INSTALLATION & OPERATION

Kakadu 120

Installation and Operating Manual

Part No · Kakadu-120-88.4

88.4 kWh outdoor lithium iron phosphate battery cabinet. Slide-in modules with quick-connect cabling, two independent strings, scalable to 1.41 MWh.

KAKADU 120 CABINET

DOCUMENT	VERSION	RELEASED	PRODUCT
Installation and Operating Manual	V1.1	10 September 2026	Kakadu 120 · Kakadu-120-88.4

READ FIRST

Installation, termination and commissioning must be carried out only by a licensed electrical worker competent in battery energy storage systems, in accordance with AS/NZS 3000 and AS/NZS 5139.

CONTENTS

CHAPTER 1

Introduction

Kakadu 120 is a lithium iron phosphate battery energy storage system housed in an outdoor-rated cabinet. Each cabinet holds two independent battery strings, and up to 16 cabinets can be paralleled into a single system.

Kakadu 120 is named for its 120 V DC class battery voltage. A string consists of one BMS and four battery modules connected in series. Each module is nominally 35.2 V with 11.05 kWh of usable energy, giving a string a nominal 140.8 V and 44.2 kWh. A cabinet contains two strings, for 88.4 kWh of usable energy. Up to 16 cabinets may be connected in parallel, for a maximum system energy of 1.41 MWh.

88.4 kWh	140.8 V	300 A	1.41 MWh
USABLE PER CABINET	NOMINAL DC	CONTINUOUS CHARGE / DISCHARGE	MAXIMUM SYSTEM ENERGY

- Modules slide into the cabinet and connect with quick-connect cabling.
- The two strings in a cabinet operate independently, so the system keeps operating if one string faults.
- The Battery Information Collector (BIC) design makes communication more stable and reduces system stoppages caused by communication faults.

FIGURE 1.1 Kakadu 120 cabinet, door open. Each of the two strings comprises four battery modules above one BMS.

CHAPTER 2

Glossary

TABLE 2.1 — TERMS USED IN THIS MANUAL

TERM	FULL NAME
BESS	Battery Energy Storage System
BMS	Battery Management System
BIC	Battery Information Collector
SOC	State of Charge
SOH	State of Health
LFP	Lithium iron phosphate ($LiFePO_4$)
Module	One 35.2 V / 11.05 kWh battery module
String	One BMS with four modules in series (140.8 V / 44.2 kWh)
Cabinet	The enclosure, containing two strings (88.4 kWh)

CHAPTER 3

Safety

DANGER — HIGH VOLTAGE

Installation, termination and commissioning must be carried out only by a licensed electrical worker competent in battery energy storage systems, and must follow AS/NZS 3000 and AS/NZS 5139. Power cables and plugs carry high voltage from the battery at all times, including when the system is switched off.

Follow the safety requirements in this manual strictly when installing, commissioning, operating and maintaining the product. Incorrect operation or work may damage the product and other property, or cause injury or death to the operator or to third parties.

When fixing the product with screws or other fasteners, use the correct tool and tighten to the torque given in this manual or on the product label. Read this manual before installation to ensure the product is installed and used safely.

WARNING

1. Installers and users must familiarise themselves with this manual before starting work.
2. Power cables and plugs carry high voltage from the battery. Take care when wiring.
3. Ensure a fire extinguisher is in place before installation and use.
4. Battery modules weigh 91 kg. Use a mechanical lifting aid (module trolley, hoist or lifter) to position modules in the cabinet. Do not attempt to lift a module manually.

3.1 Intended use

- Kakadu 120 is designed to work with inverters rated for a 120 V DC class battery bank, in residential, commercial and industrial (C&I) applications.
- The BMS allows Kakadu 120 to be connected to the AERL Nexus gateway for remote monitoring and firmware upgrades.
- The IP55 enclosure is rated for indoor or outdoor installation. Outdoors, the cabinet must be shaded from direct sun by an awning, roof or its orientation — see section 5.1.
- Kakadu 120 is not suitable for powering life-sustaining medical equipment. Ensure that a power failure of the battery system cannot cause personal injury.

3.2 Battery module leakage

Stop using a damaged battery immediately and dispose of it in accordance with local regulations. Damage to the battery may release electrolyte, which can cause breathing difficulties, skin irritation and chemical burns. Consult the Safety Data Sheet for more information.

Follow these guidelines promptly if you come into contact with battery electrolyte.

- **Eye contact —** rinse gently with running water for at least 15 minutes and seek medical help promptly.
- **Skin contact —** rinse under running water for more than 15 minutes, remove any contaminated clothing and seek medical attention.
- **Inhalation or ingestion —** leave the contaminated area and seek medical assistance.

3.3 Fire

> ⚠ **DANGER — BATTERY FIRE**
>
> A battery fire may occur if the battery is exposed to a flame, an excessive heat source or extreme temperatures. A burning battery may emit carbon monoxide, carbon dioxide and other gases, and may produce smoke.
>
> **If a fire occurs, dial 000.** Isolate the system if it is safe to do so, then move immediately to a safe location. Firefighters should wear full-face self-contained breathing apparatus (SCBA) and full protective gear, and use a dry chemical extinguisher to cool and extinguish the battery and prevent the fire from spreading.

3.4 Handling

- Take care during installation to avoid damaging the battery.
- If a battery is damaged before installation, contact AERL for advice before proceeding.
- Protect the battery from damage during transport and handling.

- DO NOT clean the battery with water or solvents, or allow foreign objects to enter it.
- DO NOT unplug any cable while the battery is operating.
- DO NOT use the battery together with batteries of other brands or types.
- DO NOT short-circuit the battery modules.
- DO NOT subject the battery to external forces, such as dragging it along the ground or placing heavy objects on it.

3.5 Storage

- Recharge stored modules at least every six months to prevent irreversible damage from deep discharge. Hold the storage temperature at approximately 25 °C.
- For short-term storage, keep the ambient temperature between 0 °C and 35 °C.

- DO NOT store unpacked battery modules or BMS units outdoors, or anywhere exposed to direct sunlight, high humidity, heat or water.

CHAPTER 4

Product information

4.1 What is in the box

Kakadu 120 ships as three separate consignments: the cabinet (with the accessories box packed inside), the BMS boxes and the battery boxes. Check all items against the list below before starting installation.

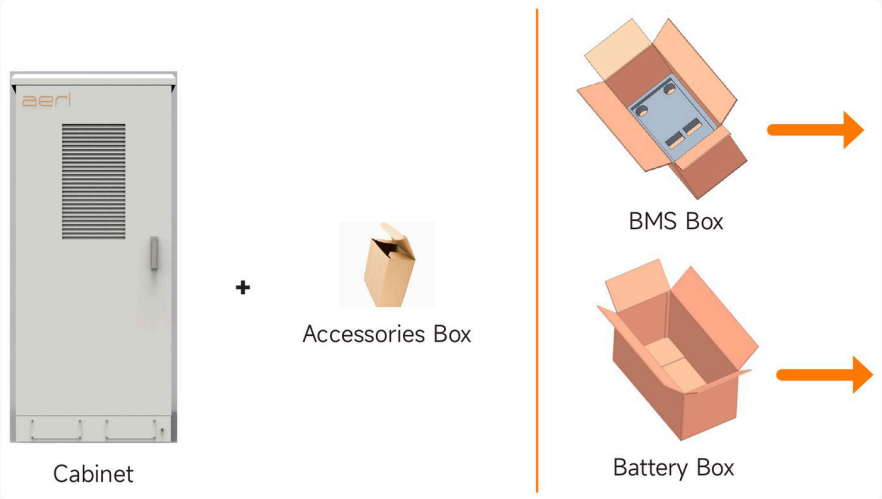


FIGURE 4.1 The cabinet ships with the accessories box. BMS units and battery modules are packed and shipped separately.

