RedEarth
ENERGY STORAGE
Power yourself

DropBear

HOME BATTERY SYSTEM—ON AND OFF-GRID
Single and Three Phase Models

User Manual

www.redearth.energy

Power yourself.

RedEarth Energy Storage is an Australian-owned and operated manufacturer of energy storage systems
Co-founded by CEO Charlie Walker, CTO Chris Winter, and non-executive director Bruce Ebzery in 2013, RedEarth Energy Storage began as a startup doing research and development into battery energy storage systems specifically for the Australian market.

Starting in the off-grid environment with the development of BlackMax, RedEarth has since added on-grid, commercial and industrial, and residential systems to its suite of products, all designed to be modular and scalable to allow the end-user customer to update their systems should their needs change.

RedEarth operates with the belief that electricity will be the primary energy source in the future, and that every business and residence can generate more clean, green electricity than it can consume – meaning they can financially capitalise on their excess solar energy.

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Safety

Symbol	Explanation
	Refer to the operating instructions.
	Indicates additional information, emphasized contents or tips that may be helpful.
	Caution, risk of electric shock.
	Caution, risk of danger.
	Do not touch live parts until 10 minutes after disconnection from the power sources.

The wiring diagrams and installation instructions are given as a guide only and compliance to appropriate standards is the responsibility of the installer. Relevant standards are listed below:

AS/NZS 3000:2018	Wiring rules
AS/NZS 5033:2021 (and 1&2)	Installation and safety requirements for photovoltaic (PV) arrays
AS/NZS 4509.2:2012	Stand-alone power systems—Design
AS/NZS 1170.2:2011	Structural design actions—Wind actions
AS/NZS1768:2007	Lightning protection
AS/NZS 3008.1.1:2017	Electrical installations—Selection of cables
AS/NZS 5139:2019	Electrical installations—Safety of battery systems for use with power conversion equipment

The DropBear must only be installed by suitably qualified personnel who have read and are familiar with its operation and hazards.

The battery provided with this system must be charged only by the Victron inverter and MPPT. Do not attempt to charge the batteries with any other charger device or connect any devices directly to the DC battery bus unless approved by RedEarth.

In the event of a fire evacuate the area and call emergency services. A dry agent fire extinguisher should be readily available and used. DO NOT use water.
Note: MSDS document is provided with the system and can be found at www.redearth.energy

Do not use a damaged battery. Batteries should only be disposed of at an appropriate recycling centre. Please contact RedEarth for advice.

A battery can present a risk of electrical shock and high short-circuit current. The following precautions should be observed when working on batteries:

- Remove watches, rings, and other metal objects.
- Use tools with insulated handles.
- Disconnect charging source prior to connecting or disconnecting battery terminals.

In our efforts towards constant product enhancement, this document is subject to change at any time. Please visit http://www.redearth.energy and download the appropriate and latest version manual.

About Your DropBear

Your RedEarth DropBear is an Australian-made ready-to-run energy storage system for On or Off-Grid and single or three-phase applications.

The system is designed to be easy to install and use. It is assembled and factory tested prior to shipment and requires only limited programming on-site for standard configurations.

It uses Selectronics SP Pro battery inverters together with RedEarth's TROPPO 4841 lithium batteries (LFP). As standard it is combined with Selectronic-certified Fronius inverters (single or three phase versions depending on your system) making it an AC-coupled system.

It is supplied with everything needed to connect the PV Solar array and a generator (either 2-wire auto start or manual start), or the grid for grid-connected systems.

Your DropBear is designed to be installed indoors or outside in a shaded and weather protected area and fixed against a wall. A changeover switch is included in case there is a problem with the system. In this case the loads are run solely off an alternate power source (e.g., generator or the grid) until the system is operational again.

Remote monitoring is available via RedEarth's EMU app, subject to mobile phone coverage.

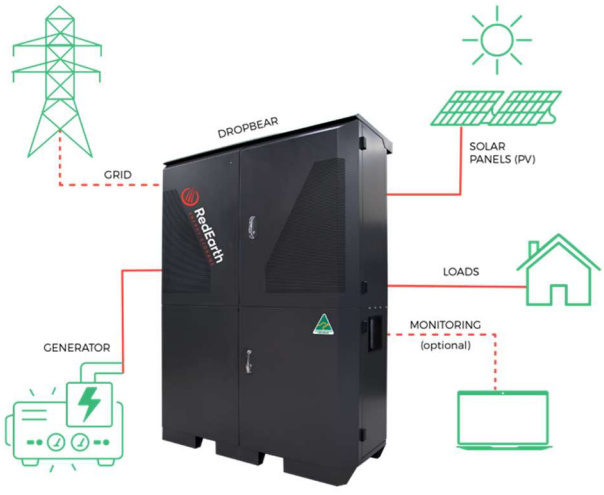
Monitoring requires you to register your system by scanning the QR code located on your system, with your mobile phone. This allows you to register your warranty activate your remote monitoring and receive ongoing updates from RedEarth.

This is particularly useful if you choose to subscribe to RedEarth's remote monitoring service, RedEarth Optimum, which maximises the value of your system by ensuring you are receiving all the benefits available to you through our PPP (Private Power Plant) offers. Contact RedEarth Customer Support for more details.

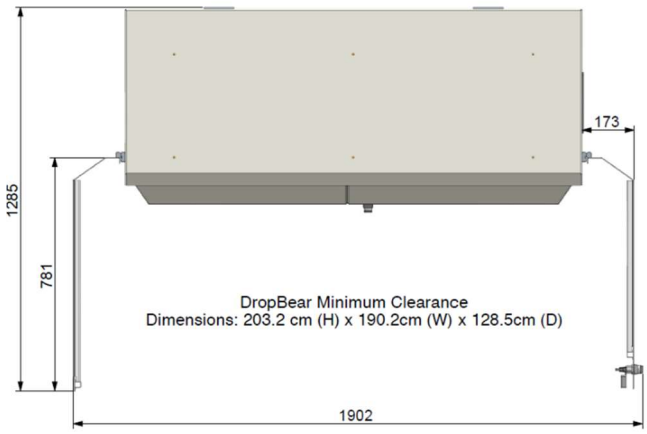
During factory testing all parameters have been pre-set for correct operation between the SP Pro inverter, the Fronius solar inverters and the battery bank. However, some parameters may need to be adjusted during installation (e.g., generator size and maintenance run-time, etc).

