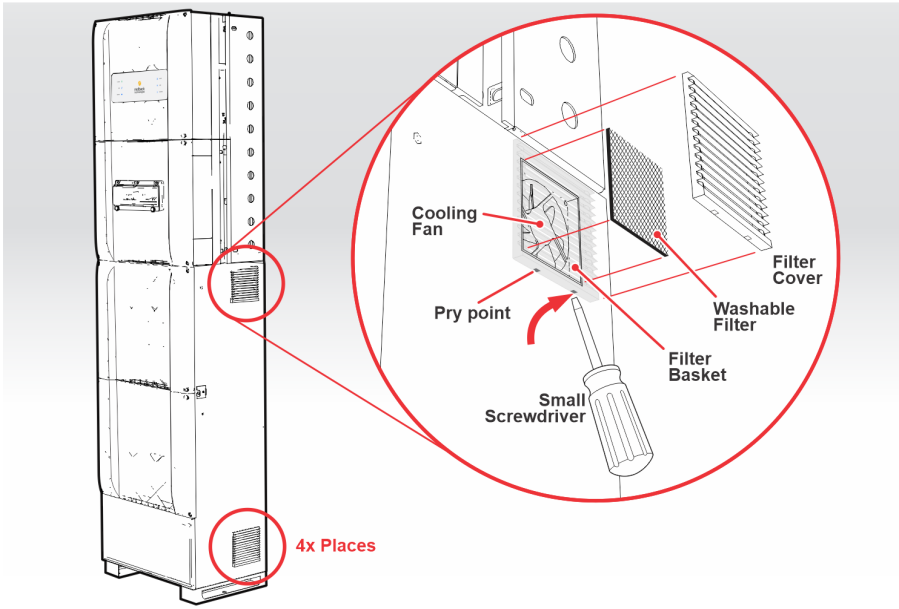
Item	Name	Reason	Procedure	By Service Person	By Owner
1	Battery Enclosure vents, filters, and fan blades.	Airflow is reduced when dust accumulates on the vents, or the filter is clogged. The lower intake vents are more likely to be affected.	See section 11.2.	☑	☑
2	Cabinets	Cabinets may become soiled.	Wipe down the outside of cabinets with a just-damp cloth. Immediately wipe dry with a microfibre cloth. Do not use cleaning agents as they may damage the finish.	☑	☑
3	Inverter heatsink fins	Cooling efficiency reduces when dust, dirt or debris accumulate on the heatsink.	Clean the heatsink fins using a small brush, cloth, or compressed air.	☑	☒
4	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.	☑	☒
5	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.	☑	☒
6	Cable seals	Cable seals prevent water and insects entering the Inverter.	Remove BoS Front Cover and tighten all visible cable glands and waterproof caps.	☑	☒
			Remove the Connection Kit Top Cover (if fitted) and tighten all cable glands and waterproof caps.	☑	☒

13.2 Cleaning the BE14000-HV fan filters

Occasionally, it is necessary to clean the battery enclosure filters and filter covers. There are four filters in total, two at each side of the enclosure. To clean the filters:

1. Switch the Battery Enclosure Isolators OFF (right)
2. Switch BATTERY SYSTEM DC isolator OFF (down).
3. Fans are installed in the upper vents only and will run if the batteries are hot. Ensure the fans are off before accessing the upper vents. While waiting, you can start work on the lower vents.
4. Using a small screwdriver or similar tool, pry the filter covers from the filter baskets- there are two pry points at the lower edge of the cover.
5. Brush, wipe or vacuum any dust or debris from the covers.
6. Remove the filters from the baskets. Wash in cold soapy water, rinse and squeeze out excess water. Lay flat to dry.
7. Inspect the fan blades. Remove heavy dust build-up with a brush, cloth, or vacuum cleaner. Do not use fluids of any type.
8. Refit the filters to the baskets.
9. Refit the filter covers, ensuring the vents face downward. There should be two tactile “clicks” as the snap-fits engage.
10. Switch the Battery Enclosure Isolators OFF (left)
11. Switch the BATTERY SYSTEM DC isolator ON (up).





14. Specifications

PV PORT	VERSION 0312	VERSION 0314
Number of MPPTs	2	2
Strings per MPPT Input	2/1	2/1
MPPT Operating Voltage (range)	DC200 – 550V	DC200 – 850V
Maximum Input Voltage (Vmax)	DC600V	DC1000V
Maximum Current (Imp)	DC 12.5/22A	DC 12.5/22A
Maximum PV Input Power[1]	16000Wp	16000Wp
Short Circuit Current (Isc)[2]	DC 17.5A/36A	DC 17.5A/36A
Maximum Back Feed Current	0A	0A
Decisive Voltage Class (DVC)	DVC-C	DVC-C
[1]Over-panelling benefits vary with location. [2]Manufacturer's declared and tested Max. Short Circuit Current (I_{SC} Max)		
GRID INTERACTIVE PORT	**ALL MODELS**	
Nominal Output Voltage	AC 400/380V	
Nominal Output Frequency	50 Hz	
Rated Output Current	AC14.5A/ 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	
Rated Apparent Power	10000VA[1]	
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		ALL MODELS
Operating Temperature Unconditioned without solar effects		-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 fittings
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 front covers; Stainless steel fittings
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
Power/Energy Monitoring	Includes 1 x utility grade energy meter (class 1)

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

DESIGNED WITH INSTALLATION STANDARDS CONSIDERED		
AS/NZS 3000:2018	AS/NZS 5139:2019	AS/NZS 5033:2021

15. Redback installation details

SUPPLIER	INSTALLER
Company:	Company:
Address:	Address:
Telephone:	Telephone:
Email:	Email:
Date Installed:	

INSTALLATION DETAILS	YES	NO	Model	Serial number
Redback Inverter	☒	☐	**ST10000**	
Battery Enclosure 1	☒	☐	**BE14000-HV**	
Battery Enclosure 2	☐	☐		
Battery 1	☐	☐		
Battery 2	☐	☐		
Battery 3	☐	☐		
Battery 4	☐	☐		
Battery 5	☐	☐		
Battery 6	☐	☐		
Battery 7	☐	☐		
Battery 8	☐	☐		
Backup circuits	☐	☐	1	
	☐	☐	2	
	☐	☐	3	
Relay 1	☐	☐		
Relay 2	☐	☐		
Relay 3	☐	☐		