Product Manual

Scalable Energy Storage Solutions

Lithium Ferro Phosphate (LFP) Battery Module

Rack mountable Scalable Energy Solutions

48V 2.9kWh & 4.1kWh Smart BMS

Model Number: GZ48-058-2RU-01Z & GZ48-081-2RU-01Z

(With or without optional rack mounting kit)

Contents

1 Introduction

Thank you for purchasing this genZ LFP Battery Module. It has been designed and manufactured to provide many years of trouble-free service.

Please read this manual prior to installing any of the LFP Battery Module models. This product manual covers the following battery module model:

- GZ48-058-2RU-01Z (48Volt DC, 2.9kWh, 58Ah, 2 Rack Unit high)
- GZ48-081-2RU-01Z (48Volt DC, 4.1kWh, 81Ah, 2 Rack Unit high)

This manual provides important information that must be followed during installation, commissioning and maintenance of the Battery Modules. Failure to follow these instructions may lead to damaging the battery module, the system it is being installed into and/or voiding your warranty. There are important safety and handling procedures that must be followed for your own safety and the safety of those around you.

This manual also contains information for customer support and factory service if it is required.

2 General Information

2.1 Life Support Policy

We do not recommend the use of any of our products in 'life support' applications where failure or malfunction of the product can be reasonably expected to cause failure of the life support device or to significantly affect its safety or effectiveness.

2.2 genZ Energy Pty Ltd

3 Safety Guidelines

Weight

These Battery Modules are heavy. Any time the Battery Module has to be handled be sure to use enough personnel, appropriate manual handling techniques, strong supports and suitable lifting equipment.

Risk of Electric Shock

Hazardous voltages maybe present on parts inside this module. Do not attempt to open or disassemble the module. These Battery Modules contain no user serviceable parts.

Stored Energy

These Battery Modules can, especially if they are connected in parallel, produce high currents.

Qualified Service Personnel Only

Repairs and Battery replacement must be performed by qualified service personnel only.

Safety Data Sheet (SDS)

Refer to the SDS that was supplied with this module in case of an accident. Alternatively, the SDS can be found on the genZ web site. www.genz.com.au

4 Specifications

Model	GZ48-058-2RU-01Z	GZ48-081-2RU-01Z
Nominal Voltage (VDC)	51.2	51.2
Nominal Capacity (Ah)	58.5	81
Nominal Capacity (kWh)	2.9	4.1
Nominal Current (A)	≤ 29	≤ 40.5
[1]Maximum Current – Primary Protection (A, Limited by BMS)	60	60
[2]Maximum Current – Secondary Protection (A, Limited by Circuit Breaker)	< 75	< 75
DC Power (W at Nominal Current)	1484.8	2073.6
Min/Cut-off Charge Current (A)	0.5 < cut-off < 1.0	0.5 < cut-off < 1.0
Maximum Charge Current (A)	29	40.5
Charge/Discharge cycles to specified Depth of Discharge (DoD) Capacity retention >80%	10,000 @ 80% DoD 5000 @ 90% DoD (2500@100% DoD and 1C)	10,000 @ 80% DoD 5000 @ 90% DoD (2500@100% DoD and 1C)
Operating Temperature Limits (°C)	Charge 0 to 55 Discharge -20 to 60	Charge 0 to 55 Discharge -20 to 60
Operating Humidity (non-condensing)	85%	85%
IP Rating	IP50	IP50
Battery Case Dimensions (mm)	450±4 D x 420±4 W x 88±2 H	570±4 D x 420±4 W x 88±2 H
Terminal Connection	Genuine Anderson SB50 BLUE	Genuine Anderson SB50 BLUE
Weight (kg)	26.6±0.5	35.7±0.5
BMS Over Voltage Cut Off (V, Approx.)	58.4	58.4
BMS Under Voltage Cut Off (V, Approx.)	40	40
BMS Short Circuit Cut Off (A)	250 ± 30 (20ms Trip)	250 ± 30 (20ms Trip)
[3]BMS Over Temp Cut Off (°C)	65	65
Charge Time Approx.	2 hours at 29 A	2 hours at 40.5 A
Self-Discharge	<14% per annum	<14% per annum
Round Trip Charge/Discharge Efficiency	≥ 96%	≥ 96%
Circuit Breaker Compliance	Double Pole, non-polarised, 60A IEC 60947-2	Double Pole, non-polarised, 60A IEC 60947-2
BMS Communications	ZDC Compatible[4]	ZDC Compatible[4]
UN Type Number (Module chemistry)	UN 3480	UN 3480
Lithium Composition	As Lithium Ferro Phosphate, $LiFePO_4$ or LFP	As Lithium Ferro Phosphate, $LiFePO_4$ or LFP
Decisive Voltage Classification (DVC)	Class A	Class A
Casing /Coating	Steel / Satin surf mist industrial coating	Steel / Satin surf mist industrial coating
Other	Certification: See genz.com.au for details Li Ion IFpR/27/66/[13P16S]E/-10+50/90	Certification: See genz.com.au for details Li Ion IFpR/27/66/[18P16S]E/-10+50/90

[1] The over and under voltage cut-out may vary from that stated due to the BMS protecting the internal cell voltages ahead of overall pack voltage.
[2] This parameter is configurable within the BMS configuration application.
[3] For charge and discharge rates of 0.5C and operating at 25°C.
[4] Communication with the batteries is managed via the genZ Data Controller (ZDC), allowing multiple batteries and banks to be controlled by a single device. Battery data can be accessed through the ZDC's built-in web interface or integrated with custom solutions via Modbus, SNMP, and other standard protocols. The ZDC operates independently of cloud-based services, running software that is fully developed, maintained, and supported by genZ Australia. It can be easily mounted on a DIN rail or directly onto an enclosure.

5 Module Overview

5.1 Battery Management System (BMS)

This battery module is fitted with a fully integrated, sophisticated and highly configurable BMS. The BMS is designed to provide user safety and protect the battery cells.

5.1.1 Safety and protection features

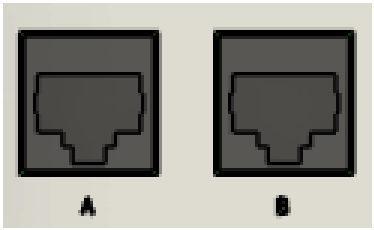
- Over voltage charging protection
- Under voltage discharging protection
- Restrict operation above a maximum temperature
- Restrict operation below a minimum temperature
- Over charge and discharge current protection
- Short circuit protection
    - This is in addition to the protection provided by the circuit breaker.
- Automatic balancing of the cells contained within the battery pack

5.1.2 Additional features

- Communications via the ZDC
- Digital Inputs and Outputs (software controlled)
- Control of the LED that appears as an annulus surrounding the push button on the front panel
- BMS firmware updates via genZ configuration software. Contact genZ for further details regarding the software.

