FUSION ESS ENERGY STORAGE

Document No.: FES-OM-01
Information Version: 1.3

FES-512

Installation& Operation Manual



Residential

Commercial

Industrial

Utilities and Telecom

Unit 30/76 Hume Highway LANSVALE
NSW 2166 AUSTRALIA
02 9755 7851
batteries@superstart.com.au

FUSION ESS ENERGY STORAGE

Due to continuing product improvements, Fusion reserves the Right to change specifications without notice. For most current Data, please contact your Fusion Energy Storage representative.

FUSION ESS
ENERGY STORAGE

CONTENTS

1. Safety **4**

1.1 Symbols 4
1.2 Audience 4
1.3 General Warnings 4
1.4 Safe Handling Procedures 5
1.5 Storage 5
1.6 Personal Protective Equipment 6
1.7 Damaged Battery 6

2. Introduction **7**

3. Product Information **8**

3.1 Items Shipped In The Box 8
3.2 Mechanical Specifications 8
3.3 Electrical Specifications 9
3.4 Environmental Specifications 9
3.5 Protection Specifications 10
3.6 Standards and Certification 10
3.7 Circuit Breaker Specifications 11

4. Module Interface **12**

4.1 LED Status Indicator 13
4.2 Dry Contact 13
4.3 Communication Ports 14
4.4 DIP Switch / Module ID Configuration 15
4.5 LCD Screen 16

5. Installation **19**

5.1 Tools 19
5.2 Label 19
5.3 Location 19
5.4 DC Cables 20
5.5 DC Protection 21
5.6 How to Mount Battery Modules 22
5.7 Grounding 25
5.8 Single Battery Connection Procedure 25
5.9 Parallel Battery Connection Procedure 26
5.10 Startup & Shutdown Proaedure 27

6. Communication Protocol **28**

6.1 Software Installation & Configuration 28
6.2 Inverter Compatibility & Protocol Selection 29
6.3 Software Menu Definition 31
6.4 Inverter Compatibility & Protocol Selection 33

7. Charging **34**

8. Routine Maintenance **35**

9. Disposal & Recycling **35**

10. Relates Information **36**

1. Safety

1.1 Symbols

	Caution! Warning! Reminding. Safety related information. Risk of battery system failure of life cycle reduces		Do not dispose of product with household waste
	Caution, risk of electric shock		Recycling
	Heavy enough may cause severe injure		Read this manual installation and operation
	Keep the battery away from open flame or ignition sources		Grounding
	Keep the battery away from children		Safety Certification by Intertek

1.2 Audience

Configuration, installation, service, and operating tasks should only be performed by qualified personnel in consultation with local authorities having jurisdiction and authorized dealers. Qualified personnel should have training, knowledge, and experience in:

- Installing electrical equipment
- Applying applicable installation codes
- Analyzing and reducing hazards involved in performing electrical work
- Installing and configuring batteries
- Installing and configuring systems activated by relays

1.3 General Warnings

Failure to follow these instructions may result in death or serious injury

- This equipment must only be installed as specified.
- Do not install the battery module in series.
- Do not disassemble or modify the battery module.
- Battery should not be exposed to temperatures above or below the temperature ratings specified within in this manual.
- Battery should not be crushed or punctured.
- If there is damage to the battery module case, do not touch exposed contents.
- There are no user-serviceable parts inside.
- Do not touch the exposed contents of a Lithium cell
- Do not lay tools or other metal parts across the terminals.
- Two-person lift is recommended for the battery module.
- Do not touch the energized surfaces of any electrical component in the battery module system.
- Before servicing the battery module, follow all procedures to fully de-energize the battery module system.
- Battery should be kept away from animals and children.
- Follow the “Safe Handling Procedures” below when working with the battery module.

1.4 Safe Handling Procedures

Before using the battery module, read all instructions and cautionary markings on the unit and all appropriate sections of this manual.

- Use personal protective equipment when working with battery modules.
- Do not dispose of the battery module in a fire.
- Promptly dispose of or recycle used battery modules following local regulations.
- Do not disassemble, open, crush, bend, deform, puncture or shred.
- It is prohibited for the battery cover to be opened. Doing so will void the warranty.
- Do not modify, re-manufacture, or attempt to insert foreign objects into the battery module, immerse or expose the battery module to water or other liquids, fire, explosion, or other hazards. If the user suspects damage to the battery module due to water, heat, or other reason, take it to a service centre for inspection.
- Only use the battery module for the system for which it is specified.
- Do not lift or carry the battery module while in operation.
- The battery module is heavy. When lifting the battery module, follow appropriate standards.
- Only lift, move, or mount following local regulations.
- Take care when handling battery module terminals and cabling.
- Do not expose the battery module to high temperatures.
- Do not submerge the battery module.
- Do not install the battery module with the faceplate down.
- Only use the battery module with a charging system that meets specifications. Using a battery module or charger that does not meet specifications may present a risk of fire, explosion, leakage, or other hazards.
- Do not short-circuit a battery module or allow metallic conductive objects to contact battery module terminals.
- Replace the battery module with only another battery module that meets the specifications of the system. Using a battery module that does not meet specifications may present a risk of fire, explosion, leakage, or other hazards.
- Do not drop the device or battery module. If the device or battery module is dropped, especially on a hard surface, and the user suspects damage, take it to a service centre for inspection.

1.5 Storage

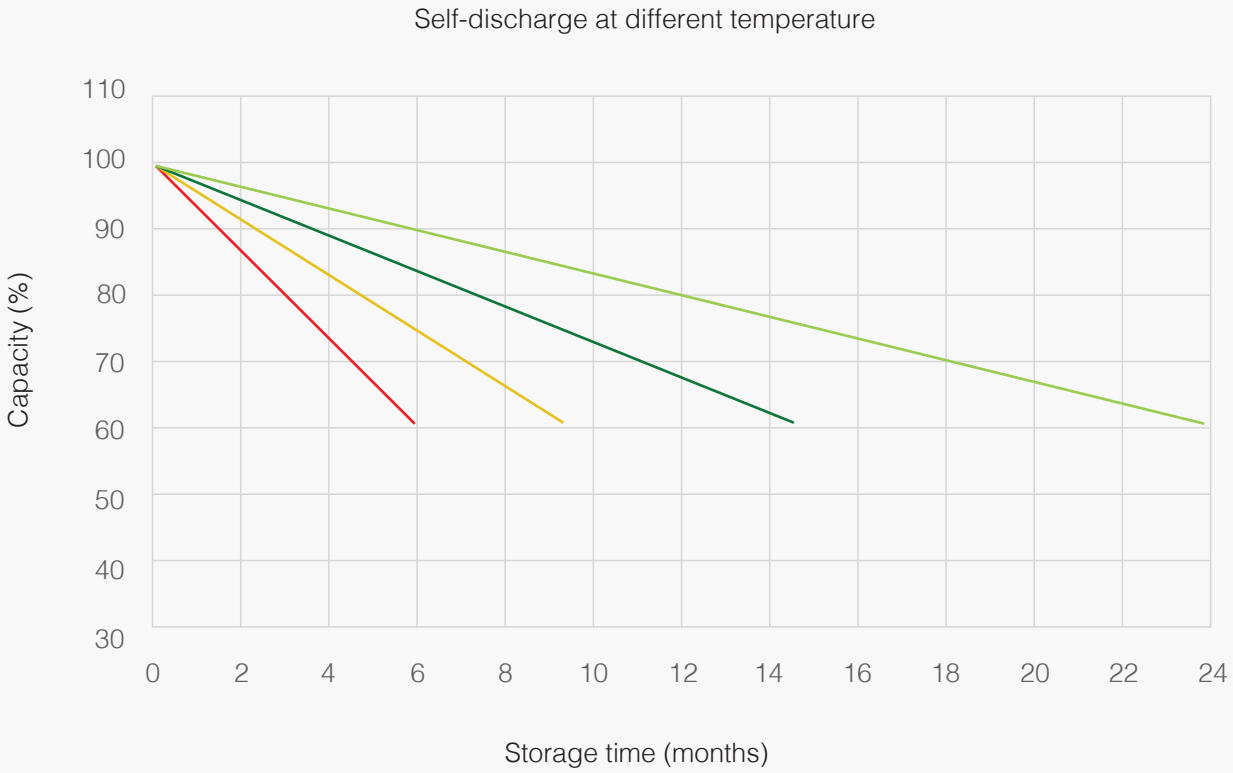
The Battery module must be stored in its original packaging, in an indoor location that is clean, level, dry and ventilated. Keep the location away from any sources of heat, open flames, direct sunlight and flammable or hazardous materials.

The battery module switch must be set to the OFF position and ensure the modules terminals have the rubber terminal protectors attached.

The battery module must not be connected to any load. Leaving the battery module connected to a load or any electronics during storage may subject the battery module to discharge, resulting in irreversible damage and voiding the warranty.

Store the battery modules at 95% SOC or more; between 51.20-53.28 volts.
Ensure you apply an adequate charge to the battery every 3 – 6 months as the battery will self-discharge by 2% every month. Allowing the battery to self-discharge below 48.0 volts too often or to be stored at 0% SOC will result in irreversible damage and void the warranty. For more details on how to charge the battery module, refer to the charging section of this manual.

