

Anklous ST Series All-in-One Energy Storage System Installation Guide

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.

Catalogue

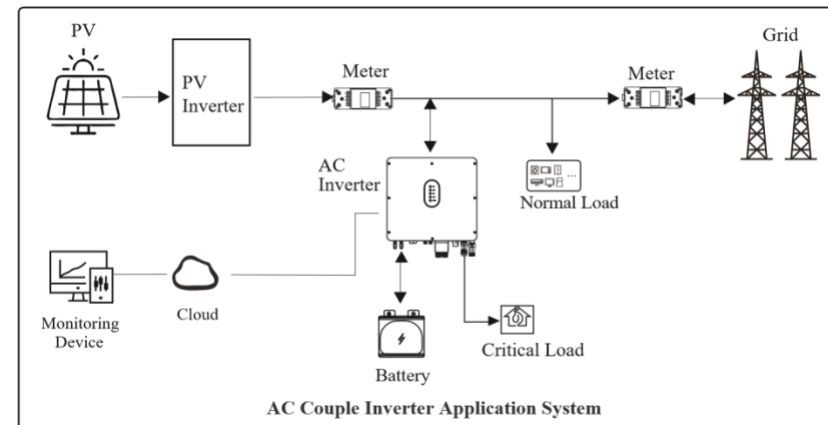
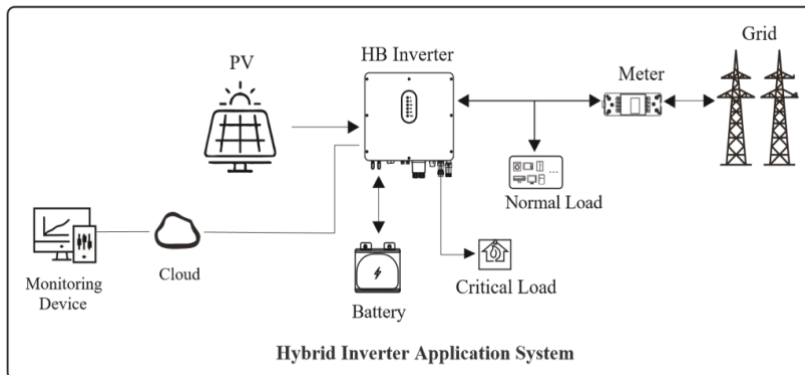
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1 System Information

1.1 System introduction

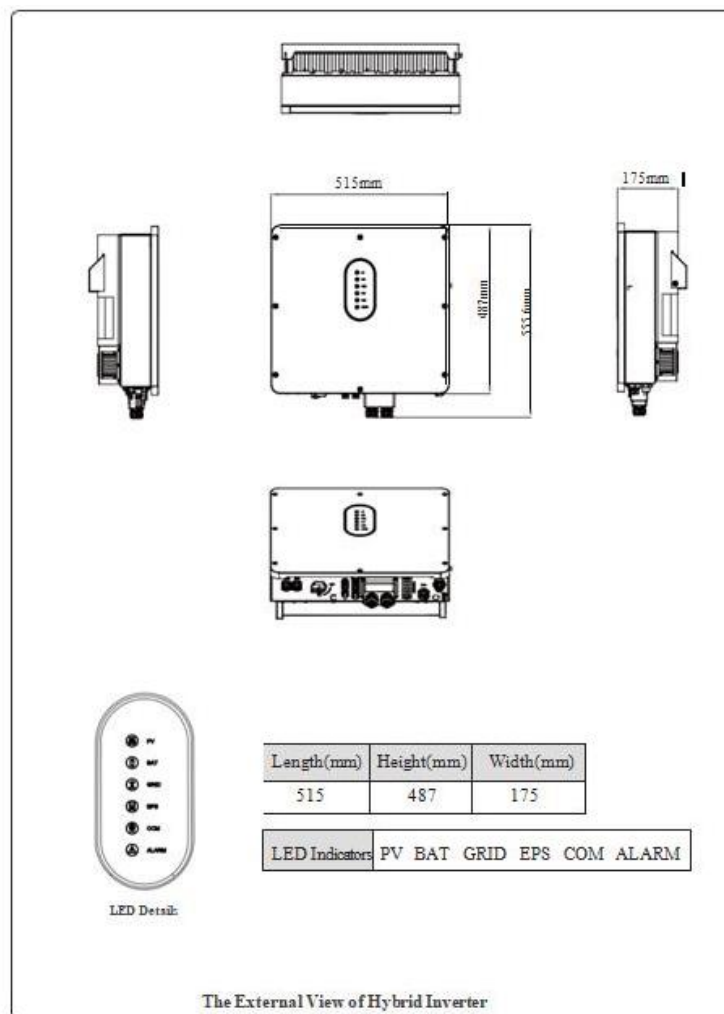
Anklous ST series all-in-one energy storage system include AKS-INV-HB5000 inverter and AKS-BSG5220 and system box. AKS-INV-HB5000 inverter and AKS-BAT5220 are our standard products which can be sold independently. System box are designed for the System energy storage system and it owns a DC battery breaker(125A) inside and can cover all the cables as you can seen below pictures. It will save your room space and much more beautiful without jumbled wiring. Our System energy storage system can be applied in DC-coupled systems (mostly new installation), AC-coupled systems (mostly retrofit) as the following schemes show:



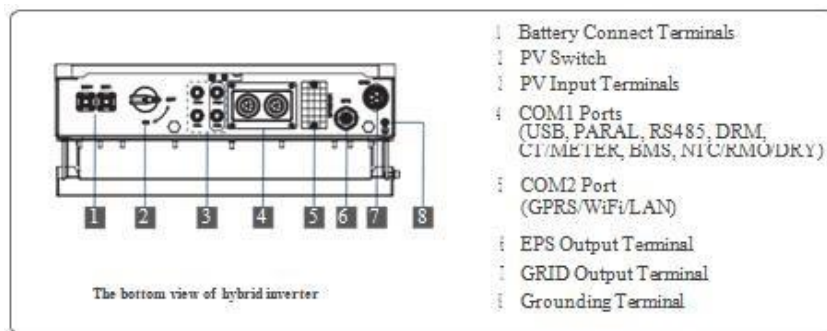
CAUTION:

For the AC-coupled system, unlike Hybrid, two power meters are to be mounted.

