StarCharge

Energy Infrastructure

Metis-100-E

SI105TENT05
SI105TENT50
SI105TENT60

User Manual

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Legal Statement

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Contents

1 Manual Description

1.1 Scope of Use

This manual is used for product information, installation, electrical connection, maintenance, packaging and transportation of energy storage converters.

■ Attention:

Keep this manual properly for easy access.

The illustrations in this manual are for illustration only, please refer to the actual product received.

1.2 Target Audience

This manual is only for use by personnel with electrical operation certificates. The operations described in the manual must be performed by trained and experienced electricians in accordance with basic electrical safety protection requirements.

1.3 Instructions for Use of Symbols

The safety symbols cited in this manual are shown in the table below. These symbols are used to remind readers of the safety matters that should be observed during equipment installation, operation and maintenance.

DANGER	**DANGER** "DANGER" means a highly potentially dangerous situation which, if not avoided, may cause death or serious injury.
WARNING	**WARNING** "WARNING" indicates a moderate potentially hazardous situation that may cause death or serious injury.
CAUTION	**CAUTION** "CAUTION" indicates a lower hazardous situation that, if not avoided, may cause minor or moderate injury.
	**High temperature danger** The temperature of the device will increase during the operation process, and the contact should be avoided.
	Please read the user manual before performing any operation of the converter.

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	**High voltage danger** Due to the high voltage present in the converter, it is very likely to endanger the life. **Capacitor discharge** The converter must be disconnected from the grid and from the battery module before opening the cover. Wait at least 30 minutes for the storage capacitor to discharge completely.
	The product should not be treated as household waste.
	**Earthing marks** Protect the earth wire connection position.

Note: The inverter is not suitable to be installed in household / domestic areas.

2 Safety Instructions

2.1 General Safety

When installing, operating, and maintaining equipment, please read this manual first and follow all safety precautions marked on the equipment and in the manual.

The "instructions", "precautions", "warnings", and "dangers" in the manual do not represent all safety precautions that should be followed, but only serve as a supplement to all safety precautions. Our company does not assume any responsibility for violating general safety operation requirements or violating safety standards for design, production, and use of equipment.

This equipment should be used in an environment that meets the design specifications, otherwise it may cause equipment malfunction, resulting in equipment functional abnormalities or component damage, personal safety accidents, property losses, etc., which are not within the scope of equipment quality assurance.

Local laws, regulations, and specifications should be followed when installing, operating, and maintaining equipment. The safety precautions in the manual are only used as local laws and regulations supplement to regulations.

Our company will not be responsible for any of the following situations:

- Not operating within the usage conditions specified in this manual.
- The installation and use environment exceeds the provisions of relevant international or national standards.

- Unauthorized disassembly, modification of products, or modification of software codes.
- Failure to follow the operating instructions and safety warnings in the product and documentation.
- Equipment damage caused by abnormal natural environments (such as earthquakes, fires, storms, etc.).
- Transportation damage caused by the customer' s own transportation.
- Damage caused by storage conditions that do not meet product documentation requirements.

Live operation is strictly prohibited during installation:

- It is strictly prohibited to install, use, and operate outdoor equipment and cables (including but not limited to handling equipment, operating equipment and cables, plugging and connecting to outdoor signal interfaces, high-altitude work, outdoor installation, etc.) in adverse weather conditions such as lightning, rain, snow, and strong winds above level six.
- After installing the equipment, empty packaging materials in the equipment area, such as cartons, foam, plastics, cable ties, etc., shall be removed.
- If a fire occurs, evacuate the building or equipment area and press the fire alarm bell, or call the fire alarm number. Under any circumstances, it is strictly prohibited to re-enter a burning building.
- It is strictly prohibited to artificially alter, damage or obstruct the identification and nameplate on the equipment.
- When installing equipment, tools need to be used to tighten the screws to the specified torque.
- Fully familiar with the composition and working principle of the entire photovoltaic grid connected power generation system, as well as the relevant standards of the country/ region where the project is located.
- Paint scratches that occur during equipment transportation and installation must be repaired in a timely manner, and long-term exposure of the scratched parts to the outdoor environment is strictly prohibited.
- Do not open the host panel of the device.
- Reverse engineering, de-compilation, disassembly, disassembly, adaptation, implantation, or other derivative operations shall not be carried out on the device software. It is not allowed to study the internal implementation of the device, obtain the source code of the device software, steal intellectual property rights, etc. in any way, and the results of any device software performance testing shall not be disclosed.
- During equipment operation, if any faults are found that may cause personal injury or equipment damage, the operation should be immediately terminated, reported to the responsible person, and effective protective measures should betaken.

- Before using tools, please master the correct method of using them to avoid injury to people and damage to equipment.
- When the equipment is running, the shell temperature is high and there is a risk of burns. Please do not touch it.

2.2 Personnel Requirements

- Personnel responsible for installing and maintaining equipment must first undergo strict training, understand various safety precautions, and master the correct operating methods.
- Only qualified professionals are allowed to dismantle safety facilities and repair equipment.
- Personnel operating equipment, including operators, trained personnel, and professionals, should have local or national requirements for special operation qualifications, such as high-voltage operation, climbing, and special equipment operation qualifications.
- The replacement of equipment or components (including software upgrades) must be completed by professional or authorized personnel.

2.3 Electrical Requirements

2.3.1 Earthing Requirements

- When installing equipment that needs to be earthed, the protective earth wire must be installed first; When dismantling equipment, the protective earth wire must be removed last.
- It is prohibited to damage the earthing conductor.
- It is prohibited to operate equipment without installing earthing conductors.
- The equipment should be permanently earthed for protection. Before operating the equipment, the electrical connection of the equipment should be checked to ensure that it is reliably earthed.

2.3.2 General Requirements

Before making electrical connections, please ensure that the equipment is not damaged,otherwise it may cause electric shock or fire.

- All electrical connections must meet the electrical standards of the country/region where they are located.
- It is necessary to obtain permission from the power department of the country/region in order to connect to the grid for power generation.
- User provided cables should comply with local laws and regulations.
- When performing high-voltage operations, please use specialized insulation tools.

2.3.3 AC and DC Operation

DANGER

It is prohibited to install or remove power cords with electricity. At the moment of contact with the conductor, the power cord core can generate an arc or spark, which can cause fire or personal injury.

- Before electrical connection of the equipment, if it is possible to touch live parts, the corresponding breaking device of the previous level of the equipment must be disconnected.
- Before connecting the power cord, it is necessary to confirm that the power cord label identification is correct before connecting.
- If the device has multiple inputs, all inputs should be disconnected and the device can only be operated after it is fully powered down.

2.3.4 Wiring Requirements

- The use of cables in high-temperature environments may cause aging and damage to the insulation layer, and the distance between the cable and the periphery of the heating device or heat source area should be at least 30mm.
- Similar cables should be tied together, and different types of cables should be laid at least 30mm apart. It is prohibited to wrap or cross lay each other.

2.4 Mechanical Safety

2.4.1 Handling Safety

- When carrying heavy objects, preparations should be made for load-bearing to avoid being crushed or twisted by heavy objects.
- When handling equipment by hand, protective gloves should be worn to avoid injury.

2.4.2 Ladder Use Safety

- When electrical climbing operations may be involved, wooden or fiberglass ladders should be used.
- When using a herringbone ladder, the pulling rope must be firm, and someone must support the ladder during operation.
- Before using the ladder, please confirm that it is in good condition and its load-bearing capacity meets the requirements. Overweight use is strictly prohibited.
- When using a ladder, the wide foot should be facing downwards or protective measures should betaken at the bottom of the ladder to prevent slipping.
- Ladders should be placed in a stable place. The inclination of the ladder should be 75° .

2.5 Surge Protective Devices (SPDs)

Surges caused by direct lightning strikes or indirect lightning strikes can cause damage to equipment. Induced surges are the most likely cause of lightning damage to most installations, especially in rural areas where power is often provided by long overhead lines.

The AC side of the converter are integrated with Class II SPD protection devices, so there is no need to install external lightning protection systems on both sides.

3 Product Description

3.1 Product Introduction

This series of products is a bidirectional converter that realizes the charge and discharge control of the energy storage battery. The energy storage converter is an important part of the smart grid, which can regulate power resources and ensure the normal operation of the grid. On the one hand, the converter can invert the direct current of the energy storage battery into alternating current to supply power to the load or input into the grid; on the other hand, the converter can rectify the alternating current of the grid into direct current to charge the energy storage battery.

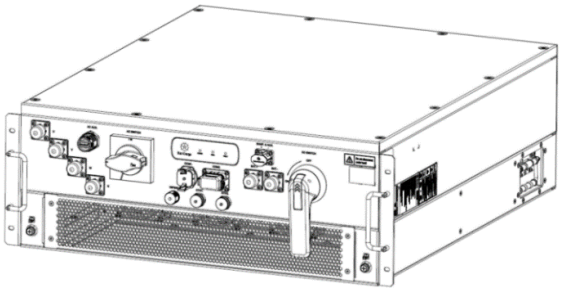

Figure 3-1 Appearance

3.2 Basic Characteristics

This series is a three-phase high-performance converter with high conversion efficiency and stable and reliable products.

Advantages:

- Advanced DSP control technology.
- With the latest highly efficient power supply topology structure.
- Advanced anti-island solution.
- IP65 protection level, both indoor and outdoor environment can be installed.
- The maximum efficiency can reach 98.1%, and the total harmonic distortion is less than 3%.
- LED status indication.
- Remote monitoring via a PC or an application.

3.3 Explanation of Model Meaning

	SI	105	T	EN	T	xx
Meaning	Product type	Power	Three-phase	European Standard	No charging interface	05：tandard product 50：on/off-grid switching 60：DC common bus

3.4 Product Dimensions

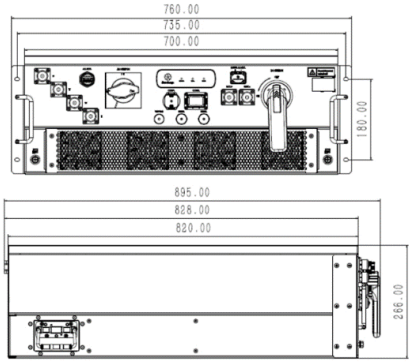

Figure 3-2 Appearance Dimensions (unit: mm)

3.5 Structural Layout

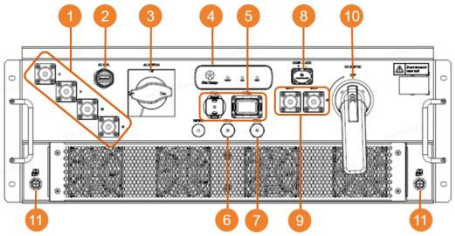

Figure 3-3 Structural layout

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Table 3-1 Component description

No	Screen Print	Name	Illustrate
1	AC(U/V/W/N)	Grid interface	AC input/output connection
2	AC AUX.	AC auxiliary power supply interface	Output interface for supplying AC power to loads within the energy storage cabinet. (Not on-grid/off-grid port, Load type: Battery Management System (BMS), thermal management, safety system, monitoring and communication, and auxiliary functions shall be determined according to the actual application scenario.)
3	AC BREAKER	AC molded case circuit breaker	Breaker for connecting to the grid
4	/	Display panel	Indicates the machine status
5	COM1. COM2.	Communication and dry contact interface	External communication and dry contact
6	ETH1.	DRED interface	DRED interface
7	ETH2.	On/Off-Grid switching signal interface	On/Off-Grid communication switching port Note: Applicable only to SI105TENT50.
8	SAMP&AUX.	Voltage sampling and DC auxiliary power supply	Battery voltage sampling and DC auxiliary power supply output wiring Note: Applicable to SI105TENT05, SI105TENT50
	M	DC common bus parallel interface	DC Bus Midpoint Note: Applicable only to SI105TENT60.
9	BAT+. BAT-.	Battery interface	DC input connection
10	DC SWITCH	DC Isolator Switch	Connection switch with battery
11	/	Protective earthing point	Connection point for protective earthing

Note:

1. No leakage current detection, users need to install appropriate leakage protection equipment (TYPE B) in the system based on the type of grid connection for the energy storage system(recommended RCD for a single PCS: 300 mA).
2. The SAMP&AUX interface does not have fuses or circuit breakers and requires external installation.
3. The ACAUX interface does not have fuses or circuit breakers and requires external installation.
4. ETH2. port is for I/O interaction only and is not SELV (Safety Extra-Low Voltage).

AC molded case circuit breaker and DC isolating switch

The AC molded case circuit breaker (as shown in ③ in Figure 3-3) is the connection switch between the converter and the power grid; The DC disconnector (as shown in Figure 3-3 ⑩) is the connection switch between the converter and the battery; When necessary, the converter can be safely disconnected from the power grid and the converter from the battery.

In order to ensure the safety of operators, please ensure that the AC molded case circuit breaker and the DC disconnector are disconnected under the following conditions:

- When installing wiring, the AC molded case circuit breaker and DC isolating switch must be in the OFF position.
- When checking and repairing, put the AC molded case circuit breaker and DC isolating switch in the OFF position and wait for 30 minutes, then use a multimeter to test maintenance work can only be performed when the DC bus voltage inside the machine is below 10V.

COM interface

COM1 is a 16-pin signal connector, as shown in Figure 3-4; COM2 is an 18-pin signal connector, as shown in Figure 3-5.