ACCESSORIES BOX CONTENTS

TABLE 4.1 — ACCESSORIES BOX CHECKLIST

ITEM	LENGTH	QTY
Battery-to-BMS Positive Series Power Cable	–	2
Battery-to-BMS Negative Series Power Cable	–	2
Battery Series Power Cable A	250 mm	4
Battery Series Power Cable B	280 mm	2
Battery Communication Cable A	250 mm	4
Battery Communication Cable B	400 mm	2
BMS Communication Cable	280 mm	2
Terminating Resistor	–	2
Positive Connector	–	2
Negative Connector	–	2
Washer Bolt	–	40

FIGURE 4.2 Accessories box contents.

> **NOTE**
> Communication cables and power cables **between** BMS units are not supplied. The connectors required to make them are in the accessories box — see steps 7 and 9.

4.2 Functional areas

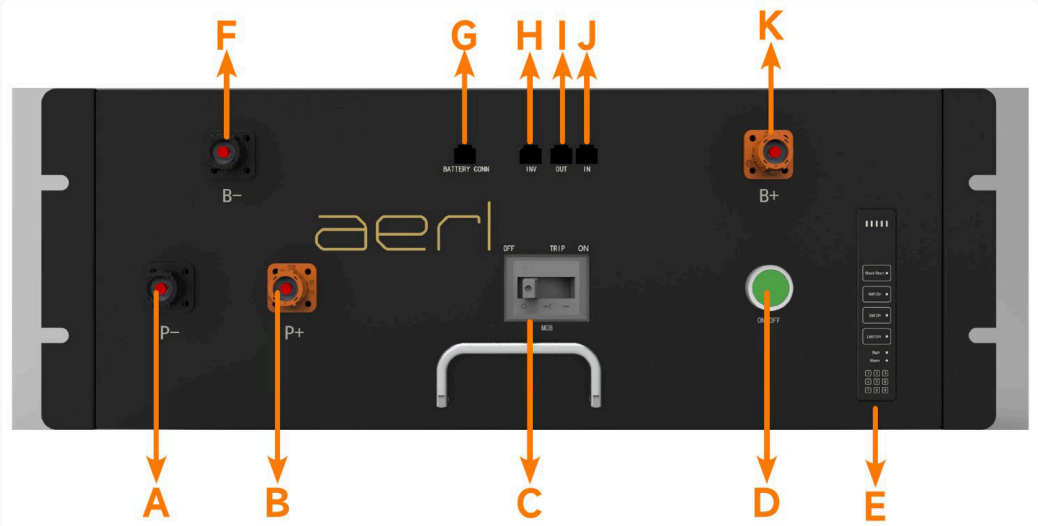


FIGURE 4.3 BMS front panel.

TABLE 4.2 — BMS FRONT PANEL

LETTER	LABEL	FUNCTION
A	P−	Power terminal, negative (to inverter)
B	P+	Power terminal, positive (to inverter)
C	MCB	Main circuit breaker
D	ON/OFF	System startup / shutdown
E	HMI	Human machine interface
F	B−	Power terminal, negative (to battery)
G	BATTERY COMM	Communication to battery
H	INV	Communication to inverter
I	OUT	Parallel out
J	IN	Parallel in
K	B+	Power terminal, positive (to battery)

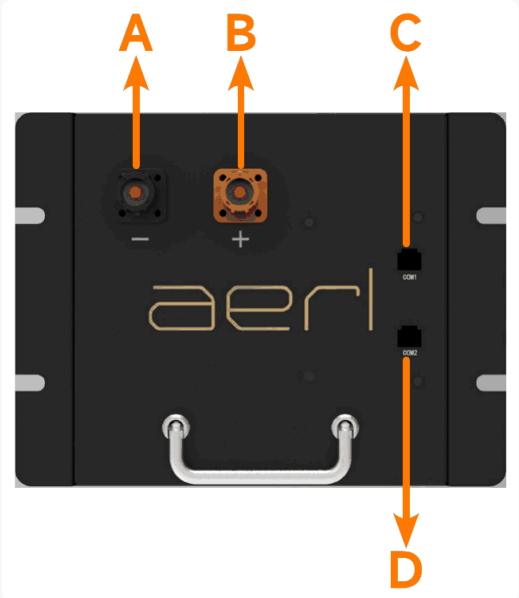


FIGURE 4.4 Battery module front panel.

TABLE 4.3 — BATTERY MODULE FRONT PANEL

LETTER	LABEL	FUNCTION
A	−	DC negative
B	+	DC positive
C	COM1	Communication port
D	COM2	Communication port

4.3 Specifications

TABLE 4.4 — SYSTEM SPECIFICATIONS

KAKADU 120 CABINET	
Part number	Kakadu-120-88.4
Nominal voltage	140.8 V DC
Operational voltage range	112.2 V DC to 165 V DC
Capacity	88.4 kWh / 628 Ah
Battery module arrangement	2 strings / 4 modules per string
Depth of discharge	Up to 90%
Maximum continuous discharge current	300 A @ 25 °C (150 A per string)
Peak discharge current (1 min)	315 A
Maximum continuous charge current	300 A @ 25 °C (150 A per string)
Integrated BMS circuit breaker	2-pole, 250 A, 200 V DC
Lithium chemistry	$LiFePO_4$ / LFP
Cell construction	Prismatic
Operating temperature range	Charge −10 °C to 50 °C / discharge −20 °C to 50 °C
Operating humidity	Up to 95% non-condensing
BMS cell over-voltage protection	3.65 V DC
BMS cell under-voltage protection	2.55 V DC
BMS over-temperature cut-off	56 °C
Short-circuit current	4500 A
Arc flash incident energy at 450 mm	0.0027 cal/cm²
Arc flash boundary	215 mm
Altitude	< 2500 m
DC connectors	200 A quick connect, maximum 50 mm² cable
IP rating	IP55
Efficiency	> 96%
Cooling	Natural convection
Scalability	16 cabinets in parallel
Series connection	Not permitted
Communications	CAN 2.0A
Weight	970 kg
Dimensions (W × H × D)	795 × 1900 × 1150 mm
Certifications — cell	UL 1973, UL 9540A, IEC 62619:2022, UN 38.3
Warranty	10 years — conditions apply, see section 11

TABLE 4.5 — BATTERY MODULE SPECIFICATIONS

KAKADU 35.2 BATTERY MODULE	
Part number	Kakadu-35.2-11S
Dimensions (W × H × D)	295 × 225 × 960 mm
Energy	11.05 kWh
Nominal voltage	35.2 V
Continuous current rating	150 A
Battery interconnection	Quick connector with 21 mm² (4 AWG) UL cable
Communications	CAN 2.0A
IP rating	IP20
Weight	91 kg
Warranty	See section 11

TECH NOTE

Kakadu 120 requires an AERL Nexus Gateway to manage the battery communications and ensure the correct charging profile is applied by the inverter.

CHAPTER 5

Installation

This section gives the requirements and the step-by-step procedure for installing Kakadu 120 safely. Take the installation procedure into account when designing the system.

5.1 Requirements for the installation location

The installation location must be suitable for safe operation and long-term use, in accordance with AS/NZS 5139 Section 6. Choose a location where the battery can be easily connected and serviced. AERL also recommends the following.

- Keep the battery at least **5 m** from any source of heat, such as fires, transformers and heaters, to avoid overheating.
- Ensure the environment is free of flammable and explosive materials.
- Battery life is maximised at an ambient temperature of 15–30 °C; the system operates from −10 °C to 50 °C (Table 4.4).
- Ensure the ground is flat and level.
- Keep the location away from sources of dust, corrosive gas and salt spray.
- Shade the cabinet from direct sun with an awning, a roof or its orientation. Direct sun raises the internal temperature and reduces charge and discharge capability.
- Ensure the location is well ventilated with good air circulation.
- Ensure the location is secure and away from children and animals.