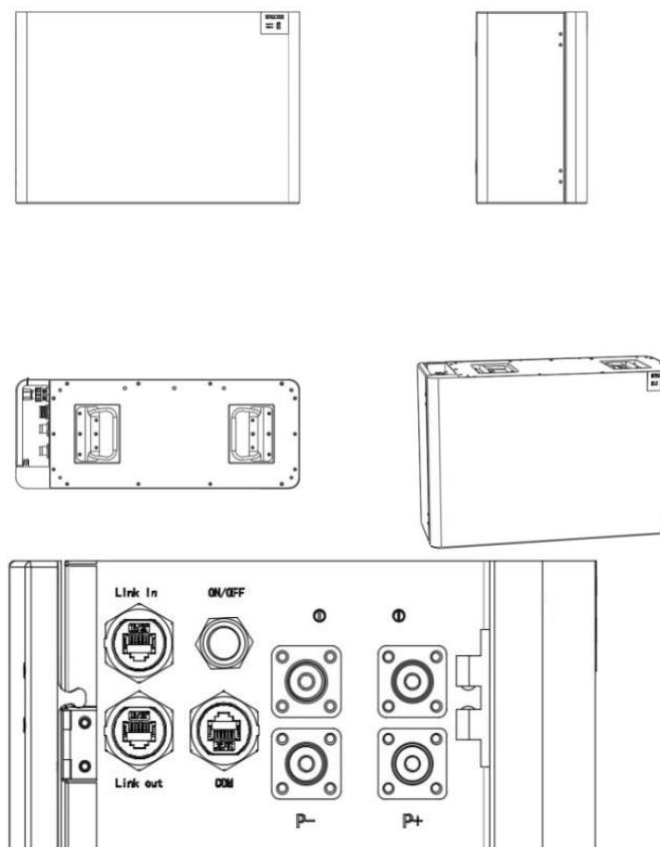
1.2 AKS-INV-HB5000 information



Inverter Specification	AKS-INV-HB5000	AKS-INV-HB6000
Efficiency		
Max.Efficiency(PV to Grid)	97.3%	
Max.Efficiency(Battery to Load)	94%	
Input(PV)		
Max.Input Voltage	550V	
Rated Input Voltage	360V	
Max.Input Current	15A	
Max.Short Circuit Current	20A	
Start Input Voltage	90V	
MPPT Operating Voltage Range	70V-520V	
Max.Number of PV Strings	2	
No.of MPPTs	2	
Input(Battery)		
Battery Type	Lithium-ion/Lead-Acid	
Nominal Battery Voltage	48V	
Battery Voltage Range	40-60V	
Max.Charge/Discharge Current	120A	120A
Lithium-ion Batter Charge Curve	Self-adaption to BMS	
Lead-Acid Battery Charge Curve	3 stages	
Output(Grid)		
Rated AC Active Power	5000W	6000W
Max.AC Active Power	5500W	6000W
Rated AC Voltage	230V	
AC Voltage Range①	180V-275V(Adjustable)	
Rated Grid Frequency	50Hz/60Hz	
Grid Frequency Range②	55Hz-65Hz(Adjustable)	
Max.AC Current Output to Utility Grid(A)	25A	27.2
THDI	<3%(Rated Power)	
Power Factor	>0.99 Rated power(Adjustable 0.8 Leading-0.8 Lagging)	
Output(EPS)		
Nominal Output Power	5000VA	6000VA
Nominal Output Voltage	230V	
Nominal Output Frequency	50Hz/60Hz	
THDV	<3% @ 100% R Load	
Switching Time(Optional)	10ms	



1.3 AKS-BSG-5220 information



Product Type	AKS-BSG-5220
Cell Technology	Li-iron (LFP)
Battery Module Capacity(kWh)	5.22
Battery Module Voltage(Vdc)	51.2
Battery Module Capacity(Ah)	102
Battery Module Serial Cell Quantity (pcs)	16
Battery Cell Voltage(Vdc)	3.2
Battery Cell Capacity(AH)	102
Dimension (W*D*H, mm)	515*350*200
Weight (kg)	45
Operation Life(years)	15+
Operation Temperature	0-50℃
Storage Temperature	-20-60℃
Transportation Certificate	UN38.3

ON/OFF

1. ON

For multiple AKS-BSG-5220 in parallel, long press (more than 3 seconds) ON/OFF button of MASTER battery (Which connect with inverter), normal LED will be lighted, battery system will automatically encode and assign ID to each slave battery, then battery system will operate normally.

2. OFF

Press ON/OFF button of Master PACK (which connect with inverter) more than 3s, LED will flash in the front panel and then release the button, the master pack will shut down after all slave packs shut down (Sleep mode).

In the system with inverter, there is a breaker between inverter and battery system, normally the breaker keeps off-state if the system does not work.

COM Port

CAN / RS485/RS232 Communication Terminal (RJ45 port),
CAN/RS485 connect to inverter, follow CAN / RS485 protocol.

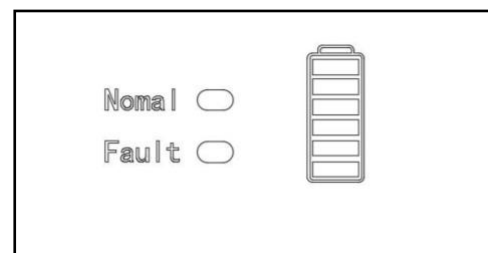
RS232 Communication follow RS232 protocol, for manufacturer or professional engineer to debug or service.

PIN	Definition
Pin 1	RS485-B (to PCS, reserved)
Pin 2	RS485-A (to PCS, reserved)
Pin 3	GND_2
Pin 4	CANH (toPCS)
Pin 5	CANL (toPCS)
Pin 6	RS232_TX
Pin 7	RS232_RX
Pin 8	RS232_GND

Link in/Link out

Link in/Link out are used for the communication between battery piles. The battery pack close to the inverter as the master, others are the slave pack.

LED Indicator Definition



flash 1 0.25s light / 3.75s off

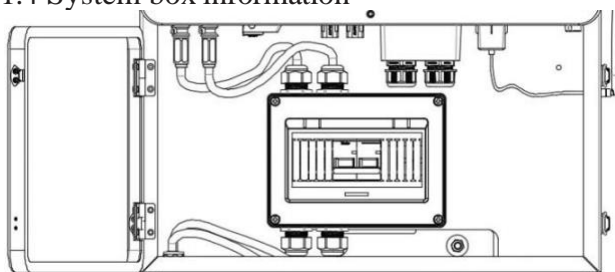
flash 2 - 0.5s light / 0.5s off

flash 3 - 0.5s light / 1.5s off

LED Indicators Instructions

Status	Normal	Fault	Battery Level Indicator							Description
	L8	L7	L6	L5	L4	L3	L2	L1		
Shut down	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	All OFF
Standby	Flash 1	OFF	According to the battery level							Indicates Standby
Charging	Normal	Light	According to the battery level							The highest capacity indicator LED flashes (flash 2), others lighting
	Full Charged	Light	OFF	Light	Light	Light	Light	Light	Light	Turn to standby status when charger off
Protection	OFF	Light	OFF	OFF	OFF	OFF	OFF	OFF	OFF	Stop charging
Discharge	Normal	Flash 3	According to the battery level							
	UVP	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	Stop charging
Protection	OFF	Light	OFF	OFF	OFF	OFF	OFF	OFF	OFF	Stop discharge
Fault	OFF	Light	OFF	OFF	OFF	OFF	OFF	OFF	OFF	Stop charging and Discharge

1.4 System box information



There is a DC breaker between battery and inverter and can cover all the cables as you can see, It will save your room space and much more beautiful without jumbled wiring.

2 Installation

2.1 Installation site and environment

2.1.1 General

This System energy storage system is outdoor version and can be installed in an outdoor or an indoor location.

When the System are installed in a room, it must not be hampered by the structure of the building, the furnishings and equipment of the room.

The System 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 location are not allowed for installation:

- habitable rooms;
- ceiling cavities or wall cavities;
- on 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 85%;
- places where salty and humid air can penetrate;
- seismic areas- additional security measures are required;
- sites higher than 3000 meters above sea level;
- 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.