Figure 3-4 COM1. Connector

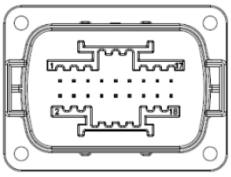

Figure 3-5 COM2. connector

Table 3-2 COM1 Connector Pin Functions

Pin No.	Definition	Illustrate
1	24V_IN	The converter input 24V auxiliary power interface is used for the auxiliary power supply of the converter. Since the converter integrates a 24V auxiliary power supply that draws power from the battery internally1), leaving this interface disconnected will not affect the operation of the converter. Note: This interface is connected to the Safety Extra-Low Voltage (SELV) circuit of the converter and must not be connected to the power circuit.
2	24V_IN	
3	24V_IN	
4	GND	
5	GND	
6	GND	
7	GND	The converter outputs 24V power interface. This is a debugging interface for the converter and should not be used. Note: This interface is connected to the Safety Extra-Low Voltage (SELV) circuit of the converter and must not be connected to the power circuit.
8	GND	
9	24V_OUT	
10	24V_OUT	
11	CT_CANL	Power positive (+) pole (CT_VCC), power negative (-) pole (CT_GND), and output (CT_CANL, CT_CANH) of the battery current sensor. The current sensor has a range of +/-500A and outputs in CANBUS digital format at a baud rate of 250kbps. The power supply voltage range for the sensor is 12-15Vdc, with a minimum current of 300mA.
12	CT_CANH	
13	CT_GND	
14	CT_VCC	

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Pin No.	Definition	Illustrate
15	RS485_A_2	The RS485 interface can be used for communication with EMS. The reference ground (GND, COM1 connectors pin4~pin8) of the energy storage inverter RS485 interface is connected to the reference ground of EMS RS485 and cannot be connected to PE.
16	RS485_B_2	

Note:

This energy storage converter has an integrated 24V auxiliary power supply that draws power from the battery. When the battery interface of the converter has power (voltage ranging from 350V to 950V) and the isolation switch is closed, the internal 24V auxiliary power supply of the converter operates. In this state, when the converter is turned off, the power consumption is approximately 10W.

Table 3-3 COM2 connector pin functions

Pin No.	Definition	Illustrate
1	CAN_H	CAN interface for communication with BMS. It is recommended to connect the reference earth (GND, COM1 connector pin4~pin8) of the energy storage converter's CAN interface to the reference earth of the BMS.
2	CAN_L	
3	RS485_A_1	RS485 interface, reserved. It is recommended to connect the reference earth of the energy storage converter's RS485 interface (GND, COM1 connector pin4~pin8) to the reference earth of the interconnection communication interface.
4	RS485_B_1	
5	DIO_IN_P	Input dry contact, reserved.
6	DIO_IN_N	
7	ESTOP_P	Input dry contact for emergency stop.
8	ESTOP_N	
9	DIO_OUT_P	Output dry contact, reserved.
10	DIO_OUT_N	
11	DC_RLYN_EN_P	BAT- contactor enable signal (When the voltage relative to DC_RLYN_EN_N is 24V, the BAT- contactor is open; when the voltage relative to DC_RLYN_ EN_N is 0V, the BAT- contactor status is controlled by the converter. When DC_RLYN_EN_P and DC_RLYN_EN_N are floating, the BAT- contactor status is controlled by the converter). Note: This interface is connected to the energy storage converter's Safety Extra-Low Voltage (SELV) circuit and should not be connected to the power circuit. DC_RLYN_EN_N is connected to the converter SELV circuit earth.
12	DC_RLYN_EN_N	

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Pin No.	Definition	Illustrate
13	DC_RLYP_EN_P	BAT+ Contactor Enable Signal (When the voltage relative to DC_RLYP_EN_ N is 24V, the BAT+ contactor is open; when the voltage relative to DC_RLYP_ EN_N is 0V, the status of the BAT+ contactor is controlled by the converter. When DC_ RLYP_EN_P and DC_RLYP_EN_N are floating, the status of the BAT+ contactor is controlled by the converter). Note: This interface is connected to the Safety Extra-Low Voltage (SELV) circuit of the converter and must not be connected to the power circuit. DC_ RLYP_EN_ N is connected to the SELV circuit earth of the converter.
14	DC_RLYP_EN_N	
15	NC	Converter commissioning interface. Note: Do not wire.
16	NC	
17	DSP_CAN1_L	CAN interface: This interface is dedicated to carrier synchronization and is not compatible with other CAN interfaces. Note: CAN functions of ports 17 and 18 are applicable only to the SI105TENT60 model.
18	DSP_CAN1_H	

ETH Interfaces:

ETH1. ETH2. are 8-pin signal connectors, as shown in Figure 3-6.

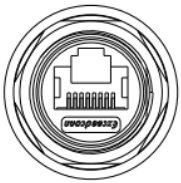

Figure 3-6 ETH1. 2 Connector

Table 3-4 ETH1. Pin Functions

Pin No.	Definition	Illustration
1	DRM1/5	Channel 1 (DRM1 mode)
2	DRM2/6	Channel 2 (DRM2 mode)
3	DRM3/7	Channel 3 (DRM3 mode)
4	DRM4/8	Other use (DRM4 mode)
5	RefGen	Other use
6	Com/DRM0	Common terminal (DRM0 mode)
7	COM	Shorted
8	COM	

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Table 3-5 ETH2. Pin Functions

Pin No.	Definition	Illustration
pin1	GND	Closing dry contact output, pulse-triggered; pulse width must be greater than 250 μs.
pin2	OPEN	
pin3	GND	Opening dry contact output, pulse-triggered; pulse width must be greater than 250 μs.
pin4	CLOSE	
pin5	GND	Zero-cross feedback input.
pin6	ZC	
pin7	GND	Status input: contact open indicates closing status; contact closed indicates opening status.
pin8	OS	

3.6 Display Panel

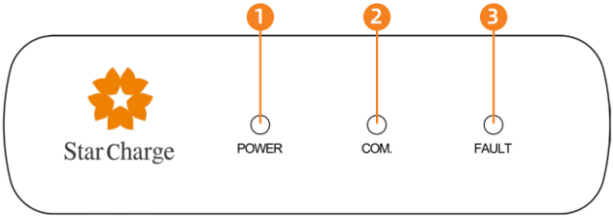


Table 3-6 Description of LED indicators on the LED panel

No	Screen Print	Color	Meaning
1	POWER	Green	Running Status Indicator
2	COM.	Green	Communication Indicator
3	FAULT	Red	Fault alarm Indicator

Table 3-7 Status description of the indicator board

LED	Indicator	Color	State	Behavior	Meaning	Explanation
①	POWER	Green	On	Constantly on	On Grid	The device is in on-grid operation mode.
			Blink	1s on, 1s off	Off Grid	The device is in off-grid operation mode.
			Fast Blink	0.2s on, 0.2s off	Self-check or pre-synchronization	The converter is in self-check or grid synchronization.
			Slow Blink	1s on, 4s off	Power supplied but not running	The converter is not running, but auxiliary power is supplied.
			Medium-Slow Blink	1s on, 2s off	Standby	The converter is in standby operation mode.
			Off	Constantly off	No power or fault	The device has a fault or no auxiliary power is supplied.

LED	Indicator	Color	State	Behavior	Meaning	Explanation
②	COM.	Green	Slow Blink	1s on, 4s off	CAN Communication	The device receives CAN data.
			Medium - Slow Blink	1s on, 2s off	ECB Communication	The device receives ECB data.
			Fast Blink	0.2s on, 0.2s off	Firmware Upgrade	The converter is undergoing a firmware upgrade.
			Off	Constantly off	No Data Interaction	The converter does not receive communication data.
③	FAULT	Red	Blink	1s on, 1s off	Significant fault	The converter has significant fault.
			Slow Blink	1s on, 4s off	Minor fault	The converter has minor fault.
			Off	Constantly off	No fault	The converter has no fault.

Note: The PCS does not include ground-fault detection functionality. This function must be provided externally and comply with the AS/NZS 5033 standard. Ground-fault alarms should be sent to the customer via remote monitoring.

3.7 Working Principle

This series of energy storage converter products realizes the charge and discharge control of the energy storage battery. The DC interface of the energy storage converter is connected to the energy storage battery, and the AC interface is connected to the three-phase AC grid or load. When the battery is discharged, the energy storage converter inverts the DC power of the energy storage battery into a three-phase AC power supply for the load. When the battery is charged, the energy storage converter rectifies the alternating current of the three-phase grid into direct current to charge the energy storage battery. Energy storage The structural block diagram of the streamer is shown in Figure 3-7.

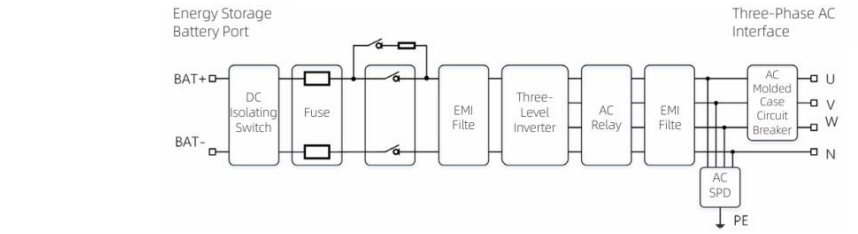


Figure 3-7 Structural block diagram of energy storage converter

3.8 Working Mode

Energy storage converters generally include two working modes: on-grid mode, off-grid mode and standby mode.

Note: SI105TENT05 model on-grid/off-grid switching method: When the PCS operates normally in on-grid mode, the external EMS monitors the grid. If a grid fault occurs, the EMS first sends a shutdown command to the PCS and disconnects the grid-side switch at the external on/off-grid switching point (while keeping the load side connected to the PCS side). Then, the EMS sends an off-grid operation mode command to the PCS, followed by a startup command to enable the PCS to operate in off-grid mode.In on-grid mode, the energy storage converter can perform energy storage battery charging and discharging functions.

If no external automatic on/off-grid switching device is installed for the SI105TENT50 model, the on/off-grid switching method is the same as that of the SI105TENT05. When an external automatic on/off-grid switching device is installed, the switching method is as follows: the PCS must be connected to the external automatic on/off-grid switching device. The PCS actively monitors the grid, and when a grid fault occurs, the PCS performs on-grid blocking and sends a trip signal to the external automatic on/off-grid switching device. After the device completes tripping and returns a signal to the PCS, the PCS switches to off-grid operation.

The SI105TENT60 does not support off-grid operation.

- The charging method is constant power charging.
- The discharging method is constant power discharging.

When connected to the grid, the energy storage converter can automatically track the grid frequency, combined with the monitoring system to achieve functions such as smooth power output, peak shaving and valley filling, load balancing, emergency response to transient active power output, emergency support of transient voltage, and improvement of power quality.

In on-grid mode, the PCS can be controlled to enter standby mode. In standby mode, the energy storage converter' s DC contactor and AC relay remain closed, blocking the power device output, which can reduce PCS power consumption and allow the equipment to quickly recover to on-grid mode.

- Standby mode can serve as an alternative to on-grid idle (zero power) operation to reduce the power consumption of the energy storage converter.
- It is possible to switch from standby mode to other grid-connected states (grid-connected battery charging, grid-connected battery discharging, grid-connected zero power) or shut down. It is also possible to switch from other grid-connected states to standby mode.

  However, it is not allowed to switch to standby mode when the system is being shut down in grid-connected mode. In off-grid mode, it is not allowed to switch to standby mode.
- The switching time between standby mode and other grid-connected modes (grid- connected

battery charging, grid-connected battery discharging, grid-connected zero power) is within 2 seconds. Here, the switching time refers to the control switching time and does not include time delay caused by communication or other factors.

Off-grid mode

In off-grid mode, the system can output AC voltage with constant amplitude and frequency. When the grid loses power or is in an independent system, the equipment can continue to supply power to various loads.

3.9 Communication Method

The converter has multiple communication methods, including RS485 communication, CAN communication. You can easily obtain the system operation data of the current converter.

3.9.1 RS485 Communication

RS485 communication is used for communication between the converter and the energy storage system's EMS. The converter sends information such as status, operating data, and faults to the EMS and receives and executes various commands sent by the EMS. RS485 communication can also be used to communicate with the converter's dedicated debugging software, which is used to monitor the converter's operational information, diagnose faults, and upgrade the converter's firmware programs.

3.9.2 CAN Communication

CAN communication can be used for communication between the converter and the battery management system (BMS), allowing the converter to receive information and execute related commands sent by the BMS.

4 Technical Parameters

Note: SI105TENT60 without off-grid function，off-grid parameter not applicable this model

Model	SI105TENT05, SI105TENT50	SI105TENT60
DC SIDE PARAMETERS		
Battery type	lithium iron phosphate battery	
Full Load Voltage Range	650~950 V	
Max. Voltage	950V	
Input start-up voltage	650V	
Rated charging/discharging power	100 kW	
Max. Continuous Current	158 A	
Max. Charge / Discharge Current	158 A	
AC PORT (On-Grid Mode)		
Rated/Max. output power	100 kVA	
Rated/Max. output current	145 A	
Rated grid voltage	230V/400 Vac, 3W+N+PE;	
Nominal Operating Frequency	50 Hz	
Power factor range	1.0 (lagging)-1.0 (leading)	
Current (inrush)	145 A	

Maximum output fault current	817.5A	
THDi	<3% (rated power)	
Maximum reactive power limit	-100 kW ... +100 kW	
Maximum inverter backfeed current to array	0A	
AC PORT (OFF-Grid Mode)	SI105TENT05, SI105TENT50	SI105TENT60
Rated grid voltage	230V/400 Vac,3W+N+PE	/
Rated/Max. output power	100 kVA	/
Max. unbalanced output power	17.5 kVA	/
Rated/Max. output current	145 A (Linear load)/90 A(Nonlinear load)	/
Nominal Operating Frequency	50 Hz	/
Max. allowable crest factor	2.5	/
THDv	<3% (rated conditions, resistive balanced load)	/
PROTECTION		
Overvoltage protection level	Ⅱ (DC) / Ⅲ (AC)	
Pollution level	Ⅲ	
Protection level	Ⅰ	
Active anti-islanding Method	Active frequency drift detection method	
Protection functions	Anti-reverse connection protection DC overvoltage and undervoltage protection Anti-AC phase sequence error protection AC overcurrent protection Overtemperature protection Anti-islanding protectionAnti-islanding AC surge protection	
GENERAL DATA		
Topology	Transformer-less	
Conversion type	DC/AC	
Peak efficiency	98.1%	
Operating temperature range	-25 ℃ ~+60 ℃ (derating above 45℃)	
Humidity	0%~95%	
Operating altitude	3000 m	
Audible noise	<75dBA@1m	
Parallel operation	Up to 20 parallel connections (on-grid)	
MECHANICAL		
Dimensions (W x H x D)	700×266×820 mm	
Weight	≤ 85 kg	
cooling	Intelligent forced air cooling	
Enclosure material	Metal enclosure	
Installation method	Rack-mounted	
Enclosure protection rating	IP65	
INTERFACE		
Indicator	LED	
Communication methods	RS485, CAN (standard)	

EN

5 Installation

5.1 Visual Inspection

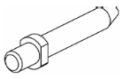
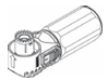
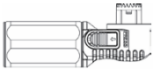
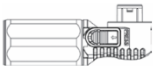
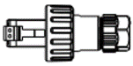
Ensure that the energy storage converter is not damaged during transportation. If there is any visible damage, such as cracks, please contact the dealer immediately.