Ensure the battery modules are stored within the specified temperature. Exposing the cells to extreme temperatures may damage the cells or make it difficult to charge them Refer to the Environmental Specifications section for more details.



1.6 Personal Protective Equipment

When handling or working near a battery:

- Use Personal Protective Equipment, including clothing, glasses, insulated gloves, and boots.
- Do not wear metal rings, watches, bracelets, or necklaces.

1.7 Damaged Battery

A damaged battery should not be used and should be returned to Fusion Batteries or disposed of via a recycling facility. Leaking electrolyte can cause skin irruption and chemical burns so contact should be avoided.

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 area and seek professional medical attention immediately, however inhalation is not expected due product form and nature of use.
Fire:	Should the battery pack catch on fire, a dry agent fire extinguisher should be readily available and used. DO NOT use water. Evacuate the area and call emergency services. Toxic gas may be produced if the battery catches fire.

Note: Refer to SDS Document No. SSB-SDS-02 V1.6 for more details which is available from the Super Start Batteries web page or upon request.

2. Introduction

The Fusion ESS is designed and manufactured for the world's harshest conditions to be a simple, flexible and reliable energy storage solution. As a result, the Fusion ESS can be easily installed with some inverter and charger combinations, UPS, rectifiers, DC or AC coupled charging devices, on-grid and off-grid in single, dual or three phase applications. There are almost no limitations in applications and suitable devices that can charge or discharge the Fusion battery. Currently the Fusion battery is available in 51.2 V.



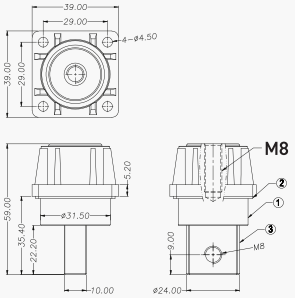
FES-512

3. Product Information

The technical information presented here within outlines the physical and electrical characteristics of the Battery and what environment they should be installed in.

3.1 Items Shipped In The Box

Items	Description
1	Battery Module (FES-512)
1	Battery link Communication cable (530mm)
2	Flexible insulated copper connector (Double-hole M10)
2	Red rubber connector cover
4	Black rubber connector cover
4	Terminal bolts (M8 x)
2	2 x Inverter communication cable
1	User Manual

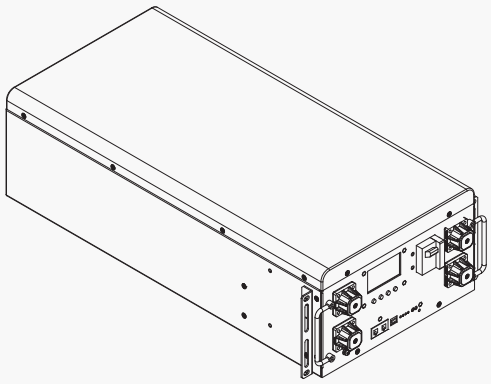


Terminal bolts (M8 x)

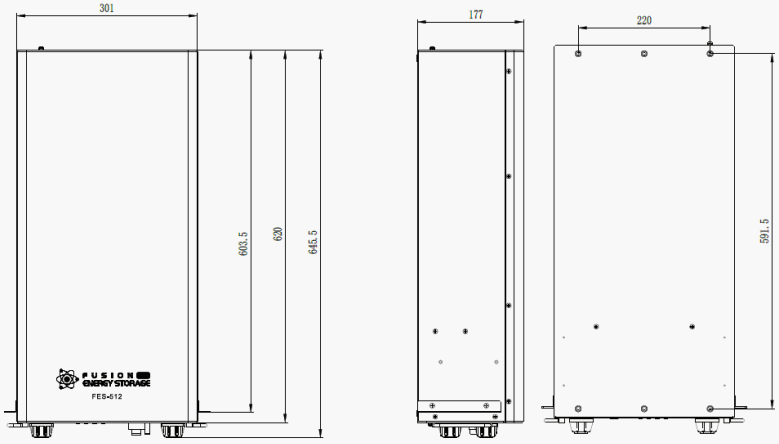
3.2 Mechanical Specifications

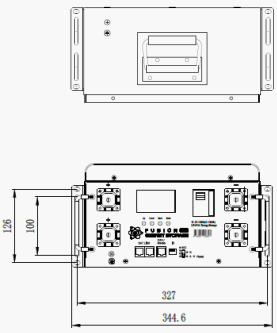
FES-512	
Chemistry	LiFePO4
Casing Material	Steel Case
Internal Cell Assembly	16S/1P
Total Length	645.5mm（±2mm）
Total Width	300mm （±2mm）
Total Height	177 mm（±2mm）
DC connections	≤10.5 N.m
Weight	46.0Kg
Ingress Protection Rating	IP 20

Note: The IP20 rating applies to the battery module only. When installed inside a Fusion-approved IP55 cabinet, the combined system is suitable for outdoor installation subject to the installation conditions in this manual.



Battery Module (FES-512)





3.3 Electrical Specifications

Rated Voltage	51.2 V
Energy	5120 Wh
Capacity (0.2C5A)	100 Ah
DC Efficiency	96-99% @1C
Charge Type	CC/CV – Float
Charge Voltage – Bulk (CC)	57.0 V ±0.2
Charge Voltage – Absorption (CV)	57.0 V
Charge Voltage - Float	55.2 V
Low Voltage Disconnect	43.2V
Low Voltage Disconnect (Recommended)	45.0V
Maximum Discharge Current	100A
Maximum Charge Current	100A
Maximum Charge Current (Recommended)	50A
Peak Discharge Current	150A (1s)
Short Circuit Current	1754A/8ms
Communication	RS485, CAN
Number of batteries in Parallel	32
Breaker	Yes
Cycle Life (Cycles)*	>8500 @25°C

* Cycle Life is defined based on specific operation conditions, for more details please check with Fusion Batteries service team.

3.4 Environmental Specifications

Rated Altitude	≤ 2000 m
Charge Operating Temperature**	-5~45°C
Discharge Operating Temperature**	-20~45°C
Storage Temperature**	0~55°C
Recommended Temperature	0-45°C
Cooling Type	Natural

** Specifies the temperature of the cells and not the ambient temperature. Ambient temperature and cell temperature may not be the same. Operating outside of specified temperatures will result in permanent capacity loss and void the warranty. Operating at either ends of the range will affect the cycle life; it is recommended to operate at the recommended temperature range listed above.

3.5 Protection Specifications

CHARGE		DISCHARGE	
Over Voltage		**Under Voltage**	
Warning	57.6V (	Warning	45.0V
Protection	58.4V	Protection	43.2V
Recovery	56.0V	Recovery	48.0V
Over Current		**Over Current**	
Protection	>101-104A (20 second delay); >104A (1-2 second delay)	Protection	>101-104A (20 second delay); >104A (3 second delay)
Recovery	Recovery after 60 seconds from protection event	Recovery	Recovery after 60 seconds from protection event
Over Temperature		**Over Temperature**	
Warning	55°C	Warning	55°C
Protection	60°C	Protection	60°C
Recovery	< 50°C	Recovery	< 50°C
Under Temperature		**Under Temperature**	
Warning	-3°C	Warning	-15°C
Protection	-5°C	Protection	-20°C
Recovery	> 0°C	Recovery	> -15°C

3.6 Standards and Certification

- **UN38.3 Transportation**
- **UL 1973**
- **IEC62619**
- **UL9540A**

3.7 Circuit Breaker Specifications

Main Technical Parameters



(Images are for reference only)



(Images are for reference only)

Electrical Parameters

- Rated Operating Voltage:
  1P: AC230/240V; DC60/80V
- Rated Current: 125A
- Rated Insulation Voltage: 500V
- Power-Frequency Withstand Voltage: AC2500V, 50Hz, 1 min
- Rated Ultimate Short-Circuit Breaking Capacity: 10kA
- Rated Service Short-Circuit Breaking Capacity: 7.5kA
- Rated Impulse Withstand Voltage: 4kV