5.2 Front Panel Controls and connectors

5.2.1 Battery Circuit Breaker Aux Contacts COM/NO/NC



RJ45 Connector A and B.
Connection internally to a clean set of auxiliary contacts within the circuit breaker. The connections provide a common (COM) and Normally Open (NO).

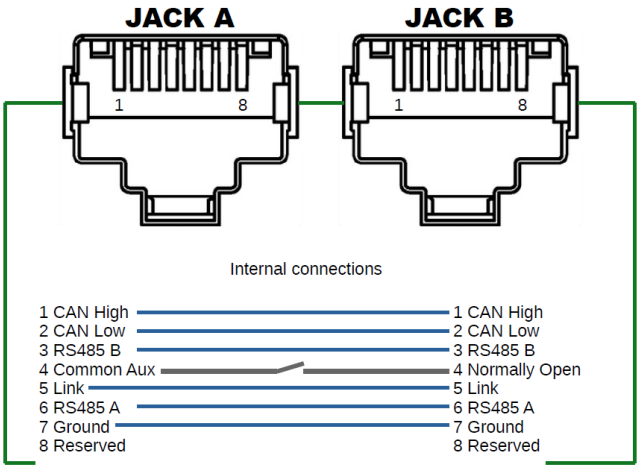
NOTE: That NO is closed when the circuit breaker is in the ON position, and open when in the OFF position.

5.2.2 BMS Communications Interface

RJ45 connector A and B provides the communications interface for the BMS.

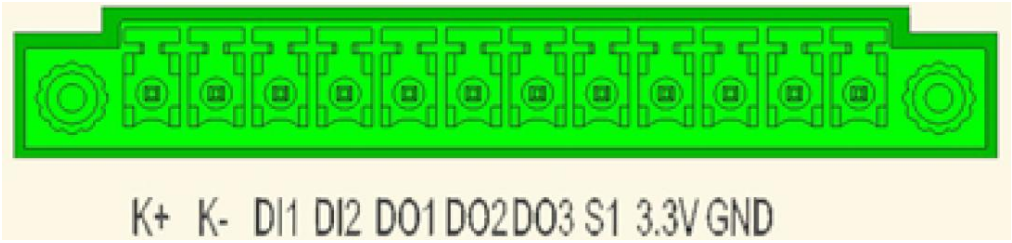
The battery can be communicated with using the genZ Data Controller (ZDC). Please contact genZ for further information on this product.

Note: A 120Ω termination resistor plug will be required at the end of the final battery per rack. The Termination resistor plug can be acquired from genZ.



5.2.3 BMS Digital I/O

WARNING: Prior to using this feature, failing to fully understand the technical and electrical requirements and limitations of these input and output connections may result in permanent damage to the BMS and voiding your warranty.



12 pin pluggable connector that provides access to BMS digital inputs, outputs, 3.3V supply and 'Key' wake. Only 10 of the 12 pins are used, the final 2 pins are not connected.

Note: All digital inputs are hard coded with a digital debounce. For the BMS to recognise any of the input states (high or low) that state will need to be active and stable for at least 5 seconds.

1. **Key+** Placing a short between Key + and Key- will wake the BMS from a deep sleep.
2. **Key-** Placing a short between Key - and Key+ will wake the BMS from a deep sleep.

   Note: The 2 'Key' pins are connected internally to a clean set of Auxiliary contacts mechanically linked to the main circuit breaker. Turning the circuit breaker ON effectively places a short across these pins, waking the BMS. Under normal use, do not use these pins for any other purpose.
3. **DI1** This input will turn the discharge MOSFETS off. The input state can be read via the ZDC.
4. **DI2** This input will reset the BMS board number (communications address) to 1. The input state can be read via the ZDC.

   Note: The Digital Inputs (DI's) are enabled (high/on/1) by applying a 3.3V supply sourced from pin 9 "3.3V"

5. **DO1** When ON indicates that the BMS is awake/active. Open collector, takes signal to digital ground. This pin is INTERNALLY connected to the batteries push button green LED. The state can be read via the ZDC.

6 **DO2** When ON indicates that there is a level 1 alarm from the BMS. Open collector, takes signal to digital ground. The state can be read via the ZDC.

7 **DO3** When ON indicates that there is a level 2 alarm from the BMS. Open collector, takes signal to digital ground. The state can be read via the ZDC.

8 **S1** Taking this pin to the DIGITAL GROUND (Pin 10) will wake the BMS.

<u>WARNING:</u> Do NOT short the 3.3V to any ground or to supply any external component that requires any current greater than 30mA. Failure to observe this may result in BMS failure and void your warranty.

9 **3.3V** This is the digital 3.3V supply from the BMS.

10 **GND** This is the digital ground and should not be confused with the communications ground, the battery negative (for negative earth systems), battery positive (for positive earth systems) or battery chassis ground.

5.2.4 BMS Energised (green LED) and Wake push button

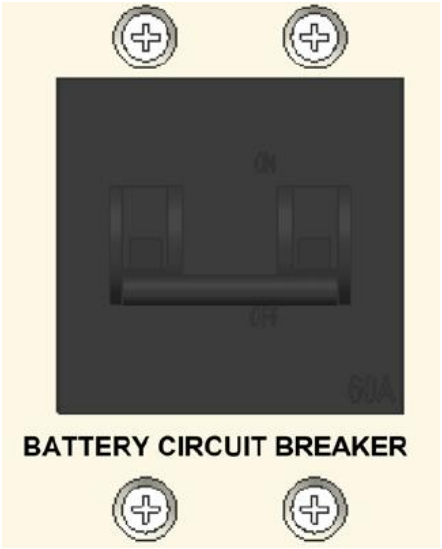
Pressing this button will 'wake' the BMS from its low power state if the BMS has not already been awakened by one of the following:

1 Turning the Battery circuit breaker ON.

2 Communicating with the BMS via the ZDC.

The push button anulus will glow 'green' when the BMS is awake.