⚠ CAUTION If the device needs to be stored for a long time after unpacking, it is recommended to wrap the device with the original plastic of the device.

5.2 Packing List

Compare the packing list to check whether the models of the supplied accessories are complete and correct, as shown in Table 5-1. If you find that the accessories are missing or the models do not match, please make on-site records in time.

Table 3-5 Status description of the indicator board

No.	Name	Qty	Image	No.	Name	Qty	
1	Guide pin	2		8	Energy storage orange plug (with teeth)	3	
2	Cold-rolled terminal	2		9	Energy storage orange plug (without teeth)	1	
3	Energy storage black plug (with teeth)	1		10	Two-core plug	1	
4	Energy storage black plug (without teeth)	1		11	Five-core plug	1	
5	Sixteen-core plug	1		12	RJ45 plug Applicable to SI105TENT05, SI105TENT60	1	
6	Eighteen-core plug	1			RJ45 plug Applicable to SI105TENT50	2	
				13	Factory inspection report	1	/
7	Ferrite ring	2		14	Certificate of conformity for the entire machine	1	/

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CAUTION

1. The plugs are individually packaged for shipment; (The factory report and certificate of conformity are shipped with the entire machine).
2. Optional 50 mm² energy storage plug (please contact sales separately)

5.3 Installation Requirements

Please make sure that the installation location meets the following conditions:

- The Metis is protected to IP65.
- Do not install the converter in locations that exceed the technical specifications (temperature: -25° C to +60° C, relative humidity: 0%-95%) for high or low temperatures, or in damp areas.
- Do not install the converter in a closed space without ventilation, and ensure that the air around the converter has a certain degree of fluidity.
- There should be no flammable or explosive items, or places with dust, corrosive substances, or salt in the installation environment.

CAUTION

Since the operation of the converter will generate noise pollution, it is advisable to avoid installing it in places close to residential areas.

5.3.1 Installation Space Requirements

Ensure that there is enough space around the converter for heat dissipation or maintenance. There are no heat dissipation size requirements for the top and bottom, as long as they can be installed.The installation space requirements of the converter are shown in Figure 5-1 below (unit: mm).

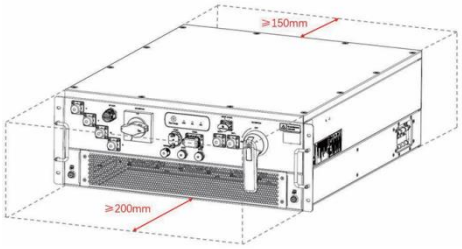

Figure 5-1 Schematic diagram of installation space requirements

5.3.2 Heat Dissipation Requirements

The converter uses forced air cooling with a front-to-rear airflow configuration. It is installed in a system cabinet, and the air intake and exhaust ports of the cabinet must remain unobstructed, in direct alignment with the PCS. The exhaust outlet of the converter must be equipped with an exhaust

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channel to direct hot air to the cabinet's exhaust port, to avoid issues like airflow short-circuiting and hot air recirculation. It is recommended that the intake and exhaust openings of the cabinet use a fine mesh grille design, with an effective area of at least 600 cm² for the intake and 700 cm² for the exhaust. If the intake and exhaust of the cabinet are equipped with louvers or dust filters, additional system fans should be installed in the airflow channel where the converter is located to assist with heat dissipation. The airflow passing through the converter should not be less than 600 CFM. The type of system fan can be selected based on specific airflow channel designs, cabinet protection, and space considerations. as shown in Figure 5-2.

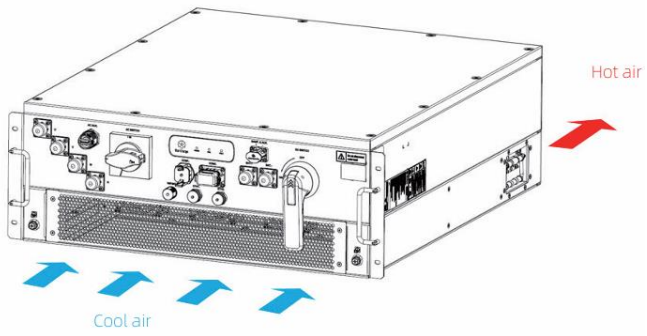

Figure 5-2 Schematic diagram of heat dissipation space

■ **Note:**

1. The term "effective area of intake/exhaust ports" refers to the open area of the cabinet's ports.
2. The aforementioned ventilation area and airflow requirements apply only to the cooling airflow channel of a single converter, without accounting for other heat sources within the system cabinet.

5.3.3 Moving Requirements

Before installation, the converter needs to be moved to the selected installation site. When moving, you can choose handles to carry according to the site conditions, as shown in Figure 5-3.

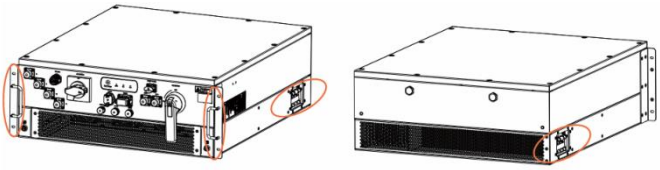

Figure 5-3 Schematic diagram of handle handling

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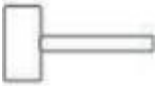
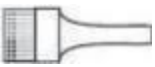
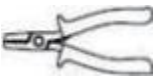
CAUTION

- It is recommended to have at least 4 personnel involved in the transportation of the converter, wearing protective gear such as anti-smashing shoes and gloves.
- When carrying, move carefully to avoid impact or dropping.
- Throughout the transportation process, it is crucial to pay constant attention to the center of gravity of the converter and avoid sudden lowering or lifting.
- The converter should not be directly placed on a hard surface. Prior to placement, it is necessary to use protective materials such as sponge pads or foam underneath it.

5.3.4 Installation Tools

Recommended installation tools include but are not limited to the following tools, as shown in the table below; other auxiliary tools can also be used according to site conditions if necessary.

Table 5-2 Installation tools

Type	Tool			
Installation Tools	 Impact drill, drill bit	 Socket wrench set	 Torque wrench	 Slotted screwdriver
	 Phillips screwdriver	 Rubber hammer	 Adjustable wrench	 Marker pen
	 Label	 Steel tape	 Brush	 Insulating tape
	 Thermal casing	 Heat shrink gun	 Wire strippers	 Diagonal pliers
	 Crimping tool	 Hydraulic pliers	 Utility knife	Cable tie

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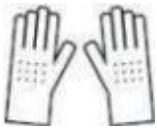
Type	Tool			
Installation Tools	 Clamp ammeter	 Ammeter		
Protective Equipment	 Dust mask	 Goggles	 Safety gloves	 Safety shoes

CAUTION

- The installation tools need to be insulated to avoid danger caused by electric shock.
- The range of the multimeter needs to be ≥ 1000 Vdc.

5.3.5 Product Installation

The converter can be fixed to the cabinet pillar using mounting ears.

Step 1: Install the guide pin from the accessories in the package to the converter. The recommended torque is 10N·m, as shown in Figure 5-4.

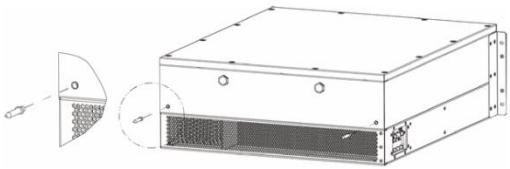


Figure 5-4 Fix the guide pin

Step 2: Slide the converter into the cabinet along the mounting rails on both sides until the mounting ears are flush with the upright columns of the cabinet, as shown in Figure 5-5.

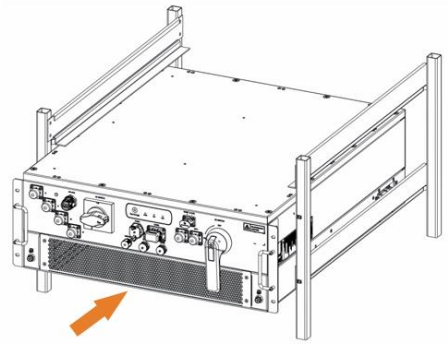


Figure 5-5 Insertion of the converter into the cabinet

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Step 3: Use the M6×16 hexalobular internal cross combination screws to fix the converter on the cabinet column through the mounting ears. The recommended torque is 4.5N·m, as shown in Figure 5-6.

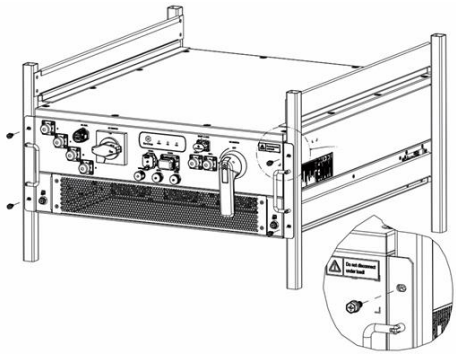

Figure 5-6 Fix the converter

CAUTION The screws need to be prepared by users, and can be replaced with the same type.

6 Electrical Connections

6.1 System Wiring Diagram

1. This diagram is an example for grid systems without special requirements on electrical wiring connection.
2. This product needs to be switched manually from on-grid to off-grid/off-grid to on-grid.

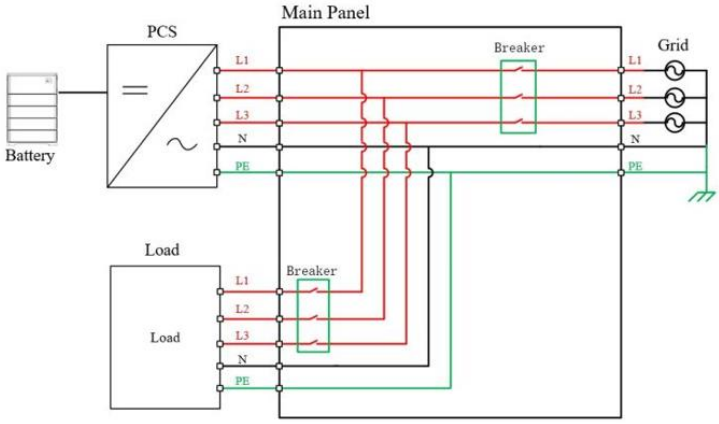

Figure 6-1 System Wiring Diagram

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6.2 Notes on Grid Connection

1. The energy storage converter is suitable for a rated three-phase voltage of 230/400 V and a frequency of 50 Hz for the grid. Other technical requirements should comply with the local public grid specifications.
2. This series of products are applicable to the following six kinds of structural grids.

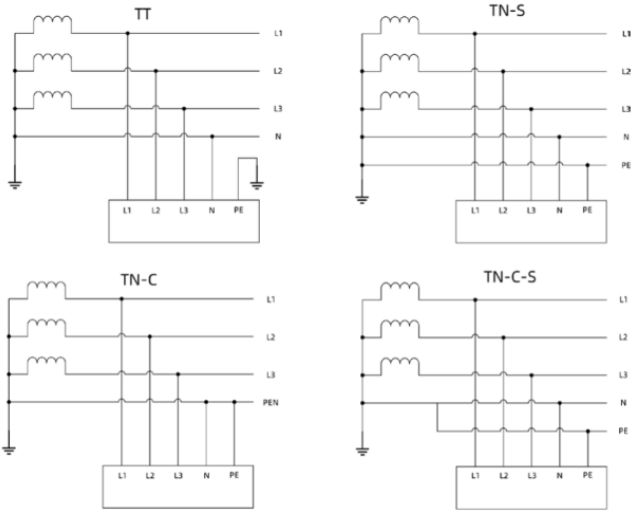

Figure 6-2 Four kinds of structural grids

CAUTION

1. This energy storage converter does not have an integrated residual current detection device or an installed leakage protection device. Users need to install appropriate leakage protection equipment (TYPE B) in the system based on the type of grid connection for the energy storage system.
2. When the energy storage converter is applied to a TT grid, the voltage requirement for the neutral line (N) to protective earth (PE) is less than 30 V.

3. Corresponding country frequency

Region	Furf
Australia A	50.15 Hz
Australia B	50.15 Hz
Australia C	50.50 Hz
New Zealand	50.15 Hz

The PCS complies with the requirements of AS/NZS 4777.2:2020 Amd 2:2024.

6.3 Precautions for Installation

During electrical connection, professional operators must be equipped with protective equipment, such as safety gloves, goggles, insulating shoes, etc.

DANGER	• High voltage may exist in the converter! • Before electrical connection, make sure that all cables are not charged! • Before electrical connection, ensure that the AC circuit breaker and DC disconnector are in OFF state!
WARNING	• The wiring operation must be completed by professional technicians only. • Any improper operation during the electrical connection process may lead to equipment damage or casualties. • The cables used must be firmly connected, intact, well insulated and of appropriate specifications.
CAUTION	• The wiring process must follow the relevant rules of the local grid and the relevant safety instructions of the energy storage battery. • The converter can be connected to the grid only with the permission of the local power department.

6.4 Cable Requirements

The cable requirements for the converter are shown in Table 6-1 below.

Table 6-1 Cable Requirements

Name	Type	Recommended wire diameter (mm²)
External earthing wire	Outdoor earthing wire of 1000 V and above	35 mm² (yellow-green)
AC side input wirep	Outdoor multicore or single-core wire/ cable of 400 V and above	U/V/W three-phase: 70 mm²,OD: 16.5±1.0 mm N wire: 35 mm² (blue), OD: 11.6±0.5 mm
AC auxiliary power	Outdoor five-core wire of 400 V and above (with blue and yellow-green)	6 mm², OD: 10.5±1.5 mm
COM1 communication wire	Outdoor multicore wire of 300 V and above	0.5 mm², OD: 5.5±1 mm
COM2 communication wire	Outdoor multicore wire of 300 V and above	0.5 mm², OD: 7±1 mm
M connection cable	Outdoor single-core cable of 1000 V and above	10mm², OD: 6.5±0.5mm 10mm², OD
SAMP&AUX detection wire	Outdoor single-core cable of 1000 V and above	2.5 mm², OD: 3.6±0.4 mm
DC side input wire	Outdoor single-core cable of 1000 V and above 1000 V	70 mm², OD: 16.5±1.0 mm

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- The cables in this table are based on European standard copper wires. If you use other wires, please refer to the standard for reasonable replacement. In line with safety requirements, the wires selected by our company have passed national standard certification or UL certification with excellent quality.
- If the recommended wire diameter is not used, please confirm with our company.
- For the AC UVW and DC input lines, if a 50 mm² cable is chosen, the cable type should be consistent, and the recommended outer diameter is 13.2±0.7 mm.

