Installation of Manual

Energy Storage System (ESS)

Storion-TB250 (Micro-grid，with M38210-S)

V01

IMPRINT

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Copyright Statement

Version Information

Version	Date	Content
V01	Feb. 24th, 2020	First edition.

Content

1. Introduction

1.1 Brief Introduction

This manual applies for Storion-TB250 Li-ion battery energy storage system, mainly includes:

(1) Safety introduction

Introduces the product use, operating notes and qualification of operators of TB250 Li-ion battery energy storage system.

(2) Product description

Describes product appearance, product characteristics, system composition and major functions of TB250 Li-ion battery energy storage system.

(3) System installation

Introduces the installation of TB250, including cautions.

1.2 Explanation of Terms

(1) Lithium iron phosphate cell (LiFePO4)

Basic unit constituted by electric poles and electrolytes, Each cell is independent and closed.

Notes: Paralleled cell cannot be regarded as an independent cell, even repacked as one whole battery pack.

(2) Lithium iron phosphate pack

Combination made up of battery monitoring circuit, battery equalization circuit, electrical connectors, communication interfaces, thermal management devices and multiple Lithium iron phosphate cells.

Notes: For packs from same company, all the details such as physical size, working performance and interface specification should be consistent so that all the packs are compatible and interchangeable.

(3) Battery management system

Electronic equipment collection for monitoring the operating information of cells, packs and system units (such as voltage, current, temperature, protective parameter of batteries), evaluating the state of charge (SOC), the state of health (SOH) and cumulative processed energy and protecting batteries for safety, etc.

(4) Battery system unit

A combination of batteries through series parallel combination inside and a battery management system (BMS) in which accesses to DC side of a bidirectional converter.

(5) Storage unit

A combination of a bidirectional converter and a battery system unit, which can be used as an independent load or be controlled directly by monitoring system.

2. Safety Instructions

2.1 Manual Keeping

This manual contains important information about operating the system. Before operating, please read it very carefully.

The PCS should be operated in strict accordance with the description in the manual, in case that it causes damage or loss to equipment, personnel and property.

This manual should be kept carefully for maintenance and reparation.

2.2 Operator Requirements

The operators should get a professional qualification, or 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 carrying out maintenance work it has to be at least two operators in the filed all the time. They can not operate on any equipment until they are all powered off and fully discharged.

It is strictly prohibited for any maintenance to be carried out when equipment are on or charged.

2.3 Protection of Warning Sign

The warning sign contains important information for the system to operate safely and it is strictly prohibited to torn or damage the sign.

Ensure that the warning sign is always clear.

The signs should be replaced immediately if damaged.

2.4 Setting of Warning Sign for Safety

While instructing, maintaining and repairing, to prevent unrelated personnel nearby to cause incorrect operation or accident, the suggestions below should be followed:

Obvious signs should be set at front switch and rear-level switch in case of accidents caused by false switching.

Warning signs or tapes should be set near the operation areas.

Keys of the system must be pulled out after maintenance or operation.

2.5 Live Line Measurement

High voltage in the container which may cause vital electric shock when touched by accident.

Equipment protection must be taken in live line measurements (e.g.: insulation gloves).

The measuring equipment should be connected and used correctly to ensure personnel safety. When measuring, at least two workers are needed.

2.6 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 matches specification in case of electric arc or shock.

2.7 Electrostatic Prevention

Contact or improper operation of the printed circuit board or other ESD sensitive components may result in damage to the device. Unnecessary contact should be avoided.

2.8 Moisture Prevention

It is very likely that moisture may cause damages to the system.

Do not open the container door if the humidity is larger than 95%.

Repair or maintaining activities in wet conditions should be avoided or limited.

2.9 Operation After Power Failure

The battery system belongs to energy storage system, which maintains fatal high voltage even when the DC side is disconnected. Therefore, touching of the battery output is strictly prohibited.

The PCS maintains fatal voltage even when both the DC or AC side are disconnected, so it must be tested by the multimeter for safety before operation.

2.10 Minimum Personal Protective Equipment

For the safety of operators to the system, personal protective equipment are required. During the operation, following protective equipment are required:

No.	Item	Notes
1	Work clothes	
2	Protective shoes	
3	Protective glasses	

When doing maintenance works such as checking cables or wires, measuring voltage, replacing small electrical parts or cleaning modules and brackets, as minimum the following protective equipment are required:

No.	Item	Notes
1	Work clothes	
2	Protective shoes	
3	Protective glasses	
4	Insulated gloves	For touching live parts

Note: All metal tools during maintenance should be insulated.

When replacing modules, the following protective equipment are required:

No.	Item	Notes
1	Work clothes	
2	Protective shoes	
3	Protective glasses	
4	Insulated gloves	For touching live parts

Note: When replacing modules, the stacking machine should be used carefully in case that the modules may fall down. All workmen are suggested to wear high-safety and high strength protective shoes to protect their feet.

3. Product Description

The AlphaESS Storion-TB250 energy storage system supports Micro-grid mode to run. When the PV PCS generates insufficient power to support load consumption, the energy stored in the battery can be used.

The overall system connection diagram is as follows:

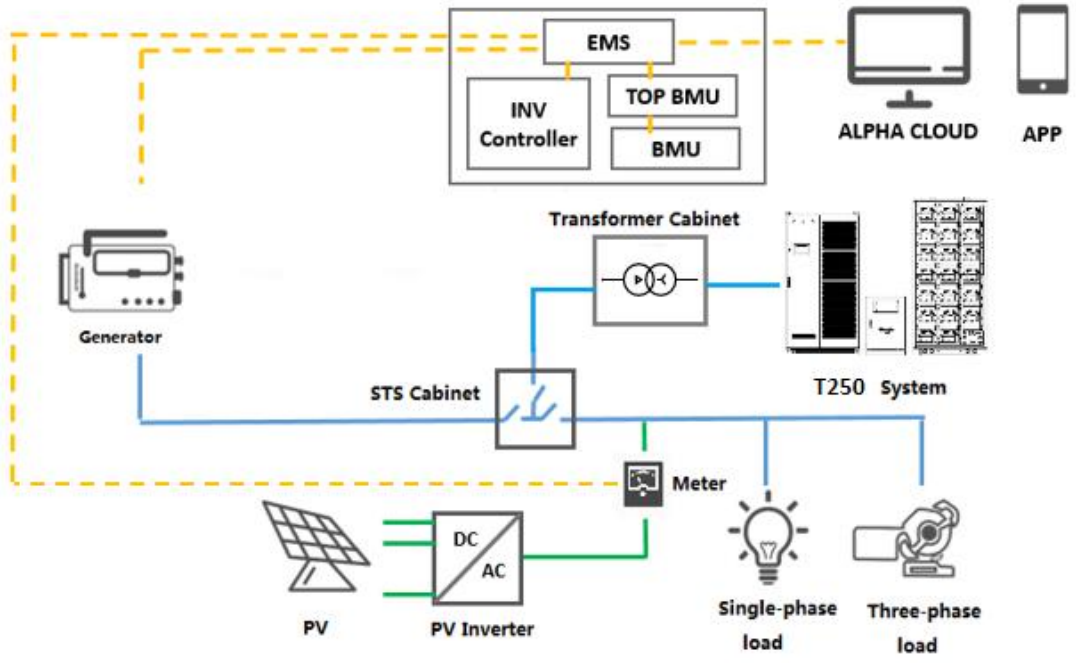


Figure 3-1 Applications of the system

3.1 Appearance of the Product

Figure 3-2 shows the appearance of the system.

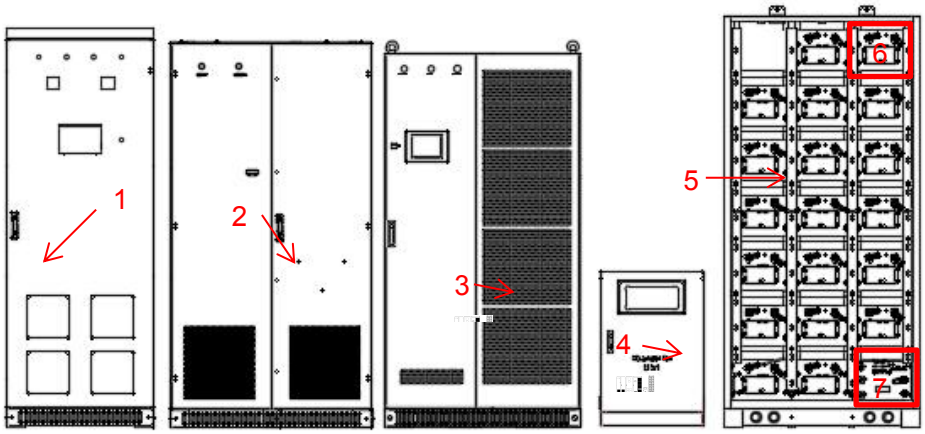


Figure 3-2 TB250 System Appearance

Table 1 TB250 System composition

Item	Components
1	800kW STS
2	500kVA Transformer
3	Storion-TB250
4	Junction Box（With TOP BMU Box）
5	Battery Rack
6	M38210-S
7	HV900105 Box

3.2 Product Characteristics

LiFePO4 batteries produced by AlphaESS have longer lifespan and higher reliability, which is able to satisfy the application of energy storage systems.

The system is highly modular designed, and it is easier to assemble, transport and maintain.

The system has a three-level BMS and is allowed for system expansion.

The system adopts all time balancing technology so that the consistency of batteries and modules can be well ensured.

The system is designed as a removable container which is compact in structure, flexible, convenient for installation and testing, suitable for the working environment and is able to satisfy different kinds of applications.

The system has current balance technology between strings in case of circulating current or unbalanced power.

The system has relatively developed thermal management technology so that the consistency of the system environment can be ensured.

The system has both remote monitor function and local control function.

The system realizes flexible scheduling of electric power system through communication among BMS, PCS and monitoring system.

The system realizes emergency fire protection by using the automatic alarming and fire extinguishing system.

3.3 Parameters of Components

3.3.1. PCS

3.3.1.1 Product Instruction

The PCS can be used for micro-grid applications.The PCS can be used with PV inverter to supply load energy and charge the battery. When the PV energy is insufficient, the diesel

engine can continue to provide energy output after starting.