5.2.5 Dual Pole 60Amp Circuit Breaker

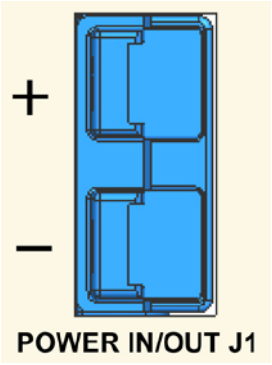


This is the ON/OFF control for the battery module. Turning the "BATTERY CIRCUIT BREAKER" ON (up is ON) will energise the "POWER IN/OUT J1" connector. During an over current event, the "BATTERY CIRCUIT BREAKER" provides a secondary layer of protection. Refer to Appendix B – Circuit Breaker Trip Curve (BS) for characteristics.

Note 1: Should an external short circuit (high current) condition occur, the BMS may operate disconnect the load before the circuit breaker trips.

Note 2: Before connecting the battery, ensure that the circuit breaker is in the down "OFF" position.

5.2.6 DC Power In/Out J1



The “POWER IN/OUT J1” connector is a standard Anderson SB50 (Blue) connector. The upper pin is positive, and the lower pin is negative. The SB50 connector is UL rated to 120Amps.

It should be noted that Andersons are ‘keyed’ and as such, blue Andersons will not connect with a different coloured Anderson.

5.2.7 Chassis Earth (font and rear connection)

This is an earthing point for the chassis of the battery and to be considered as a point for equipotential bonding to other battery modules or the rack/enclosure the battery is installed in.

Note: This earthing point is not connected to the battery positive, negative, signal ground or digital ground. DC power to/from the battery module is floating.

6 Installation

Reference should also be made to the “Installation Guide”. Failure to follow these guidelines will void the limited warranty and cause potential damage to property or serious injury.

6.1 Receiving Information

Once the product is received, it should be visually inspected for damage that may have occurred during shipping. Immediately notify the carrier and place of purchase if any damage is observed. The packing materials that the product was shipped with has been designed to minimize any shipping damage. In the unlikely event that the product needs to be returned to the manufacturer, use the original box and packing material.

6.2 Installation Placement

The Battery Module must be installed such that it is not exposed to:

- Sources of heat or where the ambient temperature is expected to regularly exceed 55°C
- Extreme cold where the ambient temperature is expected to regularly fall below -10°C
- Direct sunlight
- Rain, water, salt laden air or where the humidity is likely to cause condensation
- A corrosive atmosphere
- Reverse polarity

In addition:

- Do not charge the battery if the temperature of the battery is below 0°C.
- Always charge in accordance with the charge profile as described in this manual
- Do not connect these batteries in series
- Do not connect the batteries where the difference in voltage between any parallel connected battery is ≥0.3V
- Select a location, which will provide good air circulation for the Battery Module at all times.
- Route cables so they cannot be walked on or damaged.
- Refer to the specifications for specific operating parameters.

6.3 Installation of Battery Module(s)

Read the “Installation Guide” and associated cautions before installing the Battery Module. Place the Battery Module in the desired location and complete the rest of the installation procedure.

These battery modules can be used in any orientation provided consideration is given to protecting the circuit breaker, connectors and LED/Switch from damage.

6.4 Charger

A charger designed for charging LFP’s is highly recommended. Alternatively, use a charger that has configurable/programmable charging characteristics such that it meets the required profiles as detailed in this manual. If in doubt, please contact the supplier/place of purchase of this battery module for further guidance.

6.5 Installation of a single Battery Module

Consider the following prior to installing:

- Use only genuine Blue Anderson SB50 connectors available from genZ
- Use the matching colour of Anderson SB50 connector. These connectors are keyed and (for example) only a blue Anderson will connect with a blue Anderson.
- The polarity of the connector is observed. + and – symbols are clearly marked on both the connectors and the front panel of the module.
- The correct size of cable to the battery connector is used.
- The batteries will arrive with approximately 66% State of Charge.
  Note: The SoC may be lower or higher than this.

6.6 Parallel Connection

When connecting in parallel, the following considerations also apply:

- As the connection of these modules in parallel can result in high currents and stored energy, the design of such a system should be made by a suitably qualified engineer.
- All battery modules should be charged prior to installation as the modules may have different states/levels of charge. Refer to the “Operation” section of this manual for charging guidelines.
- Do NOT install a fully discharged battery module into a fully charged bank of batteries.
- Do NOT install a fully charged battery module into a fully discharged bank of batteries.
- Do NOT mix these battery modules with other battery chemistry types without prior engineered testing.
- Do NOT mix these battery modules with LFP batteries from other manufacturers or batteries of differing chemistry.
- Be aware of limitations with respect to both CAN and RS485 communications and parallel connections.

6.7 Series Connection

These battery modules are **NOT** designed for connecting in series. Connecting in series will void your warranty as well as potentially creating a hazardous, high voltage situation.

6.8 Rackmount Configuration (optional rack mount kits)

If mounting to a standard 19-inch rack, usage of the genZ mount kit is recommended. There are three versions of rack mount kits available:

- GC3KW-SHLF-KT – Full shelf kit to mount a 3kWh and 4.1kWh genZ 2RU battery module.
- GZUNI-SHLF-KT – Universal split shelf kit suitable for either a 2kWh, 2.9kWh, 3kWh and 4.1kWh genZ 2RU battery module.

Use the included rackmount brackets and screws to mount the Battery Module in a rack by following the steps below.

1. Install the tray/split shelves into the rack using appropriate rack mounting screws (not included).
2. Install the tray/split shelves supporting rails and attach to the racks' rear vertical mounting post using appropriate rack mounting screws and nuts (not included).
3. Using the provided screws, tighten the rail to the tray.
4. Slide the battery module into the tray.
5. Attach the battery module retaining plates using rack mount bolts (not included). Attach the battery module retaining plates to each side of the battery module. Use of split washers may be required where modules are located in areas of movement or vibration.

WARNING: Failure to install the tray supporting rails may result in failure of the battery module tray and/or personal injury.

6.9 Connecting the Battery Module

(QUALIFIED SERVICE PERSONNEL ONLY)

1. Ensure that the battery module circuit breaker is in the OFF (lever down) position.
2. This should also be confirmed by seeing that the green LED is OFF.
3. Attach an earth wire (if required in your design) to the earth point, located just below connector J1. An alternate earth point is also located on the rear of the module.
4. Inspect for any damage to cables or connectors.
5. Connect the Power In/Out J1 connector by firmly pushing the plug straight into the socket.

6.10 Initialization

1. Once battery connection is complete, calibrate the system by fully charging and balancing the batteries as per sections 7.4.2 and 7.4.3.

