VAULTA BATTERY INSTALLATION MANUAL

Vaulta Operations Pty Ltd / ABN 18 652 703 538

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1.0 INTRODUCTION

Vaulta is a Brisbane-based company, founded in 2020, that is pioneering advanced battery casing technology. Vaulta's innovative no-weld design simplifies assembly, promotes recycling, and allows for seamless adaptation to emerging technologies in battery packs.

Vaulta batteries are compatible with a wide range of inverter and charger combinations, including UPS, rectifiers, DC or AC-coupled charging devices, and can be used in both on-grid and off-grid applications across single, dual, or three-phase systems.

This manual is intended to guide and assist licensed, experienced, and certified technicians/installers with the installation and usage of Vaulta batteries. It outlines essential procedures and information for the installation of Vaulta battery units and cabinets.

It is important to note that this manual is solely for use by qualified professionals. Installers should be familiar with best practices and local electrical codes to ensure compliance with all relevant regulations.

For instructions on troubleshooting, repairing, or maintaining the battery unit or cabinet, please refer to the appended FAQ file. Additionally, Vaulta's website offers web-based reporting and troubleshooting tools for issues encountered during installation and operation. Visit the Vaulta website at https://www.vaulta.com.au/ and navigate to the Support menu to report issues.

Please note, that any troubleshooting information provided pertains solely to the Vaulta battery unit and does not apply to other equipment, such as inverters.

FEATURES AND APPLICATIONS

- Vaulta battery units are ideal for rack-mounted stationary storage deployments in controlled environments. These units can be a cleaner power source in locations prone to regular brownouts or a backup power solution for sensitive equipment such as data centres or telecom infrastructure. The Vaulta battery system is also suitable for off-grid applications, including power generated by solar, wind, or other renewable sources.
- Vaulta's advanced battery management system, combined with lithium iron phosphate cells, ensures the product can endure the specified charge/discharge cycles over its ten-year lifespan. For optimal charge and discharge rates, please refer to the "Technical Specifications" in **Section 3** of this document.

2.0 SAFETY NOTICES

The VAULTA Battery is a low voltage, high amperage DC battery system that must only be installed by skilled and qualified electrical trades personnel. Installers should have a thorough understanding of correct cable specifications, DC bus arrangements, external circuit protection, and polarity checking. It is the installer's responsibility to ensure compliance with all applicable local, national, and international standards, as well as any other relevant regulations.
Before working on or with the battery system, it is essential to carefully read, understand, and adhere to all safety instructions. For detailed safety information, refer to the Safety Data Sheet (SDS).

INCORRECT OPERATION OR WORK MAY CAUSE

- Injury or death to the operator or a third party
- Damage to the system hardware and other properties belonging to the operator or a third party

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

2.1 BASIC SAFETY

The following precautions should be observed when working with battery packs and cabinets. Battery terminals are always live, do not place electrically conductive items or tools on top or in front of the battery at any time. (where possible keep each terminal covered with its transportation cover). While working with batteries always maintain correct PPE of protective eyewear and clothing.

Cabinets:

- It is intended to be at least a "**2 person**" lift when moving or installing,
- Should not be exposed to pressure, or have objects placed on top of them,
- Be positioned away from any potential water hazard,
- Must have visibly displayed notice regarding weight and OH&S lifting requirements,
- After installation of batteries, warning and safety notices regarding the inside batteries must be tagged.

The cabinets **should not** be:

- Installed in direct sunlight, rain or saline environments.
- Exposed to strong impacts of any type.
- Subject to any battery connectors touching conductive surfaces unless intended to do so.

Batteries modules & packs:

- Must always be kept dry and dust-free.
- Are heavy and are intended to be at least a "**2 person**" lift when moving or installing,
- Must be kept away from children, insects or animals.

The Battery modules within a cabinet **should not be**

- Exposed to temperatures above or below the temperature ratings specified within this manual.
- Touched if wet.
- Installed in direct sunlight.
- Exposed to strong impacts.
- Crushed or punctured.
- Maintained or serviced with the power ON.
- Left unlocked at any time except when any maintenance is required.

- Disassembled as there are no serviceable components.

Keep the Path Clear	Wear Appropriate PPE	Use Proper Lifting Tools
		

2.2 TRANSPORTATION

Vaulta cabinets are large and heavy and, in most cases, will be shipped in the original manufacturer's packaging and securely fastened to a pallet.

The batteries are safe for road transport and are shipped in a partially discharged state (approximately 30%) with terminal protection covers and circuit breakers turned off.

Care should be taken to ensure that no damage occurs from fasteners during transport.

All cartons and crates used to transport batteries must prominently display all necessary warning labels. Never lift a battery by its terminals or cables.

All Vaulta cabinets are designed to be transported without batteries installed and without heavy PCE (Power Conversion Equipment).

