



Troppo 
LFP 4841

Troppo - 4841 Manual - Version 2, 17th August 2021



RedEarth
ENERGY STORAGE

INSTALLATION AND OPERATION MANUAL

TROPPO - 4841 LITHIUM BATTERY (LFP)



CLEAN ENERGY COUNCIL
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SAFETY INSTRUCTIONS

Installers and users are responsible for familiarising themselves with this manual.

The Troppo-4841 battery is certified to IEC62619:2017 and AS/NZS 60950.

The Troppo-4841 battery uses high-quality cylindrical Lithium Iron Phosphate (LFP) cells which are safe, robust and reliable in higher ambient temperatures. The cells themselves are also certified to IEC62619 (2015) by TuV, specifically for RedEarth, and have industry leading service life. They are fully recyclable.

Each Troppo-4841 battery has an internal Battery Management System (BMS) designed together with RedEarth that provides protection against operation in over and under temperature, over and under voltage, over current (charging), as well as short circuit (discharging) protection. It also extends the service life of the battery through internal balancing of the individual cell strings.

Low voltage protection feature: The Battery Management System (BMS) has a feature that shuts down the battery if the voltage goes below 40V+/-2 volts. This is to protect the cells from damage. See the relevant section of this instruction manual to restart the battery.

The battery includes a 2-pole non-polarised circuit breaker specifically manufactured for RedEarth. A 2-pole circuit breaker is required to meet Australian standards for battery installations.

Other safety features of the Troppo-4841 battery include the use of touch-safe high-quality industry standard Amphenol Surlok DC connectors for safe and easy connection of the DC battery cables. These have a significant safety advantage over legacy systems using exposed bolted terminals. Bolted connections present a short-circuit risk as well as the possibility of a loose connection becoming a hot-joint.

The display included in the Troppo battery increases safety by showing the voltage and current status of the battery at all times. This is helpful when batteries are being connected in parallel, and larger balancing currents can flow if the battery voltages are not similar. Note that the BMS includes a safety feature that does not allow current to flow if the battery voltages are different by more than 2-3 volts. Bring the battery voltages closer together by charging or discharging one of the batteries before reconnecting.

The display also includes an odometer function that shows the total energy in kWh that has flowed into and out of the battery. It can also be useful for indicating if one battery in a string is not doing as much work as other batteries.

A status indicator light is also included on the battery. This is always lit when the battery circuit breaker is on and the battery is ready for use. If the battery has shutdown due to under-voltage protection shutdown, then it will not light up. The light also incorporates a momentary button feature that is for future developments of the battery.

Installation:

Installation should only be performed by qualified and experienced installers who can specify the correct cables and DC bus arrangement, external circuit protection, polarity checking and suitability of the design for the application. RedEarth provides factory built and tested energy storage systems designed and engineered to national and state requirements to simplify installation.

SAFETY INSTRUCTIONS

Transportation:

Lithium Iron Phosphate Batteries are classed as Dangerous Goods (DG) Class 9 UN3480 and therefore safe for transport. The batteries are shipped in approved transport protection packaging in a partially discharged state with terminal protection in place and the circuit breaker off. RedEarth Troppo-4841 battery is also UN38.3 certified. UN38.3 is the current United Nations standard that lithium batteries must meet and receive certification for safe transport.

Basic Safety and handling:

Basic Safety and handling:

- Battery pack is intended to be a 2 person lift when being installed.
- Battery should not be exposed to temperatures above or below the temperature rating specified in this manual.
- Battery should not be installed where it is in direct sunlight, or where it can become wet.
- Battery should not be exposed to strong impacts, crushed or punctured.
- Do not short the battery terminals or connect with reverse polarity!
- Battery should not be disassembled unless qualified and approved by RedEarth to do so.
- Battery should be kept away from animals and children.
- The maximum stacking height is 8 batteries when in RedEarth's transport box.

Damaged battery:

A damaged battery must not be used and returned to RedEarth as soon as possible or disposed of via a recycling facility. Leaking electrolyte can cause skin irritation and chemical burns so contact should be avoided.

Eye Contact	Rinse gently with running water. Seek medical attention if irritation develops.
Skin Contact	Rinse gently with running water. Seek medical attention if irritation develops.
Ingestion	If Ingested do not induce vomiting and contact your local poisons information centre or doctor.
Inhalation	Evacuate area and seek professional medical attention immediately, however an inhalation hazard is not expected due to product form and nature of use.