7 Operation

7.1 To Turn the Battery Module ON or OFF

To turn the battery module on, move the circuit breaker 'up'. This will energise the POWER IN/OUT J1 connector. It will also activate the BMS and associated green LED on the front panel.

To turn the battery module off, move the circuit breaker 'down'. This will de-energise the POWER IN/OUT J1 connector. It will also de-activate the BMS. At this point the green LED on the front panel may also extinguish after a short period of time.

If the green LED does not illuminate when the circuit breaker is in the 'ON' position, go to the trouble shooting section of this manual.

7.2 Waking the Battery Management System (BMS) from low power/sleep

7.2.1 Activate BMS with circuit breaker

If the green LED is off, this indicates that the BMS is in sleep mode. Turning the circuit breaker on will wake the BMS.

7.2.2 Activate the BMS with communications

Communications with the BMS via the ZDC will wake the BMS. If the main circuit breaker is off, then, if communications is disconnected/cease the green LED will turn off after a few seconds.

7.2.3 Activate the BMS font panel push button/LED

Pressing the non-latching push button for at least 3 seconds will wake the BMS. Once the button is released, if there are no communications to the ZDC and the Battery Circuit Breaker is OFF, the BMS will go back into a sleep state after approximately 10 seconds, with the green LED extinguishing completely followed by a less intense 'blink' of the green LED 3 seconds after that. It should be noted that the interval mentioned above may vary depending on BMS activity.

7.3 Power in/out J1

The DC power to the J1 connector is floating. Neither the positive nor the negative is connected to the module's chassis.

When the circuit breaker is in the OFF position, both the positive and negative is isolated from the battery pack inside the module casing (dual pole).

7.4 Charging the Battery Module

These battery modules should only be charged by a charger that is designed to charge LFP chemistry, at the correct voltage, current and charge profile or a charger that can be configured to follow the charge profile.

The charging profile described below is designed to achieve **maximum amount of cycles/life** of the battery module.

7.4.1 Operating temperature (Applicable to all models)

An ambient temperature of 23 to 27 Celsius is the ideal temperature for the operation of the battery. Operating outside of these temperatures will affect cycle life, capacity and possibly the warranty.

7.4.2 Charging current

Commence a charge cycle where the current is limited (Constant Current or CC) at ≤0.5C

- ≤29 Amps (for model GZ48-058-2RU-01Z)
- ≤40.1 Amps (for model GZ48-081-2RU-01Z)

7.4.3 Balance voltage (Applicable to all models)

Charge the battery module at a Constant Current (CC) until the module voltage reaches 57.6±0.2 Volts.

Continue charging at a constant voltage of 57.6±0.2 Volts for a minimum of 30 minutes, up to 120 minutes. This will then allow the cells to 'balance' their terminal voltage.

If the charge current drops to anywhere between 0.5 and 1.0 Amps, the charge current can be terminated.

Alternatively, the charge cycle can be terminated anywhere between 30 to 60 minutes.

At the completion of the above charge profile, the battery can either be stored or placed on a float charge.

It recommended that the batteries are balanced every charge and no longer than 1 week between every charge. This is to ensure accurate state of charge (SoC) predictions and balancing performance.

7.4.4 Float voltage (Applicable to all models)

If the battery module is to be placed on a float charge, maintain a voltage between 54.4 and 55.2 Volts. The lower of the two voltages is preferable for systems on long term float that are not cycled regularly.

For systems (such as uninterruptable power supplies) that will see the batteries on float charge for extended periods of time, the batteries should be cycled (at least to DoD 10%) and then fully charged as a minimum annually. For best performance, 120 days between tests is recommended.

7.5 Discharging the Battery Module

The discharge characteristics described below are to achieve maximum cycle life of the battery module.

7.5.1 Battery module discharge current (≤0.5C)

- ≤28 Amps (for model GZ48-058-2RU-01Z)
- ≤40.1 Amps (for model GZ48-081-2RU-01Z)

It should be noted that these modules can deliver up to 60Amps!

7.5.2 When to charge a discharged module

While the battery module is protected by the BMS to prevent excessive battery module discharge, it is recommended to recharge the battery module as soon as practical following a discharge event. A fully discharged battery should not be allowed to remain in that state for longer than 24 hours. Doing so will reduce the overall life expectancy of the battery module and possibly void your warranty.

7.6 Storage

The battery module should be stored, fully charged in an area that is protected from the elements and at an ideal temperature of 20°C and low humidity. It should be stored in its original packing.

At least annually, the battery should be charged in accordance with “Charging” section of this manual.

If storing a battery for an extended period of time, reference should be made to the “Self-Discharge” characteristics as indicated in the table of specifications.

It should also be noted that, a battery module that has been stored for an extended period of time may exhibit a loss of capacity when it is first placed into service. This ‘loss of capacity’ can normally be corrected by cycling the battery at least three times.

8 Maintenance

Unlike Lead Acid batteries, genZ Lithium Ferro Phosphate (LFP) battery modules are virtually maintenance free. There is no requirement to check fluid levels or salt deposit build up on battery terminals.

It should be noted that it is outside of the scope of this manual to cover the variety of different systems and locations that the battery module(s) may be used in. Users of the battery module(s) should ensure that the overall system installer/designer provides a maintenance guide and suggested maintenance interval.

The following activities are recommended to maximise system longevity and reliability. It should be noted that the recommended frequency for maintenance may need to be reviewed depending on the demands placed on the battery modules or the environment that they are operated in.

8.1 genZ batteries on long term float charge

For systems such as an Uninterruptable Power Supply (UPS) that will see the batteries on float charge for extended periods of time, the batteries should be cycled (at least to a DoD of 10%) and then fully charged annually. This should be considered as an annual routine as a minimum.

If a discharge test is not practical and where available, perform an equalisation charge every 120 days where the maximum charge Voltage (when reached) is maintained for between 60 and 120 minutes.

8.2 Monthly Inspection (suggested, not mandatory)

- If the battery module forms part of a battery system or bank, check the modules to see if:
  - The circuit breakers are in their desired configuration.
  - The state of the green LED on the front panel corresponds to the BMS being active.
  - Ventilation and/or air-conditioning (where fitted to a room or rack) is functioning correctly to maintain the proper temperature of the battery bank. In particular the state of any filters that may become clogged due to air quality.

