ESS Series Battery

User Manual

B20L48V100

B20L51V100

Version: 01.02

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CONTENTS

1 Foreword

Overview

This operation manual mainly introduces the ESS series product introduction, application description, installation, power-on, maintenance and provides instructions for technical support engineers, maintenance engineers and users.

Reader

This document is mainly applicable to the following engineers.

- Technical Support Engineer
- Installation Personnel
- Maintenance Engineer

Symbol in Label, Manual and Product

Sign	Meaning &Description
DANGER	Danger: Indicates a hazard with a high level of risk that will cause death or serious injury if not avoided.
WARNING	Warning: Indicates a hazard with a moderate risk that may cause death or serious injury if not avoided.
ATTENTION	Notice: Indicates a hazard with a low level of risk that may cause minor or moderate harm if not avoided.
NOTE	Explanation: Supplementary explanation of key information in the main text. "Explanation" is not safety warning information, and does not involve personal, equipment and environmental damage information.
	Label for Waste Electrical and Electronic Equipment (WEEE)Directive (2012/19/EU)
	Read the product and operation manual(instructions) before operating the battery system!
	Do not place near open flame.
	Recycle label.
	The certificate label for EMC.
	Warning electric shock.

1 Foreword

Signe	LA description
DANGER	Danger: Indique un danger avec un niveau de risque élevé qui entraînera la mort ou des blessures graves s'il n'est pas évité.
AVERTISSEMENT	Avertissement: Indique un danger avec un risque modéré qui peut entraîner la mort ou des blessures graves s'il n'est pas évité .
ATTENTION	Avis: Indique un danger avec un faible niveau de risque qui peut causer des dommages mineurs ou modérés s'il n'est pas évité.
REMARQUE	Explanation: Explication supplémentaire des informations clés dans le texte principal. "Explication" n'est pas un avertissement de sécurité et n'implique pas d'informations sur les dommages personnels, matériels et environnementaux.
	Label for Waste Electrical and Electronic Equipment (WEEE)Richtlinie (2012/19/EU)
	Lesen Sie die Produkt- und Bedienungsanleitung (Anleitung), bevor Sie das Batteriesystem in Betrieb nehmen!
	Nicht in die Nähe von offenem Feuer stellen.
	Etikett recyceln.
	Das Zertifikatsetikett für EMV.
	Warnung Stromschlag.

2 Safety

2.1 Safety Precautions

Before carrying out battery work, you must read carefully the safety precautions and master the correct installation and connection methods of the battery.

- Prohibit to turn it upside down, tilt, or collide.
- Prohibit to short-circuit the positive and negative poles of the battery, otherwise it will cause the battery to be damaged.
- Prohibit to throw the battery pack into a fire source.
- Prohibit to modify the battery, and it is strictly prohibited to immerse the battery in water or other liquids.
- DO NOT place installation tools on the battery during battery installation.
- DO NOT disassemble, squeeze, bend, deform, puncture, or shred the battery without the authorization of supplier and authorized dealers.
- DO NOT exceed the temperature range, otherwise it will affect the battery performance and safety.
- The battery circuit must be kept disconnecting status during installation and maintenance operations.
- Check the battery connection end bolts regularly to confirm that the bolts are tight.

2.2 Abuse Operation

The battery pack needs to avoid abuse operations under the following (including but not limited to) conditions:

Abuse Operation	Protection Description
Reverse connection of positive and negative poles	If the positive and negative poles are connected reversely, the battery will be directly damaged.
External short circuit	If the battery pack is short circuited externally, the battery will be directly damaged.
Series connection application	The battery pack does not support the application of battery packs in series. If the battery packs are forced to be connected in series, the batteries may be directly damaged, and may even cause fire, explosion and other dangers.

3 Overview

3.1 Product Description

The B20L48V100/B20L51V100 ESS series products use lithium iron phosphate (LFP) as the positive electrode material. It can be widely used in energy storage systems such as residential energy storage, back-up power, and PV self-consumption optimization.

The battery pack is composed of 15 cells/16 cells of LFP batteries in series connection, with low self-discharge, high energy density, and no memory effect. This type of battery also has excellent performance in high rate, long cycle life, wide temperature range, and high safety.

3.1.1 Features

- **High energy density**

  Higher volume ratio energy and weight ratio energy.

- **Maintenance-free**

  The battery pack is maintenance-free in the process of using, which can save customers' battery operation, maintenance testing costs and reduce the frequency of on-site replacement.

- **Long cycle life**

  The battery pack life is 3 times long than the ordinary lead-acid batteries.

3.1.2 Basic Functions

- **Monitor**

  The battery system uses a high-performance BMS, it has protection functions such as over current, over voltage, high and low temperature, etc.

- **Alarm**

  Support abnormal alarms such as over voltage, undervoltage, over current, short circuit, high and low temperature, battery failure, hardware failure, etc.

- **Communication**

  Provide dual RJ45 interfaces, upload alarming and status data through the RS485/ CAN communication protocol.

- **Balance function**

  Support the cells balance function.

3.2 Application Scenario

The battery pack is used to provide backup power, load shifting, peaking shaving and can be used for residential energy storage, solar energy storage and other application scenarios.

If there is a monitoring platform or APP of the customer's terminal Charger/Inverter for battery configuration, then the battery status and data can be easily monitored through the inverter's monitoring platform or APP.

The normal working operation diagram of the battery pack can be as shown in the figure below.

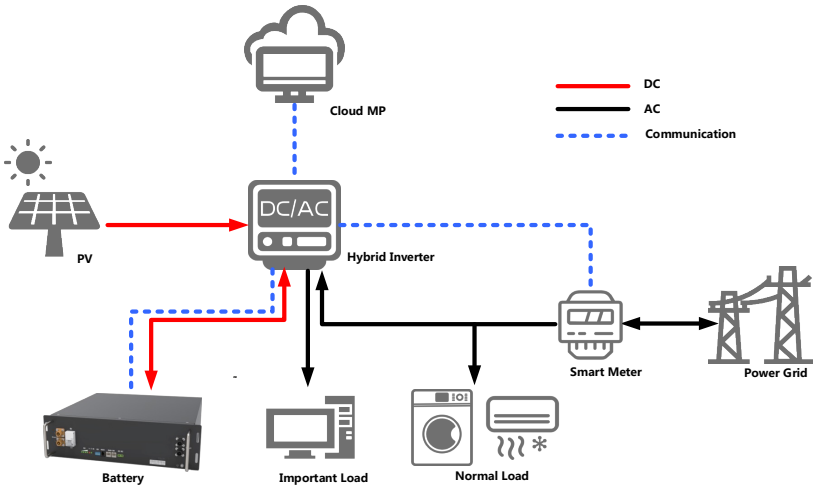


Figure 3-1 Normal Working Operation Diagram of the Battery Pack

4 Application Description

4.1 Low-temperature Application

- **Low-temperature charging**

The battery pack does not support direct charging of the battery below 0°C. When the minimum temperature of the battery is below 0°C, the BMS will cut-off the charging circuit and cannot be charged.

- **Low-temperature discharging**

The battery pack does not support discharge below -20°C. When the minimum temperature of battery is below -20°C, the BMS will cut-off the discharge circuit and cannot discharge.

4.2 Low Battery-capacity Storage (SOC≤5%)

After the battery pack is powered off, there will be BMS static power consumption and self-discharge loss. In actual scenarios, it is necessary to avoid low-battery-power state (SOC≤5%) storage. If it is unavoidable, the longest storage period is 30 days@25°C, 15 days@45°C. The battery needs to be recharged in time after storage, otherwise the battery may be damaged due to over-discharge, and the entire battery pack needs to be replaced.

The following conditions may cause the battery pack to be stored in a discharged state:

- After the utility power failure, the line/fault cannot be eliminated in time, and the power supply cannot be restored for a long time.
- After the installation and commissioning work is completed, the utility power is turned off directly, but the battery pack is not powered off, which will cause the battery to enter the low power consumption mode.
- Other reasons cause the battery pack to fail to enter low power consumption normally.

4.3 Application of Nearing the Ocean

The atmospheric corrosion environment is defined and classified according to the natural environment state, and the A/B environment is defined as follows:

- A. environment refers to the ocean or the land near the pollution source, or the environment with simple shelter (such as awning. "Near the ocean" refers to the area 0.5～3.7km away from the ocean; "Near the pollution source" refers to the area within the following radius: 3.7km from the saltwater lake, 3km from heavy pollution sources such as smelters, coal mines, and thermal power plants, chemical industry, rubber, electroplating, etc. 2km from medium pollution sources such as chemical

industry, rubber and electroplating, etc. And 1km from light pollution sources such as food, leather and heating boilers, etc.

- B. environment. Refers to the environment on land or outside with simple shelter (such as awning within 500m from the coast, or the environment on the sea.

NOTE

- The battery pack can be used under other environmental conditions and cannot be used alone under A/B environment. If it is to be used in the A/B environment, it needs to be equipped with a high-protection air-conditioning cabinet, which is recommended to be IP55 or higher.

4.4 Installation Location Requirements

- Please install the battery pack indoor.
- The area is completely waterproof.
- There are no flammable or explosive materials.
- The distance from heat source is more than 2 meters.
- The distance from air outlet of inverter is more than 0.5 meters.
- The minimum clearance to battery pack is more than 5mm, rack, cabinet or any object is more than 0.5 meters.
- The installation areas shall avoid of direct sunlight.
- There is no mandatory ventilation requirements for battery pack, but please avoid of installation in confined area. The aeration shall avoid of high salinity, humidity or temperature.
- Batteries are not allowed to be installed in the habitable space of the residence.

4.5 Recycling and Disposal

Failed batteries contain varieties of heavy metals, corrosive organic solvent, carbon and other harmful materials, and if they are threw away arbitrarily, it is too harmful to the environment and public health.

