

Rechargeable Lithium battery

Operation and Maintenance manual



Product Model: SGH48100T

Product Specifications: 51.2V 100Ah

Version: V-00

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Appendix I31

1. Information

1.1 Validity

This document is valid for: SGH48100T Battery Pack.

1.2 Target Group

This document is intended for qualified persons and operators. Only qualified persons are allowed to perform the activities marked in this document with a warning symbol and the caption "Qualified person".

Qualified persons must have the following skills:

- Knowledge of how lithium iron phosphate batteries work and are operated.
- Knowledge of how an energy storage system (including PV/battery/hybrid inverter, MPPT, Meter, Distribution box etc.) works and is operated.
- Knowledge of local applicable connection requirements, standards, and directives.
- Training in the installation and commissioning of electrical devices, batteries.
- Training in how to deal with the dangers and risks associated with installing, repairing and using electrical devices, batteries.

1.3 Levels of warning messages

The following levels of warning messages may occur when handling the product

 **DANGER**

Indicates a hazardous situation which, if not avoided, will result in death or serious injury.

⚠ WARNING

Indicates a hazardous situation which, if not avoided, could result in death or serious injury.

⚠ CAUTION






Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury or product permanent damage.

⚠ NOTICE

Indicates a situation which, if not avoided, can result in property damage or product not work or accelerated product damage



1.4 Symbol Description

1.4.1 Symbols on products label

| Label | Definition |
|---|--|
|  | Beware of electrical shock |
|  | Do not place the battery within children/pet touchable area. |
|  | Do not place the battery near heat source and flammable material |
|  | Do not expose the battery to direct sunlight, rain and snow. |
|  | Do not short circuit the battery |

| | |
|---|------------------|
|  | Recycle label |
|  | WEEE designation |

1.4.2 Other symbols

| Label | Definition |
|---|--|
|  | Indicates activities that can only be performed by qualified persons |
|  | Grounding point |

1.5 Abbreviation Description

| Abbreviation | Definition |
|-------------------------------------|--|
| Battery/battery pack/battery module | Single SGH48100T rechargeable lithium iron phosphate battery pack including cells, BMS and enclosure etc. |
| Battery system/cluster | Multiple SGH48100T battery pack connected in parallel with power, communication and grounding cables and installation auxiliaries. |
| BMS | Battery management system Electronical Unit to ensure lithium cells' safety and display information or control the battery work mode. |
| SOC | State of charge The battery state of charge refers to the percentage of the remaining capacity and rated capacity of the battery. |
| SOH | State of health The battery health status refers to the percentage between the full charged capacity and the rated capacity of the battery. |
| DIP switch | Dual in-line package switch |
| COCP | Charge over current protection |
| DOCP | Discharge over current protection |
| COVP | Cell over voltage protection |
| POVP | Pack over voltage protection |
| CHTP | Charge high temperature protection |
| DHTP | Discharge high temperature protection |

| | |
|------|---------------------------------------|
| CUVP | Cell under voltage protection |
| PUVP | Pack under voltage protection |
| CLTP | Charge high temperature protection |
| DLTP | Discharge high temperature protection |
| SCP | Short circuit protection |

2. Safety

2.1 Safety precautions

DANGER

Explosion risk

- Do not impact the battery with heavy objects.
- Do not squeeze or pierce the battery pack.
- Do not throw the battery pack into the fire.

WARNING

Fire risk

- Do not expose the battery pack to the condition over 80°C.
- Do not put the battery near a heat source, such as a fireplace.
- Do not expose the battery pack to direct sunlight or raining.

CAUTION

Electric shock risk

- Do not allow non-qualified person to disassemble the battery pack.
- Do not touch the battery pack with wet hands.
- Do not expose the battery pack to moisture or liquid environment.

NOTICE

Damage risk

- Do not short-circuit or reverse connect the battery.
- Do not use chargers or charging devices unapproved by the manufacturer to charge the battery.
- Do not mix batteries from different manufacturers or different kinds, types or brands.

2.2 Safety instructions

The battery has been designed and tested in accordance with international (such as UN38.3 etc.) safety requirements. However, due to various factors during the whole lifetime process, Manufacturer cannot guarantee absolute safety, in order to prevent personal injury and property damage and ensure long-term operation of the battery, please do read the below section carefully to operate the battery and handle emergency situations.

2.2.1 Safety gear

It is required to wear the following safety gear when installing and handling the battery pack.



Insulated gloves



Safety Glasses



Safety Shoes

2.2.2 Emergency safety measures

Water invasion

Please cut off the AC power supply of the system first and then disconnect all switched under the premise of ensuring safety.

Electrolyte or gas leakage

If the battery pack leaks electrolyte, avoid contact with the leaking liquid or gas. If one is exposed to the leaked substance, immediately perform the actions described below.

- Gas Inhalation: Evacuate the people in the contaminated area and seek medical aid immediately.

- Eye Contact: Flush your eye with clean and flowing water for 15 min, and seek medical aid immediately.
- Skin Contact: Thoroughly rinse the exposed area with soap and water to be sure no chemical or soap is left on them, and seek medical aid immediately.
- Ingestion: Induce vomiting, and seek medical help immediately.

 **WARNING**

In case of fire situations, please use carbon dioxide fire extinguisher rather than liquid to put out fires.

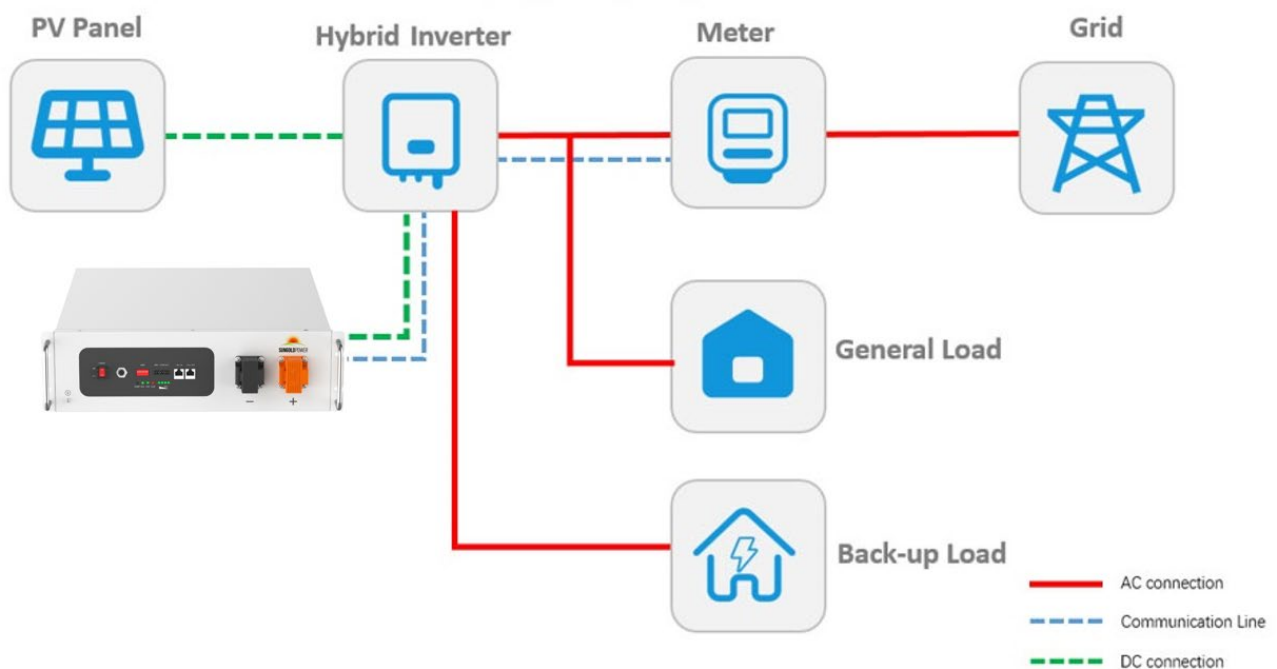
2.2.3 Other Tips

- All the product are strictly inspected before shipment, please contact your supplier for replacement if you notice there's any defectives such as swelling.
- Do not disassemble batteries and components, otherwise the manufacturer will not be responsible for any damage caused by unauthorized disassembly or repair.
- Do enable the battery to be safely grounded before use to make sure the system in safe and normal operation.
- Please ensure that the electric parameters of these devices are compatible mutually before connecting the battery to other devices.
- Please take the environmental factors into careful considerations to ensure that the system can work in a suitable condition as the environment and storage methods have a certain impact on the service life and reliability of this product.

3. Product Overview

3.1 Introduction

The SGH48100T battery is designed for residential application and works as a storage unit in the photovoltaic system. It is a 51.2V lithium battery system, with BMS inside. It could be operated in both on-grid, back-up and off-grid modes with compatible inverters. Below is the general schematic of an ac-coupled system with the batteries.



