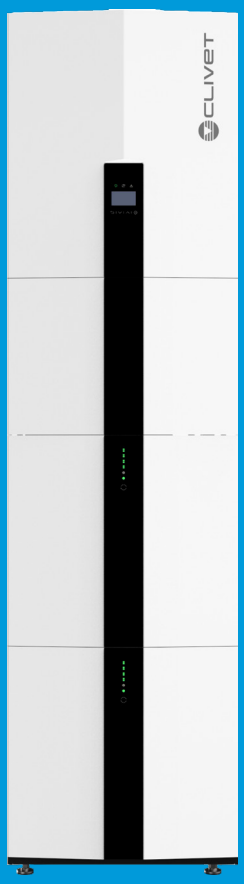
Clivet SINERGY

CEC-T 10K

ENERGY STORAGE SYSTEM



MANUAL FOR INSTALLATION, USE AND MAINTENANCE

M0HP00002-01
08/2023

Copyright Statement

Please keep the manual properly and operate in strict accordance with all safety and operating instructions in this manual. Please do not operate the system before reading through the manual.
Copyright Statement Contact the nearest hazardous waste disposal station when the products or components are discarded.

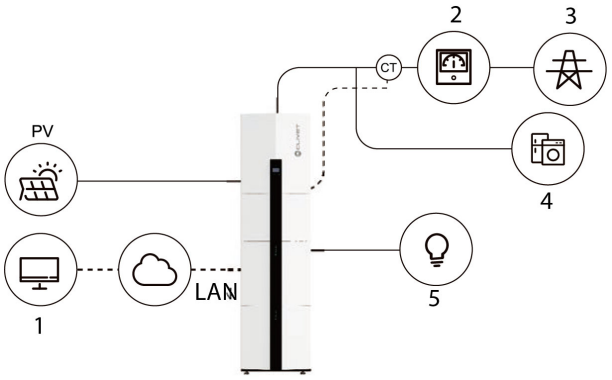
CONTENTS

1. Introduction

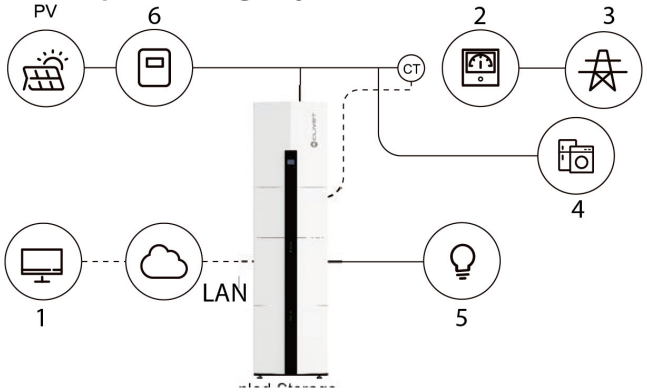
1.1 System Introduction

CLIVET CEC-T 10K can be applied in DC-coupled systems (mostly new installation), AC-coupled systems (mostly retrofit) and Hybrid-coupled systems (mostly retrofit, and PV capacity-increase), as the following schemes show:

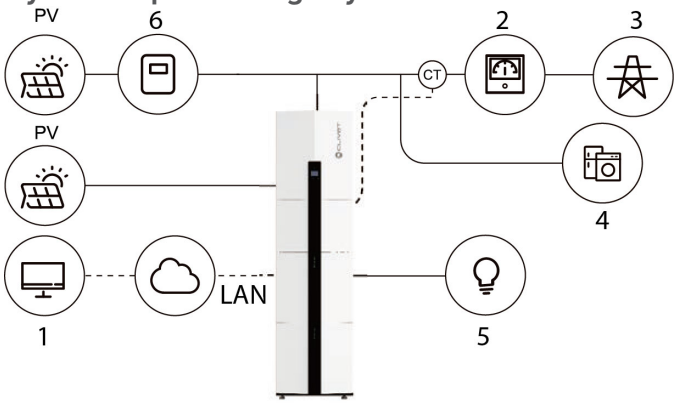
DC-coupled Storage System – Scheme



AC-coupled Storage System – Scheme



Hybrid-coupled Storage System – Scheme

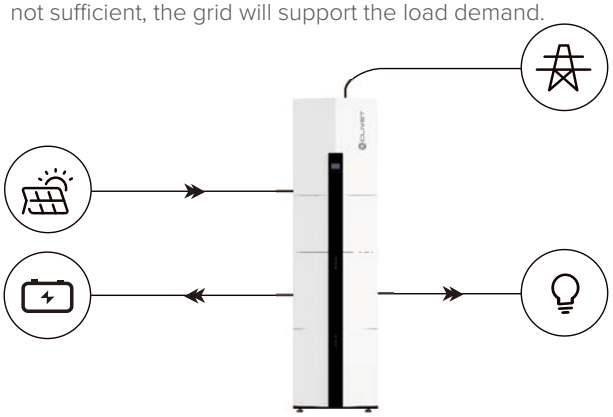


1	Monitor device
2	Grid Meter
3	Grid
4	Normal Loads
5	Backup Loads
6	PV Inverter

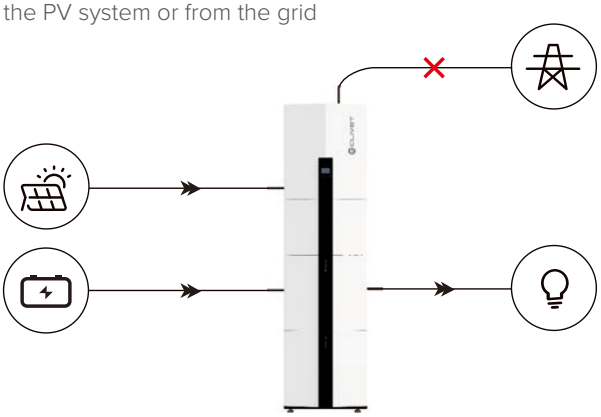
1.2 Operation Modes:

There are three basic modes that end users can choose via inverter screen/APP.

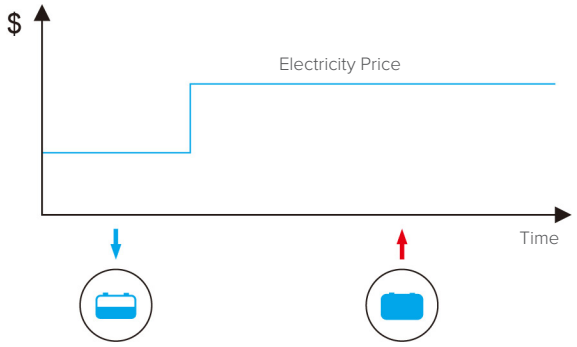
– SELF CONSUMPTION: The energy generated by the solar panels will be used in the following order: Feed the home loads; Charge the battery and then, feed into the grid.When the sun is off, the load will be supported by battery to enhance self consumption. If the power supply from the batteries is not sufficient, the grid will support the load demand.



– BAT PRIORITY: Under this mode, the battery is only used as a backup power supply when the grid fails and as long as the grid works, the batteries won't be used to power the loads. The battery will get charged with the power generated by the PV system or from the grid



– PEAK SHIFT: This mode is designed for time-use mode customer. The customer is able to set up the charging/discharging time & power via inverter screen.



1.3 Safety Introduction

Manual Keeping

This manual contains important information about operating the system.
Before operating, please read it very carefully.
The system should be operated in strict accordance with the instructions in the manual,otherwise it can cause damages or loss to equipment, personnel and property.
This manual should be kept carefully for maintenance.

Operator Requirements

The operators should get a professional qualification, or be trained.
The operators should be familiar with the whole storage system, including compositions and working principles of the system.
The operators should be familiar with the product Instruction.
While maintaining, the maintainer is not allowed to operate any equipment until all the equipment has been turned off and fully discharged.

Protection of Warning Sign

The warning signs contain important information for the system to operate safely, and it is strictly prohibited to tear or damage them.
Ensure that the warning signs are always well-functioned and correctly placed.
The signs must be replaced immediately when damaged.

	This sign indicates a hazardous situation which, if not avoided,could result in death or serious injury!
 5 min	The SINERGY must not be touched or put into service until 5 minutes after it has been switched off or disconnected to prevent an electric shock or injury.
	This sign shows danger of hot surface!
	Refer to the operating instructions.

Setting of Warning Sign for Safety

During instruction, maintenance and repair, follow the instructions below to prevent non-specialist personnel from causing misuse or accident:
Obvious signs should be placed at front switch and rear switch to prevent accidents caused by false switching.
Warning signs should be set near operating areas.
The system must be reinstalled after maintenance or operation.

Measuring Equipment

To ensure the electrical parameters to match requirements, related measuring equipment are required when the system is being connected or tested.
Ensure that the connection and use matched specification to prevent electric arcs or shocks.

Moisture Protection

It is very likely that moisture may cause damages to the system. Repair or maintaining activities in wet weather should be avoided or limited.

Operation After Power Failure

The battery system is part of the energy storage system which stores life-threatening high voltage even when the DC side is switched off. Touching the battery outlets is strictly prohibited.
The inverter can keep a life-threatening voltage even after disconnecting it from the DC and / or AC side.
Therefore, for safety reasons, it must be tested with a properly calibrated voltage tester before an installer works on the equipment.
This Symbol indicates that the marked device must not be disposed of as normal household waste. It must be disposed of at a collection center for the recycling of electric and electronic equipment.

1.4 Battery Safety Datasheet

Hazard Information

Classification of the Hazardous Chemical

Exempt from classification according to Australian WHS regulations.

Other Hazards

This product is a Lithium Iron Phosphate Battery with certified compliance under the UN Recommendations on Transport of Dangerous Goods, Manual of Tests and Criteria, Part III, subsection 38.3.
For the battery cell, chemical materials are stored in a hermetically sealed metal case, designed to withstand temperatures and pressures encountered during normal use.
As a result, during normal use, there is no physical danger of ignition or explosion and chemical danger of hazardous materials' leakage.
However, if the product is exposed to a fire, added mechanical shocks, decomposed, added electric stress by misuse, the gas release vent will be operated.
The battery cell case will be breached at the extreme. Hazardous materials may be released. Moreover, if heated strongly by the surrounding fire, acrid or harmful fume may be emitted.

Safety Datasheet

For detailed information please refer to the provided battery safety datasheet.

1.5 General Precautions

⚠ DANGER

Danger to life due to high voltages of the PV array, battery and electric shock.
When exposed to sunlight, the photovoltaic panels generates dangerous DC voltage which will be present in the DC conductors and the live components of the inverter.
Touching the DC conductors or the live components can lead to lethal electric shocks.
If you disconnect the DC connectors from the system under load, an electric arc may occur leading to electric shock and burns.

- Do not touch uninsulated cable ends.
- Do not touch the DC conductors.
- Do not open the inverter and battery.
- Do not wipe the system with damp cloth.
- Have the system installed and commissioned by qualified personnel with the appropriate skills only.
- Prior to performing any work on the inverter or the battery pack, disconnect the inverter from all voltage sources as described in this document.

⚠ WARNING

- Risk of chemical burns from electrolyte or toxic gases.
- During standard operation, no electrolyte shall leak from the battery pack and no toxic gases shall form.
- Despite careful construction, if the Battery Pack is damaged or a fault occurs, it is possible that electrolyte may be leaked or toxic gases formed.
- Do not install the SINERGY in any environment of temperature below -25°C or over 60°C and in which humidity is over 90%.
- Do not touch the SINERGY with wet hands.
- Do not put any heavy objects on top of the SINERGY.
- Do not damage the SINERGY with sharp objects.
- Do not install or operate the system in potentially explosive atmospheres or areas of high humidity.
- Do not mount the inverter and the battery pack in areas containing highly flammable materials or gases.
- If moisture has penetrated the system (e.g. due to a damaged enclosure), do not install or operate the system SINERGY.
- Do not move the system when it is already connected with battery modules.
- Secure the system to prevent tipping with restraining straps in your vehicle.
- The transportation of SINERGY must be made by the manufacturer or an instructed personnel. These instructions shall be recorded and repeated.
- A certified ABC fire extinguisher with minimum capacity of 2kg must be carried along when transporting.
- It is totally prohibited to smoke in the vehicle as well as close to the vehicle when loading and unloading.
- For the exchange of a battery module, please request for new hazardous goods packaging
- In case of contact with electrolyte, rinse the affected areas immediately with water and consult a doctor without delay.

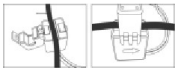
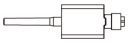
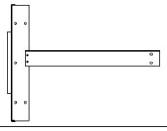
⚠ CAUTION

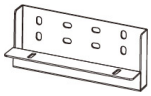
Risk of injury through lifting or dropping the system. The inverter and battery are

- heavy. There is risk of injury if the inverter or battery is lifted incorrectly or dropped during transport or when attaching to or removing from the wall.
- Lifting and transporting the inverter and battery must be carried out by more than 2 people.

1.6 Parts list

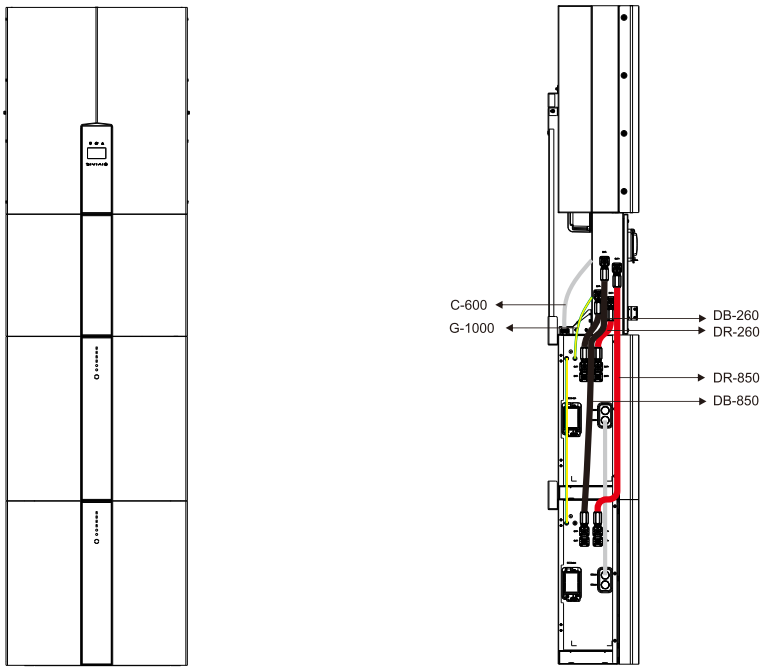
Check the following parts list to ensure it is complete.
Delivers a total system this consists of:

Inverter			
			
6xM5*12	5xST6.3*50 5xD10*50	3xCT and com cable	2xAC Collector
			
4xMC4	1xCollector	1x Mounting Panel	2xCT Connector
			
1×COM Connector	1xUser Manual		

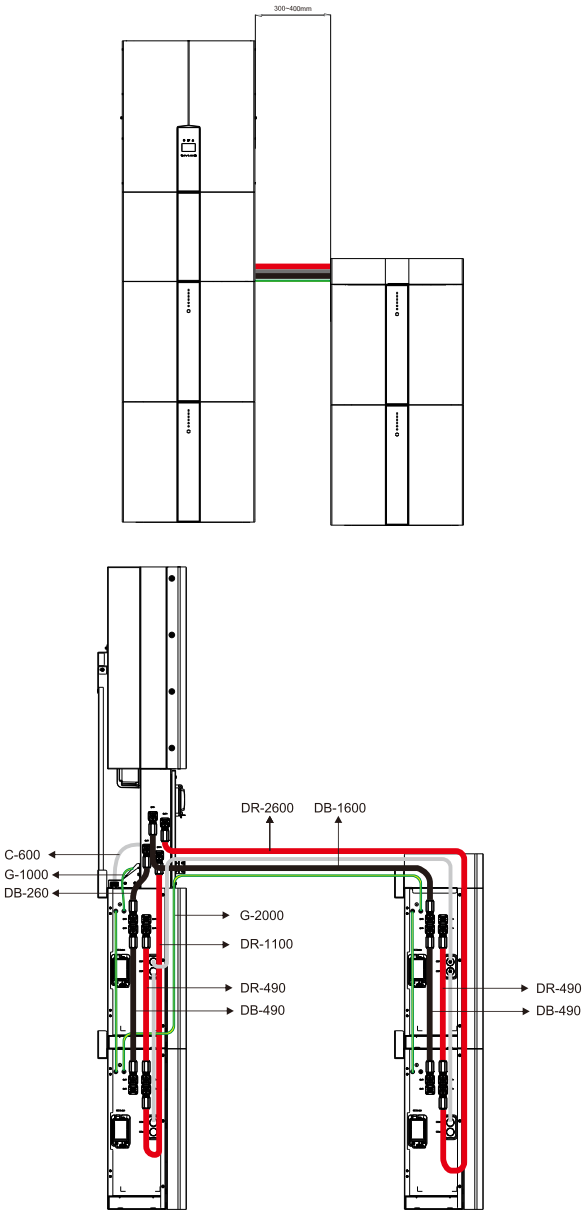
CEC-S B 5K		
		
4xST6.3*50 4xD10*50	2xM5*12	4xM6 Gasket
		
1x Mounting Panel		

1.7 Accessory

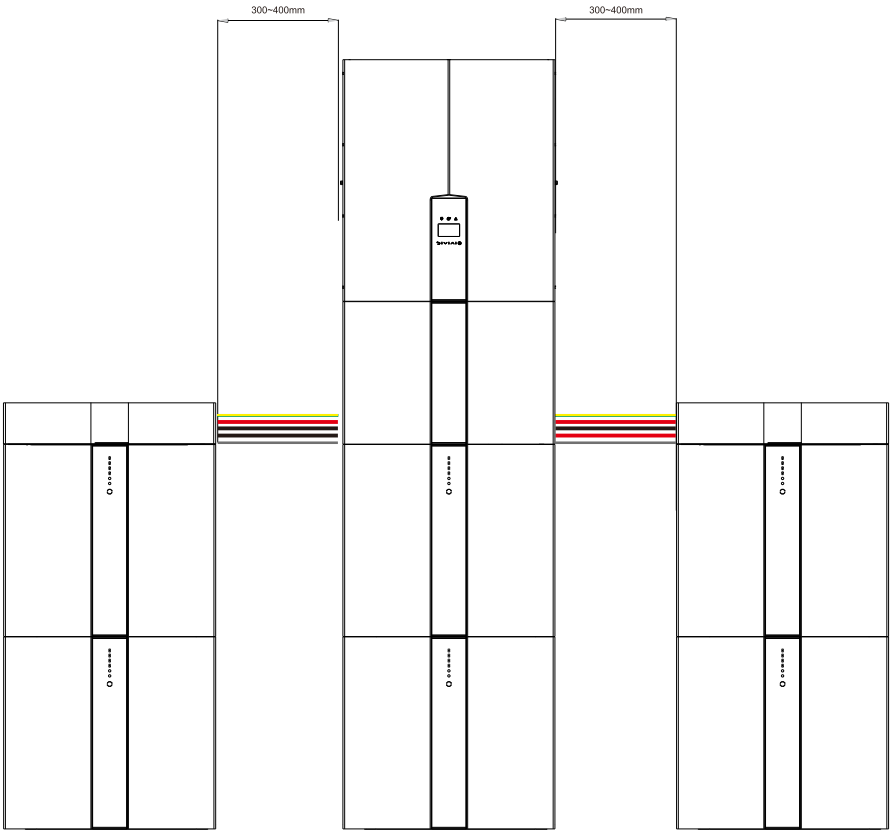
Cable (CAB10TX)

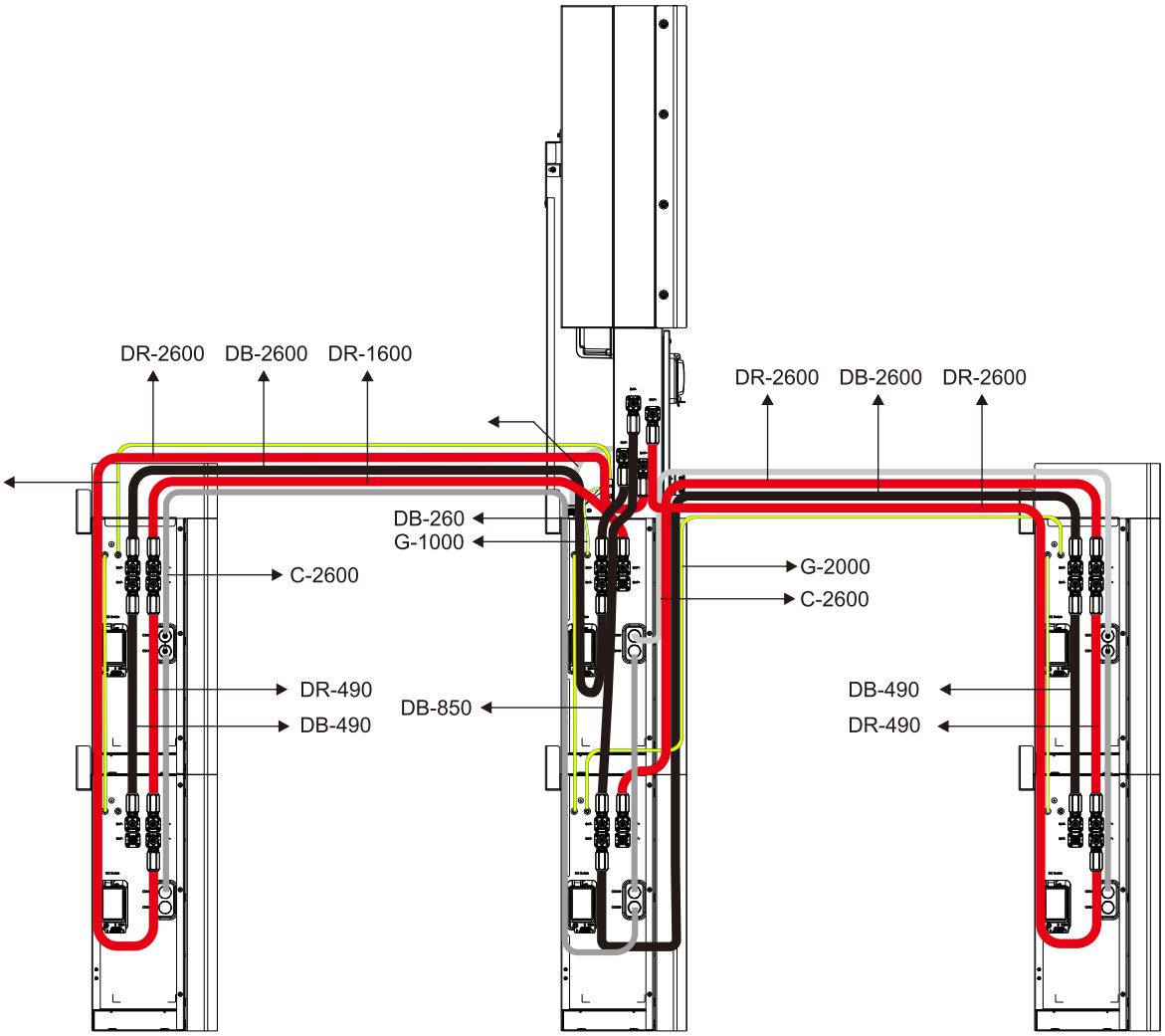


Cable (CAB20TX)

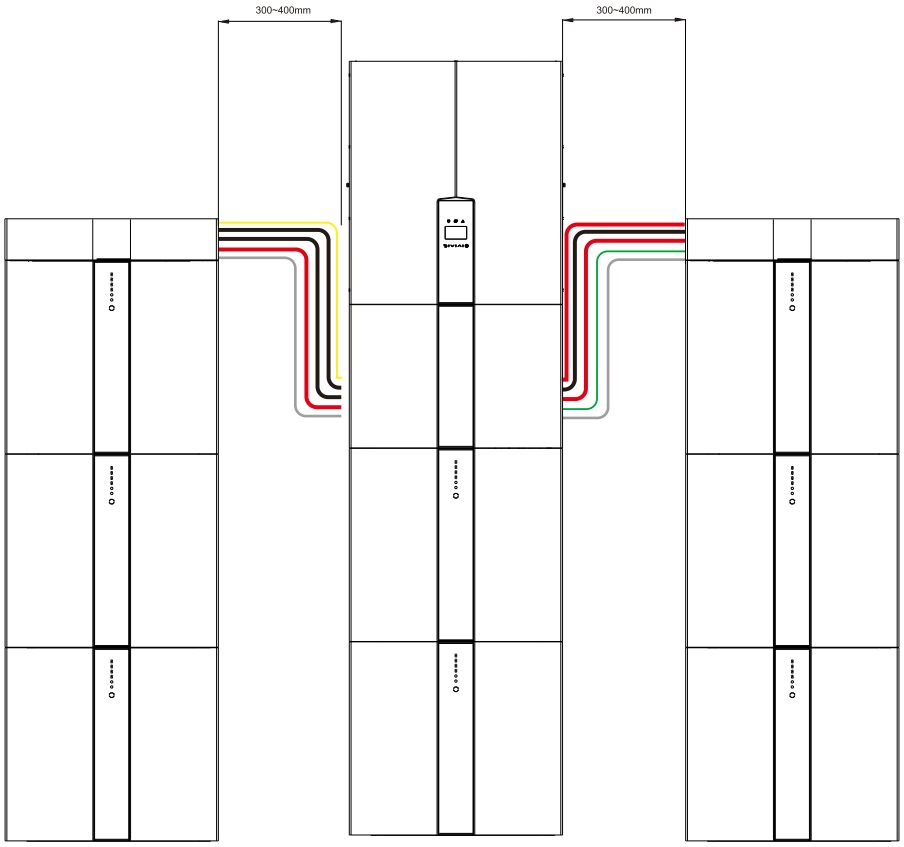


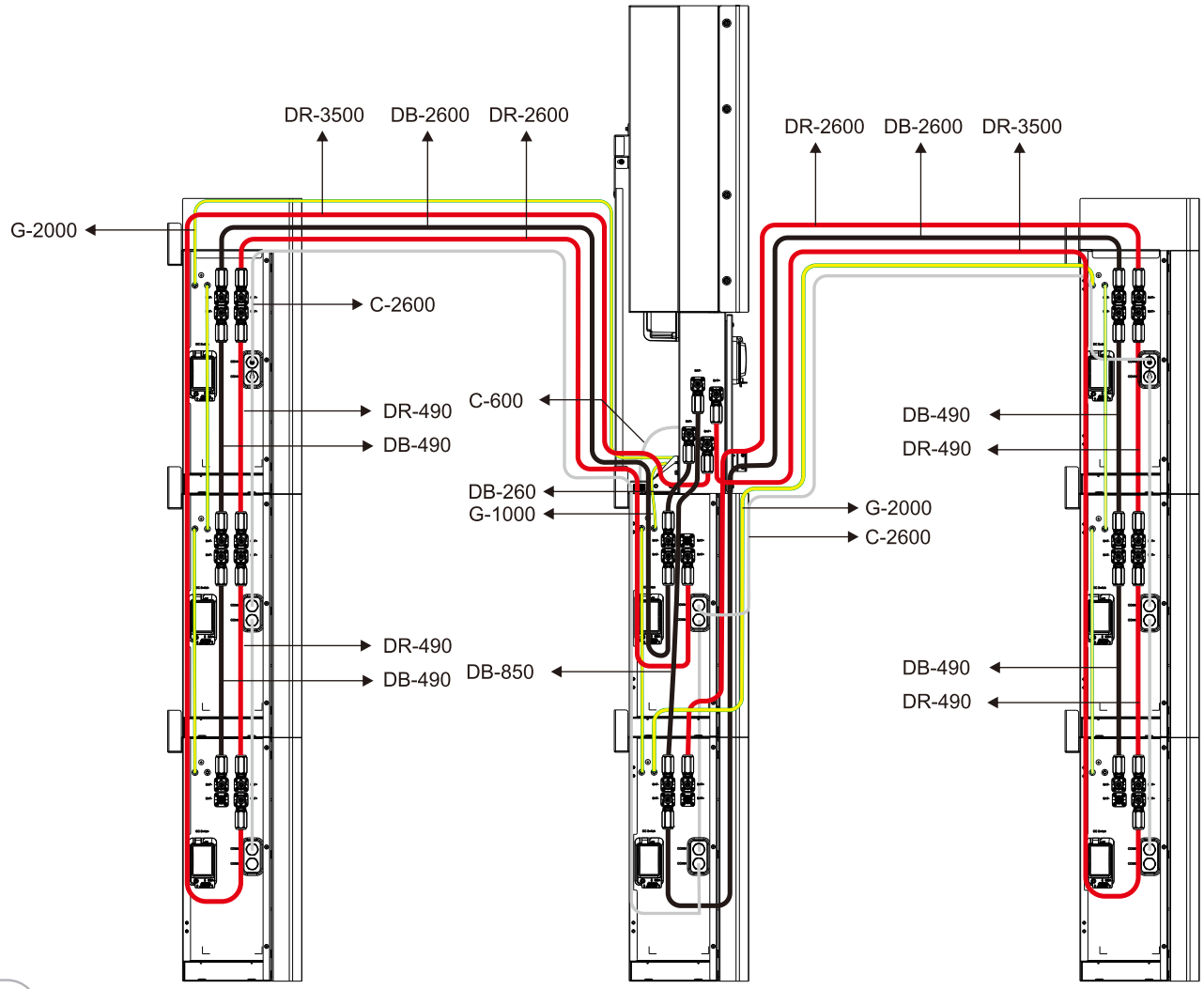
Cable (CAB30TX)



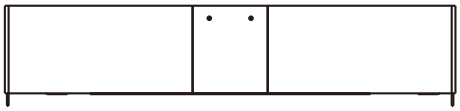


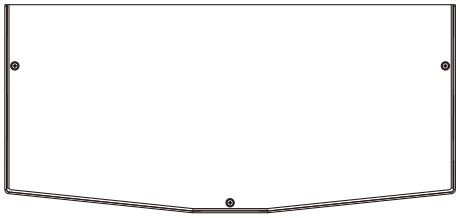
Cable (CAB40TX)