Fire:

In the unlikely event of a fire a dry agent fire extinguisher should be available and used. DO NOT use water. Evacuate the area and call emergency services. Toxic gas may be produced if the battery catches fire.

SDS:

Note: Refer to the SDS document for more details. The SDS is available from RedEarth Energy Storage Ltd.

OVERVIEW



Troppo

LFP 4841

The Troppo-4841 Battery is RedEarth's own in-house developed and built Lithium Iron Phosphate battery.

It is an Australian-made product that is designed and assembled by RedEarth in its facility in Brisbane.

The Troppo-4841 battery's features make it one of the easiest and safest lithium-ion batteries to install and use, and you have the support of RedEarth's experienced Brisbane-based technical team behind you. Just call.

The Troppo-4841 battery has been specifically designed to be self-managing. This means it does not need to communicate with the inverter/charger to operate. There is no need for multiple communication wires between the batteries and inverter (and the complications that go with configuring it), making installation simple. It also allows the battery to be used in systems which do not have the capability to communicate with batteries. For example, older lead-acid based battery systems that need a replacement battery.

Troppo-4841 batteries include a display that shows the battery voltage and current. It also includes an odometer that shows how many "miles" the battery has done in its lifetime (measured in total kWh into and out of the battery)



Battery connectors are the industry standard, safe and easy to connect Amphenol connectors. A built-in two pole circuit breaker allows for time and cost savings during installation.

The batteries can be connected in parallel to suit applications from the smallest domestic application, right through to telecommunications and commercial sized projects (note: they are not suitable for series connection).

The battery can be coupled with many of the inverters available in Australia today. RedEarth can assist you in selecting the requirements for your system and setting the appropriate parameters.

The Tropo-4841 is currently available in a 48Vdc model and is sized to be installed in standard 19" (inch) racks. RedEarth also provides its own range of purpose built 19" racks for this.

The Tropo-4841 battery is certified to IEC62619:2017 and AZ/NZS60950 allowing it to be used in Australia. It is supplied in the appropriate DG approved shipping carton.

Qualified installation person (Installer)

The installation tasks described in this manual should be carried out by a suitably qualified and skilled installer with adequate skills, qualifications, and experience. They should:

- Have a thorough understanding of operations, design, and installation principles of On and Off grid electrical systems.

- Have a thorough understanding of the risks and dangers associated with installing and using electrical equipment.

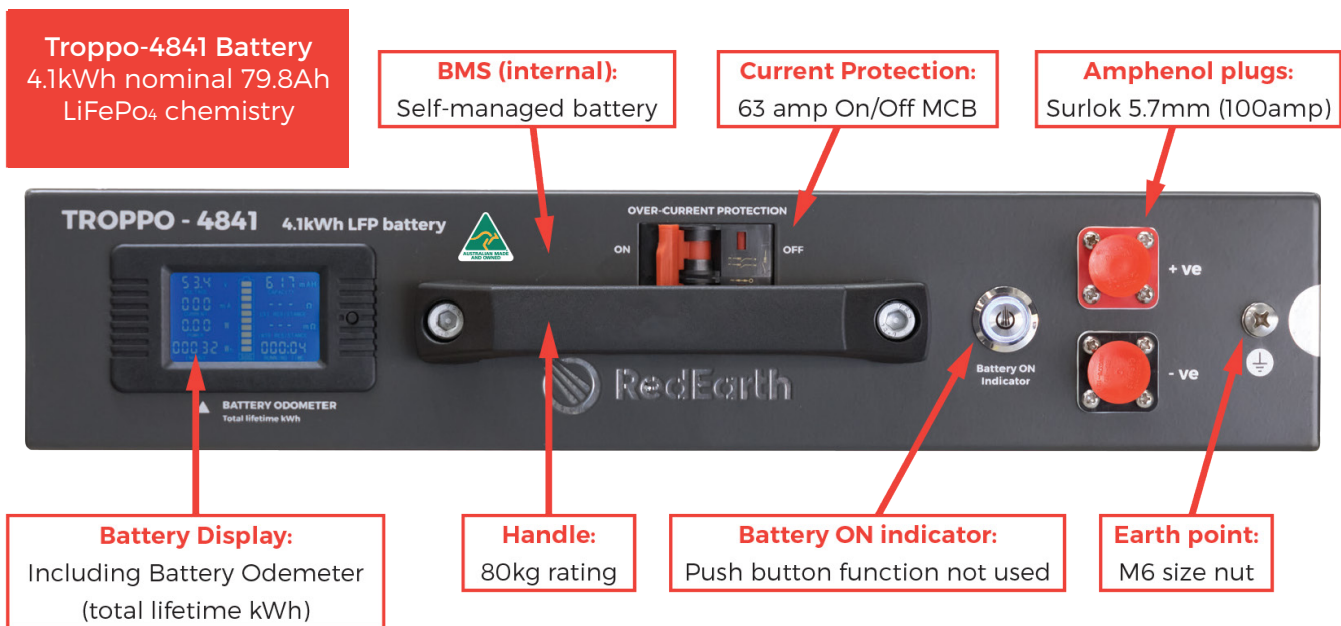
- Hold all local, state and country-based qualifications to carry out such work.