2.3 MISSING PARTS CLAIMS

Any freight damage or missing parts must be reported to Vaulta to initiate a parts claim. Upon unpacking the product, carefully verify that all components are included by referring to the complete parts list at the end of this manual. If any shortages are discovered, please contact Vaulta immediately with a list of the missing parts. All parts claims must be submitted within ten (10) days of delivery.

2.4 LOCATION OF BATTERIES AND CABINET

The battery and cabinets should be:

- Located horizontally and not stacked upon one another.
- Kept in a dry, dust-free environment, away from moisture. A humidity control setup such as an Anti-Condensation system may be required inside the enclosure, with controlled airflow to expel moist air, unless the battery system is installed in a moisture and climate-controlled room.
- Kept away from incompatible substances.
- Stored within a temperature range of 0°C to 45°C, with 25°C being ideal for long-term storage.
- The battery should not be installed where direct contact with dust and smoke may be possible. If unavoidable, appropriate air filtration must be used to prevent dust and smoke from contacting the battery, and the battery installation should be indoors or in an IP66 or greater enclosure.
- There are no explosive or flammable materials nearby.
- Operation of charge and discharge outside of the ideal temperature should be limited to the range specified in the technical specification.
- The area and/or enclosure is vermin-proof to suit your environmental locations.

- The batteries and battery cabinets/housings are not exposed to direct sunlight.
- The batteries should only be installed in the designated position. Never install the pack at an angle (**Fig 1**).

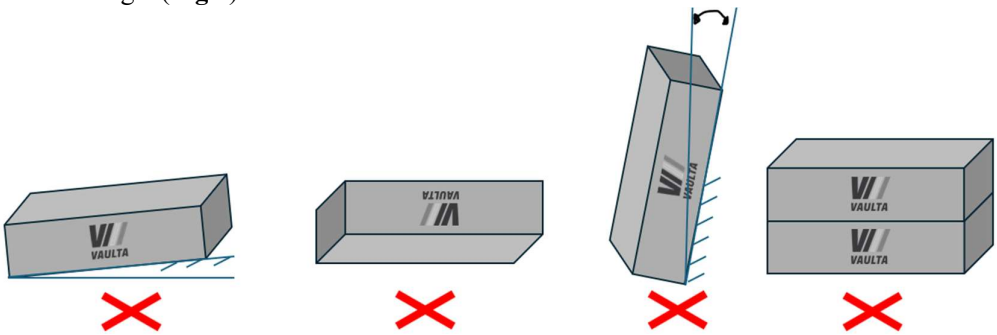


Fig 1. Prohibited positions

2.5 DAMAGED CABINET

A damaged cabinet that impedes or restricts the installation or positioning of the batteries should not be used. It should be returned to Vaulta or disposed of via an approved recycling facility, following approval from Vaulta.

2.6 DAMAGED BATTERY

Do not use the battery if you notice any of the following signs:

- Pungent odours
- Overheating
- Significant colour-change or blistering of the casing
- Swelling or change in shape
- Unusual noises such as crackling or hissing while moving

In these cases, the battery should be safely handled and reported to Vaulta immediately.

2.7 GENERAL FIRST AID

General first aid procedures for handling batteries are outlined in **Table 1**. For additional information, refer to the SDS document for the battery pack.

Table 1. First aid instructions for exposure to hazardous substances of the battery pack

Eye Contact	Rinse gently with running water and seek medical attention if irritation develops
Skin Contact	Rinse gently with running water and seek medical attention if irritation develops
Ingestion	If ingested, do not induce vomiting and contact your local poisons information centre or doctor
Inhalation	Evacuate the area and seek professional medical attention immediately

2.8 FIRE

If a battery pack catches fire or begins emitting smoke:

- Attempt (without risking injury to yourself or others) to turn off the battery power switch.
- If the battery is on fire, only use a Type D foam or CO_2 fire extinguisher and lightly douse the battery. Do not use water or ice.
- Evacuate the area immediately and call emergency services and contact the fire warden.

If the battery is emitting smoke but not on fire, quickly ventilate the area to reduce the risk of the fire starting or spreading. Toxic gases may be released if the battery ignites.

2.9 LIFE SUPPORT APPLICATIONS

Vaulta batteries **should not** be used in life support applications where failure of the batteries can reasonably be expected to cause failure of the life support equipment or effect operation of such equipment.

2.10 QUALIFIED PERSON (INSTALLER)

This operation manual details and lists the tasks required for battery and cabinet installation which must be performed by a licensed, qualified and skilled trades person. The installer needs to be a person with adequate skills, qualifications and experience.

They **should**:

- Have a thorough understanding of operations, design and installation principles of battery energy storage systems.
- Have a thorough understanding of all dangers and risks associated with installing and using electrical devices.
- Hold all local, state and country base qualifications to carry out such work.
- Adhere to all safety and installations requirements within this manual.

