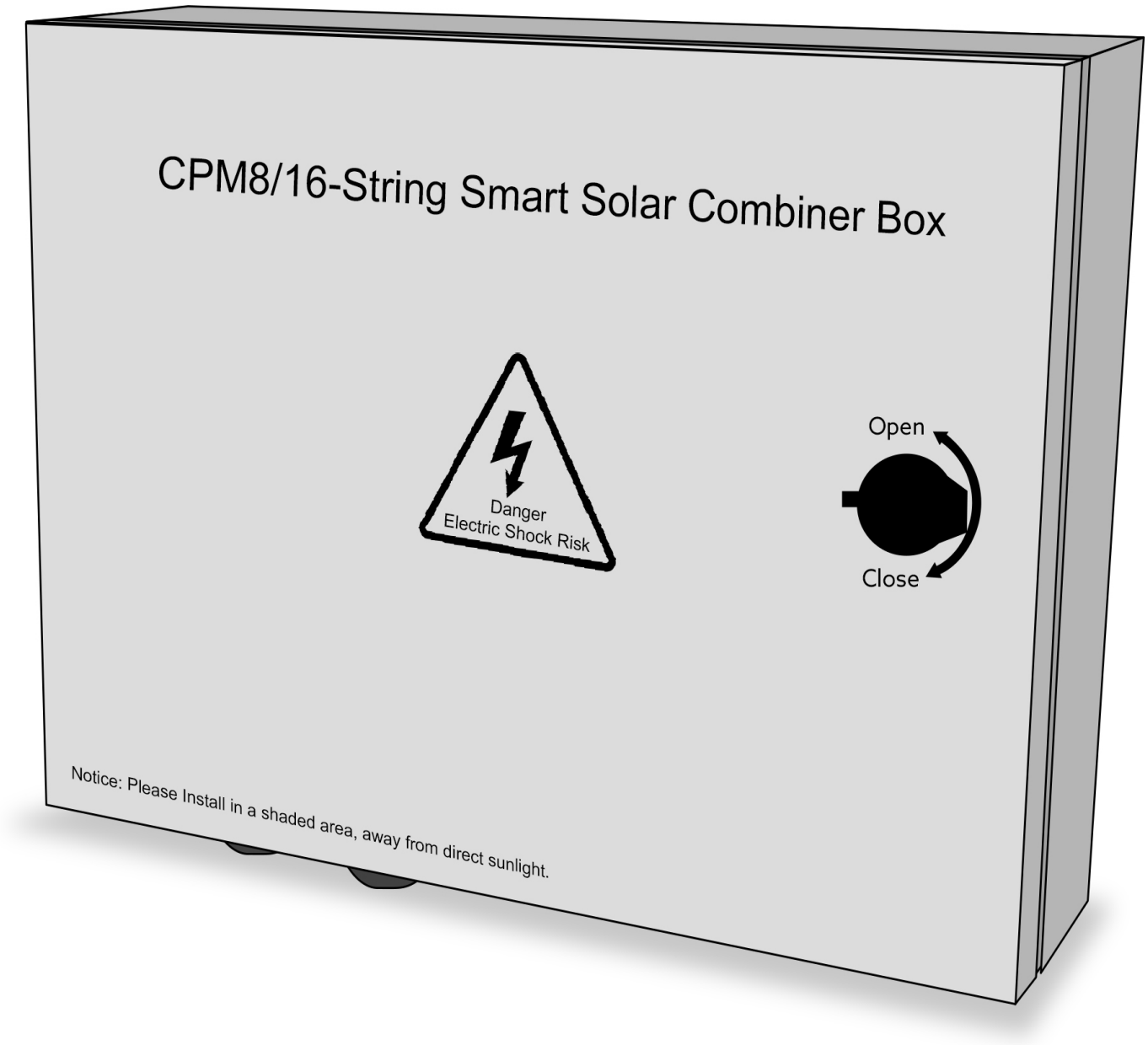
User Manual



CPM Smart Solar Combiner Box

- Please read this user manual carefully before use and keep it properly for future reference.
- Images are for reference only, actual products may vary.

V1.0

Content

1 About This Manual

1.1 Applicability

This manual is applicable to the following smart solar combiner box series:

• CPM8

• CPM16

Unless otherwise specified, the term "combiner box" will be used hereinafter.

1.2 Intended Users

This manual is intended for personnel involved in the transportation, installation, and operation of this product. This manual is intended for personnel involved in the transportation, installation, and operation of this product. The personnel must meet at least the following requirements:

• Possess a certain level of professional knowledge in electronics, electrical wiring, and mechanical engineering, and be familiar with electrical and mechanical schematics.

• Familiar with the components and working principles of the stacked photovoltaic power generation system, as well as the combiner box and its upstream and downstream equipment.

• Have received professional training related to electrical equipment installation and trial operation.

• Familiar with the relevant standards and regulations of the country or region where the project is located.

• Familiar with the content described in this manual.

Only personnel who meet the above requirements are allowed to perform installation, operation, maintenance, and other tasks on the combiner box. Unauthorized personnel are not allowed to perform any operations on the combiner box to prevent accidents.

1.3 Manual Usage

Before using this product, please read this manual carefully. Keep this manual together with all other product components so that relevant personnel can easily access the manual when needed.

The content of the manual will be continuously updated and revised; however, minor discrepancies between the manual and the actual product and errors may occur. Please refer to the actual product for accurate information.

1.4 Mark Usage

In order to ensure the safety of users and their property while using this product and to use the product efficiently, the manual provides relevant information and highlights it with appropriate marks. The following symbols will be used throughout this manual. Please review them carefully to make the most effective use of this manual.

Danger

"Danger" indicates a high potential hazard that could result in serious injury or death if not avoided.

Warning

"Warning" indicates a moderate potential hazard that could result in serious injury or death if not avoided.

Caution

"Caution" indicates a low potential hazard that could result in moderate or minor injury if not avoided.

Attention

"Attention" indicates a potential risk that could result in equipment malfunction or property damage if not avoided.

"Note" provides additional information in the manual, emphasizing and supplementing the content. It may also offer tips or suggestions for optimizing product usage, helping you solve problems or save time.

Please note the warning marks on the device, which include the following:

Mark	Definition
	This mark indicates that the device contains high voltage internally, and touching it may post a risk of electric shock.
	This symbol indicates the protective grounding terminal, which must be securely grounded to ensure the safety of the operator.

2 Safety Precautions

Please read the contents of this chapter carefully before installing and using the combiner box. Our company reserves the right to deny liability and warranty for any injury to personnel or damage to equipment resulting from failure to follow the safety instructions in this manual.

Danger

Photovoltaic modules carry electrical voltage, and accidental contact can lead to electric shock or severe burns. When wiring the combiner box, the following safety precautions must be observed:

- Before wiring, please disconnect the connections at the end of the photovoltaic modules.
- Before wiring, use a multimeter to measure the DC voltage. It is recommended to use a multimeter with a voltage rating of no less than 200V for measurement.
- Please follow all safety instructions provided by the solar panel manufacturer.

Danger

Damaged equipment or system malfunctions can result in electric shock or fire hazards!

- Conduct a preliminary visual inspection of the equipment before operation to check for any damage or potential hazards.
- Check that other external devices or circuit connections are in a safe condition.

Make sure the equipment is in a safe condition before operation.

Danger

Touching the internal terminals of the device may cause death by electric shock or fire!

- Do not touch the terminals or conductors connected to the combiner box or adapters.
- Follow all instructions and safety documentation related to combiner box connections.

Danger

There may be high voltage electric shock danger inside the product!

- Pay attention to and follow the warning marks on the products.
- Follow the safety precautions listed in this manual and other documents related to the equipment.

Danger

Grounding cables must be well grounded, otherwise:

- Failure to follow safety precautions may pose a fatal electric shock hazard to the operator!
- Lightning strikes may cause damage to the equipment!

Warning

The wrong cable connection can damage photovoltaic panels, combiner boxes, and adapters.
When connecting cables, please observe the following precautions:
• Connect cables according to the wiring diagram.
• Measure the open circuit voltage of the photovoltaic module before wiring to ensure that the DC input voltage range meets the device requirements.
• Before wiring, identify the positive and negative polarities of the cables and ensure that there is no grounding fault.

Warning

• Only professional electricians or personnel with professional qualifications can operate and wire this product.
• All operations and wiring must comply with the relevant national and local standards.
• Warning marks must be clearly visible and should be replaced immediately if damaged.

Warning

When connecting cables, ensure that the screws on the wiring terminals of the combiner box are properly secured. If the copper core of the cable cannot fully connect with and be tightened to the terminal, the terminal will heat up and burn under a long working time. Multi-strand copper core fire-retardant cables must be used, and the wire diameter is not less than the recommended value in the appendix.
Fasten the nuts of the waterproof terminals. Otherwise, water leakage may occur and the combiner box may be damaged.

Warning

Do not operate with load before inspecting or replacing the fuse! The fuse must be installed or removed when there is no load, to avoid arc damage to the equipment and potential personal injury.

Attention

After operation, please ensure that the combiner box cover is securely locked.
Avoid frequently opening the combiner box cover to prevent affecting its waterproof performance.

Caution

Contact with or improper handling of printed circuit boards or other electrostatic-sensitive components may result in damage to the devices.
• During installation, avoid touching any parts inside the combiner box other than the terminal blocks.
• Follow electrostatic protection guidelines and wear an anti-static wrist strap.

3 Product Introduction

3.1 System Introduction

3.1.1 Overview

For the photovoltaic stacked power generation system, in order to facilitate maintenance and improve reliability and operability, it is generally necessary to add a DC combiner device between the photovoltaic modules and the load side.
This series is specifically designed to meet these requirements and, when paired with our AX series adapter, creates a comprehensive photovoltaic power generation system solution.

3.1.2 Features

Safety and Reliability
• Dedicated secondary surge protector for photovoltaic systems.
• Integrated communication lightning protection function to enhance communication reliability.
• IP66 protection rating, meeting outdoor installation requirements.

Flexible Solution
• Support MC4 connector, easy wiring.
• The output supports copper or aluminum core cables, offering convenient selection.
• Optional DC PLC communication, low cost networking.
• Optional 8 or 16 input strings, flexible design.

Easy Operation and Maintenance
• Modular design, easy and quick maintenance.
• Built-in monitoring module, real-time monitoring of equipment operation status.
• Monitoring the voltage and current of photovoltaic modules, as well as busbar voltage, to promptly detect any abnormalities in the modules.