CAUTION

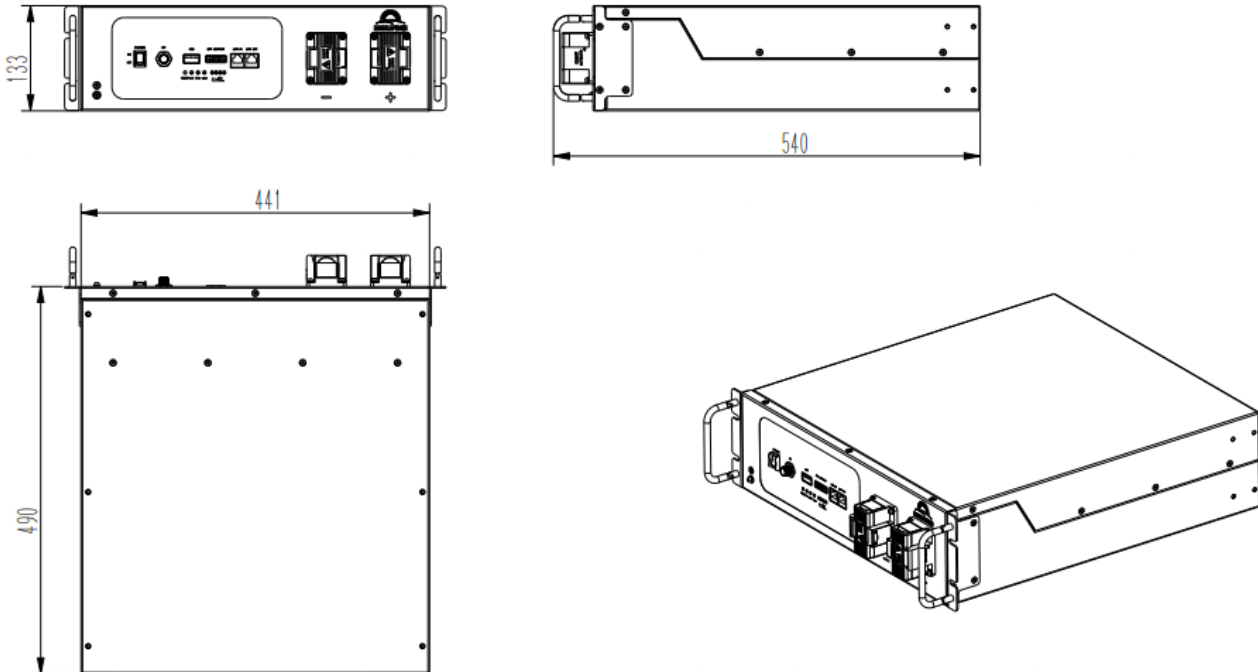
This electrical connection in this diagram is only for illustration, please follow the Manual suggestions of related devices and operate in accordance with locally

3.2 Features

- Highest safety, battery is made from LiFePO₄ chemistry and comply with highest international safety and transport standard.
- Modular and flexible, support up to 32 batteries connect together to expand the system energy.
- Built-in pre-charge circuit to avoid rush current when connecting with different inverter/chargers.
- Automatic dynamic addressing function when connected multiple batteries together.
- Support a maximum of 96% DOD under off-grid and back-up application
- Built in BMS provide warning and protection functions including over-discharged, over-charged, over-current, short-circuit and high/low temperature.
- LiFePO₄ as cathode material and automatic balancing function to meet longer cycle life
- Compact size and light weight for easy installation and maintenance.
- Multiple installation bracket to adopt with different customers' requirement.
- LED display, CAN/RS485 port for external communication and upgrade the BMS firmware.
- Rapid shutdown function for North American market.

3.3 Specification

3.3.1 Dimension



3.3.2 Parameters

| Items | SGH48100T |
|----------------------------|--------------------------------------|
| Rated voltage | 51.2V |
| Max. voltage range | 44.8~57.6V, Shipping voltage>51.2V |
| Charge voltage | 56.0V |
| Float charge voltage | 54.6V |
| Nominal energy@0.5C | 5.12KWh |
| Usable energy@0.5C | 4.92kWh |
| Nominal capacity@0.5C | 100Ah |
| Dimension | 490*441*133mm (19.3*17.3*5.2 inch) |
| Weight | ~47kg (103lb) |
| Standard charge current | ≤50A |
| Max. charge current | 70A |
| Standard discharge current | ≤50A |

| | | |
|---|---|--|
| Max. discharge current | 100A (initial temp. $\leq 86^{\circ}\text{F}$ (30°C)) | |
| Peak discharge current | 101~119A@5mins 120~200A@15S | |
| Communication | RS485 /CAN | |
| Max parallel number | 32pcs | |
| Operation temperature ¹ | Charge: 14°F to 122°F ($-10\sim 50^{\circ}\text{C}$) Discharge: -4°F to 122°F ($-20\sim 50^{\circ}\text{C}$) | |
| Heating opening condition ² | -13°F (-25°C) $\leq T \leq 41^{\circ}\text{F}$ (5°C) @ $I \geq 0.08\text{C}$ | |
| Heating completion condition ³ | $T \geq 53.6^{\circ}\text{F}$ (12°C) | |
| Storage temperature @off mode | 32°F (0°C) $< T < 86^{\circ}\text{F}$ (30°C) | < 6 months |
| | 14°F (-10°C) $< T < 113^{\circ}\text{F}$ (45°C) | < 3 months |
| | Recommended environment | 59°F to 95°F ($15\sim 35^{\circ}\text{C}$), 5~75%RH |

NOTICE

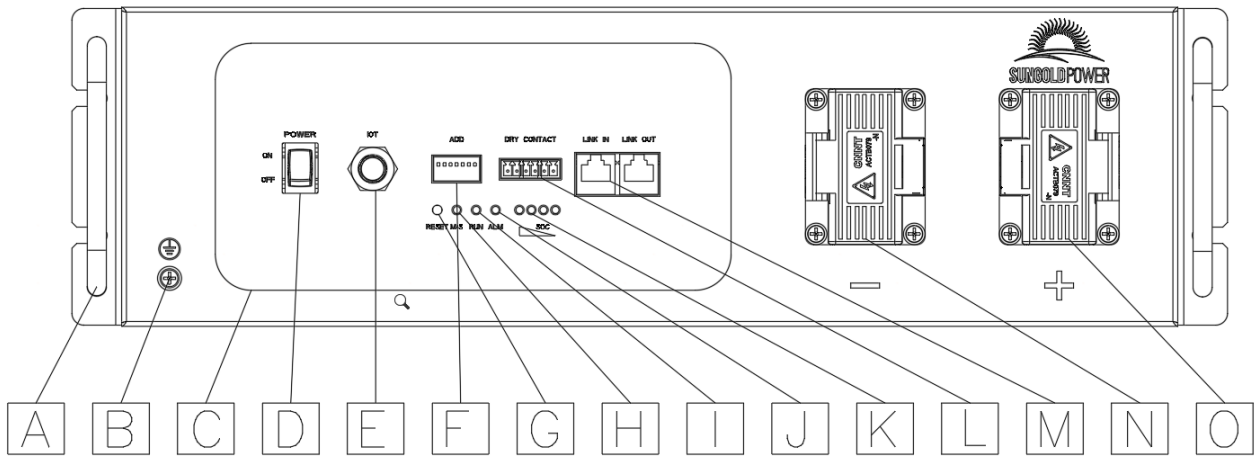
1. The optimum operating temperature range is from 59°F to 86°F (15°C to 30°C), Frequent exposure to the harsh temperatures may worsen the performance of the battery pack and cycle life.
2. The current of the heating film is calculated in addition and is not added to the current detected by the BMS.
3. If the battery system is fully charged for the first time, the heating is stopped after a delay of 1 hour.
4. The heater operates within a temperature range of -13°F to 41°F (-25°C to 5°C).

Condition 1: When the battery temperature falls between 14°F to 41°F (-10°C to 5°C), the heater activates, initiating a low-current charging process. The heater will be off at 53.6°F (12°C), but regular charging of the battery continues.

Condition 2: In cases where the battery temperature is below 14°F ($< -10^{\circ}\text{C}$), the charging current is exclusively directed to the heating system until the battery temperature rises above 14°F (-10°C). Once this threshold is reached, the heater operates as described in Condition 1.

Please note that the heating system operation does not impact the State of Charge (SOC) of the battery.

3.3.3 Panel Interface



| No. | Items | Usage description | Remark |
|-----|---------------------|---|--|
| A | Handles | For handling, installation and disassembly of battery | |
| B | Ground | Used to connect battery with ground | |
| C | PET | Decorative film | |
| D | Power switch | Used to Power on/off battery | |
| E | IOT | Used to connect with cloud platforms | |
| F | DIP | Used to set the RS485 baud rate and inverter protocol choosing | |
| G | Reset | Used to sleep(3s)/awake(3s)/reset(6~10s) BMS in power on mode. | |
| H | M/S | Used to indicate the module is Master or Slave battery | Single mode: OFF Parallel mode: ON- Master battery OFF- Slave battery |
| I | RUN | Used to show battery is in running status when lighting or flashing | |
| J | ALM | Used to show battery Alarm/Protection status | |
| K | SOC | Used to show battery real-time SOC | |
| L | Dry contact | 1 channel input signal 2 channels output signal | |
| M | Link IN Link OUT | For internal and external communication | |
| N | Negative terminal | Used to connect the inverter/charger | |
| O | Positive terminal | Used to connect the inverter/charger | |

3.3.3.1 L: Dry contact

| PIN | Type |
|-----|---|
| 1 | NO Output1, Charge enable/disable signal |
| 2 | |
| 3 | NO Output2, discharge enable/disable signal |
| 4 | |
| 5 | Passive INPUT signal. |
| 6 | Rapid Shutdown function for US |