2.11 SYMBOLS USED

	Danger	**Lethal voltage!** Lethal electricity incident is when the battery is short circuited, or one element of the pack is arching. Only a qualified person can perform the wiring of the battery packs and integrated devices like inverter (AS/NZS 3000). Batteries deliver electric power, resulting in burns or a fire hazard when they are short circuited, or wrongly installed. **Danger:** ● Severe injuries or death may occur if touch the short-circuited elements or arched zones.
	**Warning**	**Risk of battery system damage or personal injury** ● DO NOT pull out the connectors while the system is operating! ● De-energize from all multiple power sources and verify that there is no voltage. ● DO NOT open or deform the battery module, otherwise the product will be out of warranty scope. **Warning:** ● Whenever working on the battery, wear suitable personal protective equipment (PPE) such as rubber gloves, work shoes and safety glasses.
	**Caution**	**Risk of battery system failure or life cycle reduction** **Caution:** ● Improper settings or maintenance can permanently damage the battery. ● Incorrect inverter parameters will lead to a further faulty/damage to battery.
		**Read the product manual before operating the battery system!**

3.0 TECHNICAL SPECIFICATIONS

Table 2. Vaulta battery types and specifications

	4U	6U	Vertical Battery	Heavy Duty Battery
Capacity (kWh)	5.12	14.36	5.12	14.36
Capacity (Ah)	100	280	100	280
Nominal Voltage	48 V (51.2)	48 V (51.2)	48 V (51.2)	48 V (51.2)
Chemistry	LiFePO4	LiFePO4	LiFePO4	LiFePO4
Charge / Discharge Current (A)	50A/50A (0.5C)	70A/70A (0.25C) Recommended	50A/50A (0.5C) Recommended	70A/70A (0.25C) Recommended
Max continuous charge/discharge current	50A/50A (0.5C)	140A/140A (0.5C)	80A/80A (0.8C)	140A/140A (0.5C)
Configuration	16S1P	16S1P	16S1P	16S1P
Communication	CAN Bus	CAN Bus	CAN Bus	CAN Bus
Communication port	Two RJ45 ports	Two RJ45 ports	Two RJ45 ports	Two RJ45 ports
BMS balancing	Passive ≈ 600mA	Passive ≈ 600mA	Passive ≈ 600mA	Passive ≈ 600mA
Working temperature (°C) - charge	0 to 55	0 to 55	0 to 55	0 to 55
Working temperature (°C) - discharge	-20 to 55	-20 to 55	-20 to 55	-20 to 55
Weight (kg)	45	95	42	100
Dimension	176mm×482mm× 479mm	267mm×482mm× 720mm	141mm×353mm× 462mm	Slightly bigger than 6U
Power terminals	Surlok plugs	Surlok plugs	M8 ring terminal	Surlok plugs
Orientation	Horizontal (rack mounted)	Horizontal (rack mounted)	Horizontal and Vertical	Horizontal (rack mounted)
Shelf temperature (°C)	25 recommended			
Calendar life	10 years @ 25°C			
Cycle life	4000 cycles @ 35°C, 80% DOD, 0.5C/0.5C (compression) 3000 cycles @ 35°C, 100% DOD, 0.5C/0.5C (compression)			

*** **Table 2** lists **various** models of battery packs manufactured and supplied by Vaulta. The primary product is the 6U 14.36kWh 280Ah battery pack. Vaulta has also produced several other models with different capacities. If these additional models are installed, their specific manuals will be appended to this document.

4.0 VAULTA LIMITATION OF LIBILITY and WARRANTY

4.1 LIMITATION OF LIBILITY

The **manufacturer and Vaulta** are not and will not be held responsible for any liability for loss, damages of any kind expressed or implied, injury, and or damage to you or your property or otherwise caused by improper installation, use of this product or neglect on your or the operators' actions.

4.2 PRODUCT WARRANTY

Vaulta warranty applies to the following products manufactured and produced by Vaulta:

- **Stationary Storage range**:
  - Vaulta's 19in LFP Battery Pack BESS (**48V - 14.36kWh**)
  - Vaulta's LFP Battery Pack BESS (**48V - 5.12kWh**)

4.2.1 LIMITED PRODUCT WARRANTY

- Vaulta warrants that the Product shall be free from defects in workmanship and materials for a period of ten (10) years from the Delivery Date.
- The warranty in this clause does not cover any cosmetic damage to exterior parts, nor to corrosion due to any cause nor to any damage to painted surfaces.

4.2.2 WARRANTY CLAIMS

All warranty claims should be addressed to

Contact email - accounts@vaulta.com.au

Head Office
53 Holland Street, Northgate, QLD 4013,
Australia

5.0 WHAT'S IN THE PACKAGE

Each Vaulta battery installation is supplied with all the cabling required for installation. Depending on the battery installation, the accessories may differ. Check the shipping notice/bill for the accompanying accessories. Examples of the contents are as follows:

- Pack Controller Unit (PCU)
- Vaulta reinforced brackets (if a cabinet is provided)
- Cabinet
- Inverter (if applicable)
- Cable kit
- Victron Busbar

5.1 THE CABINET

Vaulta supplies the batteries with a variety of cabinet types (**Fig 2**). These cabinets are typically pre-wired at Vaulta to ensure an easy installation process.