5.2 Tools


Safety shoes


Insulated gloves


Goggles


Screwdriver


Drill


Torque wrench


Hydraulic crimping pliers


Wire cutter


Utility knife


Adjustable spanner


Spirit level


Module lifter / trolley

5.3 Placing the cabinet

INSTALLATION SPACE REQUIREMENTS

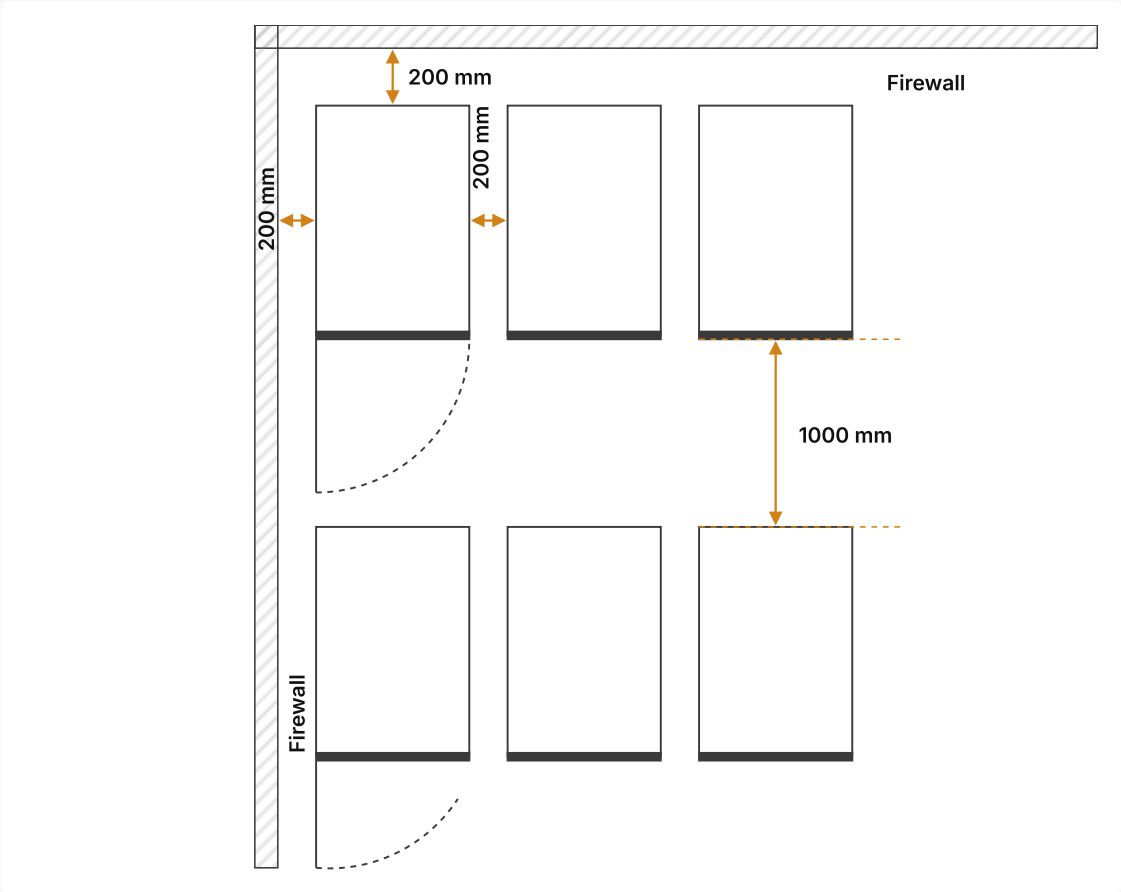


FIGURE 5.1 Minimum clearances: 200 mm to a firewall, 200 mm between adjacent cabinets, and 1000 mm between rows for door swing and access.

> **NOTE**
> The figures above are the minimum clearances for the installed system. Allow additional temporary working space — approximately 750 mm — to manoeuvre the cabinet into position during installation.

FOUNDATION REQUIREMENTS

> **NOTICE**
> The foundation drawing is for reference only and must not be used as the final construction drawing. Verify the foundation design parameters for the energy storage system against the installation environment, ground load-bearing capacity, geological conditions and seismic requirements of the project site.

1. The energy storage system must be installed on concrete or another non-combustible surface. The installation surface must be level, solid and even, with sufficient load-bearing capacity and no depressions or slope.
2. Design the foundation for the total weight of the equipment.
3. Compact and level the base of the excavation to prevent subsidence or tilting over time.
4. After excavation, protect the foundation from water infiltration and disturbance. If the soil is disturbed by water, excavate further and replace the soil.
5. The level deviation between the foundation surface and the cabinet contact surface must not exceed 3 mm.
6. Build the foundation above the highest recorded flood level for the site, and at least 300 mm above the surrounding ground level.
7. Construct drainage in accordance with local geological conditions and municipal drainage requirements, so that water cannot accumulate around the foundation. The foundation drainage must cope with the highest recorded rainfall for the site, and all discharged water must be treated in compliance with local laws and regulations.
8. Allow for the cable routing of the energy storage system when constructing the foundation, and reserve cable trenches or inlet holes accordingly.
9. Seal all reserved foundation holes and cable inlet openings at the bottom of the equipment.

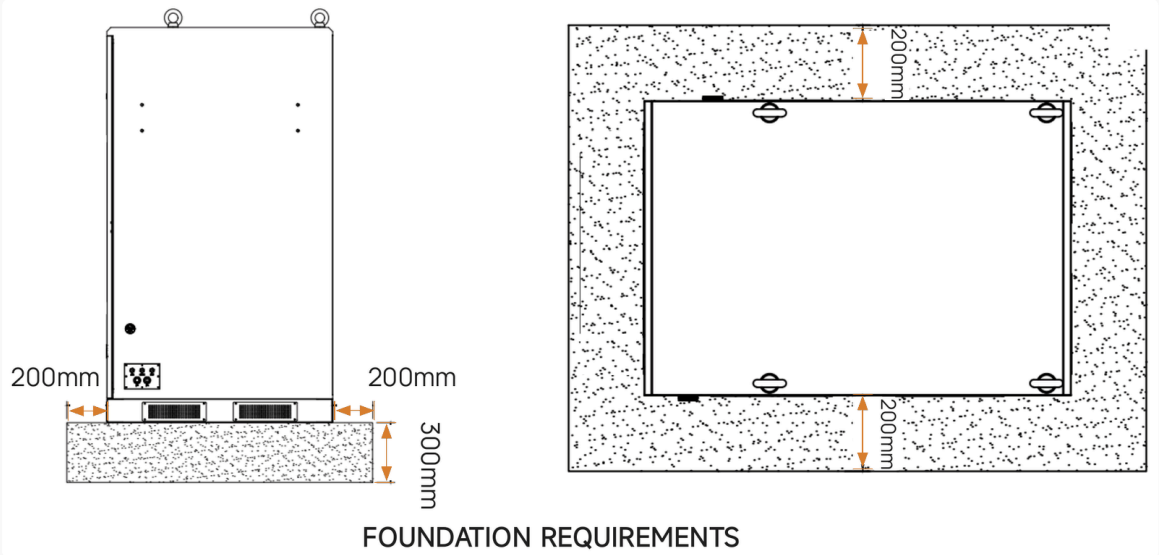


FIGURE 5.2 Foundation reference drawing — 200 mm setback on each side and a minimum 300 mm plinth above surrounding ground level.

5.4 Installation steps

Each cabinet holds two strings. Carry out steps 1 to 8 for each string, then complete step 9.

1 Install the BMS, then the modules

Install the BMS in the bottom position first, then install all four battery modules above it.

FIGURE 5.3 The BMS goes in first, at the bottom of the string.