2.1.2 Restricted Locations

The System shall not be installed—

- (a) in restricted locations as defined for panels in AS/ NZS 3000;
- (b) within 600 mm of any heat source, such as hot water unit, gas heater, air conditioning unit or any other appliance.
- (c) within 600 mm of any exit;
- (d) within 600 mm of any window or ventilation opening;
- (e) within 900 mm of access to 240Vac connections;
- (f) within 600 mm of side of other device.

A System 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 System must also not be installed in potentially explosive atmospheres for gas cylinders that are heavier than air gases and have a vent clamp in

3.4.3

To protect against the spread of fire in living spaces where the System is mounted or on surfaces of a wall or structure in living spaces with a System 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 System and the surface of a wall or structure.

If the System is mounted at a wall or at a distance of 300mm from the wall or structure separating it from the habitable space, the distances to other structures or objects must be increased. The following distances must then remain free:

- (i) 600 mm beside the System;
- (ii) 600 mm above the System; and
- (iii) 600 mm before the System.

If the distance between the System and the ceiling or any object above the system is less than 600 mm, the ceiling or structural surface above the system must be made of

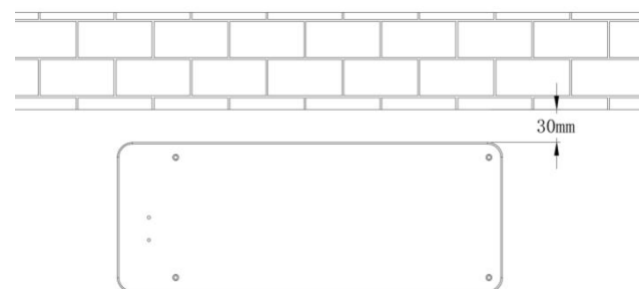
non-combustible material within a radius of 600 mm around the system.

The System must be mounted so that the highest point is not more than 2.2m above the ground or the platform.

2.2 Installation steps

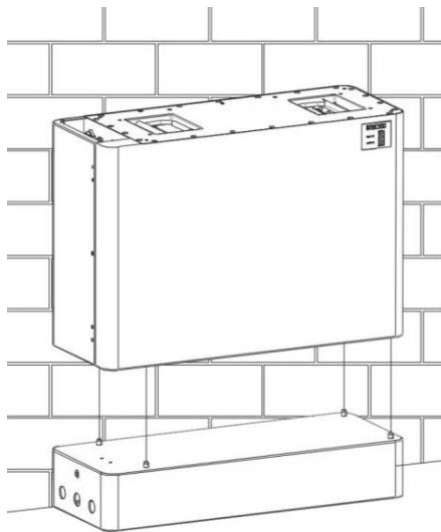
Step 1

Take out the base from system box and placed the base against the wall, the distance between the base and the wall is 30mm as follows. Use the gradienter to keep the base is a clinic.



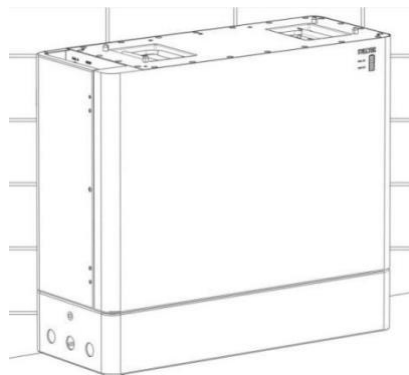
Step 2

Twist the dowel pin (from the system box packaging box) into the base and put the first battery pack on the base.



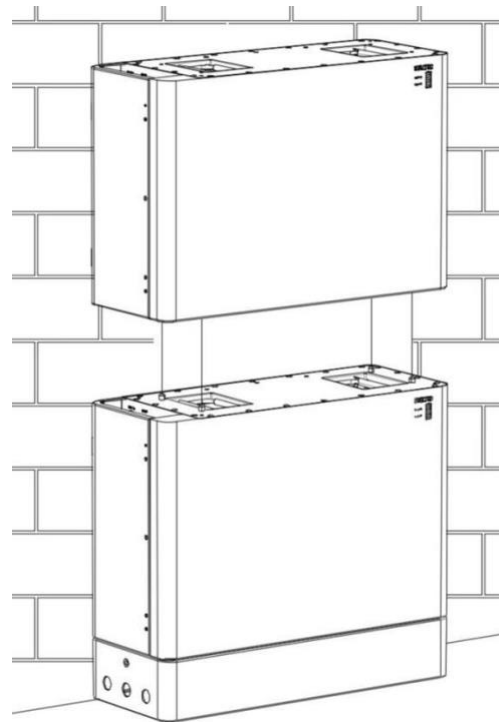
Step 3

Twist the dowel pin (from AKS-BSG5220 packaging box) into the first battery pack



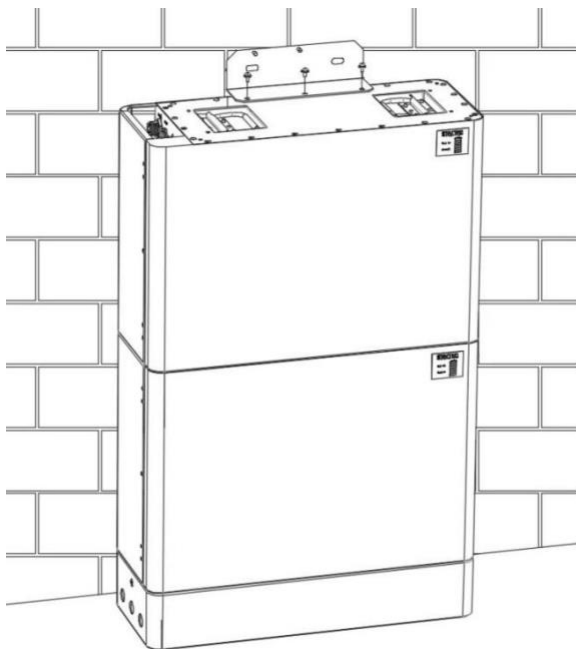
Step 4

Put the second battery pack onto the first pack

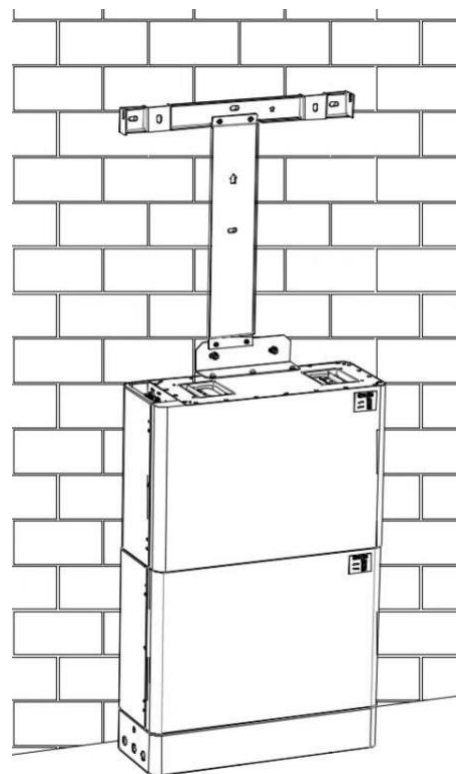


Step 5

Fixed the battery with a L shape metal parts lean against the wall using M5 hex screw (from system packaging box)