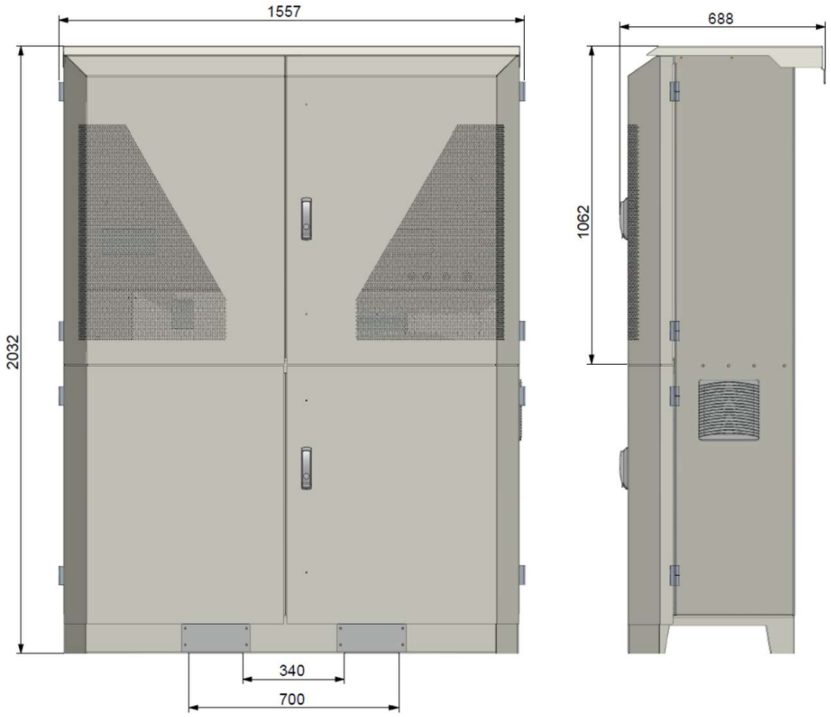
Note: Selectronics allows more complex installations to be installed (such as dual phase or high-power grid T-connections).

To do these, your installer should have experience with Selectronics and have received training directly from them. RedEarth primarily supplies and supports our standard configurations. If they are modified for a particular installation, then the responsibility for these changes passes to the certified installer.



Dimensions and Clearance/Positioning Information





DropBear Weight

367kg for 1-phase with x2 Fronius PV inverters and without any Troppo batteries (42.5kg per battery)

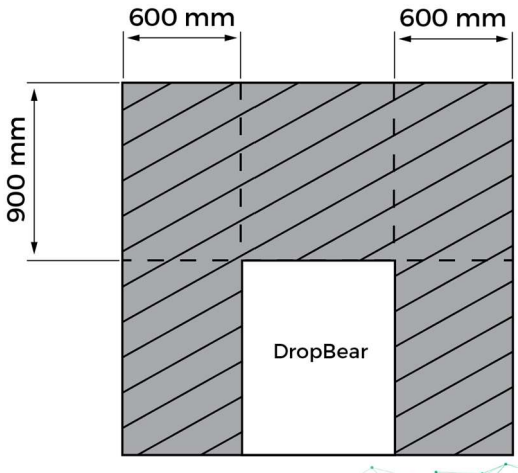
Dimensions:
203.2 cm H x 155.7 cm W x 68.8 cm D

DropBear Minimum Clearance to allow access with the doors open:

2.4 m H x 2.0 m W x 1.3 m D

Positioning information summary:

Minimum Clearance around SunRise where no windows doors etc are allowed, according to AS/NZS 5139, Is shown below.



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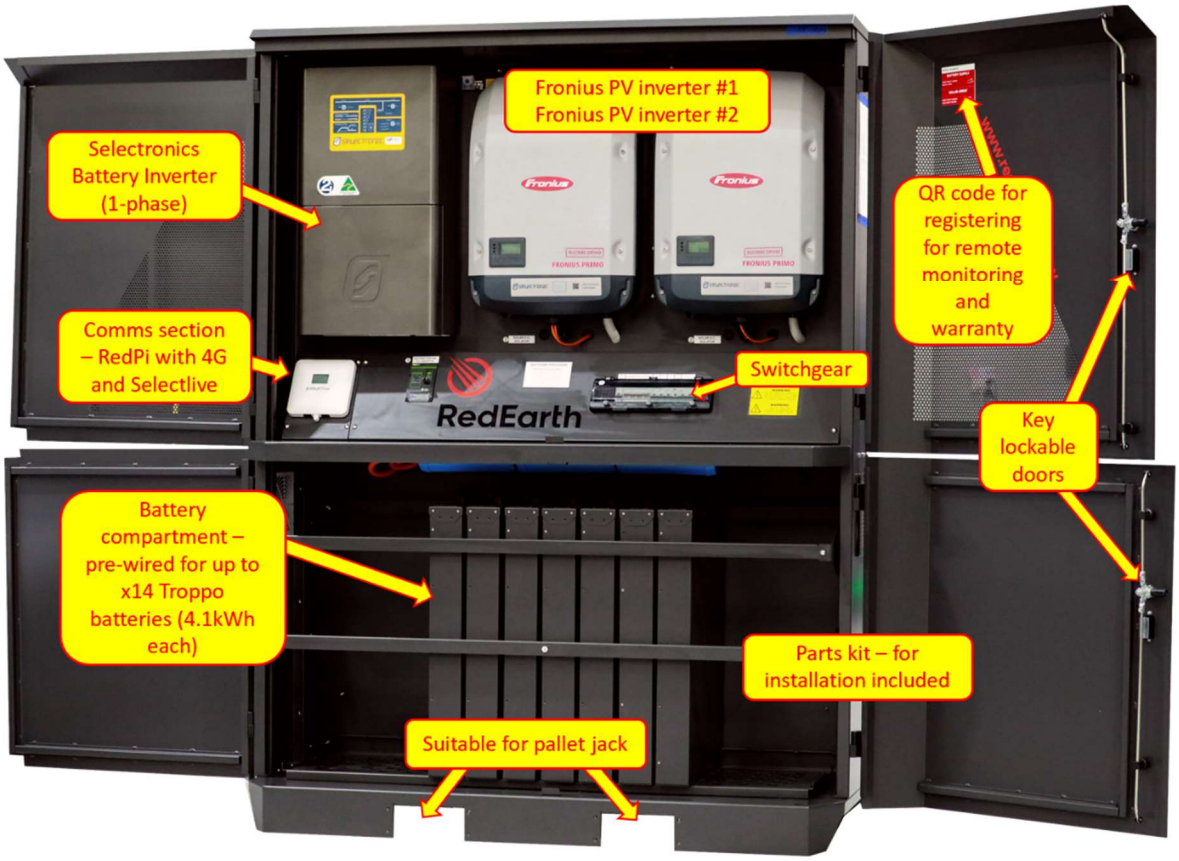
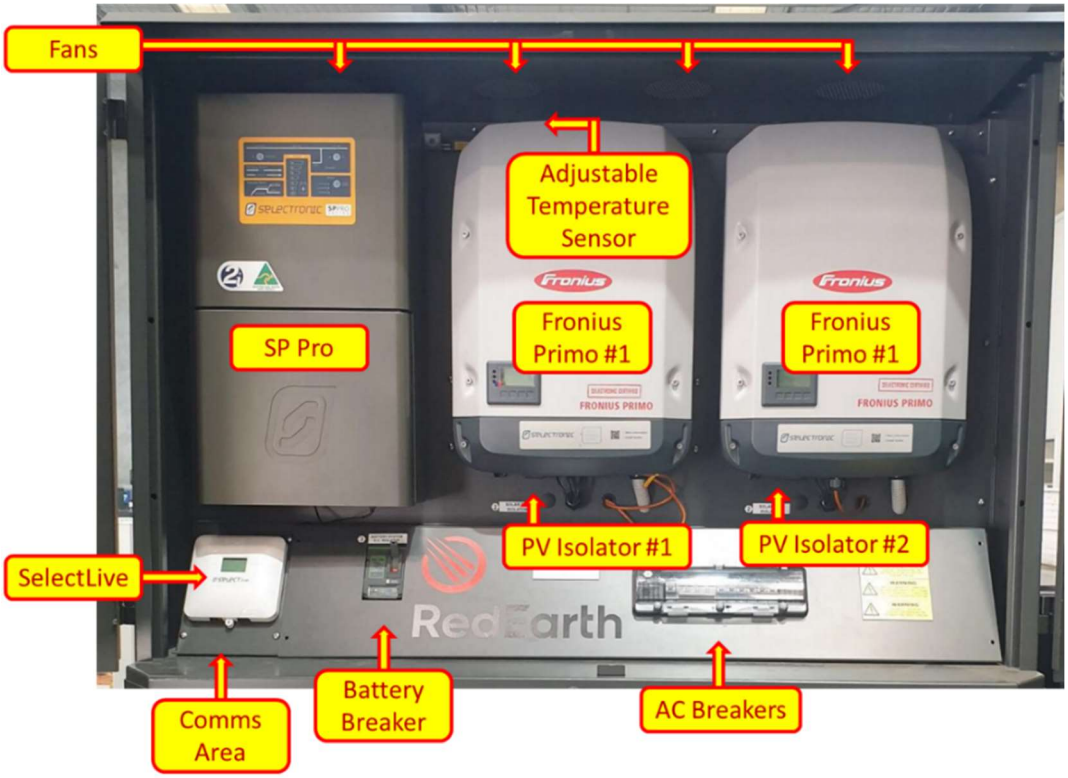
DropBear Overview