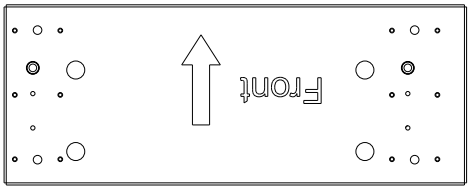


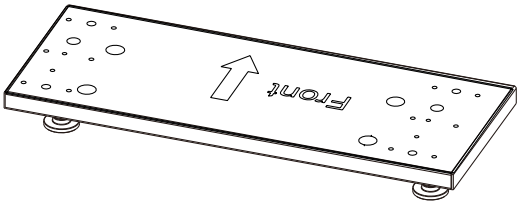
Mechanical Top cover



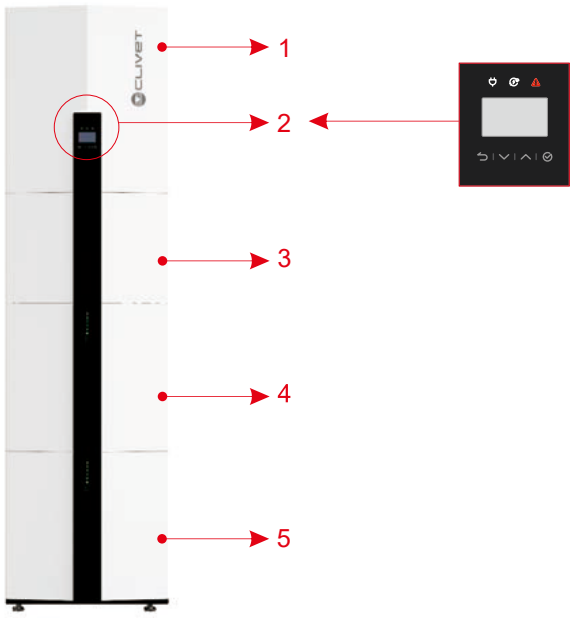


Floor stand support



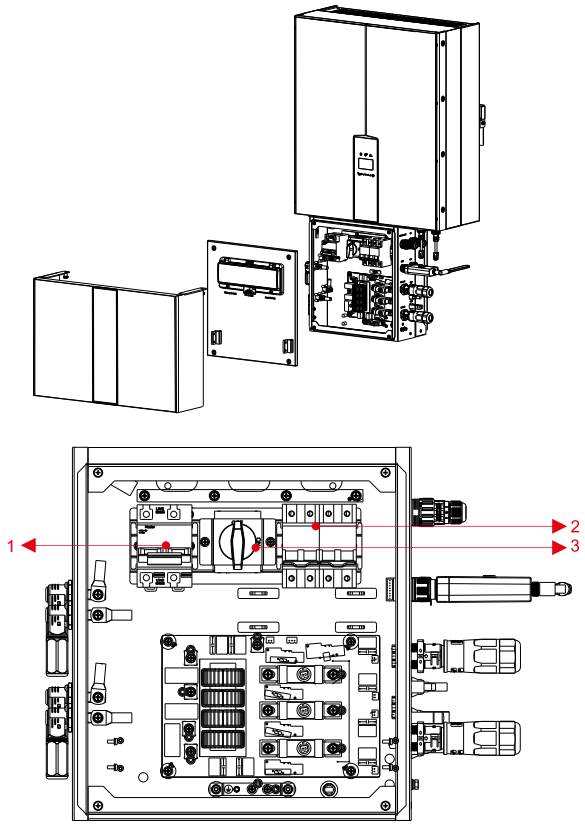


1.8 System Appearance



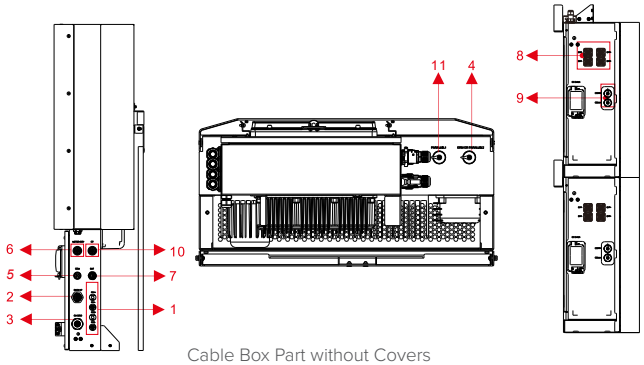
Object	Description
1	Hybrid Inverter
2	EMS Display Screen
3	Cable Box (connected to Inverter)
4	CEC-S B 5K (Battery 1)
5	CEC-S B 5K (Battery 2, if configured)

Inverter without Cable Box Covers– Front View



Cable Box Part without Covers – Front View

Object	Description
1	Battery circuit breaker
2	Output terminal block BACK UP
3	DC isolation switch (direct current)



Cable Box Part without Covers

Object	Description	DVC class
1	PV1, PV2	DVC C
2	BACKUP	DVC C
3	ON GRID	DVC C
4	DRM OR PARALLEL 2	DVC A
5	COM	DVC A
6	METER + DRY	DVC A
7	BAT	DVC A
8	BAT+,BAT-	DVC A
9	COMM	DVC A
10	CT	DVC A
11	PARALLEL 1	DVC A

Note: The DVC indicates the minimum required level of protection for the circuit

Decisive voltage Classification (DVC)	Limits of working voltage V		
	a.c. voltage r.m.s. U_{ACL}	a.c. voltage peak U_{ACPL}	d.c. voltage mean U_{DCL}
A*	≤25 (16)	≤35.4 (22.6)	≤60 (35)
B	50 (33)	71 (46.7)	120 (70)
C	>50 (>33)	>71 (>46.7)	>120 (>70)

The table values in parentheses are to be used for PCE or portions of PCEs rated for installation in wet locations as addressed in 6.1 for environmental categories and minimum environmental conditions.
*DVC-A circuits are allowed under fault conditions to have voltages up to the DVC- B limits, for maximum 0.2 s.

1.9 Liability Limitation

Any product damage or property loss caused by the following conditions,does not assume any direct or indirect liability by the manufacturer.

– Modification of the product, aesthetics or replacement of parts without prior authorization from the manufacturer;
– Changes, repair attempts and erasing of series number or seals by personnel not authorized by Clivet S.p.A.;
– System design and installation are not in compliance with standards and regulations;
– Fail to comply with the local safety regulations (VDE for DE, SAA for AU);
– Transport damage (including painting scratch caused by rubbing inside packaging during shipping). A claim should be made directly to shipping or insurance company in this case as soon as the container/packaging is unloaded and such damage is identified;
– Fail to follow any/all of the user manual, the installation guide and the maintenance regulations;
– Improper use or misuse of the device;
– Insufficient ventilation of the device;
– The maintenance procedures relating to the product have not been followed to an acceptable standard;
– Force majeure (violent or stormy weather, lightning, overvoltage, fire etc.);
– Damages caused by any external factors.

2. Installation

This Manual introduces the basic steps to install and set up .

NOTE:

Please be cautious unpacking the battery, otherwise components could be damaged.

2.1 Installation Site and Environment

General

This SINERGY energy storage system is outdoor version and can be installed in an outdoor location.
When SINERGY systems are installed inside a room, access to the various parts must not be hindered by the structure of the building or by the furniture and equipment in the room.
Maintain the envisaged clearances.
The SINERGY is naturally ventilated.
The location should therefore be clean, dry and adequately ventilated.
The mounting location must allow free access to the unit for installation and maintenance purposes, and the system panels must not be blocked.
The following locations are not allowed for installation:

- Habitable rooms;
- Ceiling cavities or wall cavities;
- Nn roofs that are not specifically considered suitable;
- Access / exit areas or under stairs / access walkways;
- Where the freezing point can be reached, such as garages, carports or other places as well as wet rooms (environmental category 2);
- Locations with humidity and condensation over 90%;
- Places where salty and humid air can penetrate;
- Seismic areas - additional security measures are required;
- Sites with altitude over 2000m;
- Places with an explosive atmosphere;
- Locations with direct sunlight or a large change in the ambient temperature;
- Places with flammable materials or gases or an explosive atmosphere
- Places directly exposed to the elements

2.2 Restricted Locations

The SINERGY shall not be installed :

a In restricted locations as defined for panels in AS / NZS 3000;

b Within 600mm of any heat source, such as hot water unit, gas heater, air conditioning unit or any other appliance.

c Within 600mm of any exit;

d Within 600mm of any window or ventilation opening;

e Within 600mm of side of other device.

A SINERGY installed in any corridor, hallway, lobby or the like and leading to an emergency exit shall ensure sufficient clearance for safe egress of at least 1 meter.
The SINERGY must also not be installed in potentially explosive atmospheres for gas cylinders that are heavier than air gases and have a vent clamp in accordance with AS /NZS 3000.

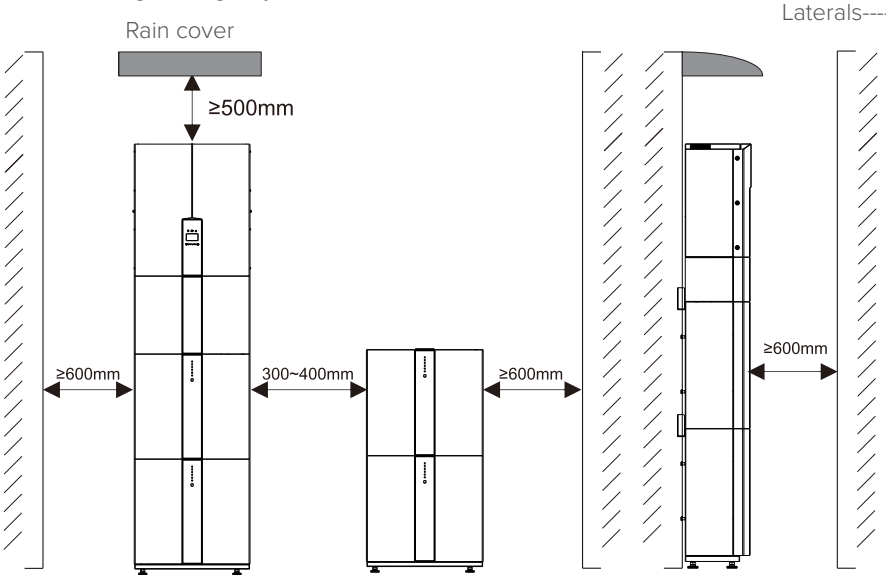
2.3 Protection in dangerous environments

To protect against the spread of fire in living spaces where the SINERGY is mounted or on surfaces of a wall or structure in living spaces with a SINERGY on the other side, the wall or structure shall have a suitable non-combustible barrier. If the mounting surface itself is not made of a suitable non-combustible material, a non-combustible barrier can be placed between the SINERGY and the surface of a wall or structure.
If the SINERGY is mounted at a wall or at a distance of 300mm from the wall or the structure separating it from the habitable space, the distances to other structures or objects must be increased.
The following distances must remain free :
(i) 600 mm beside the SINERGY;
(ii) 500 mm above the SINERGY;
(iii) 600 mm before the SINERGY.
If the distance between the SINERGY and the ceiling or any object above the system is less than 500mm, the ceiling or structural surface above the system must be made of noncombustible material within a radius of 600mm around the system.
The SINERGY must be mounted to ensure the highest point is not more than 2.2m above the ground or the platform.

Clearances

Limited Distance of Installation to Neighboring Objects

Top---------- 500mm
Front--------- 600mm
Laterals------600mm

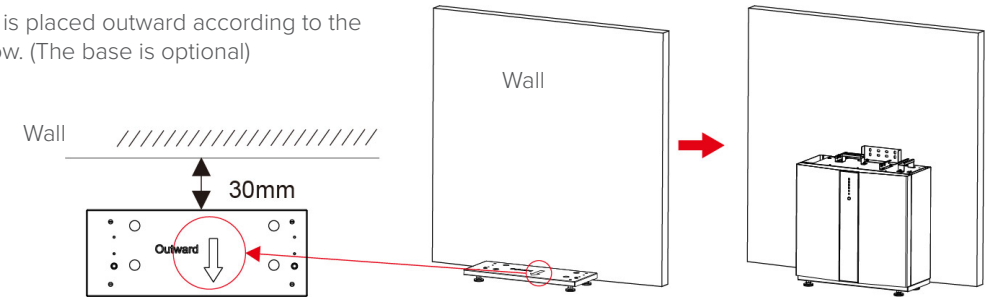


2.4 Installation

STEP 1

Remove the battery and inverter from the packaging box.
Find the base accessory kit, Keep the base level and place the battery pack on the base.
The installation distance between the base and the wall shall be 30mm.

Note: the base is placed outward according to the silk screen arrow. (The base is optional)



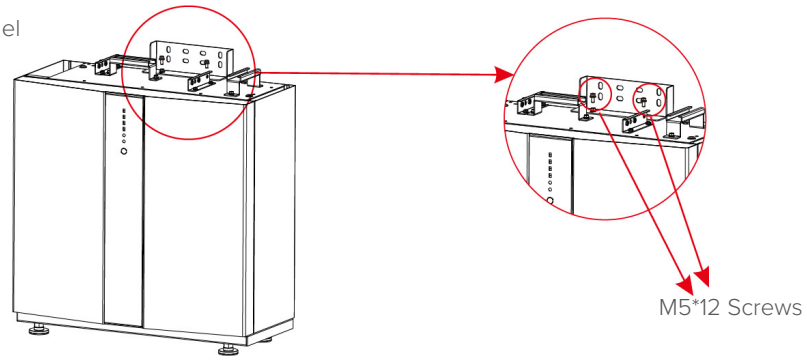
Base installation diagram

Battery Installation

STEP 2

Assemble the battery mounting panel on the battery.

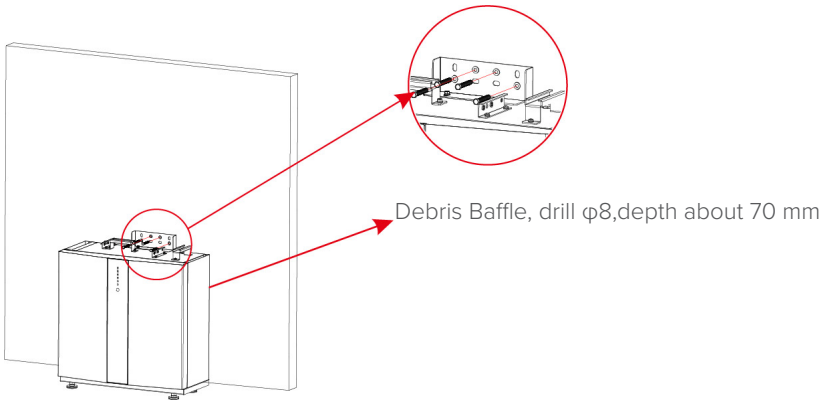
Assemble Battery Mounting Panel



STEP 3

Position the battery parallell to the wall and use a Φ8mm drill to drill holes at a depth of about 70mm in the wall for subsequent fixation of the mounting plates.

Battery Installation Drill Holes



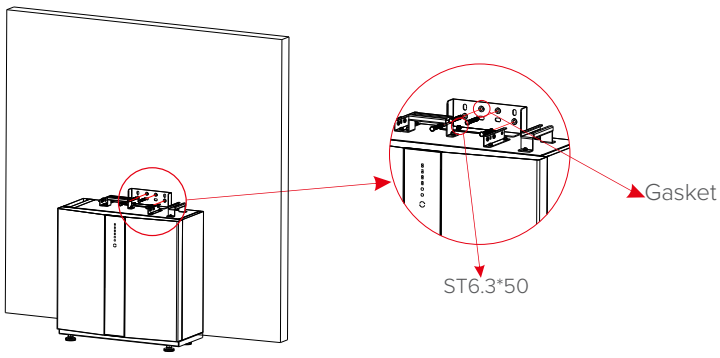
NOTE:

The type B RCD must be installed on the backup port of the system according to local regulations.

STEP 4

Remove the debris baffle and secure the battery to the wall with screws and gaskets.

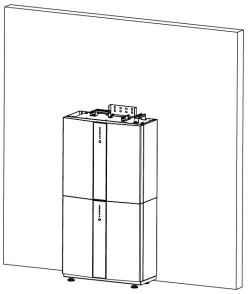
Battery Installation – Mounting on the Wall



STEP 5

To assemble the second (and all other) battery, repeat steps 6 and 7,respectively.

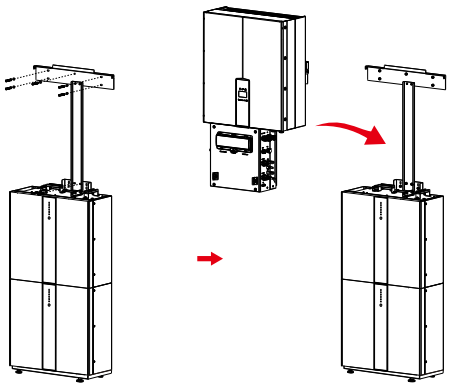
Battery Installation Second
Battery Installation



Inverter Installation

STEP 6

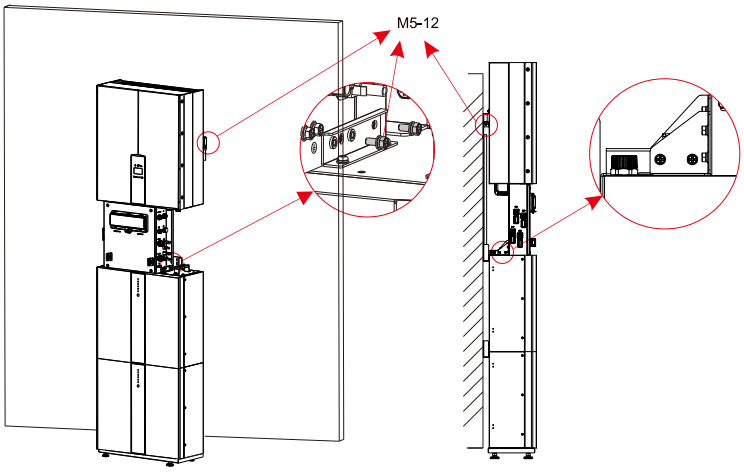
Inverter Installation.



STEP 7

Hang the inverter onto the mounting panels, adjust the entire system and ensure that the battery and the inverter have been securely hung onto the panels and brackets. Installation.

Inverter Installation on the Wall



STEP 8

Please make AC cables on site.