3.3.3.2 M: Link IN / Link OUT

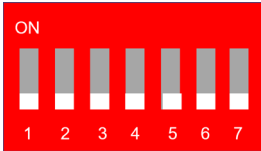
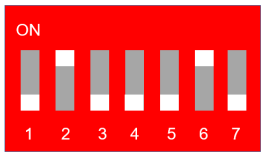
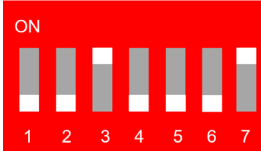
| Port | Pin No. | Definition | Remarks |
|----------|---------|------------|--|
| Link IN | 1 | RS485-B1 | 1.Used to connect with external devices to establish communication. 2.Used to connect with upper battery pack Link OUT. |
| | 2 | RS485-A1 | |
| | 3 | SGND | |
| | 4 | CAN-H | |
| | 5 | CAN-L | |
| | 6 | SGND | |
| | 7 | RS485-A1 | |
| | 8 | RS485-B1 | |
| Link OUT | 1 | RS485-B2 | Used to connect with downward battery pack Link IN. |
| | 2 | RS485-A2 | |
| | 3 | SGND | |
| | 4 | CAN-H | |
| | 5 | CAN-L | |
| | 6 | SGND | |
| | 7 | RS485-A2 | |
| | 8 | RS485-B2 | |

3.3.3.3: DIP addressing

| DIP | | | | | | | Remarks |
|--|--|---|---|---|--|---|--------------|
| RS485 baud rate | Undefined | | | | Protocol | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | |
| ON: 115200 | Reserved for multiple cluster parallel and other future function | | | | 0 | 0 | Protocol ID0 |
| OFF: 9600 | | | | | 1 | 0 | Protocol ID1 |
| | | | | | 0 | 1 | Protocol ID2 |
| | | | | | 1 | 1 | reserved |
| Keep all batteries the same setting | Keep default setting | | | | Master: according to inverter Brand Slave: keep default setting | | |

Note:

Only the master battery needs to set the Protocol ID and keep all slave battery default settings after choosing the protocol ID, the battery will auto-detect the inverter information and corresponding to get into running, restart to take effect after setting a new DIP sequence.

| CANbus Connection | | RS485 Connection | | DIP setting (Master battery) |
|-------------------|---|------------------|--|--|
| Protocol ID | INVERTER | Protocol ID | INVERTER | |
| CAN 1 | Victron/SMA/Studer Innotec/Sofar | RS485 1 | SUNGOLDPOWER SPH/Voltronic/RCT/ MPP/Alpha outback/ Phocos |  X000000 |
| CAN 2 | SUNGOLDPOWER SG /SolArk/Solis/Goodwe/Deye/ Growatt/SAJ/LUXPOWER/M egarevo/INVT/Sermatec/MU ST/Sunsynk | RS485 2 | SUNGOLDPOWER SPH |  X100010 |
| CAN 3 | Schneider | RS485 3 | LUX POWER |  X010001 |

NOTICE

Fail to follow the DIP switch setting will cause the communication fault between battery and inverter, for more detail setting with different inverter/charger, please contact your supplier for consultation.

3.3.3.4 RUN/ALM/SOC

| Mode | Status | RUN | ALM | LED indicator | | | | Description |
|-------------|---|--------|--------|---|-----|-----|-----|----------------------------|
| | | ● | ● | ● | ● | ● | ● | |
| Power off | - | OFF | OFF | OFF | OFF | OFF | OFF | All OFF |
| Standby | Normal | FLASH1 | OFF | According to battery SOC | | | | See note |
| | Warning | FLASH1 | FLASH3 | | | | | |
| Charge | Normal | ON | OFF | According to battery SOC (highest SOC LED: FLASH2) | | | | See note |
| | Warning | ON | FLASH3 | | | | | |
| | COCP | FLASH1 | OFF | According to battery SOC | | | | Stop charging |
| Discharge | Normal | FLASH3 | OFF | According to battery SOC | | | | See note |
| | Warning | FLASH3 | FLASH3 | | | | | |
| | CUVP/PUVP | OFF | FLASH3 | OFF | OFF | OFF | OFF | Stop discharging |
| | DOCP | OFF | ON | OFF | OFF | OFF | OFF | Stop discharging |
| Temperature | CHTP/DHTP CLTP/DLTP | OFF | ON | OFF | OFF | OFF | OFF | Stop charging/dis charging |
| Failure | Cell/NTC failure Sensor failure MOS failure Reversed polarity /SCP | OFF | ON | OFF | OFF | OFF | OFF | Stop charging/dis charging |

Note: 'Warning' including items of cell imbalanced/low voltage/high current/high&low temperature.

| FLASH Type | ON | OFF |
|------------|-------|-------|
| FLASH1 | 0.25S | 3.75S |
| FLASH2 | 0.5S | 0.5S |
| FLASH3 | 0.5S | 1.5S |

3.4 Protection function

| Items | Description | Remark |
|----------------------------|--|---------------------------------------|
| Charge end COVP POVP | The BMS will stop charging if any cell or PACK voltage reach the protection value and it will be auto-released only when both Pack and cell voltage back to the release voltage range or there is efficient discharge current. | |
| Discharge end CUVP | The BMS will stop discharging if any cell or PACK voltage is under the protection value and it will be released only when all | Can Automatic recovery. Please charge |

| | | |
|---|--|---|
| PUVP | the cell voltage back to the release voltage range or there is efficient charge current. | timely, otherwise it may be in Low-power mode to be over-discharged and damage battery. |
| CHTP DHTP | The BMS will stop charging or discharging or both if any cell/environment/MOS temperature is beyond the range. | Automatic recovery when temperature falls. |
| CLTP DLTP | The BMS will stop charging or discharging or both if any cell/environment/MOS temperature is under the range. | Automatic recovery when temperature rise. |
| COCP | The BMS will stop charging when the charging current is higher than the protection value. And it will release from the protection when the system delays time is met. | Automatic recovery. If locked after three consecutive times, manual intervention is required. |
| DOCP | The BMS will stop discharging when the discharging current is higher than the protection value. And it will release from the protection when the system delays time is met | Automatic recovery. If locked after three consecutive times, manual intervention is required. |
| SCP Reversed polarity | The BMS will stop charging when detect short circuit or reversed polarity. | Charge to release. Manual press reset. |
| Temperature, Voltage, Current sensor failure | Enter the failure mode, manual intervention is required no charging and discharging. | Manual intervention. |
| Sleep mode | After reaching a certain condition, BMS will enter dormancy mode to reduce BMS consumption | Charge, press reset or restart to activate. |

CAUTION

Please re-charge the battery via MPPT, grid/generator or other energy source within 24h if the battery is over discharged, otherwise, it may be damaged.

NOTICE

Manually short-circuit and reverse the battery will void the warranty.

4 Installation

4.1 Preparation

4.1.1 Safety Compliance


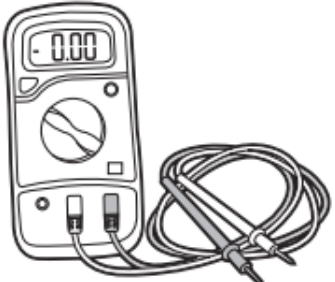
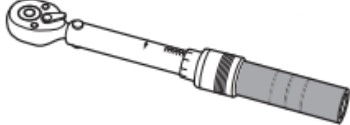
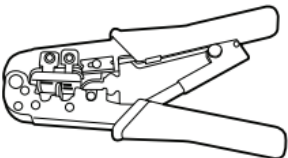
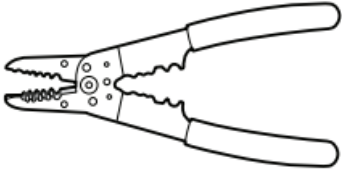
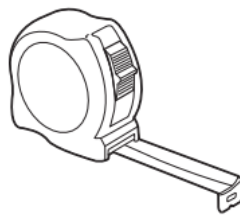


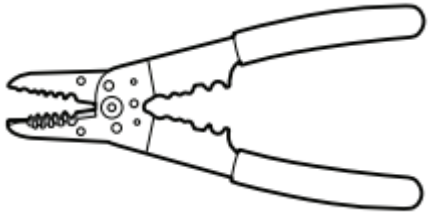

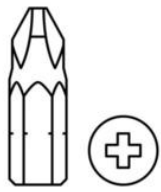
The system installation must be finished by qualified person(s), During the whole installation process, please strictly follow the local safety regulations and related operating procedures.

4.1.2 Environment

The operating environment shall meet the following requirements:

| Category | Description |
|---------------------|---|
| Working temperature | 14 to 122° F(-10°C-50°C)(maximum operating range) 59 to 86° F(15°C-30°C) (optimal temperature) |
| Relative humidity | 5%~90%, No condensation |
| Altitude | <3000m |
| Safety requirement | <ul style="list-style-type: none"> • Do not expose the battery to direct sunlight, rain and snow. • Do not place the battery within children/pet touchable area. • Do not place the battery near heat source and flammable material • Do not drop, deform, impact, cut or spearing with a sharp object. • Do not put heavy things on battery. • Do not disassemble the battery without Manufacturer's permission. • No conductive dust and water or other liquid to contact battery. • Follow the emergency measure if there is water invasion or electrolyte and gas leakage. • Contact your supplier within 24 hours if any product failure happens. |

4.1.3 Tools

| Tools | |
|---|---|
| <p>Torque screwdriver</p>  | <p>Multi-meter</p>  |
| <p>Torque wrench</p>  | <p>Cable crimper</p>  |
| <p>Wire stripper</p>  | <p>Tape measure</p>  |
| <p>Flat-head screwdriver</p>  | <p>Phillips-head screwdriver</p>  |
| <p>Wire stripper</p>  | <p>Drill</p>  |
| <p>Phillips-screwdriver bit</p>  | |