Fig 2. Vaulta batteries are positioned in different types of cabinets

Fig 3 shows a typical cabinet that is prewired at Vaulta. The cabinet is a 19' rack-mounted, powder-coated galvanised steel cabinet with key lockable front and back doors. The front door is a single door that contains a glass viewing panel. The back door is split into two side-by-side perforated steel mesh doors.

Each cabinet has been pre-installed with additional bracing (depending on the number of battery packs to be installed) to support the batteries that are to be installed.

Fig 3. A typical prewired cabinet

All safety warnings and notices are affixed to the front and side of the cabinet to advise of all potential dangers and electrical shock hazards.

5.2 THE BATTERY PACK/s

Each Vaulta battery pack contains 16 individual lithium-ion cells in a 16S1P configuration, which is defined as 16 connected in series and 1 in parallel to the two load terminals located at the front of the battery pack.

5.3 BATTERY MESSURMENTS

Fig 4 illustrates the dimensions of the 6U battery pack. It has no user-accessible features from the top, sides, or back, however, the grill pane on the rear of the shroud cover should not be obstructed as they are necessary for the ventilation of the unit. The dimensions for the "vertical battery" packs are represented in **Fig 5**.

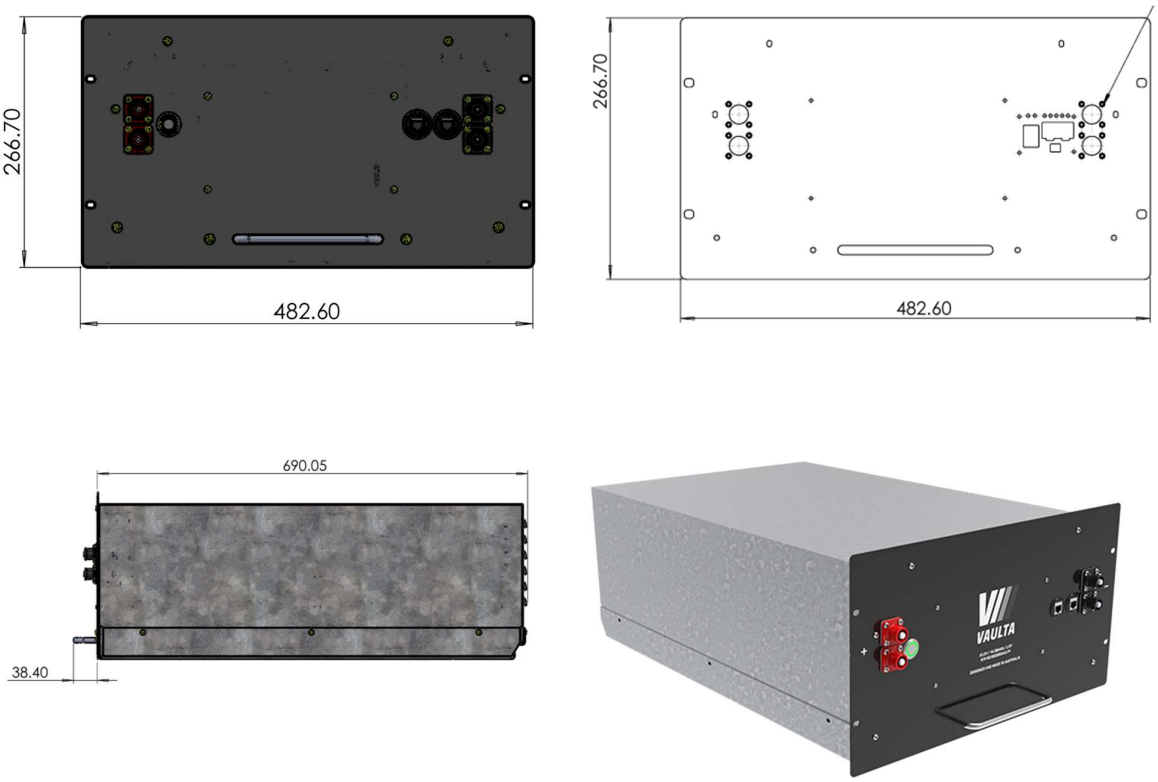


***Fig 4**. 6U 14.36kWh battery pack*

The above 14.36kWh 6U battery pack is also available in a ruggedized, heavy-duty structure for special applications where the battery is subjected to mobile handling or vibration loads.

Vaulta offers 5kWh battery packs which were manufactured in the 4U configuration until 2023. While 4U is not continued, the new design is a vertically mounted battery as shown in **Fig 5**.