Complies with UL1077 parameter requirements

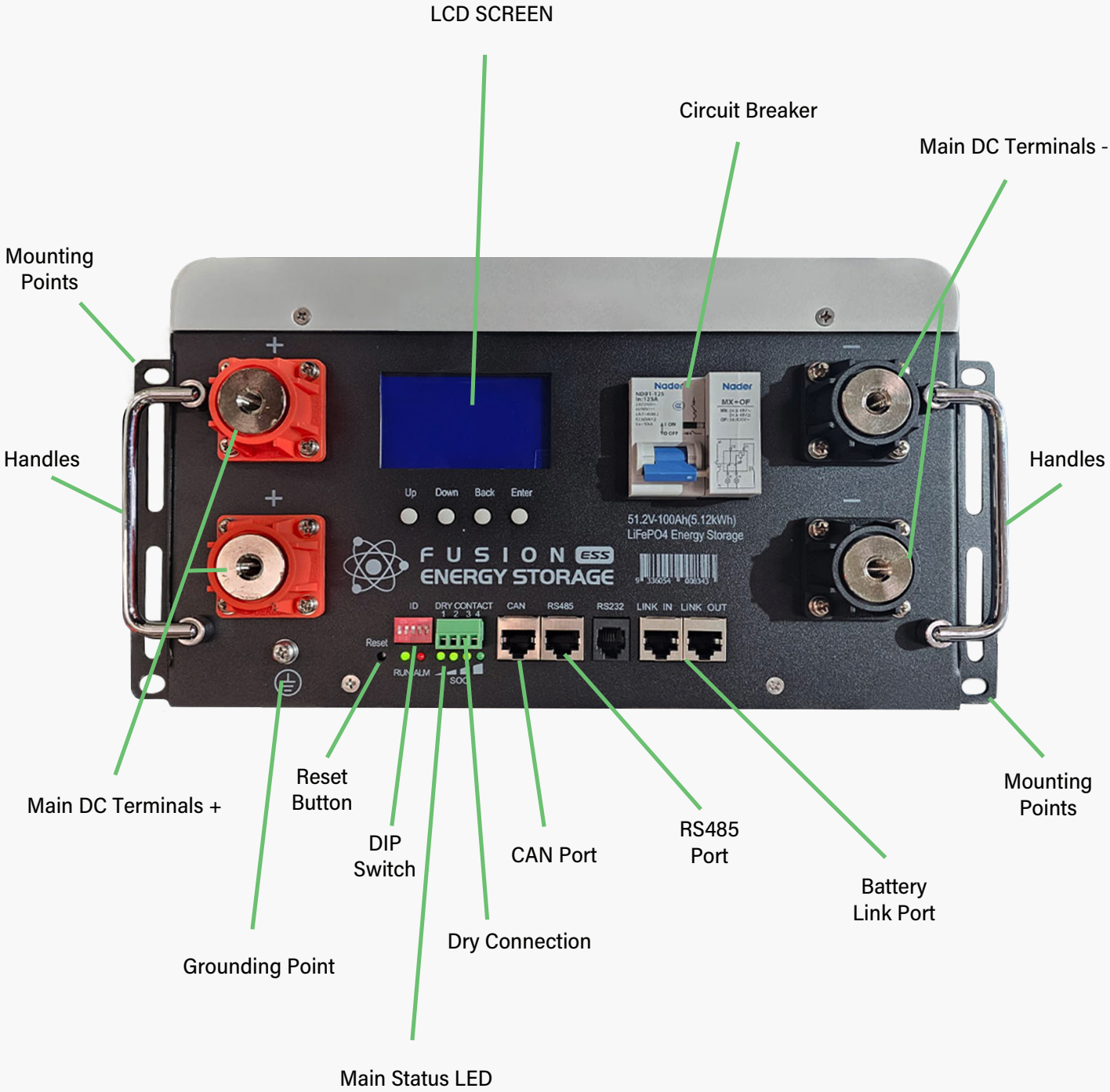
Trip Curve (C)	Type	UG	FW	Maximum V	Freq.Hz	Amp	No. of poles	TC	OL	SC
C	OC	A	0	60 DC	DC	50-125	1-4	2	0	10kA, U2

Isolation Function

- Clear disconnection indication
- Green mark visible in inspection window when contacts are open

★ *For more detailed information on our circuit breaker, please contact Fusion Batteries for an up to date specification sheet.*

4. Module Interface



4.1 LED Status Indicator





Description

1. RUN: Solid green light indicates Standby
2. RUN: Flashing green light indicates Charging or Discharging
3. ALM (Alarm): Flashing red light indicates battery alarm
4. ALM (Alarm): Solid red light indicates battery protection status
5. SOC LED 1: Solid green light indicates 0-25% State Of Charge
6. SOC LED 2: Two solid green lights indicate 25-50% State Of Charge
7. SOC LED 3: Three solid green lights indicate 50-75% State Of Charge
8. SOC LED 4: Four solid green lights indicate 75-100% State Of Charge

4.2 Dry Contact (DO Port)

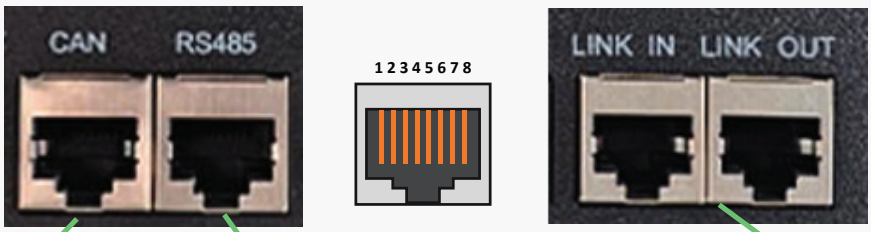


Description

- Pin 1 and Pin 2 are one circuit (DO1)
- Pin 3 and Pin 4 are one circuit (DO2)
- DO1: Close and conduct when SOC is greater than 5%, otherwise open and do not conduct.
- DO2: Open and do not conduct when the device is shut down/sleeping, in alarm, under protection, or in error. Otherwise, close and conduct.

4.3 Communication Ports Pin Definition





CAN Port

PIN No.	CAN Function
1	NC
2	GND
3	NC
4	CANH
5	CANL
6	GND
7	485-A
8	485-B

RS485 Port

PIN No.	RS485 Function
1	NC
2	GND
3	NC
4	NC
5	NC
6	GND
7	485-A
8	485-B

LINK IN / LINK OUT Ports

PIN No.	LINK Function
1	LINK-485B
2	LINK-485A
3	NC
4	NC
5	NC
6	GND
7	LINK-485A
8	LINK-485B

CAN Port

For inverter communication via CAN bus. When connected between the Master battery and the inverter it can summarise data of all linked battery modules.

RS485 Port

For inverter communication via RS485. When connected between the Master battery and the inverter it can summarise data of all linked battery modules.

LINK IN / LINK OUT Ports:

Used to link multiple battery modules for communication in a parallel setup.

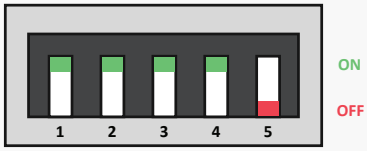
4.4 DIP Switch / Module ID Configuration

When multiple batteries are used in parallel you must configure the ID address of each battery using the DIP Switch. Avoid setting the same address.
The battery that is connected to the inverter must be set as the primary controller (Master), i.e. ID No. 1. All subsequent ID's will be defined as the subordinate device (Slave) and will synchronize its actions with the master.
If only one battery is used you must set it as ID No. 1.
Refer to the below table for each address configuration.

ID NO.	DIP Switch Position				
	1	2	3	4	5
1	ON	ON	ON	ON	OFF
2	ON	ON	ON	OFF	ON
3	ON	ON	ON	OFF	OFF
4	ON	ON	OFF	ON	ON
5	ON	ON	OFF	ON	OFF
6	ON	ON	OFF	OFF	ON
7	ON	ON	OFF	OFF	OFF
8	ON	OFF	ON	ON	ON
9	ON	OFF	ON	ON	OFF
10	ON	OFF	ON	OFF	ON
11	ON	OFF	ON	OFF	OFF
12	ON	OFF	OFF	ON	ON
13	ON	OFF	OFF	ON	OFF
14	ON	OFF	OFF	OFF	ON
15	ON	OFF	OFF	OFF	OFF
16	OFF	ON	ON	ON	ON
17	OFF	ON	ON	ON	OFF
18	OFF	ON	ON	OFF	ON
19	OFF	ON	ON	OFF	OFF
20	OFF	ON	OFF	ON	ON
21	OFF	ON	OFF	ON	OFF
22	OFF	ON	OFF	OFF	ON
23	OFF	ON	OFF	OFF	OFF
24	OFF	OFF	ON	ON	ON
25	OFF	OFF	ON	ON	OFF
26	OFF	OFF	ON	OFF	ON
27	OFF	OFF	ON	OFF	OFF
28	OFF	OFF	OFF	ON	ON
29	OFF	OFF	OFF	ON	OFF
30	OFF	OFF	OFF	OFF	ON
31	OFF	OFF	OFF	OFF	OFF
32	ON	ON	ON	ON	ON





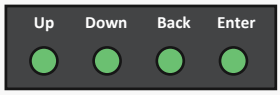


Once the DIP Switch address has been set you must press the RESET button on the module interface. You can view the Module ID No. in the 'System Data' Menu on the LCD screen.

4.5 LCD Screen



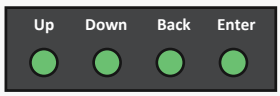
Home Page



Press any button to turn on the LCD screen. The screen will display the battery status. If no buttons are pressed, the Screen will automatically turn off after 3 minutes.