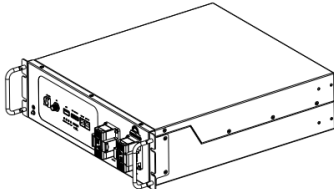


4.2 Inspection

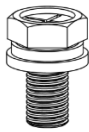
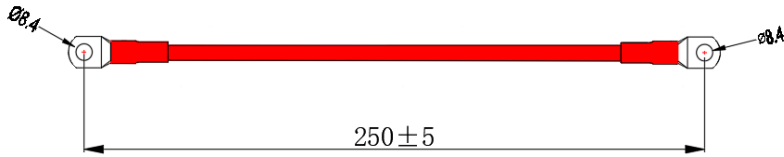
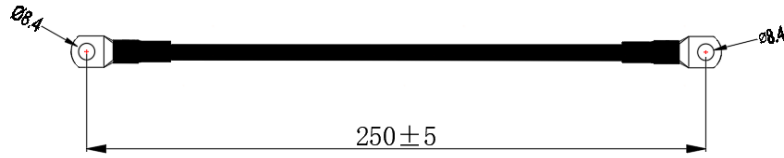
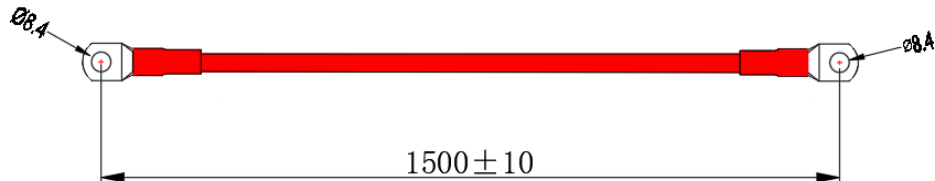
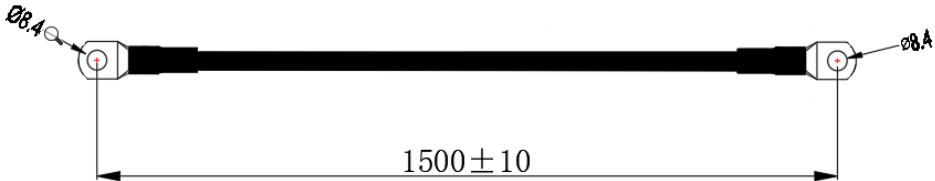
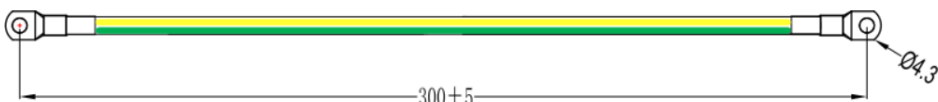
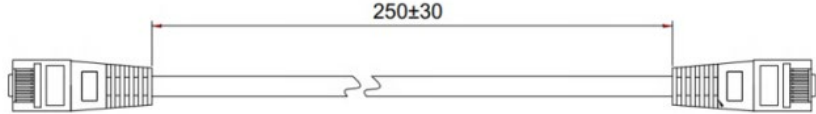
4.2.1 Unpacking

- Please load and unload it in accordance with the specified requirements to prevent sun and rain when you receive the equipment.
- Please check and confirm the goods (such as quantity, appearance, etc.) according to the "scope of delivery " before unpacking.
- Do light take and put during unpacking process to protect the surface coating of the object;
- Please record and feedback to the manufacturer if the inner packing is damaged after unpacking.

4.2.2 Scope of delivery

Check the scope of delivery for completeness and any externally visible damage. Contact your supplier for supplementary delivery if the listed material is incomplete or damaged.

| General materials | | |
|---|---|--|
| <i>(Battery unit)</i> | | |
|  <p>Battery Pack *1pcs</p> | |  <p>Manual *1pcs</p> |
| Type | Detail | Qty. |
| Rack mounted kits | A: Float nuts M6  | 6pcs |

| | | |
|---|--|----------------------|
| | <p>B: Combination Screw C: Hexagon bolt M8</p>  | <p>4pcs 2pcs</p> |
| |  | <p>1pcs</p> |
| |  | <p>1pcs</p> |
| <p>Power cable</p> |  | <p>1pcs</p> |
| |  | <p>1pcs</p> |
| <p>Grounding cable</p> |  | <p>1pcs</p> |
| <p>Battery to battery communication cable</p> |  | <p>1pcs</p> |

For inverter communication PIN definition detail, please check **Appendix I**

⚠ NOTICE

Keep the unused cable pins NULL to avoid affecting the closed loop communication.

⚠ NOTICE

A ground connection of communication cable may be required from some inverters, please follow the rules from inverter manufacture.

4.3 Start Installation

⚠ Qualified person

4.3.1 Remainder

Please check again the following conditions or equipment whether meet the requirements before installation:

- Check if there's enough space for installation, and if the load-bearing capacity of the bracket or cabinet meets the weight requirements.
- Check whether the power cable pair(s) used meets the maximum current requirement for operation.
- Check whether the overall layout of power supply equipment and batteries at the construction site is reasonable.
- Check whether the installer is wearing anti-static wristband.
- Check whether there're two people on the construction site for installation work.
- Check if there's potential risks at location of installation site, e.g flooding, sun exposure, corrosion, and salt spray.

4.3.2 Procedures

⚠ CAUTION

Injuries may result if the product is lifted incorrectly or dropped while being transported or mounted.

Wear suitable personal protective equipment for all work on the product.

⚠ CAUTION

Ensure that no lines are laid in the wall which could be damaged when drilling holes.

4.3.2.1 Rack mounted

i. Take the battery pack out from carton.

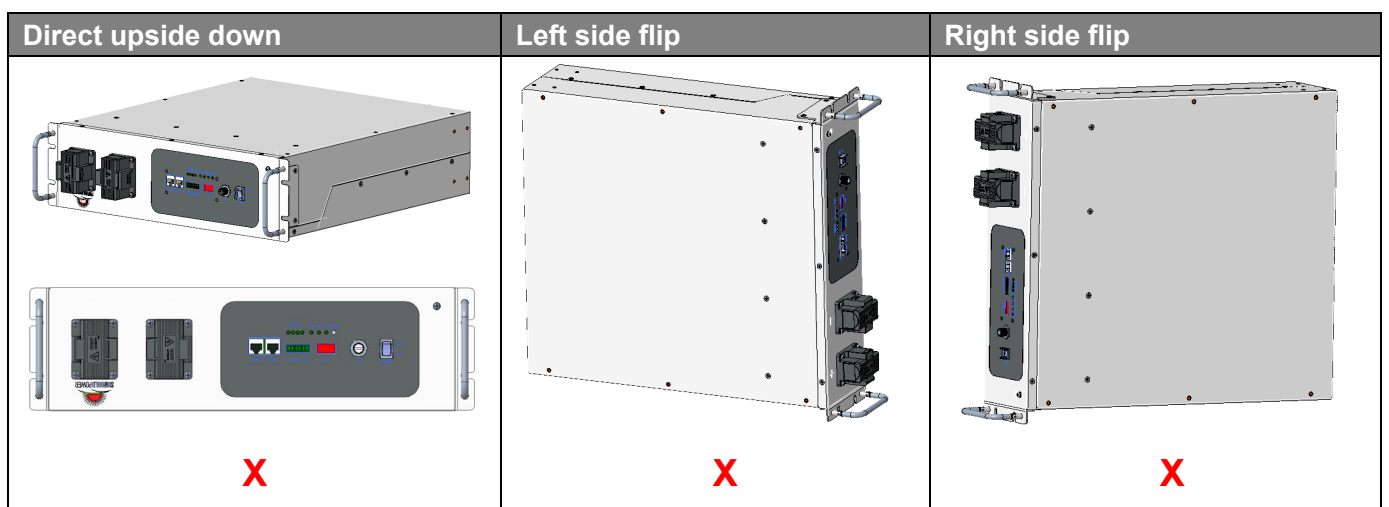
ii. Get the Rack or cabinet ready and place it horizontally at a reasonable location.

iii. Place the battery on the rack or cabinet tray via manual-lift, Insert the screws and fasten the battery to the rack or cabinet

iv. Finish the cable connection

4.3.3 Tips

4.3.3.1 Installation not allowed



5. Cable connection and commissioning

5.1 Get battery ready

5.1.1 Ensure all the battery is in OFF mode, check and confirm the installation is tighten and stable.

5.1.2 Check the number and specification of cable kit accessories are correct according to the Scope of delivery item, if you are making cable yourself, please follow manufacturer's requirements.

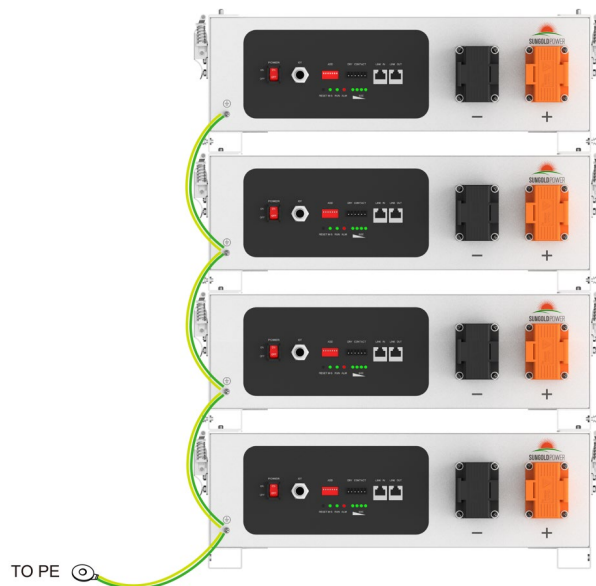
5.1.3 Switch on all battery individually before wiring, check whether there is any alarm/protection information, if yes, turns to troubleshooting. Then switch off all batteries.