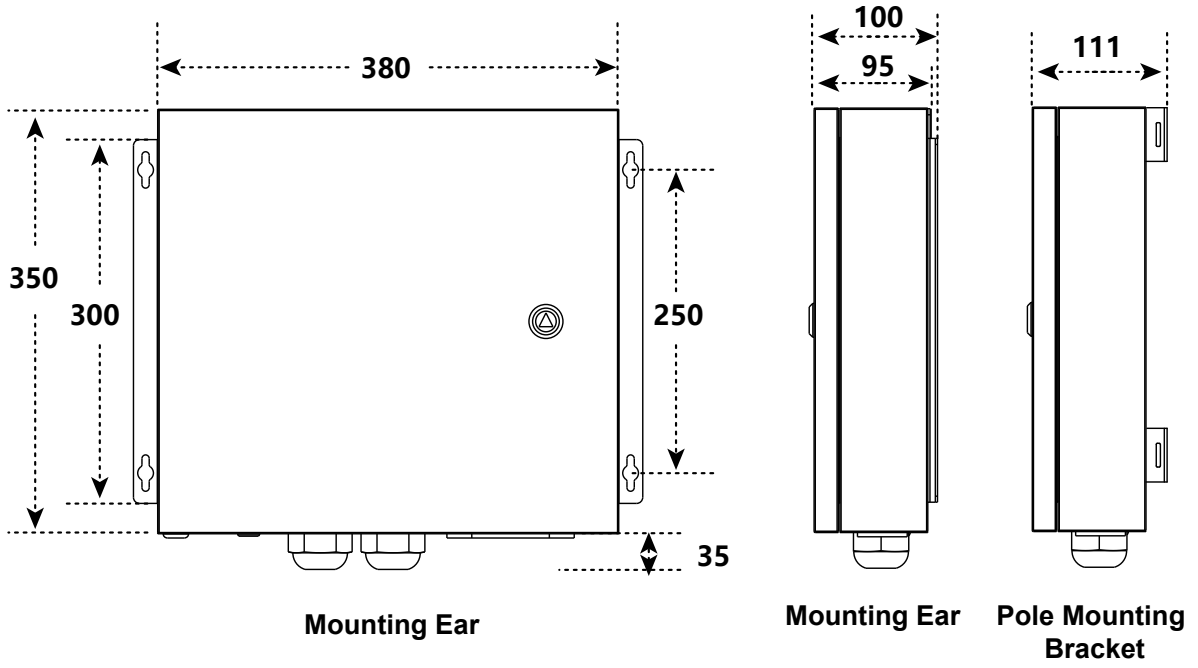
3.2 Product Conponents

3.2.1 Product List

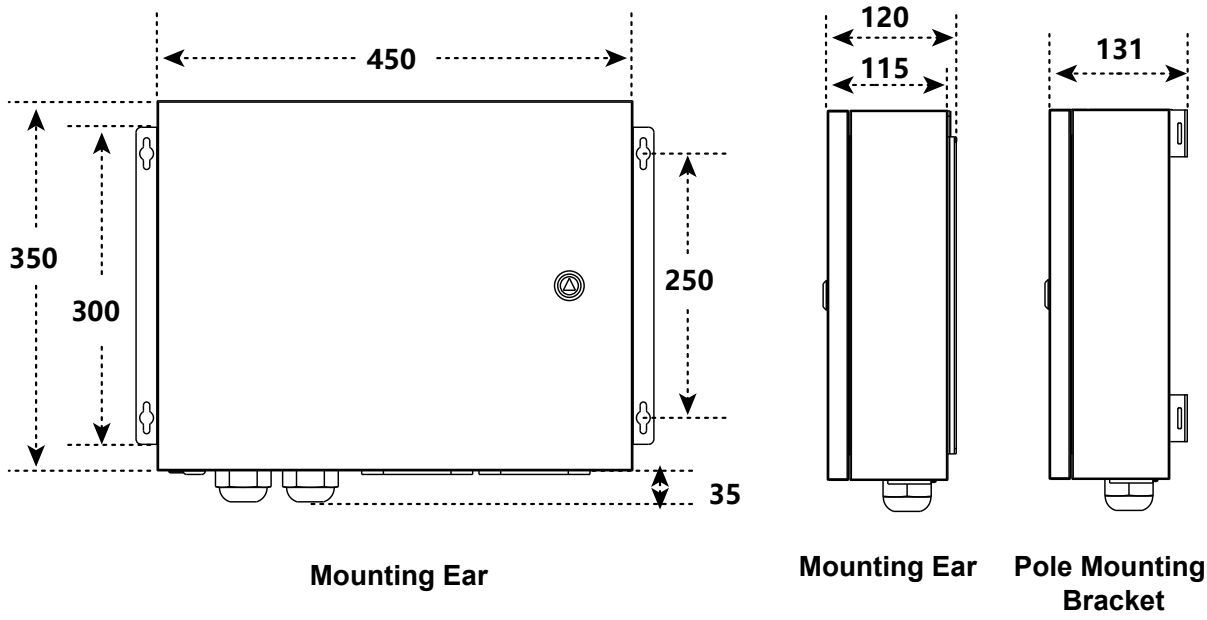
Number	Item	Description	Quantity
A	Combiner Box	—	1
B	Mounting Ear	Used for wall-mounted installation and fixation of the combiner box.	2 (Default)
C	Pole Mounting Bracket	Used for pole-mounted installation and fixation of the combiner box.	2 (Optional)
D	Adapter	Used to enhance the efficiency of PV modules.	1~16 (Optional)
E	Accessory Package	Includes truss head self-tapping screws M5*60, 8*60 expension tube (For battery input) copper lug terminal OT50-8 (For adapter) bare U-shaped terminal UT6-4	4 2 2*N (N is the quantity of adapters)
F	Fuse	Used for spare fuse module inside the combiner box. (25A)	2
G	User Manual	—	1
H	Triangle Key	Used to open/lock the combiner box	1
I	Firestop Putty	For terminal sealing.	1 (CPM8) 2 (CPM16)

3.2.2 Product Dimensions

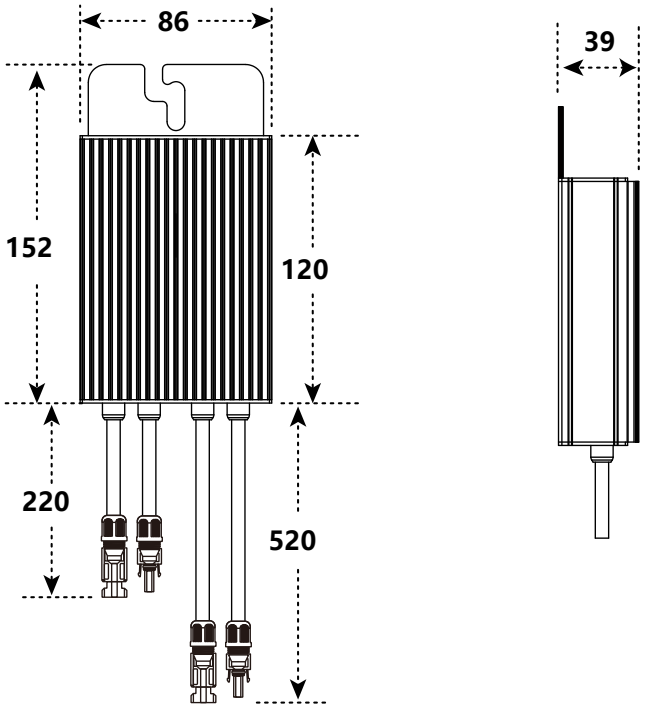
Model: CPM8
Unit: mm



Model: CPM16
Unit: mm

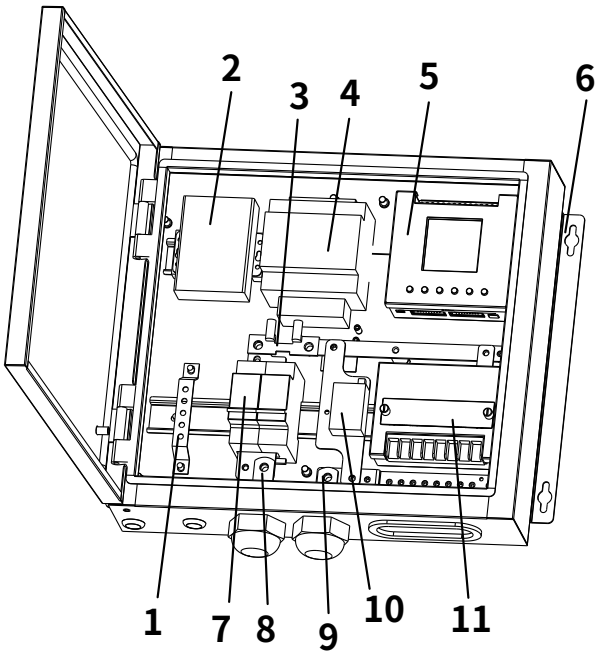


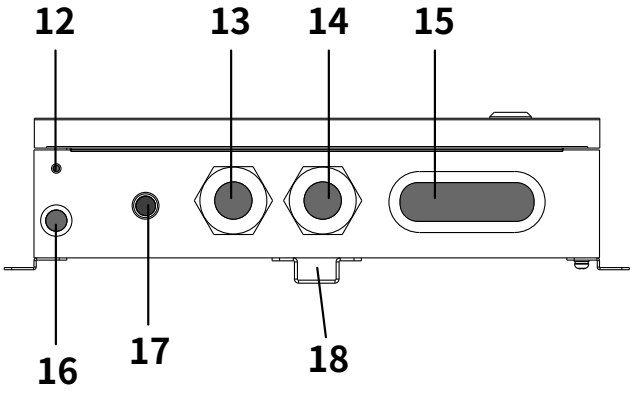
Model: AX550/650
Unit: mm



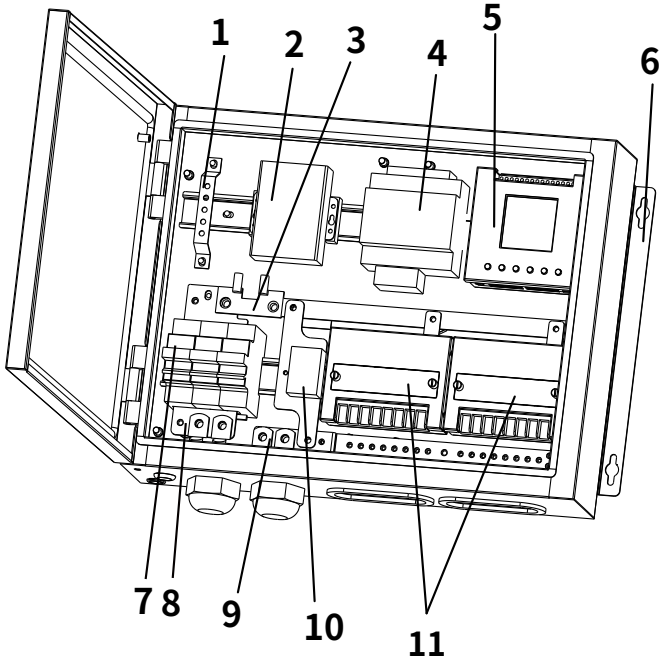
3.2.3 Product Structure

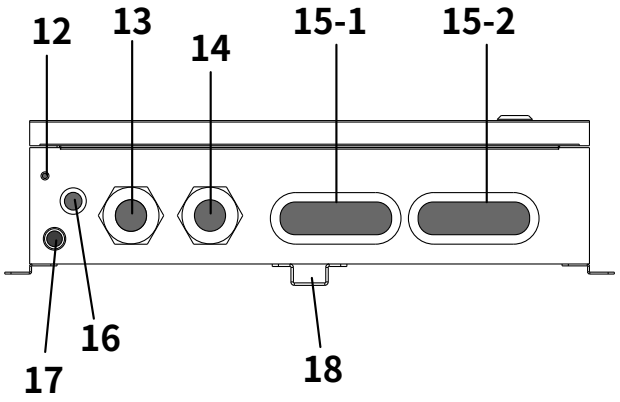
Model: CPM8



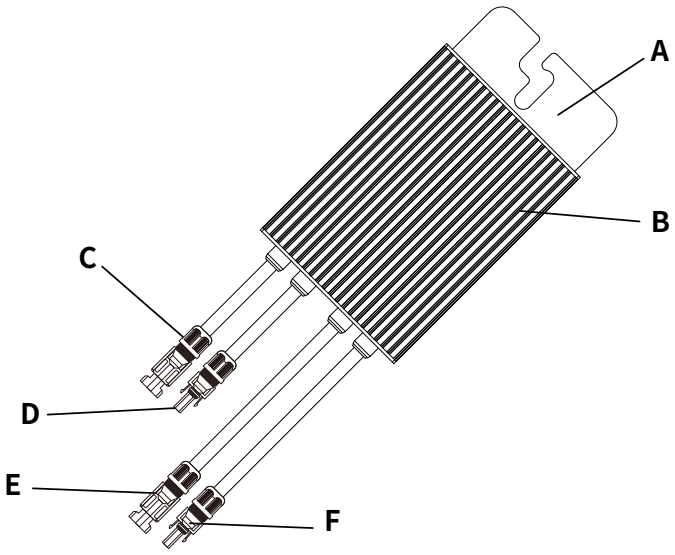


Model: CPM16





1	Grounding Busbar	8	BAT Negative Copper Busbar	15	Adapter Output Connection Port 1-4 String
2	DTU	9	BAT Positive Copper Busbar	16	Adapter Output Connection Port 5-8 String
3	Shunt	10	Surge Protection	15-1	Adapter Output Connection Port 1-8 String
4	Meter	11	Fuse Module	16-1	Adapter Output Connection Port 9-16 String
5	Control Display Screen	12	Grounding Terminal	17	Antenna Port
6	Mounting Ear	13	Output Cable Port (Negative)	18	Pole Mounting Bracket
7	Circuit Breaker	14	Output Cable Port (Positive)	19	