- Inspect the Battery Module for signs of:
  - Physical damage.
  - Damage to the connecting DC cables or Anderson connectors.
  - Exposure to water, excessive condensation, chemical deposits, dust or other foreign substances that may affect the operation of the battery module(s).
  - Rodent, insect or other animal activity. This type of activity is often best detected by looking for droppings, an unusual odour such as that of urine, gnawed cables and fittings, nests, noises or mounds of sand or other foreign materials.

8.3 Annual Inspection (suggested, not mandatory)

In addition to the monthly inspection:

- If the battery module forms part of a battery system or bank, check the modules to see if:
  - DC cables, busbars (where fitted), fuses (where fitted) and any other components that form part of the overall DC battery circuit are inspected for damage or signs of heat stress.
  - If the battery module(s) are housed in a cabinet, the cabinet should be inspected according to the manufacturer's/installer's instructions. The frequency of the inspection maybe more or less than 6 months.

- If the battery module(s) are being stored (for example as spares), they should be charged according to the "Charging" section of this manual.

9 Trouble shooting

SYMPTOM / FAULT	POSSIBLE CAUSE	POSSIBLE SOLUTION
NO OUTPUT VOLTAGE AT IN/OUT J1 POWER CONNECTOR	CIRCUIT BREAKER TURNED OFF/TRIPPED	TURN ON THE CIRCUIT BREAKER
	BMS UNDER VOLTAGE, IN PROTECTION MODE, OUTPUT OFF	RECHARGE THE BATTERY AND RECHECK FOR CORRECT OUTPUT VOLTAGE
	BMS OVERCURRENT, IN PROTECTION MODE, OUTPUT OFF	CHECK FOR SHORT CIRCUITS OR EXCESSIVE CURRENT DRAW
	BMS OVER VOLTAGE, IN PROTECTION MODE, OUTPUT OFF	CHECK FOR CHARGING CIRCUIT SUPPLYING EXCESSIVE CHARGE VOLTAGE
	BMS OVER TEMPERATURE, IN PROTECTION MODE, OUTPUT OFF	CHECK AND INVESTIGATE REASON FOR HIGH TEMPERATURE
	OTHER	RETURN TO GENZ FOR SERVICE
GREEN LED NOT ILLUMINATING WHEN CIRCUIT BREAKER ON	BMS UNDER VOLTAGE, IN PROTECTION MODE, OUTPUT OFF	RECHARGE THE BATTERY AND RECHECK FOR CORRECT OUTPUT VOLTAGE
	BMS OVERCURRENT, IN PROTECTION MODE, OUTPUT OFF	CHECK FOR SHORT CIRCUITS OR EXCESSIVE CURRENT DRAW
	BMS OVER VOLTAGE, IN PROTECTION MODE, OUTPUT OFF	CHECK FOR CHARGING CIRCUIT SUPPLYING EXCESSIVE CHARGE VOLTAGE
	BMS OVER TEMPERATURE, IN PROTECTION MODE, OUTPUT OFF	CHECK AND INVESTIGATE REASON FOR HIGH TEMPERATURE
	BATTERY VOLTAGE TOO LOW	RECHARGE THE BATTERY MODULE
	BMS HAS FAILED TO WAKE	PRESS ENERGISE PUSH BUTTON
	OTHER	RETURN TO GENZ FOR SERVICE

SYMPTOM / FAULT	POSSIBLE CAUSE	POSSIBLE SOLUTION
CIRCUIT BREAKER TRIPS	EXCESSIVE DISCHARGE CURRENT	USING A CLAMP METER, CHECK THAT THE CURRENT BEING DRAWN FROM THE BATTERY MODULE IS LESS THAN 60AMPS. REFER TO INFORMATION/WARNING REGARDING STATE OF CHARGE
	EXCESSIVE CHARGE CURRENT	USING A CLAMP METER, CHECK THAT THE CURRENT BEING SUPPLIED TO THE BATTERY MODULE IS LESS THAN 60AMPS. REFER TO INFORMATION/WARNING REGARDING STATE OF CHARGE
	OTHER	RETURN TO GENZ FOR SERVICE
BATTERY MODULE FAILING TO CHARGE OR HOLD CHARGE	INSUFFICENT CHARGE VOLTAGE/CURRENT	CHECK FOR FAULTY CHARGER, POOR CABLING OR LOOSE CONNECTORS
	SOLAR OR OTHER CHARGER NOT CONFIGURED CORRECTLY	REFER TO THE MANUFACTURER OR THE SOLAR OR MAINS CHARGER
	BATTERY CHARGER MIGHT BE FAILING TO START A CHARGE CYCLE. THIS MAY OCCUR WITH SOME SMART CHARGERS THAT REQUIRE SEEING AT LEAST SOME VOLTAGE FROM A BATTERY	CHECK WITH CHARGER MANUFACTURER OR SUBSTITUTE THE CHARGER FOR A DIFFERENT TYPE OR USE A DC POWER SUPPLY SET TO THE CORRECT CHARGE VOLTAGE AND CURRENT
	OTHER	RETURN TO GENZ FOR SERVICE
BATTERY MODULE FAILING TO COMMUNICATE	INSUFFICENT CHARGE VOLTAGE/CURRENT	CHECK FOR FAULTY CHARGER, POOR CABLING OR LOOSE CONNECTORS
	CIRCUIT BREAKER TURNED OFF/TRIPPED	TURN ON THE CIRCUIT BREAKER
	INTERFACE/COMMS PARAMETERS NOT SET PER APPENDIX E	REFER APPENDIX E
	POOR COMMUNICATIONS	CHECK TERMINATION RESISTOR INSTALLED CORRECTLY. CHECK SUITABLE SHIELDED TWISTED PAIR CABLE IS USED
	OTHER	RETURN TO GENZ FOR SERVICE

10 Warranty & Service Information

10.1 General Information

Refer to the genZ website at www.genz.com.au for full details of the warranty on this product.

To ensure that you are covered by our warranty, the purchaser shall follow the below requirements:

- The battery module(s) have been purchased from genZ Energy, an authorised distributor, dealer or reseller
- Overall system design shall be by a suitably qualified professional
- Installation and commissioning by a licenced, accredited (for example, through the Clean Energy Council) installer
- Installation in accordance with the genZ installation manual and this product manual
- Overall system is maintained in accordance with instructions and manuals associated with not only the battery module(s), but, any chargers, inverters or any other equipment used in the overall system
- The overall system has been configured such that charging and discharging requirements (as detailed in this manual) are met
- The person or persons installing these battery module(s) has provided all necessary information concerning the operation and maintenance of the battery module(s) and associated system to the end user.