6.4.1 Earth Connection

The bottom of the energy storage converter is equipped with two protective earth terminals. Before electrical wiring, it is necessary to connect the two external earthing terminals to the on- site earthing copper bar to achieve reliable earthing and ensure that the earthing resistance is less than 10Ω .

WARING Before AC side, DC side wiring and other wiring, please make a protective earthing connection.

Use a wire stripper to remove an appropriate length of insulation from the ground wire, and crimp it into the corresponding terminal (provided in the accessory package). Use diagonal cutting pliers to cut a suitable length of heat shrink tubing, slide it over the crimped terminal, and evenly heat it with a heat gun. Pass the crimped ground wire terminal through two ferrite rings in sequence (provided in the accessory package), securing the two ferrite rings in place with cable ties. The ferrite rings must be fixed to the cabinet or converter to prevent movement. The terminal is to be locked onto the converter, with a recommended torque of 8.8 N·m, as shown in Figure 6-3.

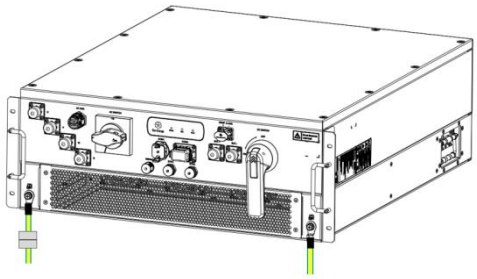

Figure 6-3 Schematic diagram of earthing wire earthing

CAUTION

In order to improve the anti-corrosion performance of the earth terminal, it is recommended to apply anti-rust paint on the outside of the crimped terminal for protection.

The earthing of the converter and the earthing of the lightning rod of the building where the converter is installed cannot be the same, and the two must be separated (as shown in Figure 6-4); otherwise, the converter will be damaged by lightning strikes.

The earthing of the converter should be directly connected to the earthing system, and the impedance should be less than 20mΩ .

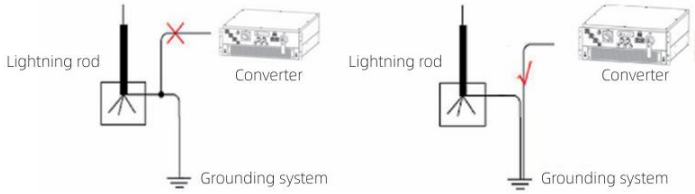

Figure 6-4 Schematic diagram of converter earthing

6.4.2 AC Input Wiring

Cable requirements

CAUTION

- In order to prevent the accidental disconnection of the connection between the converter and the grid caused by the high impedance of the AC cable, be sure to select the AC cable according to Table 6-1 reasonable cable diameter on the AC side.
- Before the cable is grounded, it is necessary to add a label (in any form) to the cable to avoid abnormal wiring.

External AC circuit breaker

In order to reliably disconnect the converter from the power grid, an external AC circuit breaker (recommended: 250A 400V) should be installed between the converter and the AC side.

Wiring steps

CAUTION

Before connecting to the grid, first ensure that the grid voltage and frequency meet the requirements of the converter, as detailed in 4 Technical Parameters. Otherwise, please contact the power company to solve it first.

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DANGER

- Before making electrical connections, ensure that all cables are not energized.
- Before the electrical connection of the converter is completed, it is forbidden to close the AC circuit breaker switch, and the AC circuit breaker is in the OFF state, as shown in Figure 6-5.

Step 1: Ensure that the external AC breaker is open and cannot be accidentally closed.

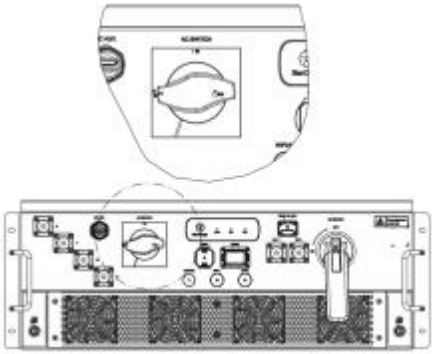

Figure 6-5 AC circuit breaker

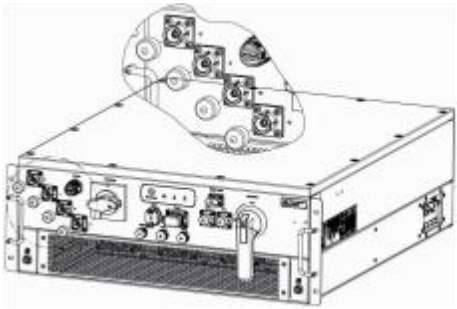

Figure 6-6: Remove the dust cover

Step 2: Take off the dust caps on the AC U,V, W and N sockets, as shown in Figure 6-6.

Step 3: Strip the U,V, W and N cables to appropriate lengths with wire strippers, respectively put them into the plug housing and sealing rubber sleeve. Use hydraulic crimping pliers to crimp them onto the plug terminals. Assemble the rubber sleeve and plug housing, and finally plug the connectors into the corresponding sockets on the converter, as shown in Figure 6-7.

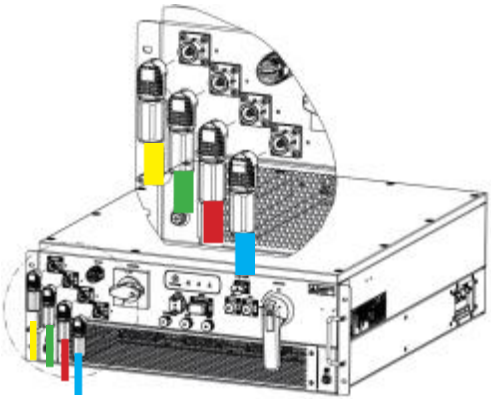

Figure 6-7 Schematic diagram of AC wiring

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The preparation steps for AC power cables are as follows.It is recommended to use tin plated copper cables to prevent oxidation during the use of bare copper cables, which can cause excessive temperature rise at the crimping point.

1) Unscrew the nut on the back cover of the terminal, as shown in Figure 6-7-1.

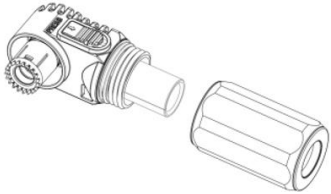

Figure 6-7-1 Unscrew the back nut of the terminal

2) Thread the cable and heat shrink tubing through the back cover nut as shown in Figure 6-7-2.

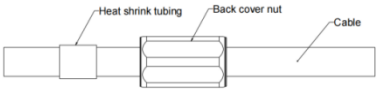

Figure 6-7-2 Thread the cable and heat shrink tubing

3) Peel off the insulation layer of the cable by 15.5+0.5mm, as shown in Figure 6-7-3.

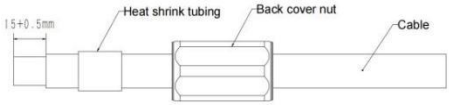

Figure 6-7-3 Peel off the insulation layer of the cable

4) Crimp terminal, holding time of 2s, crimping size requirements as shown in Figure 6-7-4.

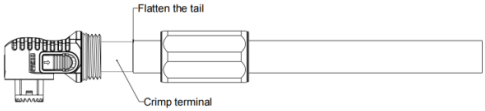

Figure 6-7-4 Crimp terminal

5) Wrap the crimping terminal with the heat shrink tubing, and the maximum distance from the end of the sleeve to the plastic is 21mm, as shown in Figure 6-7-5.

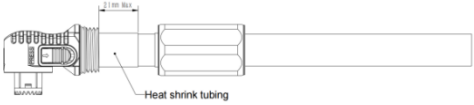

Figure 6-7-5 Wrap the crimping terminal with the heat shrink tubing

6) Tighten the back cover nut with a recommended torque of 1.5-2 N·m. The assembled cable is shown in Figure 6-7-6.

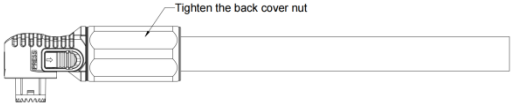

Figure 6-7-6 Tighten the back cover nut

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Step 4: Installing the AC Connector Cover:

Secure the cover to the converter using M4*10 combination screws, with a recommended tightening torque of 1.2 N·m. The cover is used to protect the operator from direct contact with the terminals, as shown in Figure 6-8.

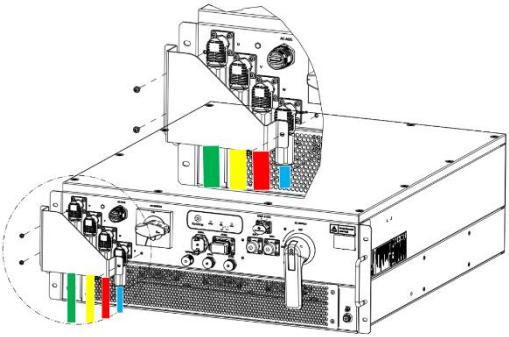

Figure 6-8 Installing the AC Connector Cover

⚠ CAUTION

- Ensure that the cable crimping is reliable and the plug is mated in place.
- Avoid extrusion or stress on the cable insulation layer for improper connection operations may cause the converter to fail to work normally.

6.4.3 AC Auxiliary Power Wiring

Step 1: Use an unlocking tool or a flathead screwdriver to hold down the locking buckle and rotate counterclockwise to remove the dust cap on the AC AUX. socket, as shown in Figure 6-9.

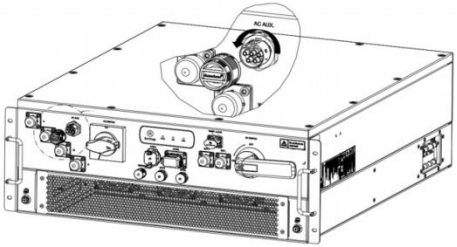

Figure 6-9 Remove the dust cap on the AC AUX. socket

Step 2: Strip the cables to an appropriate length, insert them into the plug cap and nut, connect them to the plug according to the wiring sequence shown in Figure 6-10, and tighten them.

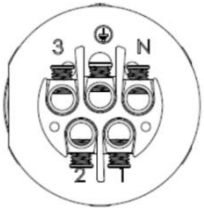

Figure 6-10 Schematic diagram of pin definition

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Pin marking	Pin definition	Recommended cable
1	phase line U	6mm², above 400V
2	phase line V	6mm², above 400V
3	phase line W	6mm², above 400V
N	Neutral line N	6mm², above 400V (blue)
PE	Earth line PE	6mm², above 400V (yellow-green)

Step 3: Insert the connected plug into the AC AUX. socket and turn it clockwise until the locking buckle pops up, as shown in Figure 6-11.

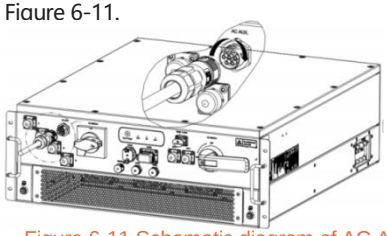

Figure 6-11 Schematic diagram of AC AUX

The preparation and removal steps for auxiliary power cables are as follows.d

1) Stripping, only supports multiple copper wires, the ground wire should be 5mm longer than the live and neutral wires, as shown in Figure 6-11-1.

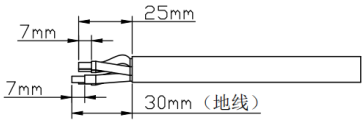

Figure 6-11-1 Stripping

2) Thread the cable through the tail cover, clamp, sealing body, and main body in sequence; Pay attention to the installation direction, as shown in Figure 6-11-2.

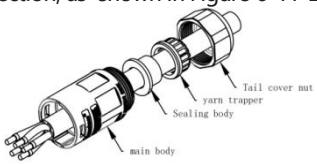

Figure 6-11-2 Thread the cable

3) Stripped cable crimping tube terminal, as shown in Figure 6-11-3.

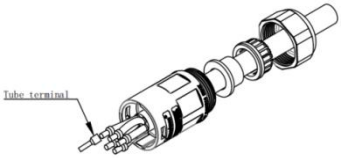

Figure 6-11-3 Crimping tube terminal

4) Crimp the wire, corresponding to the color of the core wire and the position of the terminal hole, with a screw torque of 0.8 ± 0.1N·m, as shown in Figure 6-11-4.

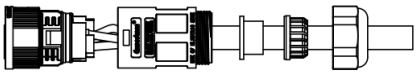

Figure 6-11-4 Crimp the wire

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5) Insert the plastic core into the main body, install the buckle in place, and hear a clicking sound, as shown in Figure 6-11-5.

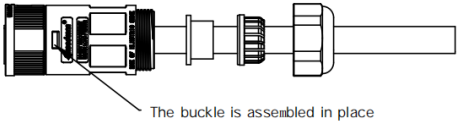

Figure 6-11-5 Insert the plastic core

6) Place the sealing body and wire clamp into the main slot, and tighten the locking nut with torque 2.5±0.5N·m, as shown in Figure 6-11-6.

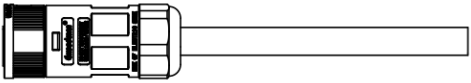

Figure 6-11-6 Tighten the locking nut

7) When dismantling the wiring harness, use a straight screwdriver to press against the buckle and rotate the wiring terminal according to the UNLOCK mark as shown in Figure 6-11-7.