What is in your DropBear

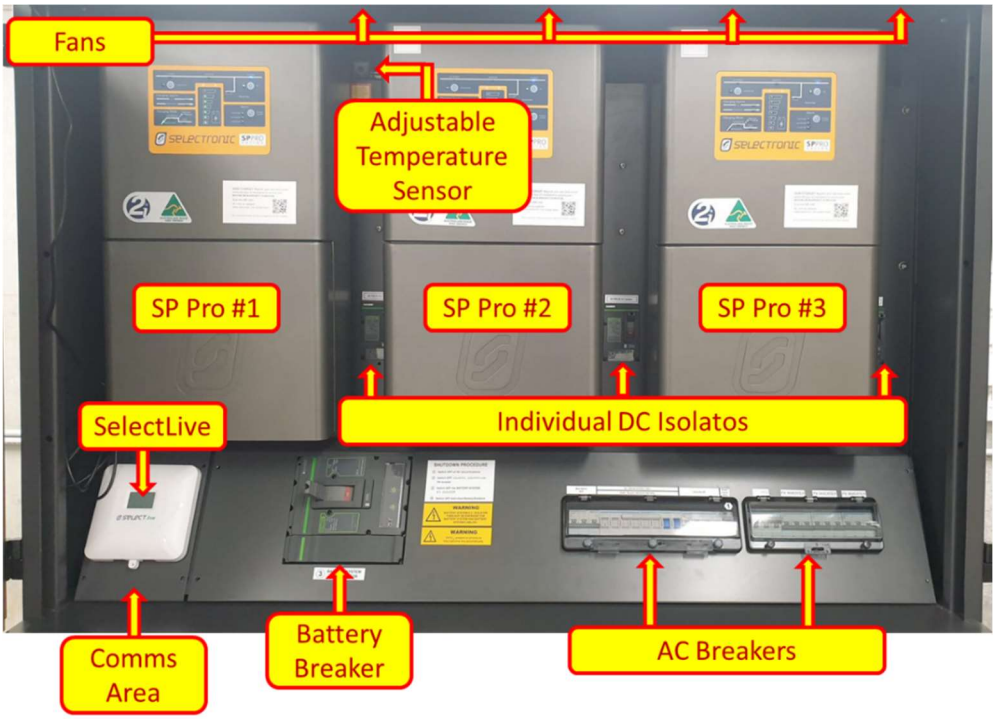
This is an overview of the components in your DropBear. It has two main sections. The top section contains the inverters and switch gear, and the isolated bottom section contains the TROPPO batteries. Each section has a key-lockable double door. The image below shows the 1-phase version of the DropBear.



The two images below show the 1-phase and 3 phase version of the inverter section of the DropBear. In the 3-phase version the Fronius PV inverters are installed outside the DropBear.



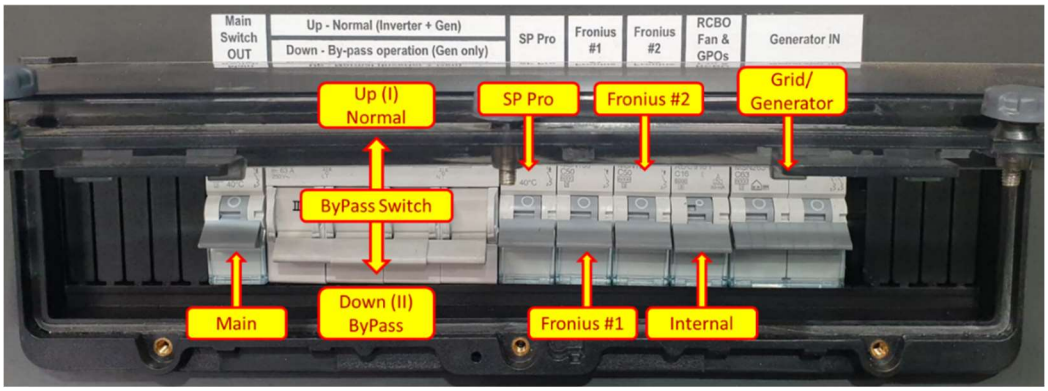
1-phase setup with x2 Fronius PV inverters