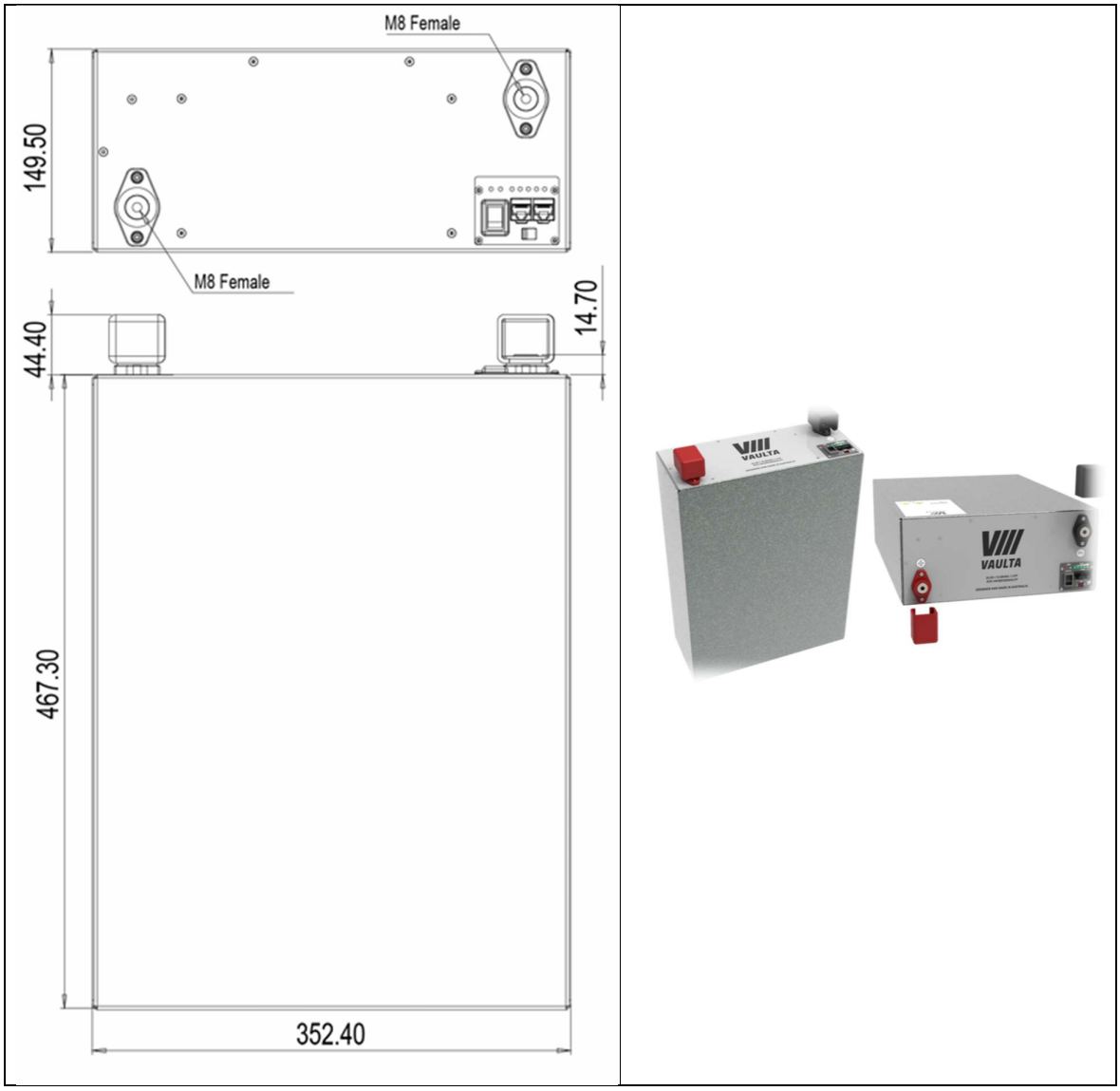


Fig 5. Vaulta vertical mounted battery, 5kWh, 100Ah

6.0 PRE-INSTALLATION – INSTALLING BATTERIES INTO RACK CABINET

6.1 POSITION THE CABINET

The installation site must be suitable for the size and weight of the units being installed. A fully equipped cabinet may exceed 700kg, so adequate care must be taken to ensure that the site is suitable. The cabinet rack should be installed a on level, solid surface, concrete, brick, or similar. It is recommended that the cabinet also be braced back to a wall for support and safety.

To begin the installation, wheel the cabinet rack into its position keeping in mind the distance from the inverter. (keep as close as possible) Be sure the position does not expose the cabinet to any direct sunlight, dust or any potential moisture and has sufficient room in front and behind to not impede the doors or airflow.

If there are multiple cabinets to be installed, there must be adequate space between cabinets to

maintain proper ventilation as detailed in **Table 3**.