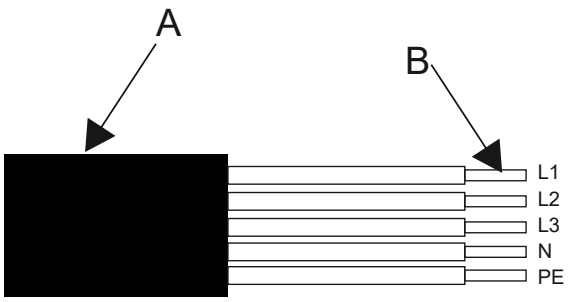
STEP 8-1

Please follow the AC cable requirements below.

For backup connection, 12AWG or 4mm² cable is required to be used.
Cable required. Please make sure the resistance of the cable is lower than 1 ohm. If the wire is longer than 20m, it is recommended to use 10AWG or 6mm² wire for backup and 8AWG or 8mm² wire for mains. The cable cross-sections must be checked in accordance with regional and national specifications and standards. The cross-sections mentioned above are the minimum requirements of the manufacturer

WARNING:

There are ”L1,L2,L3” “N” ‘’ PE’’ symbols marked inside the connector, the Line wire of grid must be connected to “L1,L2,L3” terminal; the Neutral wire of grid must be connected to “N” terminal; the Earth of grid must be connected to ‘’PE‘’

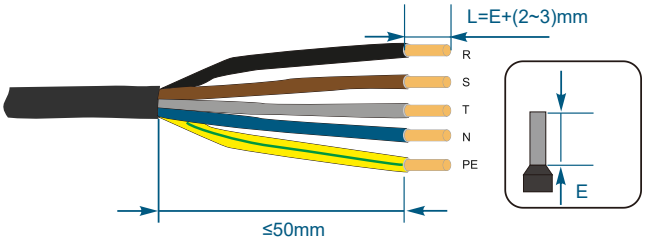


Object	Description	Value
A	External diameter	10mm
B	Copper conductor cross-section	6mm²
The PE conductor must be 10mm longer than the L and N conductors		

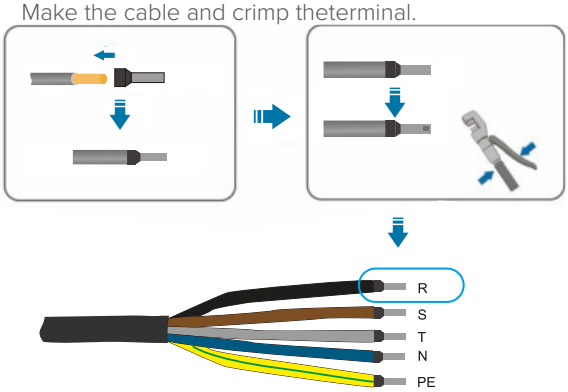
Insert the conductor into the suitable ferrule acc. to DIN 46228-4 and crimp the contact.

1 Strip the protection layer and insulation layer by specific length,as described in the figure below.
When locking the power grid cable into the external power grid connector, the RST should be marked on the corresponding cable, because when installing the CT, the three CTs with RST identification need to be buckled on the RST line of the corresponding identification.

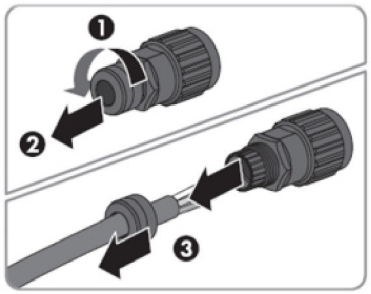
Pin	Description
1	R
2	S
3	T
N	N
	PE



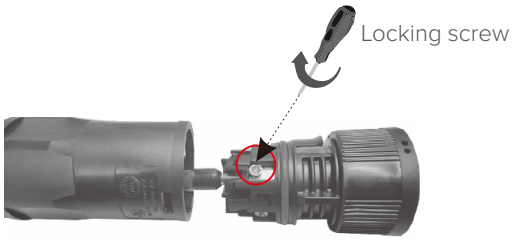
2 Make the cable and crimp theterminal.



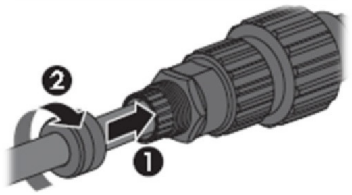
3 Unscrew the swivel nut from the threaded sleeve and thread the swivel nut and threaded sleeve over the AC cable.



4 Insert the crimped conductors L, N and PE into the corresponding terminals and tighten the screw with a hex key wrench screw driver(size:2.5, 1.2~2.0 N.m). Ensure that all conductors are securely in place in the screw terminals on the bush insert.



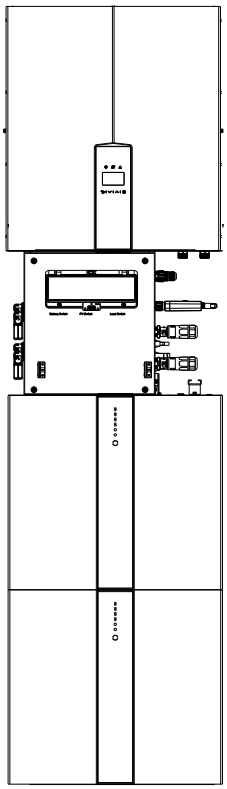
5 Screw the swivel nut onto the threaded sleeve. This seals the AC connector and provides strain relief for the AC cable. When doing so, hold the busch insert firmly by the locking cap.
This ensure that the swivel nut can be screwed firmly onto the threaded sleev.



5. Assembly the plug shell ,adapter as below picture, push the adapter and shell by hand until a “Click” is heard or felt.

6 Plug the AC connector into the jack for the AC connection by hand until a “Click” is heard or felt.

7 Use tool to clamp the AC wiring terminal and wire rod; screw the nut, but do not tighten it.
Make sure that the cable is free to pass through the water-proof components.
Once the terminal is connected to the right site of the inverter, tighten the nut.



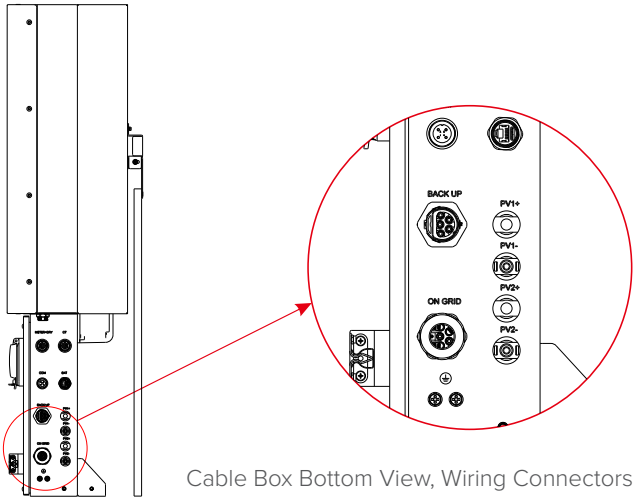
8 Connect the AC wiring terminal to the corresponding hole site of the inverter and lock it with a screw driver or electric screw driver (suggestion: stem diameters and torsion of screwdriver or electric screwdriver should be 4mm and 8~12kg-f.cm respectively)

9 Tighten the nut.

10 Circuit breaker parameters are recommended:
Back-up 25A/400Vac 6KA
On-grid 32A/400Vac 6KA

STEP 8-2

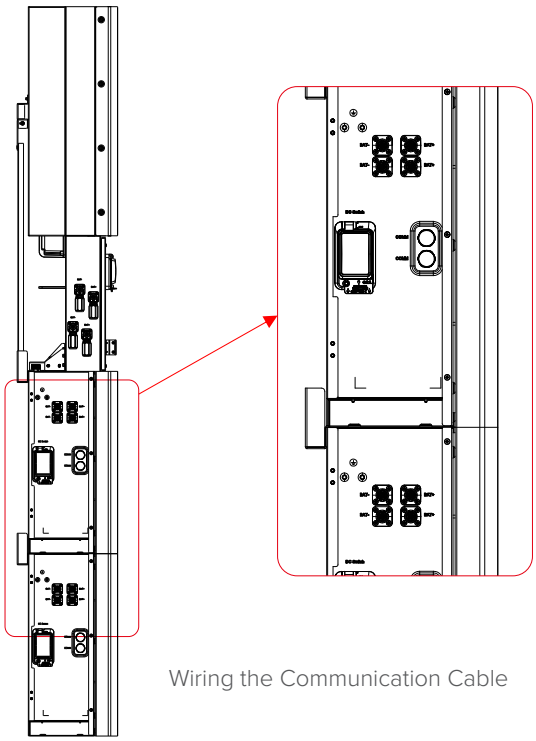
Connect the Backup and Grid cables in advance according to the connector mode, and connect them to the Backup and Grid board connectors in turn.



Cable Box Bottom View, Wiring Connectors

STEP 9

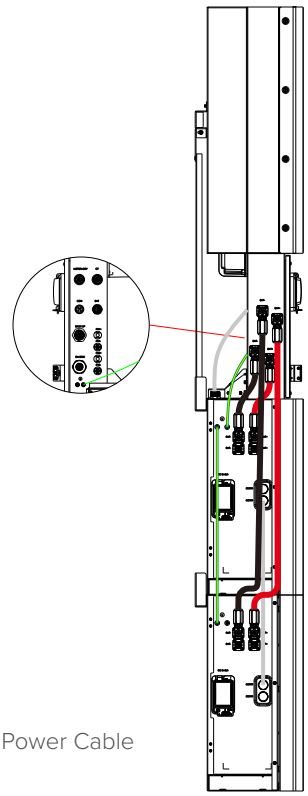
Connect the BAT communication cable of the cable box to the topmost battery at the right side.
Then use the communication cable supplied with the batteries to connect the batteries to each other via the respective connectors on the left side.
After you have connected all the modules together, close all covers (if you want to connect further battery modules, you must mount them before closing).



Wiring the Communication Cable

STEP 10

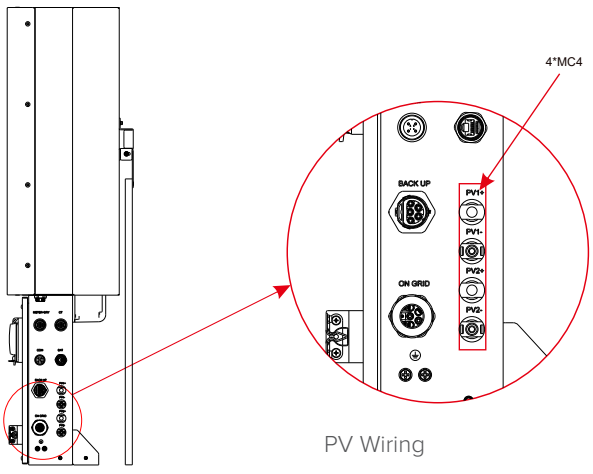
Connect the power cables of the bottom battery from step 4 to the side terminals of the top battery.
Make sure that red connects to red and black connects to black.



Wiring the Battry Power Cable

STEP 11

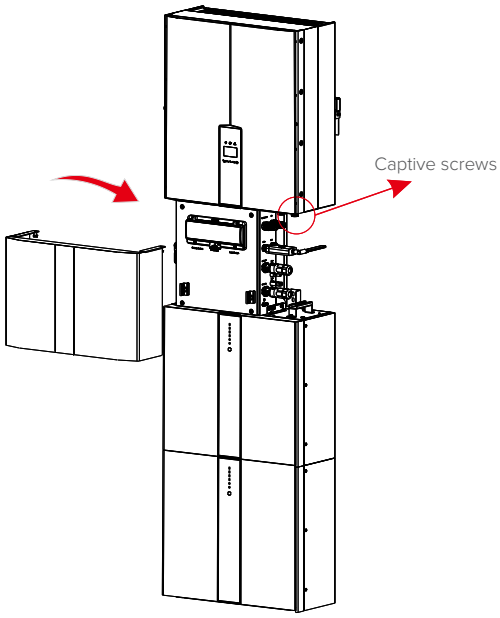
Close the battery covers and connect the PV-MC4 connectors to the system (connection on both sides).
Also, connect all AC cables, the meter communications cable METER, and the ethernet cable LAN.
Then close the cable box cover.
The installation is now complete.



PV Wiring

STEP 12

Close the lid and tighten the screw.



STEP 13

Commissioning of the energy storage system
After the installation of the energy storage system completed, in order to ensure the normal operation of the system, it is necessary to check the battery, PV and grid input parameters according to the following steps.

- **a** Manually press the reset button of the battery pack touch screen for 3-5S, then turn on the battery switch of both the battery pack and the hybrid inverter after the green light of the capacity indicator on the battery pack touch screen is on and there is no red light alarm indication, and check the screen Battery Prmeter interfaces after the inverter LCD screen is on for 5-10S, and check whether the temperature, voltage and capacity are normal (the temperature determination is roughly based on the current ambient temperature of the system, the voltage determination is in the range of 50V ± 3V, and the capacity determination is 100AH for a single battery pack, when multiple battery packs are connected in parallel, the capacity is the number of battery packs multiplied by 100AH).
- **b** After PV input connected and PV switch of the hybrid inverter closed, check whether the voltage display on the PV input display interface is normal.
- **c** After connecting to the grid, check whether the voltage display on the Grid-connected output interface is normal.

⚠ NOTE:

Recommended AC circuit breaker rating is 32A for grid, 25A for backup.

⚠ NOTE:

It is necessary to disconnect the power line, communication line and communication line between battery pack and inverter to manually sleep all battery packs.

⚠ STATEMENT:

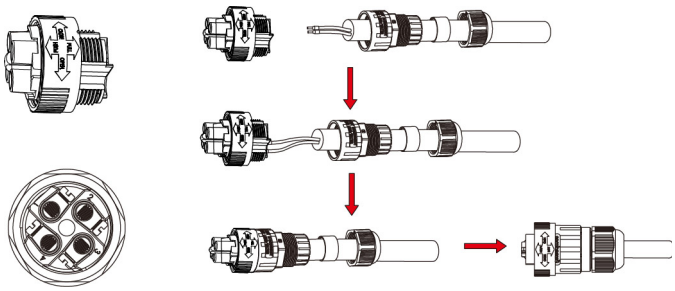
The method of anti-islanding protection is power variation

2.5 External CT Connection

The electricity meter should be mounted and connected at the grid transition point (feed-in point) so that it can measure the grid reference and feed-in power.

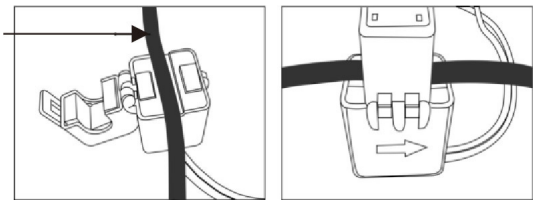
1. Loosen the nut, and untangle the single-aperture sealing ring.

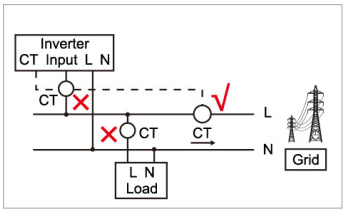
Pin	Description
1	R phase CT positive electrode (White)
2	R phase CT negative pole (Black)
3	S phase CT positive electrode (White)
4	S phase CT negative pole (Black)
5	T phase CT positive electrode (White)
6	T phase CT negative pole (Black)



2. Install the waterproof component and screw on the waterproof sheath nut.
3. Open the external CT wiring port, the arrow points to the direction of the power grid, put the wire into the external CT card slot, and buckle the buckle.

Line L





NOTE:

External CT should be placed near the power grid.
If CT test pass but inverter still can't achieve export power (power is not controllable or always 0 power output).
Please check installation location of the CT.