Failed batteries need to be recycled and disposed of according to local policies. Supplier can provide the recycling guideline about the lithium battery, which can help the end user to guide how to recycle and dispose the lithium battery.

4.6 Operation Restrictions

- ONLY can support Max. 15 batteries in parallel.
- A single battery connected to the inverter must not exceed 5kW. When more than 4 batteries are connected in parallel, the total power of the inverters must not exceed 16kW.
- DO NOT use batteries with a large state of charge (SOC) gap (>30%) together.
- DO NOT replace the BMS or other components without Solarbatt ‘ consent.
- DO NOT use with different type of batteries that are not form Solarbatt.
- DO NOT use beyond the temperature condition specified in the user manual.
- Do not let the battery go into sleep mode after over-discharge, which will severely damage the battery.
- Maximum discharging energy will not exceed 4 kWh every day within 80% DoD under 35℃.

5 Product Introduction

5.1 Panel Introduction

5.1.1 Panel Function

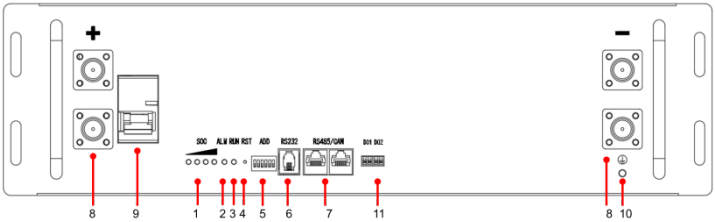


Figure 5-1 B20L48V100 Front Panel

NOTE

- ESS series panel functions take B20L48V100 as an example.

The interface definition as below table：

Table 5-1 Operation Panel Interface Definition

No.	Name	Description	Remark
1	SOC	State of capacity	Details shows in table5-3
2	ALM	Alarm light	Details shows in table5-4
3	RUN	Run state of battery	Details shows in table5-4
4	RESET	Reset switch	Restart battery and recover some certain alarms status
5	ADD	Dip switch	Address range 0~15
6	RJ-11	RJ-11 interface for firmware update	Used only for professional maintenance
7	RJ-45	2*RJ-45 interface for RS485/CAN communication	Details shows in table 5-6
8	Battery Output	Power terminal	-
9	Switch	Power switch	
10	GND	Module ground connection	-
11	Dry Contact (Optional)	NC. / NO. dry contact	

NOTE

- The position or terminal block of the above-mentioned panel interfaces is different for different ESS series products. Please refer to the corresponding product datasheet.

5.1.2 Indicator Description

There are 6 indicators on the operation panel, divided into three categories: 4 green SOC Indicators, 1 red alarm Indicator and 1 green run indicator.

Table 5-2 Indicators Flash Mode

Flash mode	ON	OFF	Common name
Flash Mode 1	0.25 s	3.75 s	/
Flash Mode 2	0.5 s	0.5 s	Slow Flash
Flash Mode 3	0.5 s	1.5 s	/
Flash Mode 4	0.25 s	0.25 s	Strobe

The power indicator is used to identify the current capacity status of the battery. The number of flashing indicators corresponds to different remaining capacity. The specific meaning is shown in the following table.

Table 5-3 SOC Indicator Definition

Number of Indicator	Remaining Capacity Range
1 indicator on	0% < SOC≤25%
2 indicators on	25% < SOC≤50%
3 indicators on	50% < SOC≤75%
4 indicators on	75% < SOC≤100%

The corresponding relationship between battery operation status and indicator operation status is shown in the following table.

Table 5-4 Battery Status and Indicator Operation Mode

Battery Status	Normal/ Abnormal	RUN	ALM	SOC Indicators				Description
-	-	●	●	●	●	●	●	-
Power off/ Sleep	-	OFF	OFF	OFF	OFF	OFF	OFF	-
Standby	Normal	Flash 1	OFF	According to SOC				Flash mode shown in Table 5-2
Charge	Normal	Flash 2	OFF	According to SOC				-
Discharge	Normal	ON	OFF	According to SOC				-
Alarm	Abnormal	According to the state of charge and discharge	Flash 2	According to SOC				Recoverable
Error	Abnormal	OFF	ON	OFF				-

5.1.3 DIP Address

Please assign an address to the battery BMS through the DIP switch to communicate with the battery.

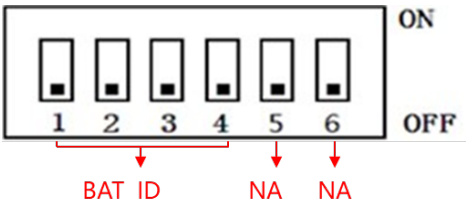
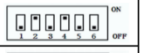
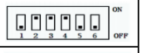
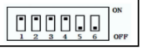


Figure 5-2 DIP Switch

5 Product Introduction

The relationship between DIP address and BMS address as below :

Table 5-5 Correspondence between BMS and DIP switch

DIP 1	DIP 2	DIP 3	DIP 4	BMS Address	BMS Address
OFF	OFF	OFF	OFF	0	
ON	OFF	OFF	OFF	1	
OFF	**ON**	OFF	OFF	2	
ON	**ON**	OFF	OFF	3	
OFF	OFF	**ON**	OFF	4	
ON	OFF	**ON**	OFF	5	
OFF	**ON**	**ON**	OFF	6	
ON	**ON**	**ON**	OFF	7	
OFF	OFF	OFF	**ON**	8	
ON	OFF	OFF	**ON**	9	
OFF	**ON**	OFF	**ON**	10	
ON	**ON**	OFF	**ON**	11	
OFF	OFF	**ON**	**ON**	12	
ON	OFF	**ON**	**ON**	13	
OFF	**ON**	**ON**	**ON**	14	
ON	**ON**	**ON**	**ON**	15	

NOTE

- when installing more than one battery, the addresses need to be assigned according to the number of packs installed.

- When the battery and the external device use the CAN communication mode, the battery(master) connected to the external device is set to 0, and the other packs(slave) are set to 1/2/3 in sequence. For example, three batteries in parallel.

5 Product Introduction

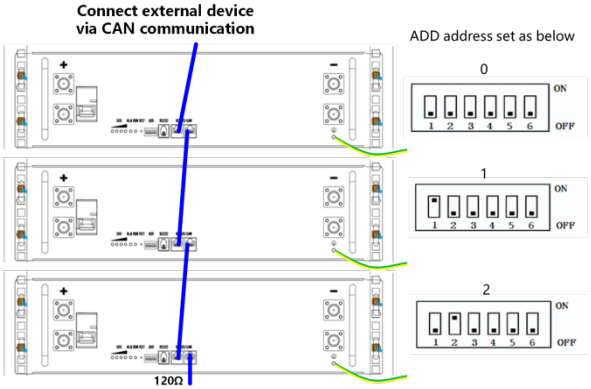


Figure 5-3 ADD Address Setting

• When the battery and the external device use the RS485 communication mode, the battery connected to the external device is set to 1, and the other packs are set to 2/3/4 in sequence. For example, three batteries in parallel.

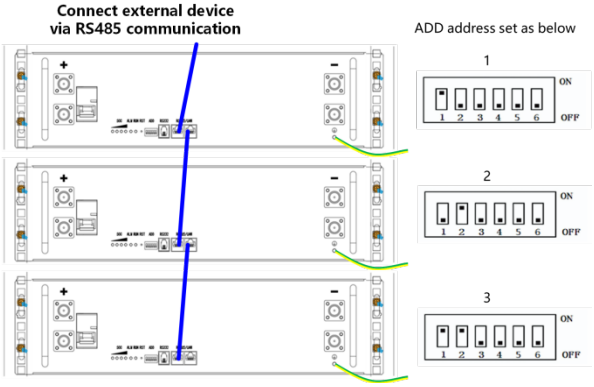
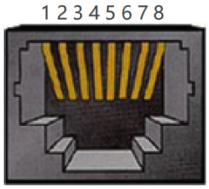


Figure 5-4 ADD Address Setting

5.1.4 Communication Port Definition

RJ 45 definition as below :

Table 5-6 RJ 45 Definition

RJ 45Photo	Pin	Description
	1/2/3	NC
	4	RS485_A
	5	CAN _L
	6	CAN_H
	7	RS485_B
	8	GND

NOTE

• The above is the definition of conventional communication, if you have special needs, please contact supplier or an authorized dealer.

6 Installation

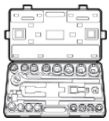
6.1 Tools Preparation

⚠ ATTENTION

- Use insulated tools to avoid electric shock. If tools without insulation protection, you need to wrap the exposed metal parts with insulation tape.

The following table describes the tools and meters that may be used before installation.

Table 6-1 Installation

Manual forklift	Electric forklift	Electric screw driver	Adjustable wrench
			
Phillips screwdriver	Slotted screwdriver	Torque wrench	Claw Hammer
			
Socket wrench	Multimeter	Protective gloves	Helmet
			
Insulated shoes	Anti-static gloves	Goggles	Insulating tape
			

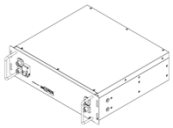
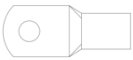
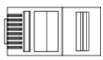
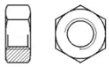
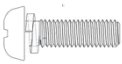
6 Installation

6.2 Open Package Inspection

1 Move the battery to the nearby of site.
2 Open the package and check whether the items are complete.
3 Check the appearance whether there is the damage or leakage.
4 Indoor installation as the battery pack is IP20.
5 Battery pack are designed to be installed in a rack or cabinet.
6 Battery pack rack/cabinet not provided with battery system and are considered outside the scope of product certification.
7 Package items.