A	Back Panel / Mounting Panel
B	Heat Dissipation Enclosure
C	OUT- (Negative)
D	OUT+ (Positive)
E	PV+ (Positive)
F	PV- (Negative)

4 Delivery, Storage, and Installation

4.1 Check the integrity of the Product

Before leaving the factory, the combiner box has been carefully inspected by quality control department and securely packaged. However, during transportation, there may still be a risk of the equipment being bumped or even damaged.

Upon receiving the combiner box, it is essential to first check its integrity and condition of the goods after transport. At least the following items in the user manual should be thoroughly verified:

• Verify that all product components are complete by checking against the packing list.

• Confirm that the model of the combiner box and internal equipments received matches the model you ordered.

• Carefully inspect the internal and external equipments of the combiner box to check if any damage occurred during transportation.

If any issues or concerns arise during the inspection, please contact the carrier or our company promptly.

Warning

Only a combiner box that is complete and free of any damage can be installed and undergo trial operation. Before installation, please ensure the following:

• The combiner box itself is intact and free of any damage.

• The internal and external equipments of the combiner box are both intact and free of any damage.

4.2 Storage

If not put into operation immediately, the combiner box should be stored under specific environmental conditions:

• The combiner box with packaging should be stored in a ventilated, dry, and clean indoor environment, and a desiccant should be kept inside.

• The storage carrier should be capable of supporting the weight of the combiner box along with its outer packaging.

• The number of layers of combiner boxes stacked should not exceed the "maximum stacking limit" indicated on the outer packaging.

• The packaging box should not be tilted or inverted.

• When storing the equipment, ensure proper ventilation and moisture prevention. Do not store the equipment in an environment with water.

• The storage temperature range is -40°C to +70°C, with a relative humidity range of 0% to 95%, noncondensing.

• Be mindful of extreme environments, such as sudden cold, heat, or impacts, to avoid causing damage to the combiner box.

• If the storage time exceeds six months, a thorough inspection and testing by a professional are required before the equipment is put into operation.

• Perform regular inspections, generally no less than once a week. Check if the packaging is intact and undamaged, and prevent insect or rodent infestation. If the outer packaging is damaged, it should be replaced immediately.

Attention

Do not store without packaging!

Do not store outdoors or in environments with direct sunlight!

Do not store the combiner box tilted or inverted!

Attention

After long-term storage, a thorough inspection should be carried out before installing the combiner box to ensure it is intact. If necessary, it should be tested by professionals before installation.

4.3 Selection of Installation Environment

The combiner box is suitable for outdoor or indoor installation. The following requirements should be met:

• The installation location should fully consider the size and weight of the combiner box. It should be installed as close as possible to the photovoltaic modules for better combiner functionality and to reduce cable usage.

• The installation environment temperature should be between -40°C and +60°C, with a relative humidity between 0% and 95%. It should be installed in a dry, well-ventilated, and dust-free location.

• For base station projects, the combiner box should be installed in a shaded area of the photovoltaic panel rack, using a vertical installation method. To improve heat dissipation and facilitate daily maintenance, sufficient space should be maintained around the combiner box in all directions.

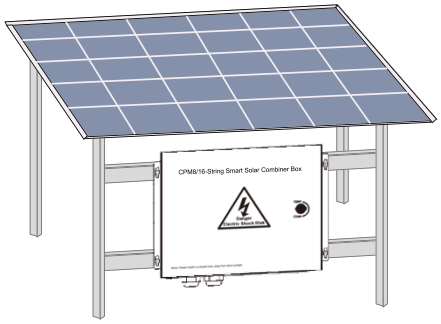
Attention

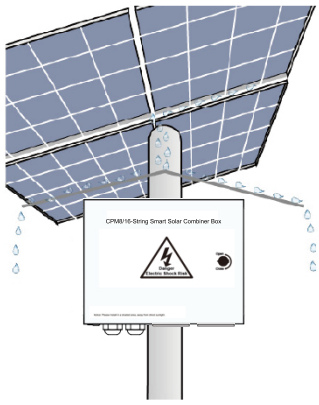
Moisture during the installation process can lead to damage to the combiner box. Do not install the combiner box during rain or when the humidity is high. After installation, ensure the waterproof terminals are securely tightened to prevent moisture from entering. Once wiring is complete, seal any unused terminals.

4.4 Installation

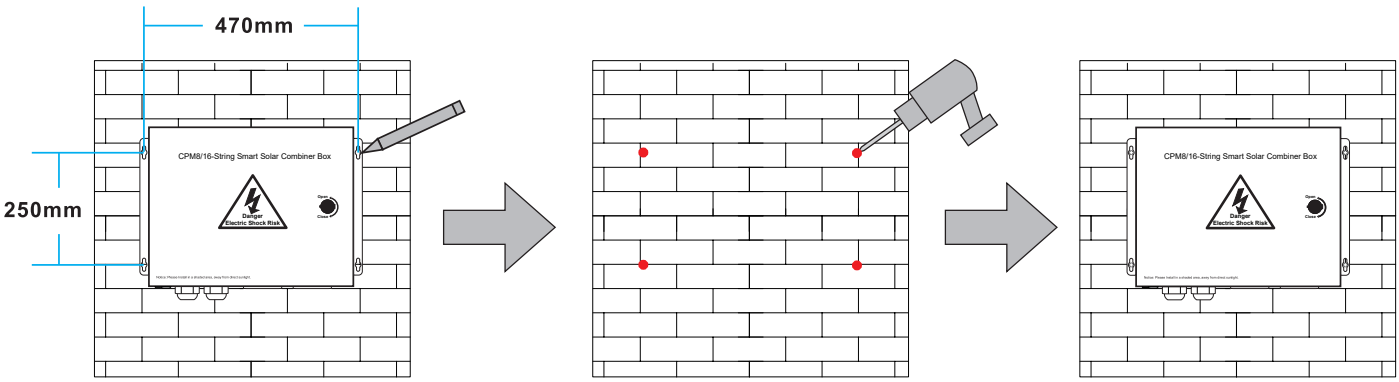
Fix the combiner box to the installation surface.

On-site, for easier future maintenance, choose an appropriate height to install the combiner box on the wall, rack, or the back of the photovoltaic modules.





Example：Wall-Mounted Type



5 Electrical Connection

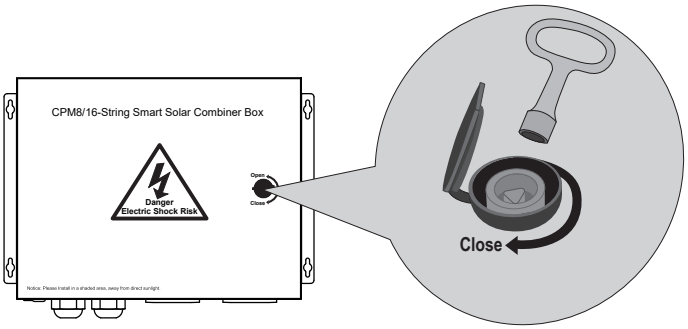
5.1 Preparation before Wiring

5.1.1 Open the Combiner Box

Attention

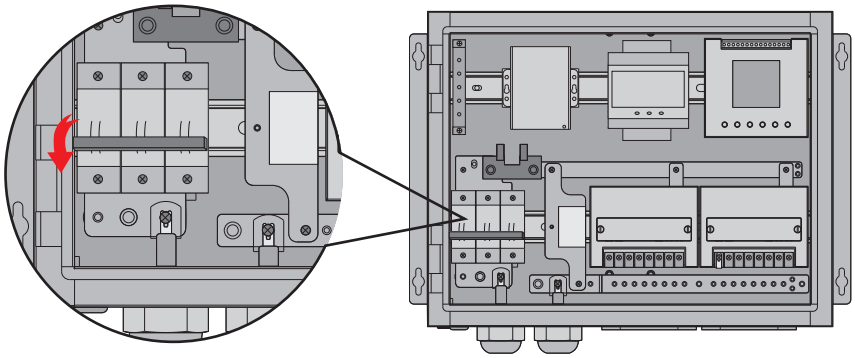
To prevent moisture from entering the combiner box, do not open the combiner box on rainy or snowy days. If this is unavoidable, take appropriate protective measures.

Use the dedicated key provided in the accessories and turn the key according to the direction indicated on the lock to open the combiner box.



5.1.2 Power off Preparation

Check if the circuit breaker inside the combiner box is in the 'OFF' (disconnected) position.



5.2 Wiring

5.2.1 Wiring Steps

Please use photovoltaic dedicated copper core cables for the input terminal of the combiner box. The recommended specifications are as follows.

Specifications	Current	Wire Type
2.5mm^2	15A	Copper Core
4mm^2 (Recommended)	25A	Copper Core
6mm^2	36A	Copper Core

Please use photovoltaic-specific copper core cables for the output terminal of the combiner box. The recommended specifications are as follows.

Specifications	Current	Wire Type
35mm^2 (recommended for CPM8) and above	150A	Copper Core
35mm^2 x2 (recommended for CPM16) and above	300A	Copper Core

Danger

The photovoltaic modules and the battery system carry voltage, and contact with them can result in electric shock or severe burns. When wiring the combiner box, the following safety precautions must be followed:

• Before wiring, please disconnect the connection at the end of the photovoltaic module, and set the combiner box output circuit breaker to "OFF."

• Before wiring, please measure the DC voltage with a multimeter. It is recommended to use a multimeter with a voltage rating of no less than 200V to avoid serious consequences.

• When connecting the photovoltaic modules, please follow all safety instructions provided by the solar panel manufacturer.

Warning

Incorrect cable connections can cause damage to photovoltaic panels, combiner boxes, and other equipment. The following precautions must be followed during wiring:

• Wire according to the wiring diagram.