**Step 6**

Fix the mounting plate (from the system packaging box) with the L shape metal using M5 hexagon nuts with flange as follow:

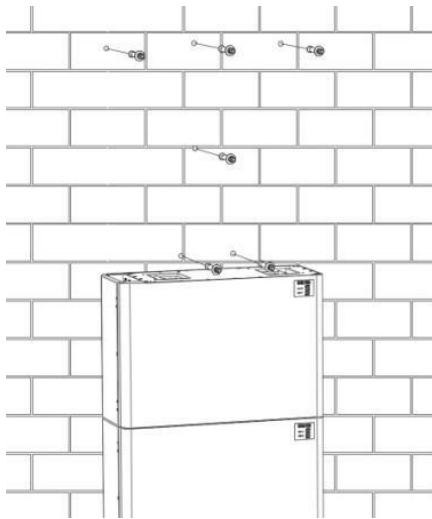


Step 7

Fix the mounting plate as above, confirm the position where to drill a hole in the wall.

Step 8

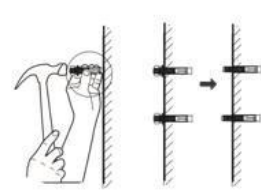
Take off the L shape metal and the mounting plate and drill hole on the wall. Position the battery parallel to the wall and use a $\Phi 10\text{mm}$ drill to drill holes at a depth of about 45mm in the wall for subsequent fixation of the mounting plates.



NOTE: Place a cover (paper, foil, etc.) over the battery while drilling into the wall to protect it from dust. In addition, at the place of installation, the slope of the ground on a horizontal plane may not exceed 3° .

Knock the expansion screw kit into the hole together with a hammer.

After tightening 2-3 buckles, the expansion bolts are tight and not loose, and then unscrew the bolts, spring washer, gasket. Refer to Figure below.



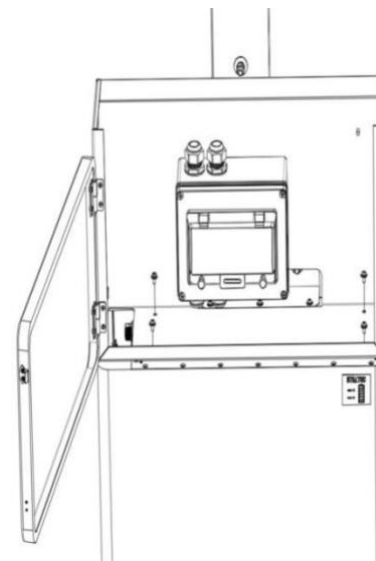
Step 9

Remove the debris baffle and secure the battery to the wall with the L shape metal part.

Install and fix the mounting bracket on the wall.

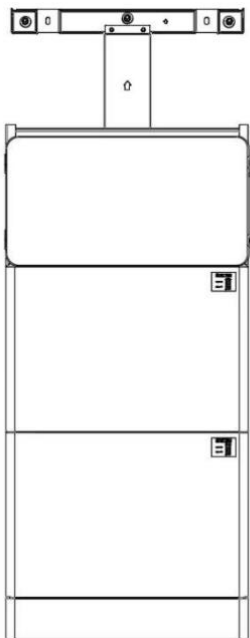
Step 10

fix the system box to the battery using screw M5*8 (from the system packaging box)



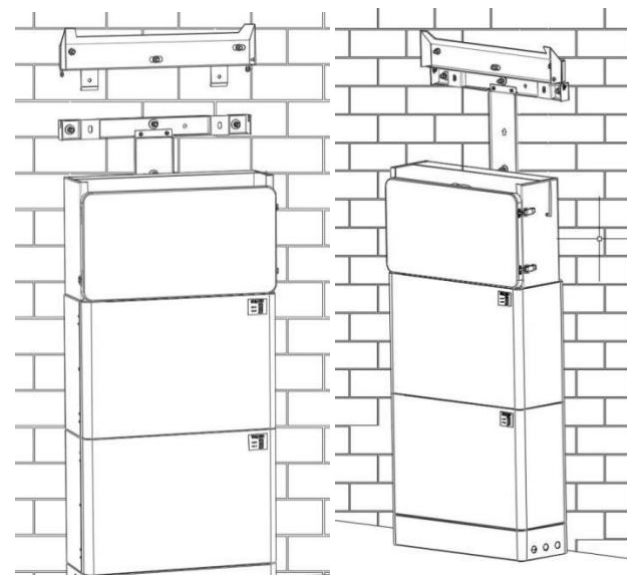
Step 11

Fix the inverter bracket (from inverter packaging box) with the hanging board (from the system packaging box) using hex screw M6*10 as below



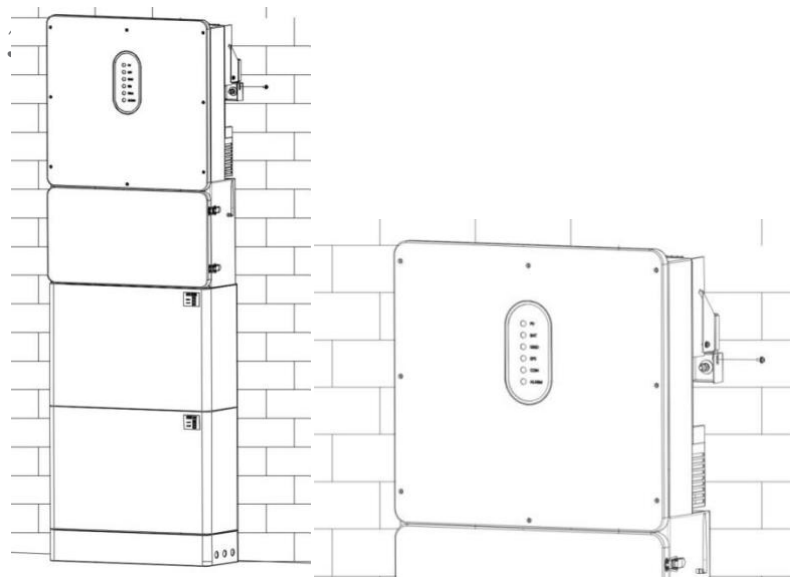
Step 12

Insert the bracket into the mounting plate as below



Step 13

Install the inverter on the mounting bracket. Then lock the inverter using the security screw M6(from inverter packaging box).

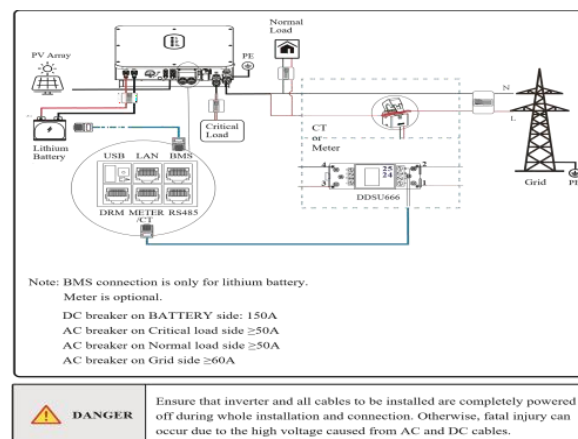


Electrical Connection

This chapter shows the details connection of System. And PV connection is N/A for AKS-INV series AC couple inverters. The following illustration only uses the AKS-INV-HB5000 series hybrid inverters as an example.