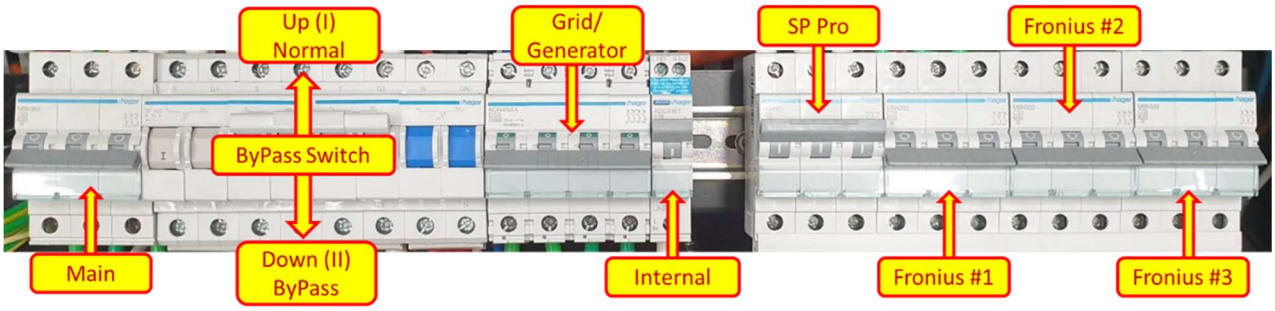
3-phase setup (external Fronius PV inverters)

The switch gear in the top section is labelled for easy identification as shown below.
There is a 1-phase and 3-phase version.

1-phase switch gear



3-phase switch gear

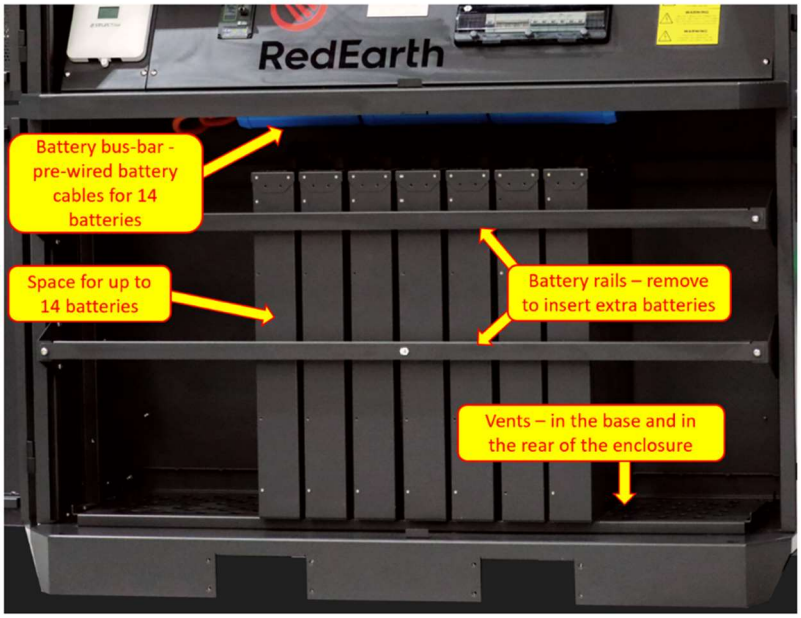


The lower enclosure is where the TROPPO batteries are installed.
The DropBear can hold up to 14 batteries (4.1kWh x14 = 57.4kWh nominal).

Front and rear rails secure the batteries in place as shown below.

Because of the characteristics of RedEarth's TROPPO lithium battery, it is possible to install additional batteries in your system at a later date, please contact RedEarth to purchase extra TROPPO batteries.

The enclosure is pre-wired with battery cables for all 14 batteries via the bus-bar system attached to the top plate. This makes adding additional batteries a simple process of plugging in the spare battery cables into the connectors on top of each battery and screwing in the supplied earth wire.



DropBear Components and Their Features

Battery Inverter

The Selectronics SP Pro in your DropBear operates as both an inverter as well as a battery charger. It charges the batteries by rectifying AC power, from the Fronius Solar inverters or generator/grid, into DC power to charge the batteries. It also inverts the batteries DC power into AC power to run your loads.

With many operating modes, our most popular is the "Self-Use" mode. All the solar power produced will be prioritised to the loads, the excess will be used to charge the battery and once the battery is full, the solar will be ramped down to match the remaining loads

NOTE: *In the event of critically low battery state of charge (SOC), the inverter will use the generator/grid to support the loads until sufficient solar power returns. In an "off-grid" application, this means that the inverter will auto-start the generator. It can also flash an emergency light if only a manual start generator is installed.*

The LEDs on the front of the SP Pro indicate the health and operational status of your system. Refer to the 'How to operate your DropBear' section for more details.

Solar Inverter

RedEarth supplies Selectronics-certified Fronius inverters with the DropBear.

The solar inverter converts the solar arrays DC power into usable AC power. This will then directly power your home appliances first; excess power will then charge your battery.

In an Off-grid installation, if the system has excess solar power available after the loads are supplied and the batteries are full, then the incoming power from the Fronius solar inverter is automatically scaled back.

The Fronius inverters performance can be monitored via the embedded display or via the RedEarth EMU app.

Note: The use of Fronius inverters that are Selectronics-certified allows more solar panels to be connected to the system (in off-grid applications or if the system is operating in back-up mode) This is because a 2:1 ration of Fronius inverter rating to Selectronics inverter rating is allowed. If the solar inverter is not Selectronics-certified, then only a 1:1 ratio is allowed.

By-pass Feature

In the event of a system failure, the DropBear is fitted with a three-position By-pass switch, which can allow loads to be directly from the generator (or grid).

The changeover switch has three positioning option: [1], neutral and [2].
In normal operation this switch is in the up position [1], and the Battery and PV inverter are operating together and using the generator/grid if available.

By putting this switch down into position 2, the DropBear will operate in “By-pass” mode, meaning that the power will by-pass the inverters and “flow” from the generator/grid directly to the loads.
The middle position is a neutral option, and not normally used. In this position all terminals are disconnected, and no power will pass through it.

For more information, refer to the “How to operate your DropBear” section in this manual.
Note that the By-Pass switch Is different for the 1-phase and 3-phase systems.

Battery

Batteries are a critical part of the DropBear system as they store energy generated from the solar panels and back-up Generators or the grid. This power is used when solar energy is not sufficient or available.

The battery bank has been sized to meet your requirements according to your Load Profile and energy assessment. If your requirements grow it is easy to add additional batteries in the future. Up to 14 batteries can be added. (14x4.1kWh = 57.4kWh)

The battery used in the DropBear is RedEarth’s Australian Made Troppo-4841 lithium battery (LFP) with a nominal capacity of 4.1kWh.

12-Volt Battery Charger for the Generator Starter Battery

A Victron battery charger is included in the DropBear and is designed to keep your generator’s starter battery charged for the event of an “auto-start” is requested.

Generator Auto-Start

RedEarth’s DropBear is fitted with terminals that allow the connection of an auto-start generator that is fitted with 2-wire auto-start capability. The SP Pro is configured to start the generator when the batteries reach a State of Charge (SOC) as programmed in during installation.