3.3.1.2 Appearance Instruction

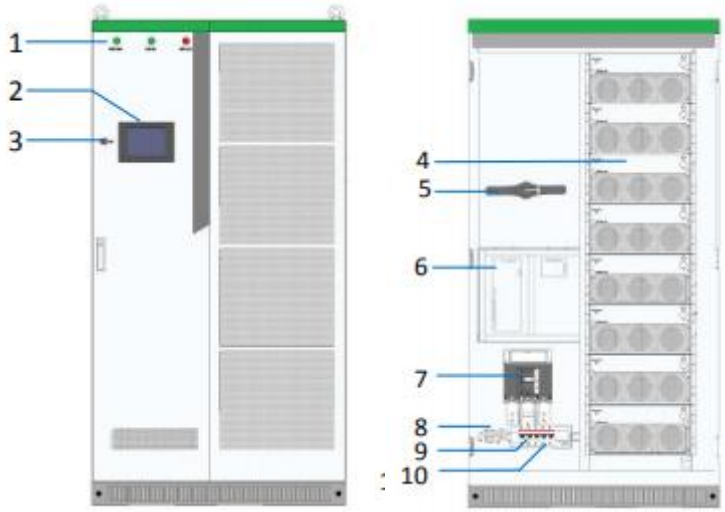


Figure 3-3 Appearance of the PCS

Table 2 Composition of the PCS

Position	Designation	Description
1	Indicator lights	
2	Touch Screen	
3	EPO (Emergency Power Off)	
4	PCS-AC module	4*DC/AC module
5	Battery DC Switch	
6	U2 Main control board	
7	AC breaker	
8	Terminals	
9	SPD Switch	
10	Auxiliary power switch	

Note: Components 8 Terminals, 9 SPD switch ,10 Auxiliary power switch can be seen after unfold the dam-board.

3.3.1.3 Technical Parameters

Table 3 Technical parameters of the PCS

No.	Item	Storion-TB250	Note

Stand-alone Mode			
1	AC Nominal Output Power	250 kW	
2	AC Max. Power	275 kW	
3	AC Output Voltage	380 Vac (± 10% configurable)	
4	Voltage Range	380 V ± 10 %	
5	AC Output Current	380 A (short term overload 436.5A max)	
6	AC Connection	3-phase and 3-wire system	
7	AC Frequency	50 Hz / 60 Hz	
8	Output THDu	< 2 %	
9	AC PF	Listed: 0.8~1 leading or lagging (Load-depend)	
		Actual: 0.1~1 leading or lagging (Load-depend)	
10	Overload Capability	100%~110% long-term; 110%~120% 1min; 120%~150% 200ms	
11	DC Voltage Range	600 – 900 V	
12	DC Max Current	436.5A	
General Data			
13	Max Efficiency	98.2%	
14	Dimensions (W x H x L)	1100 x 2160 x 800 mm	
15	Weight	450 kg	
16	Altitude	3000 m	
17	Ingress Protection	IP20	
18	Noise	70 dB	
19	Operation Temperature	-25 ℃ ~ +50 ℃ (De-rating over 45°C)	
20	Cooling Concept	Forced Air	
21	Humidity	0~95% (Non-Condensing)	
22	Communication Interfaces	Ethernet, RS-485, CAN	

3.3.1.4 Emergency Stop Switch

The converter stops working immediately after pushing the button.

If you want to restart the converter, please proceed in the following order:

A. Conduct clockwise rotation on the emergency stop switch and then loosen the locking status.

B. Push the AC breaker into “OFF” position, pull up the emergence button and then turn the AC breaker “ON”.
C. Launch the machine and operate it as required

3.3.2. STS Cabinet

3.3.2.1 Product Instruction

STS cabinet has three thyristor modules and monitoring components.The switch cabinet is equipped with a lightning protection device,a power grid load switch,a bypass load switch, a PCS breaker,and the below figure is a topology diagram of its constituent structure.

3.3.2.2 Appearance Instruction

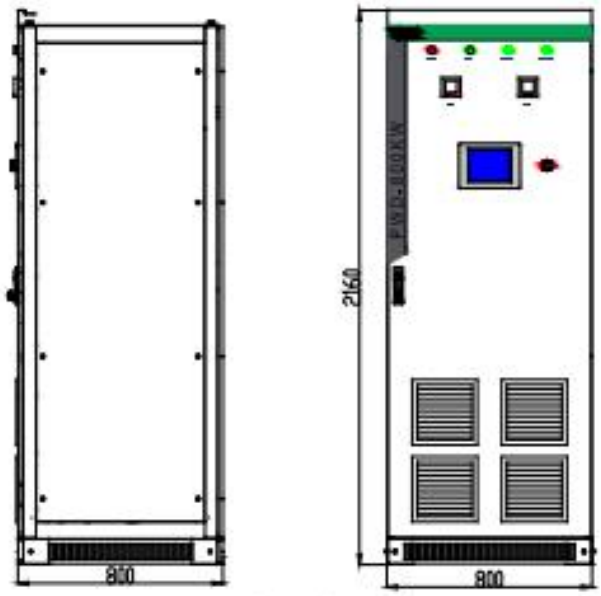


Figure 3- 4 Appearance of the STS Cabinet

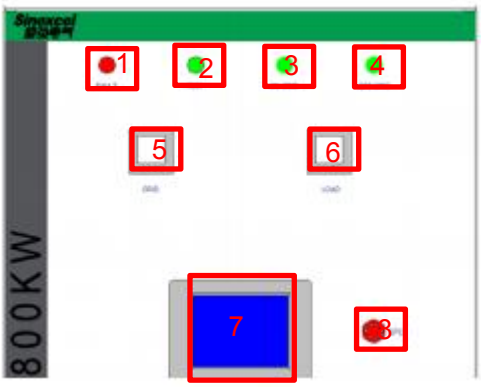


Table 4 Composition of the STS Cabinet

No.	Description	No.	Description
1	Fault indicator	5	Grid meter
2	Run indicator	6	Load meter
3	On grid indicator	7	Touch screen
4	Off grid indicator	8	EPO switch

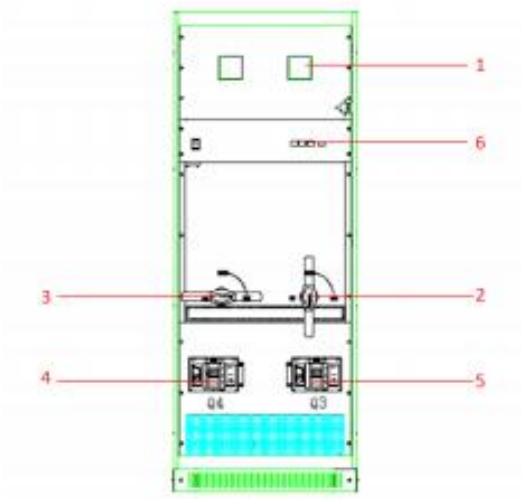


Table 5 Composition of the STS Cabinet（Inside）

No.	Description	No.	Description
1	Meter installation hole	4	Load output breaker
2	Bypass breaker	5	PCS connection breaker
3	Main grid input breaker	6	Communication board

3.3.2.3 Technical Parameters

Table 6 Technical parameters of the STS Cabinet

No.	Item	800K STS	Note
1	Rated capacity	800 kW	
2	Rated voltage	400V	
3	Input voltage range	-25%~15%	
4	Output voltage range	-25%~15%	
5	Rated input current	1155A	
6	Max input current	1270A(110%)	
7	AC frequency	50 Hz / 60 Hz	
8	Frequency range	47~52Hz/57~62Hz	
9	Switching time gap	<80ms	

10	The max load standing capacity during switching	300kW	
11	Wiring made	3 phase 4 wire	
12	Max Efficiency	99.5%(Full load)	
13	Cool mode	Forced air cooling made	
14	Dimensions (W x H x L)	800 x 2160 x 800 mm	
15	Weight	300 kg	
16	Altitude	3000 m	
17	Ingress Protection	IP20	
18	Noise	70 dB	
19	Operation Temperature	-20 ℃ ~ +45 ℃	
20	Humidity	0~95% (Non-Condensing)	
21	Communication Interfaces	Ethernet, RS-485	

3.3.3. Transformer Cabinet

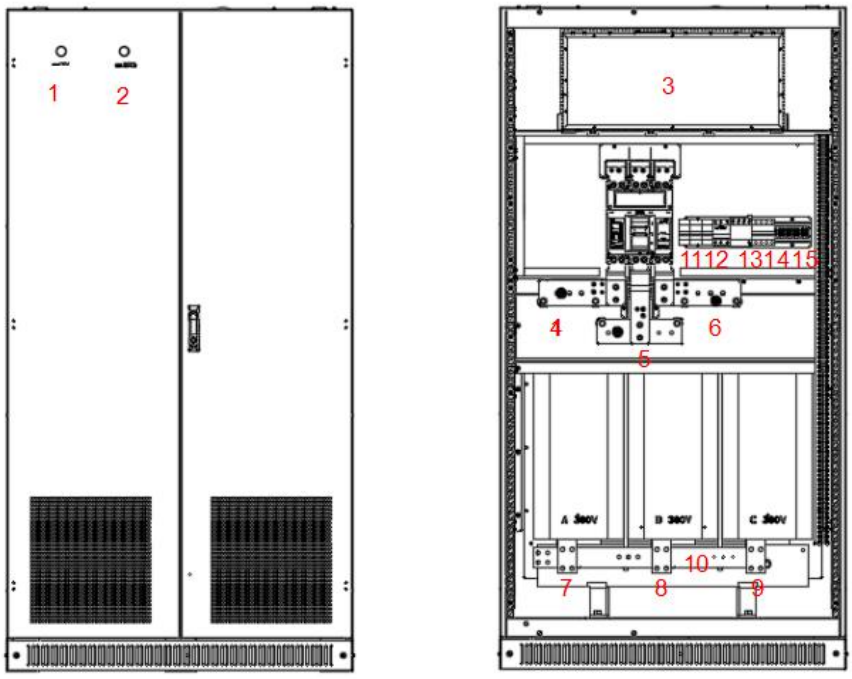


Figure 3- 5 Appearance of the Transformer Cabinet

Table 7 Composition of the Transformer Cabinet

No.	Description	No.	Description
1	PCS indicator	9	AC input phase C

2	On-grid indicator	10	AC output phase N
3	Fan	11	220V input switch
4	AC output phase A	12	Fan 220V switch
5	AC output phase B	13	Lightning protection 3 phase switch
6	AC output phase C	14	Lightning protection
7	AC input phase A	15	AC circuit breaker soft-start switch
8	AC input phase B		