Table 3. Safe distances between multiple cabinets

Direction	Minimum Distance	Suggested Distance
Front	800mm	1000mm
Rear	50mm	250mm
Top	300mm	900mm
Sides	250mm	600mm
Between Cabinets	200mm	350mm

❖ **Note:** Cabinets have AC fans installed for cooling. Fans are not compulsory for cooling unless your installation requires, an ambient temperature-controlled switch (thermostat)

6.2 PREPARATION

As required by local regulations (AS/NZ 5139:2019), sufficient breakers and/or fuses may be required and should be obtained before the installation of the batteries.

Confirm that the cabinet is positioned in the final place before installing the batteries.

It is recommend assembling and installing all equipment before connecting any electrical components. When installing batteries into cabinet racks, start at the bottom and work your way up so the cabinet remains stable with the weight being distributed evenly.

6.3 TO INSTALL A BATTERY UNIT:

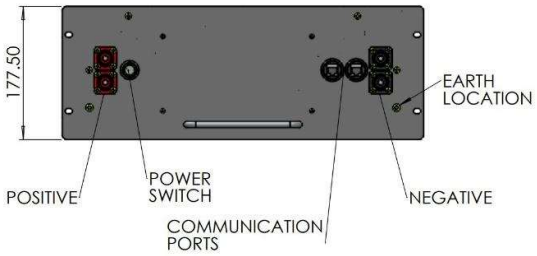
- Open both the front and back doors of the cabinet rack
- Starting at the bottom of the cabinet, working from the front side, insert the battery pack by sliding it carefully along the pre-installed plate insert until the front panel meets the inside rack rail. Noted by the fact that the battery can go no further. (Using a trolly lift like shown in the images will make inserting the batteries much easier and safer)

- Locate the two [2] holes on each side of the battery front panel which should marry up to the cage nuts on the inside rack rail.
- Using the bolts provided place and tighten each bolt to the corresponding nut. There are four (4) bolts in total.
- If more than one battery is to be installed repeat this process until all batteries are installed.
- Secure the locking feet then wind down the adjustable support legs until firm against the ground, transferring the cabinet weight from the castor wheels, ensuring the cabinet is level.

❖ **Note:** The castor wheels are not designed to take the weight of the cabinet and batteries. The adjustable support legs supplied must be used. Failure to use the support legs may cause the caster wheels to fail and cause physical harm or damage to the battery storage system.

More photos:

6.4 CONNECT THE CABLES TO BATTERIES



Once all mechanical connections are assembled, and the batteries are fixed in place within the rack, the electrical connections can be made. Each 6U Vaulta battery unit has two **200 amp rated R4 radial socket** (RADSOK) connectors on the positive terminal, and two more on the negative terminal. To connect to the positive and negative terminals, we recommend using **Surlok plugs** manufactured by Amphenol. (variants of this plug can be requested depending on colour, straight or angled connection, and sealing type if required for the installation).

Each plug should contain a minimum of 50 mm^2 connections as smaller connectors and cables may not be able to safely carry the 200-amp supply that the battery is capable of.

- **Note**: The position of the power switch and terminals may vary in vertically mounted battery packs and could differ across other battery pack models.
- **Note:** When paralleling multiple cabinets, battery cables from each cabinet must be the same length and cable size. This safeguards that the **impedance** of all battery packs plus their connecting cables remain at the same level to prevent deviated current sharing among the packs.
- **Note:** The correct way of connecting multiple batteries in parallel is to ensure that the total path of the current in and out of each battery is equal.

6.5 INTEGRATION OF BATTERIES WITH INVERTERS

Vaulta certifies the following 48V inverters that are integrated with the battery packs and communicate via CAN:

Victron	Deye and NOARK	SMA*
victron energy BLUE POWER	 Deye	

- **Note**: Vaulta does not guarantee compatibility with any non-certified inverters and does not provide warranty coverage for damage caused by faulty or incompatible inverters. Please refer to the specific inverter installation manual for details on inverter installation and battery interconnect requirements.
- **Note**: For other communication protocols, such as Modbus, or non-listed inverters, please consult the Vaulta technical team.
- **Note**: Vaulta batteries feature a precharge control system to prevent inrush currents to the inverter when powering up from the battery.
- ***Note**: SMA integration is still under testing.

7.0 WIRING AND CABLING

- **Note** If local regulations require grounding of battery units, a ground lug is available on the front panel for this purpose. Follow local regulations for correct grounding procedures.
  Power is supplied to and from the battery unit by two Surlok SLPRBBPSR and two Surlok SLPRBBPSB connectors for 6U, heavy duty and 4U battery packs. For vertical batteries, connections are made with M8 ring lug terminals.

  - Cabling must conform to local regulations. We recommend using 0 AWG or 1/0 AWG (50mm² or larger) cables.
  - Ensure that the cabling is connected to the cabinet busbars before making connections to the battery unit. This allows all electrically conductive components in the cabinet to be fastened and secured before energizing the system.