It is important that you maintain a record of your purchase details relating to the battery. Including, the model number, serial number of the battery module(s), place of purchase and/or who installed it.

Before calling for service, verify that the charger and load are operating correctly. Refer to the "Troubleshooting" section of this manual.

If you believe that the battery module is not delivering its rated capacity (refer to Section 4, Specifications) the battery module may be considered faulty deliver less than 70% of its rated capacity during the warranty period.

Note: Some chargers/inverters display the capacity of a battery module or the battery system. These calculated values can be inaccurate and therefore should not be relied on.

To determine the battery capacity, the below process should be conducted by a suitably qualified professional:

- Fully discharge the battery at 0.2C until the low voltage cut-off is reached
- Fully charge the battery at the recommended voltage and 0.2C rate for 24 consecutive hours
- Fully discharge the battery at a constant 0.2C until the low voltage cut-off is reached. Perform this at an ambient temperature between 23°C and 27°C. Record the number of hours it takes to reach low voltage cut-off point.
- Fully charge the battery at the recommended voltage and 0.2C rate for 24 consecutive hours
- The test is now complete

The percentage of rated capacity can now be calculated as:

$$Percentage\ of\ rated\ capacity(\%) = \frac{100\ \times 0.2\ \times C\ \times hours\ to\ discharge}{C}$$

Where:

$$C\ \ = \ Rated\ Capacity\ (Amp\ Hours)$$

Example:
48V 4.1kWh battery module has a nominal capacity of 81Ah
0.2C equates to a constant current load of 16.2 Amps
The battery is discharged at a constant 16.2 Amps until it reaches cut-off, which, for an 80% remaining capacity would take 4 hours.
So:

$$80\% = \frac{100\ \times 0.2\ \times 81\ \times 4}{81}$$

10.2 Warranty or Service

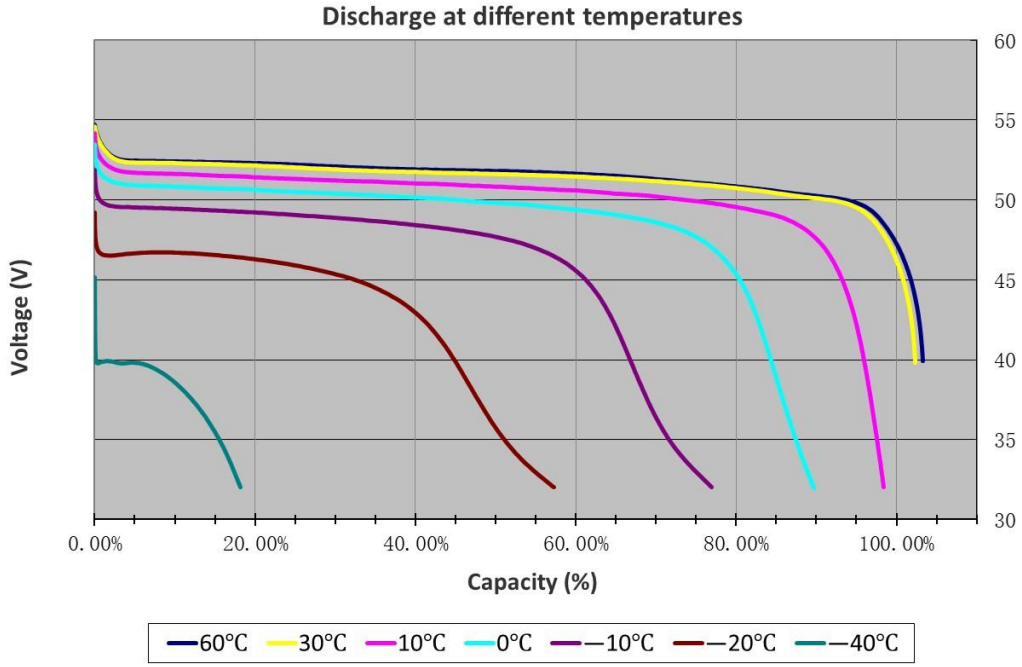
Should you believe that your battery has a fault covered under warranty, contact the place of purchase or dealer/distributor first. If you cannot reach your dealer, or if they cannot resolve the fault, please visit the genZ web site at www.genz.com.au for contact details for support.

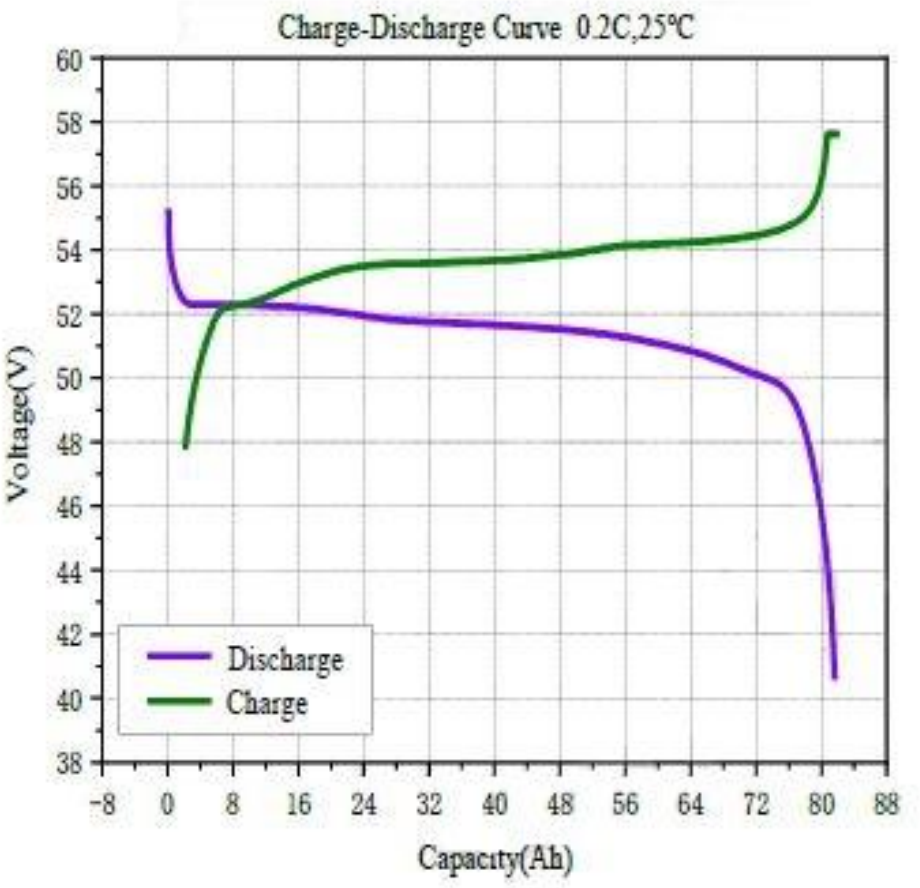
Please ensure that you have the following information available:

a) Where and when the unit was purchased.
b) The model number.
c) Serial number of your module.
d) Information on the nature of the failure.