If the generator does not turn on (e.g., no fuel or flat starter battery), the batteries will discharge down to 20% and then the inverter will stop outputting power under “LOW SOC fault”. See the ‘How to operate your DropBear’ section of this manual.

Temperature Sensor

A temperature activated relay is positioned on the rear panel behind the top part of the Selectronic inverter as shown in the picture. This relay is connected to the four (4) fans in the roof of the DropBear and will turn them on once the set temperature is reached. The dial is set to activate when the ambient temperature inside the DropBear reaches 35^0 Celsius.

Generator Specifications

The DropBear can be installed as either an off-grid or on grid system.

These options must be specified upon purchase of the DropBear as the electrical design varies with each option. However, retrofitting by a qualified installer is also possible.

If it is an off-grid system then a back-up generator will most likely be installed, ideally with the 2-wire auto-start feature.

RedEarth does not supply generators, however if purchasing a generator, inverter-generators are recommended for use with the DropBear due to their better power quality. If voltage, frequency, or current waveforms of the generator are not of a high enough quality, then it will be rejected by the Selectronics inverter.

NOTE: *Selectronic has the recommendation of a 9.5 kVA generator for the SPMC481 (5kW) and a 14kVA generator for the SPMC482 (7.5kW). For the 3-phase system with 7.5kW SP-Pro Inverters a 42kVA generator Is recommended.*

The following specifications must also be met for guaranteed compatibility with the Selectronics inverter:

- Generator waveform THD: < 10%.
- Generator Vrms range: 180 ~ 264Vac
- Generator voltage crest factor (Vpeak/Vrms): < 1.6
- Generator peak voltage: <380V
- Frequency range: 45Hz ~ 55Hz
- Frequency slew rate: <0.3Hz/sec

How to Operate Your DropBear

Power-up

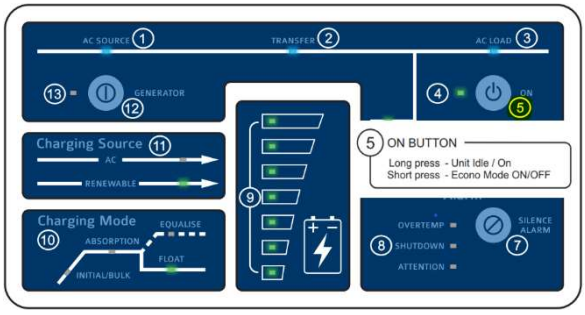
To power-up the unit you must follow the steps below.

1. Starting with all breakers in the system turned off, start by turning on the individual battery breakers on top of the Troppo batteries.
   This will charge up the capacitors inside the inverters. The LED on the three inverters will flash and beep. Wait for approximately 10 seconds.

2. Turn on the main battery breaker.

3. Turn on the PV isolator located under the Fronius inverters.
   Before beginning step 4, the Selectronics inverters are now powered but not turned on (outputting AC power).

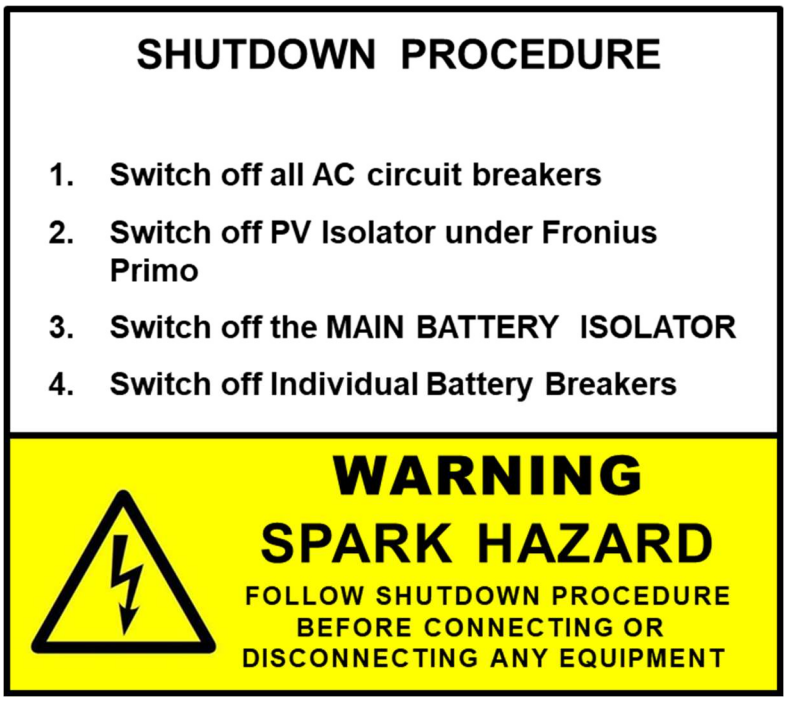
4. Turn ON the Selectronic
   To turn the inverter on you must press and hold the “ON” button on the top left-hand-side of the Master inverter (5).



5. Turn on all AC circuit breakers.

Shutdown

The following shutdown procedure should be followed. This procedure is also displayed on a sticker placed between the inverters.

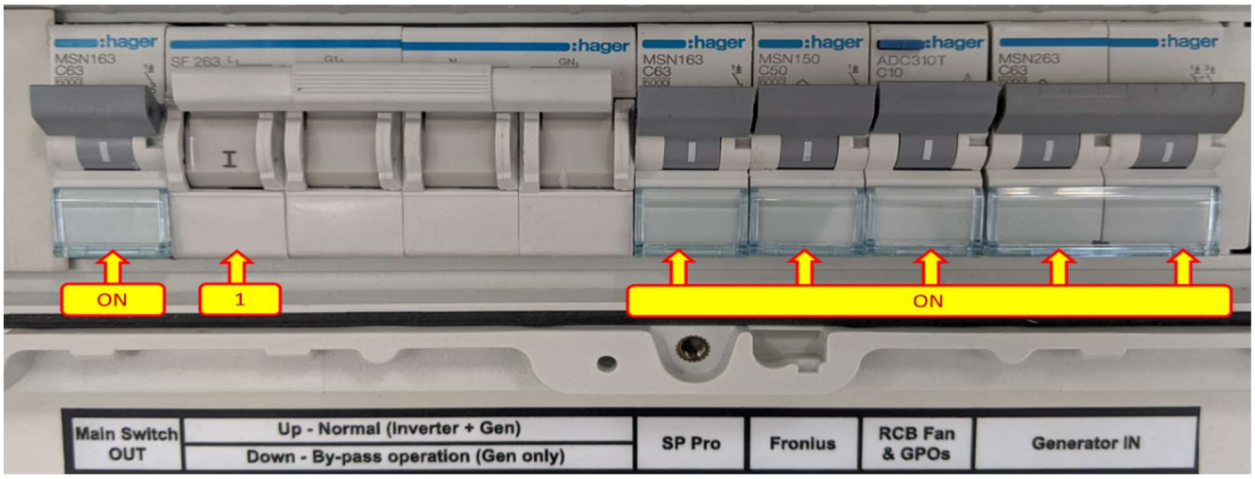


NOTE: The Power-up and shutdown procedures are the same, only in the reverse order.