- Adhere to all safety and installations requirements contained in this manual.

PHYSICAL & DESCRIPTION SPECIFICATIONS

The Troppo-4841 battery is a Lithium Iron Phosphate (LFP) battery that contains a Battery Management System that manages the battery cells. It does not need to communicate with the charger or inverter, however it is important that the charger and inverter are programmed to provide the correct voltage and current for the Troppo-4841 battery.

The image below shows the Battery face cover plate including where the connection and control components are located.



Battery Weight - 42.5kg

Battery Dimensions 438mm wide x 725mm deep x 88mm high

Package Weight (with Battery) 44.0kg

Package Dimensions 540mm wide x 800mm deep x 160mm high

NOTE: Do not open the battery. There are no user serviceable components and it will void the battery warranty.

UNDERSTANDING THE TROPPO-4841 BATTERY AND ITS USE



The Tropo-4841 battery is designed to be easy to install and use. It can be used in applications requiring a nominal 48VDC battery bank. The Tropo-4841 battery is designed for a wide range of 48VDC applications including but not limited to renewable energy systems, telecommunications, and mining applications.

As it is designed with a self-managed Battery Management System (BMS), it does not need to communicate with the inverter/charger to operate. This makes it suitable for a larger range of applications than the typical Lithium-ion battery that requires communication with the inverter/charger to continue to operate.

This section of the manual explains characteristics, features, and options for use of the battery. Additional support is available through RedEarth Technical Support by calling **0487 002 451**, emailing or visiting the RedEarth manufacturing facility in Brisbane, Australia.

Additional information can be found at **www.redearth.energy**

RedEarth offers a wide range of training options for our partners including regular training courses run at our Brisbane facility, on-site for our larger customer as well as online training options.



Charging and Discharging the Tropo Battery:

The battery should always be charged and discharged within the voltage, current and temperature ranges listed in the specifications for the battery at the end of this manual and in the data sheet.

When connecting to Inverters and chargers the parameters set in these devices are important for safe battery operation. The table below provides a guide to some of the key parameters to set. RedEarth also provides guides for setting up popular inverters and MPPTs. If in doubt, contact RedEarth.

All currents are maximum total charging and discharging currents and should be taken into consideration when multiple devices are charging the battery (e.g. MPPT and inverter/charger). For full warranty coverage the battery must be operated within the voltage, current and temperature windows defined on the following page and in the specifications in this manual and the data sheet.

Inverter or charger programming - battery parameter settings		Installer Information
Battery type	Lithium, User-defined or Sealed Lead-acid	If no Lithium or user-defined option is available then set to sealed Lead-acid
Charging method	CC-CV	Constant Current (CC) (<max. charge current of TROPPOs)... then... Constant Voltage (CV) setting of 57.6V
Recommended continuous Discharge Current	maximum 40A per Troppo battery	Install sufficient batteries to ensure that the batteries are not overloaded (see RedEarth recommendation)
Recommended continuous Charge Current	maximum 16A per Troppo battery	Install sufficient batteries to ensure that the batteries are not overloaded (see RedEarth recommendation)
Max. Charge/Discharge Current	maximum 63A per Troppo battery	Limited by the 63A MCB and also the fixed BMS internal charging current protection of 78amps +/- 8 amps
Charging end current	0.8amps (0.01C)	End Constant Voltage charging once current drops below 0.8 amps per TROPPO battery
Continuous Charge Voltage (Absorption voltage)	57.6V _{DC}	Recommended charge voltage of TROPPO
Float Voltage	disable float, otherwise set to 53.5V	Float voltage charging is not required
Equalisation Voltage	disable equalisation, otherwise set to 53.5 V _{DC}	Avoid equalising the TROPPO battery
Inverter Shut Down voltage (per Warranty)	48.0V (most of battery capacity used)	Inverter stops inverting. Leaves enough capacity to avoid internal shutdown while waiting for a charging source (e.g. solar)
Inverter Shut Down SoC	20% if available as an option	Inverter stops inverting. This leaves enough capacity to avoid internal shutdown while waiting for recharging (e.g. solar)
Restart Voltage of inverter	50V	Set restart voltage of inverter at 50V _{DC} to allow battery to recharge enough prior to applying the load to the inverter if required
Peukert Exponent	1.02	
Cable Size	Refer relevant manual or cable sizing standard	Amphenol 5.7mm Surlok - rated at 120A with 25mm ² cable (100A with 16mm ²)