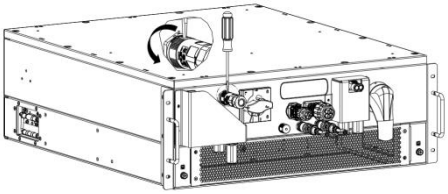

Figure 6-11-7 Dismantling the wiring harness

6.4.4 DC input/ output wiring

Step 1: Confirm that the DC isolating switch on the converter is in the OFF state, and confirm that the DC isolating switch on the converter is in the locked state.(locked by the key)., as shown in Figure6-12.

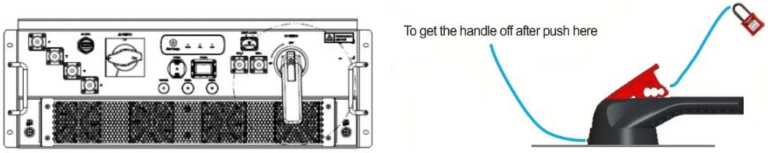

Figure 6-12 DC isolating switch

Step 2: Check whether the polarity of the energy storage battery group connected to the converter is correct.

Step 3: Remove the dust caps on the BAT+ and BAT- sockets, as shown in Figure 6-13.

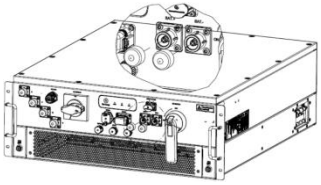

Figure 6-13 Remove the dust caps on the BAT+and BAT- sockets

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Step 4: Use wire strippers to strip appropriate lengths of the BAT+ and BAT- cables. Insert them into the plug housing and sealing rubber sleeve separately. Use a hydraulic crimping tool to crimp them onto the plug terminals, and assemble the rubber sleeve and plug housing Finally, insert the plugs into the corresponding sockets on the converter, as shown in Figure 6-14. The preparation steps for DC cables are the same as those for AC cables, as shown in pictures 6-7-1 to 6-7-6 in section 6.4.2

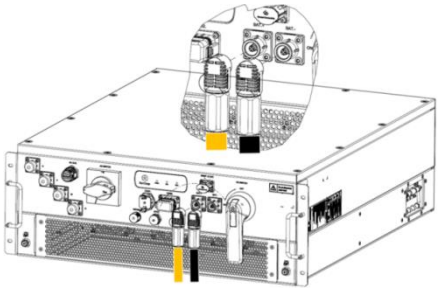

Figure 6-14 Schematic diagram of BAT+ and BAT-

⚠ CAUTION

Ensure that the crimping of the cables is reliable and the plugs are fully inserted. Avoid compression or stress on the cable insulation layer for improper connection operations may result in the converter malfunctioning. Additionally, a short circuit between the positive and negative poles can result in irreparable damage to the converter.

Step 5: Installing the DC Connector Cover:

Secure the cover to the converter using M4*10 combination screAws, with a recommended tightening torque of 1.2 N·m. The cover is used to protect the operator from direct contact with the terminals, as shown in Figure 6-15.

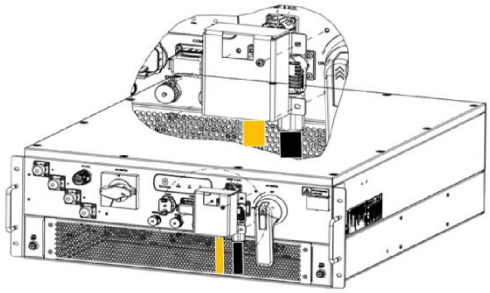

Figure 6-15 Installing the DC Connector Cover

⚠ CAUTION

If battery voltage detection and DC input wires need to be connected, please remove the dust cap first.

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6.4.5 Battery Voltage Detection and DC Input Wiring

Step 1: Take off the dust cover on the SAMP&AUX socket, as shown in Figure 6-16.

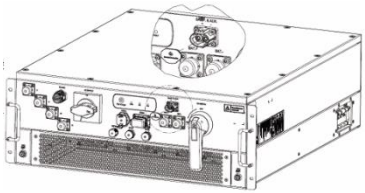

Figure 6-16: Remove the dust cover on the SAMP&AUX socket

Step 2: Use a wire stripper to strip the cable to a suitable length. Insert it into the plug housing and rubber plug, and press in the terminal with crimping pliers.

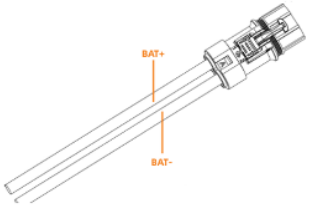

Figure 6-17 Two-core connector with cable

Step 3: Insert the cables with crimped terminals into the plug body as shown in Figure 6-17.

Step 4: Insert the plug into the socket, as shown in Figure 6-18. The other end is connected to the positive and negative poles of the battery socket.

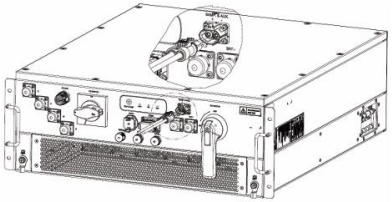

Figure 6-18 Battery voltage detection and DC input wiring

The steps for battery voltage detection and preparation of DC input cables are as follows.

1) The material preparation list is shown in Figure 6-18-1.

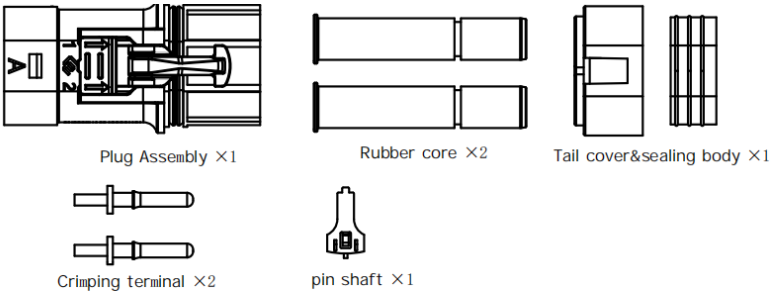

Figure 6-18-1 The material preparation list

2) Pass unshielded cables (hereinafter referred to as "cables") through the tail cover and sealing

body in sequence; Note that the shallow side of the sealing body hole faces the tail cover, as shown in Figure 6-18-2 below.

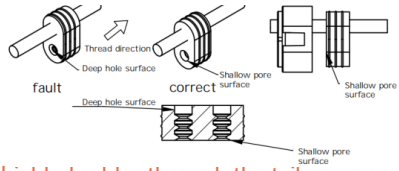

Figure 6-18-2 Pass unshielded cables through the tail cover and sealing body

3) The cable stripping length is 7mm. After stripping, refer to Table 1 for crimping height and crimping terminals, as shown in Figure 6-18-3.

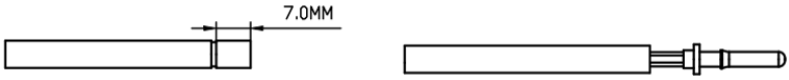

Figure 6-18-3 Stripping and crimping terminals

Table 1

Terminal specifications	Terminal crimping height (mm)	Terminal pull-out force (N)	Outer diameter of wire (mm)
2.5^2	2.5±0.1	⩾235	5.5±0.2
4^2	3.2±0.1	⩾325	6.6±0.3
6^2	3.9±0.1	⩾450	7.3±0.3
10^2	4.5±0.1	⩾500	8.6±0.3

4) Thread the crimped cable into the rubber core, and insert the assembled rubber core into the outer shell, as shown in Figure 6-18-4.

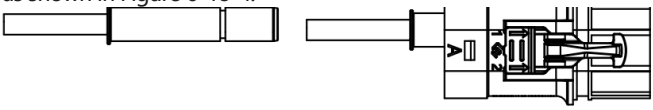

Figure 6-18-4 Insert the assembled rubber core

5) Install the pin shaft and check that the anti return card point on the pin shaft is installed in place, as shown in Figure 6-18-5 below.

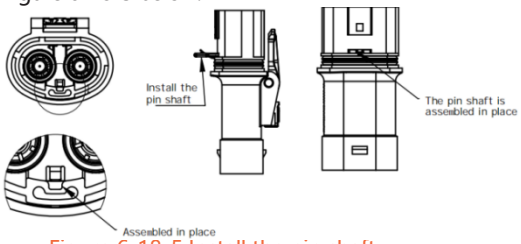

Figure 6-18-5 Install the pin shaft

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6) Push the sealing body into the shell so that it is flush with the shell, as shown in Figure 6-18-6.

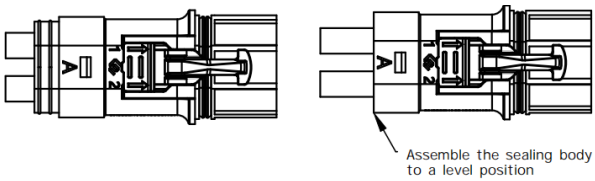

Figure 6-18-6 Push the sealing body into the shell

7) Install the tailgate, and hearing a "click" sound indicates that the tailgate is installed in place, as shown in Figure 6-18-7.

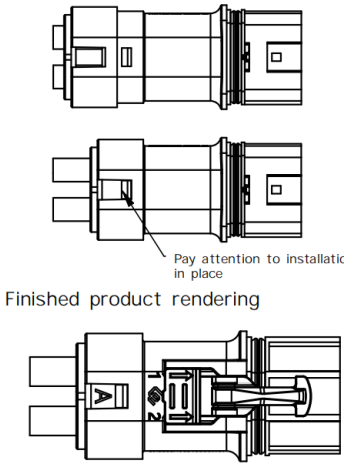

Figure 6-18-7 Install the tailgate

6.4.6 COM Communication Wiring

Step 1: Remove the COM1. and COM2. dust plugs, as shown in Figure 6-19.

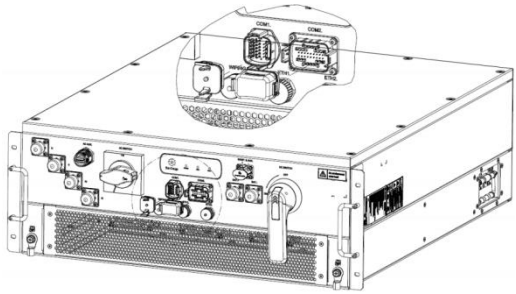

Figure 6-19 COM1. and COM2. dust plugs

Step 2: Use a wire stripper to strip the cable to an appropriate length, put it into the end nut and rubber plug of the plug, and use crimping pliers press into the barrel terminal.

Step 3: Insert the barrel terminal into the socket according to the diagram and table, then tighten the tail nut at the tail end.

Step 4: Insert the COM1. and COM2. plugs into the corresponding sockets of the converter, as shown in Figure 6-20.

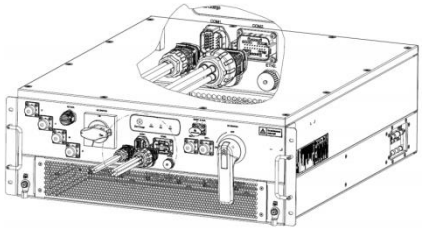

Figure 6-20 COM. communication wiring

The preparation steps for COM1 and COM2 communication terminal cables are the same, as shown below.

1) Tools for Installation:Stripping pliers,Crimping pliers,Torque wrench.

The parts pass through the cable in sequence,as shown in Figure 6-20-1.

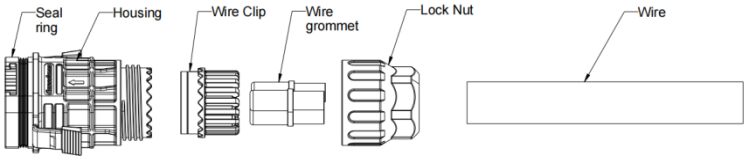

Figure 6-20-1 The parts pass through the cable

2) Strip 12-14mm off the wire.Put the conductor cores through the terminals and then press &fit with the help of crimping pliers.Insert into the plastic core by sequence,as shown in Figure 6-20-2.

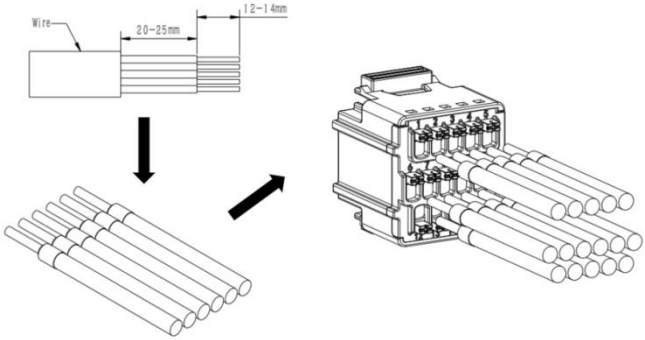

Figure 6-20-2 Insert the wires into the plastic core

3) Load the plastic core into the housing,as shown in Figure 6-20-3.

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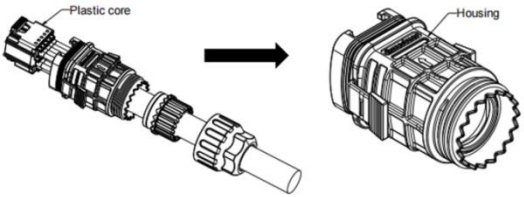

Figure 6-20-3 Load the plastic core

4) Fit the wire grommet into the wire clip.Then push the clip into the housing.Nut lock the housing with torque 8+/-2N·m,as shown in Figure 6-20-4.

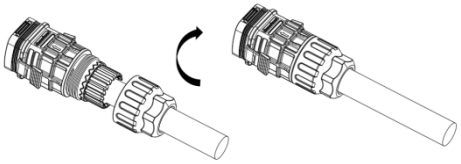

Figure 6-20-4 Nut lock the housing

6.4.7 DRM control function

ETH1 serves as the DRM function interface and is connected to the DRED module of the PCS via RJ45.

Step 1: The network cable is inserted into the terminal connector through the sealing plug hole, as shown in Figure 6-21.

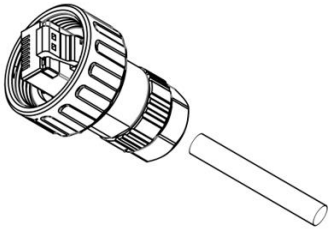

Figure 6-21 Network cable inserted

Step 2: Peel off the network cable and use cable pliers to crimp the RJ45 crystal head (Need to comply with TIA-1096-A standard).The crimping height dimension is shown in Figure 6-22.