Normal Operation

Normal operation assumes the SP Pro will use the Fronius (solar power) to charge the batteries and supply the loads during the day, use the battery during the night and use the generator when needed.

In normal operation mode the switches are set as shown in the images below, for 1-phase or 3-phase options.



Single phase version – normal operation

Three phase version – normal operation

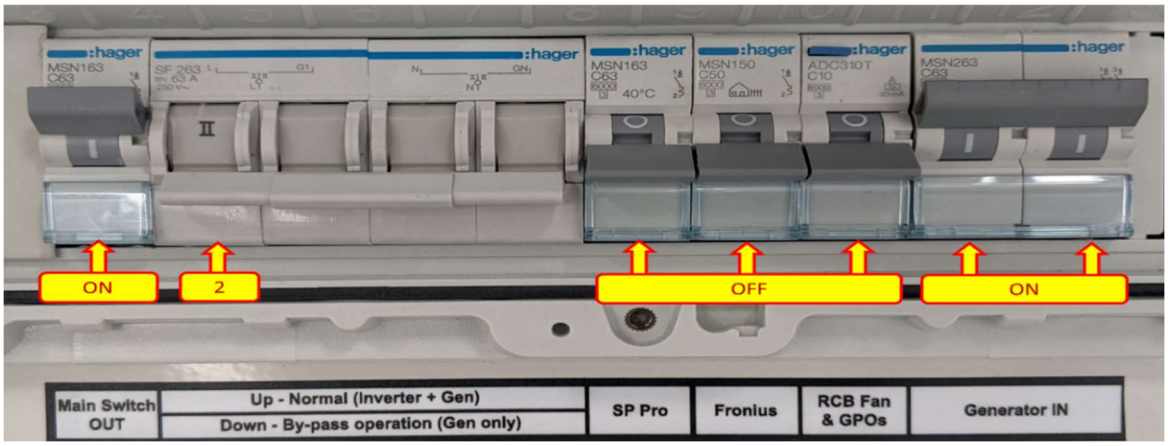
ByPass Operation

In the event of maintenance on the DropBear or failure of the SP Pro and/or the Fronius resulting in no power output from the DropBear, you can configure the system to operate in By-pass mode. This allows the generator (or grid if grid connected) to provide power directly to the loads.

To use this mode, the DropBear switches must be set as follows, and shown in the image below (for 1-phase and 3-pahse options):

1. Turn OFF all the AC breakers.
2. Turn OFF Main Battery Breaker and individual battery breakers on top of each Troppo-4841 battery.
3. Turn changeover switch from position 1 to position 2.
4. Turn ON generator AC breaker and Main Switch Out.
5. Manually start generator If off-grid.

By doing this, the generator (or grid, if it is connected) will provide power directly to the loads



Single phase version – By-pass operation

Three phase version – By-pass operation

Restart under low battery SOC

This procedure must be followed when the SP Pro has stopped inverting (providing 230V) but is still turned on (has lights on the front display).

As mentioned previously in “Low SOC Shutdown”, when the SP Pro inverter determines that the batteries are at a too low SOC, it will stop producing 230V to avoid too deeply discharging the batteries. If this does occur the Troppo-4841 batteries will go into a self-protection mode. Contact RedEarth Tech support to restart your batteries.

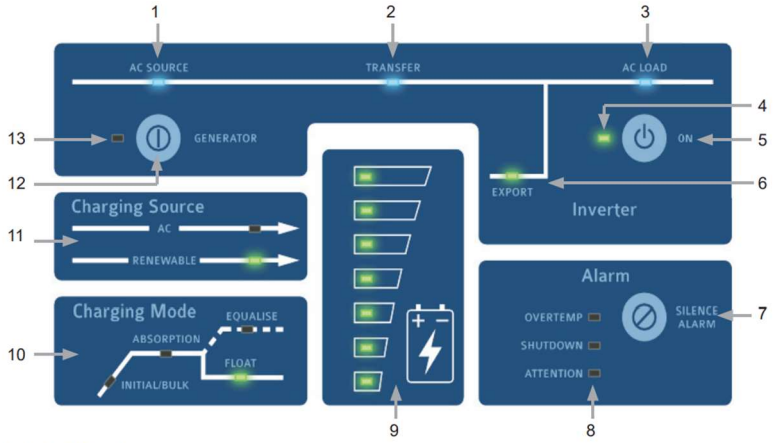
To restart the SP Pro, you must:

1. Turn OFF the Main AC Switch of the DropBear that is supplying the loads (Main Switch OUT).
2. Press the ON button on the SP PRO (this will change the state of the inverter from “fault” to “idle”).
3. Press the ON button once again (this will change the state of the inverter from “idle” to “inverting”).
4. Wait for the Fronius to start producing power and charge the batteries to a safe level (at least 3 lights on the battery gauge).
5. Turn ON the Main Switch AC Switch (Main Switch OUT) of the DropBear that is supplying the loads. Your System should start operating normally again.

Understanding the display on the Selectronics inverter

User Interface

This section lists the controls and indicators found on the front panel of the SP PRO.
The indicator brightness is adjusted according to the ambient light conditions (Blue LEDs exempted).



1 AC SOURCE *
When illuminated,this shows the presence of AC supply voltage from either the mains grid or backup generator (when installed), whichever is applicable. This is powered directly from the incoming AC supply.

2 TRANSFER *
Illuminated when an external AC supply is connected through to the AC LOAD output. If AC SOURCE is illuminated but not TRANSFER, it would generally indicate that the AC supply is out of sync tolerance – either the voltage or the frequency is beyond the set limits. It is normal operation for this to flicker slightly. This LED is ALWAYS off with an external AC source contactor.

3 AC LOAD *
When illuminated, this shows the presence of AC voltage ready to supply loads. This is powered directly from the inverter AC output or AC supply.

*Indicators **1,2,3** will operate without any DC connection to the SP PRO. An external AC supply will activate the AC bypass and illuminate these indicators.

Steady Green	The SP PRO is On.
Slow Flashing Green	SP PRO Econo mode is active and is sensing load conditions.
Fast Flashing Green	SP PRO is preparing to start.
Steady Red	Indicates that a Fault has been detected and no inverter output is possible.
Flashing Red	Indicates an open circuit or poor battery connection and no inverter output is possible.
Slow Flashing Red	Inverter has not been configured using SP LINK . No inverter output is possible.