3.3.3.1 Technical Parameters

Table 8 Technical parameters of the Transformer Cabinet

No.	Item	500kVA transformer	Note
1	Rated capacity	500 kVA	
3	Input voltage	380V	
4	Output voltage	400V	
5	Insulation class	Class H	
6	AC frequency	50 Hz / 60 Hz	
7	Wiring made	3 phase 4 wire	
8	Max Efficiency	98.5%	
9	Dimensions (W x H x L)	800 x 2100 x 1100 mm	

3.3.4. Battery System

Table 9 Battery system parameters

Item	Description	Parameter	Remark
1	Nominal discharge power	250 kW	
2	Energy storage capacity	According to the project situation	Ambient temperature is 30℃, measured at DC side
3	Continuous discharge current	0.5C (continuous)	
4	Direct voltage	600 – 900 V	
5	Communication interface	RS485, CAN2.0	

3.3.3.1 M38210-S

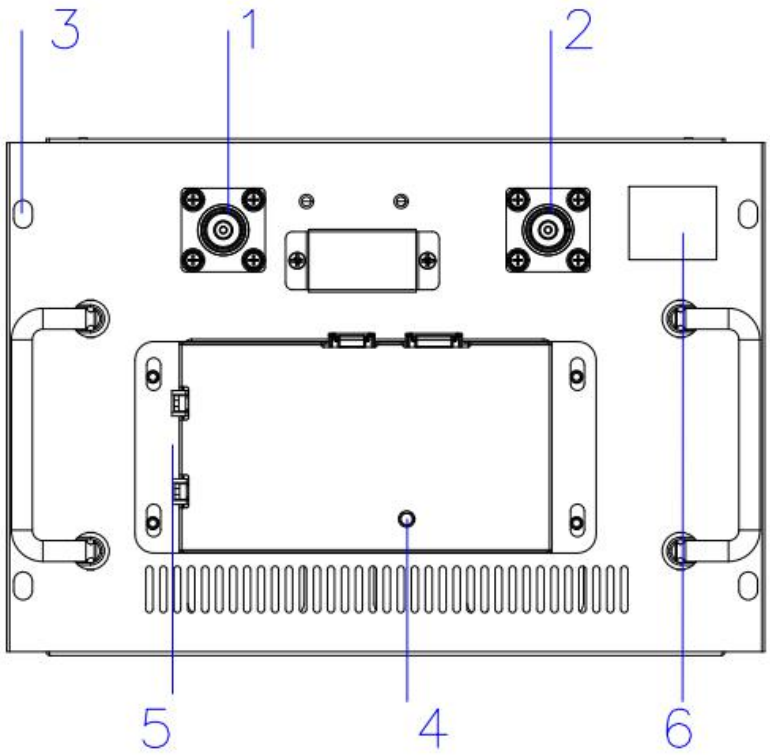


Figure 3-5 Battery front cover

Table 10 Battery interface definition

No.	Description	No.	Description
1	Battery negative pole	4	LED light
2	Battery positive pole	5	COM port (CAN) x 2
3	Earthing point x 4	6	Information label

The dip switch of M38210-S defines the serial number. Please see the detailed description in the following table.

Table 11 Battery technical parameters

No.	Item	Technical parameter	Remarks
1	Battery model	M38210-S	
2	Assembly method	12S2P	
3	Nominal voltage	38.4 V	
4	Voltage range	36 ~ 43.2 V	
5	Nominal capacity	210 Ah	Max. charge / discharge

			current 0.5C
6	Nominal stored energy	8.1 kWh	
7	Work power consumption	<2 W	
8	Dormant power consumption	<100 mW	Battery dormant state
9	Max. charge/discharge current	105 A	Constant current mode
10	DC internal resistance	< 10 mΩ	Factory default
11	Transportation/storage temperature range	-10 ~ 50 ℃	
12	Charging work temperature range	-10 ~ 50 ℃	
13	Discharging work temperature range	-10 ~ 50 ℃	
14	Communication mode	CAN and RS485	
15	Weight	62 kg	
16	Size (W x D x H)	332 x 570 x 223 (±5) mm	
17	Humidity	15% ~ 85%	

3.3.3.2 HV900105

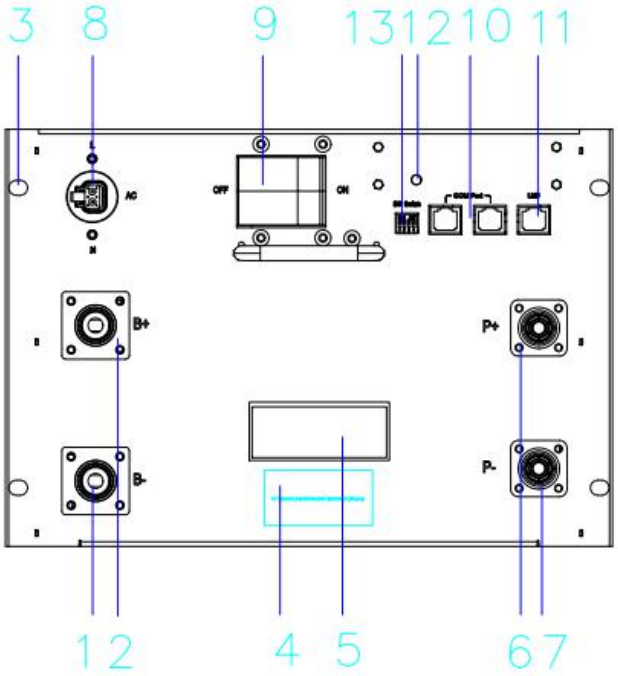


Figure 3-6 HV900105 front cover

Table 12 HV900105 interface definition

No.	Description	No.	Description
1	DCin-	7	DCout-
2	DCin+	8	AC input (auxiliary power)
3	Earthing point x 4	9	AC Air switch (auxiliary power)
4	Moulded case circuit breaker	10	BMU COM port (CAN) x 2
5	Information label	11	LMU COM port (CAN)
6	DCout+	12	LED light
		13	Tip switch

Table 13 HV900105 technical parameters

No.	Item	Technical parameter	Remarks
1	High-voltage control box	HV900105	
2	Working voltage range	200 ~ 900 V	
3	Modules Connection	6~20 M38210-S in series	
4	Rated current	105 A	
5	Dimensions (W x D x H)	292 x 416 x 223 (± 5)mm	
6	Weight	20 kg	
7	Power consumption	<10 W	

Note: For centralized batteries, the DIP switch must always be set to 1, and the rest are turned off.

3.3.2.3 Top BMU Box (with EMS)

Functions such as remote monitoring, remote upgrade, etc. can be realized through the TOP BMU Box with EMS.

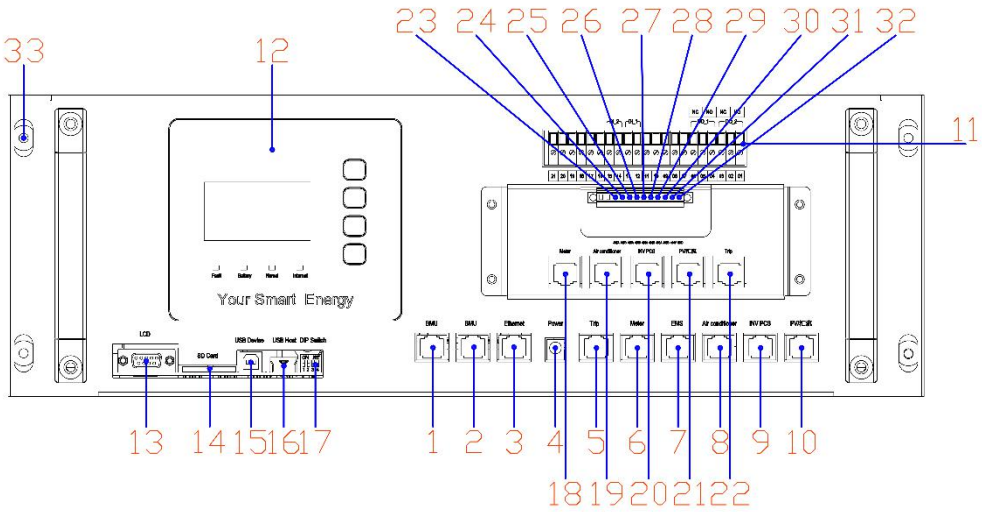


Figure 3- 7 Front cover of TOP BMU box with EMS

Table 14 Top BMU box with EMS interface definition

No.	Description	No.	Description
1	BMU COM port	17	DIP switch
2	BMU COM port	18	Meter COM port (reserved for RS485)
3	Ethernet	19	Air conditioner COM port((reserved for RS485)
4	Reserve power supply	20	INV PCS COM port (reserved for RS485)
5	Dry contact COM port	21	PV junction COM port (reserved for RS485)
6	Meter COM port	22	Dry contact COM port (reserved for RS485)
7	EMS COM port (reserved for external device communication with BMU)	23	Meter RS485A port
8	Air conditioner COM port	24	Meter RS485B port
9	PCS COM port	25	Air conditioner RS485A port
10	PV junction COM port	26	Air conditioner RS485B port
11	Dry contact port	27	PCS RS485A port
12	EMS display screen	28	PCS RS485B port
13	DB9 COM	29	PV Junction RS485A port
14	Storage card	30	PV Junction RS485B port
15	Burning port	31	Reserved
16	COM pin board	32	Reserved
		33	Earthing point x 4

Note: Top BMU Box (with EMS) can communicate with PCS, air conditioner, PV junction box and other external devices as RS485. You can use a common network

cable to connect to the device from the COM port (from ports 1 to 10), or connect to the RS485A and RS485B ports through the shielded twisted pair.