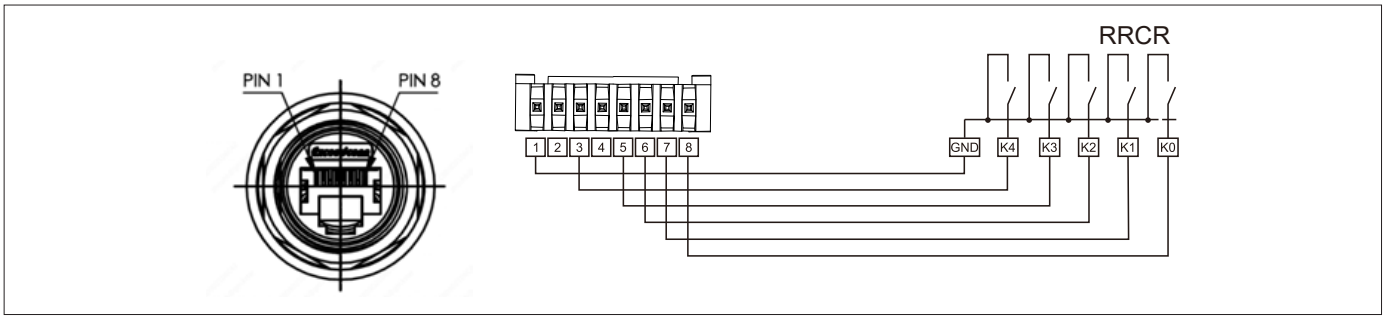
2.6 DRED Port Connection (optional, only for DRM function)

DRED means demand response enable device.
The AS/NZS 4777.2:2015 required inverter need to support demand response mode(DRM).
This function is for inverterthat comply with AS/NZS 4777.2:2015 standard. Inverter is fully comply with all DRM. A 8P terminal is used for DRM connection.

Pin	PIN-Name	Descripition	Connected to RRCR
1	G	GND	Not connected
2	V	5VDC Voltage Supply	Relays common node
3	DRM4/8	Relay contact 4 input	K4-Relay 4 output
4	V	5VDC Voltage Supply	Relays common node
5	DRM3/7	Relay contact 3 input	K3-Relay 3 output
6	DRM2/6	Relay contact 2 input	K2-Relay 2 output
7	DRM1/5	Relay contact 1 input	K1-Relay 1 output
8	DRM0	Relay contact 0 input	K0-Relay 0 output

The inverter is preconfigured to the following RRCR power levels.

DRM0	DRM1/5	DRM2/6	DRM3/7	DRM4/8	Active Power	Cos(Q)
1	0	1	1	1	0%	1
1	1	0	1	1	30%	1
1	1	1	0	1	60%	1
1	1	1	1	0	100%	1
1	1	1	1	1	100%	1
0	X	X	X	X	Standby	1



DRM connector

2.7 COMM Port connections

Pin	Descripition
1	+5V
2	GND
3	RS485-B
4	RS485-A

2.8 METER+DRY Port connections

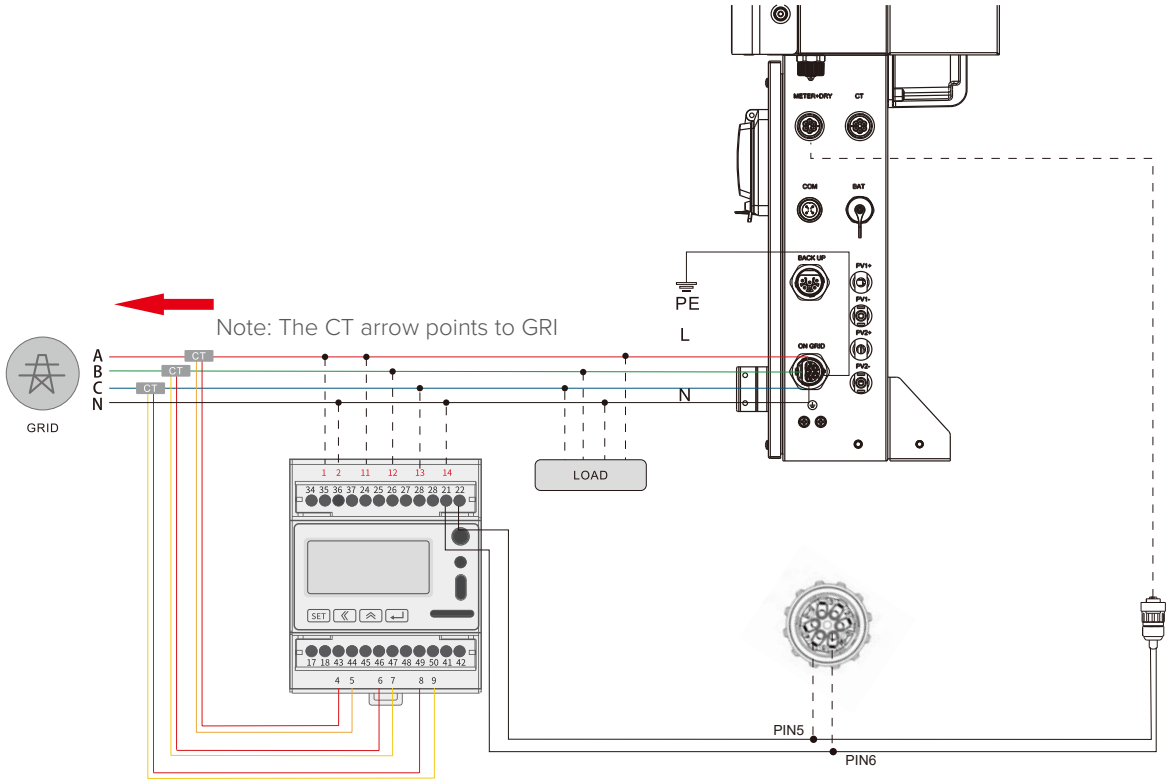
Note:

1 The Smart Meter(SM4CSX) with CT is already configured; please do not change any settings on the Smart Meter.

2 One Smart Meter can be used with only one inverter.

3 three CTs must be used for one Smart Meter and must be connected on the same phase with the Smart Meter power cable.

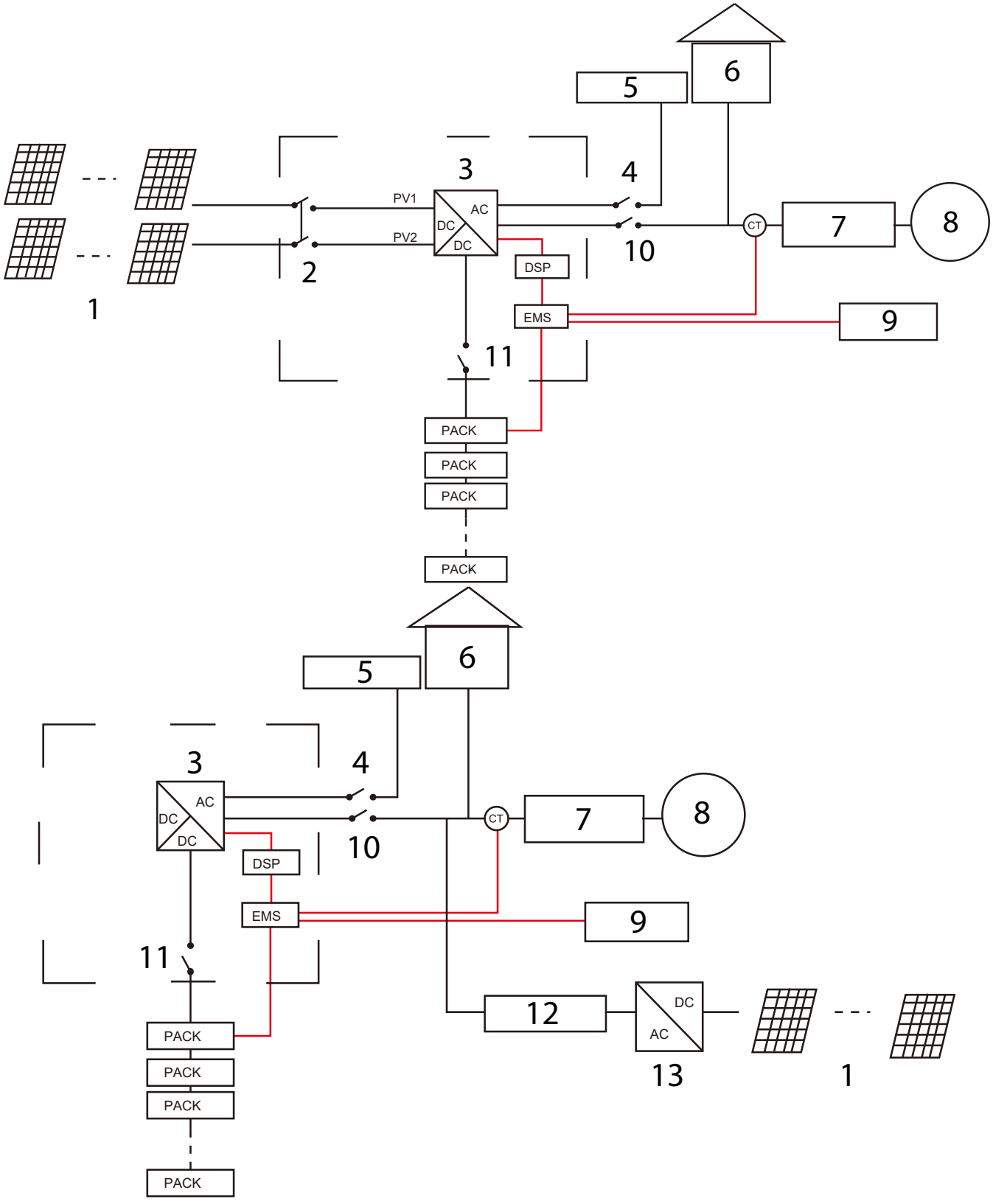
Smart Meter & CT connection diagram

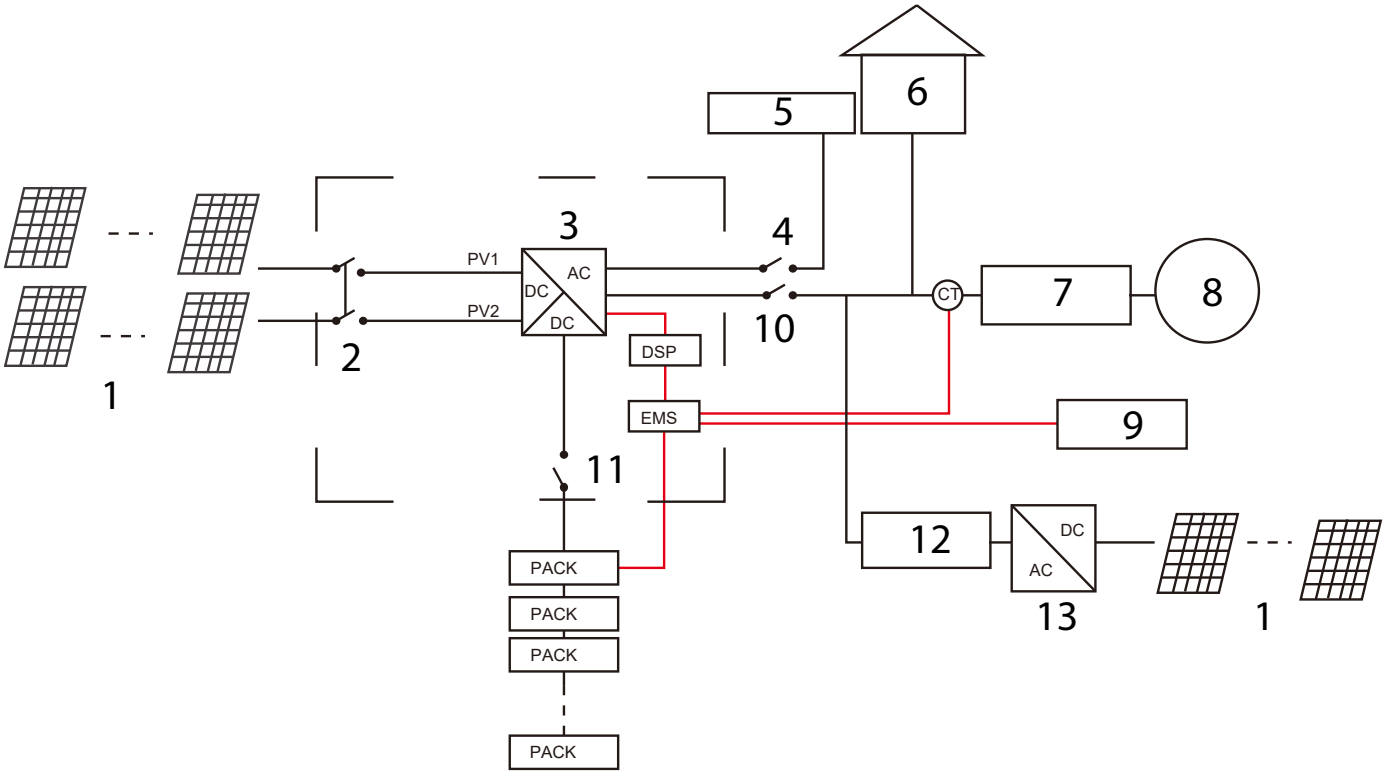


Pin	Description
1	DRY contact
2	DRY contact
3	GND
4	I/O
5	RS485-B
6	RS485-A

2.9 Single Line Diagram

The single line diagrams of DC-, AC- and Hybrid-coupled sysyem are as below:





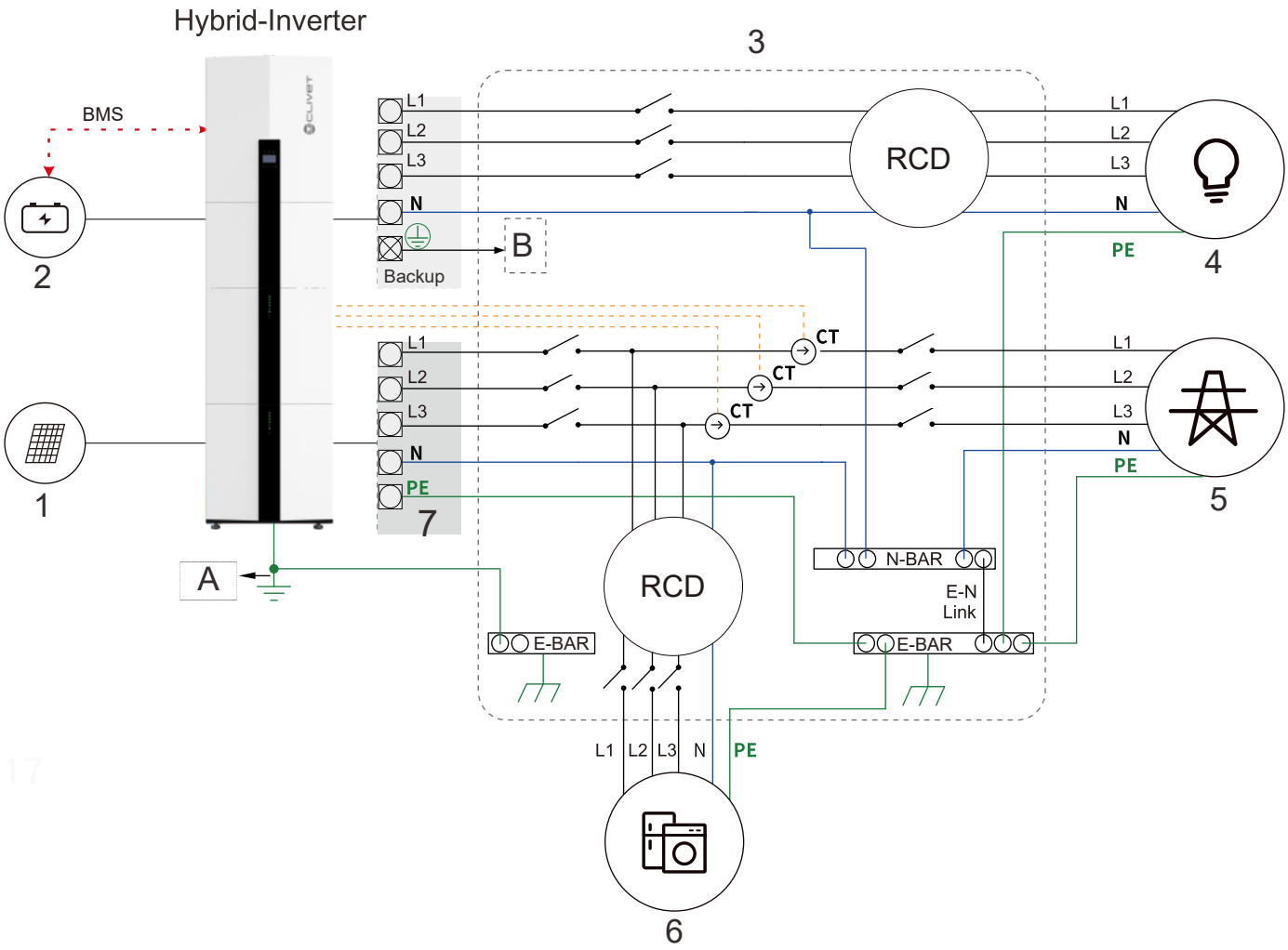
1	PV Panels
2	PV Switch
3	Hybrid Inverter
4	Back up switch
5	Back up load
6	Normal load
7	Grid meter
8	Grid
9	Router
10	Grid switch
11	Battery switch
12	PV meter
13	PV Inverter

2.10 Wiring diagram

The N and PE wires are connected together in the shunt box.