6.2.1 Packing List

Table 6-2 Packing List

Battery *1	M6*2	M8*2	Grounding Cable*1
			
120Ω Resistor*1	RJ 45*1	Snap Nut*4	M6*25 Screws*4
			
RJ 45 Dust-proof Plug*3	RJ 11 Dust-proof Plug*1	Serial Number Sticker 1-8 *1	Serial Number Sticker 9-16 *1
		1 2 3 4 5 6 7 8	9 10 11 12 13 14 15 16
Cable Tie*10	User Manual*1	Warranty Card*1	Packing List*1
			

⚠ ATTENTION

- The battery is heavy, if possible, please use tools to assist in handling.

NOTE

- If the damaged or leakage is found in battery, please do not proceed to the next step, and contact supplier or an authorized dealer in time.
- Power and communication cables connect to inverter belongs to an External Cable Kit, not include in battery carton box. They are in another extra cable box.
- If there any cable kit is missing, please contact the supplier or an authorized dealer.

6.3 Installation

1 Make sure the power system is in off state.
2 Put the battery into cabinet or rack.
3 Use 4 M6x25 bolts to fix the battery pack on the cabinet.
4 Take out the ground wires and connect one end to the ground point of the battery pack and the other end to the ground point of the cabinet.

⚠ ATTENTION

The battery pack should be installed by professionally trained person, and it is strictly forbidden to install it without permission.

Use insulated tools during installation to avoid electric shock. If tools without insulation protection, you need to wrap the exposed metal parts with insulation tape.

The battery pack is heavy, and at least 4 manpower must be prepared during the transportation and installation. If possible, please use tools to assist in handling.

※ For the Australian market, when batteries are connected in parallel or to the Charger or Inverter, an overcurrent protection and isolation device (e.g. DC breaker) that isolates positive and negative conductor simultaneously must be installed between parallel batteries and also between inverter and battery system.

※ In Australia installations must comply by AS/NZS 5139 by law.

6 Installation

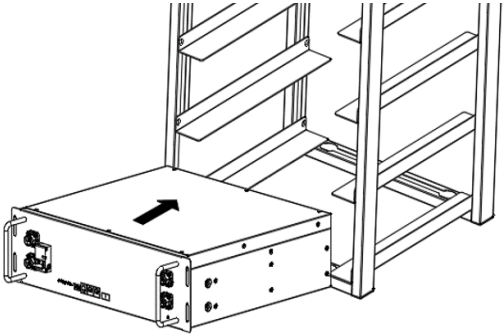


Figure 6-2 Install in a Rack

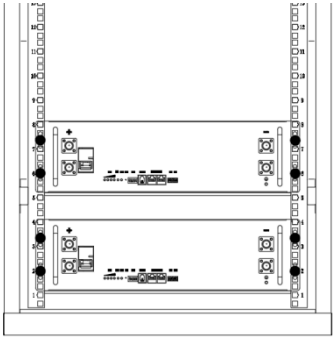


Figure 6-3 Install in a Cabinet

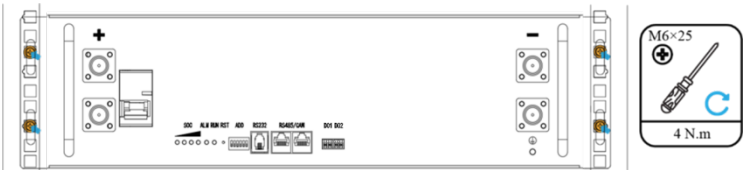


Figure 6-4 Fix Battery Pack by M6x25 Bolts

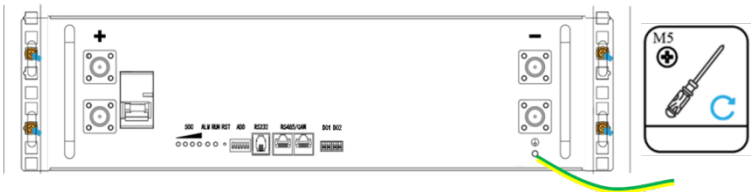


Figure 6-5 Battery Pack Ground

6.4 Cable Connection

6.4.1 Power Cable Connection

Use the negative power cable to connect the negative bus bar with the battery negative ('-') terminal, and use the positive power cable to connect the positive bus bar with the battery positive ('+') terminal.

A. 【5/6kW inverter】Power Cable Connection---This wiring method is only allowed when the system is only equipped with a 5kW/6kW inverter.
The last power cable that connected to the inverter needs to be configured. according to the actual current that may exceed 100A.

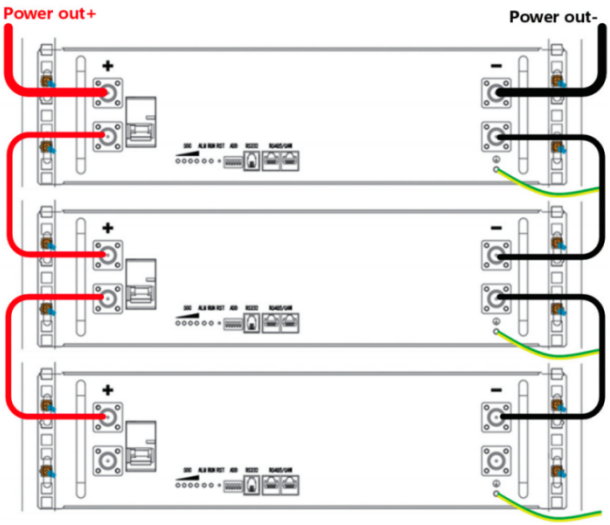


Figure 6-6 Connect the Battery Power Cables

B. 【≥8kW inverter】Power Cable Connection--- This wiring method is suitable when the output input current of the battery is greater than 100A. In this wiring method, the power cables of the battery need to be connected to the bus-bars.

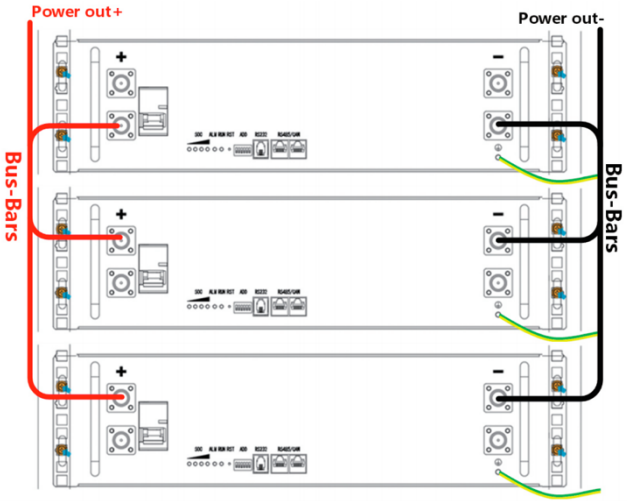


Figure 6-7 Connect the Battery Power Cables to the Bus-bars

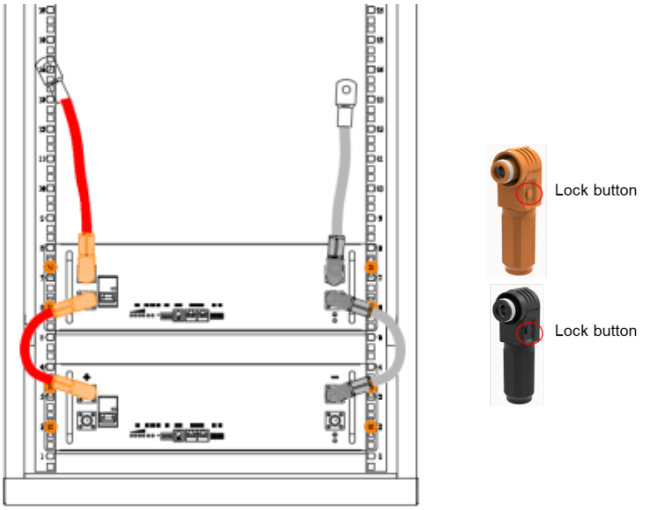


Figure 6-8 Connectors

NOTE

- For power cables use water-proofed connectors. must keep pressing this Lock Button while pulling out the power plug.

6.4.2 Communication Cable Connection

Use the communication cable to connect the battery packs in series through the RS485/CAN communication port, and connect the battery packs at the end to the external device BMS port. The communication cable pins refer to "Table 5-6 RJ45 Definition".

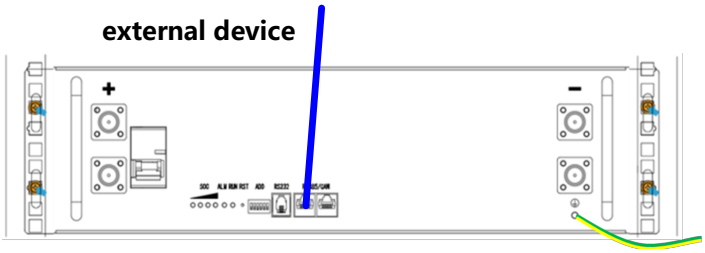


Figure 6-9 Connect RS485/CAN Communication Cable

6.4.3 120Ω Resistor Connection

To ensure stable CAN communication with the external device/Inverter, please take out a 120Ω resistor from the 'Battery Kit' and insert it into the RJ45 port of the battery that communicates farthest with the external device/Inverter.

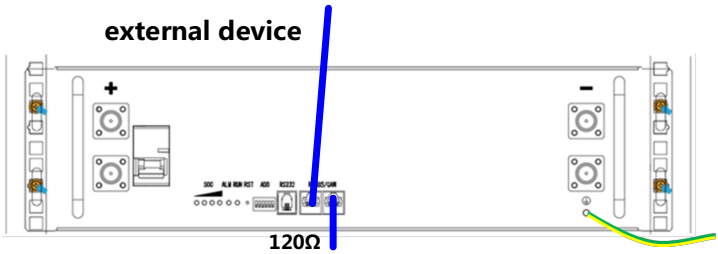


Figure 6-10 Connect 120Ω Resistor

6.5 DIP Address Setting

Assign addresses to battery packs by dialing the dialing keys of the dialing switch. DIP address please refer to ‘5.1.3 DIP Address’ .