5 ON BUTTON
A LONG PRESS (>1 second) - turns the SP PRO On. Another long press SP PRO reverts to Idle.
TWO LONG PRESSES when in low DC shutdown. AC coupled low DC shutdown recovery. (see SP LINK manual)
A SHORT PRESS (<1 second) - activates Econo mode (Not available in firmware above 11.20 or 120 VDC models)

6 EXPORT
This indicator flashes to show that the SP PRO is supplying the AC Load only with no export to grid. The SP PRO will not export active power to the grid.

7 SILENCE ALARM BUTTON
Turns off the audible alarm for this instance only. Alarm will resound with a new alarm condition.

8 ALARM INDICATORS

OVERTEMP

Yellow	SP PRO is approaching an over temperature condition
Red	SP PRO has shutdown due to an over temperature condition

SHUTDOWN

Yellow	SP PRO is approaching a shutdown condition
Red	SP PRO has shutdown

ATTENTION

Off	Normal
Yellow	Attention Required, Fan Service Request
Flashing Yellow	Either Clean Fan, Fan Fault or Capacitor Bank Service Request
Red	Immediate Attention required
Flashing RED	Unit Fault

See Attention Required in SP LINK Data View - Now section to determine specific reason for the attention indicator.

9 BATTERY "FUEL" GAUGE
These indicate the battery State of Charge (SoC). When the battery SoC is equal to the Shutdown SoC (in Configuration Settings - Inverter tab) then only the bottom LED is green. At 100% SoC all LEDs are green.

Top Indicator Flashing RED	Instant Hi DC Voltage Shutdown. Battery or battery wiring fault
Bottom Indicator Yellow	Low Battery. Battery needs charging
Bottom Indicator Red	Low Battery Shutdown. Inverter has shut down due to flat battery
Bottom Indicator Flashing RED	Instant Low DC Voltage Shutdown. Battery or battery wiring fault.
All Indicators flashing RED	Inverter in emergency Low DC Shutdown Override or AC Coupled Low Battery recovery mode (See SP LINK Manual)

10 CHARGING MODE
The Charging Mode panel indicates the present charging state. See "Battery Charging Operation" on page 58.

11 CHARGING SOURCE

AC - On.	Power from the AC Source input supply is charging battery bank (Grid or generator)
Renewable - On	Power from any monitored renewable energy supply is charging battery bank

12 BACKUP GENERATOR BUTTON

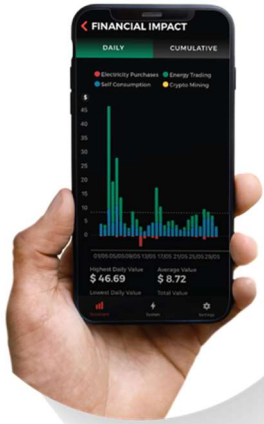
A short press	Start or stop the backup generator (where installed)..

13 BACKUP GENERATOR STATUS

Off	No backup generator activity
Flashing Green	Generator is in the process of starting
Steady Green	Generator has started and is running
Flashing Yellow	Generator is not available for auto start
Flashing Red	There is a generator fault

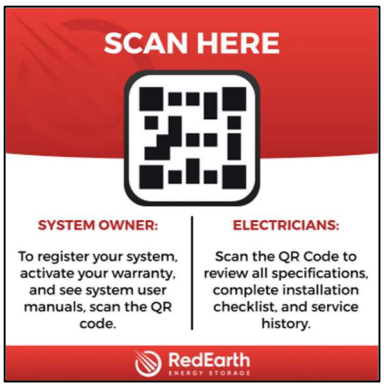
NOTE: Button **12** and LED **13** are not active when a backup generator is not installed.

How to Monitor your DropBear



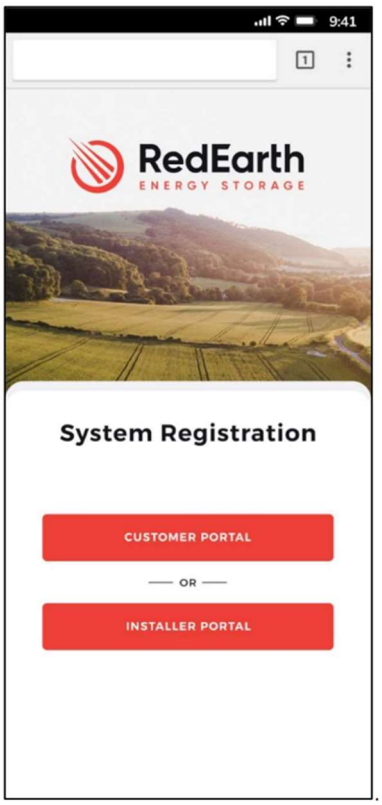
Monitoring your system is done via RedEarth's EMU app.
To setup monitoring follow the steps below.

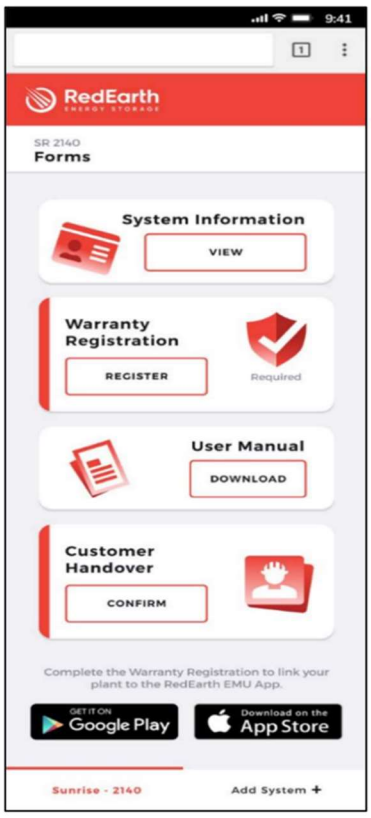
Scan the QR code sticker attached on your system. It looks like this:



Scanning the code will take you to the RedEarth customer portal.

Entering the information requested and registering your warranty will help you to get the most from your investment in your DropBear as well as RedEarth's PPP.





RedEarth Energy Storage
For sales enquiries contact sales@redearth.energy
For technical support: support@redearth.energy
15 Fienta Place, Darra BRISBANE QLD 4076 | 1800 733 637 | www.redearth.energy

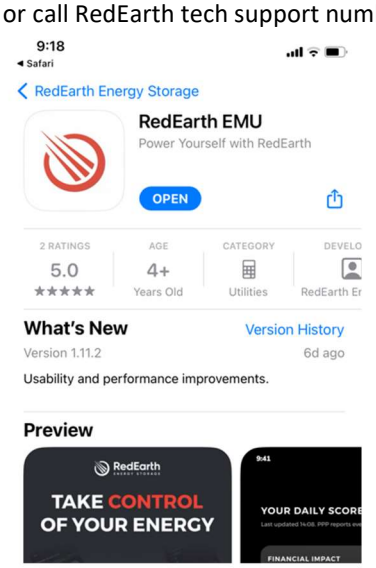
After completing the warranty registration, you can easily create an account on the RedEarth EMU app with the same email and start viewing your system straight away.