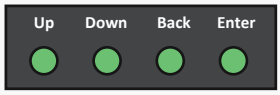
Main Menu Page



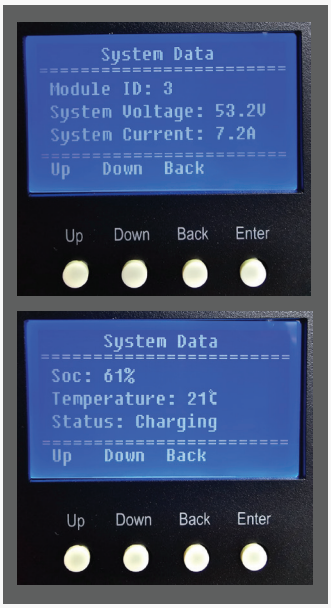
Press any button to enter the Main Manu Page. Use the ‘Up’ and ‘Down’ buttons to navigate through the options. Press ‘Enter’ button to select the option. Press ‘Back’ button to exit the Menu page to the Home screen.



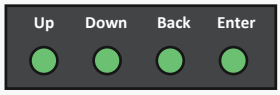
System Data



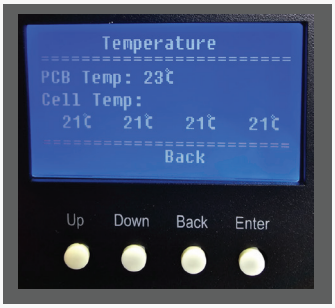
Once System Data has been selected you can view the Module information. Use the 'Up' and 'Down' buttons to navigate the page. Press 'Back' Button to exit the System Data page back to the Main Menu page.



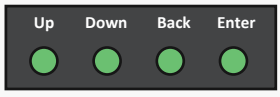
Temperature



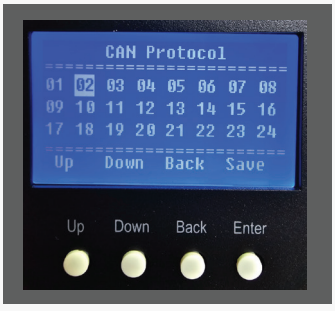
Once Temperature has been selected you can view the PCB and Cell temperature of the module. Press 'Back' Button to exit the Temperature page back to the Main Menu page.



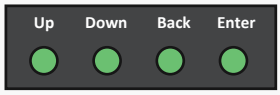
CAN Protocol

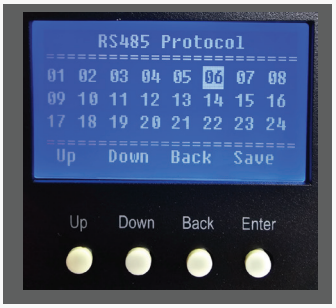


Once CAN Protocol has been selected you can view the protocol setting or change the protocol setting. To change the setting, use the 'Up' and 'Down' buttons to select the desired CAN Protocol setting, then press the 'Enter' button to Save the desired setting. Press 'Back' Button to exit the CAN Protocol page back to the Main Menu page.



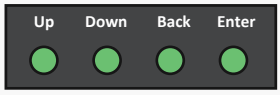
RS485 Protocol





Once RS485 Protocol has been selected you can view the protocol setting or change the protocol setting. To change the setting. use the 'Up' and 'Down' buttons to select the desired RS485 Protocol setting, then press the 'Enter' button to Save the desired setting. Press 'Back' Button to exit the RS485 Protocol page back to the Main Menu page.

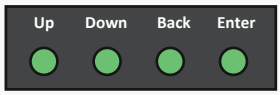
Date & Time





Once Date & Time has been selected you can view or change the date and time. Use the 'Enter' button to toggle through Year-Month-Day and Hour-Minute-Seconds. Use the 'Up' and 'Down' buttons to change the digits. To save, keep toggling through with the 'Enter' button until it saves. Otherwise press the 'Back' button to exit back to the Main Menu page.

DataLog





Once DataLog has been selected you can view data log history. Use the 'Up' and 'Down' buttons to navigate the pages. Press 'Back' Button to exit the DataLog page back to the Main Menu page.

5. Installation

Installation should be carefully considered and all aspects of the specifications should be understood to determine a suitable location and way of installing the battery. It is the responsibility of the installer to ensure that all applicable installation requirements and standards are met.

5.1 Tools

- **Insulated tools sized to match nuts, bolts, and cables**
  - Phillips screwdriver
  - Flat head screwdriver
  - Cable crimper
  - Wire cutter
  - Torque wrench
  - Drill
  - Manual Hydraulic Pliers
- **RMS type Voltmeter or clamp meter**
- **Tape measure**
- **Personal Protective Equipment (PPE)**
  - Insulated gloves
  - Safety goggles
  - Safety shoes

5.2 Label

As per Australian Standards AS4777.1:2016 and AS/NZS 5033: 2021, it is essential that you attach the correct labels in the correct place.

- Battery System Voltage Label
- Danger Risk of Battery Explosion Label
- Danger Toxic Fumes Label
- Warning Arc Flash Hazard Label

5.3 Location

The FES-512 battery module is IP20 rated and intended for indoor installation by default.

Outdoor installation is permitted only when the battery module is installed inside a Fusion-approved IP55 cabinet and installed in accordance with this manual and AS/NZS 5139.

Installation outdoors without a Fusion-approved cabinet is not permitted.

Install the battery module in locations that meet the following requirements:

- Do not install in direct sunlight
- Avoid installing the battery module in an area with high ambient temperature.
- The area must be waterproof and away from an area susceptible to flood or water leakage
- The floor is flat and level
- Away from flammable or explosive materials
- Do not attach the battery module to a frame or mounting location with excessive vibrations
- Must be secured in an approved cabinet or compartment. Secured to a bracket to prevent movement of the battery module and cables
- The battery module must not be installed upside down, on its side or face down
- Must be installed in a ventilated area with either natural airflow (Louvres, vents) or have mechanical ventilation (exhaust fans) if airflow is limited. Ensure air can freely circulate around the battery. Do not install in sealed cupboards, closets or small rooms unless mechanical ventilation is provided.
- Battery modules must sit on top of another module. There must be at least 10mm clearance between each module.

Failure to follow the following location requirements may lead to a deterioration in performance and lifespan of the battery; and will void warranty.

5.4 DC Cables

When battery modules are connected in parallel, use the flexible insulated copper connector (Double-hole M10) with a spacing of 128mm. One Positive and One Negative connector is included with each module. M8 bolts are also provided with each module.





When battery modules are connected in parallel, use a 400mm network communication cable to connect Master module with subordinate modules. Refer to the LINK IN/LINK OUT Ports PIN definition above. One green Communication cable is included with each module.

Instructions:

When connecting the Master battery module to the device (inverter), The battery end of the cable should use an M8 lug and the connection terminal type to the load depends on the device.
If the usage size is 5KW then a 4AWG (25mm^2) cable is required. If the usage is 10KW, then a 2AWG (35mm^2) or higher cable should be used. The cables should be capable of carrying the normally expected current, plus a margin of safety. Using undersized cables may result in a fire.
Manual hydraulic pliers should be adopted for wire harness crimping.
Before connecting the load, the circuit breaker switch needs to be turned to OFF first.
Recommended Torque value of DC connections: ≤10.5 N.m



× 2 Inverter communication cables.

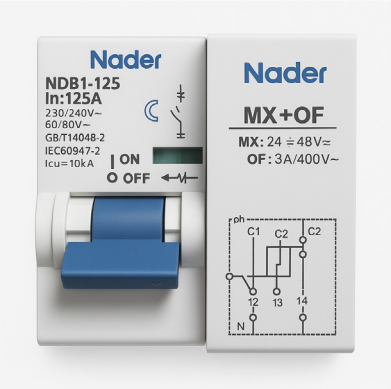
The network communication cable from the Master module to the device will depend on the device. Refer to the inverter setup section below.

5.5 DC Protection



Each Battery module is equipped with an integrated circuit breaker that connects or disconnects power from the battery to the positive and negative terminals.

1. To turn power off – switch must be down and showing green. (See image below)
2. To turn power on – switch must be up and showing red. (See image below)



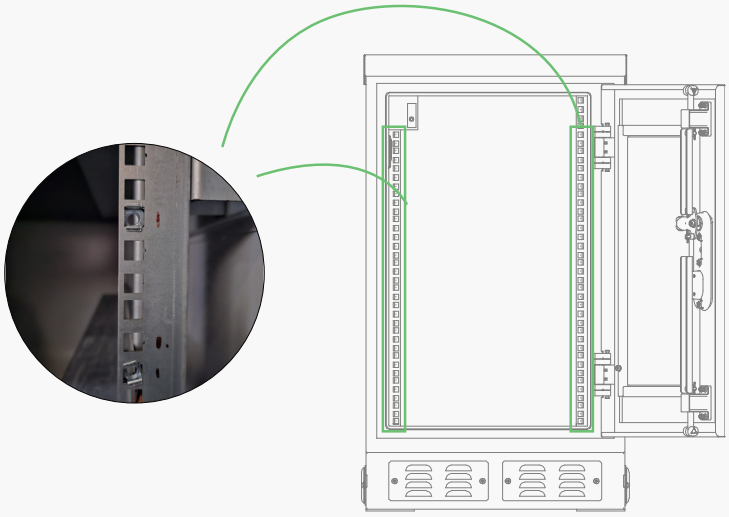
1. Power off



2. Power on

A 2-pole isolation device is required to be installed on the output of the battery system, between the battery bank and Inverter.
Check the circuit breaker to ensure it is the correct type and rating for the system.
Only use approved and certified circuit breakers.
DC protection must be installed on the positive cable and located in proximity to the battery module. For further details regarding proximity and location of the breaker, refer to your local electrical requirements.
Do not use an AC circuit breaker.