⚠ATTENTION

- Before connecting cables, make sure that the bus-bars at the user end are in a power-off state.
- Pay attention to the polarity of the battery pack.
- Communication cables and power cables must be laid separately.
- Connect the negative power cables of all battery packs first, and then connect the positive power cables.

7.1 Power-on Operation

1 Power on the charger/inverter at the user terminal.

2 Turn on the isolation devices (e.g. DC breaker) between batteries and the charger/inverter and between parallel batteries.

3 Set the lithium battery MCB/Switch to ON (if available).

4 Observe Run/Alarm indicator and judge the battery operating status. If the RUN indicator of the battery is on and the ALARM indicator is off, indicating that the battery is working normally. Otherwise indicating the battery is not working, you need to reconfirm whether the cables are connected well.

7.2 Power-off Operation

1 Turn off the Charger or Inverter power source.

2 Switch off the isolation devices (e.g. DC breaker) between batteries and the charger/inverter and between parallel batteries.

3 Turn off the power switch of battery pack.

7.3 Power System Parameter Setting

Table 7-1 Parameter Setting

No.	Parameters	Units	Standard Value	
			15S	16S
1	Rated voltage	V	48.0	51.2
2	Rated power	W	2400	2560
3	Recommended charge voltage	V	54.0	57.6
4	Recommended charge current	A	0.2C	0.2C
5	Charge current limitation	A	0.5C	0.5C
6	Maximum charge/discharge current	A	98±2	98±2
7	Over current	A	> 100	> 100
8	Condition to cut off float charge	A	0.05C	0.05C
9	Charging operation temp.	℃	0~60	0~60
10	Discharge operation temp.	℃	- 20~60	- 20~60
11	RH	/	10%~95%	10%~95%

7.4 UIWare Configuration

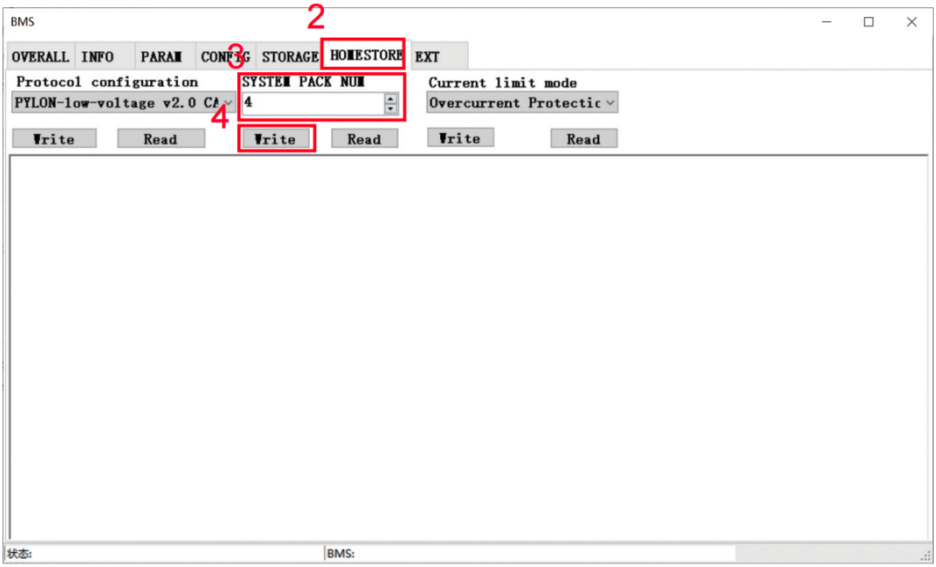


Figure 7-1 Configuration Page

1 Connect the UIWare by computer successfully.

2 Click the 'HOMESTORE' page.

3 Select the actual number of batteries in parallel connection on the 'SYSTEM PACK SUM'

4 Click the ‘Write’ button to finish the setting.

5 Restart the battery.

NOTE

- Please refer to the “UIWare User Manual” for more UIWare operations.

7.5 Check by UIWare

Connect the PC UI software to confirm the system running information been displayed normally. If the displays normally, then we can know the battery is well. and the parameter settings are right.

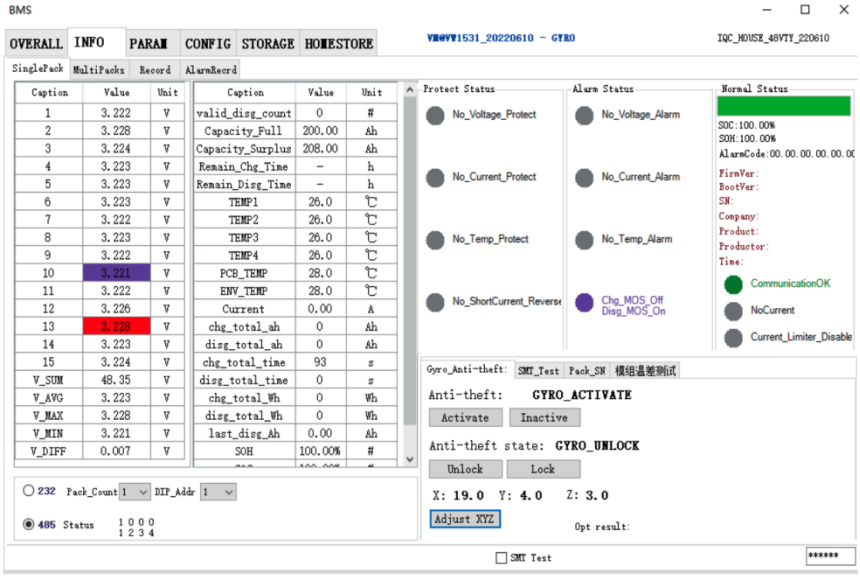


Figure 7-2 Page of UI Software

7.6 Wake Up Battery from Sleep Mode

If the inverter does not have a forced charging function or the battery and the inverter fail to communicate, the battery will enter sleep mode to protect itself.

And if the battery enters sleep mode, the battery must be charged and woken up within one week, or manually restarted within one week.

NOTE

- The content in the table is just our suggestion, and actually need to refer to the customer's design requirements.
- The setting items of different chargers will be different.
- Follow strictly the power-on procedure to power on the battery pack, otherwise it will cause damage to the device or human body.
- Make sure the charger is powered on before turning on the Battery MCB/Switch.
- Must not change the parameters optionally in the site.
- Batteries will continue charge/discharge until BMS protection if there is Lead-acid mode between battery and charger / Inverter.
- After batteries goes into the sleeping status, please restart the battery MCB/switch or charge the battery within one week.

8 Shipment & Maintenance & Storage

8.1 Shipment

It is suitable for the transportation of vehicles, ships and airplanes. During transportation, shading, sun protection and civilized loading and unloading should be performed. The box containing the product is allowed to be transported by any means of transportation. In the process of loading and unloading, the battery should be handled with care to prevent falling, rolling, and heavy pressure. Avoid direct rain and snow and mechanical impact during transportation.

And here is the suggestion for the initial SOC before shipment by different transportation:

- Airplane: 30%
- Sea :50%
- Vehicle:50%

NOTE

- Whether the loading SOC status of the battery is allowed, you need to consult the relevant government transportation department.

8.2 Maintenance

8.2.1 Battery Maintenance Considerations

When maintaining the battery, it is required to use insulated tools or wrap the tools in insulation.

- DO NOT place any debris on the top of the battery.
- DO NOT use any organic solvents to clean the battery.
- DO NOT smoke or use naked flames near the battery.
- After the battery is discharged, the battery should be charged in time to avoid affecting the battery life.
- When not using the battery for a long time, please charge the battery to 40%~50% charged state. Long-term storage with low battery may damage the battery.
- All maintenance work must be carried out by professionals.

8.2.2 Routine Maintenance

The staff should perform visual inspection on B20L series battery according to the inspection plan, please refer to the following table for maintenance.

Table 8-1 Routine Maintenance (Every three-month)

Items	Standard	Dealing
Battery Appearance	● The surface is neat and clean without stains. ● The terminals are in good condition. ● The battery pack shell is intact, and there is no bumps, breaks, or leakage. ● The appearance of the battery pack does not leak. ● No deformation or swelling of the shell.	● If the surface is dirty, clean the appearance of the battery pack with a cotton cloth. ● The battery pack terminal is damaged, replace the cable. ● If the appearance is damaged, leaking or deformed, take a photo and replace the defective battery pack. ● Please contact supplier in time for other abnormal situations.
Alarm	● No Alarm.	● Find the solution as per alarm information.

NOTE

- Suggested routine maintenance for every three-month.

Table 8-2 Routine Maintenance (Every six-month)

Items	Standard	Action
(Suggested) Complete Cycle	● There is a complete charge & discharge cycle under the equipment no lack of power.	● Check whether happens alarm action, and please check with the alarm list. ● Please contact with supplier if the alarm still exists.
Cables	● There is no aging of the connecting wire and no cracking of the insulation layer. ● The bolts at the cable connection are not loose.	● Replace the faulty connection. ● Fastening bolts.

8.3 Battery Storage

- The recommended storage temperature is 15℃~35℃.
- Battery performance degradation after long-term storage, please shorten shelf time as possible as you can.
- Recharge charge before using to recover capacity loss of self-discharge during storage and transport.
- Storage battery should be at 40%-50%SOC when the battery is not used for a long time.
- Storage battery over 40°C or under 0°C will reduce battery life.
- Storage battery in dry and low temperature, well ventilated place.