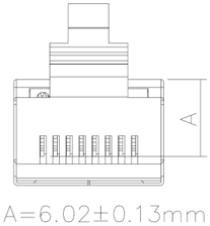

Figure 6-22 Crimp the RJ45 crystal head

Step 3:Press the RJ45 crystal head spring and push the crystal head into the connector slot， the crystal crown has a tight stop step, with dimensions shown in Figure 6-23.

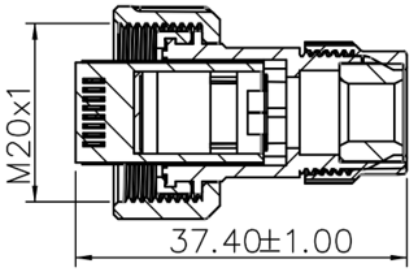

Figure 6-23 Press the RJ45 crystal head

Step 4:Tighten the lock nut with a wrench in the direction shown in the diagram, with a torque of 0.5~0.6N·m,as shown in Figure 6-24.

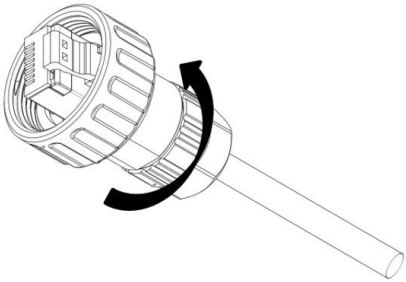

Figure 6-24 Tighten the lock nut

Step 5:Insert the RJ45 crystal head and wire end body into the board end connector, manually tighten the connecting nut clockwise with a torque of approximately 1N·m to the stop position, as shown in Figure 6-25.

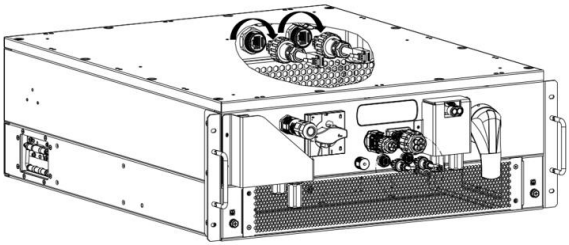

Figure 6-25 Insert the RJ45 crystal head

Step 6:Enable function as shown in Figure 6-26.

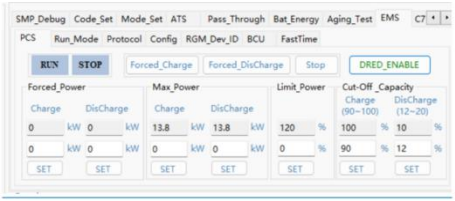

Figure 6-26 Enable DRM Function

6.4.8 BMS Communication Wiring Diagram

Step 1: In the PCS, the 1st pin of COM2 port represents CAN_H, and the 2nd pin representsCAN_L,as shown in Figure 6-27.

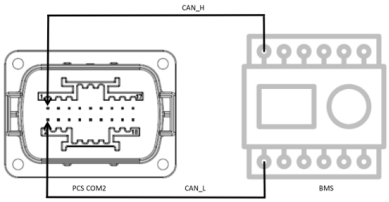

Figure 6-27 CAN Communication Wiring

6.4.9 BMS Disconnect the PCS Contactor

Step 1: To disconnect the main negative contactor of the PCS, an external safety power supply is required.,as shown in Figure 6-28.

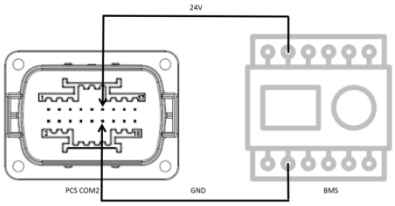

Figure 6-28 BMS Disconnects From BAT-

Step 2: To disconnect the main positive contactor of the PCS, an external safety power supply is required.,as shown in Figure 6-29.

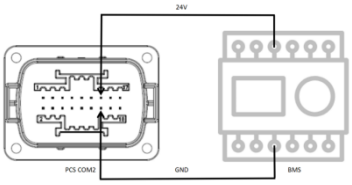

Figure 6-29 BMS Disconnects From BAT+

6.4.10 RJ45 Port Wiring

Step 1: Insert the network cable into the rear nut and rubber seal of the connector, as shown in Figure 6-30.

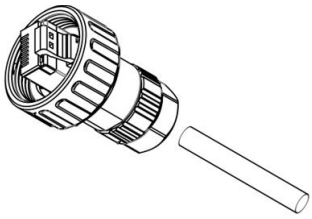

Figure 6-30 Network cable inserted

Step 2: Peel off the network cable and use cable pliers to crimp the RJ45 crystal head (Need to comply with TIA-1096-A standard).The crimping height dimension is shown in Figure，as shown in Figure 6-31.

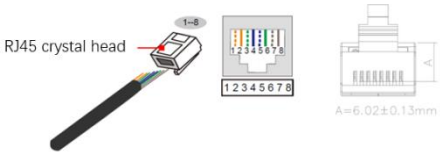

Figure 6-31 Cable preparation

Step 3: Press the RJ45 crystal head spring and push the crystal head into the connector slot，the crystal crown has a tight stop step, with dimensions shown in Figure 6-32.

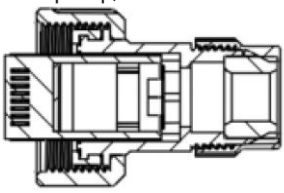

Figure 6-32 Press the RJ45 crystal head

Step 4: Tighten the lock nut with a wrench in the direction shown in the diagram, with a torque of 0.5~0.6N·m,as shown in Figure 6-33.

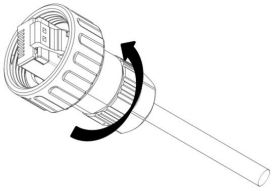

Figure 6-33 Tighten the lock nut

EN

Step 5: Unscrew the dust cap from the RJ45 port, as shown in Figure 6-34.

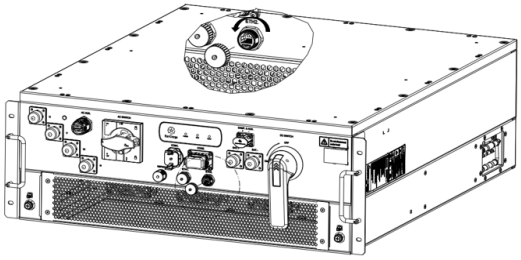

Figure 6-34 Removing the dust cap

Step 6: Insert the RJ45 crystal head and wire end body into the board end connector, manually tighten the connecting nut clockwise with a torque of approximately 1N·m to the stop position, as shown in Figure 6-35

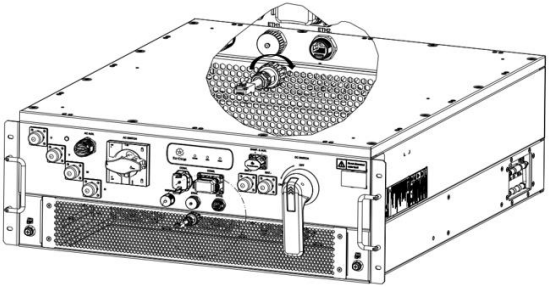

Figure 6-35 Insert the RJ45 crystal head

Step 7: Install the RJ45 port cover plate and secure it to the PCS with M4*10 combination screws. The recommended tightening torque is 1.2 N·m, as shown in Figure 6-36.

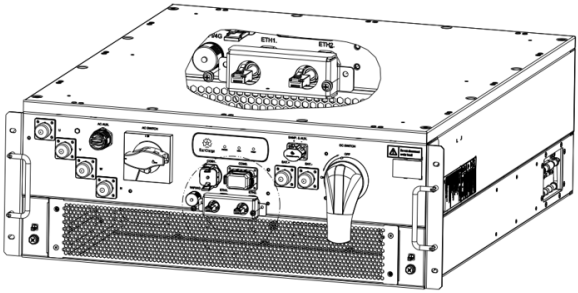

Figure 6-36 Install the RJ45 port cover plate

6.5 M100-E (SI105TENT05) Wiring Instructions

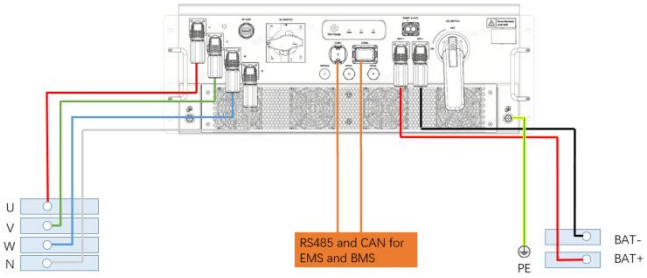

Figure 6-37 Wiring Instructions

The wiring diagram of the M100-E is shown in Figure 6-33, including DC side wiring, AC side wiring, other signal wiring, and protective grounding wiring.

DC Side Connection: BUS+, BUS-

AC Side Connection: A, B, C, N

Other Communication Signal Connections: The CAN, RS485, and other signals of the M100-E are connected to BMS, EMS, or other devices according to system communication requirements.

Protective Grounding: The protective grounding (PE) terminal of the M100-E is connected to the grounding busbar via a harness.

6.6 M100-ET (SI105TENT50) Wiring Instructions

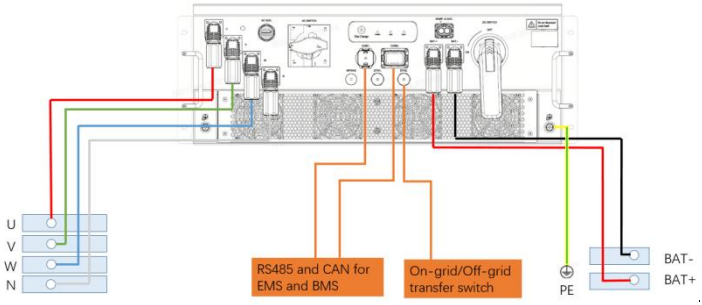

Figure 6-38 Wiring Instructions

The wiring diagram of the M100-ET is shown in Figure 6-34, including DC side wiring, AC side wiring, communication signal wiring with external on/off-grid devices, other signal wiring, and protective grounding wiring.

DC Side Connection: BUS+, BUS-

AC Side Connection: A, B, C, N

ETH2 Connection: The ETH2 port of the M100-ET (communication signal interface with external on/off-grid device) is connected to the terminals of the on/off-grid control switch (STS). Note that the wiring distance between the PCS and STS should be less than 15 meters; excessive length may affect communication quality. Shielded twisted-pair cables are recommended.

Other Communication Signal Connections: The CAN, RS485, and other signals of the M100-ET are connected to BMS, EMS, or other devices according to system communication requirements.

Protective Grounding: The protective grounding (PE) terminal of the M100-ET is connected to the grounding busbar via a harness.

6.7 M100-EP (SI105TENT60) Wiring Instructions

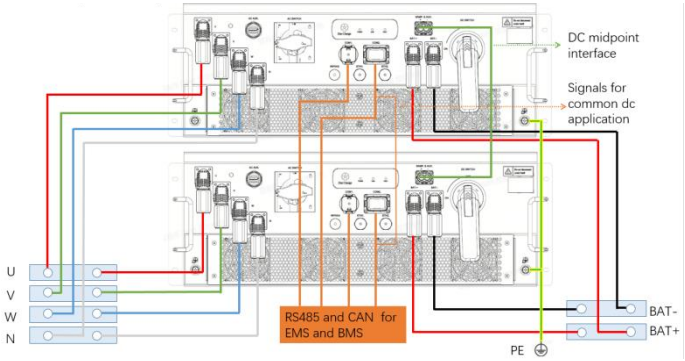

Figure 6-39 Wiring Instructions

The parallel wiring diagram of two M100-EP units on the DC and AC sides is shown in Figure 6-35, including DC side parallel wiring, AC side parallel wiring, synchronization signal wiring, other signal wiring, and protective grounding wiring.

DC Side Parallel Connection:

The DC sides of the first M100-EP unit (hereinafter referred to as M100-EP #1) and the second M100-EP unit (hereinafter referred to as M100-EP #2) are connected in parallel. The BAT.+ terminals of M100-EP #1 and M100-EP #2 are connected to the positive DC busbar (DC+) via a harness; the BAT.- terminals of M100-EP #1 and M100-EP #2 are connected to the negative DC busbar (DC-) via a harness; and the DC midpoint (M) terminals of M100-EP #1 and M100-EP #2 are connected together via a harness (recommended wire diameter: 10 mm^2).

AC Side Parallel Connection:

The AC sides of M100-EP #1 and M100-EP #2 are connected in parallel. The L1 (U) terminals of M100-EP #1 and M100-EP #2 are connected to the L1 busbar via a harness; the L2 (V) terminals of M100-EP #1 and M100-EP #2 are connected to the L2 busbar via a harness; the L3 (W) terminals of M100-EP #1 and M100-EP #2 are connected to the L3 busbar via a harness; and the neutral (N) terminals of M100-EP #1 and M100-EP #2 are connected to the neutral busbar (N) via a harness.

Synchronization Signal Connection:

The synchronization signals of M100-EP #1 and M100-EP #2 are connected. The COM2. interfaces of M100-EP #1 (pins 17 and 18) are connected to the COM2. interfaces of M100-EP #2 (pins 17 and 18) respectively via shielded twisted-pair cables.

Communication Signal Connection:

The communication signals of M100-EP #1 and M100-EP #2 are connected. The COM2. interfaces of M100-EP #1 (pins 1 and 2) are connected to the COM2. interfaces of M100-EP #2 (pins 1 and 2) respectively via shielded twisted-pair cables.

Other Signal Connections:

The RS485 and other signals of M100-EP #1 and M100-EP #2 are connected to BMS, EMS, or other devices according to system communication requirements.

Protective Grounding:

The protective grounding (PE) terminals of M100-EP #1 and M100-EP #2 are connected to the grounding busbar via separate harnesses.

6.8 Installation Inspection

After the installation is complete, check the following items:

- Check whether the energy storage battery, AC side, and communication lines are connected correctly.
- Check whether the plug and socket are securely connected and cannot be loosened.
- Check that the converter is securely installed.
- Check that all screws of the converter housing are tight.