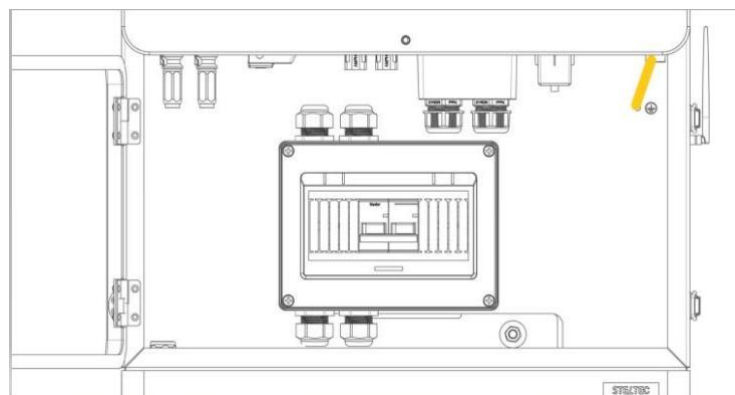
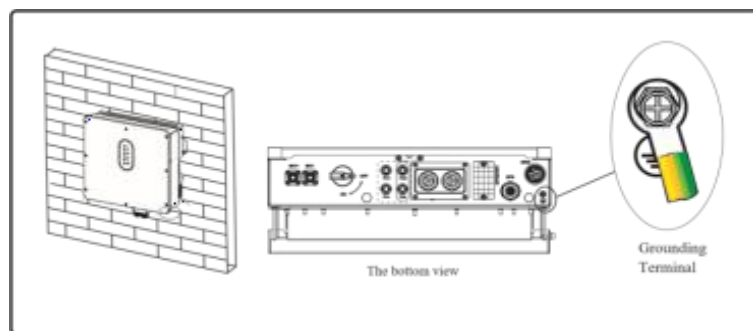
System system connection diagram:

A protective earth (PE) terminal is equipped at the side of the inverter. Please be sure to connect this PE terminal to the PE bar for reliable grounding. AWG 10 or 12 yellow green lines are recommended.

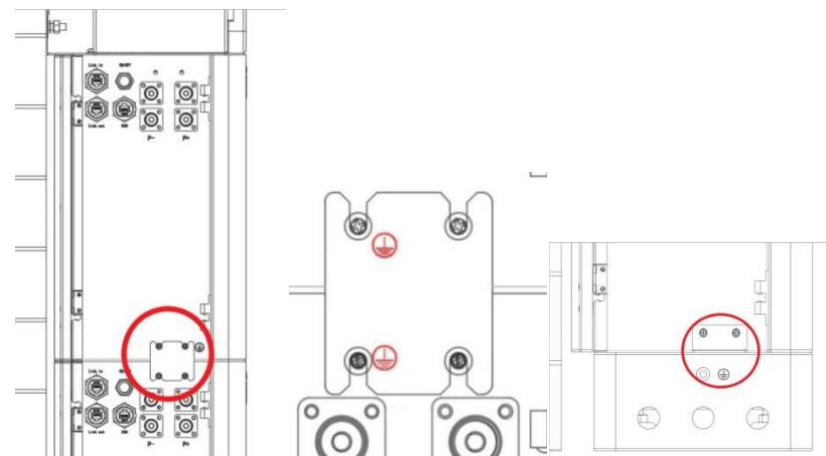


3.1 Grounding

- a. Connect to the ground between inverter and system box using M5 hexagon nuts with flange

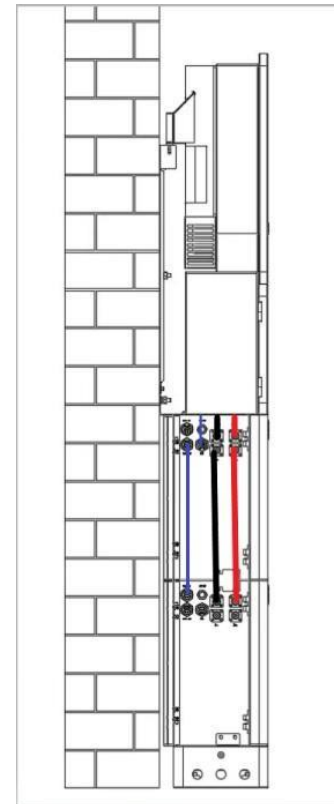
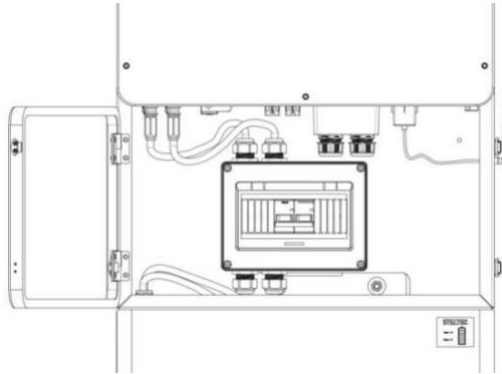


- b. Connect the battery to ground with a small metal plate using screw M4*8(from the system packaging box) as follows and there is a 1.5m GND cable fix the base

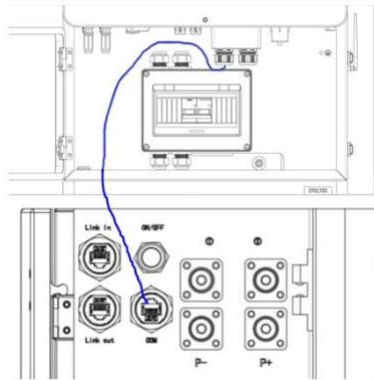


3.2 Battery power and communication cable connection

- a. Connect the battery power cable in the down side of the breaker in the system box to the upper battery which is the master battery. Connect the battery power cable in the up side of the breaker in the system box to the inverter battery ports. Connect the battery in parallel using power cable and communication cable as follow.



- b. connect the BMS cable to the inverter BMS port directly through the system box



Refer to the following steps:

a

Unscrew the waterproof cover and loosen the rubber nut on waterproof cover.

c

Insert RJ45 terminals into corresponding ports. Install the seal into the threaded sleeve, fasten the rubber nut and screw the waterproof cover back to inverter firmly with 4 x M4 screws; 1.2N.m.

b Make the RJ45 terminal according to above function description of each Pin definition. Lead the BMS cable through the rubber nut, seal and waterproof cover in turn.

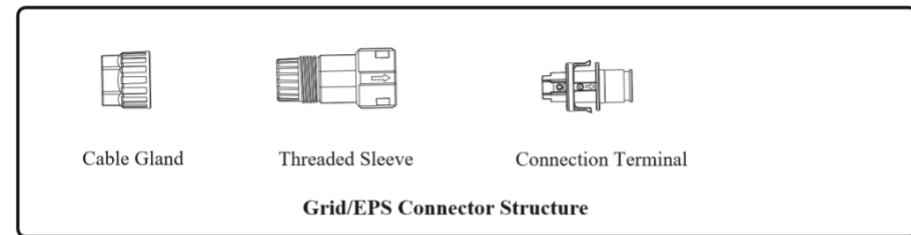
! Don't cut off any communication cables.