If the battery is not used for a long time, the battery must be charged at regular intervals. The charging requirements are as follows：

Table 8-3 Battery Charge Requirement in Storage Status

Storage Temp.	Charge Period	Charge Process
20℃~30℃	Every 6 months	1.Charge by 0.2C to 100% SOC 2.Discharge by 0.2C to 0% SOC 3.Charge by 0.2C to 40%~50% SOC
0℃~20℃ or 30℃~40℃	Every 3 months	

9 Trouble Shooting

Please refer to the table below to deal with common faults :

Table 9-1 FAQ

Phenomenon	Possible cause	Solution
The indicator does not flash	● The power cable of the battery pack is not properly connected. ● The power switch is off. ● The BMS is in a sleep state. ● BMS is damaged.	● Reconnect the power cable of the battery pack. ● Turn on the power switch. ● Charge the battery pack. ● Replace BMS.
Unable to discharge	● The terminal of the battery pack is damaged. ● BMS communication failure. ● The power switch is off.	● Replace the battery pack wiring terminals. ● Reconnect the communication line between the BMS and the battery pack. If the communication cable is damaged, replace the communication cable. ● Turn on the power switch.
Unable to charge	● The charger is malfunctioning. ● The terminal of the battery pack is damaged. ● BMS communication failure. ● The power switch is off.	● Replace the charger. ● Replace the battery pack wiring terminals. ● Reconnect the communication line between the BMS and the battery pack. If the communication cable is damaged, replace the communication cable. ● Turn on the power switch.
Communication fail	● The power switch is off. ● The BMS is in a sleep status. ● The communication cable is damage.	● Turn on the power switch. ● Charge the battery pack. ● Replace the network cable.
Inaccurate voltage display	● The voltage sampling line is damaged. ● BMS is damaged.	● Replace the voltage sampling line. ● Replace BMS.
Low capacity	● The battery pack has not been maintained for a long time. ● The single battery is damaged. ● Inaccurate voltage sampling.	● Use an equalizer to maintain the battery pack. ● Replace the damaged single battery. ● Replace the electrical sampling line or replace the BMS.
Low cell voltage	● The battery pack has not been maintained for a long time. ● The single battery is damaged. ● Inaccurate voltage sampling.	● Use an equalizer to maintain the battery pack. ● Replace the damaged single battery. ● Replace the electrical sampling line or replace the BMS.

10 Warranty

Except for the following and the conditions specified in the contract, you can go to supplier and authorized dealers for reasonable warranty and maintenance.

1 Failure of equipment caused by unauthorized disassembly and maintenance operations without the authorization of supplier and authorized dealers is not within the scope of the warranty.

2 Equipment damage caused by negligence during storage and transportation is not covered by the warranty.

3 The damage to the equipment caused by continuous overload work outside the electrical parameters of the equipment is not covered by the warranty.

4 Unauthorized testing of the equipment without the authorization of supplier and authorized dealers will not be covered by the warranty.

5 Non-equipment problems, adverse consequences caused by operation and matching problems are not covered by the warranty.

6 Equipment damage caused by natural forces, force majeure, and uncontrollable factors, such as earthquakes, typhoons, tornadoes, volcanic eruptions, floods, lightning, heavy snow, and wars, is not covered by the warranty.

7 If the product serial number is changed, blurred, or torn, it is not covered by the warranty.

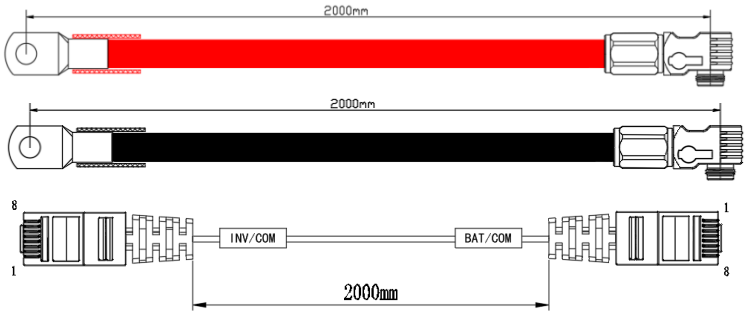
11 Abbreviation

BMS	Battery Management System
D	Depth
H	Height
LCD	Liquid Crystal Display
LFP	LiFePO4
MOSFET	Metal-Oxide-Semiconductor Field-Effect Transistor
NTC	Negative Temperature Coefficient
PC	Personal Computer
PCB	Printed Circuit Board
PCS	Power Conversion System
RTU	Remote Terminal Unit
SOC	State of Charge
W	Width

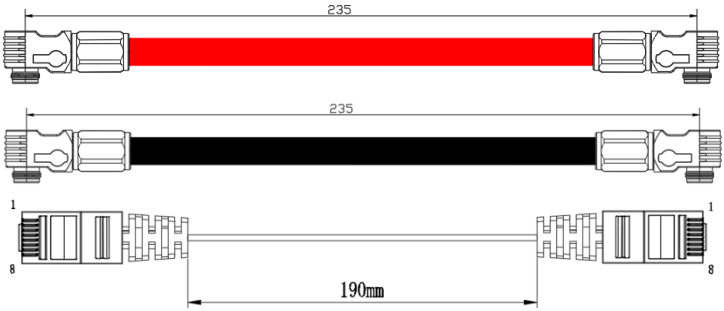
12 Extra Supplies Available Battery Cable Kit for Purchase

The following battery cable kits are optional and need to be purchased separately from Solarbatt or the authorized dealers if required.

- Master Battery Cable Kit - used for connecting between batteries and the inverter.
  - 2pcs 2000mm 4AWG power cables (peak current capacity 120A, constant 100A)
  - 1pcs 2000mm RJ45 communication cable



- Slave Battery Cable Kit - used for parallel connection between batteries.
  - 2pcs 235mm 4AWG power cables
  - 1pcs 190mm RJ45 communication cable



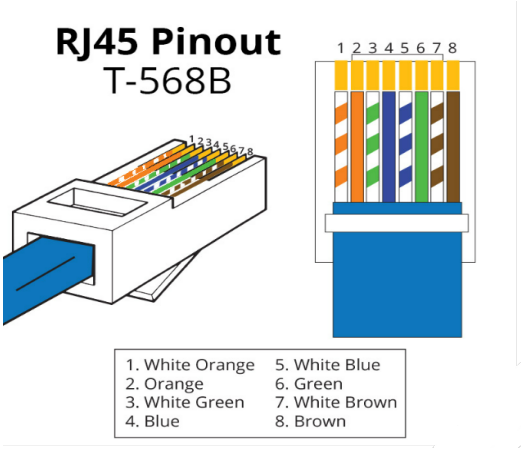
Appendix 1.

Z31 Hybrid Inverter Communication with Solarbatt Battery

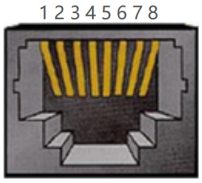
1. Verify the cable CAN communication connection with the Z31 Inverter 5KW/6KW/8KW/10KW with Solarbatt battery as per the below diagram.

➢ RS485 Cable

- An RS485 cable can be used to plug a CAN and RS485 cable into the single BMS/Battery port of the Z31 Single & Three phases Inverters.
- You need to make the cable as per the below-mentioned PIN configuration.



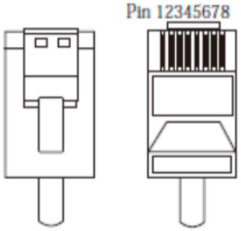
2. Battery CAN port pinout connections for B20L48V100&B20L51V100 battery.

RJ 45Photo	Pin	Description
	1/2/3	NC
	4	RS485_A
	5	CAN _L
	6	CAN_H
	7	RS485_B
	8	GND

3. Z31 5KW/6KW/8KW/10KW Hybrid Inverter CAN pinout –

4.6.1 BMS Connection (Only for Lithium Battery)

RJ45 Terminal Configuration of Battery Communication (BMS)

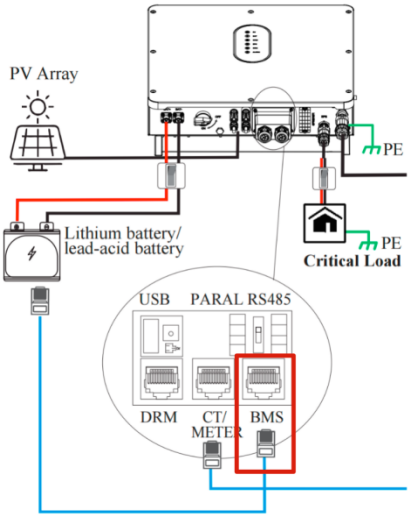


PIN	1	2	3	4
Function Description	RS485_A	RS485_B	GND_S	GND_S
PIN	**5**	**6**	**7**	**8**
Function Description	GND_S	GND_S	CAN_L	CAN_H

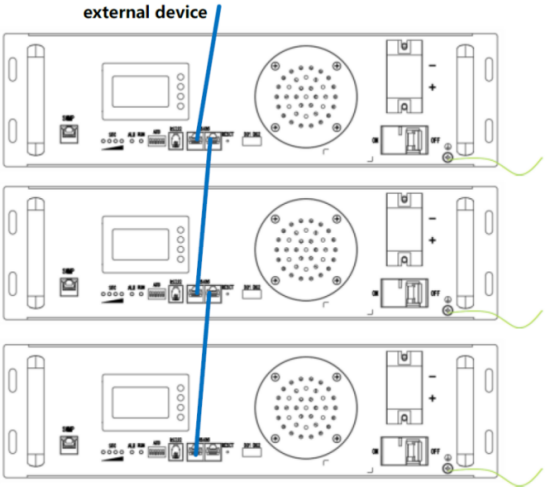
@ Final Cable Definition

Can PIN	Battery PIN	Inverter PIN
Can Low	5	7
Can High	6	8

4. You need to connect the communication cable in inverter & battery BMS port.

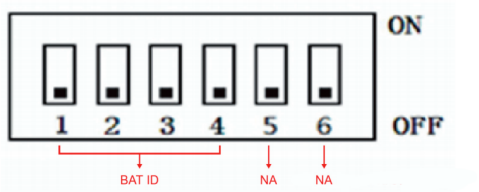


Connect the RS485 communication cable to the battery RJ 45 port.