6.9 Converter Power-On

6.9.1 On-Grid Mode Startup

Before powering on the converter, please check the converter referring to the following:

- Make sure the converter is installed correctly and fastened securely.
- Make sure all AC and DC switches are off.
- Make sure that the AC cables are plugged into the grid properly.
- Make sure the energy storage battery pack input polarity is correct.
- The converter is properly connected to the surrounding accessories.
- Make sure that all cables are securely connected and that their sheaths are not damaged.
- All safety signs and warning labels on the converter are firmly attached and clearly visible.
- No external objects or parts left on the converter.

After checking and confirming that the converter is normal, please follow the steps below to power on the converter:

Step 1: Close the DC isolation switch. After closing the DC isolation switch, the Power indicator on the energy storage converter panel starts to flash approximately 3 seconds later and gradually return to a slow flashing state.

Step 2: Close the AC molded case circuit breaker.

Step 3: Start the energy storage converter. Upon receiving the startup command, the energy storage converter initiates the startup process. The startup process takes about 75 seconds without faults. After the startup is complete, the Power indicator on the panel of the energy storage converter is constantly on. After the energy storage converter is started, a power command can be sent to adjust the output power of the converter.

6.9.2 Off-Grid Mode Startup

Before powering on the converter, please check the converter referring to the following:

- Make sure the converter is installed correctly and fastened securely.
- Make sure all AC and DC switches are off.
- Make sure that the AC cables are plugged into the load properly.

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- Make sure the energy storage battery pack input polarity is correct.
- The converter is properly connected to the surrounding accessories.
- Make sure that all cables are securely connected and that their sheaths are not damaged.
- All safety signs and warning labels on the converter are firmly attached and clearly visible.
- No external objects or parts left on the converter.

After checking and confirming that the converter is normal, please follow the steps below to power on the converter:

Step 1: Close the DC isolation switch. After closing the DC isolation switch, the Power indicator on the energy storage converter panel starts to flash approximately 3 seconds later and gradually return to a slow flashing state.

Step 2: Close the AC molded case circuit breaker.

Step 3: Start the energy storage converter. Before issuing the startup command, set the off-grid mode command. Upon receiving the startup command, the energy storage converter initiates the startup process. Assuming no faults, the activation process takes approximately 10 seconds. Upon completion, the power indicator on the energy storage converter panel will flash. After activation, the energy storage converter enters off-grid mode, with the output power determined by the load.

Only after the installation work is completed can the device be turned on.
All electrical connections must be made by professional or trained personnel in accordance with the current laws of the country of installation.

6.10 Converter Power-Off

Please follow the steps below to turn off the converter:

Step 1: Turn off. The energy storage converter turns off after receiving the shutdown command sent by the host computer.

Step 2: Disconnect the AC molded case circuit breaker.

Step 3: Disconnect the DC isolation switch.

6.11 Set up the PCS network connection

Step 1: PCS network connection: In PCS, the 15th pin of the COM1 port is RS485_A, and the 16th pin is RS485_B. The remote communication of PCS is connected to EMS (Energy Management System) through these two pins. EMS communicates externally via the network, thereby achieving remote monitoring functions for PCS. Then, EMS connects to

the cloud service via TCP (Transmission Control Protocol), thereby establishing a complete network connection system to realize related monitoring and other functions. In simple terms, PCS is first connected to EMS through the RS485 interface, and EMS communicates externally and remotely monitors PCS, and can also connect to the cloud service via TCP, forming a network connection path for the monitoring platform, as shown in Figure 6-40.

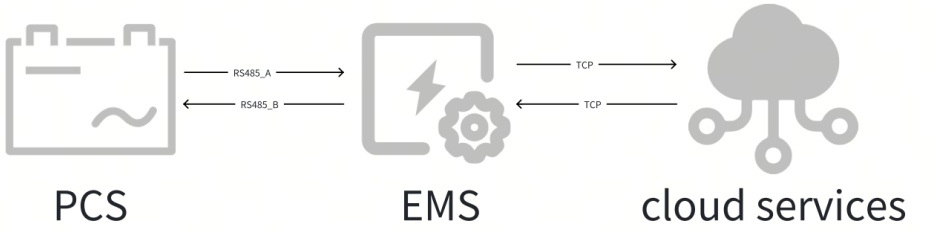
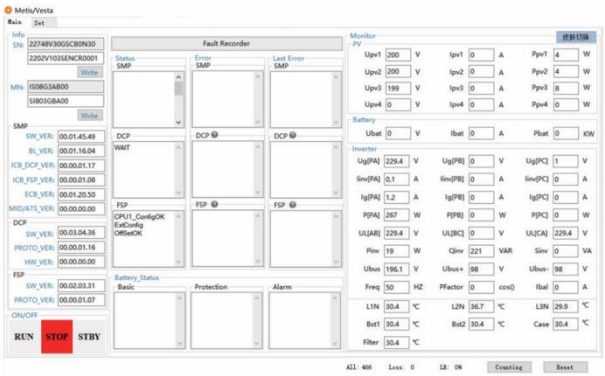


Figure 6-40 PCS network connection

7 Working Mode Set

Metis series products support reading the inverter firmware version and the selected regional settings and any variations to the default inverter settings in read-only mode. For example, in the figures below, the DCP version is 00.03.04.36, the FSP version is 00.02.03.31 and the SMP version is 00.01.45.49, the country and region choices are Australia and Region A.



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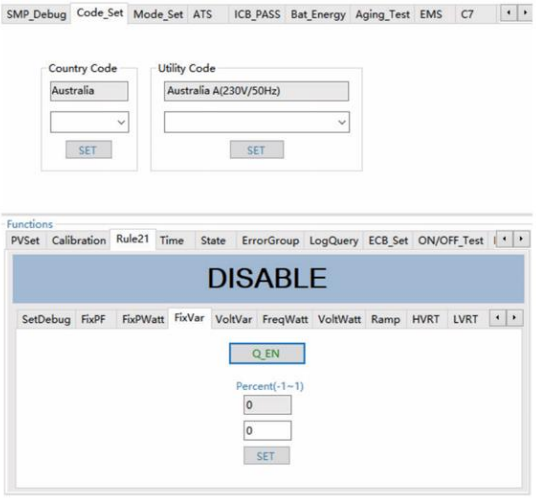
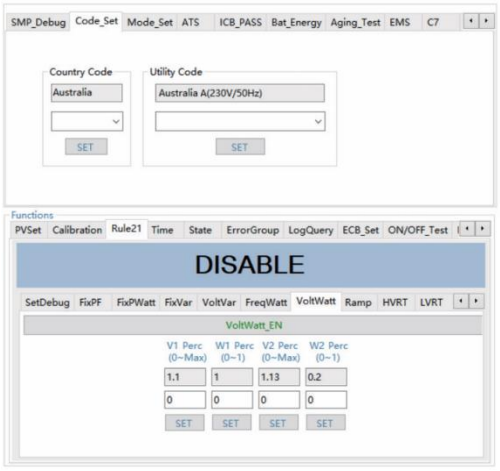


Metis series products support a variety of working mode Settings. For example: Volt-watt response mode can adjust the active power in real time according to the grid voltage. The figure below shows that in Australia and Region A. The rated grid voltage Vac is 230V and the rated active power is P, When the voltage is greater than 253V(1.1Vac) and less than 260V(1.13Vac), the active power drops linearly from P to 0.2P.



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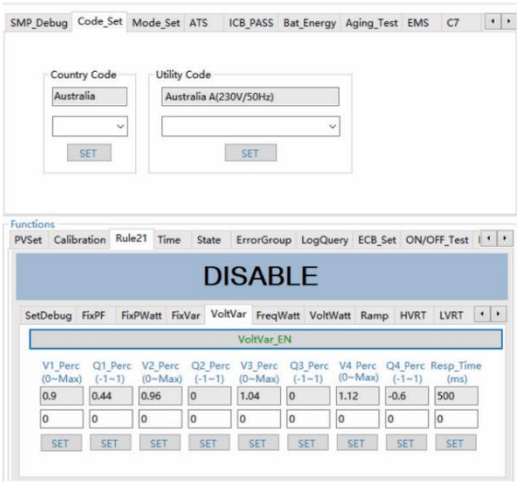
Volt-var response mode can adjust the reactive power in realtime according to the grid voltage. The figure below shows that in Australia and Region A. The rated grid voltage Vac is 230V and the rated active

power is P, if the grid voltage is greater than 207V(0.9 Vac) and less than 220V(0.96Vac), the inverter can release reactive power from 0.44P to 0, if the grid voltage is greater than 240V(1.04Vac) and less than 258V(1.12Vac), the inverter can absorb reactive power from 0 to 0.6P.



Fixed power factor mode can adjust the active power and reactive power by setting PF. The figure below shows that in Australia and Region A. The default value of PF is 1, The range of PF is -1 to -0.8 and 0.8 to

1. If the PF is between 0.8 and 1, the inverter releases reactive power, If the PF is between -1 and -0.8, the inverter absorbs reactive power.

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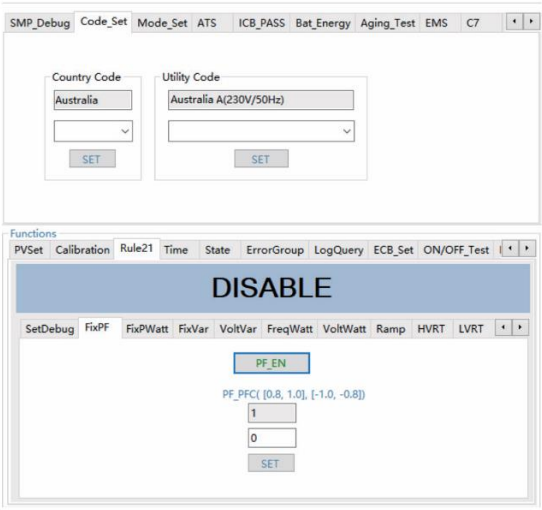
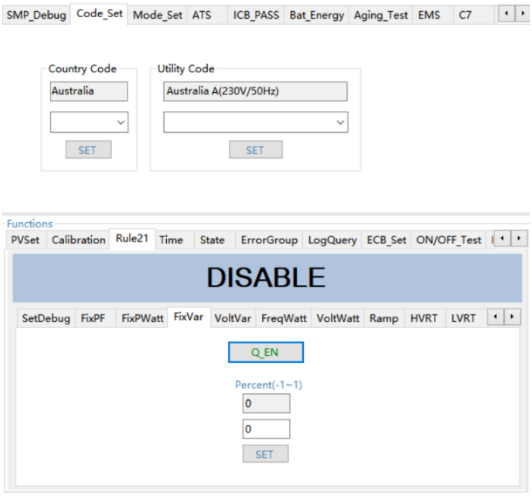
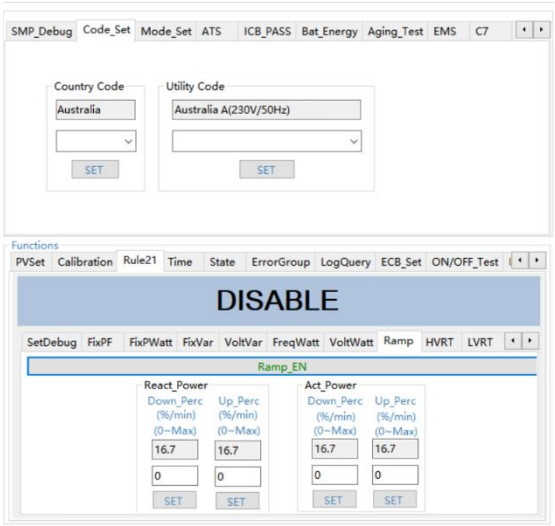


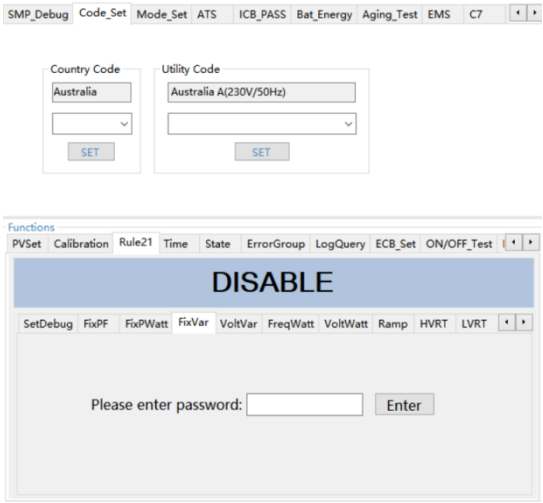
Fixed reactive power mode can adjust the reactive power. The figure below shows that in Australia and Region A. The default value of reactive power setting is 0 and the adjustment range is from -1 to 1.



Power rate limit mode allows the output power to be changed at a fixed slope. The figure below shows that in Australia and Region A. The default slope is 16.7% of rated power per minute for increase and decrease.



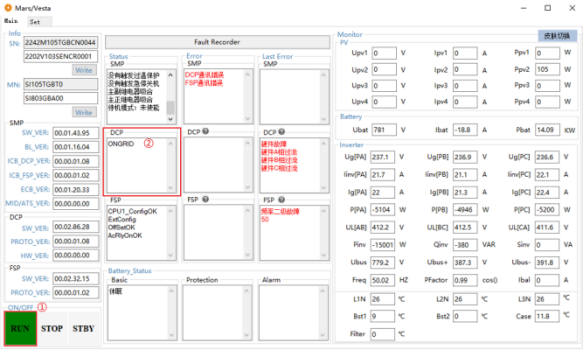
Region B, Region C and New Zealand also have the above working mode. For unauthorized persons, the variations to the default inverter settings in read-only mode. The figure below shows that, for authorized persons, writing the correct password can change the default configuration.



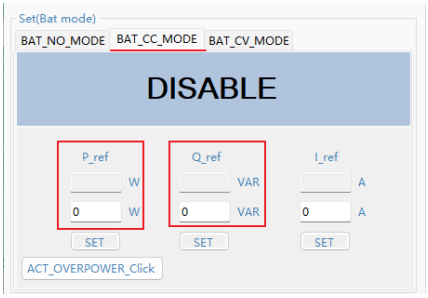
EN

8 Commissioning of the Inverter

Step1, run the inverter by click RUN as shown below. Once inverter is initialized, RUN turns green (①) and DCP state switches to ONGRID mode (②).