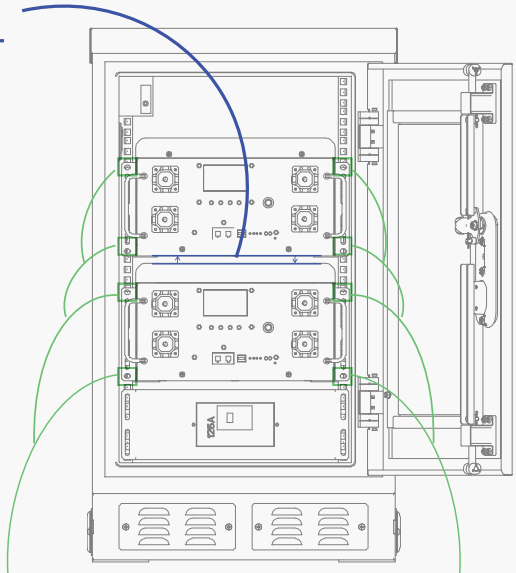
5.6 How to Mount Battery Modules



Battery modules are to be installed into an approved cabinet. The cabinet must have load bearing mounting brackets capable to safely hold the battery module.
For outdoor installations, only Fusion-approved IP55 cabinets may be used. The cabinet must provide environmental protection appropriate for outdoor installation and securely support the battery module.
The cabinet must have load bearing mounting brackets capable to safely hold the battery module.
Mark the position of the nut on the cabinets mounting bracket and clamp the nut into the cabinet.



10mm gap between each module



Install the battery module into the cabinet. Line up the mounting holes on the module with the mounting nuts on the cabinet bracket. Screw the mounting bolts through the modules holes and cabinet bracket and into the mounting nut.
If more than one module is installed in parallel, ensure you leave a minimum 10mm gap between each module.
Be aware, the module is heavy, please use a special lifting device to lift the module into place if necessary.



General Requirements

- The FES-512 battery **must be securely mounted** to prevent movement, vibration, or mechanical damage.
- The installation must comply with **AS/NZS 5139:2019** and **Fusion's installation manual.**
- The battery shall be installed in a **dry, well-ventilated area,** protected from dust, direct sunlight, water, and corrosive substances.
- The area must remain within **ambient temperature limits of 0°C to 45°C.**

Mounting Orientation

- Mount the battery **horizontally,** with **terminals facing forward.**
- Do not mount on its side, end, or upside down.
- Ensure the **mounting surface is level, rigid, and supports at least 50 kg per module.**

Outdoor Installation Requirements (IP55 Cabinet)

Outdoor installation of the FES-512 battery module is permitted only when installed inside a Fusion-approved IP55 cabinet.

The cabinet provides protection against dust ingress and water jets from any direction. Installation is not permitted in:

- Flood-prone locations
- Areas subject to continuous or high-pressure water exposure
- Wash-down areas

The installation location must:

- Allow natural airflow for heat dissipation
- Avoid prolonged direct solar exposure
- Remain within the battery's specified operating temperature range

All clearance, signage, isolation, and impact protection requirements of AS/NZS 5139 must be met.

Mechanical Mounting (Without a Cabinet)

If a standard rack or cabinet is not used, the batteries may be mounted on individual shelves, brackets, or wall-mounted trays, provided that:

a. Structural Support

- Each module is supported on non-conductive shelves or brackets that are securely anchored to the wall or floor.
- Batteries must not be able to slide or shift — use retaining brackets or straps rated for 50 kg minimum.
- The mounting structure must withstand mechanical shock and vibration per AS/NZS 5139 Clause 4.2.4.2.

b. Clearances for Ventilation and Access

Maintain the following minimum clearances around each module:

Area	FES-512	Purpose
Front (terminals side)	≥150 mm	Cable access and airflow
Sides	≥50 mm	Air circulation
Rear	≥50 mm	Ventilation
Between modules (if stacked)	≥100 mm	Heat dissipation
Above top module	≥300 mm	Heat clearance and maintenance
From floor	≥100 mm	Moisture protection and airflow

Separation from Openings and Ignition Sources

The battery modules must be:

Requirement	Purpose
From any window, door, or air vent leading to a habitable room	≥600 mm
From any ignition source (switchboard, gas appliance, outlet, etc.)	≥600 mm
From escape routes or exits	≥600 mm
From non-fire-rated walls	≥100 mm or install a 60-min fire barrier

Ventilation

- The mounting area must allow **natural or mechanical airflow** to prevent heat build-up.
- Do not install inside sealed cupboards or enclosures unless mechanical ventilation is provided.
- The air temperature around the battery must remain below **45°C** during operation

Example Mounting Methods (Without Cabinet)

Option A – Wall-mounted shelf system

- Non-conductive metal or composite shelf.
- Brackets rated for ≥50 kg.
- Batteries secured with bolts, straps or clamps.

Option B – Floor-mounted open rack

- Non-metallic or insulated frame.
- Horizontal stacking with 100 mm gaps.
- Anchored to floor for seismic stability.

Option C – Ventilated bench installation

- On raised, ventilated platform with rear clearance.
- Individual strap restraints per module.

5.7 Grounding

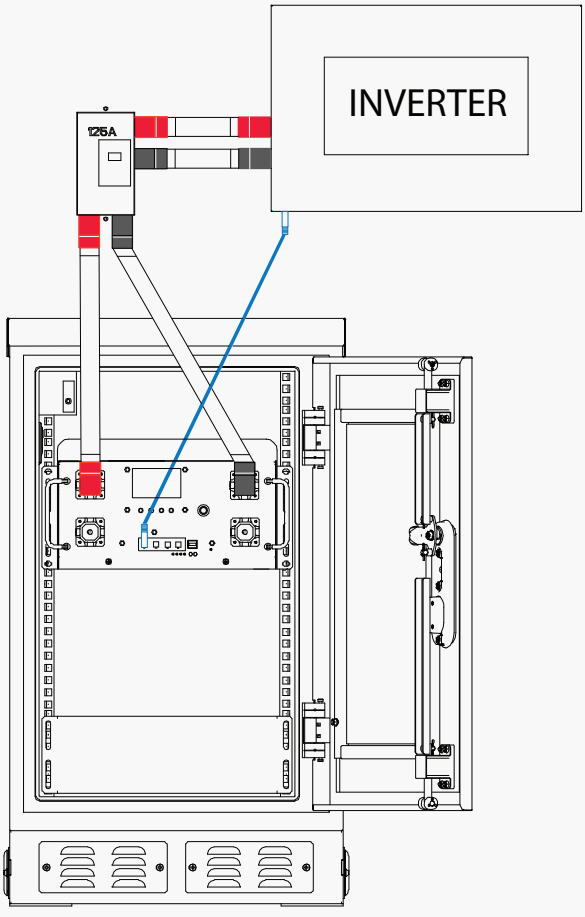




If the battery module is mounted to a rack in the cabinet and the metal surface of the module and the metal surface of the rack is directly touching, then the module is grounded. Otherwise install a grounding cable between the grounding point of all the modules and a suitable grounding point.
The grounding cable must be a yellow-green cable that is 6AWG or higher.
Recommended Torque value of grounding bolt: ⩽4.5 N.m