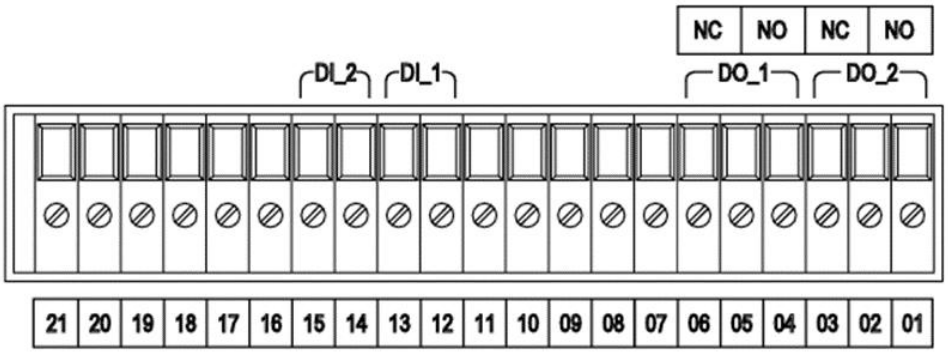


Figure 3-8 Dry contact of TOP BMU

Table 15 Dry contact of TOP BMU interface definition

No.	Description	No.	Description
01	Dry contact of generator	12	Dry contact of Fire controller fault (+24V)
02		13	Dry contact of Fire controller fault (GND)
03	Reserved	14	Dry contact of Fire fault (+24V)
04		15	Dry contact of Fire fault (GND)
05	Dry contact of BMS fault	16	Reserved
06		17	
07	Reserved	18	
08		19	
09		20	
10		21	
11			

Table 16 Technical parameters

No.	Item	Technical parameter
1	Dimensions（W x D x H)	490.6 x 323 x 161 ± 5 mm
2	COM	RS-485×4; Ethernet 10/100/1000Mbps×1
3	Internal storage	Mirco SD card, 16 GB
4	Events diary	Recent one-month happenings
5	Work voltage	24 V
6	Power consumption	<10 W

3.3.2.4 Junction box

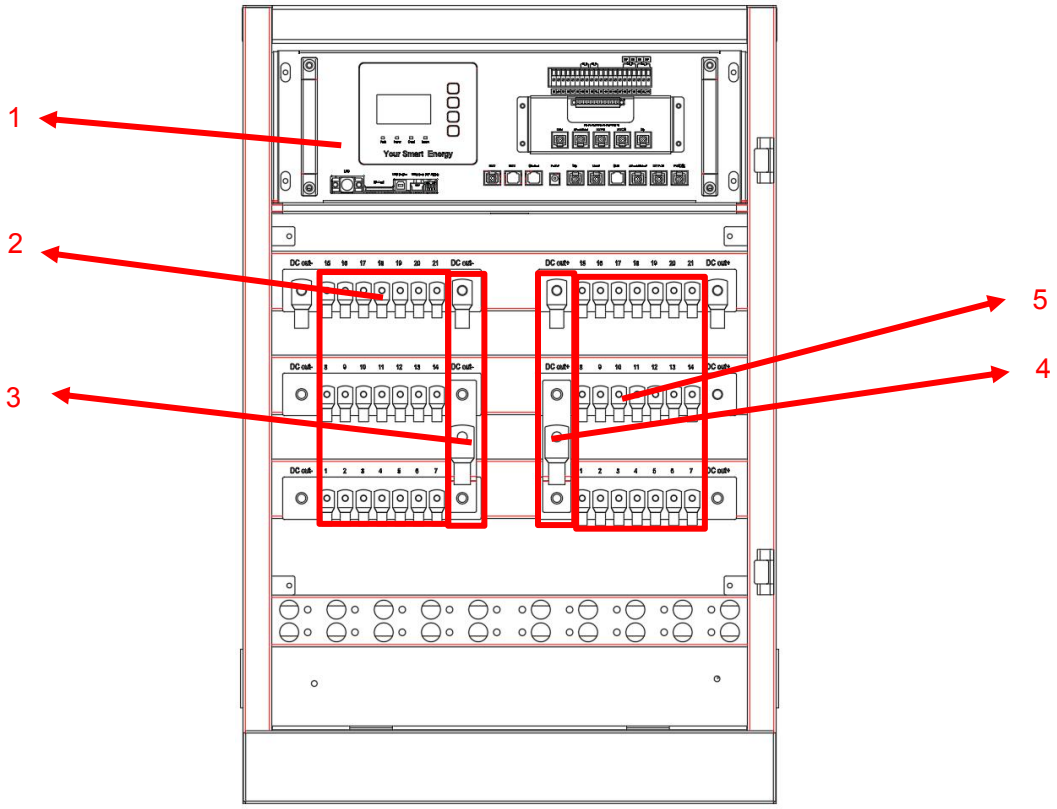


Figure 3-9 Inside of the junction box

Table 17 Wiring definition of the junction box

No.	Description	No.	Description
1	Top BMU Box	4	6 x DC OUT INV+
2	21 x DC IN BAT-	5	21 x DC IN BAT+
3	6 x DC OUT INV-		

Table 18 Technical parameters

No.	Description	Technical parameter
1	Dimensions (W*D*H)	564 x 439 x 845 mm
2	Weight	50 kg

3.3.2.5 Battery Rack

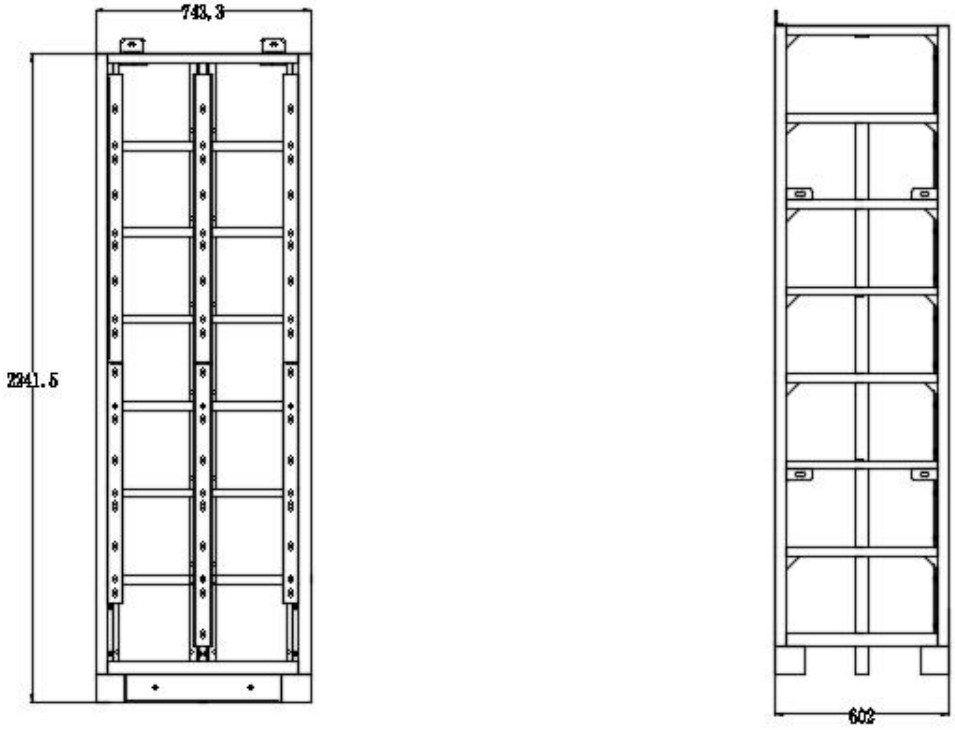


Figure 3-10 Battery Rack

Table 18 Technical parameters

No.	Description	Technical parameters
1	Dimension(D*W*H)	743.3 x 602 x 2241.5 mm
2	Weight	116kg

4. Installation

4.1 Installation Precautions

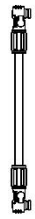
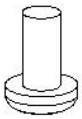
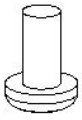
The following sites are not allowed for installation:

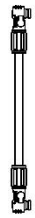
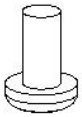
A. Sites which are salty and where humid air can penetrate.
B. Flooded areas.
C. Earthquake areas (additional security measures are required here).
D. Sites that are higher than 3000 meters above the sea level.
E. Sites that are in an explosive or potentially explosive atmosphere.
F. Sites with extreme changes of ambient temperature.
G. Sites with highly flammable materials or gases.

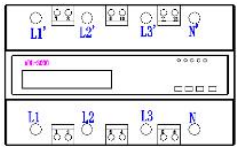
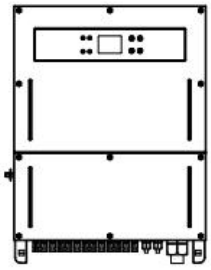
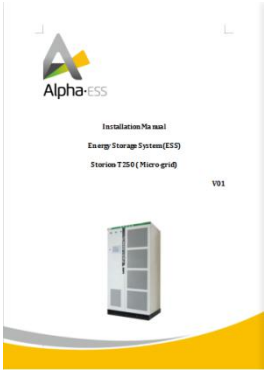
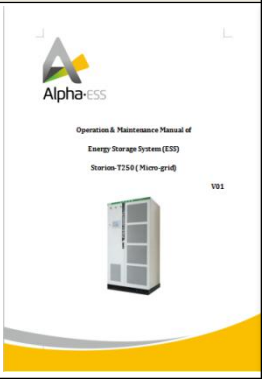
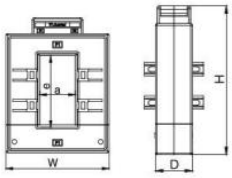
Note: The indoor temperature of the installation system is preferably between 15℃ ~25 ℃.

4.2 Parts List

Table 19 Parts List

M38210-S			
			
1 X Power Cable 130 mm, Black-Red, BAT-BAT	1 X Communication Cable 280 mm, BAT-BAT	4 X M6*16	4 X M6 Gouding Serrated Washer
HV900105			
			
1 X Communication Cable 300 mm, BAT-HV Box	1 X Communication Cable 680 mm, HV Box - HV Box	4 X M6*16	4 X M6 Gouding Serrated Washer

			
1 X Power Cable 2500 mm, Black-Black, BAT-HV	1 X Power Cable 130 mm, Red-Red, BAT-HV	AC Auxiliary Power Cable 7500 mm	1 X Terminal Resistance
DC Junction box (With TOP BMU Box)			
			
1 X Communication Cable 2500 mm, TOP BMU-HV BOX	1 X Terminal Resistance	4 x M6*16	4 x M6 Gouding Serrated Washer
			
1system: 1 x 4500 mm, 50mm2 Power Cable, Black-Black, For Junction box- INV (T50)； 1system: 1 x 4500 mm, 95mm2 Power Cable, Black-Black, For Junction box- INV(T100)	1 system: 1 x 4500 mm, 50mm2 Power Cable, Red-Red, For Junction box - INV(T50); 1 system: 1 x 4500 mm, 95mm2 Power Cable, Red-Red, For Junction box - INV(T100);	1 cluster: 1 x Communication Cable 7500 mm EMS-INV	
Bettery Rack			

			
1 cluster: Communication Cable 680 mm, BAT-BAT	1 cluster: 1 x 4500 mm, 35mm2 Power Cable, Black-Black, For HV Box - Junction box	1 cluster: 1 x 4500 mm, 35mm2 Power Cable, Red-Red, For HV Box – Junction box	
System			
			
1 x Meter	4*50kW PV Inverters	1*Installation Manual	1*Operation & Maintenance Manual
			
3*CT Outline size （W*H*D）:90*14*40mm Through size（a*e）:20*30mm			

4.3 Installation

4.3.1. PCS STS and Transformer Cabinets Installation

4.3.1.1 Removal

When removing the Cabinets a forklift can be used to remove the whole case. Users can lift the device bottom with a forklift or remove the PCS cabinet through the lifting hole on its top with a crane. It can be transported alone.