NOTE:

The following lines apply to areas in Australia, New Zealand and South Africa

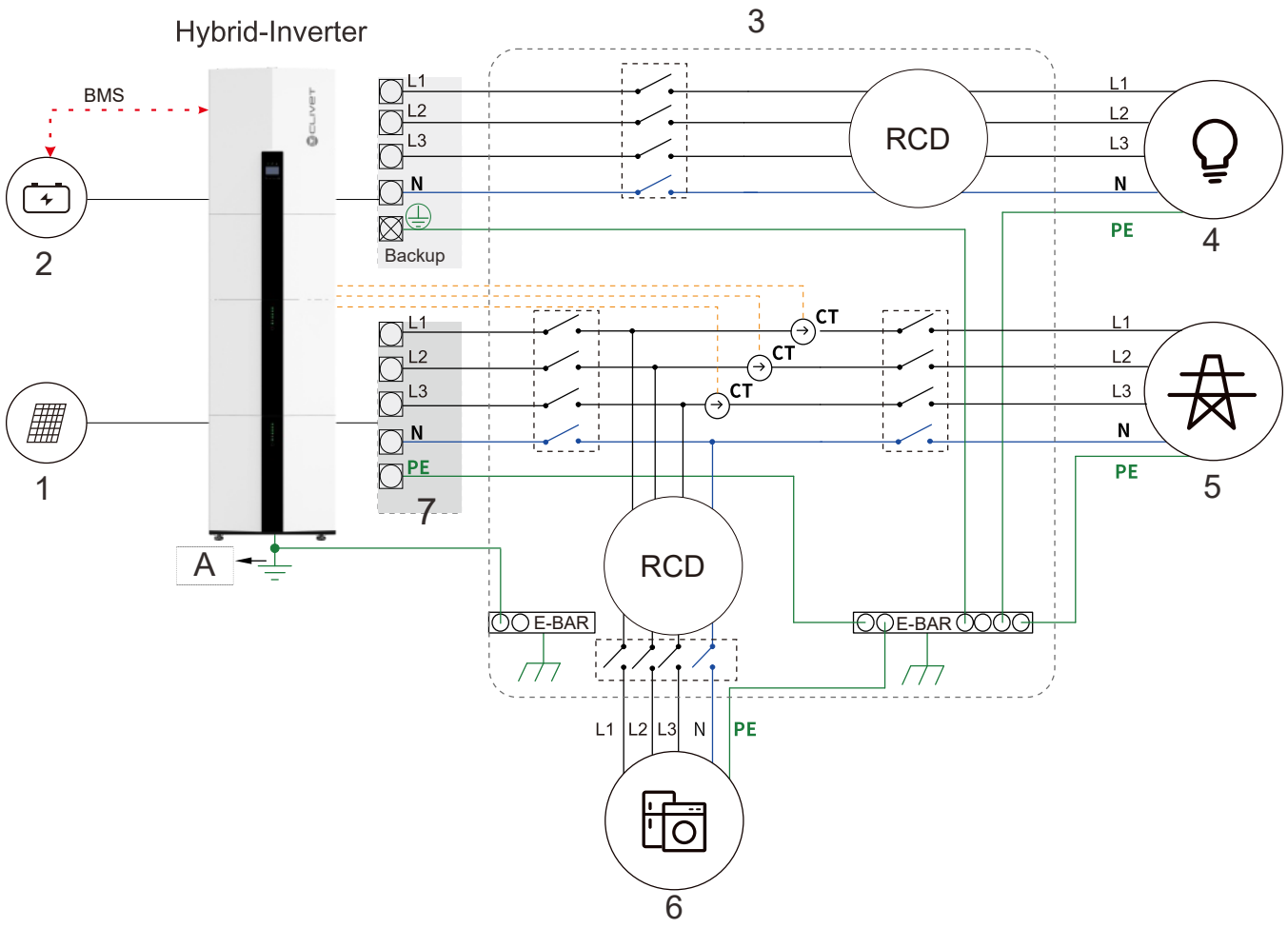


1	Photovoltaic module
2	Battery
3	Shunt box
4	Backup loads
5	Network
6	Normal loads
7	Network operation
A	The hole for the earth screw in lower-left corner
B	Do not wire in this position when the N and PE wires are connected together.

The N and PE wires must not be connected together in the shunt box.

NOTE:

Ensure that the backup ground connection is correctly and firmly clamped. If not, the BACKUP function may be interrupted in the event of a power failure.
In other areas, with the exception of Australia, New Zealand and South Africa, the following connection specifications apply:

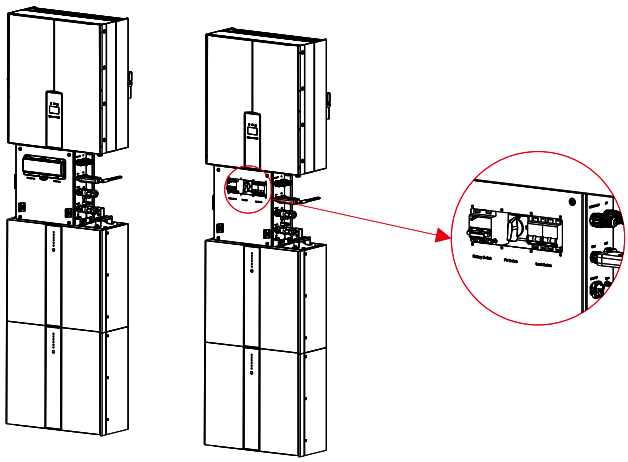


1	Photovoltaic module
2	Battery
3	Shunt box
4	Backup loads
5	Network
6	Normal loads
7	Network operation
A	The hole for the earth screw in lower-left corner

3. System Operation

3.1 Switch On

When turning on the system, it is very important to follow the steps below to prevent damage to the system.
WARNING: Please check the installation again before turning on the system.



STEP 1
Turn on the battery switch on the battery pack.

STEP 2
Press power button on all the batteries until the indicator lights turn on.

STEP 3
Turn on the external PV switch.

STEP 4
Turn on the external grid switch.

STEP 5
If backup load is applied, turn on the external backup switch.

NOTE:
the Backup switch is only used when a backup load is applied.

STEP 6
Open the battery switch cover and turn on the battery switch on the cable box of inverter.

STEP 7
Close the battery switch cover and the outer shell of the cable box.

NOTE:
If PV=0V under sunshine, please check whether PV is connected reversely or whether the circuit is normal.

NOTE:
Appliances such as air conditioner are required at least 2-3 minutes to restart because it is required to have enough time to balance refrigerant gas inside of circuit. If a power shortage occurs and recovers in short time, it will cause damage to your connected appliances. To prevent this kind of damage, please check manufacturer of air conditioner if it is equipped with time-delay function before installation. Otherwise, this inverter will trigger overload fault and cut off output to protect your appliance but sometimes it still causes internal damage to the air conditioner.

3.2 Switch Off

STEP 1
Open cable box outer shell on the inverter, open the battery switch cover and turn off the battery switch.

STEP 2
Turn off the external grid switch.

STEP 3
If backup load is applied, turn off the external backup switch.

STEP 4
Turn off the external PV switch on the cable box..

STEP 5
Open cable box outer shell beside the battery pack, open the battery switch cover and turn off the battery switch.

STEP 6
Press the power button on all the batteries, till the lights turn off.

STEP 7
Close the battery switch cover and the outer shell of cable box.

3.3 Emergency Procedure

When the SINERGY energy storage system appears to be running abnormally, you can turn off the grid-connected main switch that directly feeding the BESS, and turn off all load switches within the BESS, turn off the battery switch at the same time.
To prevent a potentially fatal personal injury, if you want to repair or open the machine after the power is switched off, please measure the voltage at the input terminals with a suitably calibrated voltage tester.
Before working on this equipment, please confirm that there is no grid electric supply to the BESS!
The upper cover plate cannot be opened until the DC-link capacitance inside the battery modules discharges completely about 15 minutes later.

3.4 Emergency Handling Plan

1. Disconnect the AC breaker.
2. Check the control power supply. If it is OK, return the power supply to find out the reason.
3. Please record every detail related to the fault, so company can analyse and solve the fault. Any operation of equipment during a fault is strictly forbidden, please contact company as soon as possible.
4. As battery cells contain a little oxygen inside and all cells have got explosion-proof valves, explosion hardly happens.
5. When the indicator light on the battery shows a red fault, check the fault type through the communication protocol, and contact our after-sales service personnel for advice.

3.5 Hazards

If the battery pack leaks electrolyte, avoid contact with the leaking liquid or gas.
If one is exposed to the leaked substance, immediately perform the actions described below:
Inhalation: Evacuate the contaminated area, and seek medical attention.
Eye contact: Rinse eyes with running water for 5 minutes, and seek medical attention.
Contact with skin: Wash the affected area thoroughly with soap and water, and seek medical attention.
Ingestion: Induce vomiting and seek medical attention.

3.6 Fire

If a fire breaks out in the place where the battery pack is installed, perform the following countermeasures:

3.7 Fire extinguishing media

During normal operation, no respirator is required.
Burning batteries can not be extinguished with a regular fire extinguisher, this requires special fire extinguishers.
If the fire is not from a battery,normal ABC fire extinguishers can be used for extinguishing.
Fire-fighting instructions

1. If fire occurs when charging batteries, if it is safe to do so, disconnect the battery pack circuit breaker to shut off the power to charge.
2. If the battery pack is not on fire yet, extinguish the fire before the battery pack catches fire.
3. If the battery pack is on fire, do not try to extinguish but evacuate people immediately.

There may be a possible explosion when batteries are heated above 150°C.

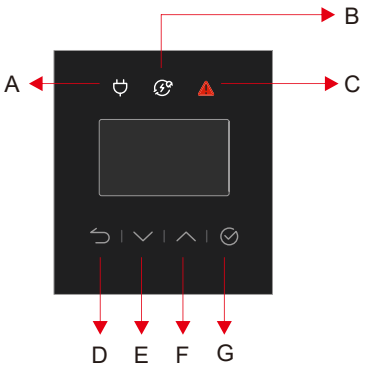
When the battery pack is burning, it leaks poisonous gases. Do not approach.

3.8 Effective ways to deal with accidents.

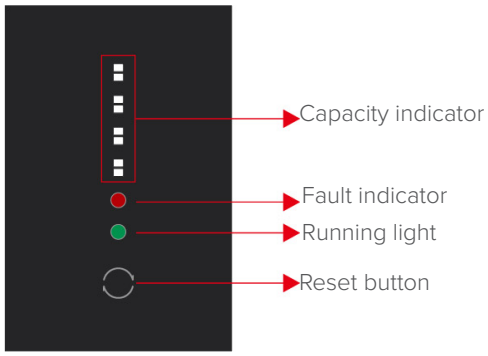
Battery in dry environment: Place damaged battery into a segregated place and call local fire department or service engineer.
Battery in wet environment: Stay out of the water and don' t touch anything if any part of the battery, inverter, or wiring is submerged. Do not use a submerged battery again and contact the service engineer.

4. EMS Introduction and Set up (Energy Management System)

Function Description



SINERGY EMS Interface



SINERGY Interface

Object	Name	Description
A	Indicator LED	Grid connection
B		Off-grid (SINERGY isolated from the electric network)
C		Red: The inverter is in fault.
D	Button Function	Return Button: Escape from current interface or function. Enter the setting interface.
E		Up button: Move cursor to upside or increase value.
F		Down Button: Move cursor to downside or decrease value.
G		ENT Button: Confirm the selection.

LED Indicator Description

LED working status indication

Status	Normal/Alarm / Protection	ON/ OFF	RUN	ALM	Power indicator LED						Instructions
		●	●	●	●	●	●	●	●	●	
Shut down	dormancy	off	off	off	off	off	off	off	off	off	All off
Standby	Normal	light	Flash one time	off	According to battery indicator						standby mode
	Alarm	light	Flash one time	Flash three times							Module low voltage
Charge	Normal	light	light	off	According to battery indicator (Power indicator highest LED flashes two)						The maximum power LED flashes twice, and the ALM does not flash when an overcharge alarm occurs
	Alarm	light	light	Flash three times							
	Overcharge protection	light	light	off	light	light	light	light	light	light	If there is no mains electricity, the indicator light turns to standby
	Temperature, overcurrent, failure, protection	light	off	light	off	off	off	off	off	off	Stop charging
Discharge	Normal	light	Flash three times	off	According to battery indicator						
	Alarm	light	Flash three times	Flash three times							
	Undervoltage protection	light	off	off	off	off	off	off	off	off	Stop discharging
	Temperature, overcurrent, short circuit, reverse connection, failure protection	light	off	light	off	off	off	off	off	off	Stop discharging
Failure		off	off	light	off	off	off	off	off	off	Stop cha rging and discharging

4.1 Display and Setting

General settings

After the machine is installed, you can use it by following the steps below. If you have more requirements for setting, you can refer to Section “Configuration Menus Overview”

Press ESC button to enter the setting interface and the default password is 00000.

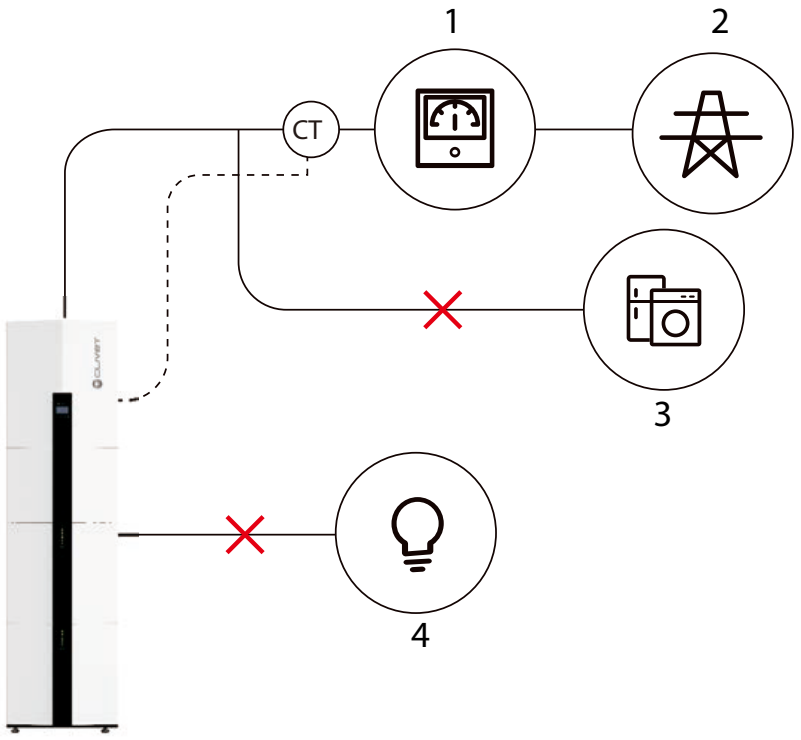
Menu Level 1	Menu Level 2	Menu Level 3	Menu Level 4	Menu Level 5	Menu Level 6	Menu Level 7	Menu Level 8	Default Selection	Comment
SET UP	Enter Password (Default 00000)	SYS Setting	Work Mode	Self Consume	Charge from Grid	Enable	Charge time	00:00-23:59	The energy generated by the solar panels will be used in the following order: Feed the home loads; Charge the battery and then, feed into the grid. When the sun is not present, the load will be supported by the battery to enhance self- consumption. If the power supply from the batteries is not sufficient, the grid will support the load demand.
							Max SOC(0% ~100%)	100%(After charging to the set value, the grid will stop charging the battery.	
						Disable(default)		Enable	
				Peak SHIFT	Time Setting	charge start1 charge end1 discharge start1 discharge end1 charge start2 charge end2 discharge start2 discharge end2	set charging and discharging time	Disable	This mode is designed for time-use mode. The customer can set up the desired charging/discharging time & power via the inverter screen or APP.
					Charge				Manually forces the system to charge the batteries from the grid.
					DISCHG				Manually forces the system to discharge to the connected load
				BAT Priority				Disable	The battery is only used as a backup power supply when the grid fails. As long as the grid works, the batteries won’t be used to power the loads. The battery is charged with the power generated by the PV system or from the grid.