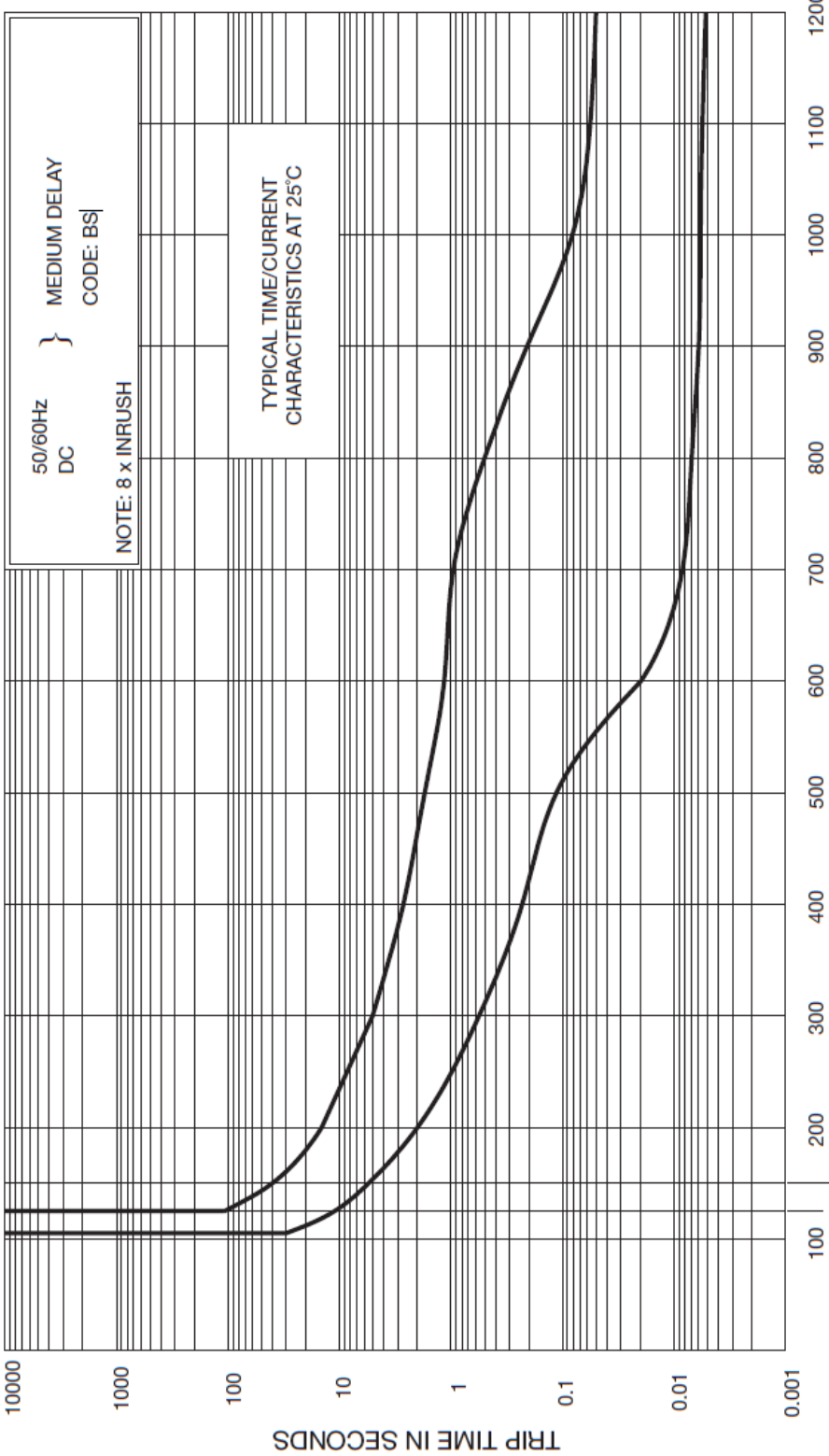
https://www.genz.com.au

11 Appendix A – Discharge and Capacity Curves





12 Appendix B – Circuit Breaker Trip Curve (BS)



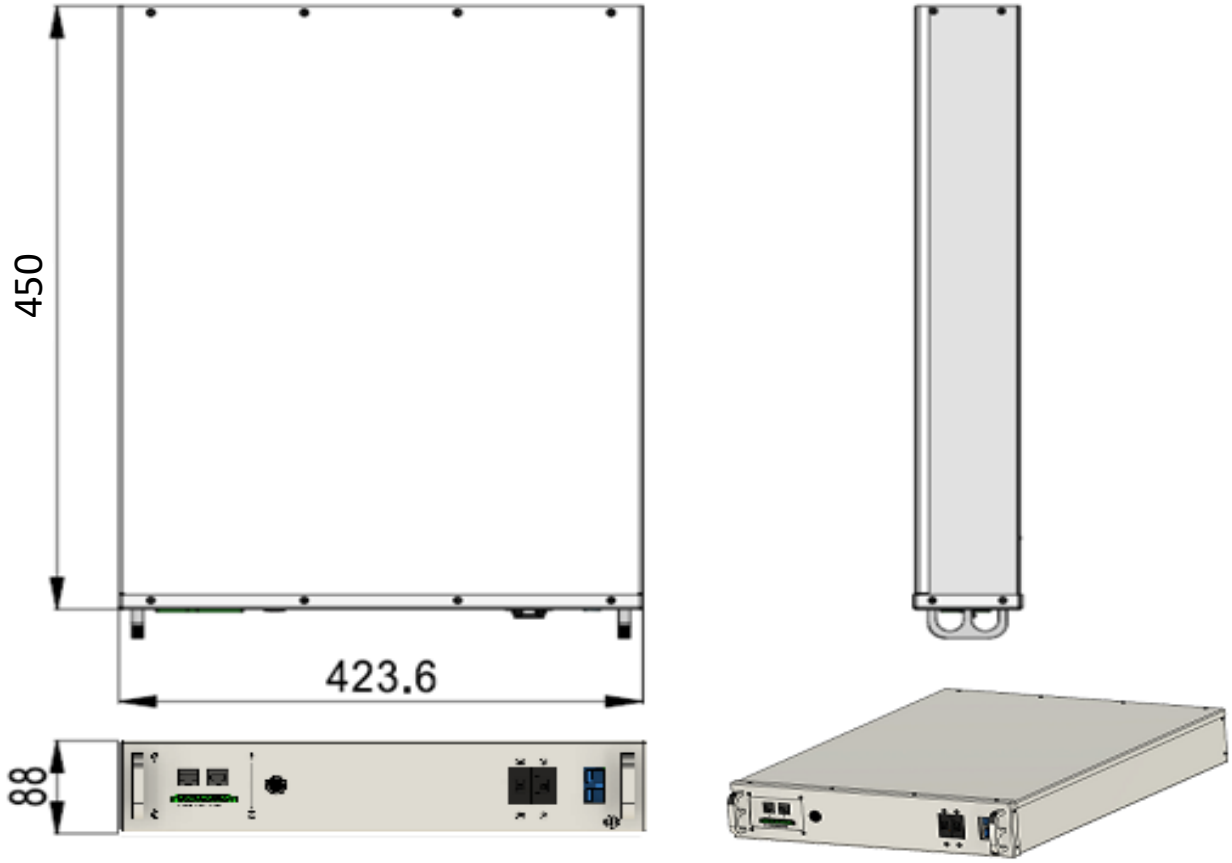
PERCENTAGE OF RATED CURRENT	100%	125%	150%	200%	300%	400%	500%	600%	700%	800%	900%	1000%	1100%	1200%
MINIMUM TRIP TIME IN SECONDS	NO TRIP	12	5.5	2	0.55	0.21	0.12	0.02	0.0085	0.007	0.006	0.006	0.0055	0.005