5. Dip Switch (BMS Address) should be 0 (All Off) for CAN connection for batteries.

To communicate with the battery, you need to assign an address to the battery BMS through the DIP switch.



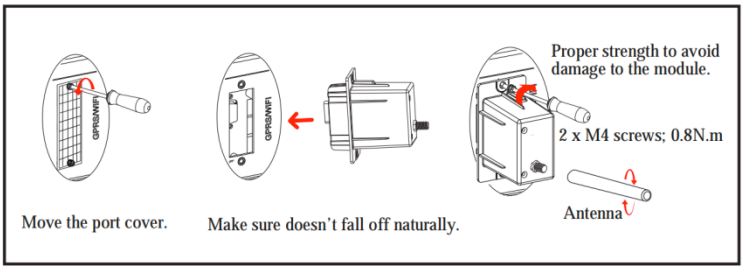
DIP 1	DIP 2	DIP 3	DIP 4	BMS Address	BMS Address
OFF	OFF	OFF	OFF	0	
ON	OFF	OFF	OFF	1	

6. Insert the WiFi Module in the inverter.

4.6.7 GPRS/WiFi Module Connection (Optional)

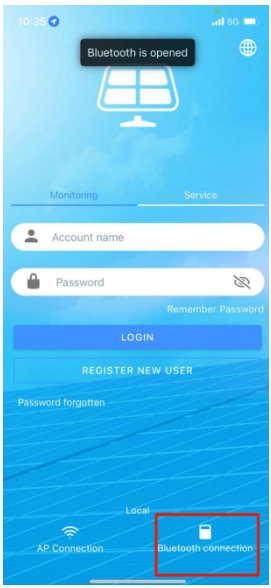
GPRS/WiFi module connection please refer to below.

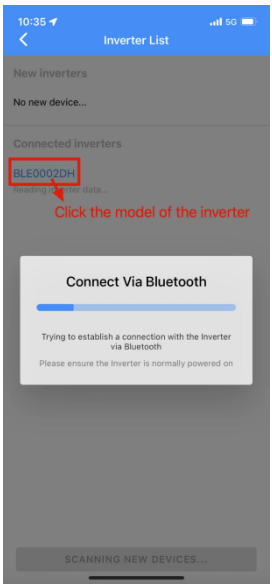
For details about APP settings, see the WIFI/GPRS Module Installation Guide in the packing case.

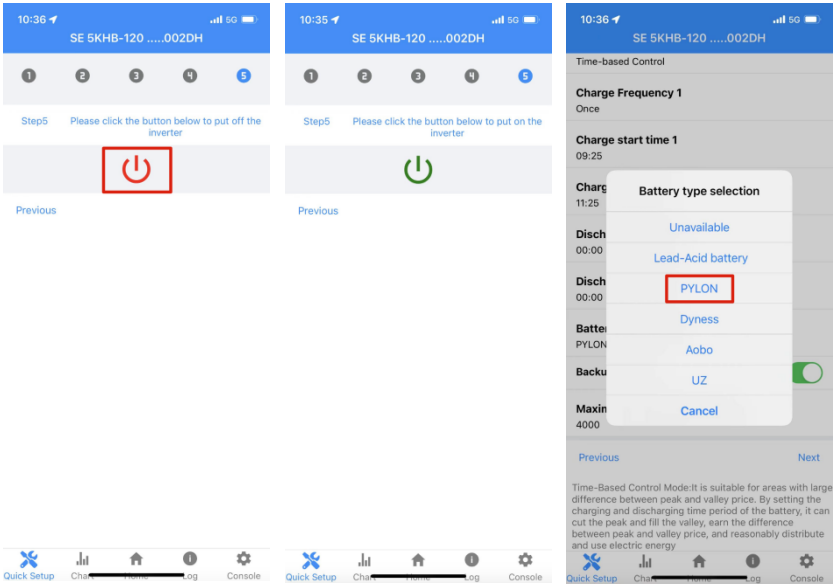


7. Download the inverter monitoring APP named 'Z31 Portal' to set up and check the settings of the system.

8. How to set on the 'Z31 Portal' APP.







Therefore, if a communication error shows up:

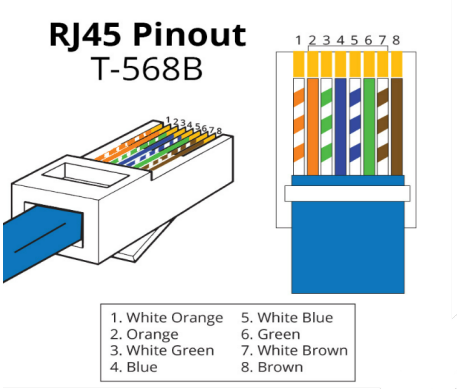
1. Check if your communication cable is the correct type.
2. Check if you are plugging the cable into the correct sockets. Usually, CAN is employed.

Appendix 2.

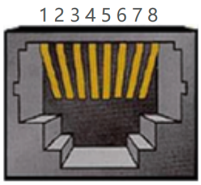
Deye Hybrid Inverter Communication with Solarbatt Battery

1. Verify the cable CAN communication connection with the Deye Inverter 5KW, 8KW, 12KW & 16kW with Solarbatt battery as per the below diagram.

- RS485 Cable
  - An RS485 cable can be used to plug a CAN and RS485 cable into the single BMS/Battery port of the Deye Single & Three phases Inverters.
  - You need to make the cable as per the below-mentioned PIN configuration.



2. Battery CAN port pinout connections for B20L48V100&B20L51V100 battery.

RJ 45Photo	Pin	Description
	1/2/3	NC
	4	RS485_A
	5	CAN _L
	6	CAN_H
	7	RS485_B
	8	GND

3. Deye 5KW/8KW/12KW Hybrid Inverter CAN pinout –

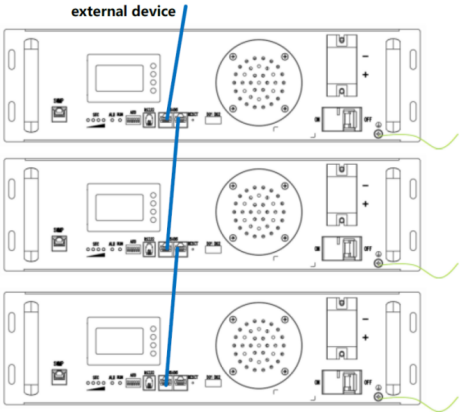
No.	RS485 Pin	CAN Pin
1	RS485B	--
2	RS485A	GND
3	GND	--
4		CANH
5		CANL
6	GND	--
7	RS485A	--
8	RS485B	--

@ Final Cable Definition

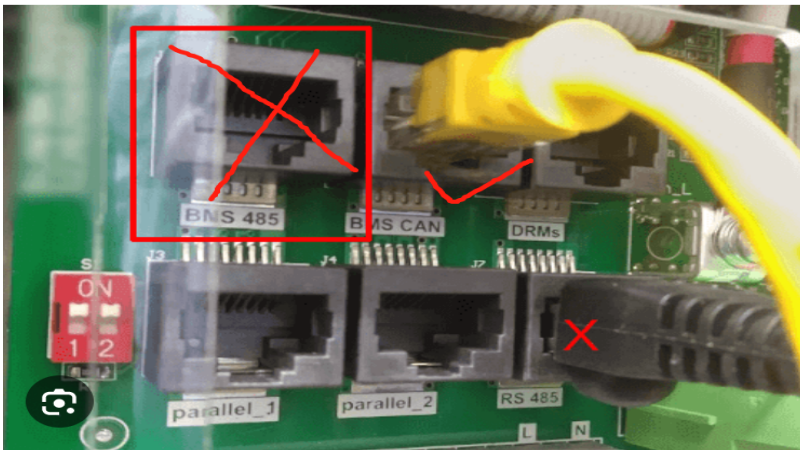
Can PIN	Battery PIN	Inverter PIN
Can Low	5	5
Can High	6	4

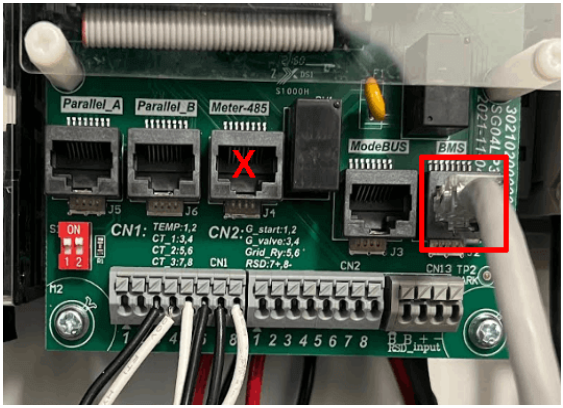
4. You need to connect the RS485 communication cable in inverter & battery BMS port (Can port).
   - An RJ45 splitter can be used to allow SolarAssistant to read the inverter while the inverter is also reading a battery via CAN.

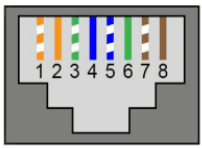
Connect the RS485 communication cable to the battery RJ 45 port.



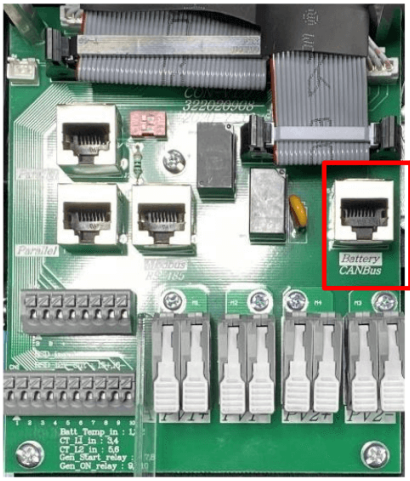
➢ 3 types of inverters BMS port locations for battery communication.