• Before wiring, be sure to measure each positive and negative terminal using a multimeter with a voltage rating of no less than 200V and ensure there is no reverse polarity!

• Before wiring, identify the positive and negative polarity of the modules and confirm there are no grounding faults.

• On-site wiring does not support star connection method.

Warning

When wiring, ensure that the terminal screws of the combiner box are properly tightened. If the copper core of the cable does not make sufficient contact with the terminal or is not properly tightened, prolonged operation may cause the terminal to overheat and burn out!

Please use multi-strand copper core fire-retardant cables, with a wire gauge not smaller than the recommended values in the appendix.

The waterproof terminal nuts must be securely tightened to prevent water ingress, which could damage the combiner box. If necessary, use firestop sealant for sealing.

Connect according to the steps shown in the diagram:

Step 1: Turn off the circuit breaker (marked 'A' below) inside the combiner box;

Step 2: Connect the positive and negative cables of the battery 'BAT' (serial number " ① ")

* **Step 3:** Connect the cable of the modules (serial number ' ② ') according to the project configuration and ensure it is securely tightened;

Connect the positive and negative terminals of the 1# adapter module input to the corresponding positive/negative terminals of input module 1.

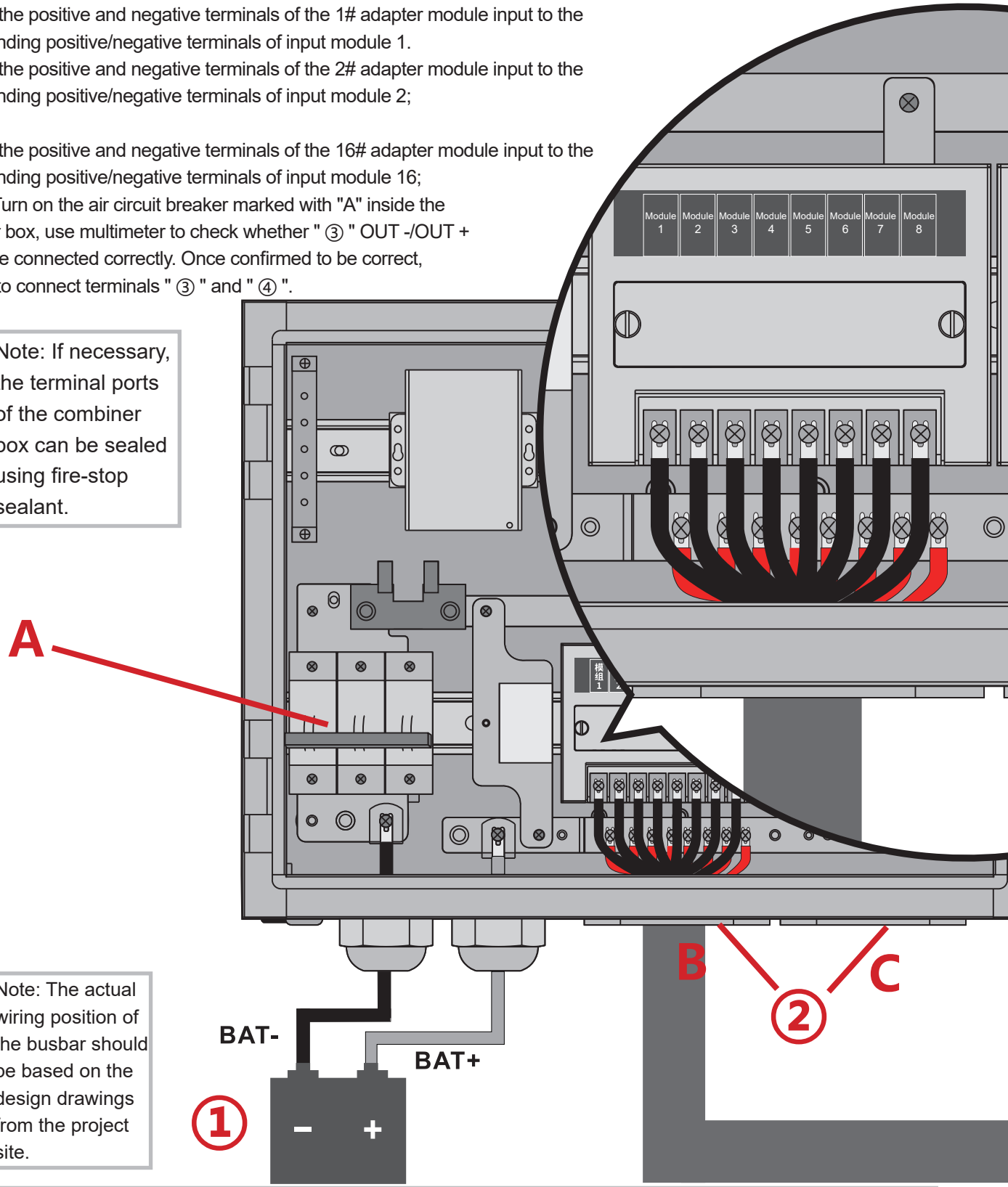
Connect the positive and negative terminals of the 2# adapter module input to the corresponding positive/negative terminals of input module 2;

…

Connect the positive and negative terminals of the 16# adapter module input to the corresponding positive/negative terminals of input module 16;

Step 4: Turn on the air circuit breaker marked with "A" inside the combiner box, use multimeter to check whether " ③ " OUT -/OUT + cables are connected correctly. Once confirmed to be correct, proceed to connect terminals " ③ " and " ④ ".

Note: If necessary, the terminal ports of the combiner box can be sealed using fire-stop sealant.

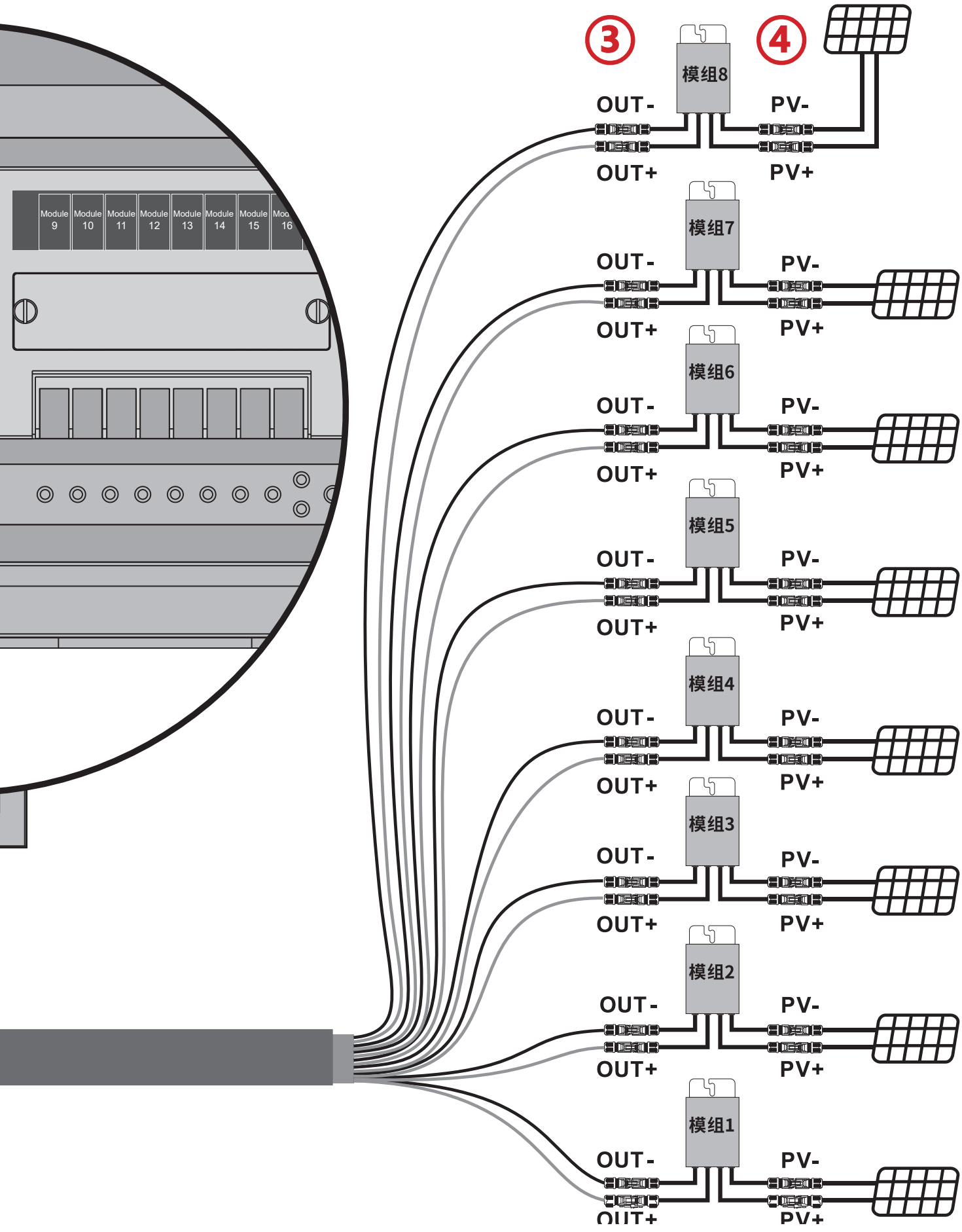


Note: The actual wiring position of the busbar should be based on the design drawings from the project site.

Note: The adapter should be connected to the corresponding terminal according to the address number. Otherwise, a communication misalignment display may occur (see error example for details).

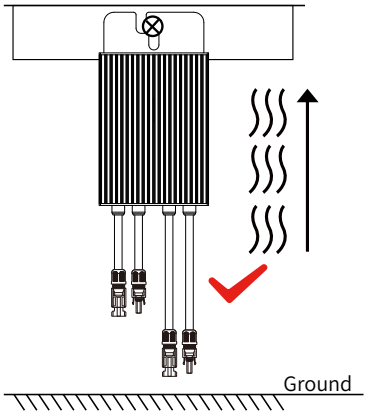
For address "B", the access addresses range from 1~8 string;

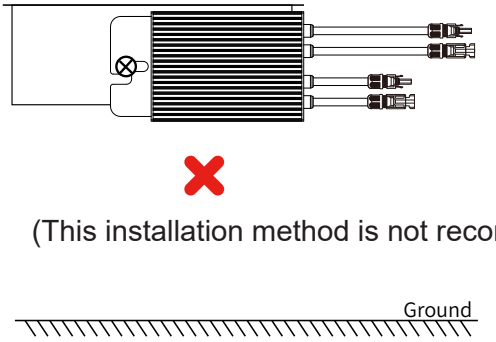
For address "C", the access addresses range from 9~16 string.