2 Secure every BMS and module

Lock all BMS units and battery modules in place with the washer bolts supplied. **Tighten to 8 N·m.**

FIGURE 5.4 Washer bolt × 40, torque 8 N·m.

3 Connect the negative battery-to-BMS cable

Connect the **Battery-to-BMS Negative Series Power Cable** from the `–` port of the battery module at the bottom of the stack to `B–` on the BMS.

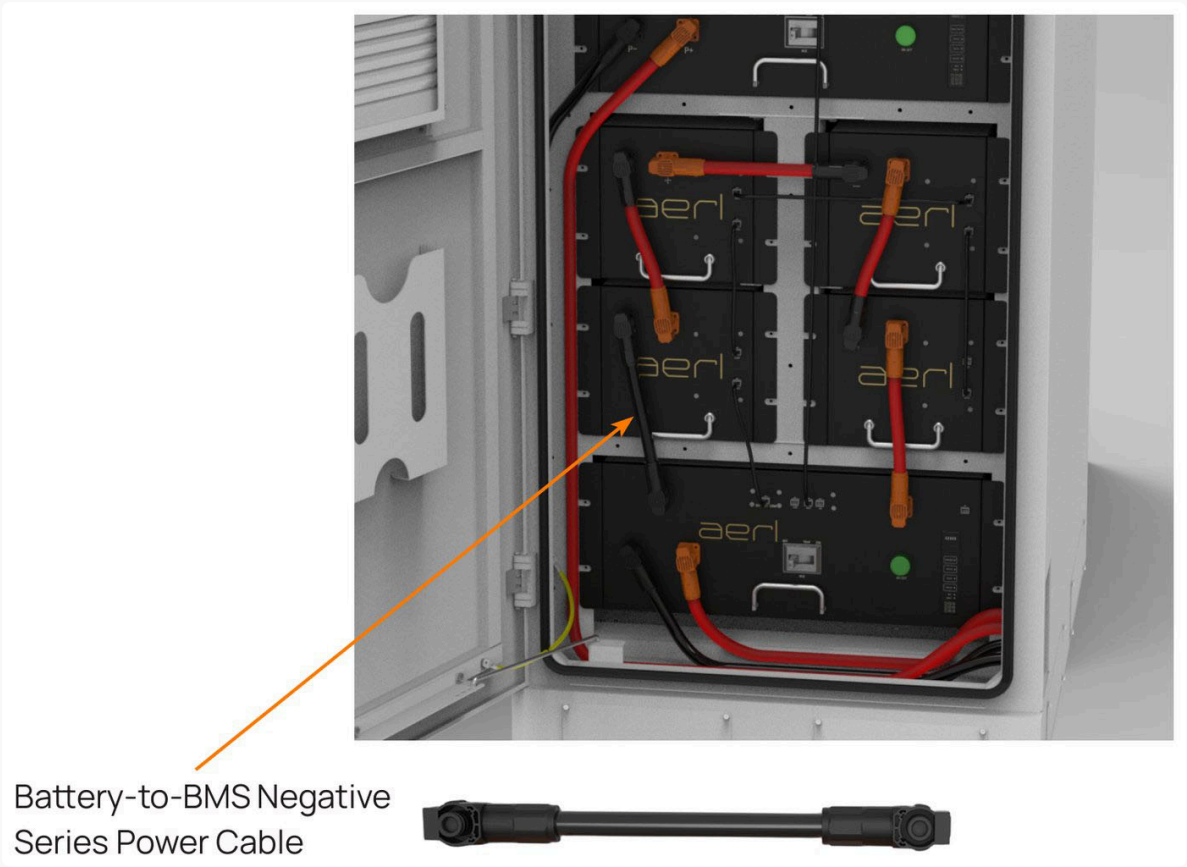


FIGURE 5.5 Battery-to-BMS Negative Series Power Cable.

4 Link the modules in series

Connect **Battery Series Power Cable A** and **Battery Series Power Cable B** between the battery modules.

> **CAUTION — POLARITY**
> Always connect the **black** connector to a `–` port and the **orange** connector to a `+` port.

> **INSTALL TIP**
> *Battery Series Power Cable A (250 mm) and Cable B (280 mm) are very similar lengths — make sure to identify which one is which before you start. If your cable is a little short when connecting the left battery module to the right, you may have them the wrong way around.*

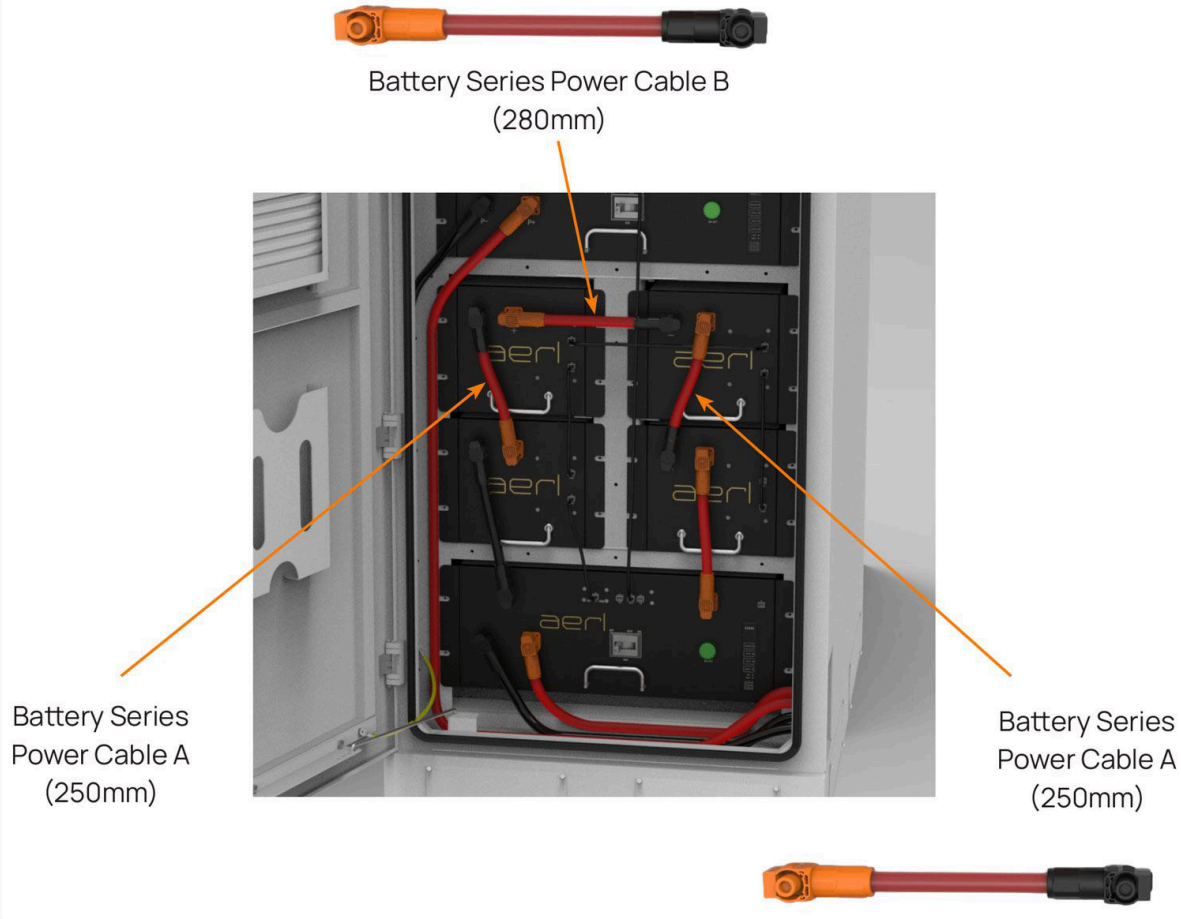


FIGURE 5.6 Battery Series Power Cable A (250 mm) between modules in a column; Battery Series Power Cable B (280 mm) across the top pair.