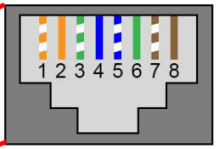






Pin	Function
1	RS-485 B-
2	RS-485 A+
3	
4	CAN Hi
5	CAN Lo
6	GND
7	RS-485 A+
8	RS-485 B-

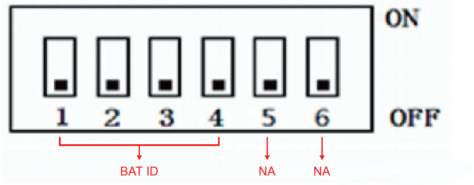




Pin	Function
1	RS-485 B-
2	RS-485 A+
3	
4	CAN Hi
5	CAN Lo
6	GND
7	RS-485 A+
8	RS-485 B-

5. Dip Switch (BMS Address) should be 0 (All Off) for CAN connection for batteries.

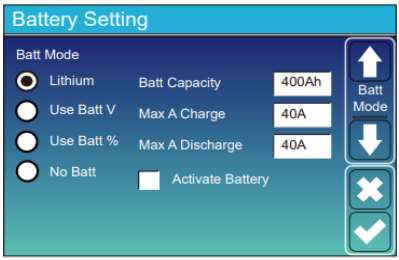
To communicate with the battery, you need to assign an address to the battery BMS through the DIP switch.



DIP 1	DIP 2	DIP 3	DIP 4	BMS Address	BMS Address
OFF	OFF	OFF	OFF	0	
ON	OFF	OFF	OFF	1	

6. Verify & set the Lithium-ion Battery Setting in the inverter -

5.6 Battery Setup Menu



Battery capacity: it tells Deye hybrid inverter to know your battery bank size.

Use Batt V: Use Battery Voltage for all the settings (V).

Use Batt %: Use Battery SOC for all the settings (%).

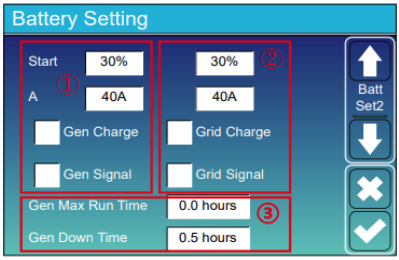
Max. A charge/discharge: Max battery charge/discharge current(0-115A for 5KW model, 0-90A for 3.6KW model). For AGM and Flooded, we recommend Ah battery size x 20%= Charge/Discharge amps.

. For Lithium, we recommend Ah battery size x 50% = Charge/Discharge amps.

. For Gel, follow manufacturer' s instructions.

No Batt: tick this item if no battery is connected to the system.

Active battery: This feature will help recover a battery that is over discharged by slowly charging from the solar array or grid.



This is Grid Charge, you need select. ②

Start =30%: No use， Just for customization.

A = 40A: It indicates the Current that the Grid charges the Battery.

Grid Charge: It indicates that the grid charges the battery.

Grid Signal: Disable.

This is Battery Setup page. ①③

Start =30%: Percent S.O.C at 30% system will AutoStart a connected generator to charge the battery bank.

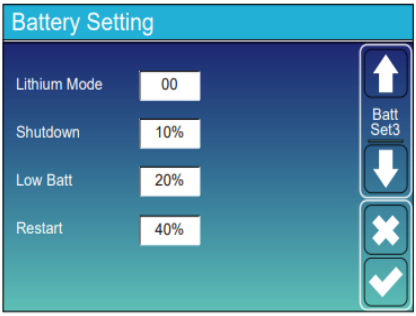
A = 40A: Charge rate of 40A from the attached generator in Amps.

Gen Charge: uses the gen input of the system to charge battery bank from an attached generator.

Gen Signal: Normally open relay that closes when the Gen Start signal state is active.

Gen Max Run Time: It indicates the longest time Generator can run in one day, when time is up, the Generator will be turned off. 24H means that it does not shut down all the time.

Gen Down Time: It indicates the delay time of the Generator to shut down after it has reached the running time.



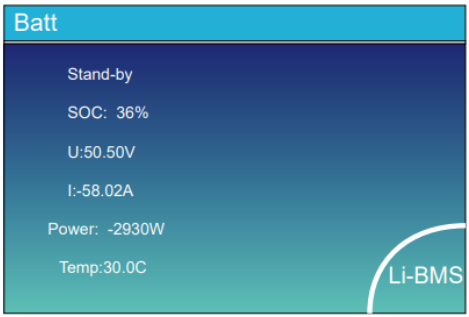
Lithium Mode: This is BMS protocol.Please reference the document(Approved Battery).

Shutdown 10%: It indicates the inverter will shutdown if the SOC below this value.

Low Batt 20%: It indicates the inverter will alarm if the SOC below this value.

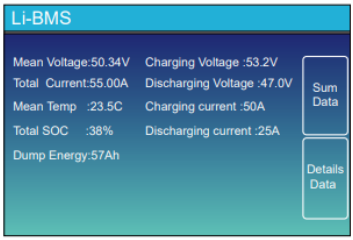
Restart 40%: Battery voltage at 40% AC output will resume.

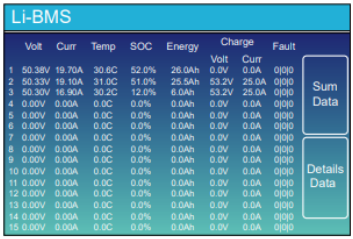
7. Finally, you can check the BMS communication status on the LCD screen.



This is Battery detail page.

if you use Lithium Battery, you can enter BMS page.





Therefore, if a communication error shows up on the display:

3. Check if your communication cable is the correct type.

4. Check if you are plugging the cable into the correct sockets. Usually, CAN is employed.

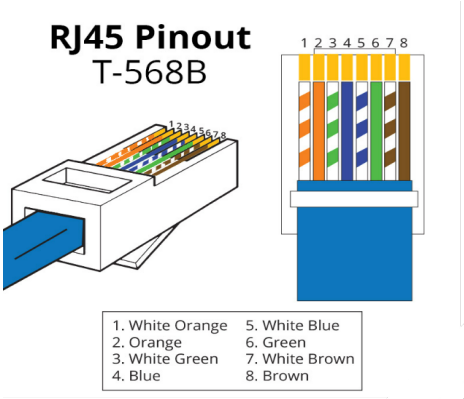
Appendix 3.

Megarevo Inverter Communication with Solarbatt Battery

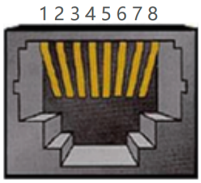
1. Verify the CAN communication cable connection with the Megarevo Hybrid Inverter 5KW, 8KW & 12KW & Solarbatt Battery as per the below diagram.

➢ RS485 Cable

- An RS485 cable can be used to plug a CAN and RS485 cable into the single BMS/Battery port of the Megarevo Single & Three phases Inverters.
- You need to make the cable as per the below-mentioned PIN configuration.

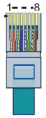


9. Battery CAN port pinout connections for B20L48V100&B20L51V100 battery.

RJ 45Photo	Pin	Description
	1/2/3	NC
	4	RS485_A
	5	CAN _L
	6	CAN_H
	7	RS485_B
	8	GND

➢ Megarevo 5KW/8KW/12KW Hybrid Inverter CAN pinout –

Communication interface bewteen inverter and battery is RS485 or CAN with a RJ45 connector.
The wiring sequence of the crystal head conforms to the 568B standard: orange white, orange, green white, blue, blue white, green, brown white and brown.



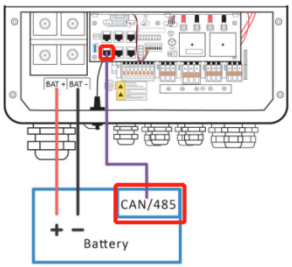
	PIN	1	2	3	4	5	6	7	8
CAN	Definition	X	X	X	BMS_CANH	BMS_CANL	X	X	X
Rs485	Definition	X	X	X	X	X	GND	BMS_485A	BMS_485B

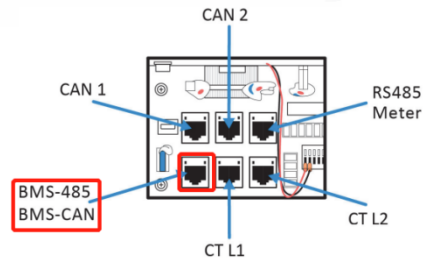
@ Final Cable Definition

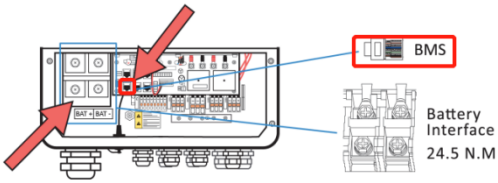
Can PIN	Battery PIN	Inverter PIN
Can Low	5	5
Can High	6	4

2. You need to connect the RS485 communication cable in inverter & battery BMS port (Can port).
   - An RJ45 splitter can be used to allow SolarAssistant to read the inverter while the inverter is also reading a battery via CAN.

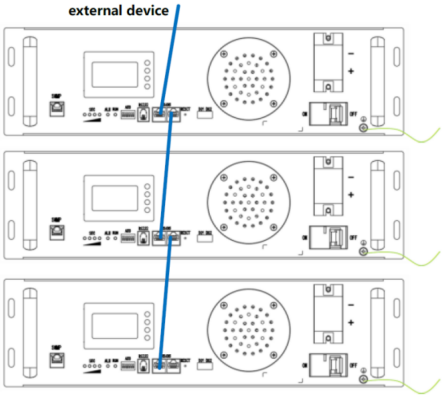
➢ **Battery connection diagram**





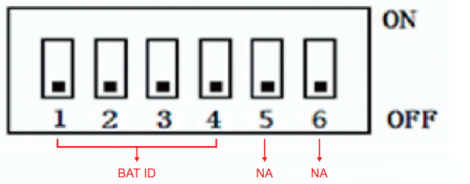


Connect the RS485 communication cable to the battery RJ 45 port.