5.2 Grounding cable connection

5.2.1 Take out the grounding screw on the battery panel, and get the cable conductor through it.

5.2.2 Fix them together, with a cylinder screwdriver and tighten it.

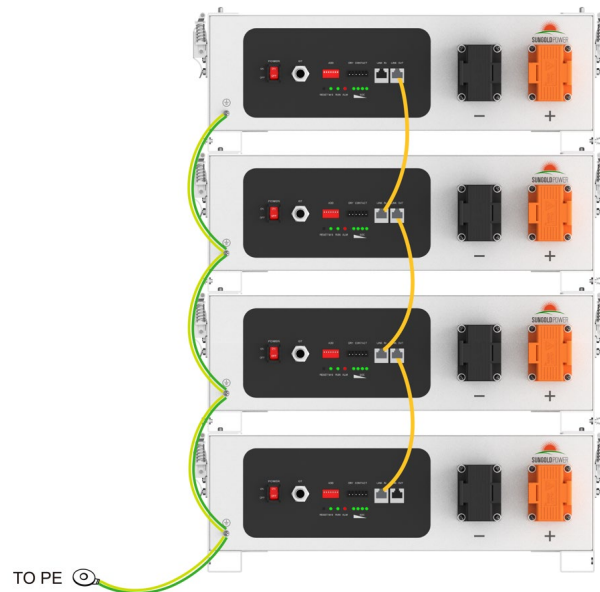
5.2.3 Connect the grounding cable with next battery module.



5.3 Communication cable connection

5.3.1 Take out battery to battery communication cable.

5.3.2 Confirm the location of Master battery, insert the RJ45 plug into the Link Out port and connect the other side to next battery Link IN port, daisy chained all batteries.



Note: the module with empty Link IN port is Master battery

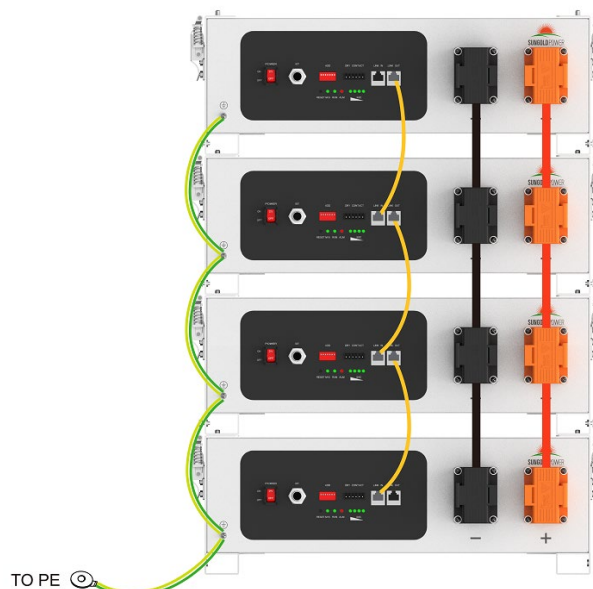
⚠ NOTICE

The BMS inside the battery pack will automatically terminate BOTH end of CANBUS pins, DO NOT need to plug the 120 Ω terminator again.

5.4 DC power cable connection

5.4.1 Take out battery to battery power parallel cable.

5.4.2 Lock the terminals on the battery terminals and secure tightly with nuts.



5.5 Connecting with inverter

⚠ CAUTION

Confirm inverter AC input and PV input is disconnected before wiring connection, and the DC/ signal switch of inverter/charger is in off status.

5.5.1 Connecting Master battery Link IN port with inverter CAN or RS485 communication port via inverter communication cable (*Version I/II/III or customized*).

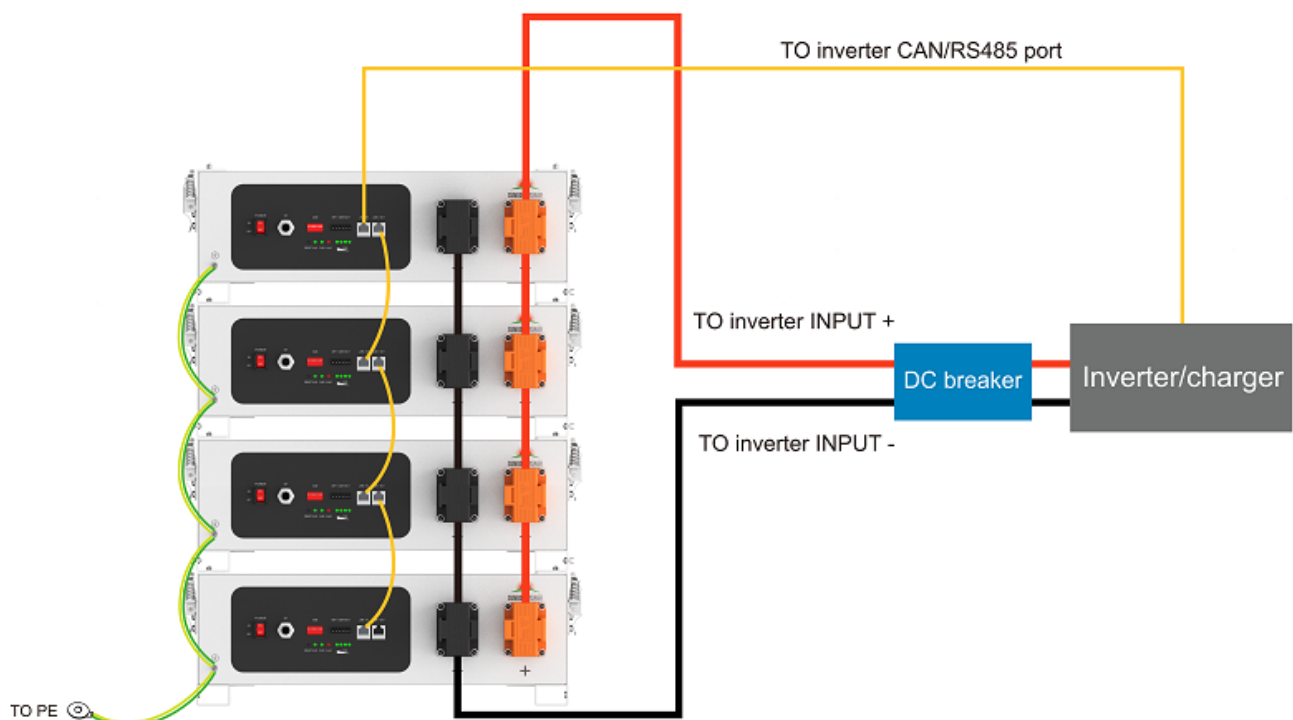
5.5.2 Connecting battery OUTPUT (+) with inverter battery INPUT (+), battery OUTPUT (-) with inverter battery INPUT (-), an external disconnection breaker between battery system and inverter is recommended, choose the corresponding power cable pair and wiring them correctly.

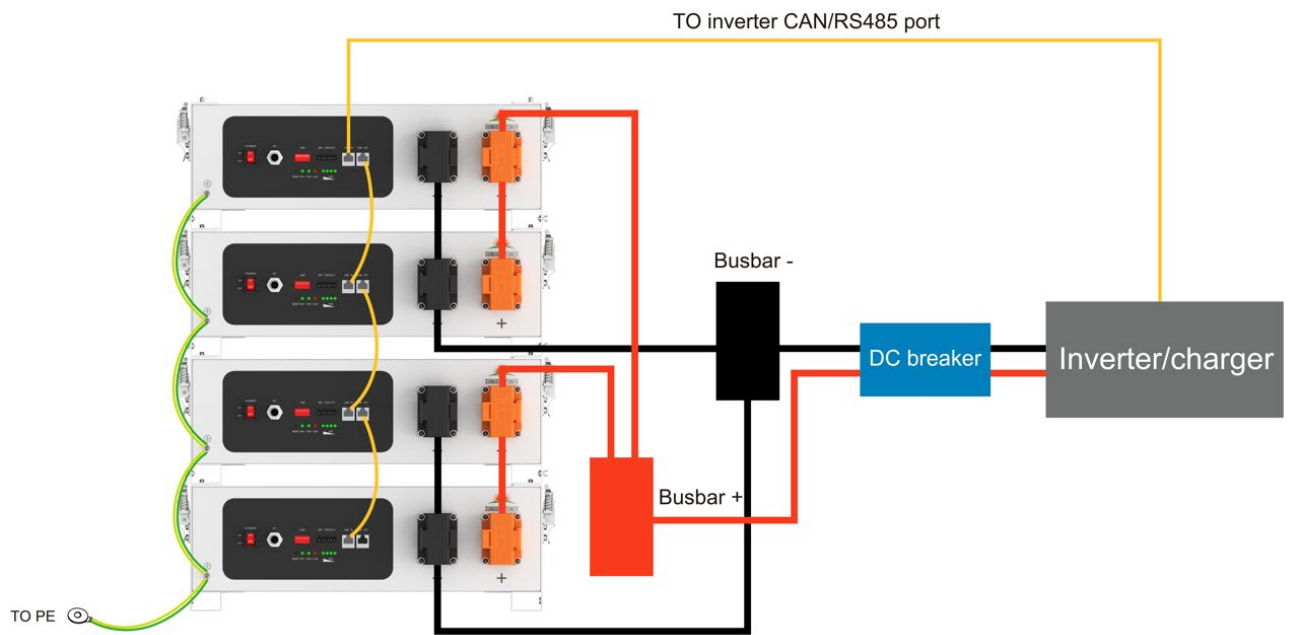
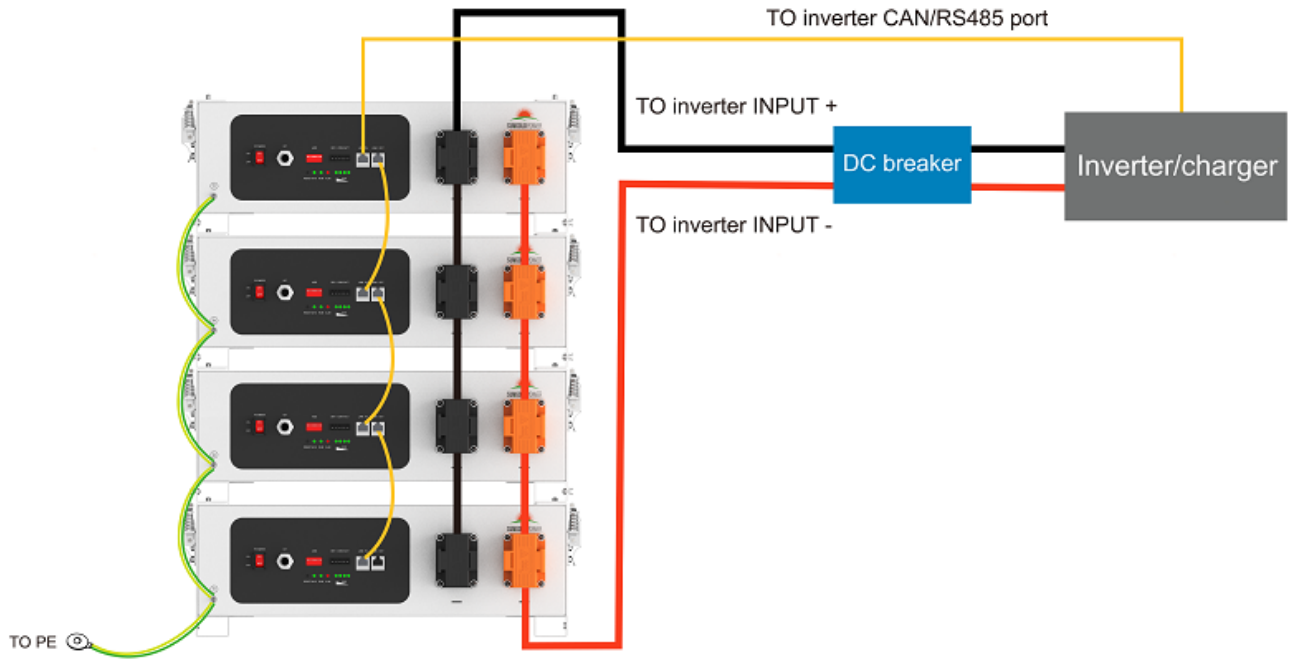
Note:

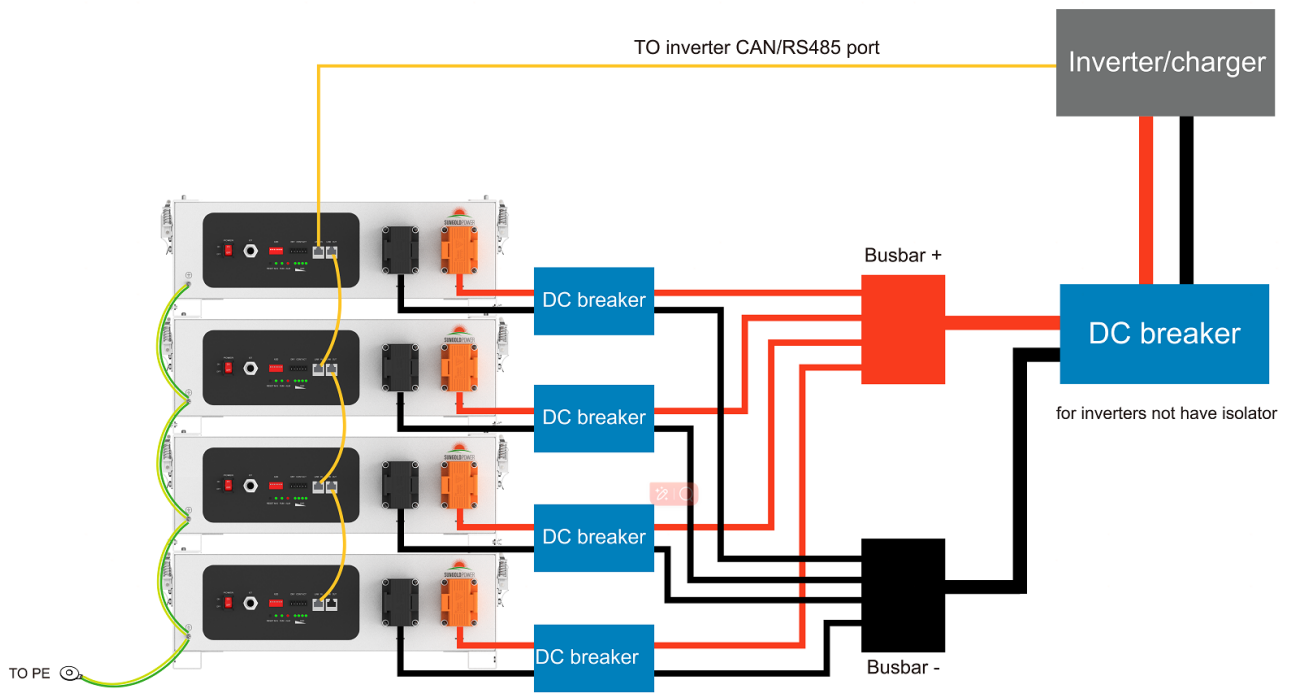
⚠ NOTICE

Choose the suitable disconnection breaker considering the inverter power/current, rated voltage, tripping characteristic etc.

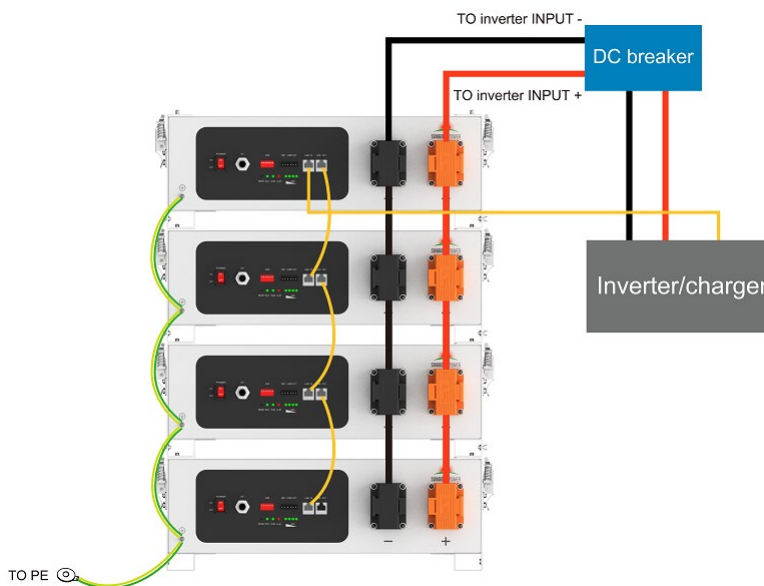
Wiring diagram allowed:







Wiring diagram not allowed:



When multiple batteries are connected in parallel, the wires connecting the positive and negative electrodes of the inverter cannot come from the same battery. This connection mode will cause the current to be unevenly distributed among the batteries, resulting in differences in the SOC of the batteries.

! NOTICE

The maximum communication cable length is required to be less than 15m between inverter/charge and battery. The maximum power cable length is suggested to be less than 10m between inverter/charge and battery.

⚠ CAUTION

The maximum tolerance current of each power cable and terminal is 125A, 100A for continuously is suggested, please use corresponding number of power cable pairs according to the field configuration and local connection requirements, standards, and directives..

5.6 Commissioning

5.6.1 Set the DIP address of the Master battery (and the Slave battery if there is any RS485 baud rate changed).

5.6.2 Switch on all battery modules, wait for 10s, make sure that only M/S led is on Master battery.

5.6.3 Turn on the breaker between the inverter and battery if there is any, then turn on the inverter/charger isolator.

5.6.4 Finish the setting on inverter/charger or any other control devices, if everything is correct, you are ready to use the system.

| No. | Inverter setting parameters | Detail |
|-----|---|--|
| 1 | Absorption voltage | 56.0V |
| 2 | Float voltage | 54.6V |
| 3 | Re-charge/Generator start voltage | ≥50V |
| 4 | Re-start voltage | 52V |
| 3 | Low SOC limit (Grid-tied) | 10/20% (differ from inverter brand) |
| 5 | Low SOC cut-off (Off-grid) | 4% |
| 6 | Low Voltage cut-off | 48.0V |
| 7 | Rated charging current limited value | 100A*N (N is the Quantity of the battery pack) |
| 8 | Rated discharging current limited value | 100A*N (N is the Quantity of the battery pack) |
| 9 | Max. charging current limited value | 200A*N (N is the Quantity of the battery pack) |
| 10 | Max. discharging current limited value | 200A*N (N is the Quantity of the battery pack) |
| 11 | Force charge/ Activate | Enable |

For more information to connect with different inverter/charger, please contact your supplier for technical support.

⚠ CAUTION

If your system is a back-up or off-grid system, make sure your configuration can cover the worst situation to avoid battery to be over-discharged.