Menu Level 1	Menu Level 2	Menu Level 3	Menu Level 4	Menu Level 5	Menu Level 6	Menu Level 7	Menu Level 8	Default Selection	Comment
			Zero Export	Enable	Disable			Disable	Allows the user to stop the system exporting to the grid. Or, if enabled, to set the export power limit.
					Enable				
				Power	0~Rated AC output power	set the export power limit			If Enable is selected, the user will be prompted to enter the power.
			CT or METER	CT				CT	CT option is used for measuring the system current.
				Meter					Meter option is used for measuring the system current.
			AC Couple	Disable				Disable	Allows the user to connect an external inverter to the system (either instead of PV, or in-addition to PC - Hybrid mode).
				Enable					
		Grid STD	1.China						
			2. Germany						
			3.Australia	AUS-A				Local	Allows the user to select the country that the system is installed in.
				AUS-B					
				AUS-C					
			4. Italy	CEI0-21					
				CEI0-21 ACEA					
			5. Spain						
			6. UK						
			7. Hungary						
			8. Belgium						
			9. New Zealand						

Menu Level 1	Menu Level 2	Menu Level 3	Menu Level 4	Menu Level 5	Menu Level 6	Menu Level 7	Menu Level 8	Default Selection	Comment
			10. Greece						
			11. France						
			12. Bangkok						
			13. Thailand						
			14. South Africa						
			15. EN50549						
			16. Brazil						
			17. VDE0126						
			18. Ireland						
			19. Israel						
			20. Poland						
			21. Chile	Chile_BT					
				Chile_HD					
				Chile_LD					
			22. Local						
			23. 60Hz						
			24. Denmark						
			25. Sweden						
			26. Austria						
		Language	1. Chinese					English	Allows the user to select Chinese, English, Italian, German language.
			2. English						
			3. Italian						
			4. German						
		Date/ Time	Set time, date and day						Allows the user to set the time, date and day
		CT self-check	Cut off all load then comfirm						This action must be performed when the inverter is externally connected to the CT. Before the CT self- check, the inverter needs to be connected to the power grid and the battery. The backup circuit breaker and normal load breaker needs to be disconnected. The CT self-check takes about 1~5 minutes.

CT self-check steps:

1 Open the external CT wiring port, the arrow points to the direction of the power grid, put the wire into the external CT card slot, and buckle the buckle.
2 Disconnect the backup loads and the normal loads.
3 Connect the battery pack and Grid.
4 Perform CT self-check via LCD.



1	Grid Inverter
2	Grid
3	Normal Loads
4	Backup Loads

4.2 Configuration Menus Overview

Menu Level 1	Menu Level 2	Menu Level 3	Menu Level 4	Menu Level 5	Menu Level 6	Default Selection	Comment
SET UP	Enter Password (Default 00000)	SYS Setting	Work Mode	Self Consume	Charge from Grid Enable Disable (default)	Enable	The energy generated by the solar panels will be used in the following order: Feed the home loads; Charge the battery and then, feed into the grid. When the sun is not present, the load will be supported by the battery to enhance self-consumption. If the power supply from the batteries is not sufficient, the grid will support the load demand.
				Peak SHIFT	Time Setting	Disable	This mode is designed for time-use mode. The customer can set up the desired charging/discharging time & power via the inverter screen or APP.
					Charge		Manually forces the system to charge the batteries from the grid.
					DISCHG		Manually forces the system to discharge to the connected load
				BAT Priority		Disable	The battery is only used as a backup power supply when the grid fails. As long as the grid works, the batteries won't be used to power the loads. The battery is charged with the power generated by the PV system or from the grid.
			PV input	Independent		Independent	Allows the user to change the PV array configuration (wiring changes would also apply!) When parallel input is set to be independent mode, PV power will be imbalanced.
				Parallel			
				CV			
			Zero export	Enable	Disable	Disable	Allows the user to stop the system exporting to the grid.

Menu Level 1	Menu Level 2	Menu Level 3	Menu Level 4	Menu Level 5	Menu Level 6	Default Selection	Comment
					Enable		Or, if enabled, to set the export power limit.
				Power	Set the export power limit(Range: 0~rated power		If Enable is selected, the user will be prompted to enter the power.
			DRM Enable	Disable		Disable	Only applicable in Austrailia and New Zealand at this time.
				Enable			
			EPS Enable	Disable		Enable	Enables the Backup output (the Load Switch needs to be turned ON).
				Enable			
			Remote CTRL	Disable		Disable	Allows control via RS485 (Scada system for example).
				Enable			
			Start Delay	20...300 Seconds		30 Seconds	This is the boot delay from when power is applied to the inverter
			CEI SPI Ctrl	Disable		Disable	This function is only applicable to use via DRM for remote control (Australian and New zealand markets only).
				Enable			
			GFCICHK ENB	Disable		Enable	Ground fault monitoring on the AC grid connection.
				Enable			
			DOD Enable	Disable		Enable	Depth of discharge. This should always be enabled. Disabling will result in the battery discharging to 0%.
				Enable			
			Generator	Disable		Disable	This option allows the user to install a secondary means of generation. For example, wind generator or diesel generator.
				Enable			
			CT or METER	CT		CT	CT option is used for measuring the system current

Menu Level 1	Menu Level 2	Menu Level 3	Menu Level 4	Menu Level 5	Menu Level 6	Default Selection	Comment
				Meter			Meter option is used for measuring the system current
			AC Couple	Disable		Disable	Allows the user to connect an external inverter to the system (either instead of PV, or in- addition to PC - Hybrid mode).
				Enable			
		BAT Setting	BAT Type	Lead- Acid	FLOAT- VOLT	LFP	Select the battery type.
					EQCHAR VOLT		
					BAT CAP		
					BAT OVP		
				LFP			
			DISC Depth	10%~90%		90%	Sets the maximum depth of discharge during grid connected state.
			OFF GRID DOD	0%~100%		90%	Sets the maximum depth of discharge when off-grid.
			CHG CURR	1~160A		160A	Sets the maximum battery charge current.
			DISC Power	0%~100%		100%	Sets the maximum discharge power - % of rated output.
			CHG Power	1%~100%		100%	Sets the maximum charge power - % of rated output.
			BAT End Volt	40~48V		43.2V	Sets the voltage that is seen as 0% remaining.
			BAT Wake-up	Enable	Disable	Enable	If enabled the battery will contantly monitor state of charge and depth of discharge. If time option is selected, the battery will wake up and check

Menu Level 1	Menu Level 2	Menu Level 3	Menu Level 4	Menu Level 5	Menu Level 6	Default Selection	Comment
					Enable		The state of charge and depth of discharge at the interval set.
				Time	Set time		If time is selected the user will be prompted to enter a value 0...300 minutes.
			Heating FLIM	Automatic		Automatic	Allows the user to enable or disable the heating film installed within the battery modules. Automatic means the system measures the Outside temperature and turns the film on as needed. Only applicable if heating film is requested at time of ordering.
				ON			
				OFF			
			BMS DOD	Disable		Disable	Leave disabled. The inverter will monitor depth of discharge.
				Enable			
			Maintain SOC	Disable		Enable	Disable: The minimum SOC will not be maintained
				Enable			Enable: The minimum SOC 2% is maintained. Whenthe battery SOC is less than 2%, the grid charges thebattery pack to 5% through the inverter.
			Force Wake	Disable		Disable	Enabling this option means the battery will always remain online and will not go to sleep.
				Enable			
		Grid STD	1.China			Local	Allows the user to select the country that the system is installed in.
			2. Germany				
			3. Australia	AUS-A			
				AUS-B			
				AUS-C			
			4. Italy	CEI0-21			
				CEI0-21 ACEA			

Menu Level 1	Menu Level 2	Menu Level 3	Menu Level 4	Menu Level 5	Menu Level 6	Default Selection	Comment
			5. Spain				
			6. UK				
			7. Hungary				
			8. Belgium				
			9. New Zealand				
			10. Greece				
			11. France				
			12. Bangkok				
			13. Thailand				
			14. South Africa				
			15. EN50549				
			16. Brazil				
			17. VDE0126				
			18. Ireland				
			19. Israel				
			20. Poland				
			21. Chile	Chile_BT			
				Chile_HD			
				Chile_LD			
			22. Local				
			23. 60Hz				
			24. Denmark				
			25. Sweden				
			26. Austria				
		Run Setting	REACT MODE	Power Factor	L0.00~L1.00 C0.00~C1.00	Enable - PF1.0	The inverter can monitor reactive power in several ways. This setting is set according to the selected grid standard and should not be changed.
				React Power	L00%~L60% C00%~C60%		
				QU Curve		Disable	
				QP Curve			
			GRID POWER	0...100%		100%	Limit or increase the power exported from the system to the grid.

Menu Level 1	Menu Level 2	Menu Level 3	Menu Level 4	Menu Level 5	Menu Level 6	Default Selection	Comment
			INV VOLT MAX	VOLT (S1)	set upper limit voltage	280Vac	These settings should not be altered. They are set automatically according to the country selected within Grid Setting. If the inverter sees that these values have been reached, or exceeded, then the inverter will stop generating.
					set protection time	1000ms	
				VOLT (S2)	set upper limit voltage	285Vac	
					set protection time	400ms	
			INV VOLT MIN	VOLT (S1)	set upper limit voltage	150Vac	
					set protection time	1000ms	
				VOLT (S2)	set upper limit voltage	120Vac	
					set protection time	400ms	
			INV FREQ MAX	FREQ (S1)	set upper limit frequency	55Hz	
					set protection time	500ms	
				FREQ (S2)	set upper limit frequency	55Hz	
					set protection time	500ms	
			INV FREQ MIN	FREQ (S1)	set lower limit frequency	45Hz	
					set protection time	500ms	
				FREQ (S2)	set lower limit frequency	45Hz	
					set protection time	500ms	
			GRID U MAX	Set max Grid voltage		280Vac	
			GRID U MIN	Set min Grid voltage		130Vac	
			GRID F MAX	Set max Grid frequency		55Hz	
			GRID F MIN	Set min Grid frequency		45Hz	
			OVER VOLT	Enable	Disable	Disable	
					Enable		
				VOLT	set voltage(If enabled,Once the AC output voltage exceeds this set value, the output power will start to decrease)	270V	
			UNDER VOLT	Enable	Disable	Disable	
					Enable		

Menu Level 1	Menu Level 2	Menu Level 3	Menu Level 4	Menu Level 5	Menu Level 6	Default Selection	Comment
				VOLT	set voltage (If enabled,Once the AC output voltage is lower than this set value, the output power will start to decrease.)	200V	
			OVER FREQ	Enable	Disable	Disable	
					Enable		
				FREQ	set frequency (If enabled,Once the AC output frequency exceeds this set value, the output power will start to decrease.)	52Hz	
			UNDER FREQ	Enable	Disable	Disable	
					Enable		
				FREQ	set frequency (If enabled,Once the AC output frequency is lower than this set value, the output power will start to decrease.)	48Hz	
			REACT RESP	6...60 Seconds		10 Seconds	This is the time it takes for the exported reactive power to reach the grid standard level. This setting should not be changed and is set according to the grid standard.
			VRT ENABLE	Disable		Enable	Voltage-ride-through. This setting should not be changed and is set automatically according to the grid standard.
				Enable			
			POW SI RATE	0...300%		100%	This is the rate of change of the output. This setting should not be changed and is set according to grid standard. 100% means that the output will hit full power within 1 minute.
		485 Address	1...32			1	Allows the user to select the RS485 address for the COM port.

Menu Level 1	Menu Level 2	Menu Level 3	Menu Level 4	Menu Level 5	Menu Level 6	Default Selection	Comment
		Baud Rate	1. 2400bps			9600bps	Allows the user to select the RS485 serial baud rate for the COM port.
			2. 4800bps				
			3. 9600bps				
		Language	1. Chinese			English	Allows the user to select Chinese, English, Italian, German language.
			2. English				
			3. Italian				
			4. German				
		Backlight	20...120 seconds			20 seconds	Allows the user to select how long the display back light remains lit.
		Date/ Time	Set time, date and day				Allows the user to set the time, date and day.
		Clear REC	Cancel			Cancel	Clears all stored records.
			Confirm				
		Password	Old password			00000	Allows the user to change the programming password.
			New password				
			Confirm new password				
		Maintenance	User cannot access				Not accessible to user.
		Auto Test	Only applicable in Italy				Only applicable in Italy
		CT self- check	Cut off all load then comfirm				This action must be performed when the inverter is externally connected to the CT. Before the CT self-check, the inverter needs to be connected to the power grid and the battery. T he backup circuit breaker and normal load breaker needs to be disconnected. The CT self-check takes about 1~5 minutes.
Inquire	INV Module						Shows the user what model of inverter is in use.
	Module SN						Shows the user the serial number of the inverter.
	Firmware						Shows the user the firmware version.
	Record						Shows the user the active faults or errors.
	BMS Info						Shows the user the battery modules connected and connection state.

Menu Level 1	Menu Level 2	Menu Level 3	Menu Level 4	Menu Level 5	Menu Level 6	Default Selection	Comment
Statistic	Time stat	Run:					Shows the user the hours run of Inverter and Grid connection.
		Grid:					
		Unit: hours					
	Conne Time	Times:					Shows the number of times the inverter is connected to the grid.
	Peak Power	History:					Shows the user the total generated watts and today's generated watts.
		Today:					
		Units: watts					
	E-Today	PV: xx kWh					Shows the user what was generated today.
		Meter: xx kWh					
		Grid: xx kWh					
		Load: xx kWh					
		Charge: xx kWh					
		Discharge: xx kWh					
	E-Month	PV: xx kWh					Shows the user what was generated this month.
		Meter: xx kWh					
		Grid: xx kWh					
		Load: xx kWh					
	E-Year	PV: xx kWh					Shows the user what was generated this year.
		Meter: xx kWh					
		Grid: xx kWh					
		Load: xx kWh					
	E-Total	PV: xx kWh					Shows the user what has been generated sinced the system was installed.
		Meter: xx kWh					
		Grid: xx kWh					
		Load: xx kWh					
		Charge: xx kWh					
		Discharge: xx kWh					
Factory RESET	Cancel:					Cancel	Resets the system to factory default settings.
	Confirm:						

5. Battery Storage And Recharging

5.1 Battery storage requirements

1. Storage environment requirements:
– ambient temperature: -10°C +45°C; recommended storage temperature: 20°C -30°C;
– relative humidity: 0%RH–90%RH (No condensation);
– in a dry, ventilated and clean place;
– no contact with corrosive organic solvents, gases and other substances;
– no direct sunlight;
– less than 2 meters from any heat source.

5.2 Storage expirations

In principle, it is not advisable to keep the battery stationary in the warehouse and idle for long periods of time.
Be sure to use it in time.
The stored batteries should be disposed according to the following requirements.

5.3 Table Stored lithium battery recharging interval

Required Storage Temperature	Actual Storage Temperature	Recommended recharging cycle
-10°C +45°C	-10°C ≤T≤30°C	12 months
	30°C T≤45°C	8 months

1 If a battery is deformed, broken or leaking, discard it immediately regardless of its storage time.

2 The allowable maximum stored battery recharging period is 3 years and the allowable maximum stored battery recharging times is 3. For example, if recharging is performed once every 8 months, the allowable maximum recharging times is 3 times; if recharging is performed once every 12 months, the allowable maximum recharging times is 3 times; if the allowable maximum stored battery recharging period or times is exceeded, it is recommended to discard the battery.

3 A lithium battery will have its capacity decreasing after being stored for a long time, and typically will have its capacity irreversibly decreasing by 3%–10% after being stored at the recommended storage temperature for 12 months. If the customer conducts the discharge test and acceptance according to the specification, there is a risk that the battery with a capacity less than 100% after being stored will fail the test.