Figure 4- 1 Moving method for cabinet

4.3.1.2 Operation Space

The installation space of the cabinets should have a proper distance from its peripheral walls so as to ensure that the machine door can be opened and closed conveniently and there will be sufficient space for module insertion and extraction, normal heat dissipation and user's operation.

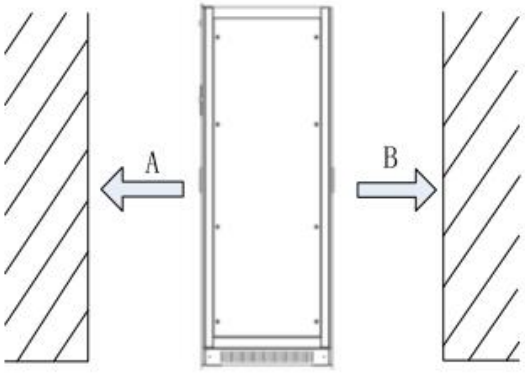


Figure 4- 2 Installation space

A≥1,000mm, make sure that the front door of the cabinet can be fully opened and there is sufficient space for cold air to enter. Users can conveniently insert and extract the module and operate the breaker.

B≥1,000mm, make sure that the rear door of the cabinet can be fully opened. Ventilation and heat dissipation should be ensured. Users can also have sufficient space for product maintenance.

4.3.1.3 Cabinet Installation

After the cabinet is removed to the installation position with a forklift or a tool. The cabinet should be adjusted and removed to the designed position. Then open the internal door of cabinet, and fix the cabinet with M13 screws, as shown in Figure 4- 3.

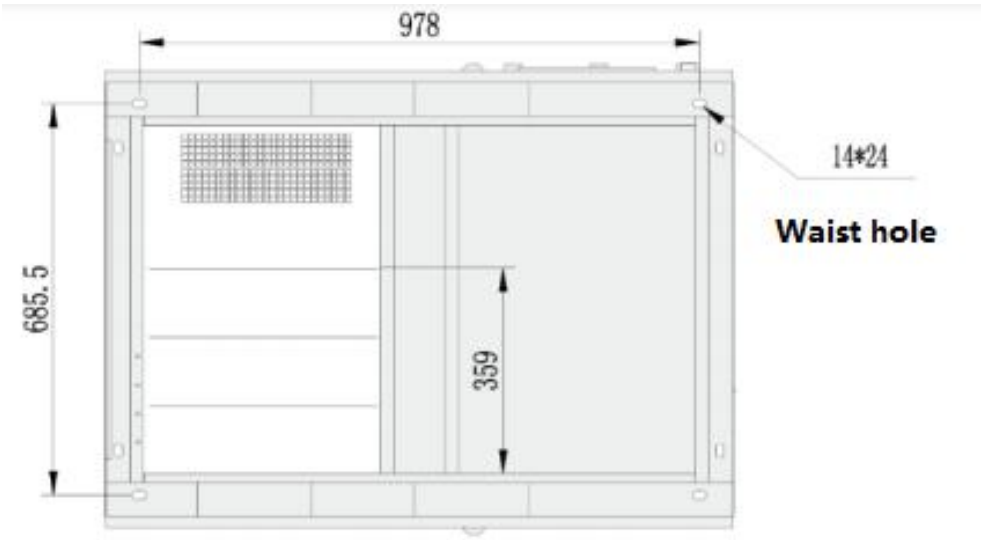


Figure 4- 3 Diagram of the PCS cabinet base

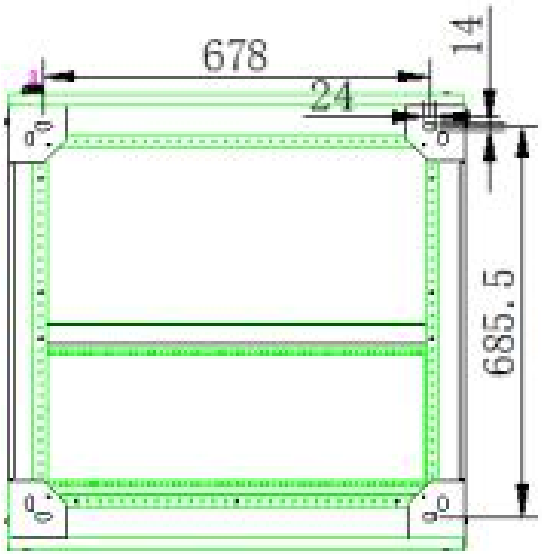


Figure 4-4 Diagram of the STS cabinet base

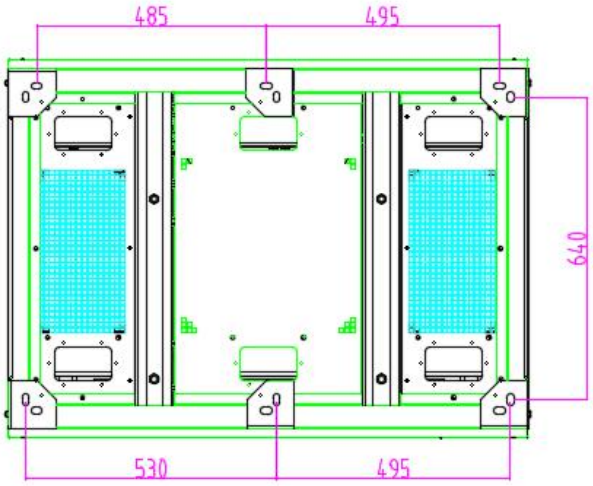


Figure 4-5 Diagram of the Transformer cabinet base

When the cabinet needs to be fixed on the steel channel, Φ14 holes can be made in the steel channel. Fix the cabinet to the steel channel with screws, as shown in Figure 4-6.

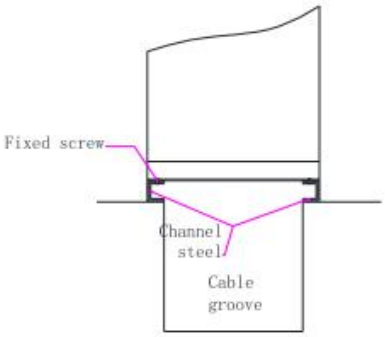


Figure 4-6 Fix the cabinet to the steel channel

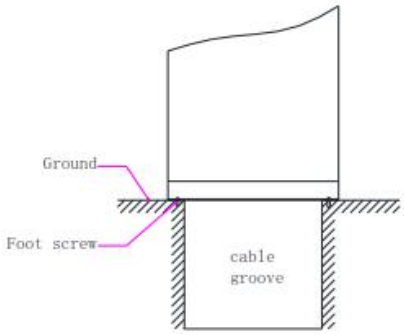


Figure 4-7 Fix the cabinet to the concrete floor

When the cabinet is fixed to the concrete floor, make holes on the floor and fix the cabinet to the concrete floor with expansion screws, as shown in Figure 4-7.

4.3.1.4 Grounding of PCS, transformer, STS

For the AC / DC module in the optical storage all-in-one, ground connection to the cabinet is achieved through its mounting ears. For the grounding of the cabinet, a grounding copper bar is installed at the bottom of the cabinet. When wiring, refer to the cable diameter in the table below to ground the copper bar.

Notice that the AC output neutral is not connected to ground.

Table 20 Grounding PE cable description

Rated power	Copper PE line section recommendation (mm²)
250kW	≥45

Rack and modules need to be grounded reliably! The grounding resistance should be less than 4Ω.

4.3.2. Battery System Installation

4.3.2.1 Battery Rack Installation

That depends on the customer.

4.3.2.2Bettery Installation

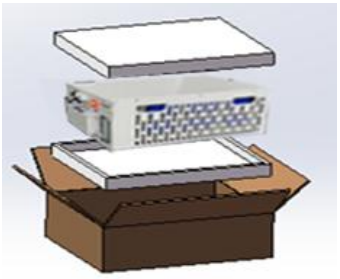


Figure 4-8 Open the packages

Figure 4-9 Diagram of the Battery SN

Step 1：Open all the battery and HV Box packages.

Step 2: Check the Battery No. and cluster No. on the battery cover.

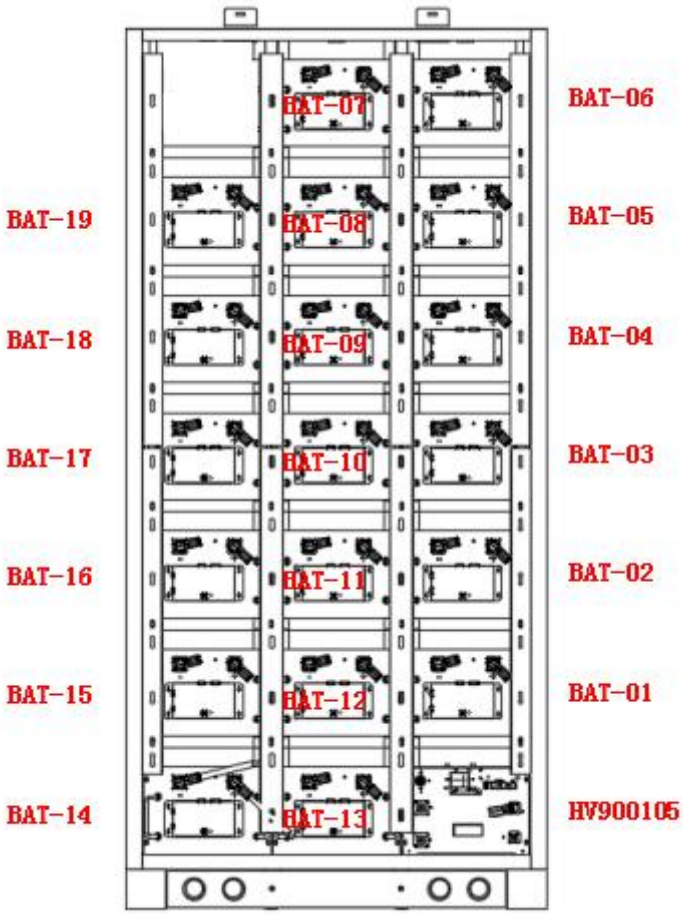


Figure 4-10 Diagram of the bettery rack

Step 3: Put the same cluster of batteries on the same rack with the serial number by turns as the above figure shows.Install the HV900105 box into the lower right corner of the battery rack.