Press the BMS cable in the seal via the side incisions.

3.3 Grid/EPS Connection

Grid/EPS connection please refer to below.

Step 1: Assemble the AC connector.



a

A. Diameter 14 ~ 20/10~14mm
B. Cross Section 8~14/4~6mm²
C. Strip Length ~10mm

b

c

d

Fastening three screws to ensure each screw head is not exceeding the surface.

Click

L
N
PE

Step 2: Connect the AC connector.

An AC breaker should be installed between inverter and the grid/EPS.

- Before connecting the AC cable from inverter to AC breaker, you should confirm the AC breaker is working normally. Turn off the AC breaker and keep it open.
- Connect the PE conductor to grounding electrode, and connect the N and L

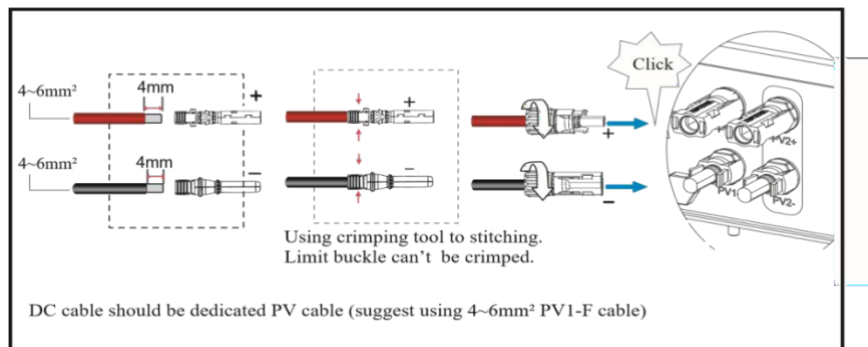
conductors to AC breaker.

c. Connect the AC breakers to the grid/EPS grid.

NOTICE	<p>Multiple inverters are not allowed to share a circuit breaker.</p> <p>Load is not allowed to connect between the inverter and the AC breaker.</p>
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To ensure that the inverter can be safely and reliably disconnected from the grid, a AC breaker ($\geq 50A$)

3.4 PV Connection (N/A for AC Couple Inverter) PV connection please refer to



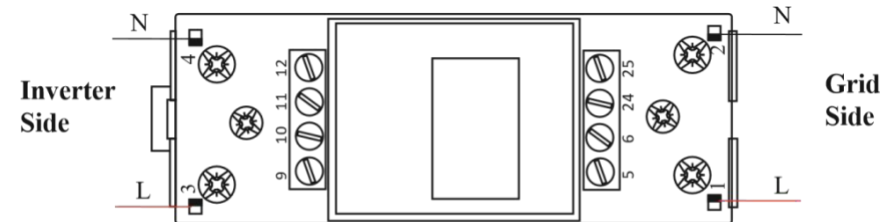
NOTICE	<p>Before connection the PV panels, make sure the plug connector have the correct polarity. Incorrect polarity could permanently damage the inverter.</p> <p>PV array shouldn't be connected to the grounding conductor. The minimum insulation resistance to ground of the PV panels must exceed 18.33kΩ, there is a risk of shock hazard if the requirement of minimum resistance is not met.</p>
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3.5 Meter/CT Connection

You can monitor usage with a meter or a CT. The meter and CT can't be installed at the same time. The meter is optional.

Meter Connection

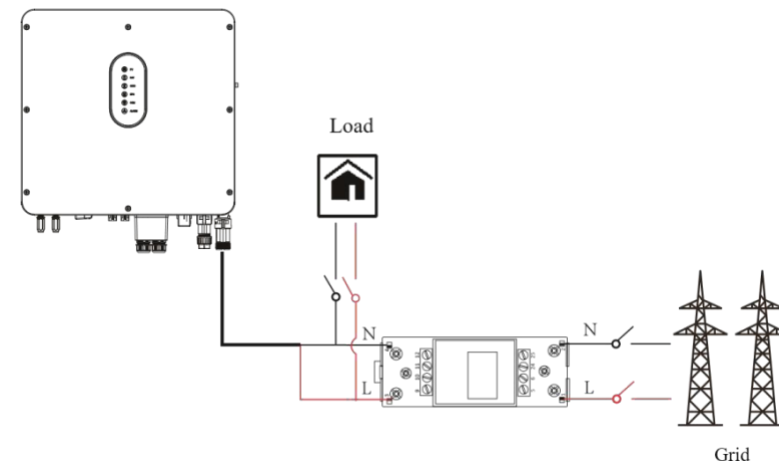
SE series inverter only supports the meter: CHNT-DDSU666 meter.



DDSU666

Before connecting to Grid, please install a separate AC breaker ($\geq 60A$; not equipped) between meter and Grid. This ensure the inverter can be security disconnected during maintenance.

The connection diagram of power cable of meter is as shown in the figure below:

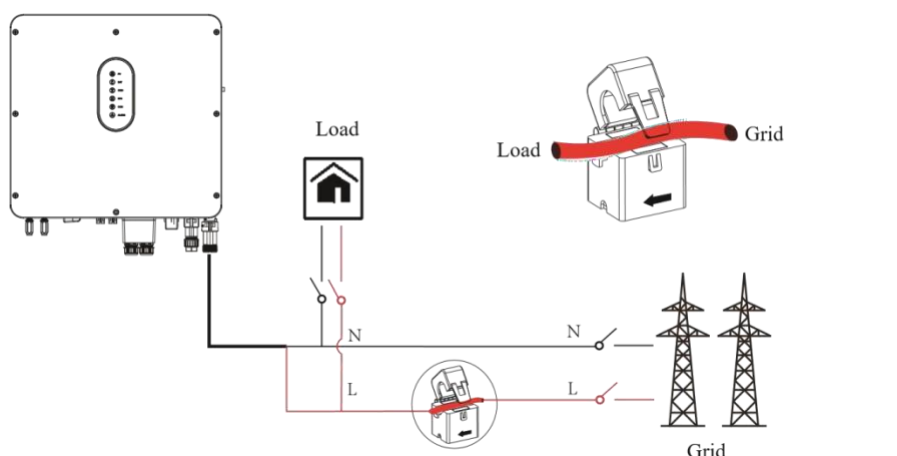


Please refer to the meter instruction manual for details.

CT Connection

Before connecting to Grid, please install a separate AC breaker ($\geq 60A$; not equipped) between CT and Grid. This ensure the inverter can be security disconnected during maintenance.

The connection diagram of power cable of CT is as shown in the figure below:



Please attention to the Current interchanger (CT) connection. The arrow on the CT indicates the current flow from grid to inverter. And lead the live line through the detection hole of CT.