The inverter (or MPPT) connected to the Troppo needs its battery parameters set as listed above. If the inverter shut down voltage is set too low there is a risk that the battery switches itself off internally for protection. This then requires a manual restart of the Troppo battery.

Refer to separate inverter-specific information in the TROPPO installation manual, otherwise contact RedEarth



The Vault

BATTERY CABINET

RedEarth's The Vault Preassembled battery cabinet:

This allows qualified installers to add RedEarth's approved Battery System as the storage component of a 48Vdc installation.

The Vault is supplied as a fully pre-wired (incl 70mm battery cables) IP20 cabinet to house with a maximum of 8 to 20 batteries for indoor applications. The Vault can be configured with a built in Battery Breaker (160-250amp NOARK MCCB) and a Victron BMV-712 battery monitor. This allows monitoring of the whole stack of TROPPO batteries and includes an alarm option (eg low battery voltage) as well as Bluetooth monitoring on your phone. There is a standard and premium version of the Vault system available. This configuration allows 9 batteries to be installed. The Vault can be paralleled together to increase total capacity.

An optional remote monitoring option is also available from RedEarth when mobile phone coverage is available. This requires the Vault version with the BMV battery monitor plus MCCB.

18 and 21 battery cabinets are also available as well as IP54+ cabinets for outdoor applications. These outdoor enclosures can be air-conditioned if required. Contact RedEarth with your requirements.

Custom installations by qualified installers:

Sizing the System is often dictated by the application. In these cases, the installation location of the battery must take into consideration the IP rating (IP40) and operating temperature range specified in the Specification section of this manual. The optimal ambient temperature range is 0°C to 45°C.

Tropo-4841 batteries do not vent any harmful gases and do not require special ventilation or cooling.

The Tropo-4841 battery is designed to be installed in The Vault or an electrical enclosure of your choice. If the battery is to be installed outdoors a suitable IP54 enclosure should be used. The location of the batteries should meet the following conditions:

- A >3mm clearance is required around the battery for a minimum of 70% of the surface area.
- The batteries are not located in a salt-air environment, e.g. by the ocean. If this is unavoidable then appropriate air filtration should be used to prevent salt air contacting the battery.
- There are no explosive or flammable materials nearby (refer to AS5139 and the Best Practise guide <https://batterysafetyguide.com.au/>)
- Charging and discharging outside of the optimal ambient temperature range should be limited to C5 and the battery cells should remain between the max and min operation temperature range as specified in this manual. (the internal BMS will stop the operation of the battery if the cell temperatures move outside their specifications)
- The temperature and humidity remain relatively constant to avoid condensation.
- The area is clean with minimal dust.
- The batteries and battery cabinets/housings are not exposed to direct sunlight.
- The Tropo-4841 battery can be installed horizontally, vertically or on its left or right side.

RedEarth can supply connectors, bus bars, DC battery cable, battery breakers and ancillary items to assist qualified installers in completing their installations.

Call RedEarth Technical support on 0487 002 451.

DC battery cables:

Each battery has a positive and negative Amphenol SurLok non keyed male connector for easy snap on connection. A full range of pre-made cable and mating connectors are available from RedEarth.

Multi-battery bus bar and DC Battery Breaker:

If multiple batteries are to be connected, then RedEarth can supply a Victron busbar which is rated to 1000A. Several can be bolted together when larger numbers of batteries are required. RedEarth also uses and can supply Noark MCCBs.