NOTE: All the cluster battery group No. shall be the same.

When you are installing the battery, please avoid scratches because of the heavy battery.

Step 4: After completing one rack, please check whether the installed batteries have the same cluster number and the same battery group number.

Step 5: If there are more than one rack, please repeat step 3 and 4 to install the other battery racks as frist rack.

4.4 Wiring

4.4.1 Battery Side Wiring

4.4.1.1 Communication Cables Connection

A. Please refer to the following figure, connect the communication cables among batteries of each cluster. These cables are in each battery parts list.

B. Take the terminal resistance in the HV900105 and insert it into the top battery COM port of each battery cluster. You can see the detailed information Figure 4-12.

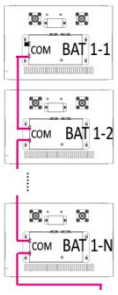


Figure 4-11 Communication cables connection in one cluster

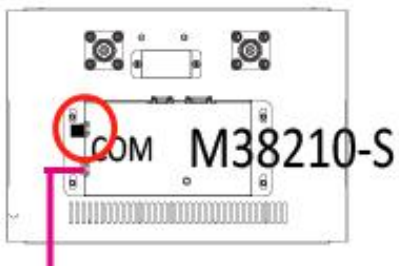


Figure 4-12 Terminal resistance in the top battery of each cluster

C. Connect the bottom battery of each cluster to HV900105 (LMU Port) by using the communication cables from HV900105 parts list.

D. Connect HV900105 (COM Port) in the nearest cluster from TOP BMU and TOP BMU box (COM Port, Port 1 or 2) by using the communication cable from TOP BMU part list. Then connect HV900105 (COM port) one by one by using cable from HV900105 parts list, please see Figure 4-13.

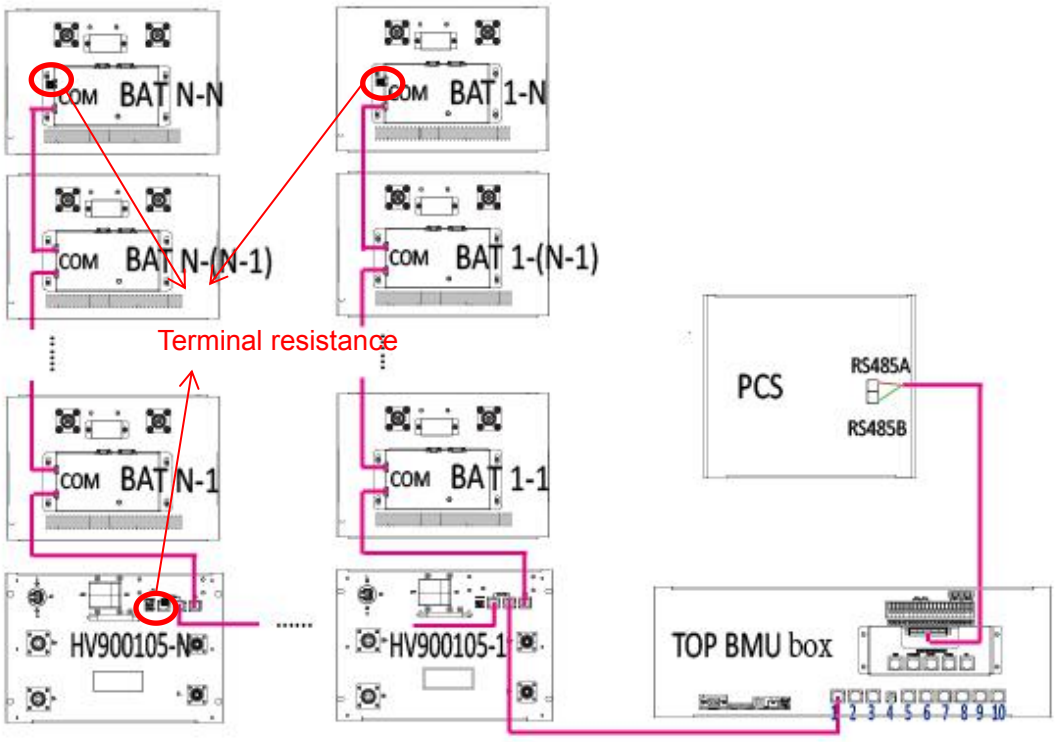
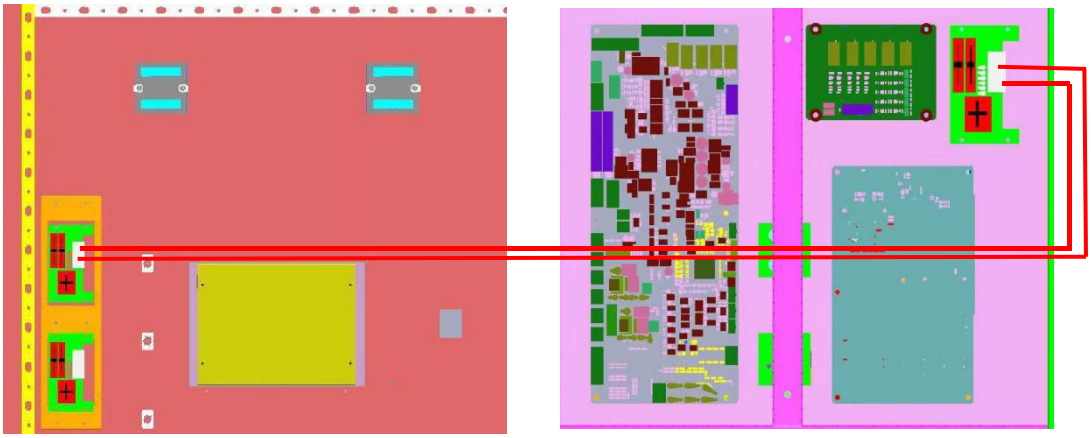


Figure 4-13 Battery side communication cables connection

Note: As shown in the position in the red circle above, the last battery of each battery cluster and the COM port of the last HV900105 need to be inserted with terminating resistances.

E. The CAN communication connection between STS and PCS is shown in Figure 4-14;

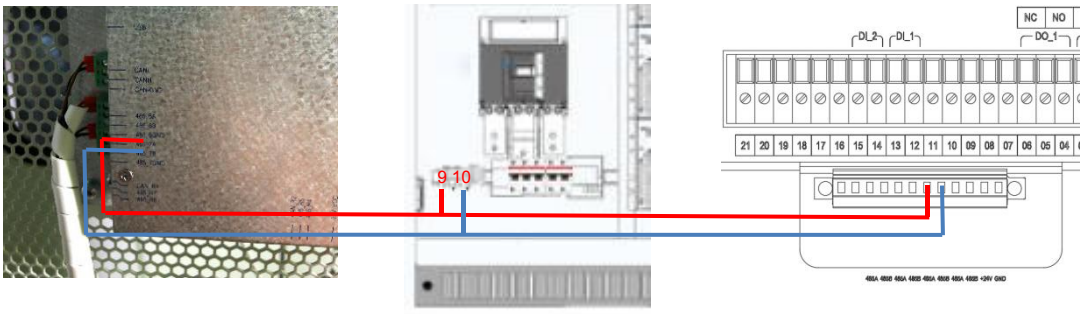


STS Door panel back PCS control board

Figure 4-14 CAN communication connection between STS and PCS

F. When connecting PCS, STS, and EMS, open the front door of the PCS cabinet and remove the lower left protective cover. Observe the communication interface. Use the

RS485 cable from the parts list to connect the TOP BMU (ports 27-485A and 28-485B) to the PCS (ports 9-485A and 10-485B), as shown in Figure 4-15; open STS The front door can see the RS485 interface on the door panel, as shown in Figure 4-15; finally, it is connected to the RS485 communication of the EMS, as shown in Figure 4-15.



STS RS485 interface PCS RS48 interface TOP BMU RS485 interface

Figure 4-15 STS-PCS-TOP BMU connection diagram

PCS wiring board port definition as Table 21 showed:

Table 21 Definition of terminal strip ports of PCS

No.	Terminal	Note
Input signal loop		
1	IN1	BMS fault signal
2	IN1_GND	
3	IN4	On/Off-grid switch node 1
4	IN4_GND	
5	IN5	On/Off-grid switch node 2
6	IN5_GND	
External communication loop		
7	CAN H	Get from external BMS
8	CAN L	
9	485 A	Output external RS485
10	485 B	
External auxiliary power input		
11	L	Obtained from external auxiliary power
12	N	Obtained from external auxiliary power
13	L	Obtained from external auxiliary power
14	N	Obtained from external auxiliary power
15	L	Reserved container fan
16	N	Reserved container fan
17	L	Connected to 500K

		transformer fan
18	N	Connected to 500K transformer fan
19	L	500K transformer temperature control switch
20	N	500K transformer temperature control switch

G. Connect the COM port 9 and COM port 20 of TOP BMU box with a regular net cable.

H. The last COM port of HV900105, which has no cable to connect, should be inserted with the terminal residence from HV900105 parts list. You can see the detailed information Figure 4-16.

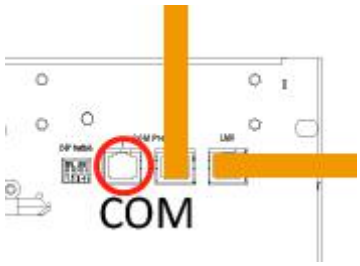


Figure 4-16 Terminal resistance in one of the HV900105

4.4.1.2 Power Cables Connection

Place the relevant power cables to junction cabinet at the first, as shown in Figure 4-17.

Note:The cover of the junction box should be taken off for wiring. The cables should be connected vertically with the copper bars in the junction cabinet.