5.7 Switch off battery

5.7.1 Turn off the inverter.

5.7.2 Turn off the disconnection breaker if there is any.

5.7.3 Turn off all batteries signal switch.

5.8 Troubleshooting and FAQ

| Items | Solution | Measure |
|----------------------|--|--|
| Unable to start | <ol style="list-style-type: none"> 1. Power on battery and press RESET 6s to observe whether the battery can be started. 2. Charge the battery use a charger or inverter to provide 54~57.6V voltage and observe it can be started. | <p>If the abnormal status still alive after above steps, please contact your supplier.</p> <p>If there is any other situation(s) excluding in this table, turn off the fault battery, contact your supplier.</p> |
| Unable to charge | <ol style="list-style-type: none"> 1. Check whether the cable connection between the battery and the inverter/charger is correct. 2. Check whether the inverter/charger setting is correct. 3. Check whether the battery is in charge protection mode, if yes, try to discharge the battery. | |
| Unable to discharge | <ol style="list-style-type: none"> 1. Check whether the cable connection between the battery and the inverter/charger is correct 2. Check whether the battery occurs short circuit, reverse connection, pre-charge failure during connection inverter etc. 3. Check whether the battery is in discharge protection mode, if yes, try to charge the battery. | |
| High/Low temperature | <ol style="list-style-type: none"> 1. Stop the battery system for a while, check whether the installation location temperature meet the requirement. 2. Avoid continuous full charging and discharging. | |
| High current | Check the configuration and parameters setting on the inverter/charger is correct. | |
| ALM always on | <ol style="list-style-type: none"> 1. Check the fault information on the inverter APP or display if possible. 2. Ask your supplier to offer BMS monitoring software to locate the reason and back to them for solution. | |
| Communication fail | <ol style="list-style-type: none"> 1. Check the communication cable type is correct and is contacted well. 2. Check the DIP switch setting is correct. 3. Check the inverter protocol related setting is correct. 4. Check both battery and inverter are working properly. | |

Q1: Battery maximum SOC is 98~99% and never goes to 100% SOC during daily cycle use, why?

This is normal and have no influence on capacity, usually BMS will calibrate the SOC to 100% when

reached cut-off current or trigger HVP, however, to avoid battery from being overcharged and to extend the cycle life as longer as possible, we left a room and set a charging profile to let battery charge slowly near full, please float the battery about 0.5~1 hour to calibrate the SOC.

Q2: 'High voltage' and 'cell unbalance' warning and alarm in rare cases, does it mean battery is damaged?

No. This is not unusual and happened on new batteries that are not balanced yet, please lower the maximum charge voltage (54.6V) and float the battery via grid or generator. If not solved, please contact your supplier.

Q3: When having multiple batteries in parallel connection, the battery on the end can't be fully charged.

Pay attention to your wiring diagram, please always follow the manual wiring advises and choose proper cable size and pair.

Q4: The current is 0A when connecting with a very small load at the situation that having multiple batteries in parallel connection, how to solve it?

Each BMS has a threshold current of 0.5A (~25W) before it begins to report, this leads the inaccurate display of the current.

Q5: SOC is not accurate or suddenly jumps to 100% during charging.

This mostly happen in off-grid applications on batteries that have not been calibrated SOC for a long time or situations that are similar to Q4 that with inverter in Idle mode or a small DC load or store the battery for a long time, we suggest fully charging at once the batteries per month refer to Q1.

Q6: The system is still running when the inverter log shows 'internal failure' warning.

This is our logic and this warning flag indicates there is 1 or more module(s) is in communication offline from the system, the system will derating and until communication is recovered.

Q7: Inverter pulling power from Grid to charge batteries in self-consumption mode.

When reached certain conditions such as low state of charge etc., battery will send charge request to ask inverter to charge the batteries, to avoid this, please discharge DOD as manual suggested.

6. Transport, Storage

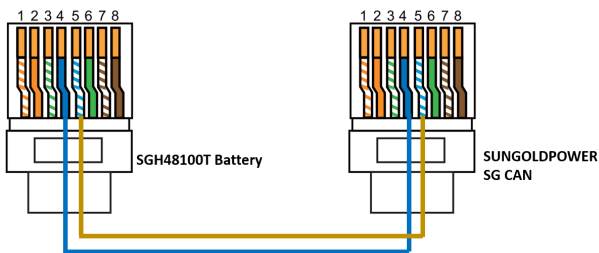
- Do not violently shake, impact or squeeze, and prevent sun and rain during the transportation.
- Do light take and put and strictly prevent falling, rolling, and heavy pressure during loading and unloading.
- The battery should be placed in a dry, clean, dark, and well-ventilated indoor environment for long-term storage, and the recommended storage temperature range is 15~30°C.
- No harmful gases, flammable and explosive products and corrosive chemical substances in the storage location.
- The batteries should be stored and transported in close to 50% SOC, do not store over 80% SOC for long time.
- If do not use for a long time, the battery needs to be charged every 6 months.
- No fall down, no pile up over 6 layers, and keep face up.

7. Disposal of battery

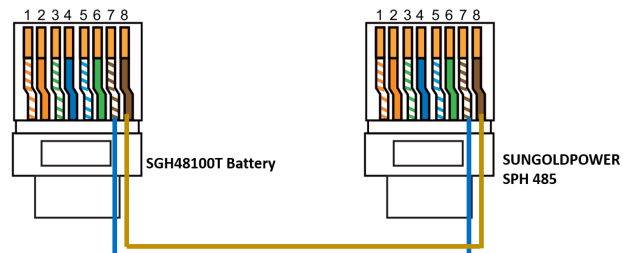
Disposal of battery must comply with the local applicable disposal regulations for electronic waste and used batteries, please review your local Battery recycling or management regulations or contact your supplier for more information.

Appendix I

Connect with SUNGOLDPOWER SPH/SG inverter/charger

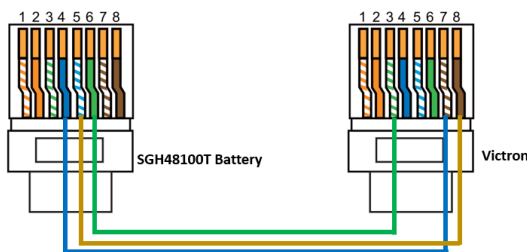


| Battery CAN port | SUNGOLDPOWER SG CAN | Cable suggest |
|------------------|---------------------|-----------------|
| Pin4 | Pin4 | Version-II(CAN) |
| Pin5 | Pin5 | |



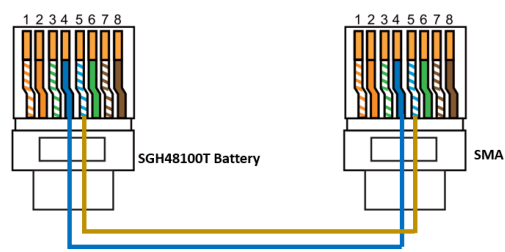
| Battery RS485 port | SUNGOLDPOWER SPH 485 | Cable suggest |
|--------------------|----------------------|-----------------|
| Pin7 | Pin7 | Version-II(485) |
| Pin8 | Pin8 | |

Connect with Victron GX & inverter/charger



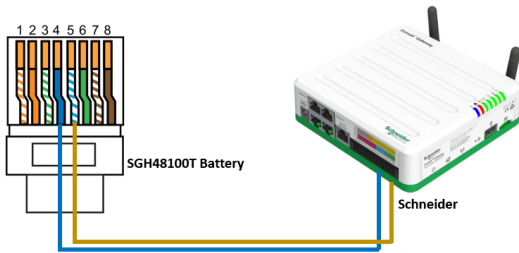
| Battery CAN port | Victron VE.CAN/BMS CAN | Cable suggest |
|------------------|------------------------|----------------|
| Pin4 | Pin7 | Version-I(CAN) |
| Pin5 | Pin8 | |
| Pin6 | Pin3 | |

Connect with SMA inverter/charger



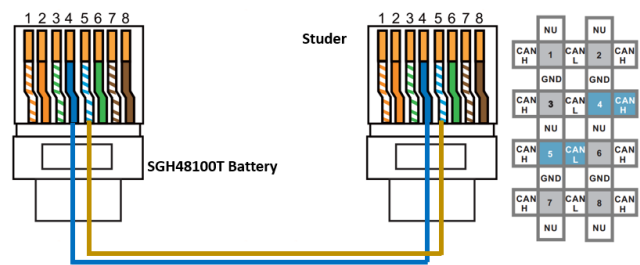
| Battery 485 port | SMA sunny island | Cable suggest |
|------------------|------------------|-----------------|
| Pin4 | Pin4 | Version-II(CAN) |
| Pin5 | Pin5 | |
| Pin6 (optional) | Pin2 (optional) | |

Connect with Schneider inverter/charger



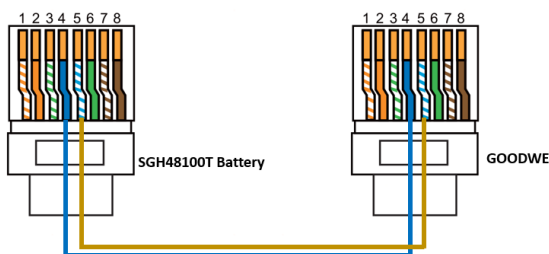
| Battery CAN port | Conext Gateway | Cable suggest |
|------------------|------------------|---------------|
| Pin4 | Pin14 | customized |
| Pin5 | Pin12 | |
| Pin6 (optional) | Pin10 (optional) | |