Monitoring:

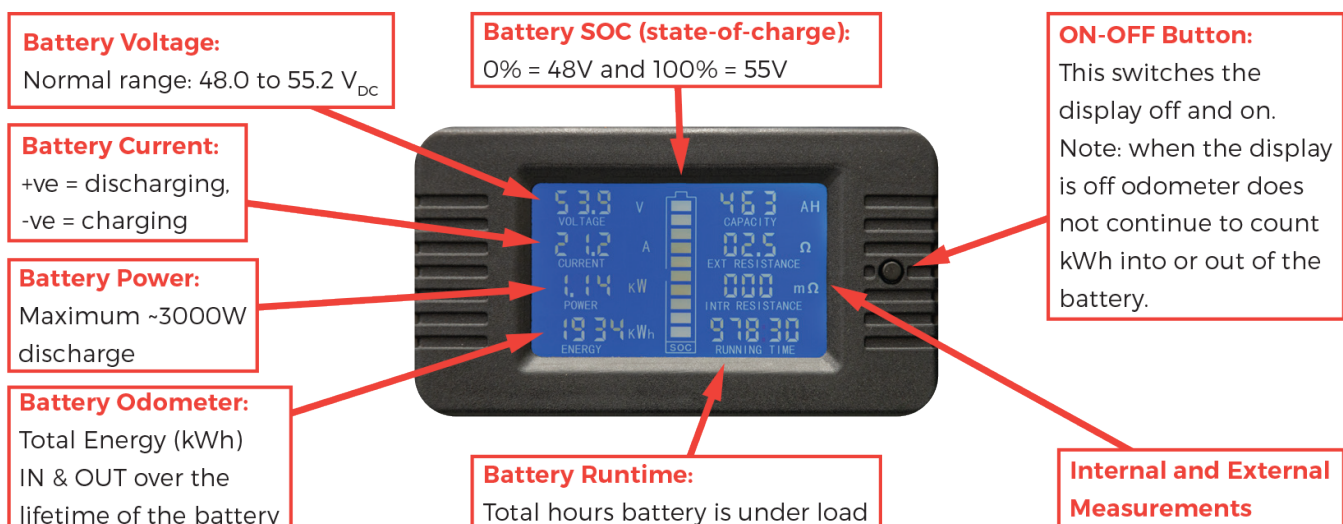
RedEarth can supply a Victron BMV-712 monitor with alarm relay and Bluetooth capability (see next page). It is included in the The Vault product as standard. A pre-configured remote monitoring option is also available. It requires mobile phone coverage.

Battery Connection and Operation

Connecting batteries together in parallel:

1. When connecting multiple Troppo-4841 batteries to a single inverter/charger follow the steps below.

Confirm status of the battery: On each battery switch ON the OVERCURRENT PROTECTION MCB and confirm that the display and indicator light illuminates. By looking at the display, confirm that the battery voltage is between 48.0V_{DC} and 57.6V_{DC}. It is recommended that the voltages of all the batteries are within 0.5 volts of each other to avoid high current flows between the batteries once they are all connected in parallel. Note that the BMS in the batteries will not allow electrical connection if the voltage difference between the batteries is greater than 2-3 volts. Bring the battery voltages closed together by charging or discharging one of the batteries before connecting in parallel.



2. Switch OFF the OVERCURRENT PROTECTION MCB of all batteries.

3. **Next, ensure the separate Main Battery Breaker connected to the inverter/charger is OFF.**

4. Connect all the batteries in parallel, by connecting them to the main bus bar using the correct Amphenol 5.7mm Surlok cables (available from RedEarth and already included in all RedEarth systems). This busbar will be connected to the inverter/charger via a separate Main Battery Breaker (Double check that all the battery cables are connected to the correct polarity).

SurLok Plus 5.7mm (IP67)



Right Angle Plug (Black)

Suit 16mm² and 25mm² cable
SLPPA16BSB



Right Angle Plug (Red)

Suit 16mm² and 25mm² cable
SLPPA16BSR



Panel Mount (Black)

Threaded Post SLPRATPSB



Panel Mount (Red)

Threaded Post SLPRATPSR

5. Switch on all the OVERCURRENT PROTECTION MCBs of the batteries and monitor the displays to ensure there are no large currents flowing. These currents will reduce quickly and will balance the batteries if their SOC was not the same. Once all balancing currents are below 5 Amps move to the next step.

6. Switch on the Main Battery Breaker. The inverter/charger should power-up depending on the type.

7. Adjust the parameters of the inverter/charger to match the requirements of the Troppo-4841 batteries. Refer to the settings included in this manual. This is a critical step. If you are unsure of the settings required contact RedEarth, as damage to batteries caused by incorrect settings of the inverter/charger will affect your warranty.