③
④
模组8
模组7
模组6
模组5
模组4
模组3
模组2
模组1
OUT-
OUT+
PV-
PV+
Module 9
Module 10
Module 11
Module 12
Module 13
Module 14
Module 15
Module 16

5.2.2 Module Installation

(Install the adapter vertically to the ground is recommended)

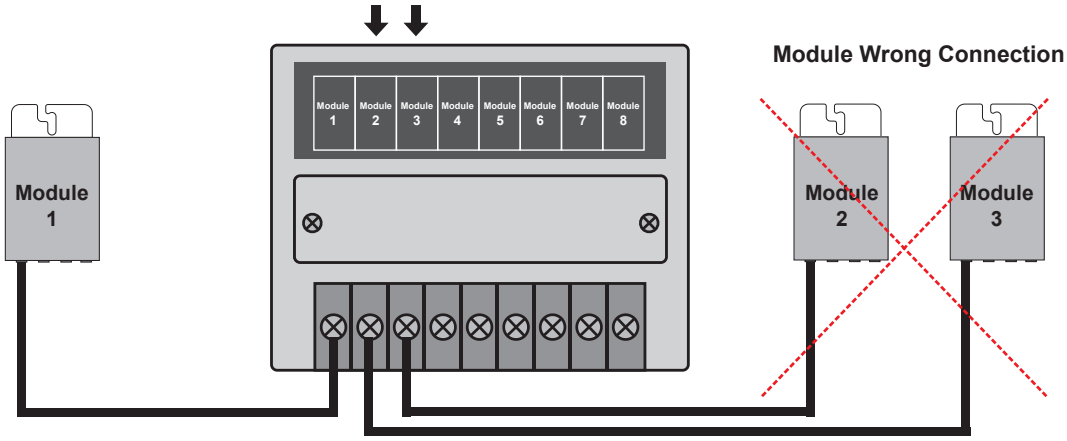




(This installation method is not recommended)

5.2.3 Example of Incorrect Module Wiring

When there is an incorrect connection of modules, data "misalignment" may occur. For example: The DC combiner box system needs to connect 3 modules, namely Module 1, Module 2, and Module 3. If one of the module connections is wrongly connected to another module, data misalignment will occur. (For clarity, the displayed data is randomly filled, and the generation data of the two modules has been removed. This is only for demonstration purposes, and the actual correct data should be based on the actual operation of the project.)



Adapter 1 data	
PV.V :	56.78V
Output.V :	56.78V
Output.I :	11.21A
Input.P :	636.5W
Daily.P.G :	23.456kWh
Total.P.G :	12345.6kWh

L/R/U/D: Adapter data
S: Settings options

Adapter 2 data	
PV.V :	50.00V
Output.V :	54.00V
Output.I :	10A
Input.P :	540W
Daily.P.G :	
Total.P.G :	✓

L/R/U/D: Adapter data
S: Settings options

Adapter 3 data	
PV.V :	48V
Output.V :	54V
Output.I :	5A
Input.P :	270W
Daily.P.G :	
Total.P.G :	✓

L/R/U/D: Adapter data
S: Settings options

Normal Adapter Data

Adapter 1 data	
PV.V :	56.78V
Output.V :	56.78V
Output.I :	11.21A
Input.P :	636.5W
Daily.P.G :	23.456kWh
Total.P.G :	12345.6kWh

L/R/U/D: Adapter data
S: Settings options

Adapter 2 data	
PV.V :	50.00V
Output.V :	54.00V
Output.I :	10A
Input.P :	270W
Daily.P.G :	
Total.P.G :	✗

L/R/U/D: Adapter data
S: Settings options

Swapped Adapter Data

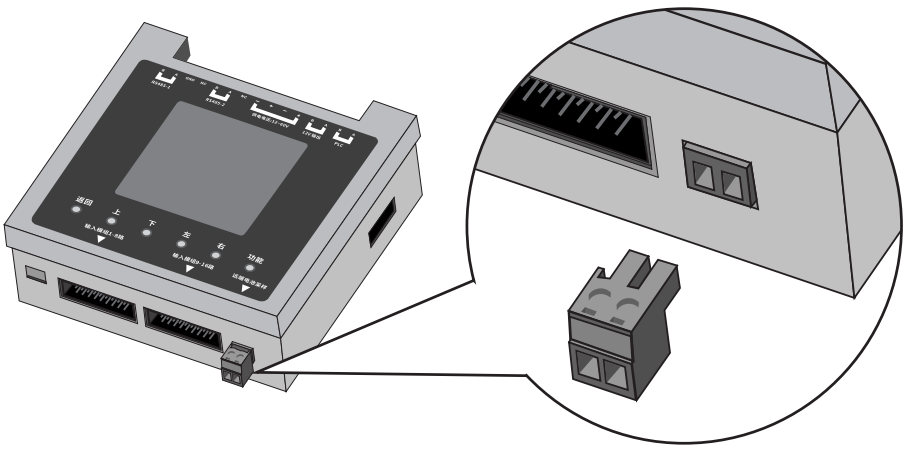
Adapter 3 data	
PV.V :	48V
Output.V :	54V
Output.I :	5A
Input.P :	540W
Daily.P.G :	
Total.P.G :	✗

L/R/U/D: Adapter data
S: Settings options

Swapped Adapter Data

As shown in the above images, when the module with address of 3 is incorrectly connected to terminal 2, the battery data remains unchanged, but the input data will display the data of module 3. Meanwhile, the data of module 2 will be incorrectly displayed in the system of module 3.

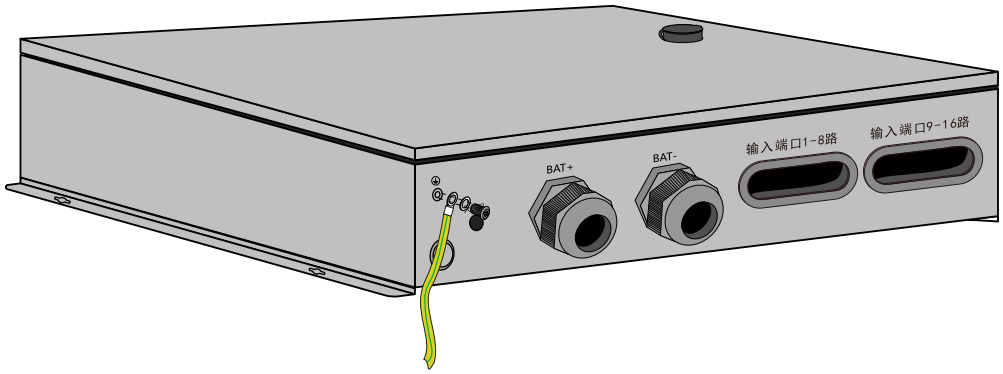
5.3 Description of Dynamic Voltage Sampling Feedback Compensation Function



The control center of this combiner box features a dynamic voltage sampling feedback compensation function, which includes three operating states:
1) Default disabled state: OFF
2) Combiner box side dynamic voltage sampling feedback compensation mode: ON-1.
3) Battery busbar side dynamic voltage sampling feedback compensation mode: ON-2.

Note: The selection and switching of this function can be configured via the display screen shown in note ① on page p23 or through remote communication commands. Modes 1 and 2 can be switched directly according to application needs, while the ON-2 mode corresponding to 3 requires the user to cut cables of appropriate length based on the location and distance of the battery on-site and connect them to the ports shown in the figure above(Note: 1. It is recommended to use at least 22AWG cables of different colors for the two sampling wires; 2. Pay attention to the sequence of positive and negative poles to prevent reverse polarity connection).

5.4 Ground Connection



Warning

The grounding cable must be properly grounded, otherwise:
• In the event of a fault, it could pose a fatal electric shock hazard to the operator!
• It could cause equipment damage in the event of a lightning strike!

Attention

The grounding connection must comply with relevant grounding standards and regulations.
• The connection of the grounding cable to the equipment and grounding electrode must be secure and reliable.
• After the connection is completed, the grounding resistance must be measured, and the resistance value should not exceed 1Ω.

5.5 Start/Stop Combiner Box

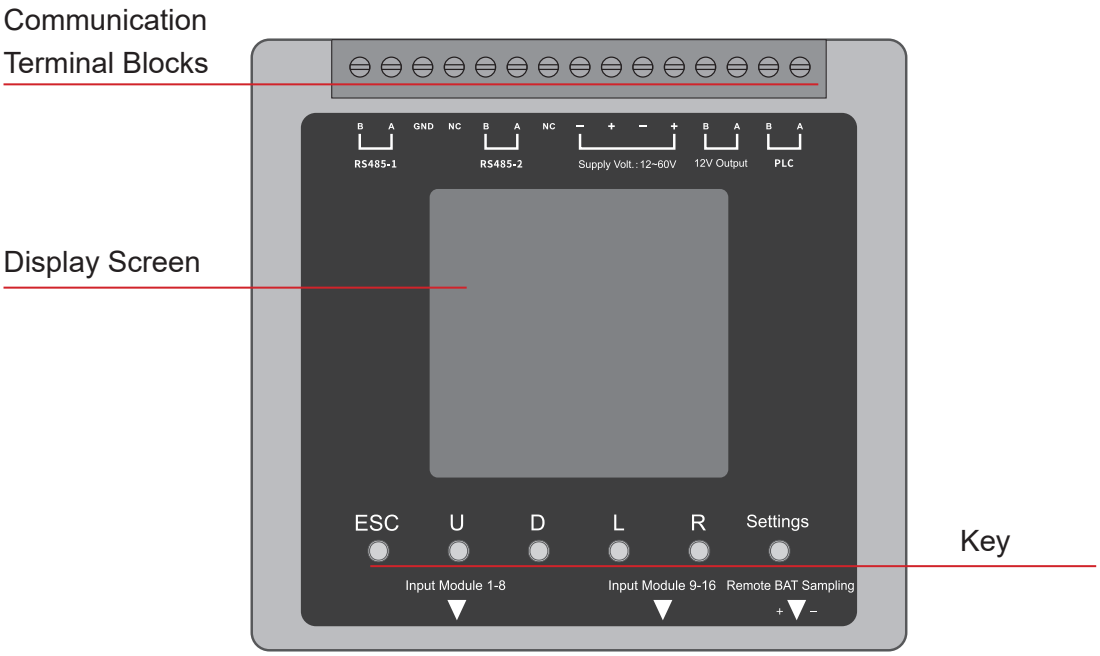
After turning on the circuit breaker, the combiner box powers on. It will automatically start after power is turned on, and automatically stop when power is turned off.

The combiner box can be manually turned off through the internal circuit breaker.

> The monitoring board will only operate when the battery voltage meets the rated working voltage of the power supply in the combiner box.