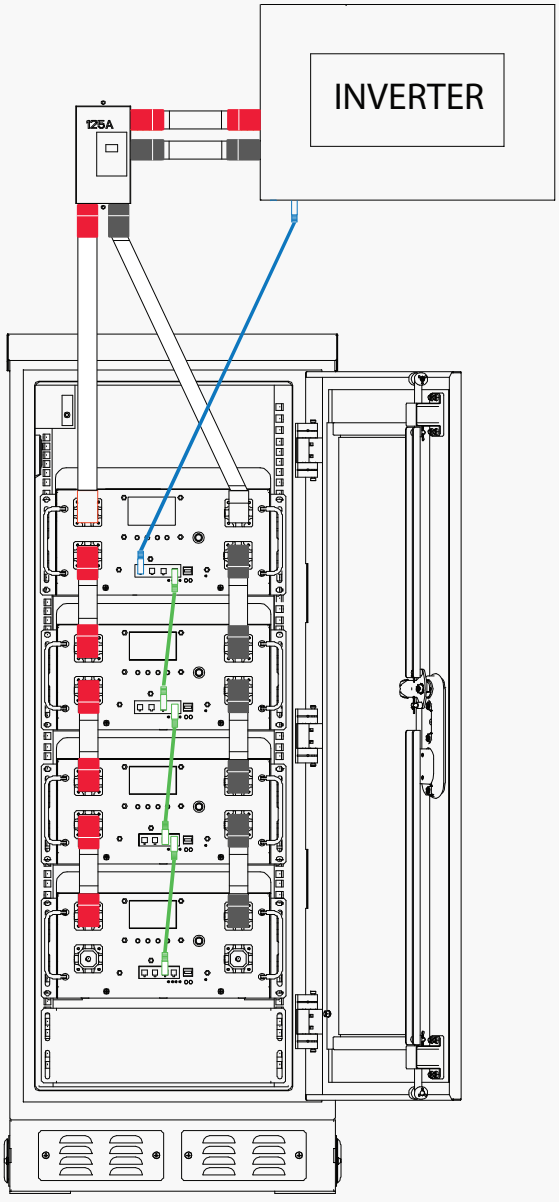
5.8 Single Battery Connection Procedure

1. If the circuit in which the battery module is installed has a disconnect, use the disconnect to isolate the battery module.
2. Set the battery module breaker switch to the OFF position to shut off power to the modules terminals. Use a voltmeter to confirm the modules terminals have powered off.
3. Mount and secure the module to the rack/cabinet.
4. Connect and secure the grounding wire to the grounding point on the module.
5. Connect the positive power cable from the device to the positive terminal on the module. Then connect the negative power cable from the device to the negative terminal on the module.
6. Set the ID Address using the DIP switch as shown in section - DIP Switch – Module ID Configuration
7. Use the 4.5 LCD screen to set the correct Inverter Protocol as shown in section - 4.5 LCD screen.
8. Use a Cat6 network cable, with one end connected to CAN or RS485 port on the module and the other end connected to the corresponding port on the inverter. Note: Refer to the PIN definition drawings provided for each compatible inverter.
9. Set the battery modules breaker switch to the ON position.
10. Press the RESET button on the module interface to apply all the new settings.
11. Close the disconnect device so the battery is no longer isolated and is now connected to the system.



5.9 Parallel Battery Connection Procedure

1. Ensure all the battery modules are the same brand, model, and version.
2. Ensure all battery modules have a similar SOC; no more than a 1.0V difference.
3. If the circuit in which the batteries are installed has a disconnect, use the disconnect to isolate the battery modules.
4. Set each battery modules breaker switch to the OFF position to shut off power to the modules terminals. Use a voltmeter to confirm each modules terminals have powered off.
5. Mount and secure each module to the rack/cabinet.
6. Connect and secure the grounding wire to the grounding point of each module.
7. Using the red flexible copper connection that has been supplied with each module; attach to the bottom positive terminal of the first module using the bolts provided. Then attach the other end of the connector to the top positive terminal on the second module. Repeat this process depending on the number of modules in a rack.
8. Using the black flexible copper connection that has been supplied with each module; attach to the bottom negative terminal of the first module using the bolts provided. Then attach the other end of the connector to the top negative terminal on the second module. Repeat this process depending on the number of modules in a rack.
9. Any terminal that has no connection must have the rubber caps attached.
10. Connect the positive power cable from the device to the positive terminal on the Master module. Then connect the negative power cable from the device to the negative terminal on the Master module.
11. Set the ID Address for each module using the DIP switch as shown in section - DIP Switch – Module ID Configuration.
12. Connect the green communication link cable between each module using the LINK IN/LINK OUT ports on the module interface.
13. Use the 4.5 LCD screen to set the correct Inverter Protocol as shown in section - 4.5 LCD screen.
14. Use a Cat6 network cable, with one end connected to CAN or RS485 port on the Master module and the other end connected to the corresponding port on the inverter. Note: Refer to the PIN definition drawings provided for each compatible inverter.
15. Set each battery modules breaker switch to the ON position.
16. Press the RESET button on each module interface to apply all the new settings.
17. Close the disconnect device so the battery is no longer isolated and is now connected to the system.



* A 2-pole isolation device must be installed on the output of each battery system in the enclosure. This is to ensure compliance with clause 5.3.1.3.9 of AS/NZS 5139: 2019, which mandates an isolation device be installed that operates in all live conductors between each battery system connected in parallel.

5.10 Startup & Shutdown Procedure

1. Pre-Startup Checks

Before powering on:

1. Verify all battery modules are securely mounted or racked.
2. Check all cables and terminals for tight connections — no loose or damaged lugs.
3. Ensure polarity is correct (positive to positive, negative to negative).
4. Confirm the system isolators and circuit breakers are OFF.
5. Ensure the area is well-ventilated and clear of flammable materials.
6. Confirm CAN/RS485 communication cables between batteries and inverter/BMS are connected correctly.
7. Measure voltage at each module with a multimeter — confirm values are within the normal range per module.
8. Confirm that battery and inverter firmware are compatible and configured.

2. Startup Procedure

Step 1 – Turn On Battery Modules

- Switch the battery circuit breaker (on each FES-512 unit) to the ON position.
- The battery indicator LEDs should illuminate. Allow 5–10 seconds for initialization.
- If multiple FES-512 units are connected in parallel, always start all units simultaneously, starting from the Master module.

Step 2 – Communication and BMS Check

- Observe the BMS LEDs: ensure no red fault lights are on.

Step 3 – Power Up Inverter/Charger

- Switch the inverter DC isolator to the ON position.
- Power on the inverter following the inverter manufacturer's startup sequence.
- Confirm system voltage, charge status, and battery recognition.

Step 4 – Verify Operation

On the inverter screen or monitoring app, confirm:

- Switch the inverter DC isolator to the ON position.
- Power on the inverter following the inverter manufacturer's startup sequence.
- Confirm system voltage, charge status, and battery recognition.

3. Shutdown Procedure

Step 1 – Stop Charging/Discharging

- Turn off all connected loads or PV charging sources.
- Wait until the inverter shows zero current to/from the battery.

Step 2 – Turn Off Inverter/Charger

- Follow inverter shutdown instructions and turn OFF the inverter.
- Switch inverter DC isolator to OFF position.

Step 3 – Turn Off Battery Modules

- Switch each FES-512 battery circuit breaker to the OFF position.
- The LED indicators will turn off after a short delay.
- If multiple FES-512 units are connected in parallel, always stop all units simultaneously, starting from the Master module.

Step 4 – Isolate and Secure

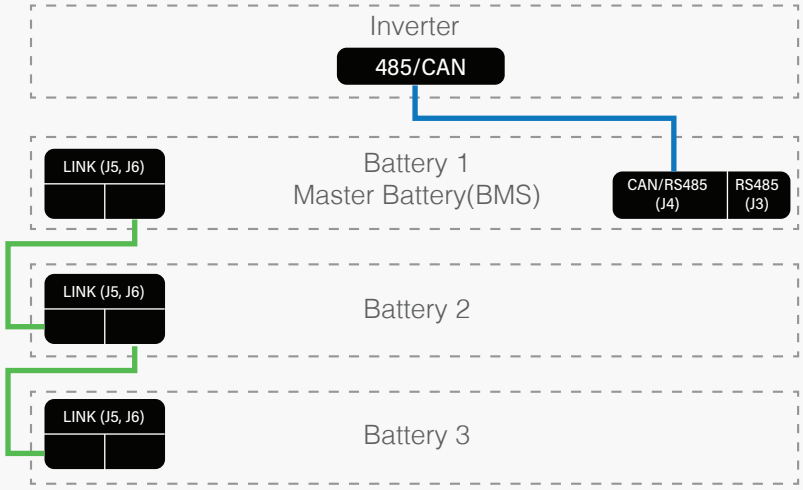
If performing maintenance or storage:

- Disconnect communication cables (CAN/RS485).
- Confirm battery terminals are de-energized using a multimeter.
- Apply insulating covers to terminals if batteries are stored.

6. Communication Protocol

Only the Master Battery module (ID Address 1) must be connected to the inverter. All other subordinate modules must have their address set from ID 2 and ascending in chronological order.
You must connect the CAN/RS485 port of the master battery to your inverter's (or communication device's) BMS communication port. This can be done using the appropriate inverter cable provided. Otherwise you can use a CAT6 cable using the correct PIN definition as shown below.
Link all modules using the green communication cable provided.