8. If you have purchased a RedEarth system with the RedEarth remote monitoring option, you can contact RedEarth now. RedEarth will log into your system and confirm that everything is operating correctly.

Shutdown Process:

To shutdown the battery, the OVER-CURRENT PROTECTION must be switched towards the OFF position.

Shutting down the battery will cause loss of power on the battery terminals (+ve and -ve) Earthing:

Next to +ve and -ve there is a attachment point for a M6 screw. This is where an earthing cable (secured by an M6 screw up to 12mm long) must be connected should the application require grounding of the case to the same potential of its enclosure.



Troppo 
LFP 4841

TROPPO BATTERY SPECIFICATIONS

The table below, extending to the following two pages, includes all the specifications of the Troppo-4841 battery that need to be understood.

It also includes additional information to help the installer to understand the specifications and parameters of the battery.

More detailed information on specific settings required for Victron, Selectronics, Voltronics and SunGrow hybrid inverters are available separately. These are the inverter brands currently used by RedEarth. If your inverter is not included in the above, please contact RedEarth for further instructions.

Troppo-4841 Self-Managed LFP Battery Module

The Troppo-4841 battery incorporate a self-managed BMS that does not require communication with the inverter/charger to operate. It does however require the inverter/charger settings to be within the specification of the battery as listed below.

Electrical Characteristics		Installer Information
Nominal Capacity	4.1kWh / 79.8Ah	$79.8\text{Ah} \times 51.2\text{V}_{\text{DC}}$ (nominal battery voltage) = 4,086Wh (approx. 4.1kWh) 16S21P = 336 x 3,800mAh cells.
Usable Capacity	3.26kWh (80% of nominal capacity)	<u>Useable capacity</u> is the capacity available when operating the battery within the normal voltage range of the connected inverter/charger (48.0-57.6V _{DC}). <u>Nominal capacity</u> is the capacity when the battery is operated from its lowest shutdown voltage up to its maximum charge voltage in a laboratory environment (40.0-58.4V _{DC}).
Nominal DC Voltage	51.2V	3.2V per cell (LFP type) x 16 cells in series (16S) = 51.2V _{DC}
Maximum Discharge Current	63A (Limited by circuit breaker)	63A 2-pole MCB protects battery and cabling. K-curve breaker characteristic (e.g. thermal shutdown in 3-60 mins at 75 amps).
Lifetime Continuous Discharge Current	40A (C2)	Recommend C2 rate for LFP chemistry = $79.8\text{Ah} \times 0.5 = 40\text{A}_{\text{DC}}$ for longest life.
Maximum Charge Current	63A (Limited by circuit breaker)	BMS over charging current protection is set at 78A +/- 8A however the 63A K-curve MCB will switch off as design.
Lifetime Continuous Charge Current	16A	Recommended is 40% of C2 rate = 16A (C2 rate = $79.8\text{Ah} \times 0.5 = 40\text{A}_{\text{DC}}$) for maximum life.
Maximum Power on discharge (kW)	Approx. 3kW	Maximum $63\text{A} \times \sim 50\text{V} = 3,000\text{W}+$
Recommended operating voltage range	48.0 - 57.6V _{DC}	48.0V _{DC} ensures the inverter stops supplying loads before the battery shuts down internally. 57.6V _{DC} is required for the balancing circuit inside the BMS to balance all the cell strings at the top of charge.
Charge / Discharge Cycles of certified 3,800mAh cells at 1C rate (to 80% Residual Capacity)	2,000@100% DoD / 4,000@80% DoD / 7,000@50% DoD @ 25°C operating temp.	4,000 cycles = 10.9 years at 80% daily DoD (Depth of Discharge) when charging and discharging at 1C rate (79.8A). This is for the cells used in the Troppo Battery.
Projected MWh delivered over battery lifetime	13.08 MWh at 80% DoD	= 4,000 cycles x 4.086kWh x 80%DoD = 13.08MWh