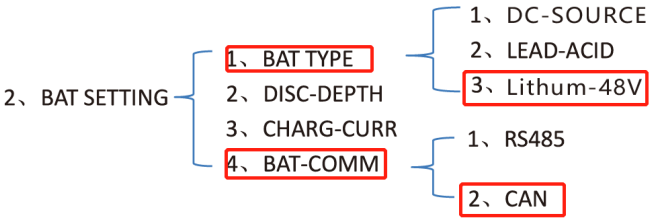
3. Dip Switch (BMS Address) should be 0 (All off) for CAN communication for batteries.

To communicate with the battery, you need to assign an address to the battery BMS through the DIP switch.



DIP 1	DIP 2	DIP 3	DIP 4	BMS Address	BMS Address
OFF	OFF	OFF	OFF	0	
ON	OFF	OFF	OFF	1	

4. Verify & set the lithium-ion battery setting in the inverter –



BAT-COMM

Interface	Description
BAT-COMM 1.RS485 →2.CAN	This interface is used to select battery communication. Press Up/Down button to move corresponding options; Press Enter button to enter the selected menu. The default option is CAN. RS485 is not supported.

5. Finally, you can check the BMS communication status on the LCD screen, No alarm will be shown on the display if battery communication is good.

Error information

Interface	Description
ERROR NO. 02:BatDisconnect 27:BMS Comm.fail	Numbers represent error codes and text is error information. Refer to pages 42-45 for specific contents. NOTE: When there is a lock mark in the upper right corner of the screen, you cannot turn the page, you need to press Enter to unlock it first.

Interface	Description
SYSTEM2 BMS Com : CAN Anti Reve : DISA DOD : 80%	BMS Com: Battery Management System communication mode. Including: CAN, RS485. Anti Reve: Displays Whether Inverter isn't allowed to generate electricity to the Grid. Including: DISABLE, ENABLE DOD: Depth of battery discharge.

Battery current interface

Interface	Description
BATTERY INFO TYPE: Lithium TEMP: 26°C SOC: 30%	TYPE: Battery type:(lead acid, lithium battery) TEMP: Battery temperature. SOC: Percentage of battery surplus capacity

Battery current interface

Interface	Description
BMS PRMETER CHAR VOL: 0.0V CHARGE: 50A DISCHA: 50A	CHAR VOL: Battery charging or discharging voltage. CHARGE: Battery charging current. DISCHA: Battery discharging current.

Therefore, if a communication error shows up on the display:

Check if your communication cable is the correct type.

Check if you are plugging the cable into the correct sockets. Usually, CAN is employed.

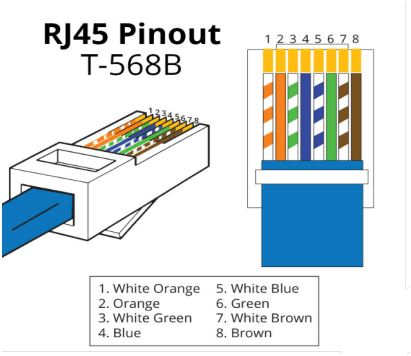
Appendix 4.

Victron Inverter Communication with Solarbatt Battery

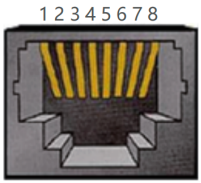
1. Verify the CAN communication cable connection with the Victron 5KW, 8KW & 10KW inverters & Solarbatt battery as per the below diagram.

➢ RS485 Cable

- An RS485 cable can be used to plug a CAN and RS485 cable into the single BMS/Battery port of the Victron Single & Three phases Inverters.
- You need to make the cable as per the below-mentioned PIN configuration.



2. Battery CAN port pinout connections for B20L48V100&B20L51V100 battery.

RJ 45Photo	Pin	Description
	1/2/3	NC
	4	RS485_A
	5	CAN _L
	6	CAN_H
	7	RS485_B
	8	GND

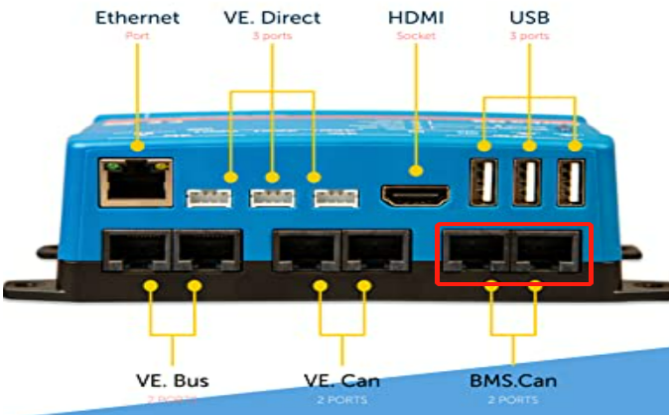
➢ Victron 5KW/8KW/12KW Hybrid Inverter CAN pinout –

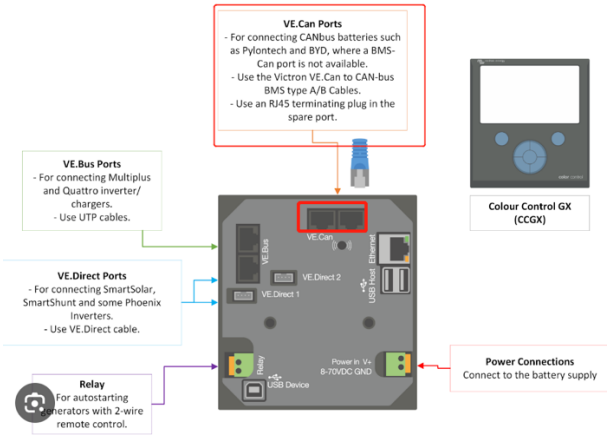
Function	Victron VE.Can side
GND	Pin 3
CAN-L	Pin 8
CAN-H	Pin 7

@ Final Cable Definition

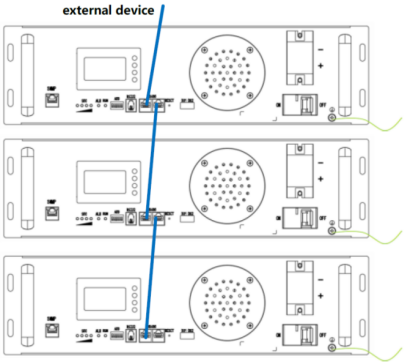
Can PIN	Battery PIN	Inverter PIN
Can Low	5	8
Can High	6	7

3. You need to connect the RS 485 communication cable in inverter & battery BMS Port (Can Port).
   - An RJ45 splitter can be used to allow SolarAssistant to read the inverter while the inverter is also reading a battery via CAN.
   - Can Dummy must be Required in Victron Controller.



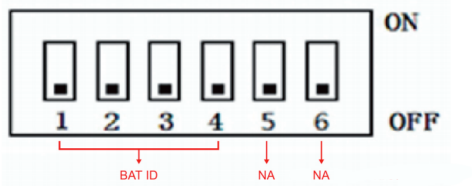


Connect the RS485 communication cable to the battery RJ 45 port.



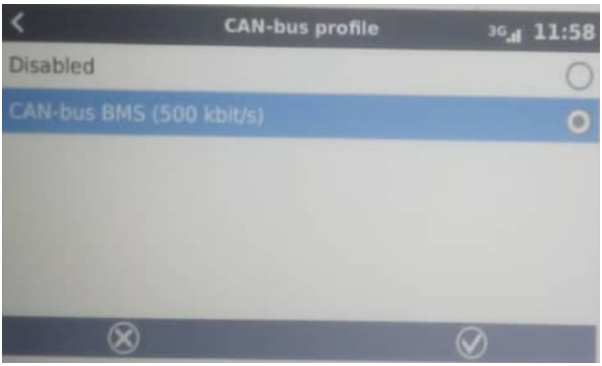
4. Dip Switch (BMS Address) should be 0 (All Off) for CAN communication for batteries.

To communicate with the battery, you need to assign an address to the battery BMS through the DIP switch.

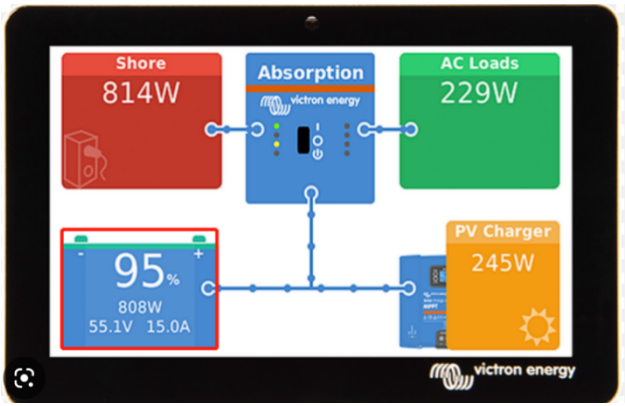


DIP 1	DIP 2	DIP 3	DIP 4	BMS Address	BMS Address
OFF	OFF	OFF	OFF	0	
ON	OFF	OFF	OFF	1	

5. Sett the lithium-ion battery setting in the Victron Controller –



6. Finally, You can check the BMS communication status on the Victron LCD screen, No alarm will be shown on the display if battery communication is good.



Therefore, if a communication error shows up on the display:
1. Check if your communication cable is the correct type.
2. Check if you are plugging the cable into the correct sockets. Usually, CAN is employed.

NOTE: *The final interpretation right belongs to Zeus Appollo Solar*

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