Connect with Studer inverter/charger



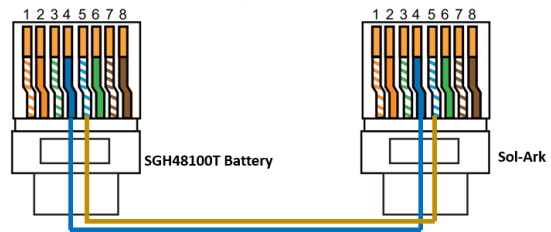
| Battery CAN port | X-Com CAN | Cable suggest |
|------------------|-----------|-----------------|
| Pin4 | Pin4 | Version-II(CAN) |
| Pin5 | Pin5 | |

Connect with GOODWE hybrid inverter



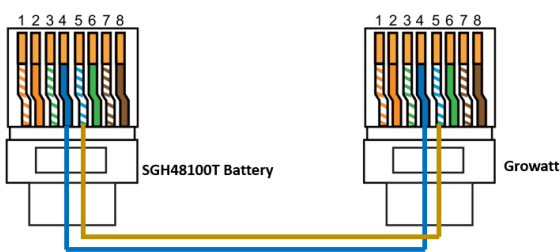
| Battery CAN port | GOODWE BMS CAN | Cable suggest |
|------------------|----------------|-----------------|
| Pin4 | Pin4 | Version-II(CAN) |
| Pin5 | Pin5 | |

Connect with Sol-Ark hybrid inverter



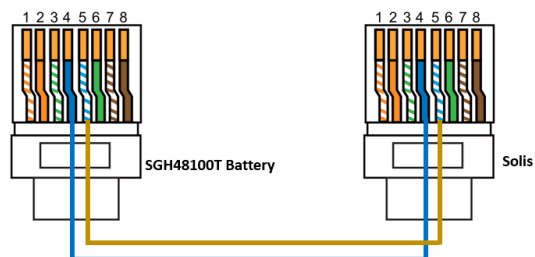
| Battery CAN port | Sol-Ark CAN | Cable suggest |
|------------------|--|-----------------|
| Pin4 | Pin4 | Version-II(CAN) |
| Pin5 | Pin5 | |
| Pin6 (optional) | Pin6 -outdoor Pin2 -indoor (optional) | |

Connect with Growatt inverter



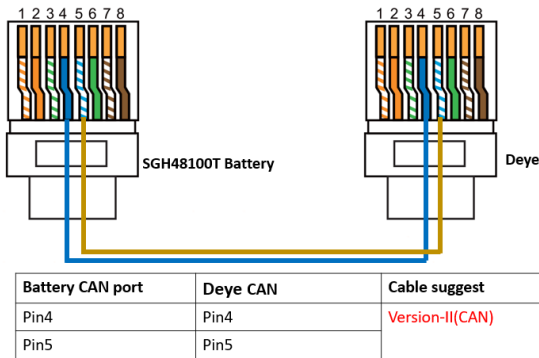
| Battery CAN port | Growatt BMS communication port | Cable suggest |
|------------------|--------------------------------|-----------------|
| Pin4 | Pin4 | Version-II(CAN) |
| Pin5 | Pin5 | |

Connect with Solis inverter

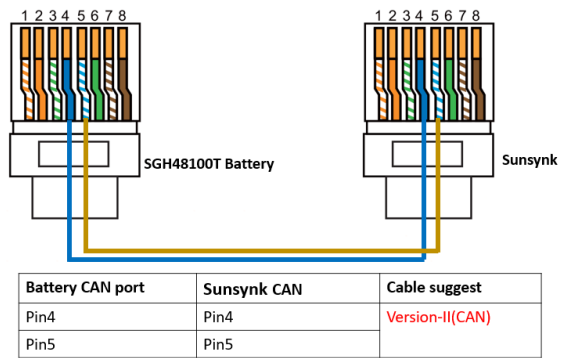


| Battery 485 port | SMA sunny island | Cable suggest |
|------------------|------------------|-----------------|
| Pin4 | Pin4 | Version-II(CAN) |
| Pin5 | Pin5 | |

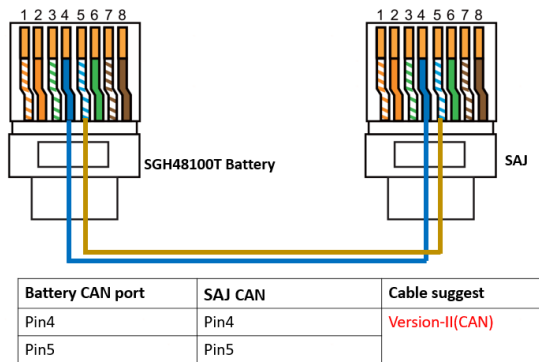
Connect with Deye hybrid inverter



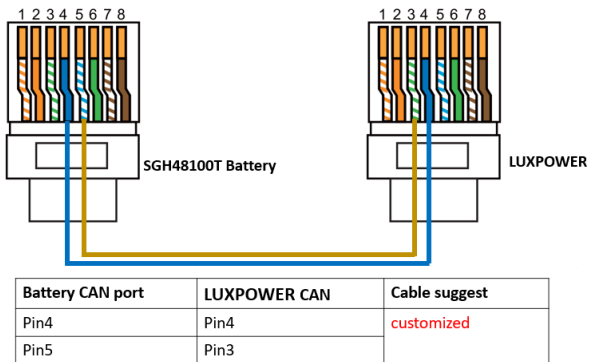
Connect with SUNSYNK hybrid inverter



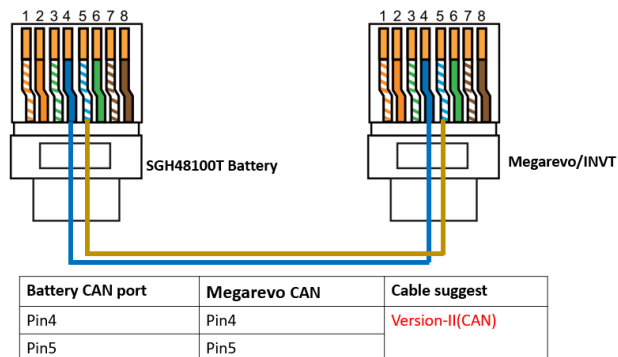
Connect with SAJ hybrid inverter



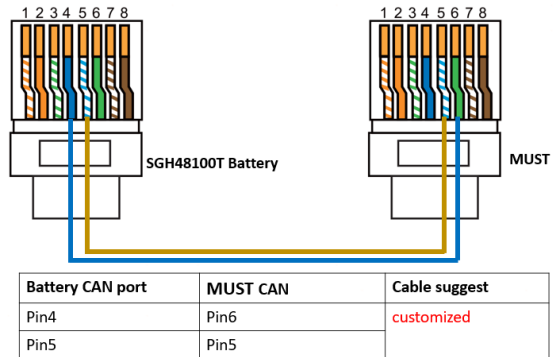
Connect with LUXPOWER inverter



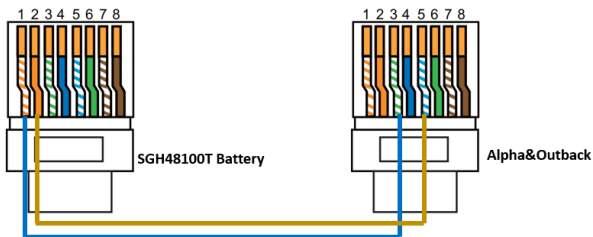
Connect with Megarevo/INVT inverter



Connect with MUST inverter

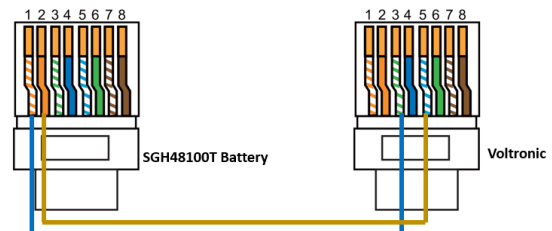


Connect with Alpha & Outback energy inverter



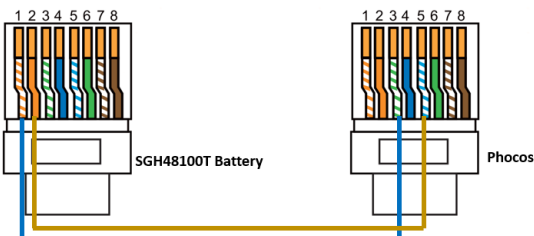
| Battery RS485 port | Alpha&Outback BMS communication | Cable suggest |
|--------------------|---------------------------------|--------------------|
| Pin1 | Pin3 | Version-III(RS485) |
| Pin2 | Pin5 | |

Connect with Voltronic inverter



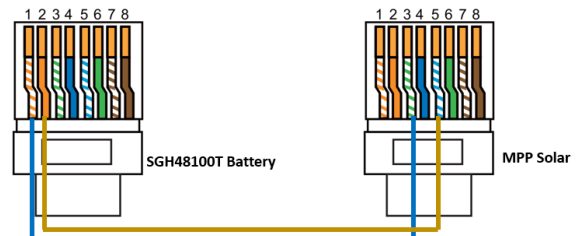
| Battery RS485 port | Voltronic BMS communication | Cable suggest |
|--------------------|-----------------------------|--------------------|
| Pin1 | Pin3 | Version-III(RS485) |
| Pin2 | Pin5 | |

Connect with Phocos inverter



| Battery RS485 port | Phocos BMS communication | Cable suggest |
|--------------------|--------------------------|--------------------|
| Pin1 | Pin3 | Version-III(RS485) |
| Pin2 | Pin5 | |

Connect with Mpp solar inverter



| Battery RS485 port | MPP BMS communication | Cable suggest |
|--------------------|-----------------------|--------------------|
| Pin1 | Pin3 | Version-III(RS485) |
| Pin2 | Pin5 | |