    - **Note:** The correct way of connecting multiple batteries in parallel is to ensure that the total path of the current in and out of each battery is equal.

  Once the cabling is installed in the cabinet, connect the Surlok fittings. Verify that all positive connections from the battery unit are connected to the positive power rail in the cabinet, and the negative battery connections are connected to the negative power rail.

- **IMPORTANT**: For startup and shutdown procedures, we strongly recommend following the steps outlined in **Sections 8.0** and **9.0** of this manual.

IMPORTANT

Please note that additional information regarding start-up and shutdown procedures for specific installations or applications may be found in **Appendix 1.0**

Refer to **Fig 6** for detailed communication and power wiring between the batteries and inverter.

❖ **IMPORTANT**: Make sure all the devices are **OFF** when connecting power cables.

General Information

- Other than the connector type, the installation process for all Vaulta batteries is similar. Batteries are connected to the busbar, which in turn connects to the inverter terminals.
- A safe electrical system protects against short circuits, overloads, and earth leakage currents. Proper earth wiring is essential for safety. Ensure the earth cable is correctly sized and that all connections are tight and torqued to the recommended specifications.
- In compliance with AS/NZS 3000:2018 (Australian/New Zealand Wiring Rules), Residual Current Devices (RCDs) are mandatory in certain electrical installations in Australia.

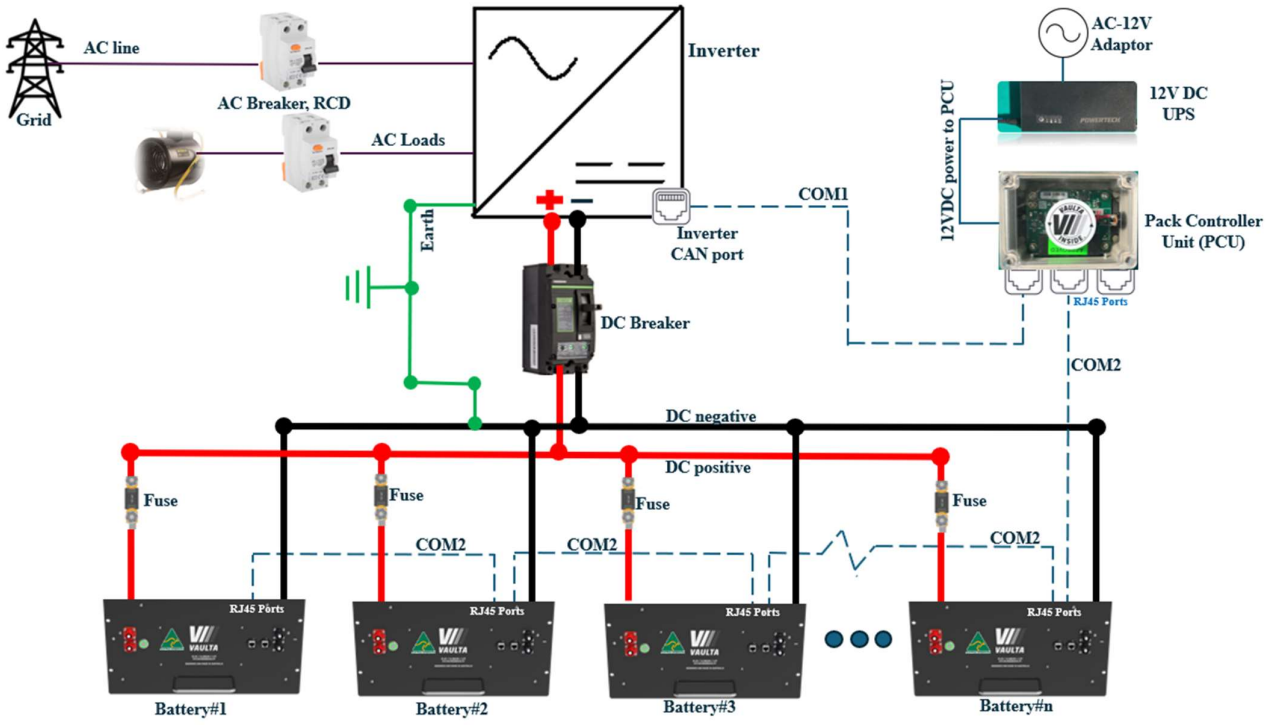


Fig 6. Cabling and Wiring schematics of a typical installation

Communication

Vaulta batteries can be paralleled and interconnected in a daisy chain configuration using Patch 5 or 6 leads. The final battery in the daisy chain is connected to the Pack Controller Unit (PCU) (**Fig 7**), which then communicates with the inverter. All physical connections are made using RJ45 connectors, and the communication protocol is CAN.

PCU and its UPS

12V adapter and communication cable (CAT6)

Fig 7. PCU and 12VDC UPS

- The inverter communicates with the PCU via patch leads (except for the case of Victron Inverter, **Fig 8**).