Round Trip Efficiency	>96%	Minimal battery losses and therefore minimal internal heat generation in normal operation
Parallel connection	from 4.1kWh to 100kWh+	Ask RedEarth for advice and support
Series connection	Not designed for series connection	Only designed to operate in nominal 48V _{DC} systems - ask details
Expected calendar Life @25°C	>10 years when used as per warranty terms	RedEarth warranty 10 years — see warranty document for details.
Environmental Characteristics		
Operating Temperature Range - Discharging	Discharge: -20°C to 60°C (+/-5°C)	BMS shuts down discharge when the internal cell temperature sensor measures outside this temperature range. This is an abnormal situation and requires investigation. As such the battery requires a manual restart before it can be operated again.
Operating Temperature Range - Charging	Charge: 0°C to 50°C (+/-5°C)	BMS shuts down charging when the internal cell temperature sensor measures outside this temperature range. It will automatically restart once the temperature sensor measurement moves back into the range 5°C to 50°C (+/-5°C).
Cooling	Natural convection	No fans... install in a shaded area.
Physical Characteristics		
Battery mounting options	In a standard 19" rack or horizontally, vertically or on either side	RedEarth can provide its pre-wired Vault system with built-in main battery breaker and Victron BMS-712 battery monitor. It also has a range of fully pre-wired inverter battery systems for both on and off-grid applications. These are Australian made and fully certified
Battery terminal connections	Amphenol Surlok non-keyed	Can be used with 16mm ² or 25mm ² cable. Caution when connecting terminals as they can be reversed (non-keyed connectors)
Battery circuit breaker	2-Pole 63A 360V _{DC} (K-curve)	2-pole 63A 600V _{DC} (K-curve) ZJBenny
Battery dimensions	725mm D x 438mm W x 88mm H	Fits into a 19" rack (2RU high) and 800mm deep
Battery weight	42.5kg	Handle is rated to 80kg
IP rating	IP20	Ingress Protection IP20: 1 st number (solids) - 2 = protected from fingers > 12.5mm (this is related to the Amphenol connector). 2 nd number (liquids) - 0 = not protected.
Safety Parameters and Certification		
Short-circuit current	400A per battery in parallel	1) max BMS discharge protection = 400A (<0.1 seconds) K-curve 63A MCB = 8-14In = 504-882A (<0.01 seconds).
Lithium Composition	Lithium Ferro Phosphate (LiFePO ₄ or LFP)	Safest lithium chemistry (LFP). Note: LG uses NMC lithium which has higher energy density but is not as stable.
Certification - TROPPO 4841 Battery	IEC62619:2017	Approved for use in Australia. UN38.3 is the current United Nations standard that lithium batteries must meet to receive certification for safe transport.

Certification - LiFePO4 3,800mAh cell	IEC62619:2017 & UN38.2	3,800mAh cell used in the Troppo battery is certified by TuV for RedEarth in the company name.
Battery Management System (BMS) Protection Settings		
Battery type and number of cells in series		Custom BMS designed and built for RedEarth
BMS Over-Volt cut off	58.4V _{DC}	Maintain battery between 48.0 & 57.6V _{DC}
BMS Under-Volt cut off	40V	Battery will switch off internally - follow Flat Battery Restart procedure to restart the battery
Charging over-current protection	78±8A	Battery will stop charging above this level
Discharge over-current protection (2 levels)	250±60A(20-400mS) & 400±100A(10-100mS)	2 levels: 250+/-60A delay 20-400mSec; 400+/-100A delay 10-100mSec.
Inverter capacitors - starting capability	14,600mF	The battery can provide the surge current needed to start an inverter with up to 14,600uF of capacitors on the DC side.
High temperature - discharge protection	60±5°C	Battery will not discharge if the two temperature sensors in the cell pack are reading above this temperature.
High temperature - charge protection	50±5°C	Battery will not charge if one of the two temperature sensors in the cell pack are reading above this temperature.
Low temperature - discharge protection	-20±5°C	Battery will stop discharging if one of the two temperature sensors reads below this temperature.
Low temperature - charge protection	0±5°C	Battery will stop charging if temperature sensors below this temperature - Required feature of all installed battery systems.
Cell balancing method	Passive equalisation at 57.6V _{DC}	Top balancing (i.e. during charging once each row of cells reaches (3.65V)

Note: In our efforts towards constant product enhancement this specification is subject to change to at anytime without notice.



TROUBLESHOOTING

The Troppo-4841 battery is a self-managed lithium battery system. This simplifies installation as no communication cables are required between the inverter/charger and Troppo-4841 batteries.

It does however require the inverter/charger settings to be correct to operate without any issues. Contact RedEarth if the following information does not solve your problem.

Flat Battery

Field experience has shown that the most common problem is the battery being discharged to the point where the internal BMS in the Troppo-4841 shuts down the battery. Follow the procedure shown at right to restart the battery.

If this is unsuccessful you will need to apply a 48V_{DC} voltage to the terminals of the battery to “jump-start” it. RedEarth can supply a suitable charger, which needs to be plugged into 230VAC.