5.4 Inspection before battery recharging

Before recharging a battery, check its appearance: Deformation/Shell damage/Leakage

5.5 Recharge Operation Steps

Step 1:Connect power cables to the battery charger correctly. The maximum number of battery PACK connected parallel is 4.
Step 2:Turn on the battery PACK DC breaker to ON; Press the battery “start key” for 3 second to start the battery PACK. Check the LED on the battery PACK is on.
Step 3:Turn on the battery charger.
Step 4:Set charging parameter on the battery charger.
Case 1, One battery PACK is charged. Set the charge limited voltage 56.5V; Set the charge limited current 50A;
Case 2, Two ~ Four battery PACKs are charged. Set the charge limited voltage 56.5V; Set the charge limited current 100A;
Step 5 After the battery is charged, switch off the battery charger and then the battery DC breaker. Disconnect the DC cables and then press the battery “start key” for 3 second to switch off the battery PACK.

6. Alarm Code and Error Code

Alarm Code

Code	Description
W00	Low supply voltage
W01	High supply voltage
W02	Low supply frequency
W03	High supply frequency
W04	Loss of photovoltaic input signal
W05	Loss of battery pack input signal
W06	Battery under minimum charge level
W07	Low battery level
W08	High battery level
W09	Overloading
W10	GFCI Over
W11	Phase line invert - neutral
W12	Problems with the ventilation system
W13	Battery capacity failure
W14	Discharge overcurrent (BMS)
W15	Charging overcurrent (BMS)
W16	Overvoltage (BMS)
W17	Over-temperature (BMS)
W18	Discharge under temperature (BMS)
W19	Voltage unbalancing (BMS)
W20	Communication error (BMS)
W21	Low voltage (BMS)
W22	BMS Chg Temp Low
W23	Overvoltage above safety level (BMS)
W24	Overtemperature above safety level (BMS)
W25	BMS Updating
W26	BMS Program Version Err
W27	BMS Program Update Fail
W28	CT Reverse
W29	Grid VoltLock Fail
W30	PV off
W31	System Reset

Error Code

Code	Description
F00	Soft Time Out
F01	INV Volt Short
F02	GFCI sensor error
F04	Low level of BUS communication voltage
F05	High level of BUS communication voltage
F06	BUS communication short circuit
F07	Failure of photovoltaic panels
F08	Short circuit of photovoltaic panels
F09	Bypass relay error
F10	Inverter power failure
F11	Inverter voltage failure
F12	Room overtemperature
F13	Sink Over Temp
F14	Network relay failure
F15	Lack of discharging current
F16	Lack of charging current
F17	Current sensor failure
F18	INV Abnormal
F19	EPS relay error
F20	Constantly overloaded system
F32	SCI Fault

7. Fault Diagnosis and Solutions

7.1 Battery Storage And Recharging

The inverter is easy to maintain. When you encounter the following problems, please refer to the Solutions below, and contact the local distributor if the problem remains unsolved.
The following table lists some of the basic problems that may occur during the actual operation as well as their corresponding basic solutions.

Fault diagnosis table

Types	Codes	Solutions
Soft Time Out	F00	(1) Restart the inverter and wait until it functions normally; (2) Contact customer service if error warning continues.
INV Volt Short	F01	(1) Cut off all the power and shut down all the machines; disconnect the load and plug in to restart machines, then check whether the load is short circuited if the fault has been eliminated; (2) Contact customer service if fault remains unremoved.
GFCI sensor error	F02	(1) Cut off all the power, Restart the inverter and wait until it functions normally. (2) Contact customer service if error warning continues.
Low level of BUS communication voltage High level of BUS communication voltage	F04 F05	(1) Check the input mode setting is correct. (2) Restart the inverter and wait until it functions normally. (3) Contact customer service if error warning continues.
BUS communication short circuit	F06	(1) Restart the inverter and wait until it functions normally. (2) Contact customer service if error warning continues.
Failure of photovoltaic panels	F07	(1) Check for good ground connection.; (2) Check if the earth resistance of PV+ and PV- is greater than 2MΩ; (3) If it is smaller than 2MΩ, check PV string for ground fault or poor ground insulation; if it is greater than 2MΩ, please contact the local inverter customer service once fault is not removed.
Short circuit of photovoltaic panels	F08	(1) Check the input mode setting is correct. (2) Disconnect the PV input, restart the inverter and wait until it functions normally. (3) Contact customer service if error warning continues.
Bypass relay error Network relay failure EPS relay error	F09 F14 F19	(1) Disconnect the PV input, restart the inverter and wait until it functions normally. (2) Contact customer service if error warning continues.
Inverter power failure	F10	(1) Wait five minutes for the inverter to automatically restart; (2) Check whether the load is in compliance with the specification; (3) Contact customer service if error warning continues.
Inverter voltage failure	F11	(1) Restart the inverter and wait until it functions normally. (2) Contact customer service if error warning continues.
Room overtemperature	F12 F13	(1) Restart the inverter, restart the machine after a few minutes of cooling, and observe whether the machine can return to normal. (2) Check if the ambient temperature is outside the normal operating temperature range of the machine. (3) Contact customer service if error warning continues.
Lack of discharge current	F15	(1) Wait one minute for the inverter to restart; (2) Check whether the load is in compliance with the specification; (3) Contact customer service if error warning continues.
Lack of charging current	F16	(1) Check if battery wiring port is short circuited; (2) Check if charging current is in compliance with presetting; (3) Contact customer service if error warning continues.
Current sensor failure	F17	(1) Restart the inverter and wait until it functions normally. (2) Contact customer service if error warning continues.
INV Abnormal	F18	Please contact the distributor
Communication Fault	F32	(1) Restart the inverter and wait until it functions normally. (2) Contact customer service if error warning continues.

Low supply voltage High supply voltage Low supply frequency High supply frequency	W00 W01 W02 W03	(1) Check if the local voltage and frequency is in compliance with the machine specification; (2) If voltage and frequency are within the accepted range, then wait 2 minutes for the inverter to function normally; but if no recovery or fault repeats, please contact the local inverter customer service; (3) Contact the local power company if voltage and frequency are beyond range or unstable.
Loss of photovoltaic input signal	W04	(1) PV is not connected; (2) Check grid connection; (3) Check PV availability.
Loss of battery pack input signal	W05	(1) Battery is not connected; (2) Check if battery wiring port is short circuited; (3) Contact customer service if error warning continues
Battery under minimum charge level Low battery level	W06 W07	(1) Check the battery availability; (2) Contact customer service if error warning continues.
High battery level	W08	(1) Check if the battery is in line with the presetting; (2) If so, power off and restart; (3) Contact customer service if error warning continues.
Overloading	W09	(1) Wait one minute for the inverter to restart; (2) Check whether the load is in compliance with the specification;
C FCI Over	W10	(1) Check PV string for direct or indirect grounding phenomenon; (2) Check peripherals of machine for current leakage; (3) Contact the local inverter customer service if fault remains unremoved.
Phase line inversion - neutral	W11	(1) Check whether the installation follows the instructions; (2) Contact customer service if error warning continues.
Problems with the ventilation system	W12	(1) Restart the inverter and wait until it functions normally. (2) Contact customer service if error warning continues.
Errors with BMS (Battery Management System)	W14 - W27	(1) Please contact the distributor.
CT Reverse	W28	(1) Perform CT self-check; (2) Contact customer service if error warning continues.
Grid VoltLock Fail	W29	(1) Restart the inverter and wait until it functions normally. (2) Contact customer service if error warning continues.
PV off	W30	(1) Restart the inverter and wait until it functions normally. (2) Contact customer service if error warning continues.
System Reset	W31	(1) Restart the inverter and wait until it functions normally. (2) Contact customer service if error warning continues.

8. Product Specifications

The characteristics of only the versions with single and double battery pack are shown

Battery Specifications	CEC-S B 5K
Electrical	
Energy capacity	5.12kWh
Battery type	LFP (LiFePO4)
Depth of discharge (DoD)	90%
Rated voltage	51.2V
Operating voltage range	44.8~56.5Vdc
Operation	
Maximum charging current	50A (0.5C)
Maximum discharging current	80A (0.8C)
Operating temperature range	0°C ~ +50°C (Charging)/-10°C ~ +50°C (Discharging)
Storage temperature range	-10°C ~ +45°C
Humidity	0% ~ 95% (No condensation)
BMS	
Modules connection	Max. 8 batteries in parallel
Monitoring parameters	System voltage, current, cell voltage, cell temperature, PCBA temperature measurement
Communication	CAN and RS-485 compatible
Ventilation type	Passive and active cooling
Physical	
Weight (Kg)	57
Dimension (W×H×D)mm	540*530*250
IP Protection	IP65
Warranty	5 Year Product Warranty, 10 Year Performance Warranty
Certificate	
Safety(Cell)	IEC 62619 UL 1973 UN 38.3

Model	CEC-T 10K
Electrical	
Connection section to the photovoltaic system	
Maximum applicable continuous voltage	1100Vd.c.
Nominal continuous voltage	720Vd.c.
MPPT voltage range	140~1000Vd.c.
MPPT range (full load)	420~850Vd.c.
MPPT tracker / strings	2
Max. continuous PV input current	15Ad.c.(x 2 inputs)
Photovoltaic short circuit current (Isc)	20Ad.c.×2
Maximum return current	0Ad.c.
Max. continuous PV input power	20000W
Battery terminal	
Battery type	Lithium or lead-acid batteries
Voltage range	44~58Vd.c.
Rated voltage	51.2Vd.c.
Maximum charge/discharge current	160Ad.c./200Ad.c.
Maximum charge/discharge power	8000W/10000W
Grid terminal parameter	
Rated voltage	230/400Va.c.
Rated frequency	50Hz/60Hz
Maximum continuous input current	25Aa.c.
Maximum continuous input power	17800W
Rated output Current	14.5Aa.c.
Maximum continuous output current	16Aa.c.
Power factor (cos phi), adjustable	0.8 leading ~ 0.8 lagging (0.95 leading ~ 0.95 lagging for Germany)
Maximum continuous output power	11000VA
Max. output fault current	102Apeak
Grid port inrush current	less than 22Apeak
Grid port overcurrent protection	32A

Backup load terminal parameter	
Rated voltage	230/400Vac
Maximum continuous output current	20Aa.c.
Rated frequency	50/60Hz
Rated output Current	13.3Aa.c.
Maximum Continuous Output Current	14.5Aa.c.
Rated continious output power	9200W
Maximum output apparent power	10000VA
Max. output fault current	99Apeak
Backup load overcurrent protection	25A
General parameter	
Temperature	-25°C to +60°C, derating above 40 °C
Protective class	Class I
Overvoltage category	II(DC side), III(AC side)
Ingress protection	IP65
Altitude	≤ 2000m
Dimension (W×H×D)mm	540*980*250
Weight (Kg)	54
Relative humidity	0~95% (No condensation)
Topology	High frequency isolation
Cooling	Natural convection
Display	LCD/APP
Communication Interface	RS485/CAN2.0/WIFI/4G
Max. Conversion Efficiency (From Battery)	94.0%
Max. Conversion Efficiency (From PV)	98.1%
Euro Efficiency	97.4%
MPPT Efficiency	99.5%
Protection function	Short Circuit Protection, AC Leakage Fault Protection, Grounding Fault Protection, Anti-islanding Protection, Overload Protection, Surge Protection, DC Polarity Protection
Certification& Standard	
Grid regulation	EN50549-1, VDE-AR-N4105, CEI 0-21
Safety regulation	IEC/EN 62109-1&2, IEC62040-1,IEC62619
EMC	EN61000-6-1, EN61000-6-2, EN61000-6-3, EN61000-6-4,EN61000-3-2, EN61000-3-3, EN61000-3-11,EN61000-3-12

Table

Grid specification (single-phase)

Grid Specification	Output Voltage Range (Vac)	Output Frequency Range (Hz)	Boot wait time(S)
China	187-252	49.5-50.2	30
Germany	184-264	47.5-51.5	60
Australia-A	180-265	47-52	60
Australia-B	180-265	47-52	60
Australia-C	180-265	45-55	60
Italy (CEI0-21)	195-264	49.8-50.2	60
Italy (CEI0-21 ACEA)	195-264	49.8-50.2	60
Spain	196-253	48-50.5	180
U.K.	184-264	47-52	180
Hungary	196-253	49-51	300
Belgium	184-264	47.5-51.5	60
W-Australia	180-260	45-52	60
Greece	184-264	49.5-50.5	180
France	184-264	47.5-50.4	60
Bangkok	198-242	49-51	150
Thailand	198-242	47-52	60
S. Africa	180-260	47.0-52	60
50549	184-264	47.5-51.5	60
Brazil	184-264	59.5-60.5	60
0126	184-264	47.5-51.5	60
Ireland	184-264	47-52	180
Israel	195.5~253	47.0~51.5	60
Poland	195.5~253	49.00~50.05	60
Chile-BT	176.0~242	47.5~51.5	60
Chile-HD	198.0~242	49~51	300
Chile-LD	198.0~242	49~51	300
Local	150-280	45.0-55	30
60Hz	184-264	59.5-60.5	60

9. Routine Maintenance

9.1 Maintenance Plan

– Check if wire connections are loose.
– Check if cables are aged/damaged.
– Check if cable insulating ribbon drops.
– Check if cable terminal is loose, any overheat sign.
– Check if ground connection is good.

9.2 Operating Environment

(Every six months)
Carefully observe whether the battery system equipment is in effective or damaged;
When the system is running, listen to any part of the system for abnormal noise;
Check whether the voltage, temperature and other parameters of the battery and other equipment parameters are normal during system operation;

9.3 Equipment Cleaning

(Every six months to one year, depending on the site environment and dust content, etc.)
Ensure that the ground is clean and tidy, keep the maintenance access route unblocked,and ensure that the warning and guiding signs are clear and intact.
Monitor the temperature of the battery module and clean the battery module if necessary.

9.4 Cable, Terminal and Equipment Inspection

(Every six months to one year)
– Check if the cable connections are loose.
– Check whether the cables are aged / damaged.
– Check whether the cable tie of the cable has fallen off.
– Check if the cable terminal screws are loose and the terminal position has any signs of overheating.
– Check whether the management system of the system equipment, monitoring system and other related equipment are invalid or damaged.
– Check that the grounding of the equipment is good and the grounding resistance is less than 10 ohms.

Notes

After the equipment is out of operation, please pay attention to following notes while maintaining:
– Related safety standards and specifications should be followed in operation and maintenance.
– Disconnect all the electrical connections so that the equipment would not be powered on.
– Wait at least 5 minutes after disconnection, so that the residual voltage of the capacitors drops to a safe voltage. Use a multimeter to make sure that the equipment is completely discharged.
– The equipment should be repaired by professional staff only and it is strictly forbidden for maintenance staff to open equipment modules on their own.
– Appropriate protective measures should be taken while maintaining, such as insulated gloves, shoes, and antinoise ear plugs.
– Life is priceless. Make sure no one would get hurt first.
– In case of a deep discharge, the battery must be charged to a SOC rate of 30% to 50%
– if the entire system is static (the battery has not been charged for two weeks or more).

Please contact us in time if there are any conditions that could not be explained in the manual.

10. Quality Assurance

When product faults occur during the warranty period, his partner will provide free service or replace the product with a new one.

Evidence

During the warranty period, the customer shall provide the product purchase invoice and date. In addition, the trademark on the product shall be undamaged and legible.
Otherwise, company has the right to refuse to honor the quality guarantee.

Conditions

– After replacement, unqualified products shall be processed by company.
– The customer shall give company or his partner a reasonable period to repair the faulty device.

Exclusion of Liability

In the following circumstances, company has the right to refuse to honor the quality guarantee:
– The free warranty period for the whole machine/components has expired.
– The device is damaged during transport.
– The device is incorrectly installed, refitted, or used.
– The device operates in harsh environment, as described in this manual.
– The fault or damage is caused by installation, repairs, modification, or disassembly performed by a service provider or personnel not from company or his authorized partner.
– The fault or damage is caused by the use of non-standard or company.

Components or software.
– The installation and use range are beyond stipulations of relevant international standards.
– The damage is caused by unexpected natural factors.
For faulty products in any of above cases, if the customer requests maintenance, paid maintenance service may be provided based on the judgment of company.

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