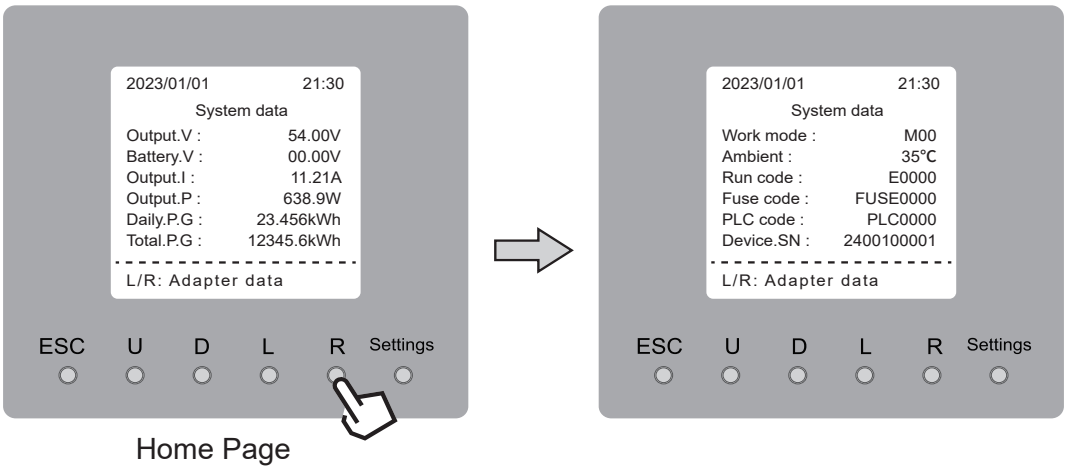
6 Settings

6.1 Overview of the Operating Interface



6.2 Operation Settings

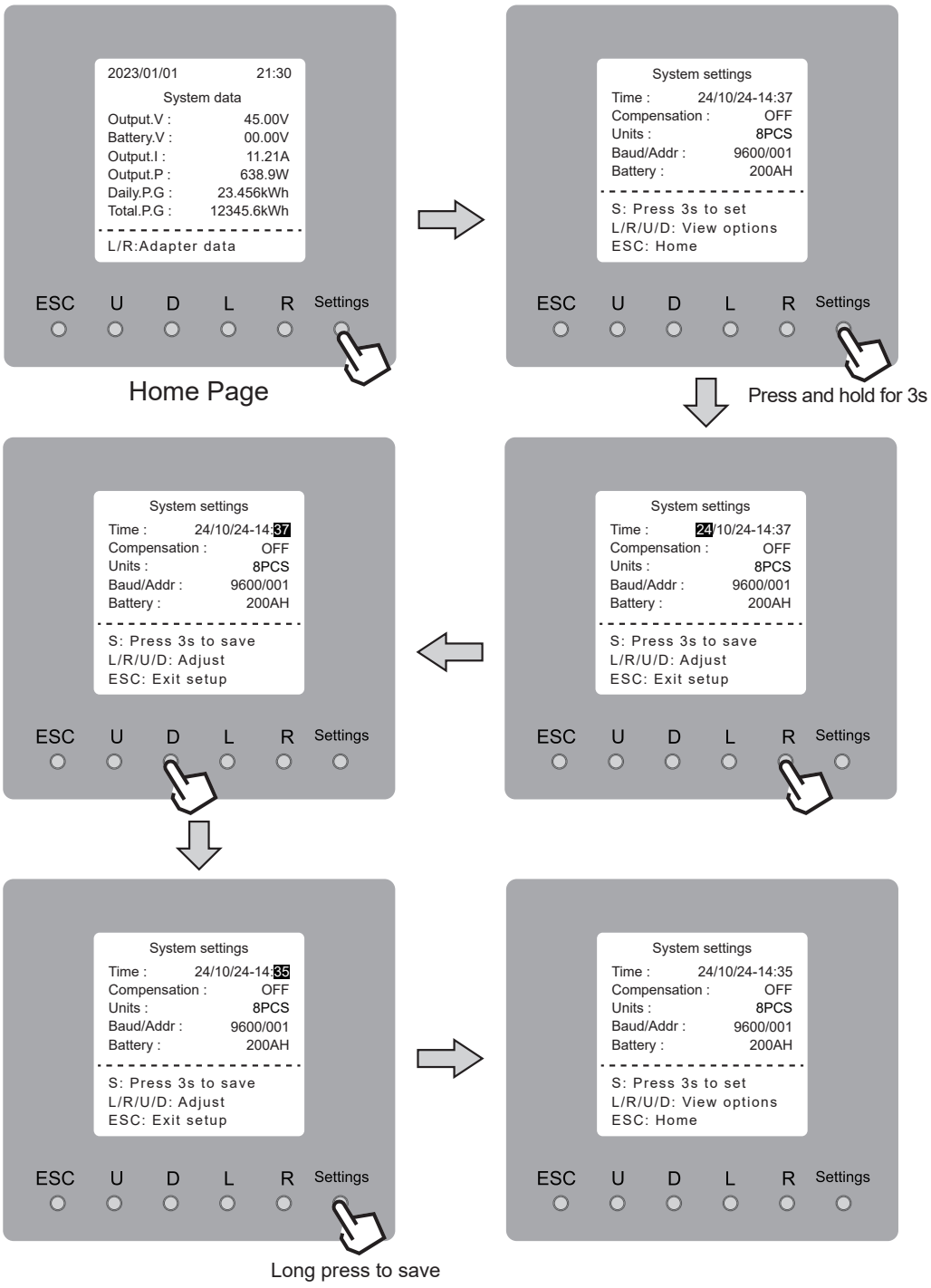
6.2.1 Operation Presentation



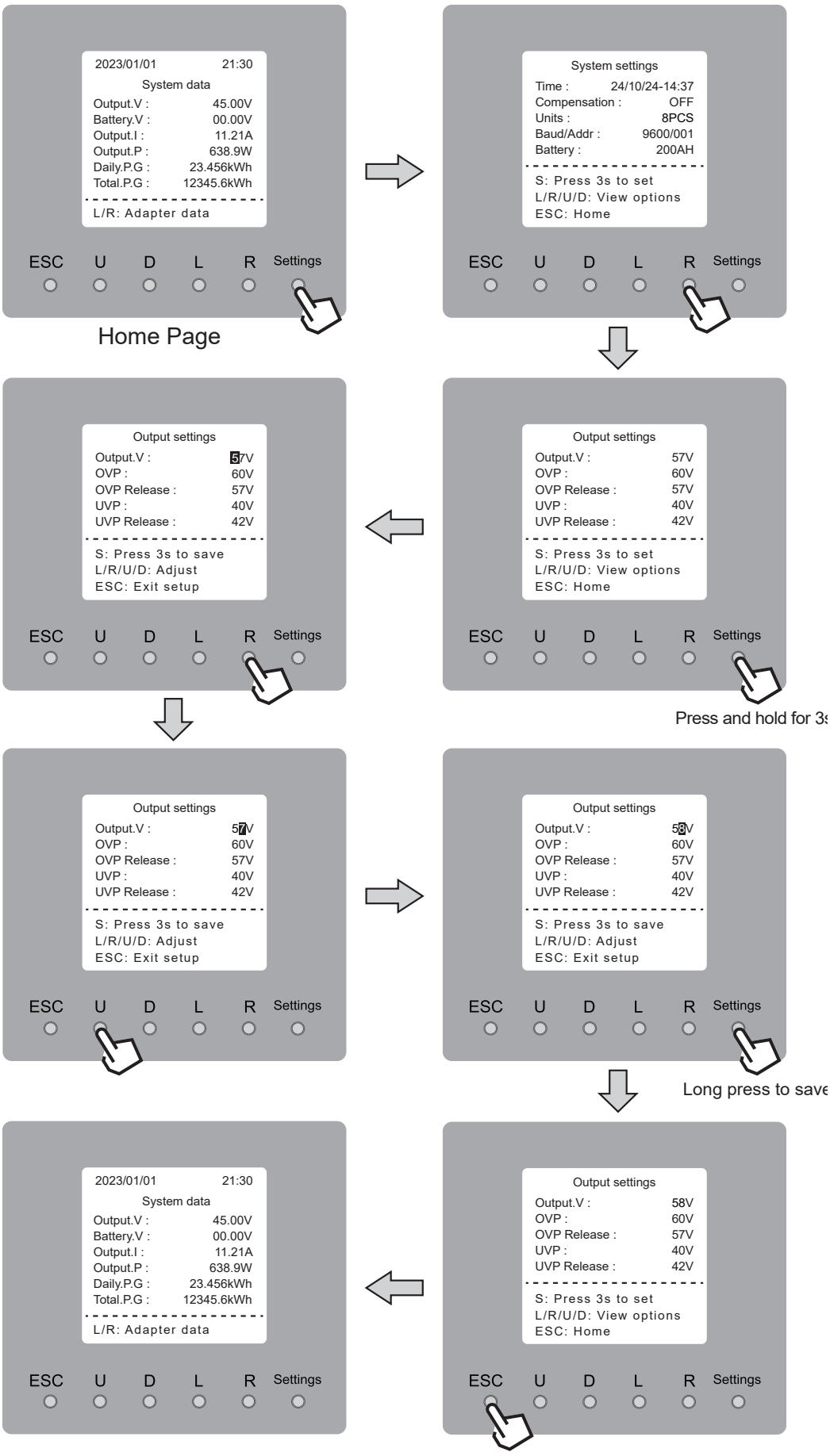
Home Page

Press “L” and “R” keys to enter the “System data” page and check the real-time data.

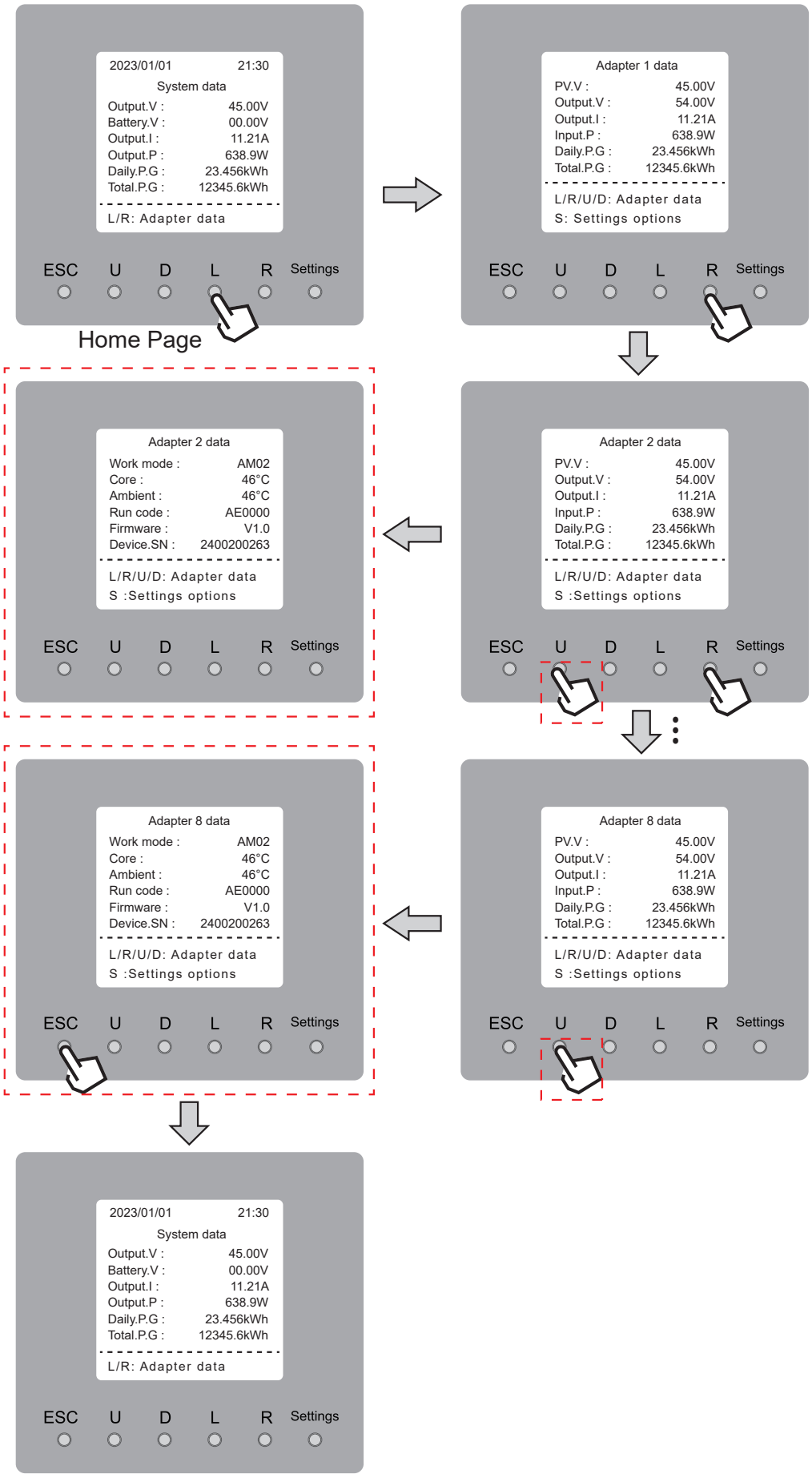
2、 Press " Settings " key to enter System settings page.