Fig 8. In the case of Victron inverters, PCU is connected to Cerbo GX gateway via genuine Victron path leads called "**VE.Can to CAN-bus BMS type A or B**". All other COMMS cables are still standard patch leads

- PCU (**Fig 7**) communicates with one battery and all the batteries are communicated in a daisy chain layout.
- There is no difference between the RJ45 ports on the PCU or the batteries.
- Vaulta batteries use the CAN bus communication protocol.

8.0 SHUTDOWN PROCEDURE

1	2
Turn off any connected PV isolators. (including AC coupled PV if applicable). 	Turn off the AC breaker/s to the battery inverter/s. 
3	**4**
Turn off battery inverter/s. 	Turn off the pack controller unit (PCU). Batteries should go into INIT state waiting for pack controller communication. (**Wait** at least **10 seconds before moving to the next step**) * makes sure that PCU is off (if powered from the left port, unplug the power cable) 
5	**6**
Turn off all the batteries.	Ensure battery isolators (DC isolators) are turned off. This step is only required when performing maintenance/ system upgrades or decommissioning

NOTE: **For re-commissioning repeat steps in reverse order.**

9.0 STARTUP PROCEDURE

1	2
Ensure battery isolators (DC isolators) are turned on. This ensures that energy can flow at a controlled rate to the connected loads when the batteries are powered on. 	Power on all the batteries (the battery terminals will not have voltage until the PCU is turned on in Stage 3). 
3	**4**
Turn on the pack controller unit (PCU). The batteries will pre-charge the inverter/s and connected loads.	Turn on the battery inverter/s.

	
5	**6**
Turn on the AC breaker/s to the battery inverter/s (if applicable – not required for some off-grid installs). 	Turn on any connected PV isolators, including AC-coupled PV (if applicable). 

NOTE: **For maintenance or decommissioning repeat steps in reverse order.**

10.0 Fault analysis using LED flash

The battery management system (BMS) included in the Vaulta battery unit can communicate with approved inverters and the PEAK CAN adapter.

If the BMS recognises a fault in the operation of the battery unit, an LED light in the power button on the faceplate of the unit will flash to indicate the type of fault (**Table 4**).

Table 4. LED Indicator Notations for Vaulta Battery Packs

Flash Count	Label	Description
9	Sense Error	There is an active SENSE ERROR event. The BMS cannot communicate with the cell measurement nodes.
8	Critical Over Volt	There is a latched CRITICAL OVER-VOLT event. The BMS has detected that the critical over-voltage threshold has been exceeded.
7	Critical Under Volt	There is a latched CRITICAL UNDER-VOLT event. The BMS has detected that the critical under-voltage threshold has been exceeded.
6	Critical Over Current	There is a latched CRITICAL OVER-CURRENT event. The BMS has detected that the critical over-current threshold has been exceeded.
5	Over-Temp	There is an active OVER-TEMP event. The BMS has detected that the over-temperature threshold has been exceeded.
4	Under-Temp	There is an active UNDER-TEMP event. The BMS has detected that the under-temperature threshold has been exceeded.
3	Pre-charge Fail	There is an active PRE-CHARGE FAIL event. The BMS has detected that the pre-charge voltage threshold has **not** been reached.
2	Balancing	There is an active BALANCING event. The BMS has detected that the balance voltage threshold has been exceeded. This indicates at least 1 cell is currently being balanced.
1	Disabled	The BMS is in either the INIT or ERROR state and the BMS outputs are all off. Meaning that the battery cannot charge or discharge. This is usually due to a communication timeout on the BMS Switches CAN ID or the BMS is not in STANDALONE mode.

11.0 VAULTA SITE COMMISSIONING CHECKLIST:

- **Note**: Copies of this checklist must be retained by the installer as well as the site owner for quality assurance purposes. Any failure to satisfy the checklist or these instructions will void the product warranty.
- **Important**: refer to Sections 7, 8 and 9 for wiring, communication diagrams, and start-up/shut-down procedure before filling this form and make sure all the steps are followed accordingly.

INSTALLATION CHECK	CONFIRM
All cables are correctly and safely connected to the appropriate receptacles and unused components have appropriate protective covers, caps, and/or termination plugs	
The environment is maintained at operating conditions	
All hardware is properly torqued	
All cables are undamaged	
All components are clean and undamaged	
All internal and external breakers are switched off	
The system is compatible with all attached equipment and compliant with local regulations	
Mechanical and electrical installation has been performed and configured *(according to the "wiring and communication" diagram in this document)*	

OPERATIONAL CHECK	CONFIRM
Breakers have been switched on according to the "start-up procedure"	
Batteries have powered-on	
Modules and control units are running	
The system has operated safely and without error for 15 minutes	

APPROVAL	SIGNATURE	DATE
Installer		
Site owner		