5 Connect the positive battery-to-BMS cable

Connect the **Battery-to-BMS Positive Series Power Cable** from the `+` port of the battery module at the bottom of the stack to `B+` on the BMS.

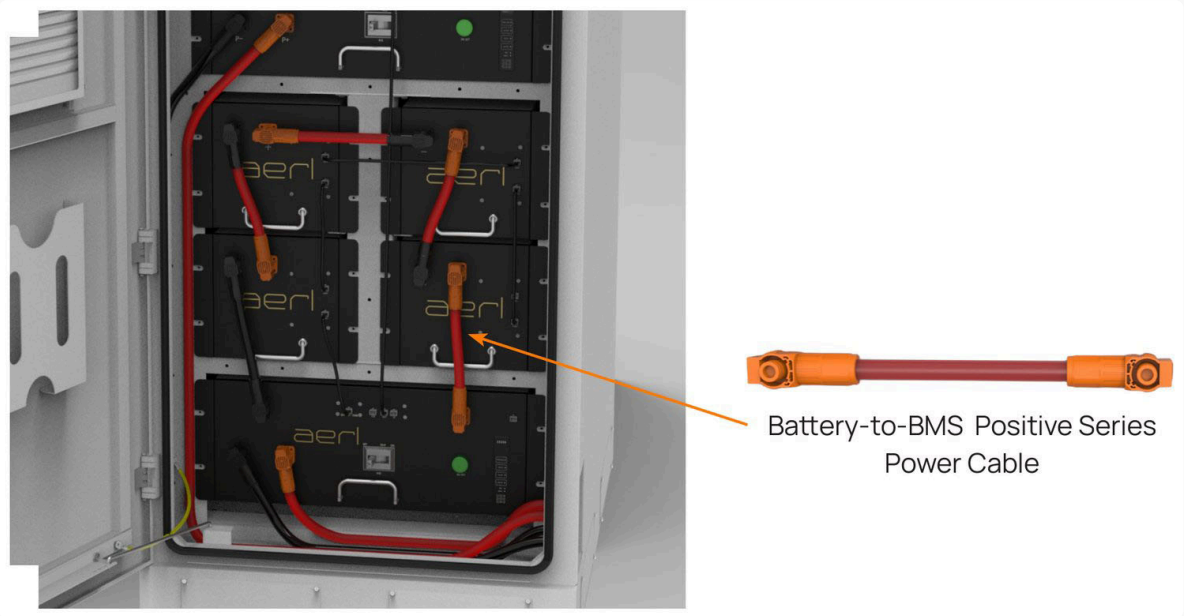


FIGURE 5.7 Battery-to-BMS Positive Series Power Cable.

6 Wire the battery communication chain

The four modules of a string sit in a 2 × 2 grid above the BMS. The communication chain runs from the BMS to the bottom-left module, up to the top-left module, across to the top-right module and down to the bottom-right module, which is the last in the chain.

- Connect the **BMS Communication Cable** between `BATTERY COMM` on the BMS and `COM2` on the bottom-left module.
- Use **Battery Communication Cable A** to connect `COM1` on the bottom-left module to `COM2` on the top-left module.
- Use **Battery Communication Cable B** to connect `COM1` on the top-left module to `COM1` on the top-right module.
- Use **Battery Communication Cable A** to connect `COM2` on the top-right module to `COM1` on the bottom-right module.

> **INSTALL TIP**
> *Battery Communication Cable A (250 mm) and the BMS Communication Cable (280 mm) are similar lengths — make sure to identify which one is which before you start. If your cable is a little short when connecting the BMS to the bottom-left battery module, you may have them the wrong way around.*

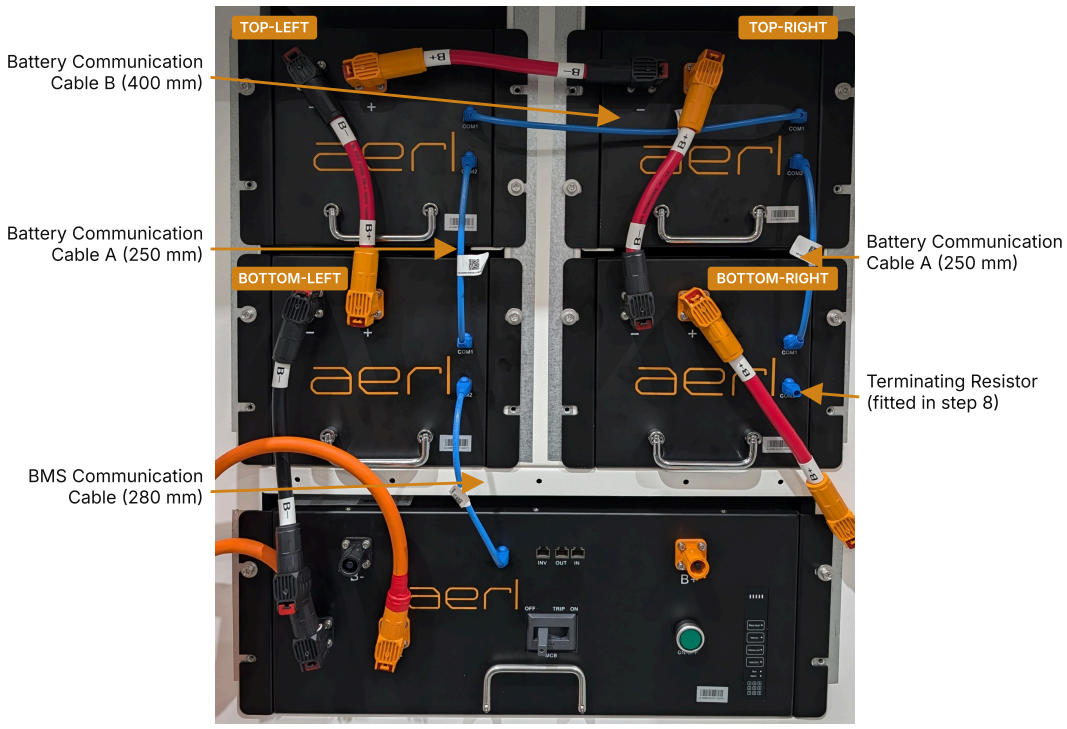


FIGURE 5.8 Battery communication chain as installed — BMS to bottom-left, top-left, top-right, then bottom-right (last module).

7 Link the BMS units

The communication cables between BMS units are not supplied. Cut and crimp them to the length required on site.

The BMS whose `INV` port is connected to the inverter is the master, and its **Master Unit** LED must be lit; on every other BMS, press **Master Unit** so that its LED is off (section 6.3). The other BMS units follow the master through the `IN` / `OUT` chain. With the lower BMS as the master, connect `OUT` on the lower BMS to `IN` on the upper BMS. For multiple cabinets, continue the chain as described in section 5.5.