On the "System data" page, press the "Settings" key once to view the system settings. Press and hold the "Settings" key to enter the system settings page. Use the L (Left) and R (Right) keys to adjust the position, and the U (Up) and D (Down) keys to adjust the values. After adjusting, press and hold the "Settings" key to save. Press the "ESC" key to go back to Home page.



On the "System data" page, press the "Settings" key once to view the system settings. Then, press the "R" key to view the Output settings. On the Output settings page, press and hold the "Settings" key to enter the output settings page. Use the "L" and "R" keys to adjust the position, and the "U" and "D" keys to adjust the value. After making the adjustments, press and hold the "Settings" to save. Press the "ESC" to go back to Home page.



On "System data " page, press "L", "R" to check Adapter data, press "U", "D" to view adapter status; press “ESC” to go back to Home page.

6.2.2 Mode and Settings Items

Combiner Box Operating Mode

Mode Code	Definition
M00	Standby
M01	Output Power Generating
M02	Waiting for Adapter Connection or Adapter Missing
M03	Remote Shutdown

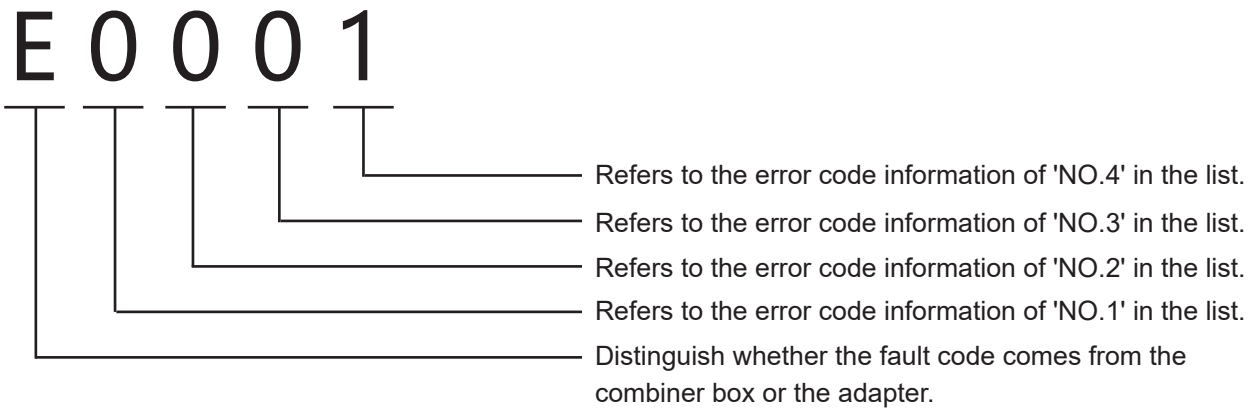
Adapter Operating Mode

Mode Code	Definition
AM00	Standby
AM01	Boost Start
AM02	Boost MPPT
AM03	Boost and Voltage Stabilization
AM11	Buck Start
AM12	Buck MPPT
AM13	Buck and Voltage Stabilization

Settings	Display Items/Parameters	Description
Time	Year/Month/Day-Hour:Minute	The product is set to Beijing time by default, and the time indication will change over time until the power is depleted. Please calibrate the time before use.
Compensation	ON-1、ON-2、OFF (Default)	ON-1 is the voltage compensation for line loss from the combiner box busbar to the adapter. ON-2 is the voltage compensation from the combiner box to the power supply cabinet (requires coordination).
Units	1~16 Units	After setting the number of adapter units to be connected, the system will generate the corresponding interface.
Baud/Addr	Baud: 9600 (Default), 38400, 115200 Address：001~247	--
Battery	200~2000AH (Default 200AH)	--
Output. V	40V~60V (Default 57V)	--
OVP	40V~60V (Default 60V)	--
OVP Release	40V~60V (Default 57V)	--
UVP	40V~60V (Default 40V)	--
UVP Release	40V~60V (Default 42V)	

6.3 Error Code

6.3.1 Error Code Explanation



6.3.2 Error Code Reference Table

CPM Combiner Box Error Code

* TBD: To Be Defined

4-Digit Warning Error Code Details																				
Initial Code	NO.1					NO.2					NO.3					NO.4				
Code	Code	TBD	TBD	TBD	TBD	Code	TBD	TBD	TBD	TBD	Code	TBD	TBD	TBD	Combiner Box Internal HighTemp. Alarm	Code	Abnormal BAT Voltage Compensation Sampling	BAT Busbar Under voltage	BAT Busbar Over voltage	Surge Protector Failure
E	0					0					0					0				
	1					1					1				●	1				●
	2					2					2					2			●	
	3					3					3					3			●	●
	4					4					4					4		●		
	5					5					5					5		●		●
	6					6					6					8	●			
	7					7					7					9	●			
	8					8					8					A	●		●	
	9					9					9					B	●		●	●
	A					A					A					C	●	●		
	B					B					B					D	●	●		●
	C					C					C									
	D					D					D									
	E					E					E									
	F					F					F									

●indicates the presence of the corresponding warning or error.

Error List	Error Descriptions
Surge Protector Failure	Surge protector failure detected through remote dry contact signal from the surge protector.
Battery Busbar Overvoltage	It has been detected that the busbar voltage sampling value inside the combiner box is greater than the overvoltage protection set value.
Battery Busbar Undervoltage	It has been detected that the busbar voltage sampling value inside the combiner box is greater than the overvoltage protection set value.
Abnormal Battery Voltage Compensation Sampling	When the [Compensation] mode is set to [ON-2], it has been detected that the difference between the busbar voltage sampling inside the combiner box and the battery end compensation sampling is greater than 2V.
Combiner Box Internal High Temp. Alarm	The temperature of the internal control board in the combiner box triggers an alarm when it reaches 85°C, and the alarm will be cleared when the temperature drops below 80°C.

Common Error Codes and Solutions		
No.	Error Code	Error Descriptions and and Solutions
1	E0001	Surge protector failure, the surge protector is damaged and ineffective. It is suggested to replace it.
2	E0002	The voltage of the combiner box busbar exceeds the set alarm value. It is recommended to inspect the system to confirm safety.
3	E0003	E0001 and E0002 exist at the same time.
4	E0004	The voltage of the combiner box busbar is lower than the set alarm value. It is recommended to check the status of the power supply and the photovoltaic system.
5	E0005	E0001 and E0004 exist at the same time.
6	E0008	Abnormal battery voltage compensation sampling. It is recommended to check whether the compensation sampling line connection is reliable and the polarity is correct. If necessary, calibrate the busbar voltage sampling value and compensation voltage sampling value for accuracy.
7	E0009	E0001 and E0008 exist at the same time.
8	E000A	E0002 and E0008 exist at the same time.
9	E000B	E00011, E0002 and E0008 exist at the same time.
10	E000C	E0004 and E0008 exist at the same time.
11	E000D	E00011, E0004 and E0008 exist at the same time.
12	E0010	The internal control board temperature in the combiner box has reached 85°C and is currently triggering an alarm. The alarm will be cleared when the temperature drops below 80°C. It is recommended to avoid long term exposure of the combiner box to direct sunlight and to check the working status of the modules inside the combiner box.
13	E001X	X denotes any code from 0 to F. This error code indicates that both E0010 and E000X (as referenced above) exist at the same time.

AX Series Adapter Error Code

4-Digit Warning Error Code Details																					
Initial Code	NO.1					NO.2					NO.3					NO.4					
Code	Code	TBD	TBD	TBD	TBD	Code	TBD	Remote Shutdown Alarm	TBD	Internal Ambient OT Alarm	Code	Core OT Alarm	Output OC Alarm	Output UV Alarm	Output OV Alarm	Code	Output OV Hardware Detection Alarm	TBD	Input OV Alarm	Input UV Alarm	
AE	0					0					0					0					
	1					1				●	1				●	1				●	
	2					2					2			●		2			●		
	3					3					3					3					
	4					4		●			4		●			4					
	5					5		●		●	5		●		●	5					
	6					6					6		●	●		6					
	7					7					7					7					
	8					8					8	●				8	●				
	9					9					9	●			●	9	●			●	
	A					A					A	●		●		A	●		●		
	B					B					B					B					
	C					C					C	●	●			C					
	D					D					D	●	●		●	D					
	E					E					E	●	●	●		E					
	F					F					F					F					
●indicates the presence of corresponding warnings or faults																					

Error List	Error Descriptions
Input Undervoltage(UV) Alarm	The adapter detects that the PV voltage is lower than the set input undervoltage protection value, and the current conditions do not meet the operating requirements.
Input Overvoltage(OV) Alarm	The adapter detects that the PV voltage is higher than the set input overvoltage protection value, and the current conditions do not meet the operating requirements.
Output Overvoltage(OV) Hardware Detection Alarm	The internal hardware overvoltage detection protection circuit of the adapter has been triggered (approximately 61V), and the adapter will stop working and outputting.
Output Overvoltage(OV) Alarm	The internal software overvoltage detection protection mode of the adapter has been triggered, and the adapter will stop working and outputting.
Output Undervoltage(UV) Alarm	The adapter has detected that the output voltage is lower than the set undervoltage protection value, and the adapter will stop working and outputting.
Output Overcurrent(OC) Alarm	The adapter detects that the output current is greater than the rated value.
Core Overtemperature(OT) Alarm	The adapter detects that the temperature of the power dissipation section exceeds 110°C, and the adapter will stop outputting.
Internal Ambient Overtemperature(OT) Alarm	The adapter detects that the internal ambient temperature exceeds 105°C, and the adapter will stop outputting.
Remote Shutdown Alarm	The adapter has received a remote communication command to shut down, and it is currently in a shutdown state. The adapter has stopped outputting.