FLAT BATTERY RESTART

If your battery has shutdown it may be discharged below the internal protection cut-off voltage.

- 1) Turn off all loads.
- 2) Connect charging source (48V_{DC} nominal) e.g. solar, generator, AC charges.
- 3) Switch off OVERCURRENT PROTECTION switch for 5 seconds then switch back on.
- 4) Power should begin flowing into the battery. The light and display should come on. Monitor the battery voltage in the display. It should rise about 50.0V_{DC} before any loads are reconnected.
- 5) If unsuccessful, contact RedEarth on 1800 733 637 or 0487 002 451.

Adding additional batteries:

It is possible to add additional batteries to an existing Troppo-4841 installation at a later date. If you are to add extra capacity the battery must be of the same type, part number, and specification.

Before adding the new battery, the original battery bank and the new battery must be bought up to a similar same voltage (within 0.5 volts as shown on the battery displays). This is achieved by discharging or recharging the existing battery until it is the same voltage as the new battery. The new battery can then be connected to the existing batteries.

Repairable TROPPO-4841:

The Troppo-4841 battery is designed to be repairable, however this is only able to be done by RedEarth or by personnel trained and qualified by RedEarth. This could be a larger partner with technical repair capabilities. Attempting to repair the RedEarth Troppo will void the warranty.

RedEarth has additional information on the website: www.redearth.energy, including instructional videos.

RedEarth Energy Storage Ltd 15 Fienta Place, Darra Brisbane QLD 4076, Australia

Phone: (07) 3279 6707 or 1800 733 637 **Technical Support:** 0487 002 451

Email: info@redearth.energy

Maintenance

The Battery system should be checked regularly as part of your system maintenance cycle, or at least every 6 months. These checks include:

- Check the battery Display to confirm all batteries are operating as expected. Current and odometer readings are similar in each battery (within +/-5%)
- All LED indicators on the batteries are on.
- Check for any obstructions placed around the battery that may reduce ventilation.
- Check for animals, insects or creatures nesting in or around the battery system.
- Check for build-up of any foreign objects in or around the cabinet.
- Check battery connections and cables for secure fitting or cable damage. (eg rats eating the cables)

OPTIONS AVAILABLE FROM REDEARTH

Additional batteries:

One of the key advantages of the modular self-managed Troppo-4841 battery design is that additional batteries can be added to an existing Troppo-4841 installation at a later date. Additional battery modules can be ordered from RedEarth together with the required battery cables. Some parameters of the inverter/charger may need to be adjusted to get the best performance from the new larger battery bank, e.g. increase the charging current setting. RedEarth's own systems that are being monitored by RedEarth can often be remotely updated. Talk to RedEarth's technical support team when you order your extra batteries.

The Vault

RedEarth can supply the system in the following sizes; Indoor rated (IP20):

- 18RU = 7 to 9 Troppo-4841 batteries
(7 if the additional Battery Breaker and Victron BMV shelf is used)
- 22RU = 9 to 11 batteries
- 27 RU = 11 to 13 batteries
- 42 RU = 19-21 batteries – this system normally does not include a built-in battery breaker as usually and external one is used.

Other components:

Busbars, DC cable, MCCB battery breakers and battery connectors are available to qualified installers from RedEarth.

RedEarth can also provide a LiFePO₄ charger for an emergency should a Troppo-4841 wbattery have discharged to the point where it has turned off internally and will not restart.

Call us to see how we can help you.



The Vault

BATTERY CABINET

WARRANTY

RedEarth provides a 10-year repair/replace warranty for the battery.

Refer to RedEarth's warranty document for details.

These five things will void your warranty:

1. Incorrect battery wiring (e.g. connecting with reverse polarity or connecting batteries in series instead of in parallel)
2. Connecting the battery to incompatible equipment (e.g. 12V battery charger).
3. Incorrect inverter and/or charger settings.
4. Disassembling battery.
5. Incorrect battery bank sizing, e.g. too few batteries for the size of the inverter.

RedEarth does not warrant for damage or defects caused by or from the following:

- Incorrect storage or transportation
- Incorrect installation and wiring
- Not installed according to this manual
- Incorrect operation of the battery
- Inappropriate environmental conditions when operating the battery
- Failure to follow safety requirements
- Tampering with the battery
- Unauthorised repairs or modifications to the battery
- External influences such as physical damage, over-charging or electrical damage
- Use outside of warranty terms and conditions



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