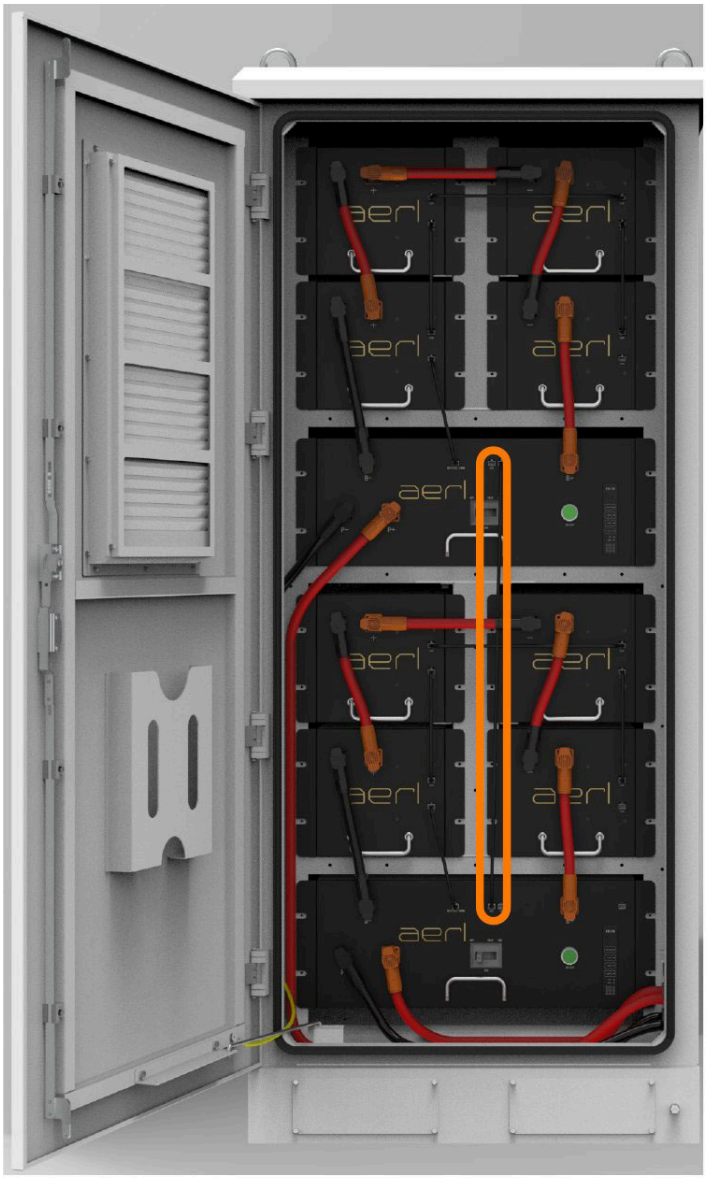


FIGURE 5.9 BMS-to-BMS communication link, lower `OUT` to upper `IN`.

8 Fit the terminating resistors

Fit a **Terminating Resistor** to `COM2` on the last module in the communication chain — the bottom-right module — of each of the two strings in the cabinet.

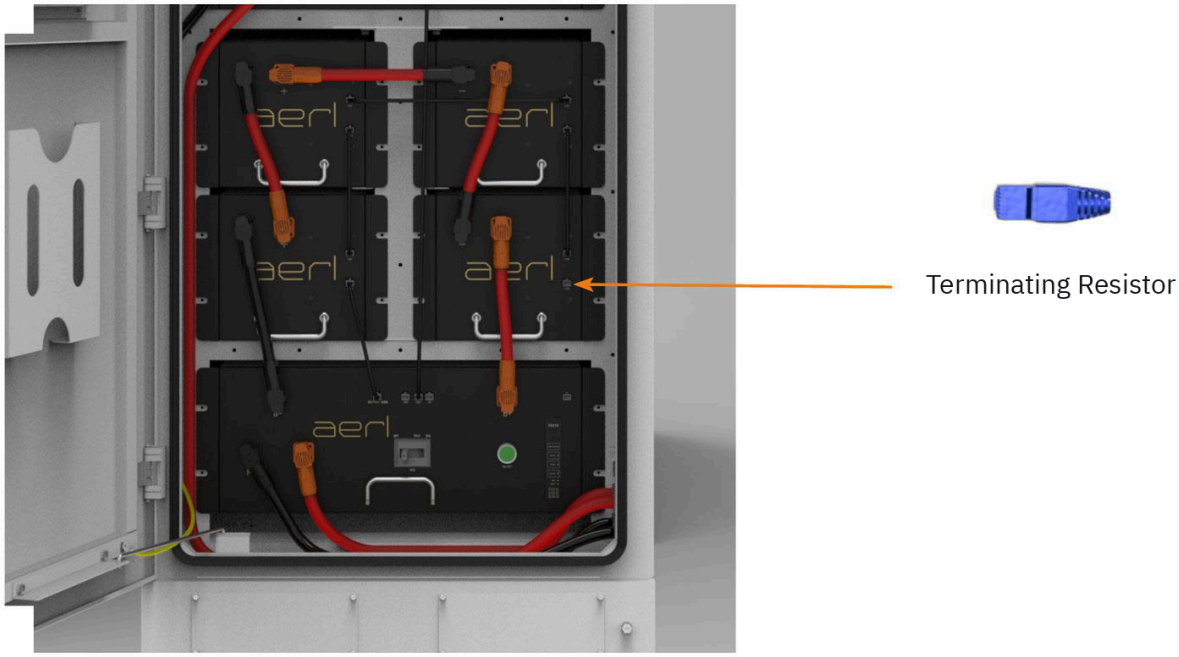


FIGURE 5.10 Terminating Resistor × 2 — one per string.

9 Make up the BMS parallel power cables

The parallel power cables between BMS units are not supplied, but the connectors needed to make them are in the accessories box. Prepare and crimp the cables to the length required on site, using the **Positive Connector** and **Negative Connector**.

The connectors accept a **maximum conductor size of 50 mm²**. Size the cable for the string current (150 A continuous per BMS) and the run length in accordance with AS/NZS 3000 and AS/NZS 3008.1.1, and do not exceed 50 mm².