Connection Diagram

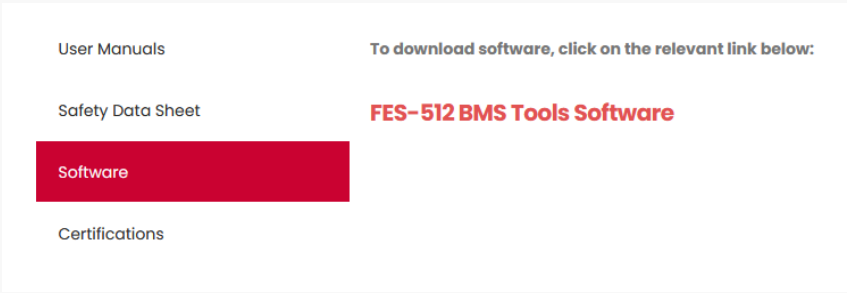


6.1 Software Installation

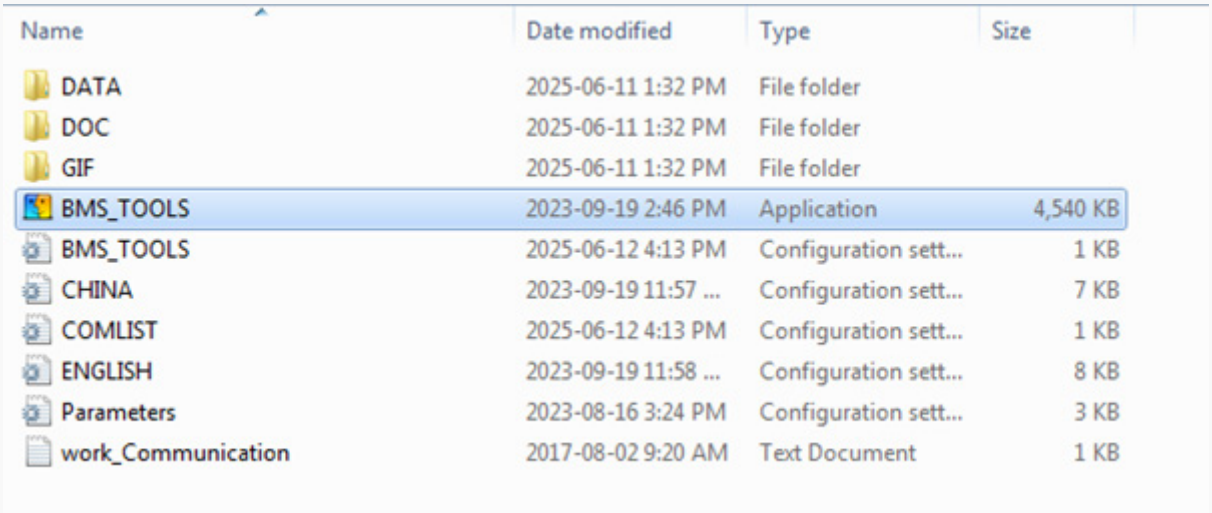
The BMS_TOOLS software provides real-time battery analysis and diagnostics. To use this monitoring software you must first download the software from our website and follow the steps below.

Visit: superstart.com.au/downloads/#software

Download the software compression package to the computer as follows:



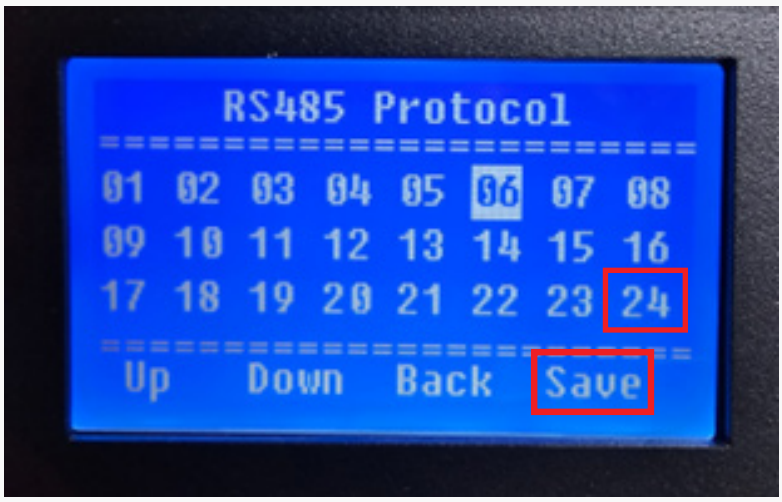
Unzip the compressed package then open the extracted folder and select and open the BMS_TOOLS application:



Name	Date modified	Type	Size
DATA	2025-06-11 1:32 PM	File folder	
DOC	2025-06-11 1:32 PM	File folder	
GIF	2025-06-11 1:32 PM	File folder	
BMS_TOOLS	2023-09-19 2:46 PM	Application	4,540 KB
BMS_TOOLS	2025-06-12 4:13 PM	Configuration sett...	1 KB
CHINA	2023-09-19 11:57 ...	Configuration sett...	7 KB
COMLIST	2025-06-12 4:13 PM	Configuration sett...	1 KB
ENGLISH	2023-09-19 11:58 ...	Configuration sett...	8 KB
Parameters	2023-08-16 3:24 PM	Configuration sett...	3 KB
work_Communication	2017-08-02 9:20 AM	Text Document	1 KB

6.2 Software Installation

1. Turn the battery module ON at the breaker switch.
2. Using the battery module interface menu, select RS485 Protocol and select number 24 (BMS_TOOLS) and save.

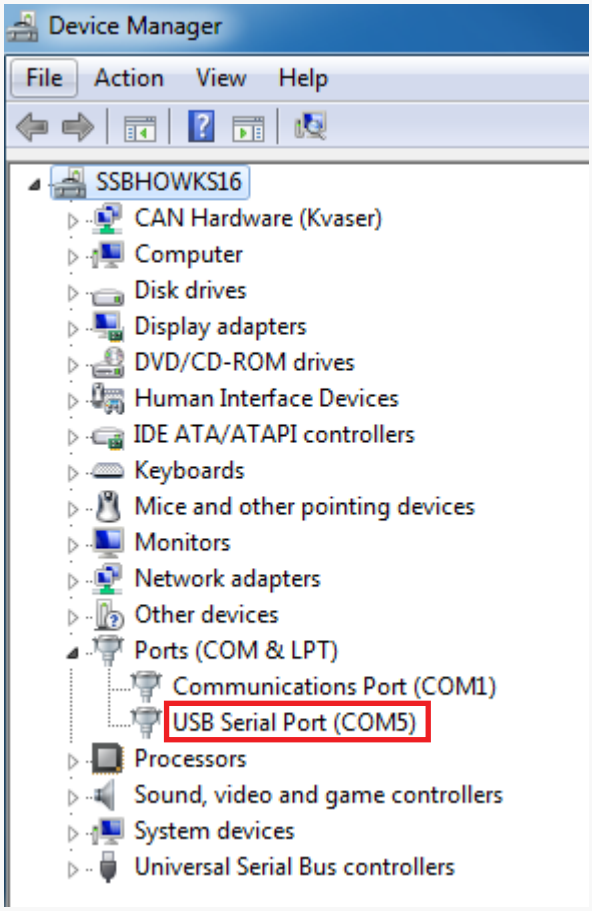


3. Connect a communication cable from the battery to the computer.

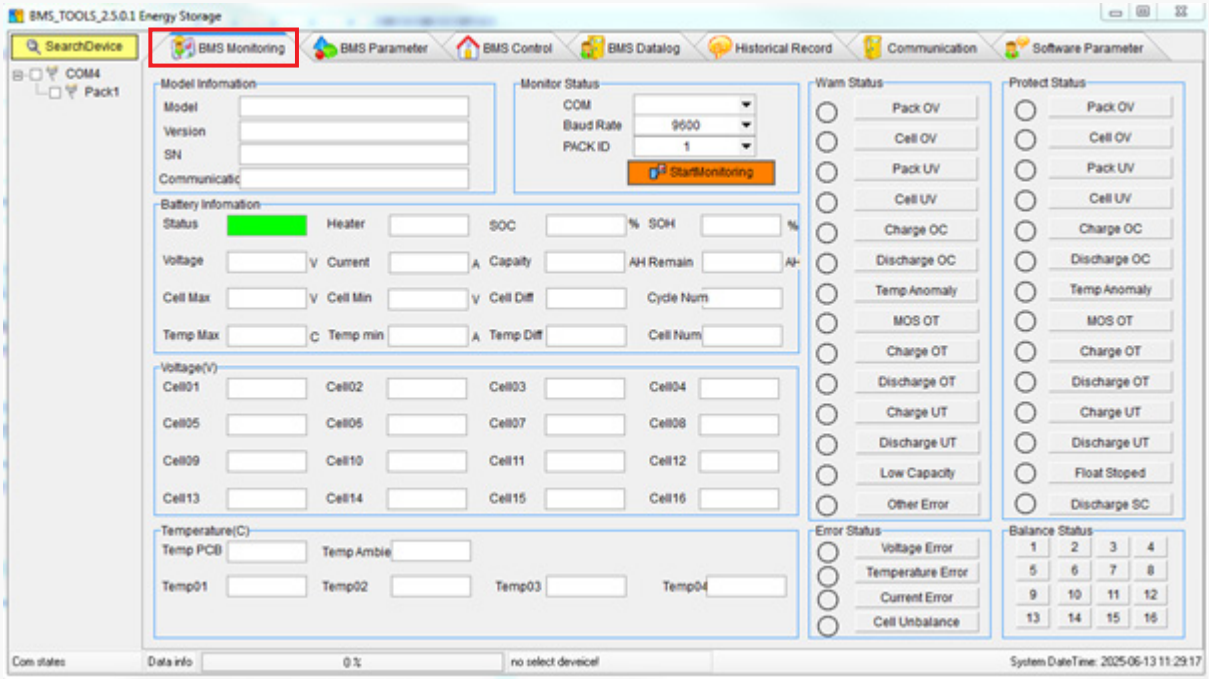
The battery connector must be a RJ45 connector and must be inserted into the RS485 port.
You can refer to the PIN definition section for Pinout specifications.