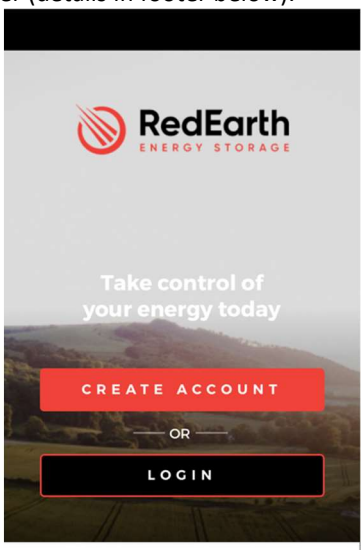
If you have any issues email support@redearth.energy or call RedEarth tech support number (details in footer below).

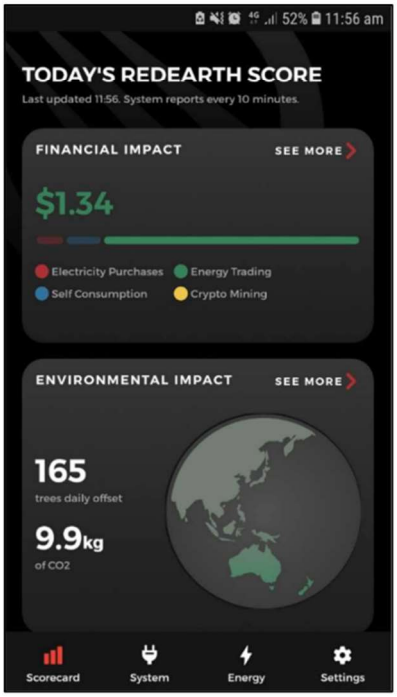
Click on the Google Play or App Store icons to download the RedEarth EMU app.

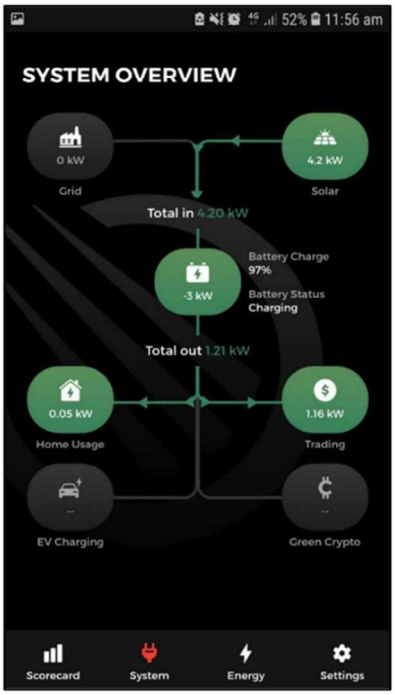
Create your account and RedEarth will immediately send a confirmation email to your email account.

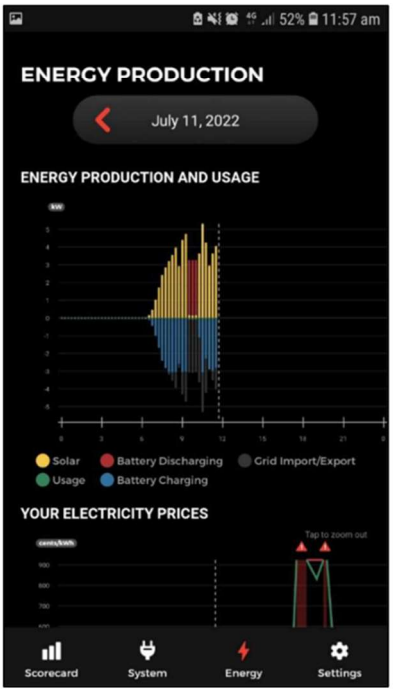
Now you are good to go!











FAQ's

Q: What should I do when my DropBear turns off?

A: *The most likely reason for this is that the inverter has reached the "low SOC" limit and has stopped inverting (producing 230V). In this situation, follow the "Restart under low SOC" procedure under "How to Operate" in this manual. If this is not the case, please turn the system off and then on again as recommended by the "Shutdown and Start-up" procedure in this manual.*

Q: What happens if my batteries go flat?

A: *Follow the "Restart under low SOC" procedure in this manual.*

Q: My Fronius (PV inverter) is showing "State 307". What does this mean?

A: *This fault is rectified automatically. Due to the low level of insolation (sunlight) early in the morning and in the evening, the STATE codes 306 (LOW PV OUTPUT) and 307 LOW PV VOLTAGE) are displayed routinely at these times of day. These STATE codes do not indicate any kind of fault.*

Q: My Generator is turning on too frequently and/or staying on for too long. What does this mean?

A: *The generator should only turn on when the battery reaches the low SOC level. If this level is reached frequently, this could mean that the loads are too large compared to the battery size. We recommend either reviewing your loads or contacting RedEarth for more energy storage.*

Maintenance and End of Life

Maintenance Schedule

Weekly

- ❑ Check component operating lights are normal

Monthly

- ❑ Clean inside the enclosure of dust, vermin, or obstructions
- ❑ Ensure safety labels/instructions remain visible
- ❑ Clean air filter with vacuum or soft brush
- ❑ Clean outside of enclosure soft brush or damp cloth

Bi-Annual

- ❑ Clean solar panel surfaces to ensure optimal performance.

Annually

- ❑ Visually inspect for loose cables or connections near inverter
- ❑ Clear any vegetation or overgrowth over the solar panels
- ❑ Inspect conditions of solar panels, cables, array frame for damage or corrosion

End of Life Recycling

Please contact RedEarth Energy Storage to arrange recycling of your battery.

Working on the inside of the DropBear system is restricted to qualified personnel.

RedEarth recommend installation by licensed electricians only.

Note that government rebates for solar panels are only available if solar panels are installed by a certified installer

Services and Options Available for Your DropBear

As a RedEarth DropBear system owner you have the choice of joining our customer community. You just need to register your contact details with RedEarth by scanning the QR code on your system with your mobile phone and following the prompts.

You can receive regular relevant communications and advice from RedEarth buy joining RedEarth Optimum.

Other benefits include:

- Access to our PPP (Private Power Plant) stream of financial benefits to you
- Remote monitoring service if required. Includes recommendation for system upgrades.
- Additional batteries for system expansion
- Extended warranty option

In addition to the DropBear system RedEarth offers other systems for both on-grid and off-grid applications. Contact RedEarth for more information.

Vault

BATTERY STORAGE

RedEarth ENERGY STORAGE

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