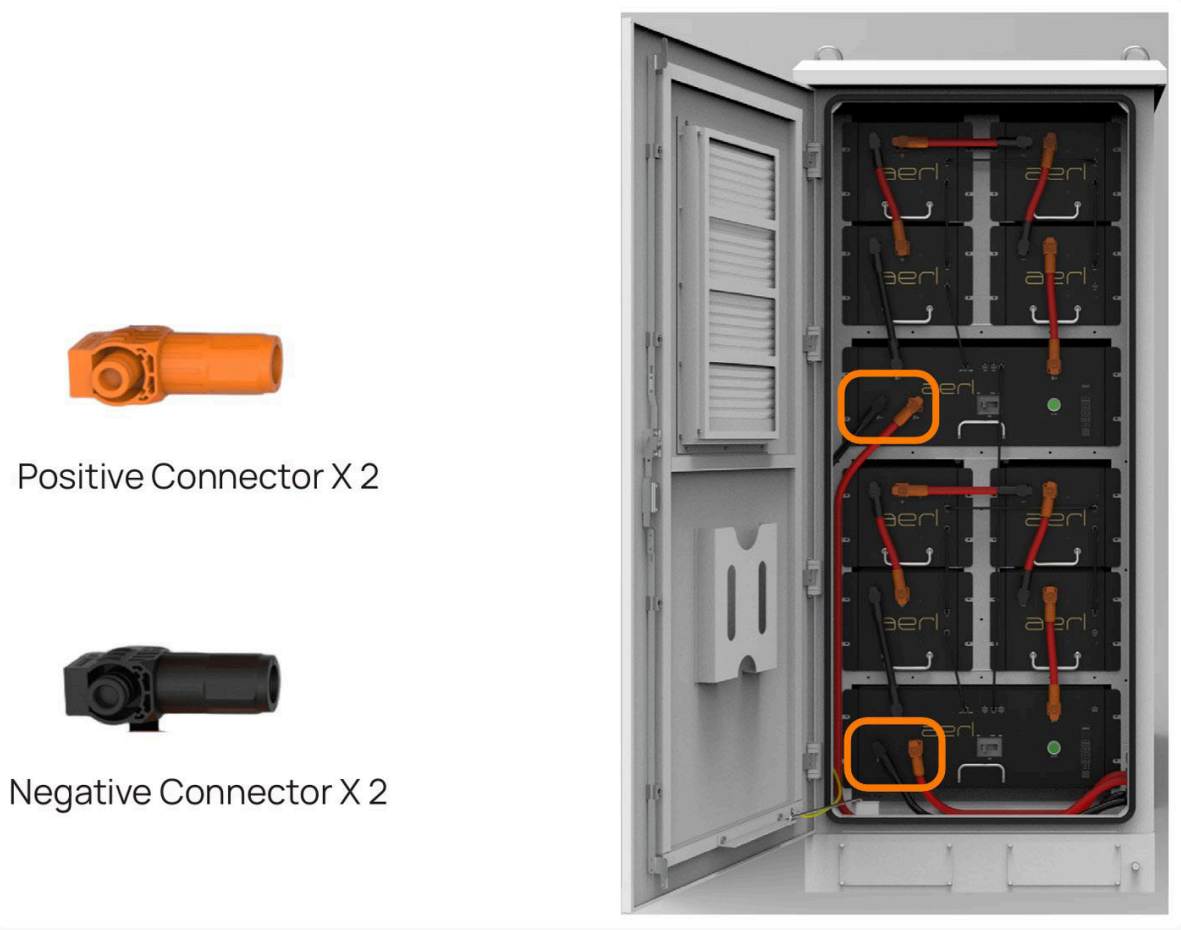


FIGURE 5.11 Positive Connector × 2 and Negative Connector × 2.

5.5 Paralleling multiple cabinets

Up to 16 cabinets may be connected in parallel. **Series connection is not permitted.**

1. Connect `P+` and `P−` of every BMS to a DC combiner using the parallel power cables made up in step 9. Size the cables and the combiner for the total system current — see the *Kakadu Combiner Box Installation Guide*.
2. Continue the communication chain from cabinet to cabinet: connect `OUT` on the upper BMS of one cabinet to `IN` on the lower BMS of the next.
3. Connect the `INV` port of the first BMS in the chain to the inverter. This BMS is the master.
4. On the HMI, leave **Master Unit** lit on the master string only (section 6.3), and leave **Last Unit** lit on the final string in the chain only (section 6.4).
5. Confirm that every string's **Run** indicator is lit and that the inverter reports the combined system capacity before applying load.

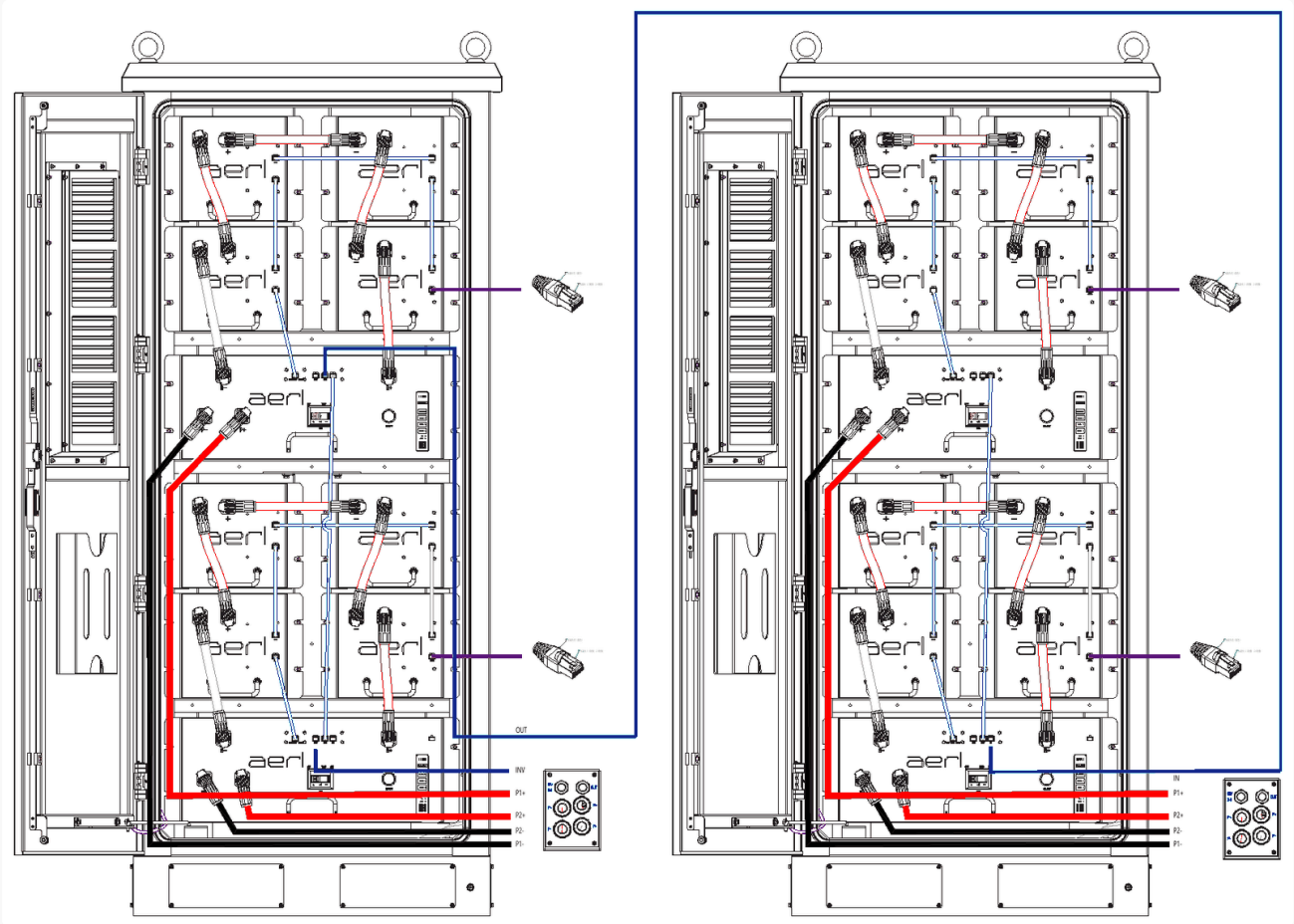


FIGURE 5.12 Parallel connection between two cabinets — power (red / black), BMS-to-BMS communication (dark blue) and inverter communication (purple).

CHAPTER 6

Human machine interface

The HMI presents real-time system data at a glance and provides direct control of black start and string identification.

It shows the running status and state of charge of the battery, and lets you trigger a black start, set the terminating string and identify individual strings in a paralleled system.

1. **SOC indicators**
   Five bars, each representing 20% of system energy.
2. **Black Start button**
   Starts the inverter from the battery in an off-grid system.
3. **Wi-Fi On button**
   No Wi-Fi module is fitted to Kakadu 120, so this button is not used. Remote monitoring is provided by the AERL Nexus gateway.
4. **Master Unit button**
   Terminating resistor for inverter communications.
5. **Last Unit button**
   Identifies the last string in the system.
6. **BMS status**
   Run and Alarm indicators.
7. **Module status**
   One indicator per battery module.

FIGURE 6.1 HMI layout.

6.1 SOC status

The SOC indicator shows the current state of charge of the system. Each lit LED represents 20% of the battery's energy.

- While **discharging**, the last lit LED flashes once per second (1 Hz).
- While **charging**, the last lit LED flashes once every two seconds (0.5 Hz).

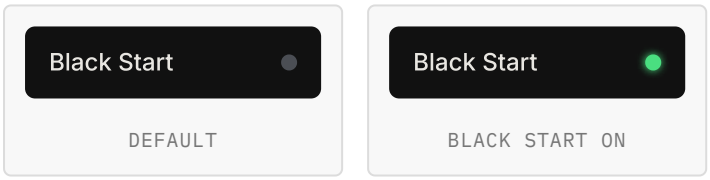
TABLE 6.1 — SOC INDICATION

	80% < SOC ≤ 100%
	60% < SOC ≤ 80%
	40% < SOC ≤ 60%
	20% < SOC ≤ 40%
	0% < SOC ≤ 20%

6.2 Black start

Black start is designed for off-grid systems. It lets Kakadu 120 supply energy to the inverter so the inverter can start the system.