Common Error Code and Solutions		
No.	**Error Code**	**Error Descriptions and Solutions**
1	AE0001	The adapter detects that the PV voltage is lower than the set input undervoltage protection value, which currently does not meet operational requirements. This is mostly seen during nighttime or periods of poor sunlight, such as on cloudy or rainy days, and can usually be ignored. However, if this fault persists under good sunlight conditions, please check the wiring between the module and the adapter, as well as the whether the protection value set on the adapter is reasonable.
2	AE0002	The adapter detects that the PV voltage is higher than the set input overvoltage protection value, which currently does not meet operational requirements. It is necessary to check whether the photovoltaic module specifications exceed the limit or if there is an adapter fault.
3	AE0008	The adapter's internal hardware overvoltage protection circuit has been triggered, and the adapter will stop outputting. It is necessary to check whether the battery busbar voltage is normal.
4	AE0009	AE0001 and AE0008 exist at the same time.
5	AE000A	AE0002 and AE0008 exist at the same time.
6	AE0010	The adapter's software over-voltage protection mode has been triggered, and the adapter will stop outputting. It is recommended to check if the set over-voltage protection value is reasonable and matches the system's requirements.
7	AE0020	The adapter has detected that the output voltage is below the set undervoltage protection value, and the adapter will stop outputting power. It is recommended to check the connection between the adapter's output terminal and the busbar, as well as the status of the battery.
8	AE0040	The adapter has detected that the output current exceeds the rated value. If this issue persists, it indicates a potential fault with the adapter. It is recommended to promptly perform on-site troubleshooting.
9	AE0050	AE0010 and AE0040 exist at the same time.
10	AE0060	AE0020 and AE0040 exist at the same time.
11	AE0080	The adapter has detected that the temperature of the power dissipation part exceeds 110°C. The adapter will stop working and outputting. It is recommended to promptly check on-site.
12	AE0090	AE0010 and AE0080 exist at the same time.
13	AE00A0	AE0020 and AE0080 exist at the same time.
14	AE00C0	AE0040 and AE0080 exist at the same time.
15	AE00D0	AE0010, AE0040 and AE0080 exist at the same time.
16	AE00E0	AE0020, AE0040 and AE0080 exist at the same time.
17	AE0100	The adapter has detected that the internal ambient temperature exceeds 105°C, and the adapter will stop outputting. It is recommended to check if the ambient temperature around the adapter is higher than 85°C.
18	AE0400	The adapter has received a communication command to shut down remotely and is currently in a shutdown state. The adapter has stopped working and outputting. You may confirm whether the operation and maintenance platform has issued the relevant command.
19	AE0500	AE0100 and AE0400 exist at the same time.
20	AE0XYZ	X, Y, Z denotes any code from 0 to F. This error code indicates that AE0X00, AE00Y0, and AE000Z (as referenced above) exist at the same time.

7 Routine Maintenance

7.1 Overview

Due to the effects of ambient temperature, humidity, dust, and vibration, the components inside the combiner box may experience aging and wear, leading to potential failures. Therefore, it is necessary to perform routine and periodic maintenance on the combiner box to ensure its proper operation and longevity.

Before performing any hardware maintenance on the combiner box, please ensure that it is powered off, and that the parts to be touched are not live.

Warning

Only qualified electrical engineers are allowed to perform the operations described in this section.

Attention

During maintenance, do not leave metal parts such as screws, washers, etc., inside the combiner box, otherwise, it may damage the equipment!

7.2 Maintenance Items

Inspection Checklist	Inspection Method	Maintenance Cycle
Electrical Connection	Check if the connections at the fuse box, waterproof PG connectors, and other terminals are loose or detached. Inspect the cables for any signs of damage.	Every 3 months
Sealing Strip	Regularly check if the sealing strip has any bubbles, cracks, peeling, lack of adhesive, or dents.	Every 1-2 months in the early stage Once a year generally

The table provides recommended routine maintenance cycle for the products. The actual maintenance cycle should be reasonably determined based on the specific installation environment of the product.

Factors such as the scale of the power station, its location, and the on-site environment can all affect the maintenance cycle. If the operating environment has a high level of sand and dust, it is highly recommended to shorten the maintenance cycle and increase the maintenance frequency.

7.3 Fuse Replacement

Warning

Once the fuse blows, it cannot be restored and must be replaced with a new fuse by a qualified operator.

The replacement fuse must be of the same type and rating as the original one!

Steps to Replace the Fuse

Step 1 Turn off the circuit breaker.

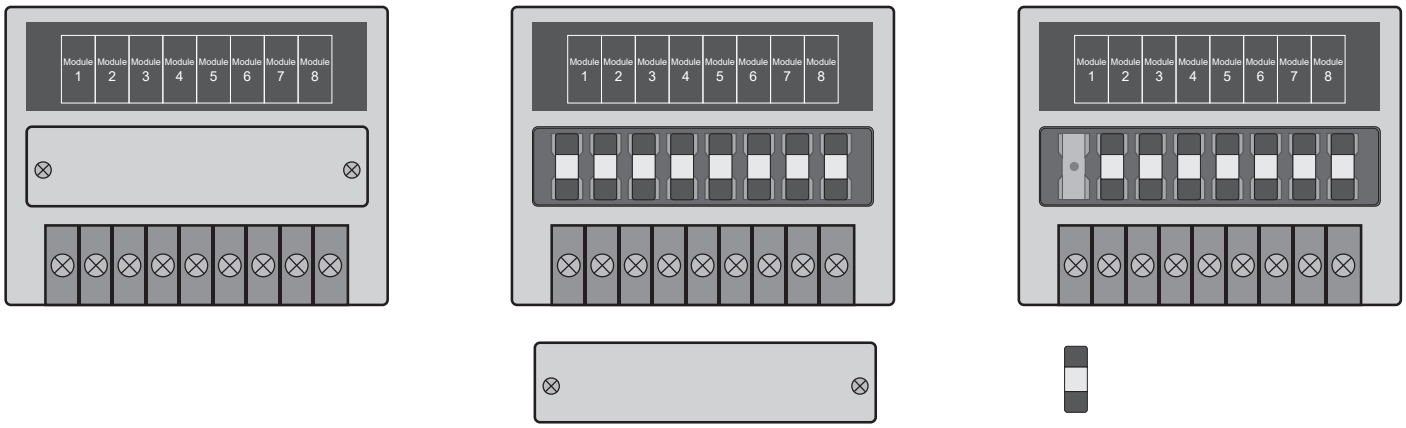
Step 2 Use a clamp ammeter to measure the current on each channel and ensure that the current is 0.

Step 3 Open the fuse box and remove the fuse.

Step 4 Install the fuse of the same specification.

Step 5 Close the fuse box.

Step 6 Turn on the circuit breaker.



Fuse Type	Specifications	Rated Current	Rated Voltage	Breaking Capacity	Melting Thermal Energy (A2.S)
Ceramic Fuse Slow-blow	5-20mm	25A	250V	300A	568

8 Appendix

8.1 Technical Specifications

Combiner Box Model	CPM8	CPM16
Standby Consumption	≤4W	≤6W
Max. Input Current	128A	256A
Max. DC Voltage	60V	
Input Voltage Range	10~60V (Recommended 40~60V)	
Performance Parameters		
Breaking Capacity (Ir) of Each String	25A	
Insulation Resistance	≥2MΩ	
Surge Protection	Nominal 20KA, Max. discharge current 40KA, Voltage Protection Level ≤ 80V	
Display Data	System data / Adapter data	
Scram Switch (Emergency Stop)	Equipped (Disconnect the combiner box output and busbar)	
Display / Communicaton		
Communication	Adapter to Combiner Box: PLC Communication / Combiner Box to External: ModBus_RS485	
Display	160*160 LCD Display	
Monitoring	Support PC monitoring, WIFI module remote monitoring, 4G remote monitoring, ethernet remote monitoring	
Other Specifications		
Installation Type	Wall-Mounted, Bracket-Mounted, Pole-Mounted	
Production Dimensions	380*385*95MM (Mounting Ear and Pole Mounting Bracket not included)	450*385*115MM (Mounting Ear and Pole Mounting Bracket not included)
Product Weight (kg)	6.36	8.12
Operating Ambient Temperature	-40℃ ~+60℃	
Storage Tempreture	-40℃ ~+70℃	
IP Rating	IP66	
Altitude Limit	≤ 4000m (For altitudes between 3000m and 4000m, for every 100m increase in altitude, the operating ambient temperature decreases by 1°C)	

Adapter Model	AX550	AX650
MPPT Efficiency	≥99%	
Peak Conversion Efficiency	≥98%	
Standby Comsumption	≤1.5W	
Heat Dissipation Method	Self-Cooling	
Performance Parameters		
Rated PV Input Power	550W	650W
$V_{start-PV}$	≥10V	
Input Voltage Range	10~60V	
MPPT Working Voltage	25-55V	
Input undervoltage protection / Recovery Voltage Value	Default Value: 20±0.5Vdc/25±0.5V (Adjustable)	
Input overvoltage protection / Recovery Voltage Value	Default Value: 60±0.5Vdc/57±0.5V (Adjustable)	
Rated Input Current	15A	17A
Rated Outout Voltage	57VDC	
Output DC Voltage Range	Output Range: 40V~60VDC (Default Output: 57VDC, Adjustable)	
Battery Type	48V System	
Dynamic Voltage Regulation Function	Equipped (able to work together with the PV smart combiner box to achieve dynamic voltage regulation function.)	
Output DC Current	≤14A	≤16A
Charging Mode	Fast Charging (Constant Current), Equalized Charging, Float Charging	
Conmmunication	DC Power-Line Communication (To Combiner Box)	
Physical Address Setting	4-Position DIP Switch (can be set to 16 groups)	
Monitoring	PC, WIFI Module, 4G, Ethernet, etc	
Protection	Reverse Discharge Protection, Input Over/Under Voltage Protection, Output Over/Under Voltage Protection, Output Overcurrent and Short Circuit Protection, Voltage Regulation Protection, Battery Reverse Connection Protection, Battery Disconnection Protection, Battery Overcharge Protection, Internal Overtemperature Protection, Overtemperature Derating Operation	
Connection	MC4	
Installation	At the bottom of the PV module / on the PV module racks	
Product Dimensions	152*86*39mm	
Product Weight (kg)	0.75	
Operating Ambient Temperature	-40℃ ~+85℃ (-40℃ ~+60℃ Full Load Operation)	
IP Rating	IP68	
Operating Altitude	≤4000m (For altitudes between 3000m and 4000m, for every 100m increase in altitude, the operating ambient temperature decreases by 1°C)	

8.2 Cable Specifications

Model	AX550/AX650
Input Cable	Specification: MC4 Connector Cable: 4 Sq Mm Copper Core Cable Wire for Photovoltaic ApplicationsLength: 500mm（±20mm）
Output Cable	Specification: MC4 Connector Cable: 4 Sq Mm Copper Core Cable Wire for Photovoltaic ApplicationsLength: 200mm（±20mm）

8.3 Quality Assurance

The warranty period for this product is subject to the contract. During the warranty period, if the covered components fail or there are quality issues with the equipment itself, our company will provide free return-to-factory repair, but on-site repair services are not provided.

Warranty Evidence

During the warranty period, the company has the right to request the customer to provide the purchase contract and the label on the equipment. At the same time, the trademark on the equipment should be clearly visible; otherwise, the company has the right to deny the quality guarantee.

Terms

• Damaged components after replacement will be handled by our company.
• The customer should allow our company reasonable time to repair the faulty equipment.

Exemption of Liability

In the following cases, our company has the right to refuse to provide a quality guarantee:
• The entire machine or warranty-covered components have exceeded the free warranty period;
• Damage caused by transportation, human error, other equipment, or damage caused by failure to promptly solve the problems after the equipment has issued an alarm;
• Incorrect installation, modification, or use;
• Operation in extremely harsh environments beyond those specified in the manual;
• Installation, repair, modification, or disassembly performed by non-contracted service providers causing machine faults or damage;
• Machine faults or damage caused by the use of non-standard parts or software;
• Any installation and usage beyond the scope specified in relevant international standards;
• Damage caused by natural disasters such as earthquakes, floods, volcanic eruptions, mudslides, lightning, fire, war, or other force majeure events.
If equipment failure is caused by the above situations and the customer requests repair services, after assessment by our after-sales service, we may assist or provide paid repair services.

To provide you with faster and better service, we kindly ask for your cooperation in providing the following information during communication:
• Equipment model;
• Equipment serial number (photo of the device label);
• Error code / name;
• A brief description of the fault;
• Photos / videos of the damaged equipment.