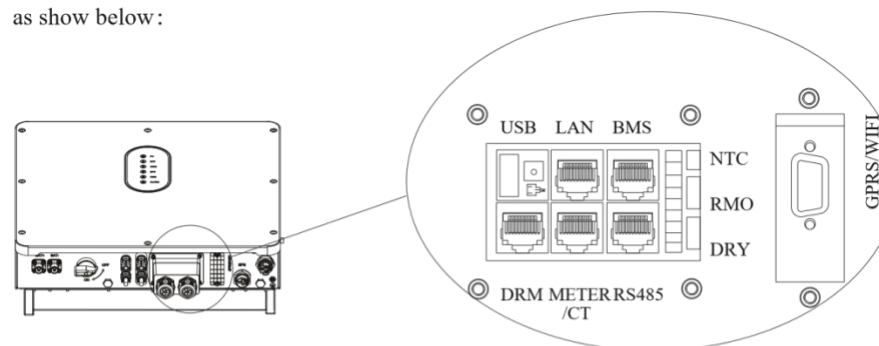
3.6 Communication Connection

There are communication interfaces in the communication port on the bottom of the inverter

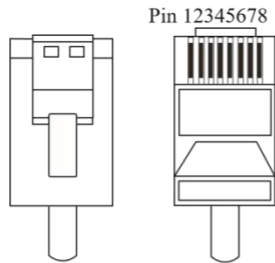
LAN Connection

Use standard Ethernet cable for Ethernet communication.

as show below :



Interface	Descriptions	
USB	For fast firmware upgrade.	
LAN	For ethernet communication.	
BMS	Lithium battery Communication Interface	
DRM	Demand response mode for Australia application	
METER/CT	For Meter communication or Grid current sense.	
RS485	For RS485 communication.	
9-Pins	NTC	Temperature sensor terminal of lead-acid battery
	RMO	Remote off control
	DRY	DI/DO control
GPRS/WIFI	For GPRS/WIFI communication.	



Refer to the following steps:

a Unscrew the waterproof cover and loosen the rubber nut on waterproof cover.

c Insert RJ45 terminals into corresponding ports. Install the seal into the threaded sleeve, fasten the rubber nut and screw the waterproof cover back to inverter firmly with 4 x M4 screws; 1.2N.m.

b Lead the Standard Ethernet cable through the rubber nut, seal and waterproof cover in turn.

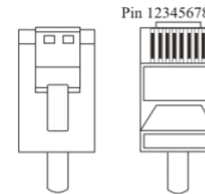
! Don't cut off any communication cables.

Press the standard Ethernet cable in the seal via the side incisions.

DRMs Connection

DRMs is a shortened form for “inverter demand response modes”. It is a compulsory requirements for inverters in Australia.

RJ45 Terminal Configuration of DRMs



PIN	1	2	3	4
Function Description	DRM1/5	DRM2/6	DRM3/7	DRM4/8

PIN	5	6	7	8
Function Description	REF	DRM 0/COM	NC	NC

Refer to the following steps:

a Unscrew the waterproof cover and loosen the rubber nut on waterproof cover.

c Insert RJ45 terminals into corresponding ports. Install the seal into the threaded sleeve, fasten the rubber nut and screw the waterproof cover back to inverter firmly with 4 x M4 screws; 1.2N.m.

b Make the RJ45 terminal according to above function description of each Pin definition. Lead the BMS cable through the rubber nut, seal and waterproof cover in turn.

! Don't cut off any communication cables.

Press the DRMs cable in the seal via the side incisions.

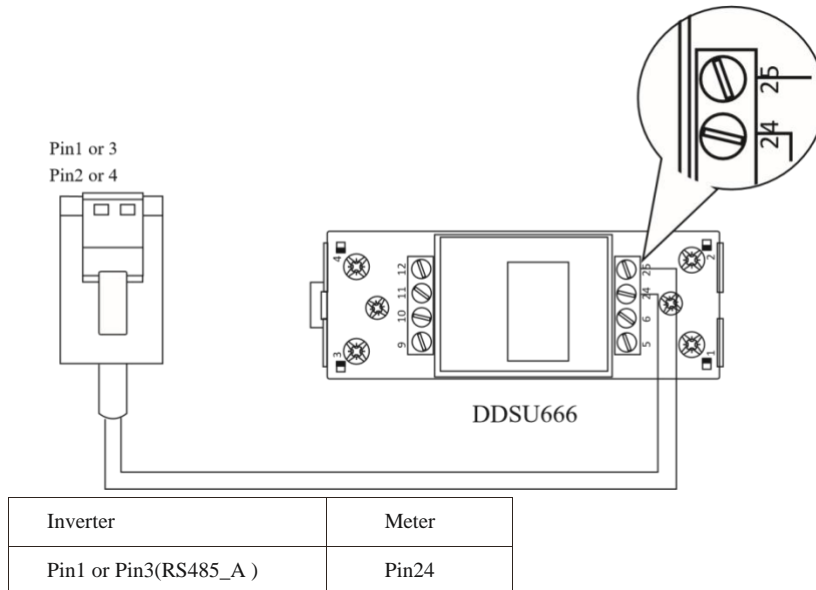
3.7 Meter/CT Connection

RJ45 Terminal Configuration of Meter/CT Communication

PIN	1	2	3	4	5	6	7	8
Function Description	RS485_A	RS485_B	RS485_A	RS485_B	CT+	CT-	NC	NC

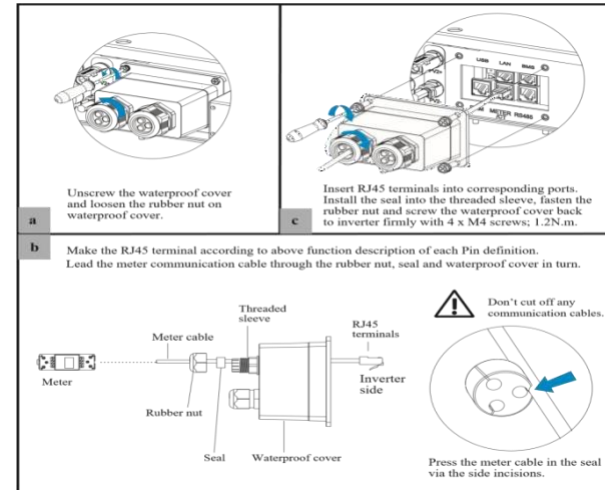
Meter Connection

Meter cable connection overview

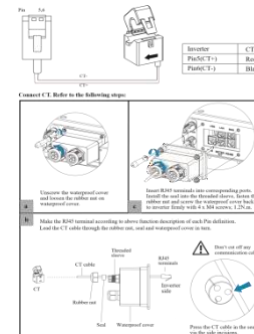


Pin2 or Pin4(RS485_B) Pin25

Connect meter. Refer to the following steps:

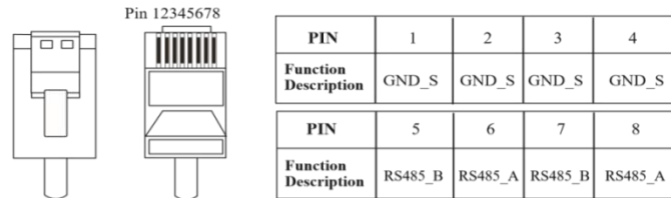


CT Connection

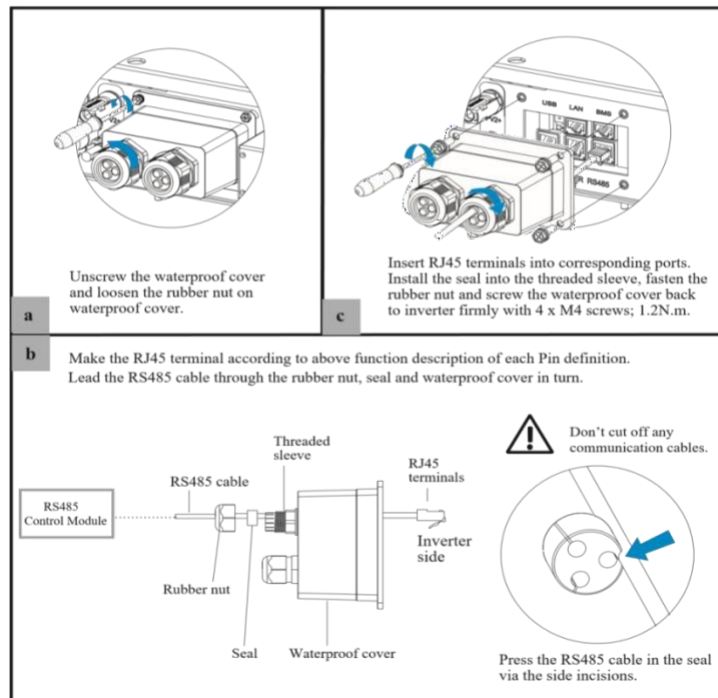


3.8 RS485 Connection

RJ45 Terminal Configuration of RS485 Communication

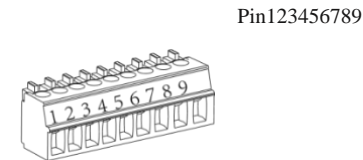


Connect RS485. Refer to the following steps:



3.9 NTC/RMO/DRY Connection(s)

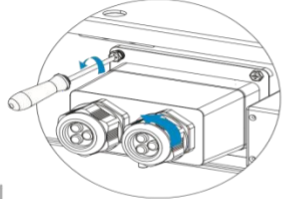
9-Pins Terminal Configuration of Auxiliary Communication



PIN	Function Description
1	NO1 (Normal Open)
2	N1
3	NC1 (Normal Close)
4	NC2 (Normal Close)
5	N2
6	NC2 (Normal Close)
7	REMO OFF
8	GND S (NTC BAT)
9	NTC BAT+

Refer to the following steps:

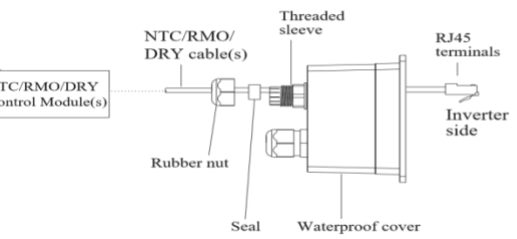
a



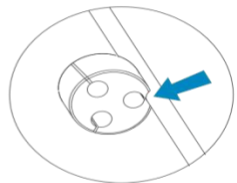
Unscrew the waterproof cover and loosen the rubber nut on waterproof cover.

b

Make the 9-Pins terminal according to above function description of each Pin definition for the auxiliary port you want to use.
Lead the NTC/RMO/DRY cable(s) through the rubber nut, seal and waterproof cover in turn.



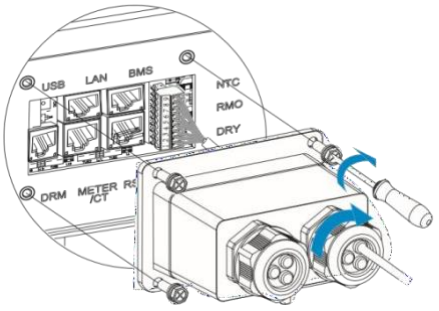
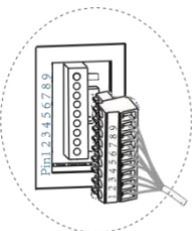
Don't cut off any communication cables.



Press the NTC/RMO/DRY cable(s) in the seal via the side incisions.

31


c

Pin	Function
9	NTC
8	
7	RMO
6	
5	DRY
4	
3	
2	
1	

Insert its 9-Pins terminal into the corresponding NTC/RMO/DRY port on the ESS inverter. Install the seal into the threaded sleeve, fasten the rubber nut and screw the waterproof cover back to inverter firmly with 4 x M4 screws; 1.2N.m.

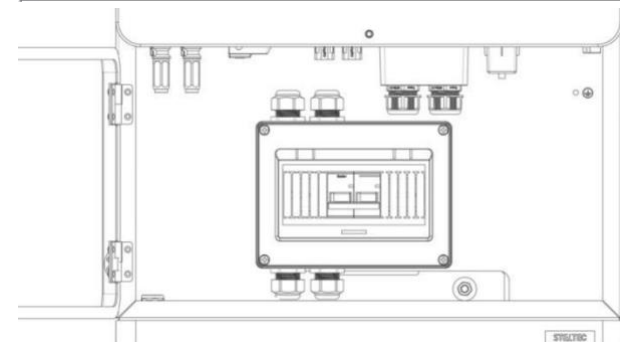
3.10 GPRS/WiFi Module Connection (Optional) GPRS/WiFi module



Move the port cover. Make sure doesn't fall off naturally.

Proper strength to avoid damage to the module.
2 x M4 screws; 0.8N.m

Antenna



4 Startup/Shutdown the System

Before operation, you need to Check:

4.1 Startup the System

Check and confirm the installation is secure and strong enough and that the system grounding

is OK. Then confirm the connections of AC, battery, PV etc. are correct. Confirm the parameters and configurations conform to relevant requirements.

AC Frequency	50/60Hz	PV Voltage	90~530V
Battery Voltage	42~60V	GridACVoltage	180~270V

Make sure all the above aspects are right, then follow the procedure to start up the inverter:

4.2 Shutdown the System

According to actual situation, if have to shut-down the running system, please follow below procedure:

Unpower off the battery.

Unpower off the PV. (N/A for AC Couple)

Unpower off the AC.

If need to disconnect the inverter cables, please wait at least 5 minutes before touching these parts of inverter

4.3 Commissioning

It is necessary to make a complete commissioning of the inverter system. This will essentially protect the system from fire, electric shock or other damages or injuries.

4.3.1 Inspection

Before commissioning, the operator or installer (qualified personnel) must inspect the system carefully and make sure:

1. The system is firmly installed correctly following the contents and notifications of this manual, and there are enough spaces for operation, maintenance and ventilation.
2. All the terminals and cables are in good status without any damages.
3. No items are left on the inverter or within the required clearance section.
4. The PV, battery pack is working normally, and grid is normal.

4.3.2 Commissioning Procedure

After the inspection and make sure status is right, then start the commissioning of the system.

1. Power on the system by referring to the Startup section 4.1.
 2. Setting the parameters on the App according to user's requirement.
 3. Finish commissioning.
-
1. Power on the AC.
 2. Power on the PV. (N/A for AC Couple)
 3. Power on the battery.
 4. Connect the cell phone App via blue-tooth.
 5. Click the Power ON on the App for the first time.