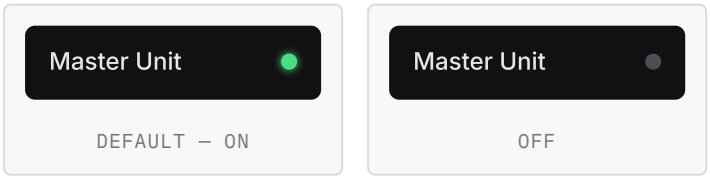
In an off-grid system, power up the system and then press and hold **Black Start** for three seconds to activate it. Once the inverter starts working, black start terminates automatically and the LED goes out.



6.3 Master Unit

Master Unit identifies the master BMS — the string connected directly to the inverter — and sets the terminating resistor for inverter communication. It must be on for the master BMS only.

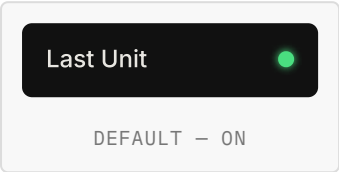
All **Master Unit** LEDs are on initially. Press **Master Unit** on each string that is not the master and confirm that its LED goes out, leaving only the master string's LED on.

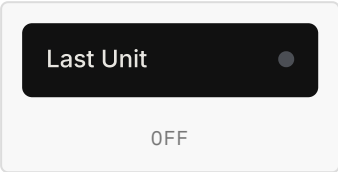


6.4 Last Unit

Last Unit confirms which string is last in the system and completes the communication circuit.

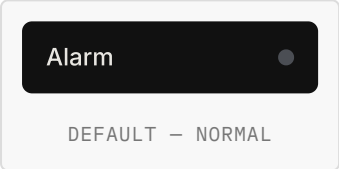
All **Last Unit** LEDs are solid on by default. To complete the communication circuit, make sure that **Last Unit** is on for the last string only. Press the button on each of the other strings and confirm that its LED goes out.

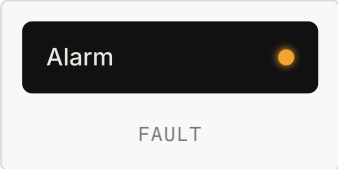




6.5 Alarm

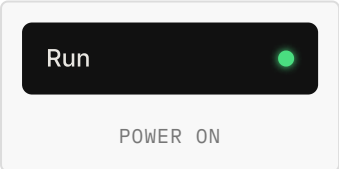
When the system is working normally, **Alarm** stays off. It lights orange when a serious fault occurs, such as over-voltage or over-current.

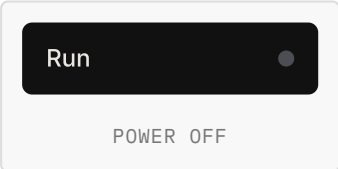




6.6 Run

When the system is working normally, **Run** lights green. When the system is powered off, **Run** is off.

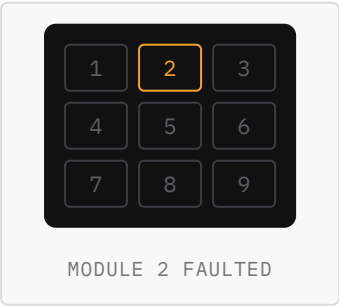




6.7 Module status indicators

This area shows the status of every module in the string. Kakadu 120 has four battery modules per string, so indicators 1 to 4 correspond to the four modules; indicators 5 to 9 are not used and stay off.

When a module is working correctly, its indicator is off. If a module fails, its number lights orange.



CHAPTER 7

System startup and shutdown

7.1 System startup

Before starting the system, confirm that every cable is connected as described in this manual, and that all MCBs and DC breakers — where fitted — are off.

1. Turn on the `MCB` on each BMS ①
2. Press the `ON/OFF` button on each BMS ②

The `RUN` and `SOC` indicators light once the system starts working.

FIGURE 7.1 Startup sequence — MCB on ①, then ON/OFF ②.

7.2 System shutdown

1. On each BMS, press and hold the `ON/OFF` button for three seconds ①
2. The MCB trips automatically. Verify that the handle is in the `OFF` position ②

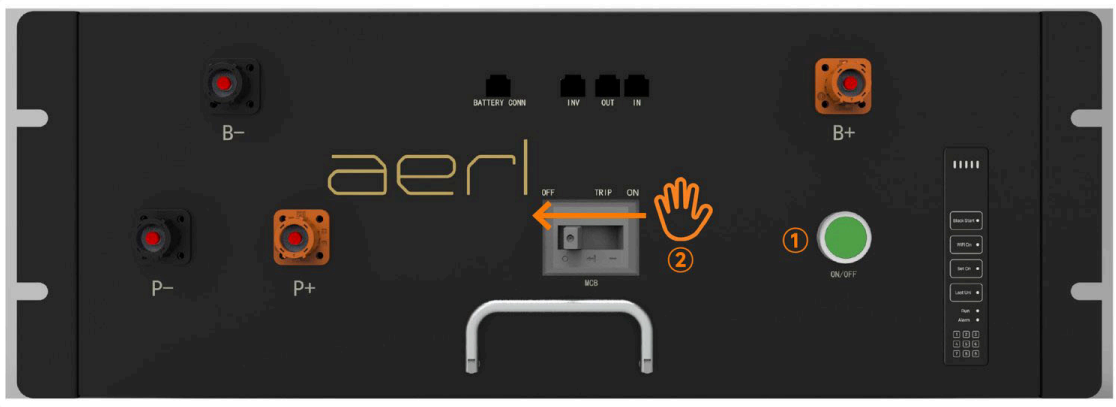


FIGURE 7.2 Shutdown sequence — hold ON/OFF ①, then confirm the MCB handle is OFF ②.

CHAPTER 8

Maintenance

> ⚠ **WARNING**
> Isolate the system power supply before operating on or maintaining the battery system. Working on energised equipment may damage the battery system or cause electric shock. All work must be carried out by authorised personnel only.

8.1 Every six months

- Check the system SOC using the `SOC` indicator on the BMS and in AERL Nexus, and confirm there is nothing abnormal.
- Check every cable connection for damage, looseness and ageing.
- Check the cells of each battery module in AERL Nexus and confirm there are no abnormal cell voltages.
- Check the system working logs in AERL Nexus and confirm there are no abnormal events.
- Check that the `ON/OFF` button and any external emergency stop are working correctly.
- Clean dust from external surfaces and the door vents with a dry cloth or brush.
- Check cell voltage spread, module temperatures and SOH in AERL Nexus.
- Inspect all metal components for corrosion.

8.2 Every year

Make sure the system is completely shut down before carrying out the following checks.

- Check that every quick-connect power plug is fully latched, and that the module and BMS washer bolts are tight (8 N·m).
- Check the power and control cables for damage, particularly where a surface in contact with metal may have been cut.
- Confirm that all cable entry points are properly sealed.
- Check that the cable layout is correct and that there are no short circuits. Correct any non-conformity immediately.
- Check for loose screws.

CHAPTER 9

Disposal

When disposing of Kakadu 120, follow local regulations for electronic waste and used batteries, and observe the following requirements.

- DO NOT dispose of the product with household waste.
- DO NOT leave waste batteries in direct sunlight or at high temperature.
- DO NOT dispose of used batteries in high-humidity or corrosive environments.

CHAPTER 10

Date of manufacture

To find the product's date of manufacture, locate the serial number on the nameplate.

CHAPTER 11

Warranty

Kakadu 120 is covered by a 10-year warranty; conditions apply. For the full warranty terms, and to lodge a claim, visit aerl.com.au or contact AERL technical support.

aerl

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