The computer connection will depend on the computer, either a DB9 or USB connector is suitable.

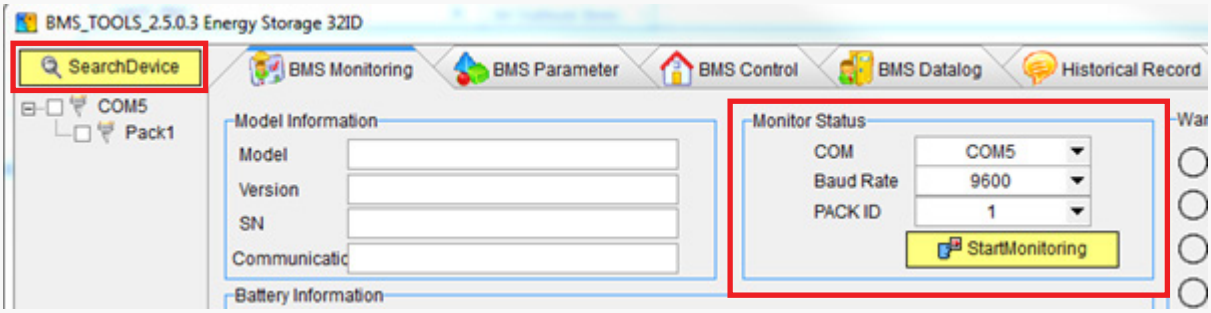
Confirm the connection by opening “Device Manager” on your computer and checking the Ports “COM” number.



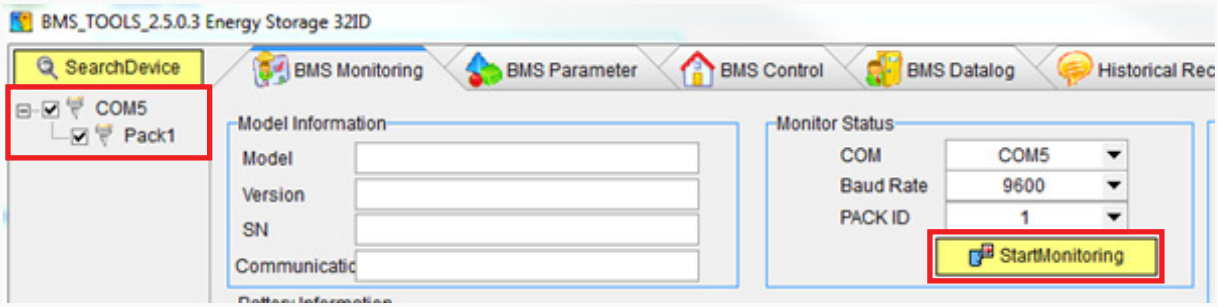
4. Open the BMS_TOOLS software and Select the BMS Monitoring Tab.



5. Under “Monitor Status,” verify “COM” matches the battery COM from the previous “Ports” list. Verify “Baud Rate” is set to 9600, and “PACK ID” is set to 1, then click “SearchDevice.” After about 30 seconds, BMS Tools will begin the monitoring process and pull real-time data from the BMS.



★ *Note: if the device is already showing under the “Search Device” button; tick the box and press “Start Monitoring”*

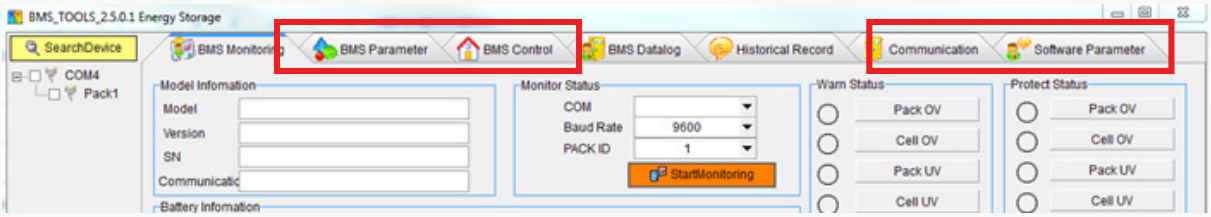


6.3 Software Menu Definition

Although there are multiple tabs in the BMS Tools software, the following tabs should not be tampered with as any unauthorized changes will void the warranty of this product and risk damaging and/or rendering the product permanently inoperable.

- **BMS Parameter**
- **BMS Control**
- **Software Paramter**

If you are experiencing any issues with the battery module or the BMS, please contact your distributor for assistance.



Tab Heading	Definition
BMS Monitoring	Real-time data and status monitoring of the BMS
BMS Parameter	BMS parameter setting management (restricted, unauthorized changes will void warranty)
BMS Control	Control state management of BMS (restricted, unauthorized changes will void warranty)
BMS Datalog	BMS operation data logging to PC (for manufacturer use)
Historical Record	BMS operation data logging to PC (for manufacturer use)
Communication	BMS operation data logging to PC (for manufacturer use)
Software Parameter	Software configuration, settings, and language selection (restricted, unauthorized changes will void warranty)

6.4 Inverter Compatibility & Protocol Selection

The following brands are compatible with the Fusion FES-512 battery modules and have been pre-set into the BMS software. For future updates, contact Super Start Batteries.

- Navigate through the LCD screen to set the CAN/RS485 inverter protocol.

Standard	No.	Inverter Brand
CAN	1	Pylon
	1	Sorotec
	1	MUST
	2	Luxpower
	3	Deye
	4	Sol-ark
	5	Megarevo
	6	GoodWe
	7	Solis
	8	SMA
	9	Growatt
	10	Victron
	11	SenergyInv
	12	Studer
	12	Xcom
	13	Sofar
RS485	1	Growatt
	2	SRNE
	3	Epever
	4	Infinisolar
	4	Axpert
	5	Schneider
	6	Pylon
	24	BMS_Tools

7. Charging

Our batteries are delivered and shipped in a partial state of charge. Prior to discharging the battery it should be fully charged to the float stage.

This first initial charge will allow the battery BMS to perform a cell balance process and ensure all cells are at the same state before regular cycling.

Only use a charger with a lithium charging profile. These generally have 3 stage Constant Current/Constant Voltage (CC/CV) charging profile; Bulk, Absorption and Float. Ensure to adhere to the charging parameters as referenced in the Electrical Specifications and Environmental Specifications sections of this user manual.

When to Charge the Battery Module:

- Opportunity charging is acceptable: It's fine to charge the battery module after each use without negatively impacting its cycle life.
- Partial State-of-Charge is fine: If the battery's state of charge (SOC) is above 10% at the end of discharge, it doesn't need to be charged immediately. However, it's important not to leave the battery in a partial SOC for extended periods, as this can cause the cells to become unbalanced and degrade performance.
- Charge if below 10% SOC: If the battery module's SOC drops below 10%, it should be recharged within 24 hours to prevent permanent damage. Failure to do so can cause irreversible harm to the battery cells in a short amount of time.
- Low charge current prolongs battery life: Charging at 50% of the nominal current or lower can help extend the cycle life of the battery module.
- Charge within the recommended temperature range: Always ensure that the battery is charged within the specified temperature limits to maintain optimal performance and prevent damage.

8. Routine Maintenance

Caution. Before servicing or inspecting the Battery module:

- Refer to the Safety and Safe Handling procedures of this user manual
- Isolate the batteries from the inverter and turn off all modules at the breaker switch
- Disconnect power terminals from all power sources

The battery module does not require maintenance itself, however you are advised to perform routine maintenance as part of your overall system maintenance. We suggest to do this every 6 to 12 months.

Maintenance Checklist:

1. Product cleanliness:

   - Ensure that the installation location is clean and free from debris, obstacles or water.
   - Inspect and clean network and battery connectors of dirt, debris or corrosion.

2. Electrical connections:

   - Ensure that all DC cables, grounding cables and power cables are secure and fasteners are torqued properly.
   - Replace any damaged, frayed or corroded cables.

3. Product Damage:

   - Inspect for cracks or bulging in the battery module case.
   - Replace any damaged or deformed battery modules.

4. Product running status (perform this check once the product is back and running)

   - Ensure all the parameters are correctly set and have not been tampered.
   - Check if the module is operating with any abnormal sounds.

9. Disposal & Recycling

If the product service life expires, please dispose of batteries in accordance with local disposal rules for batteries, electrical equipment and electronic component waste.

Do not dispose of batteries as household waste. Improper disposal of batteries may lead to environmental pollution or explosions.

If the original packaging is available, put the product inside it and then seal it using adhesive tape.
If the original packaging is not available, put the product inside a suitable cardboard box and seal it properly.

If the battery leaks or is damaged, please contact technical support or battery recycling company for disposal.



Li-Ion



10. Related Information

The Fusion battery module FES-512 has a 5 year manufacturer's warranty or an extended 10 year limited manufacturer's warranty; Conditions apply.

For warranty information, refer to the Fusion Battery FES-512 Warranty Terms & Conditions policy document, available from the Super Start Batteries website at

www.superstart.com.au

To register your battery, visit the Super Start Batteries website and complete the registration process.