MAXIMUM TRIP TIME IN SECONDS	NO TRIP	100	40	14	5	2.8	1.8	1.2	0.98	0.5	0.2	0.08	0.058	0.05

13 Appendix C – Warranted Operating Parameters

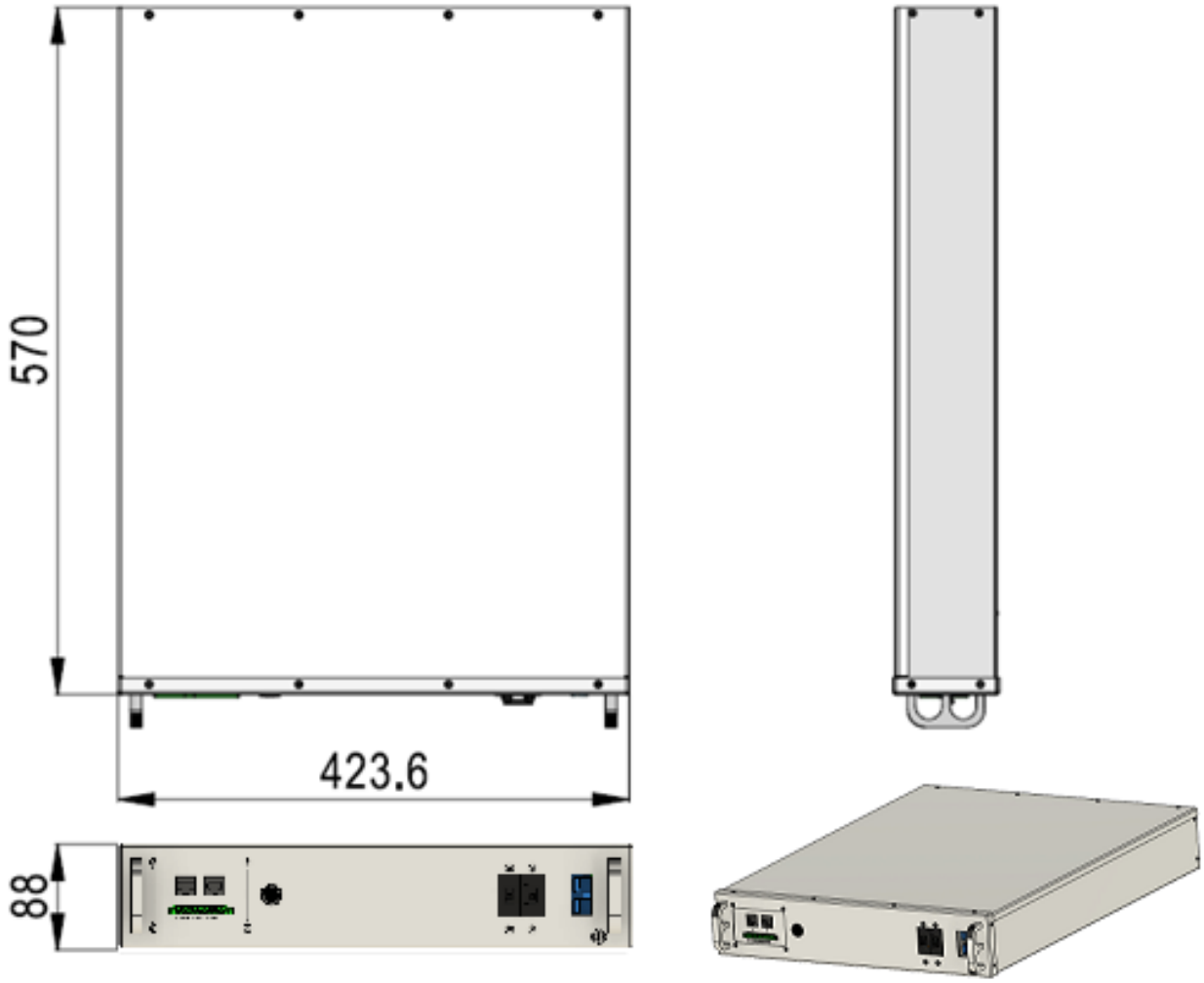
Please refer to genZ website for warranty information

14 Appendix D – Drawing and Dimensions

14.1 GZ48-058-2RU-01Z



14.2 GZ48-081-2RU-01Z



15 Notes

Serial Number:
Model Number:
Place of Purchase:
Date of Purchase:
Owner:

genZ Energy Pty Ltd

Western Australia

Email: info@genz.com.au
Web: www.genz.com.au