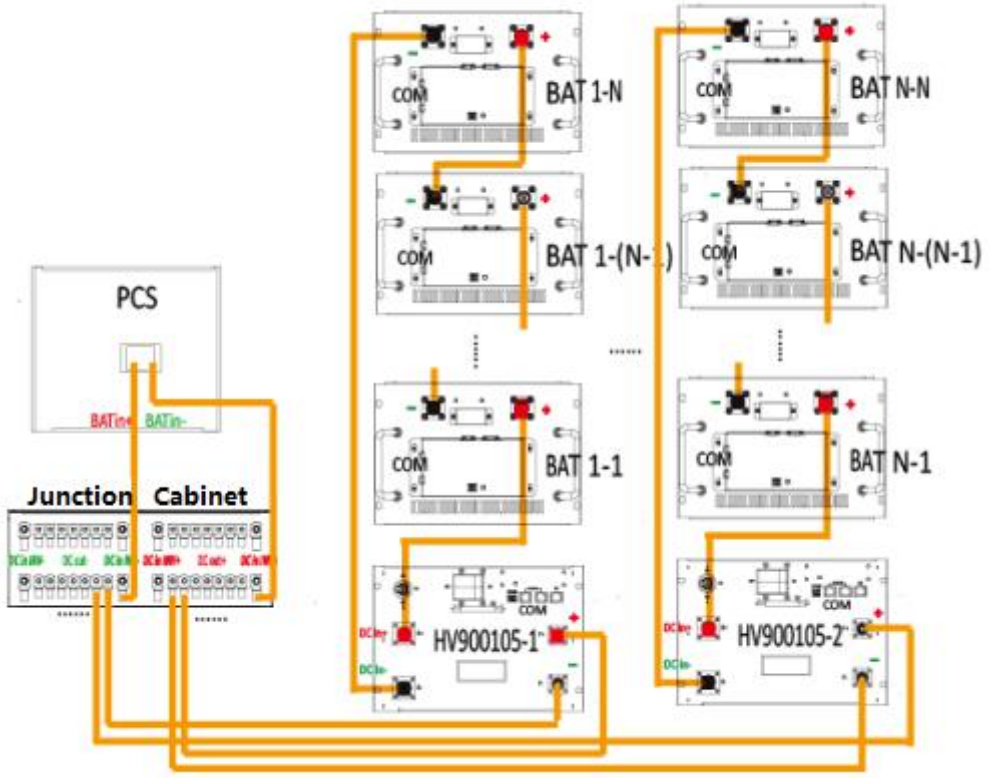


Figure 4-17 Battery side-power cables connection with junction cabinet

After wiring the junction cabinet, please fix it on the rack by using the screws and grounding serrated washers in junction cabinet parts list.

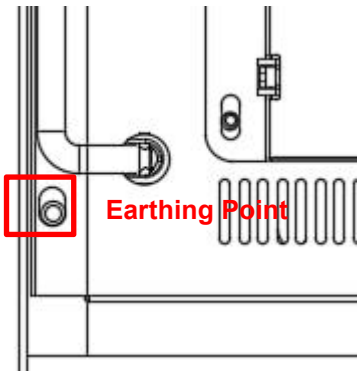


Figure 4-18 The diagram of earthing point

After wiring the battery side, please fix each box with the four screws and four grounding serrated washers to the racks. These screws and grounding serrated washers are shipped in the corresponding batteries, HV900105, Top BMU box, Junction box packages.

4.4.3 Dry Contact Description

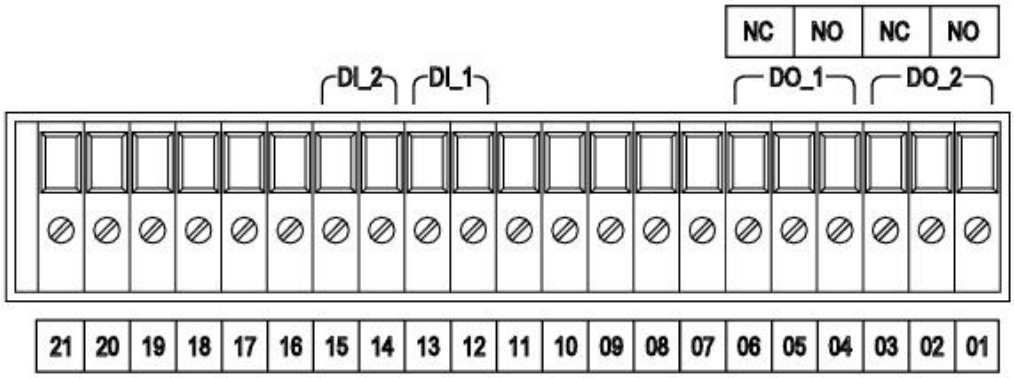


Figure 4-19 Dry contact terminal block

A. Connect DO_2 to the dry contact of the diesel generator, port 2 and 3 (normally closed contact), 1 and 2 (normally open), you can connect the diesel dry contact to control the 1 and 2.

B. Connect DI_2 to the fire fighting dry contact, port 14 and 15 are respectively corresponding to the composite fire alarm of connecting fire fighting. (if required)

C. Please connect the diesel control dry contact as the below picture shows:

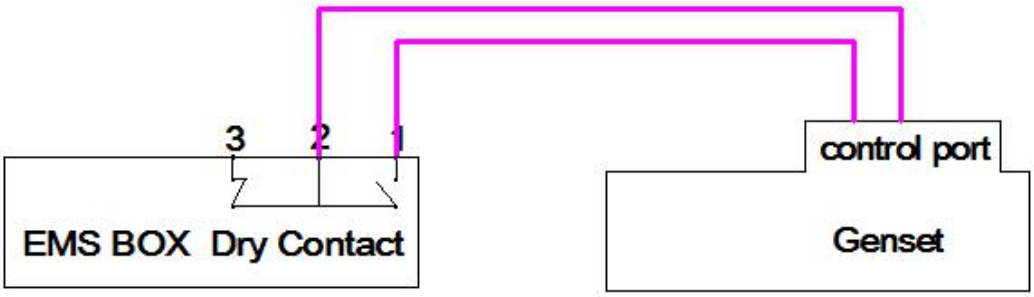


Figure 4-20 The diagram of dry contact wiring

Notes: Normally open/closed contact which connects the Genset according to the genset controller.

4.4.1. PCS Side-Wiring

The PCS cabinet adopts the wiring mode of bottom-in and bottom-out, and the cables hang down into the cable trench through the through holes on the base. Open the front door and remove the inner door, you can see the wiring copper bar. For the requirements of connecting cables on the generator side, single or multiple cables with appropriate diameters should be selected.

For Storion-TB250: 2*95 mm² copper core cable is recommended for each phase；

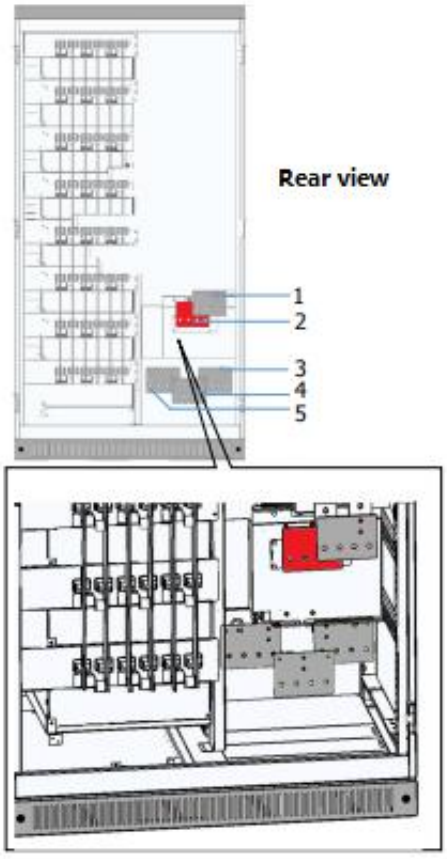


Figure 4-21 PCS wiring diagram

Table 22 PCS terminal blocks

NO	Describe
1	BAT Input +
2	BAT Input -
3	Grid / Generator Input L1
4	Grid / Generator Input L2
5	Grid / Generator Input L3

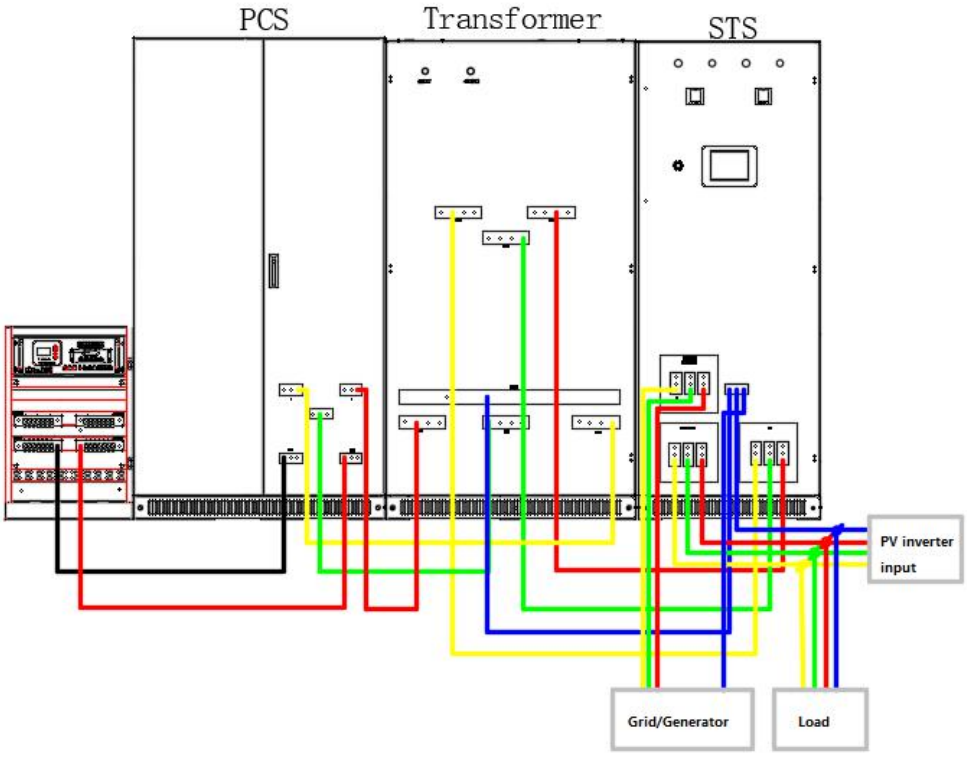


Figure 4-22 System wiring diagram

4.4.2. System grounding

The grounding of power modules/PCS connection with the rack go through hangers on the module.

As for rack grounding, the rack bottom is installed with grounded cooper bars. During wiring, refer to the following table for cable diameter.

WARNING

Notice that the AC output neutral is not connected to ground.Rack and modules need to be grounded reliably! The grounding resistance should be less than 4Ω.

4.4.3. Meter Wiring

Please refer to the following diagram to connect the CT meter.