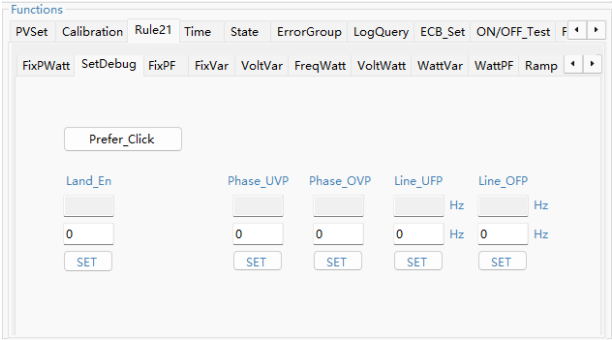
Step2, set active power reference (P_ref) and reactive power reference (Q_ref) separately as shown below. Positive value of P_ref indicates discharging, while negative value of P_ref indicates charging. Positive value of Q_ref indicates absorbing reactive power from the grid, while negative value of Q_ref indicates injecting reactive power into the grid.



9 Grid Protection Parameter Set

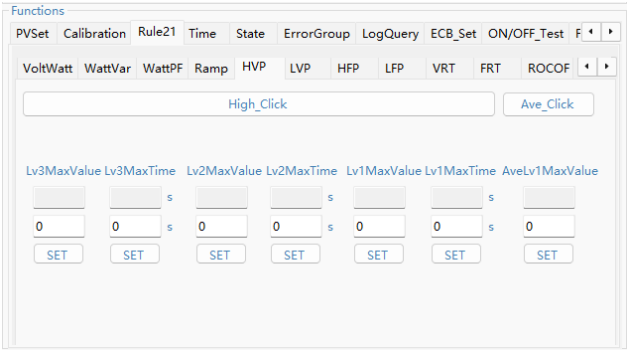
Metis series products support variations to the default inverter settings of grid voltage and frequency protection parameters. Two major parts of grid protection parameter configurations are shown below.

Part1, Reconnection grid voltage and frequency protection parameter configuration. This part refers to parameters that are effective when the inverter is not running. The setting routine is Functions/Rule21/SetDebug. As the picture shown below, Phase_UVP, Phase_OVP refer to undervoltage protection value and overvoltage protection value both in unit Volt, while Line_UFP, Line_OFP refer to under frequency protection value and over frequency protection value both in unit Hertz.

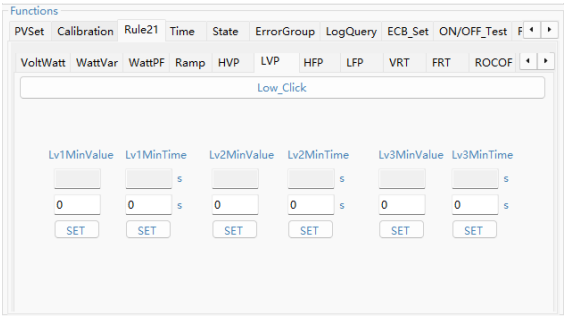


Part2, Normal grid voltage and frequency protection parameter configuration. This part refers to parameters that are effective when the inverter is running. HVP, LVP, HFP, LFP are presented below.

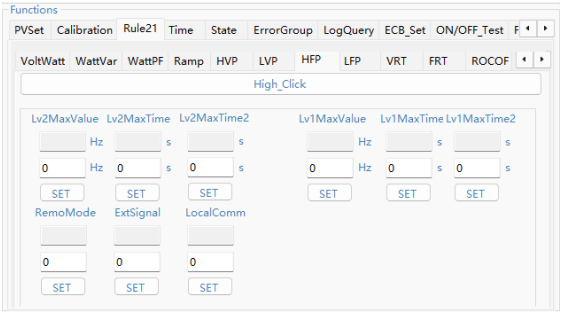
For over voltage protection, the setting routine is Functions/Rule21/HVP. High_Click is the switch of this functional block, default is enabled. Lv1MaxValue, Lv2MaxValue, Lv3MaxValue refer to level1/2/3 over voltage protection value in unit Volt (Lv1MaxValue<Lv2MaxValue<Lv3MaxValue), while Lv1MaxTime, Lv2MaxTime, Lv3MaxTime refer to level1/2/3 over voltage protection period in unit Second.



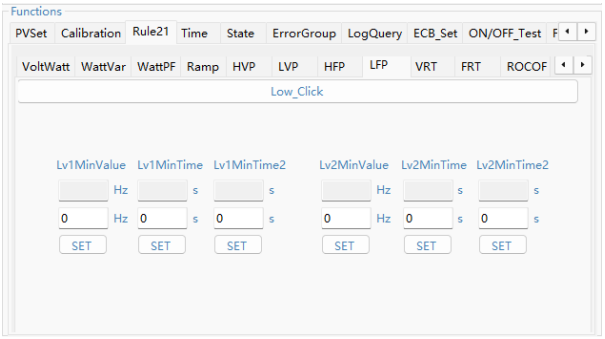
For under voltage protection, the setting routine is Functions/Rule21/LVP. Low_Click is the switch of this functional block, default is enabled. Lv1MinValue, Lv2MinValue, Lv3MinValue refer to level1/2/3 under voltage protection value in unit Volt (Lv1MinValue>Lv2MinValue>Lv3MinValue), while Lv1MinTime, Lv2MinTime, Lv3MinTime refer to level1/2/3 under voltage protection period in unit Second.



For over frequency protection, the setting routine is Functions/Rule21/HFP. High_Click is the switch of this functional block, default is enabled. Lv1MaxValue, Lv2MaxValue, Lv3MaxValue refer to level1/2 over frequency protection value in unit Hertz (Lv1MaxValue<Lv2MaxValue), while Lv1MaxTime, Lv2MaxTime refer to level1/2 over frequency protection period in unit Second.



For under frequency protection, the setting routine is Functions/Rule21/LFP. Low_Click is the switch of this functional block, default is enabled. Lv1MinValue, Lv2MinValue refer to level1/2 under frequency protection value in unit Hertz (Lv1MinValue>Lv2MinValue), while Lv1MinTime, Lv2MinTime refer to level1/2 under frequency protection period in unit Second.



10 Maintenance

This section contains information to solve possible problems with the converter and provides you with troubleshooting tips to identify and solve most possible problems.

10.1 Fault Diagnosis

Fault Information	Solution
Auxiliary power supply fault	Disconnect the AC molded case circuit breaker and the DC isolation switch. After the indicator lights are off, close the AC molded case circuit breaker, close the DC isolation switch, and check again.
Bus bar voltage fault	Disconnect the AC molded case circuit breaker and the DC isolating switch. After the indicator lights are off, close the AC molded case circuit breaker, close the DC isolation switch, and check again.
Excessive DC component	Wait for one minute after the converter is reconnected. Shutdown, disconnect the AC molded case circuit breaker and disconnect the DC isolation switch. After the indicator lights are off, close the AC molded case circuit breaker, close the DC isolation switch, and check again.
Insulation resistance detection fault	Disconnect the AC molded case circuit breaker and disconnect the DC isolation switch. After the indicator lights are off, close the AC molded case circuit breaker, close the DC isolation switch, and check again.
Grid voltage fault	Wait for the grid to return to normal, and the system will reconnect. Check if the grid voltage and frequency meet the standard.
Grid frequency fault	Wait for the grid to return to normal, and the system will reconnect. Check if the grid voltage and frequency meet the standard.
Grid reconnection fault	Wait for the grid to return to normal, and the system will reconnect. Check if the grid voltage and frequency meet the standard.
Internal communication fault	Disconnect the AC molded case circuit breaker and disconnect the DC isolation switch. After the indicator lights are off, close the AC molded case circuit breaker, close the DC isolation switch, and check again.
Pre-synchronous fault	Disconnect the AC molded case circuit breaker and disconnect the DC isolation switch. After the indicator lights are off, close the AC molded case circuit breaker, close the DC isolation switch, and check again.
Overcurrent fault	Disconnect the AC molded case circuit breaker and disconnect the DC isolation switch. After the indicator lights are off, close the AC molded case circuit breaker, close the DC isolation switch, and check again.
Phase lock fault	Shut down and power off the energy storage system, disconnect the distribution circuit breaker. Check if the grid interface wiring is normal. Check if the grid voltage and frequency meet the standard.
Battery voltage fault	Check if the battery voltage exceeds the normal range. If the battery voltage exceeds the normal range, please check the battery cluster.
Overtemperature fault	Check if the ambient temperature is within the allowable range of the converter.
Fan fault	Disconnect the AC molded case circuit breaker and disconnect the DC isolation switch. After the indicator lights are off, close the AC molded case circuit breaker, close the DC isolation switch, and check again.

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CAUTION

If the above fault information cannot be resolved, please feel free to contact us at anytime for assistance.

10.2 Troubleshooting

- Please check the fault code of the converter. If a message is displayed, please note it before proceeding further.
- Try the solutions shown in the table above.
- If the converter indicator light does not on, please check the following to ensure that the current state of the installation allows the device to operate normally:

  Whether the converter is located in a clean, dry and well-ventilated place.

  Whether the DC input switch is closed.

  Whether the cable size is appropriate.

  Whether the input and output connections and wiring are in good condition.

  Whether the indicator light and communication stick are connected correctly and not damaged.

Contact Customer Service for further assistance with system installation details and the model and serial number of the product.

10.3 Routine Maintenance

Safety inspections should be conducted by technical personnel at least every 12 months, who must have received sufficient training and possess knowledge and practical experience. The data should be recorded in the device log. If the device cannot function properly or if any testing fails, it must be repaired. During the use of the converter, the responsible person should regularly check and maintain the machine. The required actions are as follows:

- Check if the heat sink at the back of the converter has accumulated dust and dirt, and clean the machine if necessary. This work should be carried out regularly.
- Check if the indicator light of the converter is normal at least every 6 months.
- Check input and output lines for damage or aging at least every 6 months.
- Clean the converter panel at least every 6 months and check its safety.

■ Attention:

Only professionals should perform these operations.

WARNING

- Before starting the maintenance, it is necessary to turn off the converter and disconnect all power inputs of the converter.
- Wait for at least 30 minutes until the capacitor inside the converter is fully discharged before performing maintenance work.
- Only professional electrical personnel can perform fan maintenance and replacement.

The built-in fan of the converter cools and dissipates heat during its operation. If the fan cannot work normally, the converter cannot be effectively cooled, which will affect the efficiency of the converter or cause derating operation. Therefore, it is necessary to keep the fan clean and replace the damaged fan in time. Fan cleaning and replacement steps are as follows:

Step 1: Turn off the converter.

Step 2: Loosen the screws on the air inlet panel on the front side of the converter with a recommended torque of 1.5 N·m. Remove the air inlet panel as shown in Figure 10-1.

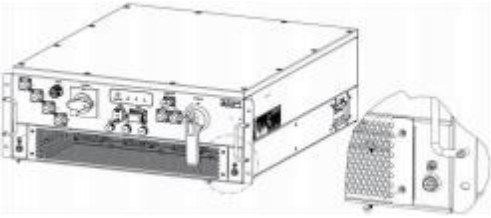


Figure 10-1 Fan inlet panel

Step 3: Loosen the fixing screws on the fan bracket and the anti - loosening screw in the middle with a recommended torque of 1.5N·m, as shown in Figure 10-2.

Step 4: Rotate the disconnect switch handle to horizontal, as shown in Figure 10-3.

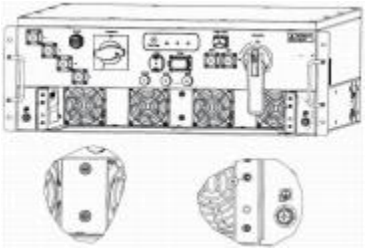


Figure 10-2 Bracket

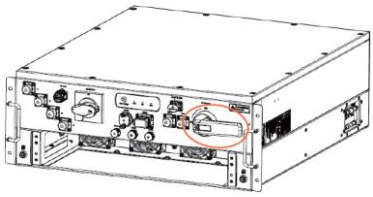
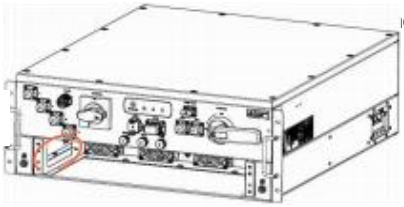


Figure 10-3 Disconnect switch handle

Step 5: Pull the fan bracket outwards, and release the connection interface of the fan, as shown in Figure 10-4.

Step 6:  own in Figure 10-5.

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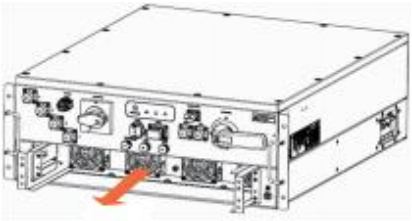

Figure 10-4 Fan connection wire

Figure 10-5 Fan module

Step 7: Use a brush or vacuum cleaner to clean the fan or replace the damaged fan. The fan should be installed with a torque of 1.5N·m.

Step 8: After maintenance is completed, reinstall the fan module into the inverter in reverse order, tighten the screws, and restart the converter.

11 Packaging, Transportation and Dismantling

11.1 Packaging

If possible, pack the converter in its original packaging. If the original packaging is not available, an equivalent box meeting the requirements below may also be used.

- Can carry 100 kg of weight.
- Hand handle shall be included.
- Can be completely closed off.
- Please manually mark the central mark of the converter on the equivalent packaging box according to the original packaging.

11.2 Storage and Transportation

Store the converter in a dry environment and maintain the temperature between -40° C~+70° C at all times. During storage and transportation, please take care that the converter is not damaged. When dealing with converters or other related components, please ensure that they are disposed of in accordance with local waste disposal regulations.

11.3 Dismantling the Converter

- Disconnect the converter from the DC input and AC output. Wait for 30 minutes to completely power down the converter.
- Disconnect the communication connection and other optional monitoring modules. Remove the converter from the bracket.

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CUSTOMER SERVICE

If you have a problem that you cannot solve by yourself, please contact customer service immediately.

Before contacting the customer service staff

Review the corresponding troubleshooting measures in the "Troubleshooting List" section of this manual.

ABOUT US

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