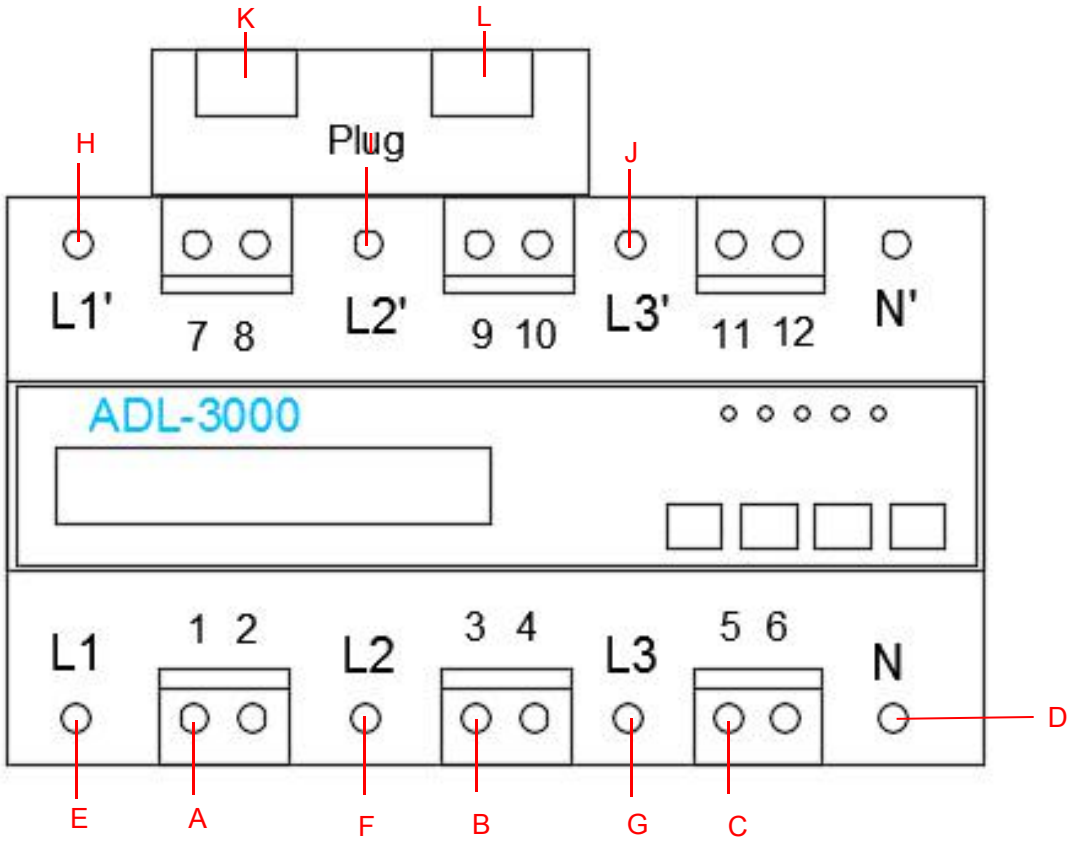


Figure 4-23 Schematic diagram of the appearance of the meter

Table 23 Ports Description

Object	Name	Description
A	Power port 1	Connect to L1
B	Power port 2	Connect to L2
C	Power port 3	Connect to L3
D	Power port N	Connect to N
E	CT1 sampling line wiring port +	Connect to S1 of CT1
F	CT2 sampling line wiring port +	Connect to S1 of CT2
G	CT3 sampling line wiring port +	Connect to S1 of CT3
H	CT1 sampling line wiring port -	Connect to S2 of CT1
I	CT2 sampling line wiring port -	Connect to S2 of CT2
J	CT3 sampling line wiring port -	Connect to S2 of CT3
K	Meter communication port 1	Connect to EMS or other meters through network cable to realize communication

		between devices.
L	Meter communication port 2	Connect to EMS or other meters through network cable to realize communication between devices.

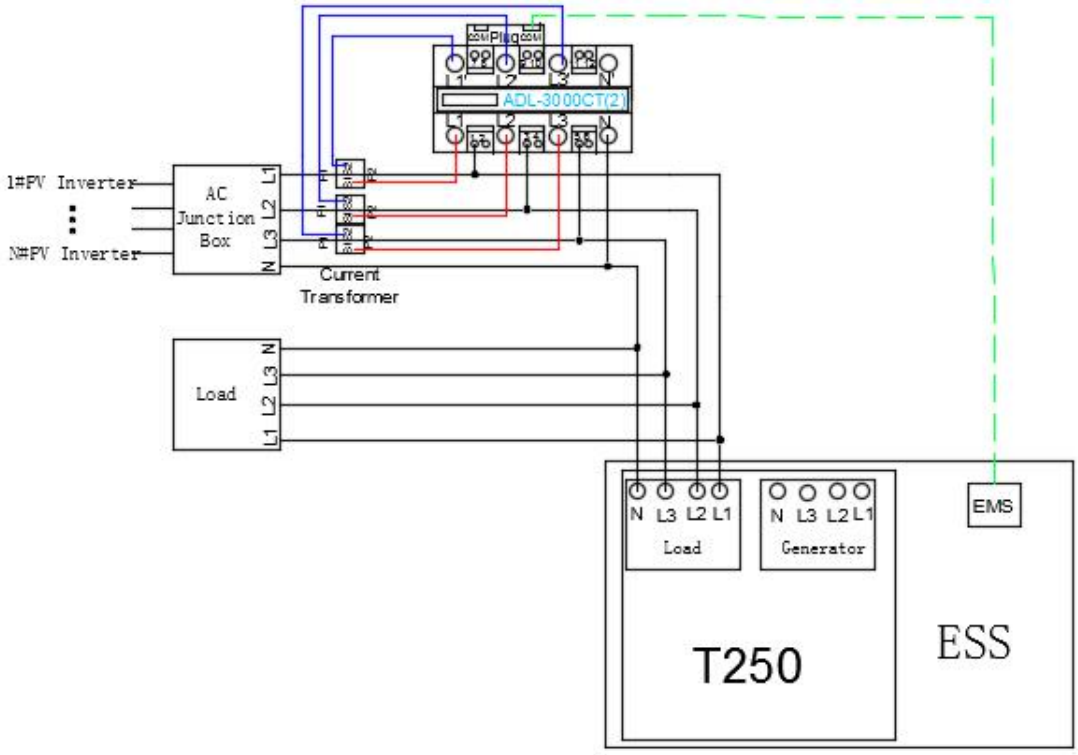


Figure 4-24 Meter wiring diagram

The meter net cable should be connected to TOP BMU COM 6.

4.4.2.1 AC Auxiliary Power Cable Connection

Please connect the AC auxiliary power inputs of each HV900105 with the Grid/GEN L phase (anyone of L1, L2 and L3 phase) and N pole of PCS by using the AC auxiliary power cable in HV900105 parts list as the following figure shows.

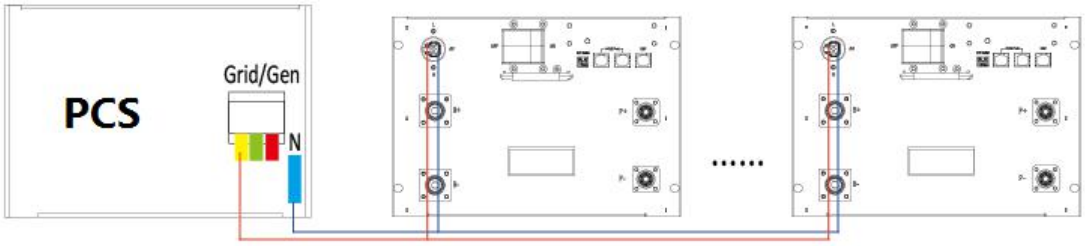


Figure 4-25 AC Auxiliary Power Cable Connection

Notes: The auxiliary power cable bond must be placed above the AC power cable bond. After this please tighten the screw.

5. Operation

Please refer to the Operation Manual for details.

6. Remove the Communication Shorting Screw

When the system is running normally and the system starts commission, remove the communication shorting screw on the PCS (terminal 1, 2). For the detailed commission steps, refer to the commission list.

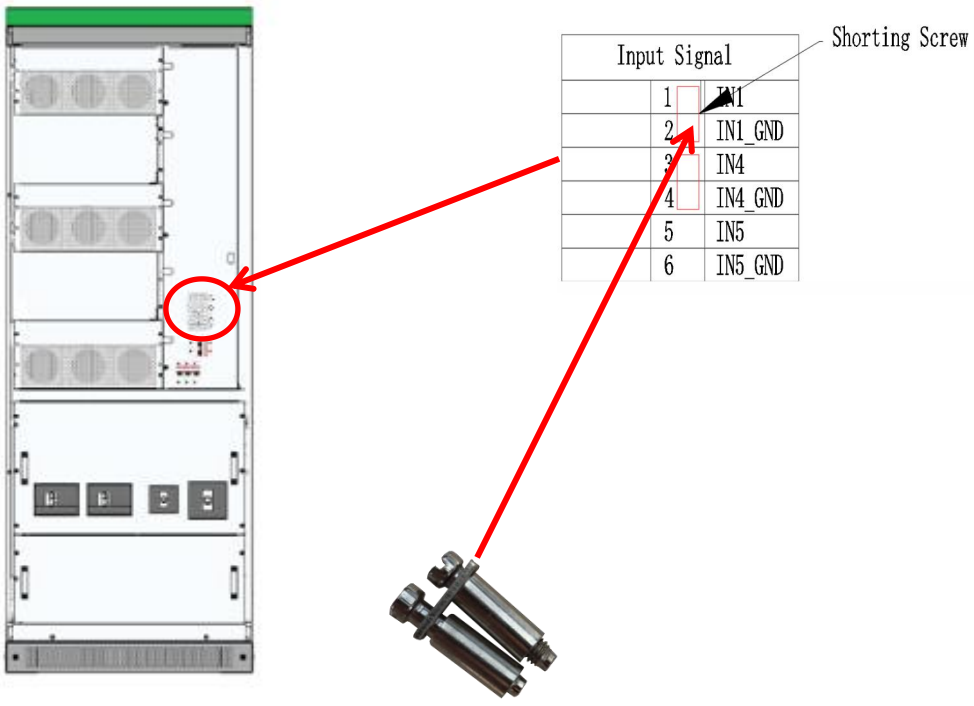


Figure 6-1 Remove the communication shorting screw

NOTE: Don't throw away the communication short-circuit screw and store it so that we can use it later.

7. Contact

If you have technical problems with our products, please contact the service hotline. Please provide the following information to help you with the necessary assistance:

• Equipment model
• Serial number
• Battery type and number, or PV modules number and string type.
• Communication type
• Firmware version
• Error number and error message